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DEQ-IDAHO FALLS

BLACKHAWK HOMEOWNERS ASSOCIATION
DRINKING WATER
FACILITY PLANNING STUDY

DWG 130-2012-11

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December 2012

EXHIBITS

1. **Well Site 1 Improvements**
2. **Blackhawk Water System Map**

APPENDICES

1. **Relevant Engineering Data**
2. **Fee Structure and O&M Budget**
3. **Figures and Graphic Data**
4. **Mailing List and Correspondence**
5. **Hydraulic Analysis (current and proposed)**
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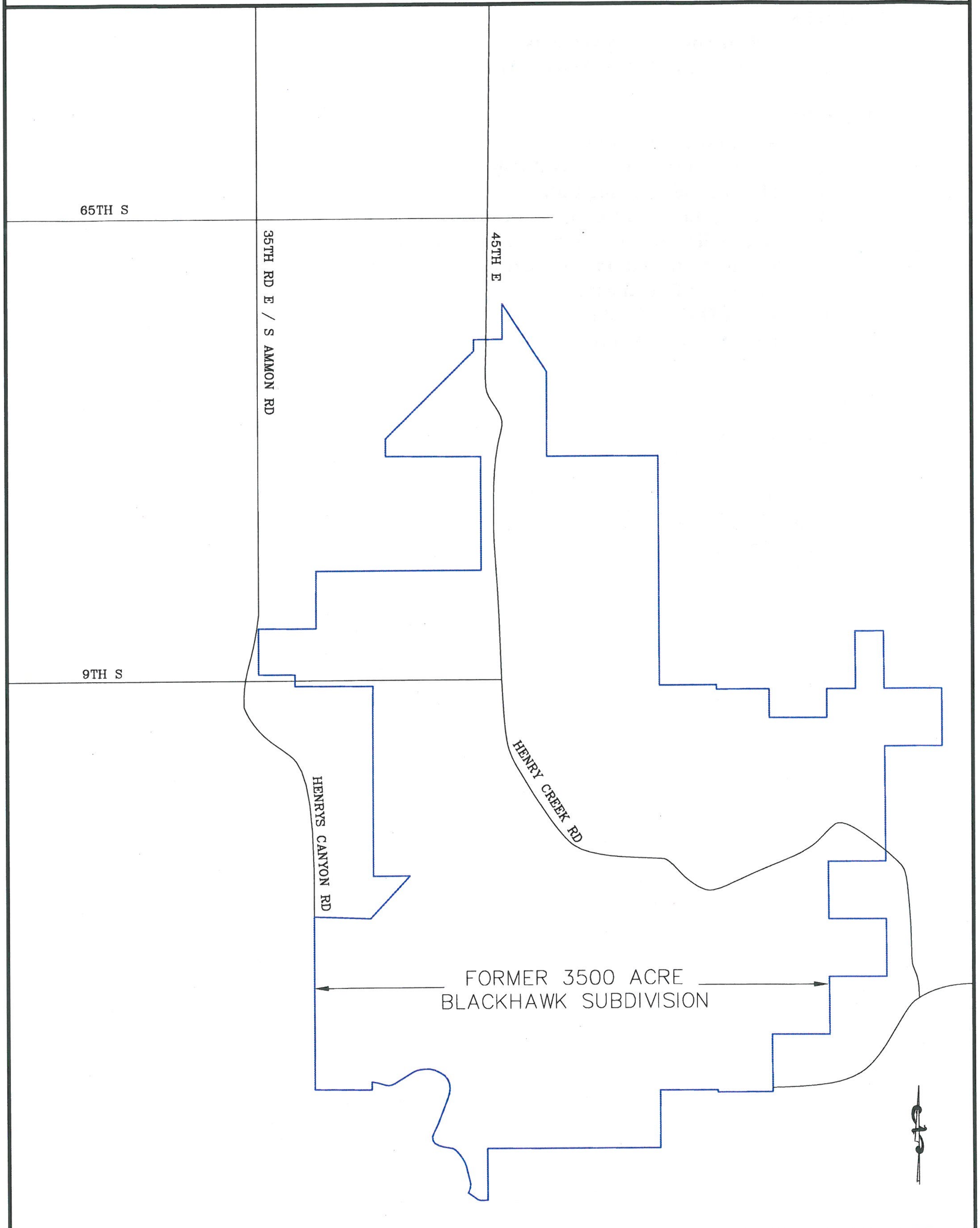
8. **Water Quality Tests**
9. **DEQ Sanitary Survey**

PROFESSIONAL ENGINEER
REGISTERED
11519
STATE OF IDAHO
GERALD R. WILLIAMS

Gerald R Williams

December 11, 2012

FIGURE 1
VICINITY MAP



I EXECUTIVE SUMMARY

The Blackhawk Subdivision water system consists of a partially completed Phase 2 changeover. The full project was never completed due to failure on the part of the developer to pay contractors to finish the system and subsequent difficulties associated with the developer's unanticipated death and the economic downturn. The end result is a system without any water supply redundancy at all, no means of providing regulatory fire flow, and non-conformance to DEQ regulations. The purpose in preparing this report was to evaluate alternatives to complete the system and bring it into compliance with regulations for the now-reduced current Planning Area that consists of recorded platted lots of the overall Blackhawk Subdivision, which includes Iron Rim. Another objective was to assess total project costs, both capital and long term annualized costs, in order to identify what the monthly fee structure should be.

Seven alternatives were investigated including: the null or do nothing alternative; only adding a large tank on the hill; going back to individual wells; and a regional option. Also investigated were three options that involved more wells and/or tanks. The best and WEI recommended alternative is to upgrade Well 1 and connect it to the system in addition to the currently functioning Well 2, install the backup generator, finish the Phase 2 changeover in the Well House, and construct a water storage tank on the hill having at least 174,000 gallons capacity. In time, it may be advisable to turn the system over to a regional water system, such as the city of Ammon, but it does not seem that alternative is the most feasible or practical at the moment.

There are other proposed improvements beyond alternative solutions to DEQ requirements. There needs to be fire hydrants added to Blackhawk Division 2, a corrosion analysis performed and mitigation provided, an energy audit and operations optimized to reduce power costs and a nearly $2800 per irrigation season month demand charge that is over and above the cost of power actually used, and to protect from freezing an air valve at the top of the system if not already done.

This study used a 45 year period in performing a life-cycle cost analysis. This was the basis for determining the best alternative and also to provide information regarding service fees, which are shown in Table 11. Given that the system is currently non-conforming and the HOA water system is minimally funded, it probably comes as no surprise that there will need to be an increase in monthly service fees. As more users connect to the system, however, relatively fixed costs are spread over more people, eventually allowing for lower fees than are currently paid.

Inasmuch as current and soon to be connected users will be paying a higher rate that helps build and pay for infrastructure, either: the connection fee should be increased; or the first year or two the monthly fees for new connections should be higher than for those already on the system. That way, newly connected users will eventually enjoy the same reduced rate as all others but will start out paying a little more as did others already on the system.

II GENERAL NARRATIVE PER DEQ FORM 5A

A. INTRODUCTION

1. **Background** The original plan for the Blackhawk Subdivision consisted of what is currently Blackhawk Subdivision Divisions 2 and 3. (Blackhawk Division 1 is actually another development remote from and unassociated with Divisions 2 and 3.) These two divisions are at the base of the foothills and were served by Well 1 and a small well house that still exists at Well Site 1 to the north of the divisions. System capacity was low because the number of lots on the system was limited and fire flow was not provided. It was also a fairly low pressure system because there was limited elevation gain. WEI is unaware of what engineering went into the original system design or to what extent construction followed design, but WEI has learned that after the original construction, there was a booster station added to increase pressure. Eventually Foothill Properties expanded the land holdings to 3500 acres, with all additional acreage uphill to the south, southwest, and southeast. The overall Blackhawk Subdivision would have within it sub-subdivisions named Blackhawk, Iron Rim, The Reserves, and other unnamed units, each with their own divisions (reference is made to *Figure 2* on the next page). Because of the expense of transport, it was planned to have at least one well location up the hill, but drilled test wells showed no promise.

   It was about this time that WEI joined the project team. WEI's role was to identify water demand for the entire system, conceptually design and model a schematic water distribution system, and to model water source, pumping, and storage components to effectively supply the system. Source water evaluations were performed with Clearwater Geosciences looking at two well sites: expanding capacity at the original Well Site 1; and adding more wells at a future Well Site 2 to the west that was also at the edge of the valley floor and Upper Snake River Aquifer where a reliable source of substantial water was available.

   Build-out flows were very high, largely because of the developer's insistence on providing full irrigation from well water to all irrigable property within the 3500 acre subdivision. Even so, the approach was to start with a backbone 16 inch high pressure pipeline all the way up 45^{th} East or Henry Creek Road, and if the developer eventually obtained the water rights to supply it and demand eventually required it, a second parallel high pressure line would be installed—another 16 inch line if water was to be supplied as the developer originally intended.

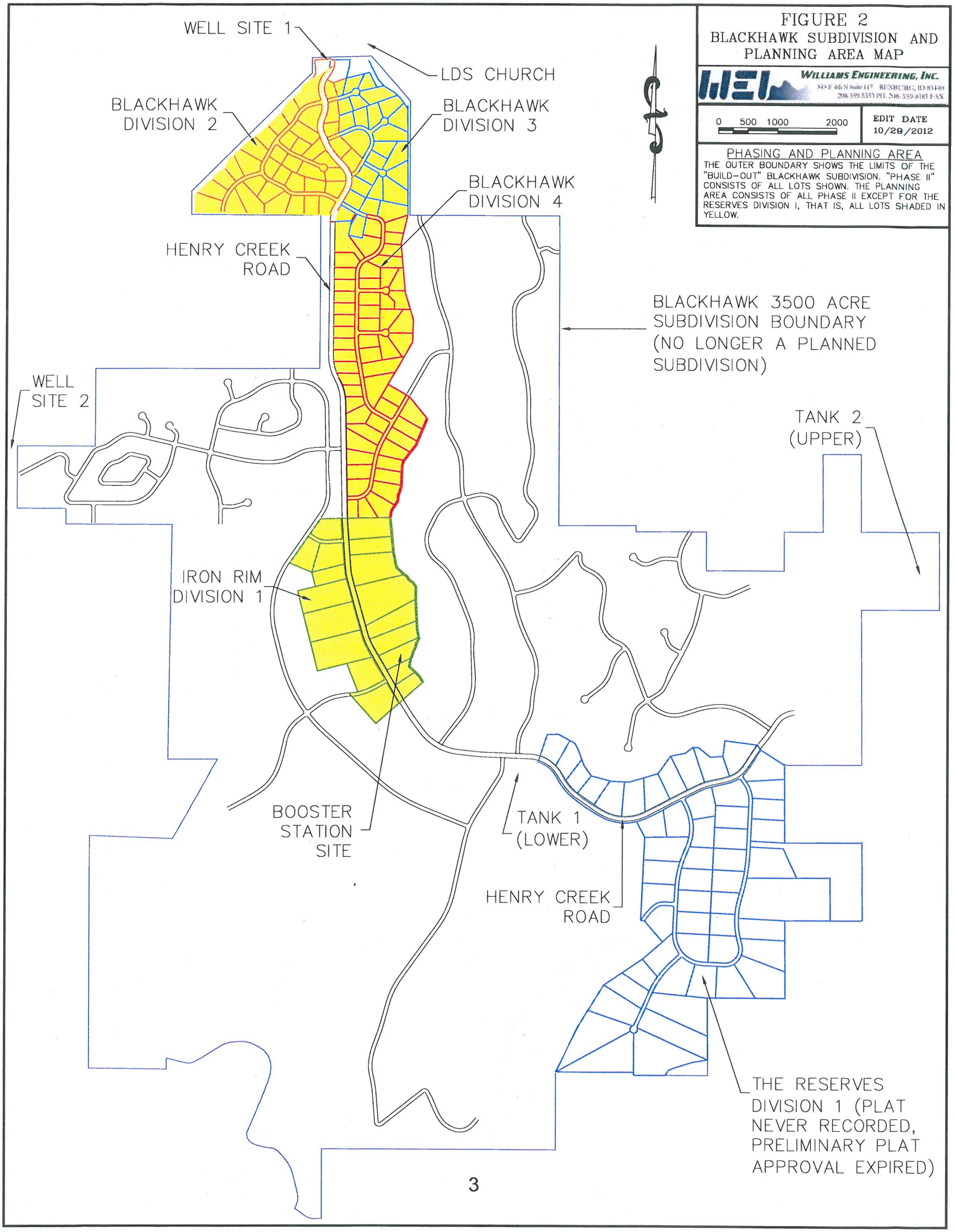


FIGURE 2
BLACKHAWK SUBDIVISION AND PLANNING AREA MAP
WILLIAMS ENGINEERING, INC.
0 500 1000 2000
EDIT DATE 10/29/2012
PHASING AND PLANNING AREA
THE OUTER BOUNDARY SHOWS THE LIMITS OF THE "BUILD-OUT" BLACKHAWK SUBDIVISION. "PHASE II" CONSISTS OF ALL LOTS SHOWN. THE PLANNING AREA CONSISTS OF ALL PHASE II EXCEPT FOR THE RESERVES DIVISION I, THAT IS, ALL LOTS SHADED IN YELLOW.
WELL SITE 1
LDS CHURCH
BLACKHAWK DIVISION 2
BLACKHAWK DIVISION 3
BLACKHAWK DIVISION 4
HENRY CREEK ROAD
BLACKHAWK 3500 ACRE SUBDIVISION BOUNDARY (NO LONGER A PLANNED SUBDIVISION)
WELL SITE 2
TANK 2 (UPPER)
IRON RIM DIVISION 1
BOOSTER STATION SITE
TANK 1 (LOWER)
HENRY CREEK ROAD
THE RESERVES DIVISION 1 (PLAT NEVER RECORDED, PRELIMINARY PLAT APPROVAL EXPIRED)

System modeling was for build-out of the entire 3500 acre subdivision and also a more immediate Phase II that would consist of Blackhawk Divisions 2, 3, and 4, Iron Rim Division 1, The Reserves Division 1, and the LDS Church near Well Site 1. In each case, the proposed system would meet DEQ and fire code requirements.

Growth, developer capacity, decisions, an early death, and the recession all played a factor in the project. Portions were built and some not, some per plan and some not. In the end the property owners were left with a system having deficiencies.

2. **System Deficiencies** Well 2 is currently the only functioning water source in the system. Well 1 is disconnected because the original pump and motor were designed only for the low lying areas of the church and Blackhawk Divisions 2 and 3, and it would not be able to pump into the current high pressure main supply line. As part of Phase II work, Well 1 was to receive a higher flow and pressure capacity pump and motor and be connected to the system, but that has not happened. Consequently, the system is in violation of DEQ capacity and DEQ redundancy requirements. The system can meet domestic only flow rates and maintain required pressures, but at a maximum capacity of 1000 gallons per minute (gpm), it cannot meet the code required 1500 gpm fire flow and maximum daily domestic flow at the same time. Furthermore, DEQ has a redundancy requirement that flows and pressure requirements must be met *with the largest capacity pumping unit in the system non-functional*. With no storage or redundant pump, having the one pump out of operation means zero flow—not even from a storage tank. Besides being non-conforming, that is a precarious situation, because it is not a matter of *if* but *when* the system will go down.

   The above are system-wide regulatory deficiencies. More isolated deficiencies are further discussed in B.6, B.8, and B.9.

3. **Authorization, Purpose and Scope** By letter dated May 4, 2012 from DEQ to the Blackhawk Homeowners Association (HOA), the HOA is authorized to perform a study of their water system in cooperation with DEQ who has agreed to participate with grant DWG-130-2012-11. Furthermore, by Agreement between the HOA and WEI dated March 16, 2012, WEI is authorized to perform this study. The purpose of the study is two-fold. First, to further explore system deficiencies and update the evaluation of alternatives to bring the system into conformance with DEQ and fire codes. Secondly, to formalize and document efforts and findings according to DEQ criteria so that proposed improvements necessary to obtain conformance can be eligible for funding assistance from DEQ and other funding agencies. The scope, therefore, is to address DEQ study requirements with respect to the HOA water system. WEI will perform the Engineering Report per DEQ Form 5-A, and the Environmental Information Document per DEQ Form 5-B will be prepared by North Wind Group.

4. **Previous Studies** WEI has never seen the information prepared for the original system design for Blackhawk Divisions 2 and 3, which probably does not matter as WEI did familiarize themself with the system as constructed that would be pertinent to the Phase II and Build-out design. Completed and submitted to and approved by DEQ were the combined Phase II and Build-out system modeling, conceptual distribution system design, and full construction drawing design for Well 2, Well 1 upgrade, Well House 1 expansion, addition of a generator and other appurtenances, and the Booster station that was to be constructed halfway up the hill. The report is officially titled *Water & Irrigation Masterplan and Basis of Design Report for the Blackhawk Subdivision* (*Basis of Design)* dated March 2007, was received by DEQ March 23, 2007, assigned DEQ project number 07-15-10, and approved by letter dated May 24, 2007. Inasmuch as the Booster Station plans were submitted later, approval of those plans came by letter dated September 27, 2007. The report fills a 2 inch 3 ring binder and is not included in the appendix, but information is provided on a DVD inside the back cover of hard copies furnished by WEI.

   Stuck with a problematic and partial water system, the HOA contacted WEI in 2009 to look at what may be the best way to go forward, not necessarily to obtain the full fledged Phase II system that now will likely never happen, but to at least end up with a code conforming system for lots already built on if not platted. WEI prepared a draft memorandum dated June 9, 2009, a copy of which is furnished in Appendix 7. Essentially, the memorandum indicates that it made sense, given equipment already installed or ordered and paid for, to proceed, as it would be the lowest cost means of meeting regulations for the built upon lots, and doing so would also meet the needs of platted lots.

5. **Facility Planning Study (FPS) Report Format** The entire FPS will consist of three documents: this FPS Engineering Report; the FPS Environmental Information Document (EID) to be prepared by North Wind Group; and the already DEQ-approved 2007 *Water & Irrigation Masterplan and Basis of Design Report for the Blackhawk Subdivision.* The latter report should be on file with DEQ, and will also be provided on a DVD inside the back cover of WEI-furnished hard copies of this report. Because the *Basis of Design* report contains hydraulic analyses and design information for Phase II, which is the current platted lots plus The Reserves, it remains the technical basis for the water system.

6. **Owner Responsibility** Owner responsibility was established and accepted based on the agreement with DEQ for a grant for this study. The balance of this subsection is based on information provided by the HOA.

   Current managerial capacity is strong. Colvin E Jergins (mecctr23@msn.com) is the Vice President of the HOA and administrator of the grant and contracts with WEI and North Wind Group. Alicia de la Cruz (alicia_d2@hotmail.com) is the president of the HOA. Angela Miller (mangmil@yahoo.com) is the bookkeeper. The contract manager, Mr. Jergins, is a Professional Engineer as well as a Project

Management Professional. Other members of the HOA board of directors are all professional persons. Included are a physician, realtor, attorney, accountant, and an industrial manager.

The HOA has the financial resources to cover their half of study costs, the balance being covered by a grant in the amount of $17,310.00.

B. EXISTING CONDITIONS

1. **Planning Area** The Planning Area is the area of platted lots that must be served by the water system. It consists of the Phase II study area minus The Reserves. The planning area is shown shaded yellow in *Figure 2* on page 2.

2. **Existing Environmental Conditions** Reference is made to the EID.

3. **Existing Facilities Description** Prior to design and construction, Foothill Properties changed their prime consultant from Mountain River Engineering to Rocky Mountain Engineering and Surveying (RMES), and it was RMES that designed the 16" supply line and associated facilities. WEI was retained to design Phase II improvements at Well Site 1 that would expand the well house, add a generator, Well 2, and upgrade Well 1, and also to design a booster station half way up the hill. RMES was to design Tank 1 that would serve Phase II. WEI's plans were all approved by DEQ when the developer made another shift and had Bradley Engineering (electrical) involved who made significant changes to Well Site 1 plans.

   System construction was restrained partially by growth and need, developer limitations and decisions, and eventually the owner's untimely death. It appears that HK Constructors completed construction of the main distribution lines and pressure reducing valves (PRVs) per RMES' plans, although it is the understanding of WEI that RMES had no involvement during the construction phase. The booster station was never constructed or needed because it would serve The Reserves that never developed. Tank 1 was needed as an additional flow source and volume, but it never was constructed and perhaps never designed. The more confusing facility is Well Site 1. Only part of it was constructed and parts that were started were never properly finished. Some was constructed per WEI plans, some per Bradley's plans, and unfortunately, there is a substantial amount of incomplete work because contractors were not paid and they left the job. There exists some jumper wires here and there and other non-code conforming quick fixes that power the system installed by who knows who. The generator, Well 1 upgrade pump, motor, downshaft and down wiring, and building interior lights were all purchased and paid for, but they have been retained by the Electrical Equipment Company as leverage to be paid for work completed. Such is the general current state of affairs.

a) **Water Supply and Pumping** Only two wells are in the system, both at Well Site 1 shown in *Figure 2* on page 2. Well 1 is currently disconnected. The test pump used when testing the well had a maximum capacity of 750 gpm, but its actual highest capacity is unknown. Clearwater Geosciences estimated it would likely produce 1000 gpm, which was used in evaluations (See *Basis of Design Report* pages 1-1 and 2-15). Well 2 exists and is presently the single source of water to the system. It was tested at 1250 gpm, and the as-built pumping system has 1000 gpm capacity.

Exhibits 1A through 1C are a reproduction of WEI's Well Site 1 Improvements design drawing Sheets 1-3, with noted known as-built differences. Well 2 was drilled and pump installed and connected as shown. Well 1 was disconnected, with the higher capacity pump and appurtenances not installed, nor the pipeline or power line from the well house to the well. Reportedly there is a pipeline stubbed out approximately 3 feet from the building ready for extension to Well 1. WEI witnessed the trench for it but the pipe was partially covered over for freeze protection. The building extension is only 10 feet and houses the additional piping system for the multiple well connections and surge anticipator valve. There are no other pumping facilities. Well logs and information are provided on the DVD in the back cover of WEI-furnished hard copies of this report. There are no as-builts on the well house construction as nothing was ever completed and approved.

b) **Storage and Distribution** There is no storage tank in the system, but there is approximately 3200 gallons storage in the 16" line above the highest service, although most of that would not benefit upper lots with pressurized flow. The distribution system is shown on *Exhibits 2A and 2B.* DEQ has original design drawings and either as-built drawings or a statement of construction per approved plans for Blackhawk Divisions 2 and 3, and plans but no as-builts for Division 4 and the 16" high pressure main in Henry Creek Road.

The location of the church and entrance way landscaping feature services were only approximately known by the developers by the time WEI and later RMES became involved with the project, and rather than find the services and connect them to the high pressure 16" line with service PRVs, a note on the RMES plans for the Henry Creek Road 16" waterline plans called for a line out of PRV1-0 that would serve Division 2 to also connect to the old low pressure 10" line that previously served Blackhawk Divisions 2 and 3. This interconnect would supply and pressurize the 10" line to the two services.

As for whether the 10" line downhill of the services to the church and entry landscaping feature is capped below the services, no-one seems to know. The developer is deceased, the developer's field man Tarreck is no longer in the state and not found, Bill Manwill is still around, but he came on board with the developer after the 16" line was up the hill past the start of Division 4, and he was not involved with the Well House work. The contractor for the 16" line was HK Constructors, and the project superintendent was Barry Hanson who is still around, but he only vaguely remembered the interconnect to the 10" line and not how the tie-in was made or whether it was capped below the services. HK has since purged project drawings. Barry is willing to sit down with someone and a set of plans, such as at DEQ, and see if memories are jogged, but at this point, it simply is not known. However, if Well 1 is upgraded and connected to the high pressure system manifold in the Well House, the old manifold would have to be removed, and if not capped before hand, the 10" would have to be capped at that time.

c) **Treatment Facilities** There are no treatment facilities, but there is space provided in case such facilities are needed.

d) **Facility Condition** The drinking water system is fairly new. The Blackhawk Division 2 water system and Well 1 was completed in year 2000, Division 3 in 2006, and all other phases in subsequent years. Except for the new 16" high pressure ductile iron line in Henry Creek Road, all lines are PVC.

e) **Water Usage** The HOA indicated that winter time use is unknown as meters are not read during that time. However, system wide the information could be known because there is a flow meter on the discharge line in the well house. As for summer, the HOA provided WEI with an average rate of 200,600 gallons per day (GPD) for the month of May 2012.

Although there are three new water meter connections being added at this time (October 2012), there have only been 54 service connections, four of which are inactive to vacant lots, and two of which are to two lots having the same owner with one house. The HOA assumes that one is used for the house and the other for irrigation. This means that there are only 49 active services to residences at the time of this study, plus to the LDS Church house. However, the church eventually drilled a well and uses it for all irrigation, so their service connection water is only used in the building.

The approved church septic system design flow, which would be representative of water demand, was for 1200 GPD and 2400 gallons per week. Residences are to be designed for 800 GPD per IDAPA 58.01.08.552.01.a. This means that the church is equivalent to 1.5 residences. Thus, the current system serves an equivalent of 50.5 residences.

Per the *Basis of Design* report, Tab 2, page 2-10, and also Tab 3, there must be allowance for a peak season use of 8.75 gpm per acre over 16 hours per day for irrigation, or approximately 4.4 gpm per half acre lot.

For May 2012, water consumption averaged daily 200,600 GPD, which divided by 50.5 equivalent residences equals 3972 GPD per residence. How consistent is this with the original study? The study used the DEQ required 800 GPD per residence, plus peak season irrigation (July and August rather than May), which equates to 5024 GPD per residence. It appears that usage may be within the design usage.

f) **Cross Connection Control** The HOA does not have a written Cross Connection Control Program.

g) **Sanitary Survey** A copy of the 2009 is provided on the DVD inside the back cover of WWI-furnished hard copies of the report.

4. **Drinking Water Quality** Per the HOA, the most recent year's water laboratory tests are 2039 (DI(2-ETHYLHEXYL)b Pthalate and zn03 nitrate. Both samples were within specification. All monthly bacteria samples were taken and all were "A". The latest report can be found on the DEQ website at: http://dww.deq.idaho.gov/IDPDWW/JSP/WaterSystemDetail.jsp?tinwsys_is_number=3740&tinwsys_st_code=ID&wsnumber=ID7100207.

5. **Existing System Hydraulic Modeling** The *Basis of Design* report provided hydraulic modeling not only for the build-out condition, but also the Phase II condition that is very similar to the Planning Area condition of platted lots. The Phase II condition included The Reserves and the Planning Area does not, but that is the only difference. That does not affect the modeling as far as what is built or needed except that the Booster Station that was to serve the upper zones, including the reserves, is no longer needed. All the Planning Area lots are served by a system that is unaffected by the elimination of the Booster Station, and thus the Phase II modeling is good for the Planned Area so long as there is adequate pumping source, storage volume, or a combination thereof.

6. **Current Violations and Problems** Paragraph A2 above discussed the system-wide shortcomings of not meeting fire flow with or without the pumping and source redundancy. Water quality has been in conformance. Colvin Jergins is the licensed drinking water operator, but the HOA does not have a backup operator. There has also been an issue with corrosion, which is odd given how new the system is. A number of nipples and trim lines on the PRVs have corroded to the point of failure or near failure. Components of some PRV units have been replaced with stainless steel. Also, there are no fire hydrants installed in Blackhawk Division 2. Additional issues are discussed in subsections B.8 and B.9 that follow.

7. **User Charges and O&M Budget** The fee structure is as follows:

- $2500 connection fee;
- April to October: $50.00 per month for the first 10,000 gallons of water delivered, and $.50 per month for each 1,000 gallons over 10,000; and
- November to March: flat fee of $75 per month (meters are not read).

The operating costs are approximately $5000.00 per month for power. There is no written budget for the system.

8. **Pressure Problems** There have been pressure issues in the past for some lots in Iron Rim. A number of causes were considered and investigated. In the end, it was determined that a faulty PRV, along with PRV settings, especially on loops where PRVs feed both ends of the loops, were not set correctly, causing a malfunction of the PRVs. Since the repair of the PRV and pressure setting changes, there have not been significant problems reported.

9. **Defects and Deficiencies** The 2009 Sanitary Survey (see Appendix 9) mentions 10 items of deficiencies. Listed as "significant" deficiencies are:

- Well 1 cap bolts missing, which has not been addressed;
- Housekeeping of the well house, which has since been addressed;
- Electrical hazards in the well house, which has not been addressed;
- Erosion around well heads, or grading away from well heads, has been addressed;
- As-builts for the well house and well site facilities and also the 16" waterline in Henry Creek Road have not been submitted. The 16" line has been completed and should have had as-built drawings. The well site upgrades were never finished which is good reason for no as-builts.
- The threaded sample tap on the manifold from Well 1 is part of a disconnected, abandoned, and to be removed system, and as such poses no safety concerns;
- The pump to waste hydrant is not connected to the current system and is not to be connected to the proposed new line from an upgraded Well 1 to the well house, where new waste facilities exist, and thus the hydrant poses no safety issues;
- Well house doors secured, which as since been addressed;
- Drinking water fees paid, which has since been addressed; and
- Operator compliance. Currently the HOA has a licensed water operator, but not a substitute or backup operator.

It may be beneficial to comment on a few statements made in the Sanitary Survey.

a) **Groundwater Sources** It is mentioned on pages 1 and 2 of the Sanitary Survey that there are two groundwater sources and that with Phase II, Wells 3 and 4 will be added. It is true that there are currently two wells, but only Well 2 is connected to the system, and Well 4 is for Buildout and not Phase II. Well 2 was constructed as part of Phase II and the main high pressure line up the hill, and also proposed but not constructed was the water storage tank halfway up the hill. The capacity of Well 1 was stated at 725 gpm. What its maximum capacity is rather than its successful test at the capacity of the pump used in the test (see B.3.a above) is the real issue.

b) **Hydropneumatic Tanks** The survey mentions four hydropneumatic tanks as part of the system on pages 1 and 3. Actually, as part of what is now thought of as Phase I, which is only Well 1 and Blackhawk Divisions 2 and 3 and the church, there were 10 tanks. Inasmuch as all have too low of a pressure rating to be usable in the current high pressure system, they were all to be removed as part of the Phase II improvements. Six were removed, and the remaining four are not connected in any way to the current functioning or proposed completed Phase II system.

c) **The Reserves** is mentioned on page 1. It was to be a part of the Phase II system. It had preliminary plat approval but was never taken to final and approvals expired. The land has been sold off. Thus, it is not a part of the water system.

d) **Automatic Transfer Switch** There will be automatic switching between the power grid and generator, which is not yet installed, but not anything between Well 1 and Well 2 as noted on page 7. Well 1 is currently not even connected to the system.

C. FUTURE CONDITIONS

1. **Population** There are 138 platted lots that are part of the Planning Area besides the church. Currently 54 of the 138 lots or 39% have services, with three more in process. The HOA has estimated that at least 75% will be connected in 5 years and that 100% will be connected in 20 years. It seems appropriate that whatever is constructed be adequate for build-out of the Planning Area as a minimum. Furthermore, while the HOA at present is not thinking in terms of a larger service area, given that much of what is already constructed (such as the 16" waterline) can service a much larger area, and that much of what is already paid for and will be added to the system to address fire flows that will not change with more added area (such as the 1MW generator), and also considering there is likely little water to be found up on the hill to service those areas in the future when such will be developed, the Blackhawk system may as well be open to planning to be a regional service as per the original plan, even though for the present the focus is on meeting DEQ and fire code for existing platted lots.

   It may be well to note here that the HOA currently has water rights only for 65 lots, and with 57 service connections before year's end, more rights need to be obtained soon or a moratorium may be necessary!

2. **Water Demand** The residential lot equivalents must be designed for 800 GPD domestic use, but with a peaking factor of 3 per the *Basis of Design* report, tab 2,

page 2-10, and a peaking factor of 6 is used for the church. Per the same page and Tab 3 of the *Basis of Design* report, there must be 8.75 gpm per acre over 16 hours per day per lot provided for irrigation, or approximately 4.4 gpm per half acre lot. Added to maximum day flows would be 1500 gpm fire flow for two hours. Thus, the design peak flow rates and volumes for the Planning Area would be per the table below.

Table 1 - Water System Flows And Volumes

Use	Avg unit rate (gpm)	Max Hr to Max Day Peaking Factor	Planning Area			
			Equivalent Residential Units	Max Day Flow Rate (gpm)[1]	Peak Hour Flow Rate (gpm)	Total Day[1] Volume (gal)
Domestic: Houses (800 GPD per house)	0.56	3.00	137	76.1	228.33	109600
Irrigation Flow (per house--1/2 acre max, 8.75/2 gpm @ 16 hrs/day-See *Basis of Design* report Tab 3))	2.92	1.50	138	603.8	603.75	579600
Domestic: Church (1200 GPD)[2]	0.56	6.00	1.5	0.8	5.00	1200
Total w/o Fire Flow				680.7	837.1	690400
Fire Flow				1500.0	N/A	180000
Total w/ Fire Flow				2180.7	837.1	870400

Footnotes

1) Based on Sunday use at the church and one of the 6 days of 7 per week assumed for irrigation per the Basis of Design Report Tab 3. Used Max Day values and fire flow, not peak hour flow.

2) The septic permit is for 1200 GPD flow, 2400 gallons per week. This should be representative of domestic water use as they have a separate well for irrigation use.

The original Blackhawk water system was designed for higher buildout flows, even from Well Site 1. The difference would be in the number of wells drilled and the size of water storage. However, if other areas uphill developed and were added to the system, theirs would be the burden to boost the water further uphill and to add whatever additional water storage was needed, and of course, to upgrade the well situation, but the Blackhawk base facility is or reasonably can be, per the original plan, capable of supplying water to more of the upland areas without adding Well Site 2 facilities or another trunkline up Henry Creek Road.

Incidentally, Phase II was based on a peak fire flow and domestic maximum day flow of 3052 gallons per minute (gpm) from Well Site 1, whereas the buildout condition only required 2815 gpm from Well Site 1.

3. **Treatment Requirements** So far there has not been a need for water treatment. However, Well Site 1 has space to provide additive treatments if needed or desired.

4. **Future without Proposed Project** Currently the water system has only one functioning well, no backup power, and no water storage other than what is in the 16" pipeline above the last service connection. That is a precarious situation and not a situation that should exist now, let alone in the future.

5. **Land Use Plans** The Planning Area is all platted so the land use is known.

6. **Proposed System Hydraulic Modeling** The *Basis of Design* report contains modeling for the Phase II condition, and the Planning Area buildout is similar except the latter does not include The Reserves that was in Phase II. The difference is that the booster station is not needed to pump water to The Reserves, and there are 53 less lots to serve. This results in a volume reduction of 53 lots times 800 domestic GPD plus 53 lots times 4.4 gpm irrigation times 60 minutes per hour times 16 hours per day, or a reduction of 266,272 gallons per day. It also results in a peak flow reduction of 53 lots times 800 GPD times a peaking factor of 3 divided by 1440 minutes per day plus 53 lots times 4.4 gpm irrigation flow, or a reduction of 321 gpm. The distribution lines are already conservatively installed for the higher flow rate, but the overall water supply and pumping and storage can be reduced.

D. DEVELOPMENT AND INITIAL SCREENING OF ALTERNATIVES

The above heading comes from the DEQ Form 5-A report checklist. It presupposes that all proposed corrective or improvement measures will involve alternative analysis, but such is not the case. For example, meeting fire code in Blackhawk Division 2 by adding fire hydrants on the adequately sized waterlines on which fire hydrants were never installed should be addressed, but an alternative analysis is not needed to consider how. Consequently, in the Form 5-A paragraph 1 below, there will be deficiencies discussed that will be addressed as a part of the project recommended by this study, but which are not a part of an alternative analysis as suggested by the title of this Section D.

1. **Problems and Deficiencies to be Corrected by the Project** A review of what has already been discussed is provided below.

   a) Subsection A.2 mentioned that there is no DEQ-required redundant water source, nor is there DEQ-required capacity with a redundant pump out of service to meet peak hour flow or to meet maximum daily flow simultaneously with fire code required fire flow. The recommended alternative project from this study needs to address this problem.

   b) Subsection B.3.b discusses a possible incompletion of isolating the old Well House piping from the new high pressure system. Per an RMES plan note, the old 10" mainline would be supplied and pressurized through PRV1-0 part way up the hill to service the entry way landscape feature and the church, but downhill of those services, the 10" line may have never been capped and may still go to the well house. Recirculation from the high pressure system back to the low pressure manifold and Well 1 should not occur even if still connected because of a check valve and closed valve, but once Well 1 is upgraded per regulatory conforming alternatives, Well 1 will be tied into the high pressure system and the 10", if not already capped, will need to be. This is not an alternative issue, but will need to be addressed with the recommended project.

c) Subsection B.6 discusses corrosion, which is not a code violation issue, but the unusualness of corrosion experienced in so short a time should be investigated in order to protect the value of existing infrastructure. There also are no fire hydrants in Blackhawk Division 2. Neither of these are an alternative issue, but both items need to be addressed with the recommended project.

d) Subsection B.7 discusses the lack of funding mechanism, where there is no formal O&M budget and no sinking fund to prepare for larger periodic maintenance or eventual replacement cost. This is not an alternative issue or even a project item, but rather an item that just needs to be done.

e) Subsection C.1 discusses water rights, and how there currently are only rights for 65 lots, that before the year is out 57 lots will be connected, and that more rights will need to be applied for. This also is not an alternative issue or even a project item, but rather an item that just needs to be done.

f) There is also concern about why the power bill is so high. There was thought that Well 1 was pumping from time to time to charge the old closed manifold, but this should not use a lot of power. The HOA has since verified that the pump is off.

g) Are there other problems that are causing high power consumption? The bill for September was $5054.42 for the well house, of which 55% was a demand charge, or a special fee for the high level of occasional short term power use. With VFDs and the ability to control target pressures, there should be a way to reduce the demand charge. There is another thought regarding potential cost savings. Balancing efficiency and cost was an issue in the original 3500 acre water system analysis, and considering the cost of redundant booster pumping systems and a backup power generator, it was determined that one booster station going up the hill was better than two. But now with a much smaller planning area, and which is all in the lower half of the 3500 acres system, can a midway booster be of benefit? What if pumping pressures were reduced at Well Site 1 by serving the lower system directly from the wells per current operation, and having a simplex non-redundant domestic and irrigation supply only booster pump that would serve Iron Rim and perhaps Blackhawk Division 4? This way all normal water consumption for Divisions 2 and 3 would not be pumped against such high pressures, and in the event of fire flow rates, a PLC control in the Well House could shift the target pressure for the well output to a level high enough, as it is now, to provide fire and maximum day flows to Iron Rim and Division 4 without the booster. To work and to benefit reduction of the demand charge, the wells would have to be ramped down enough to significantly lower power consumption, and to be able to do so and still maintain sufficient pressure and output to supply the lower levels. That is very questionable for the two existing high pressure pumps--the one installed in Well 2 and the other purchased to be installed in Well 1. And how much savings would there be with the added booster pump, and the well pumps running at lower RPM and reduced efficiency? Would the savings offset the capital cost and O&M of a booster station? It is WEI's opinion that the booster station will not allow pressures at the well house to be reduced significantly because friction losses are fairly minimal in the 16" line, so the main gain is the difference in loss in lateral systems between when there is fire flow and not. However, these are legitimate questions, and could be looked at as part of an energy audit that should be performed on the system. There is enough power consumption, along with the demand charge, to justify investigating a way through controls and settings to vary target pressure settings as specified in WEI's original design This investigation could lead to reduced power usage and the demand charge. Reducing the $5000 per month power bill 10 to 20% seems feasible given the demand charge of $2775.52, and probably should be an issue looked at as part of the project through an operational and energy audit; that is, involving both consideration of system components, existing and potential, along with normal audit investigation procedures.

h) **Fire Hydrants** Having fire flow rate, volume, and pressure in the lines is of little value if there are no fire hydrants. Division 2 was constructed with large enough lines to handle fire flow, as proven with the hydraulic modeling presented in the *Basis of Design* report, but fire hydrants were not installed. This is not an alternative analysis item, but should be corrected as part of the project.

2. **Development of Alternatives** WEI has identified seven alternatives. They include the do nothing or null alternative, the regional "connect to the city of Ammon water system" alternative, switching from a public water system to individual wells, adding a large storage tank that meets flow capacity requirements per DEQ and the fire code but no longer meets DEQ redundant source requirement, and three other alternatives that involve adding wells, tank, or both. Only the do nothing or abandoning the public water system and switching to individual wells alternatives do not involve adding the generator. Alternatives are discussed below and summarized in Table 2 on the next page.

a) **Alternative 1A** The null or do nothing alternative is not acceptable. It does not meet DEQ, fire, or county code requirements. Worse yet, it does not provide the property owners with the service and protection they need. It is not a matter of if but when there is:

- A power outage of sufficient length that "storage" in the 16" waterline uphill of users will be consumed and upper elevation homes first run out of pressure and then water, and depending on the duration of outage, more and even all homes could be out of water, as there is no water storage and with no backup power, a power outage will result in these conditions;

- A pump or motor or controls therefor go down, and with only one functioning well on the system, there is no backup—there will be no water supply until the problem is resolved, which could take days;
- There is a problem with the well. With no backup, water supply stops; and
- Even with all existing facilities functioning, there is nowhere near adequate water supply to effectively suppress a fire, let alone supply basic domestic needs at the same time.

The bottom line is that deficiencies are not just a matter of non-conformance to regulations—if not corrected they will, not may, one day affect homeowner utility and possibly protection. This is not a regulatory or functionally accepted alternative.

Table 2 - Alternative Descriptions

Alt. ID	Description	Wells in Alternative				Other Facilities			Meets Regulatory Criteria		
		Well 2	Well 1[2]	Well 3	Well 4	Tank	Generator	Booster Station	DEQ	Fire Code	County Code
1A	1 Well (#2) and do nothing (Null)	Yes	No	No	No	No	No	No	No	No	No
1B	1 well (#2) and add large tank	Yes	No	No	No	Large	Yes	No	No	Yes	Yes
2	2 Wells (1&2) and medium tank	Yes	Yes	No	No	Medium	Yes	No	Yes	Yes	Yes
3	3 Wells (1,2,3) and small tank	Yes	Yes	Yes	No	Small	Yes	No	Yes	Yes	Yes
4	4 Wells (1,2,3,4) and no tank	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes
5	Connect to Ammon water[1]	Yes[1]	Yes[1]	No	No	Yes[1]	Yes[1]	Yes	Yes	Yes	Yes
6	Go to individual wells	No	No	No	No	No	No	No	N/A	No	No

Footnotes

1) There has been no discussion with the City of Ammon regarding them taking over the system. If such were to happen, it is suspected that they would want to own and utilize Wells 1 and 2 and the generator as a minimum, plus a booster would be required for servicing up the hill. Moreover, to meet fire flow rates, it is almost inevitable that storage would be required on the hill.

2) Well 1 exists but is not connected to the system, and has not the capacity to pump into the current high pressure system. It must be upgraded, which new pump and motor have been purchased but are not installed and set up.

b) **Alternative 1B** This alternative involves only adding a tank on the hill. The tank would actually be a small tank, but relative to the development and other options, this is the "large tank" alternative. With this option, all domestic, irrigation, and fire flow rates and volume requirements can be met with the highest capacity (only) pump, which is Well 2, being out of service. However, DEQ policy also requires a redundant source for public water systems, and current DEQ interpretation is that only some of the redundant source can be from storage, but not all. There must be a second source of supply water that is not storage. A probable reason for this is that storage can supply water, but the supply is limited. Having a positive source that can continue to supply water is only wise management. That requirement effectively eliminates this otherwise viable alternative.

c) **Alternative 2** Given DEQ's redundant source requirement, there must be at least two functioning wells if not more. Alternative 2 looks at having the minimum of two wells and using storage to supply the balance of water flow rate and volume needs. This is a viable solution.

d) **Alternative 3** This alternative looks at adding not only the minimum Well 1, but also Well 3. The hope was that with three wells there would be no need for water storage, but the numbers do not support that. A small tank is still needed, albeit it can be a less expensive and aesthetically preferred and vandalism protected underground tank. This is a viable solution.

e) **Alternative 4** This alternative uses all four wells that were originally planned for the long term situation for serving areas outside of the Planning Area, and for which the current well house piping is set up. With four wells, no storage is required. This is a viable solution.

f) **Alternative 5** This is the regional solution, where the system is taken over by and connected to another water purveyor, such as the city of Ammon who has a waterline in Sunnyside Road 2-3/8 mile to the north. WEI has not spoken with the City regarding this alternative because of several problem issues that are enumerated below:

- First, the city of Ammon must agree to it, for which there would be little incentive—the existing infrastructure to maintain is extensive for the number of lots served, and significant costs for more infrastructure and added operation and maintenance (O&M) are required to bring it up to regulations. It is unlikely that it would be a financially attractive option for the City;
- Second, the water supply capacity of the City line would have to be evaluated—it most likely could not support fire flow, but only supply water that must be stored on the hill so that fire flow could be provided;

- Third, there would be significant cost to construct the 2-3/8 mile waterline;
- Fourth, the City line should have pressure to get flow to the base of the hill, but not sufficient to provide adequate pressure up the hill, and thus a system of booster pumps, with DEQ-required redundancy, must be provided at the bottom of the hill, such as at Well Site 1, that can meet domestic and irrigation flows and still, over a 24 hour basis, keep a tank on the hill full;
- The City would no doubt need and want Well 2 and Well 1 to function as otherwise planned, including with the generator backup power;
- There undoubtedly would need to be a large water storage tank on the hill that could provide fire flow rates and otherwise provide backup water; and
- The City may not permit irrigation uses on their system at current levels of use in the Blackhawk Subdivision.

It can be seen that with the regional alternative, nothing required for the system to independently meet regulatory requirements is eliminated, but only added upon. Added are a 2-3/8 mile supply line and also booster pumping facilities. For the other alternatives, the total system upgrade cost would be the burden of the Blackhawk HOA whereas if the city of Ammon took over the system the costs would be spread, but still, it most likely would be set up as a special district where sooner or later the HOA more or less paid their way.

Being in the water business is not the most convenient for private homeowners, so transferring the system to the city of Ammon certainly has merit in the long run, but it is highly unlikely that in the short run it is feasible at any less cost or financial burden to the Planning Area residents. Moreover, since one of the other viable solutions would still be required as a basis for Alternative #5, it seems prudent to proceed with further evaluation of those alternatives for now and have Alternative #5 be a future possibility to explore. WEI will not further pursue Alternative #5 at this time.

g) **Alternative 6** This alternative involves abandoning the public water system and switching to individual wells. WEI thought inclusion of this alternative would be beneficial because other recommended alternatives will all be expensive and there will likely be some whose initial thought will be, "Why not just abandon the public water system and switch to individual wells?" Investigating this alternative answers such questions.

Switching to individual wells at this point is really is not so ideal. First of all, there would be periodic maintenance costs with wells, and monthly power bills that would likely approach $200 per month just for irrigation pumping during the summer that in will exceed monthly service fees under the existing system. That only stands to reason—if the same amount of water is pumped for domestic and irrigation use, the greater efficiency available by a large system in good water table will be less cost than multiple individual systems in a poor water table. There would be no fire flow, and no system redundancy—any problem means being out of water for a period of time. Having similarly experienced having no water, the author of this report can confirm that such is a very inconvenient and undesirable condition.

The subdivision was approved and constructed based upon having a public water system. This and other regulatory and physical conditions are not favorable to switching to individual wells. This will be discussed below according to conversations with various governmental entities.

The Eastern Idaho Public Health District oversees septic system permitting that is currently the method of sewage disposal in the Planning Area. Both active and reserve area drainfields must be 100 feet from any well, both on-lot and from adjacent lot wells. Septic tanks must be at least 50 feet away. There are other setback requirements from waterlines. For existing lots, systems may be such that there is no location for a well, and for those where there is, the location must be dictated by setbacks and not other well driller or homeowner preferences. The health department foresees trouble with having everything done correctly for existing homes. Furthermore, there was no Nutrient Pathogen Study performed for the subdivision because there would be no nearby wells. That could possibly be a requirement that would need verification. Health Department issues do not prevent the switch, they just highlight concerns.

DEQ is very unfavorable to switching and noted that public funding or low interest loans would not be available for that approach. DEQ also noted that the original density and zoning was approved based on having a public water system, that their approval of the subdivision and plans therefor was based on there being a public water system, and that in order to switch, they would require the platted lots to be resubmitted through the County subdivision process and be amended and approved under the proposed revised condition.

The Idaho Department of Water Resources also noted, as did DEQ, that the subdivision was approved on the basis of having a public water system, so the plat of the system serviced lots, or the Planning Area, would have to be processed through the County subdivision process and approved for on-lot wells. If that is done, IDWR has no further stipulations, but did mention what WEI already knew of the lack of available water up the hill. As part of the original investigation for finding water for the subdivision, regional water expert Tom Wood of Clearwater Geosciences was involved, and a very deep test well was drilled on the hill. The available water was a mere pittance—maybe enough to supply a home ***if*** there was storage provided to meet peak hour demands and even then, would there be enough to meet irrigation needs in summer months? Thus, most lots would need a well, a storage tank, and a booster pump system out of the storage tank just to have domestic and, perhaps to a limited extent, irrigation water. Some would probably have sufficient, but the likelihood is that as more wells went in, there would not be enough for everyone. It is a questionable situation at best, unlike having a well on the edge of or in the Upper Snake River aquifer where the public system Well Site 1 was strategically located.

The above issues are significant, but none are absolute deal killers with respect to switching over from a public system to private wells. However, the County Planning Department metaphorically drove a stake into the heart. They indicated that for the zoning approved, the comprehensive plan requires a fire suppression system. If a code conforming separate fire suppression system is required, which is the main obstacle to be overcome in the existing public water system, it certainly makes no sense to add individual wells rather than to also serve the lots with the well, distribution line, and tank if used, that would already be in place to provide fire flows. Furthermore, for the existing zoning, *a public water system is required and individual wells are not allowed.*

Consequently, this is not an alternative that is practical or legally allowed.

h) **Environmental Impacts** Information relating to environmental impacts is covered in the Environmental Information Document report.

Discussion shows that government regulations rule out Alternatives 1A, 1B, and 6, where 1A is the do nothing alternative, 1B is the large tank but no second well alternative, and 6 is the switch to individual wells alternative. Moreover, finding no probable reduction but only addition to required facilities by the Alternative #5 regional approach, at least under current conditions, that was ruled out as probably not feasible or currently desirable. That leaves only Alternatives 2, 3, and 4, which have, respectively, 2 wells and medium storage size, 3 wells and small storage size, and 4 wells with no storage. Table 3 on the next page summarizes these alternatives and also provides calculations of the associated water storage volumes. While Alternatives 1A and 1B are not permissible, they are included for comparative purposes.

3. **Isolated Areas** *Figure 2* presented earlier shows the Planning Area. It is a linear area alongside 45th East or Henry Creek Road. There is no platted property that is isolated along the Planning Area. In time, if properties on the hillside along the Planned Area are developed or housing is constructed, they will also need water. Drilling and finding much water may be challenging as discussed earlier, but at such time negotiations could be made with the Blackhawk HOA for connection.

All three viable options shown above that meet DEQ and fire code requirements also have reserve capacity for additional domestic users.

4. **New Sources** New sources, as explained above, would be to upgrade Well 1 pump and motor and connect it to the system, and depending on the alternative, adding Well 3 and Well 4, all at the existing Well Site 1 as per the original approved water system study by WEI, except that originally the intent was for Wells 3 & 4 to be 1300 gpm wells, whereas now, with the reduced demand and for uniformity of pumps, motors, and controls, they would be 1000 gpm wells the same as Well 2 and the upgraded Well 1.

Table 3 - Alternative System Well and Tank Requirements

Description	Alternatives #1A & 1B: Well 2 and - 1A w/o Tank (Null) and 1B w/ Large Tank & Generator		Alternative #2: Upgraded Well 1, Well 2, Medium Tank, & Generator		Alternative #3: Upgraded Well 1, Well 2, New Well 3, Small Tank, &		Alternative #4: Upgraded Well 1, Well 2, New Wells 3 & 4, w/o Tank, &	
	Flow (gpm)	Max Volume (gal)	Flow (gpm)	Max Volume (gal)	Flow (gpm)	Max Volume (gal)	Flow (gpm)	Max Volume (gal)
Capacity w/ highest well out of service	0	0	1000	1440000	2000	2880000	3000	4320000
1 Hr Peak Hour Flow and Irrigation								
Sept 2012 Deficiency (gpm or gallons at the end of peak hour flow period)	439.5	26369	0.0	0	0.0	0	0.0	0
Planning Area Deficiency (gpm or gallons at the end of peak hour flow period)	837.1	50225	0.0	0	0.0	0	0.0	0
2 Hr Max Day Flow, Irrigation, and Fire								
Sept 2012 Deficiency (gpm or gallons at the end of the fire flow period)	1761.6	211392	761.6	91392	0.0	0	0.0	0
Planning Area Deficiency (gpm or gallons at the end of the fire flow period)	2180.7	261683	1180.7	141683	180.7	21683	0.0	0
Governing Required Tank Volume[1]								
For Sept 2012		**264240**		**114240**		**0**		**0**
For Planning Area Buildout		**327104**		**177104**		**27104**		**0**
Required Added Storage Volume								
Well Site 16" Pipeline Above Highest Lot	Length (ft):	2300	Vol. (gal):	3212		3212		3212
Booster 16" Pipeline (if interconnected)	Length (ft):	2950	Vol. (gal):	4119		4119		4119
Required Added Storage Volume w/o booster line		**323892**		**173892**		**23892**		**0**
Required Added Storage Volume w/ booster line[2]		**319773**		**169773**		**19773**		**0**
Comments								
DEQ acceptable	No		Yes		Yes		Yes	
Worth further evaluation?	No		Yes		Yes		Yes	

Footnotes

1) Storage tank is sized so that the 2 hour fire flow start is at 80% tank capacity, with enough volume that there is no volume deficiency.

2) The 16" booster line exists and could provide extra storage volume, but excavating, isolating, making the connection at the booster station site, and chlorinating the line will likely cost more than the cost of adding an equivalent storage tank volume for Alternative #3, and without question the cost would be more than adding extra tank volume for Alternative #2.

5. **Treatment Requirements** See paragraph C.3.

6. **Storage Requirements** See Table 3.

7. **Pumping Requirements** Each well in the system would have a capacity of 1000 gpm. The number of wells required varies as noted in Tables 2 and 3.

8. **Pressure Maintenance** As per the *Basis of Design,* the wells as designed can provide adequate pressure, and PRVs protect from having too much pressure.

9. **Irrigation** The system is designed to provide for irrigation as per section C.2 and Table 1.

10. **Distribution** The existing distribution system is adequate to meet all DEQ and fire flows as documented in the *Basis of Design.*

11. **Public Input** Reference is made to subsection E.6.

12. **Project Effects on System Classification and Operator Licensure** The current system has a well and distribution system, so increasing the number of wells at the same site and adding a tank will not increase the complexity or change the system classification or licensure requirements.

13. **Other** None.

E. FINAL SCREENING OF PRINCIPAL ALTERNATIVES AND FACILITY PLAN ADOPTION

1. **Evaluation of Costs** As noted above, after initial evaluation, only Alternatives 2, 3, and 4 are evaluated further. The capital cost of tanks for Alternatives 2 and 3 are shown on Table 4 two pages forward. Alternative 4 does not involve a tank. Well capital costs are shown on Table 5. Capital costs are not the best indicator of overall lowest cost. Present worth (or present value) is better in that future operational, maintenance, refurbishment, and replacement costs can be included and discounted to present worth. If residual service life value is included, the overall best cost comparison can be made. This is called a life-cycle cost analysis (LCCA), which was performed. The analysis period was based on the least common denominator for most facilities of 45 years. The discount rate used was 4%. LCCA evaluations are typically performed using constant or base year dollars because "project benefits should be dependent only upon real gains (cost savings or expanded output), rather than purely price effects" (Life-Cycle Cost Analysis Primer, 2002, USDOT). Consequently, inflation or deflation effects were ignored. An LCCA for the tanks is provided on Table 6, and for wells on Table 7. Table 8 provides a comparison of costs ***associated with the alternatives and does not include non-alternative*** project work, such as for corrosion correction, water rights, fire hydrants in Blackhawk Division 2, and an energy audit and operational optimization.

It can be seen from Table 8 that Alternative 2 has the lowest capital cost, lowest present worth cost, lowest LCCA (which is the best comparable), and lowest sinking fund cost, which is the amount of funds needed annually to cover monthly and non-annual periodic maintenance, refurbishment, and replacement. Again, Table 8 covers items associated with alternatives only and not other items that are needed regardless of the alternative.

Table 4 - Estimated Tank Capital Costs

Above Grade Steel Tanks (for Alternative #2 173,892 gallon tank)

Tank Size			Welded Tanks (AWWA D-100)[1]			Bolted Tanks (AWWA D-103)[1]				Tank Site Costs				Total Tank Cost	
Gallons	Diameter (ft)	Height (ft)	Pittsburg	United	Average Tank Cost	Columbian Tec (CTS)	United[4]	Superior	Tank Cost Used in Study[5]	1/2 Acre Land[2]	Found-ation[3]	Piping, Site Work, Misc[7]	Site Engineering	Welded	Bolted
300000	40.5	32	365000												
291500	46.15	24.55		455000	410000		150000		165000	25000	10000	95000	30000	570000	325000
282000	54.962	18.06				227000									
250000	37	32	335000												
228000	40	24			370000			150000	143000	25000	10000	95000	30000	530000	303000
225300	36.92	29.39		405000			130000								
222000	47.534	18.06				196000									
200000	33	32	305000		305000					25000	10000	95000	30000	465000	
173500	40	19.72		335000	335000		110000		121000	25000	10000	95000	30000	495000	281000
162000	32.68	26.12				128000			141000	25000	10000	95000	30000		301000
150000	28.5	32	270000		270000					25000	10000	95000	30000	430000	
125000	30.5	24	235000		235000					25000	10000	95000	30000	395000	
102969	26.154	26.12				99000			109000	25000	8000	95000	30000		267000
102500	30.77	19.72		245000	245000		85000		94000	25000	10000	95000	30000	405000	254000
100000	27	24	200000		200000					25000	8000	95000	30000	358000	
50000	19	24	125000		125000		70000		77000	25000	6000	95000	30000	281000	233000

Below Grade Plastic or Fiberglass Tanks (for Alternative #3 23,892 gallon tank)

Tank Size						Tank Costs (Materials and Shipped)					Tank Site Costs				
Gallons	Length (ft)	Width (ft)	Height (ft)	Bury Depth (ft)	Qty Req'd	National Tank Outlet (Den Hartog brand)	The Tank Depot (Den Hartog brand)	Loomis Tank	Xerxes	Tank Cost Used in Study	1/4 Acre Land[2]	Found-ation	Piping, Site Work,[7] Jersey[6] Barriers, Misc	Site Engineering	Total Cost
25000	47.56	10.0 dia	10.0 dia		1				45600	51000	25000	3000	80000	3000	162000
12000	37.08	8.0 dia	8.0 dia	3	2			24500		54000	25000	3000	87000	3000	172000
2500	13.17	8.16	4.24	2.33	10	3200	3400			36000	25000	3000	87000	3000	154000

Footnotes

1) Costs shown are based on budgetary quotes received from the companies listed for materials and erection.
2) Site cost estimated by the Blackhawk HOA.
3) There are five types of foundations for steel tanks, which can be as simple as 6" thick 3/4" minus road base gravel for the diameter plus 10 ' or the diameter plus 2' with a 12 gauge metal retaining band. Unnecessary concrete foundations could cost in the range of $50,000 to $70,000 per quotes for 100,000 gallon to 300,000 gallon tanks, respectively, without site earthwork, but this expense is not necessary. The tanks are typically designed to withstand 100 MPH winds without movement when empty and not anchored, but only resting on gravel.
4) Value for 50000 gallons was extrapolated.
5) 10% added to lowest budgetary quote received.
6) J10 jersey barriers at $480 each plus shipping, handling, and placement are required for non-traffic rated tanks. The Xerxes tank is traffic rated.
7) This includes a short interconnect between the two 16" lines at the previously proposed booster station, a 16" line from the proposed tank to the currently dry 16" line, and two 16" check valves, and pavement replacement where crossing under Henry Creek Road.

Table 5 - Well Capital Costs

Work Description	Well Site & Well 1	Well 2	Well 3	Well 4
Completion of electrical and installation work from previous project[1].	73000			
12" DIP line from well house to pitless adaptor	10000		10000	18000
Electrical from well house to well			20000	30000
Well 3 and/or Well 4 (well drilled, casing, seal)			75000	75000
Well 3 and/or Well 4 hardware (pump, motor, drop pipe and wiring, pitless adaptor, electrical controls, filters, ATS, and VFD per Bradley Engr. plans)			125000	125000
PLC to alternate well operation (original setup was for SCADA to do this, but SCADA is not being considered at this time)	5000			
Generator slab	1000			
Generator housing instead of building, fuel tank, isolation pads, connect generator and cover to tank, all wiring inside housing connected	74000			
Generator modification engineering	2000			
Total	**165000**	**0**	**230000**	**248000**

Footnote

1) This includes electrical work in the well house and between the well house and both Well 1 and the generator, and also to remove and replace the existing Well 1 pump and motor with the higher capacity pump stored at Electrical Equipment Co. Electrical Equipment Co has not been paid $41,234.57 for a 2008 invoice on previous work. They also want a storage fee for the generator and are holding the generator as leverage to be paid for both the invoice and storage. These amounts are not included in the cost above to complete previous work because the HOA contends the past invoice is the obligation of the estate of the deceased (McDaniels and Foothill Properties) and the storage during their responsibility has been involuntary on their part.

Table 6 - Tank Life Cycle Cost Analysis (LCCA)[1,2]

Alternative #2 174,000 Gallon Steel Tank O&M Cost for Periodic Service Items[6]

	Welded Tank					Bolted Tank				
Description	Constant or Base Year Cost[4]	Work Years	Present Worth or Value	Equivalent Uniform Annual $	PW of Residual Service Life[7]	Constant or Base Year Cost[4]	Work Years	Present Worth or Value	Equivalent Uniform Annual $	PW of Residual Service Life[7]
Initial Construction	495000	0	495000	23,890	32,100	281000	0	281000	13,562	13,781
Cleaning, inspection, and touch up[5]	3,000	5, 10, 20, 25, 35, 40	8,372	405	0	3,000	5, 10, 20, 25, 35, 40	10,963	530	0
Painting interior (sandblast and recoat)	43,561	15, 30, 45	45,076	2,176	7,458	43,561	45	7,458	360	7,458
Painting exterior (overcoat)	10,270	11.25, 22.5, 33.75, 45	15,347	741	1,758	10,270	11.25, 22.5, 33.75, 45	15,347	741	1,758
Column Total			**$563,795**	**$27,212**	$41,315			**$314,767**	**$15,193**	$22,997
Total PW Life Cycle Costs[8]			**$522,480**					**$291,770**		
Total Sinking Fund Amounts[9]				**$2,917**					**$1,101**	

Alternative #3 24,000 Plastic or Fiberglass Tank O&M Cost for Periodic Service Items

	1 Xerxes 25000 Gallon Tank					10 Den Hartog 2500 Gallon Tanks				
Description	Constant or Base Year Cost[4]	Work Years	Present Worth or Value	Equivalent Uniform Annual $	PW of Residual Service Life[7]	Constant or Base Year Cost[4]	Work Years	Present Worth or Value	Equivalent Uniform Annual $	PW of Residual Service Life[7]
Initial Construction	162,000	0	162,000	7,819	11,727	154,000	0	154,000	7,433	11,042
Cleaning and inspection (tank can be drained)	1,500	5,10,15,20 25,30,35,40,45	5,738	277	0	7,500	5,10,15,20 25,30,35,40,45	28,691	1,385	0
Access gasket seal replaced	200	11.25, 22.5, 33.75, 45	299	15	34	2,000	11.25, 22.5, 33.75, 45	2,989	145	342
Column Total			**$168,037**	**$8,111**	$11,761			**$185,680**	**$8,963**	$11,385
Total PW Life Cycle Costs[8]			**$156,276**					**$174,295**		
Total Annual Sinking Fund Amounts[9]				**$292**					**$1,530**	

Footnotes

1) Based on a LCCA analysis period of: 45 years
2) Based on interest rates as follows: Discount rate on the cost of services: 4.00%
3) The factory applied coating on the bolted tank will last approximately 45 years before recoating is needed, but subsequent field recoats will be needed approximately every 15 years the same as for welded tanks that are field coated.
4) 2013 is the base year, using 2012 prices escalated somewhat by rounding up cost quotes. The constant or base year cost will NOT be adjusted for inflation/deflation as per standard LCCA practice, because "project benefits should be dependent only upon real gains (cost savings or expanded output), rather than purely price effects" (Life-Cycle Cost Analysis Primer, 2002, USDOT. Cost figured at $2.75 per square foot for exterior coating and $7.50 per square foot for interior coating. Add'l 65% area added for the interior lid per Superior Tank Company for coating roof structural and other inside components.
5) This tank cleaning is with divers and water in the tank, which is not necessary when the interior of the tank is sandblasted and recoated, so this occurs only on the 5 year cycles that are not also the 15 year cycle (years 5, 10, 20, 25, 35, 40.
6) The frequency and cost of maintenance is based on information from several city public works directors, tank vendors in general, and especially the tank maintenance manager for United that is over both bolted and welded steel tanks.
7) Present Worth or Value estimated on base year information from various vendors and service providers and discounted at 45 years. That is, it was figured as the base year value times the current value factor times the number of items times the discount factor.
8) Total Present Worth minus Residual
9) The initial construction (first line item in table) was not included because there will not be a full replacement required, but annual costs therefor will show up as debt payments.

Table 7 - Well Site 1 Life Cycle Cost Analysis (LCCA)[1,2]

	[3]Constant or Base Year Cost		Alternatives That Meet Agency Requirements (w/o Regional Option)												
			Alt. #2 - 2 Wells				Alt. #3 - 3 Wells				Alt. #4 - 4 Wells			
Service Description	Per Well	Per Site	Work Years	Present Worth or Value	Equivalent Uniform Annual Cost[4]	PW of Residual Service Life[7]	Work Years	Present Worth or Value	Equivalent Uniform Annual Cost[4]	PW of Residual Service Life[7]	Work Years	Present Worth or Value	Equivalent Uniform Annual Cost[4]	PW of Residual Service Life[7]
Upgrade and construct wells and install control equipment	(see Table 5)		0	165,000	7,964	34,240	0	395,000	19,064	51,360	0	643,000	31,033	70,191
Remove and reset pump & motor for service work	3,400		15,30, 45	7,037	340	0	22.5, 45	5,967	288	0	30,45	6,521	315	0
Refurbish pump	1,400		15, 45	2,034	99	1,233	25	1,575	77	1,849	30	1,727	84	2,465
Replace pump	7,200		30	4,440	215		45	3,698	179		45	4,931	238	
Refurbish motor[13]	22,000		30	13,566	655	0	25	24,758	1,195	0	30	27,132	1,310	0
Replace motor	45,000		45	15,408	744	15,408	45	23,112	1,116	23,112	45	30,816	1,488	30,816
Variable frequency drive (VFD)	25,000		15,30, 45	8,560	414	8,560	22.5, 45	43,872	2,118	12,840	30,45	47,952	2,315	17,120
Elect. filters, ATS, load reactor, control	15,000		45	5,136	248	1,284	45.0	7,704	372	1,284	45.0	10,272	496	1,284
Int. & ext. piping facilities	25,000		45	8,560	414	4,280	45	12,840	620	4,280	45	17,120	827	4,280
Elect. system check & maintenance[12]		650	Annual	13,468	650	0	Annual	13,468	650	0	Annual	13,468	650	0
Operator cost[5]		4,800	Annual	99,456	4,800	0	Annual	99,456	4,800	0	Annual	99,456	4,800	0
Power[5,6]		50,000	Annual	1,036,002	50,000	0	Annual	1,036,002	50,000	0	Annual	1,036,002	50,000	0
Generator fuel[10]		7,900	Annual	163,688	7,900	0	Annual	163,688	7,900	0	Annual	163,688	7,900	0
Generator maintenance[11]		1,200	Annual	24,864	1,200	0	Annual	24,864	1,200	0	Annual	24,864	1,200	0
Generator radiator repair		2,500	15,30	2,159	105	0	15,30	2,159	105	0	15,30	2,159	105	0
Generator radiator replacement		20,000	45	3,424	166	3,424	45	3,424	166	3,424	45	3,424	166	3,424
Generator controls upgraded		13,000	45	2,226	108	2,226	45	2,226	108	2,226	45	2,226	108	2,226
Misc site upkeep/repairs[5]		100	Annual	2,072	100	0	Annual	2,072	100	0	Annual	2,072	100	0
Column Total				1,577,099	76,122	70,654		1,865,884	90,058	100,374		**2,136,829**	**103,135**	131,806
Total PW Life Cycle Costs[8]				1,506,446				1,765,511				**2,005,023**		
Total Annual Sinking Fund Amounts[9]					68,158				70,994				**72,102**	

Footnotes

1) Based on a LCCA analysis period of: 45 years

2) Based on interest rates as follows: Discount rate on the cost of services: 4.00%

3) 2013 is the base year, using 2012 prices escalated somewhat by rounding up cost quotes. The constant or base year cost will NOT be adjusted for inflation/deflation as per standard LCCA practice, because "project benefits should be dependent only upon real gains (cost savings or expanded output), rather than purely price effects" (Life-Cycle Cost Analysis Primer, 2002, USDOT).

4) This is the annualized cost of expenditures over the 45 year analysis period.

5) Based on information from the HOA.

6) HOA electricity costs are not linear with the number of active users. There is a demand charge that was 55% of the bill in an irrigation month, and it may also be similar in non-irrigation months as well. However, WEI did not figure an increase in power usage over time with an increase in users because it would result in current users paying additional now to cover increased power costs when later users hook up. If all current costs are spread among current users it will establish what the user rate arguably should be, and because the demand charge will not increase linearly with additional users, there may be a slight excess funds in time. If that occurred, the HOA could look at a service fee reduction. Currently, the opposite is true--fees have not been enough. Consequently, the approach here is to ignore the future increase in power consumption as that will be more than offset by additional customer fees (if fees are raised to meet costs as outlined in this report).

7) Present Worth or Value estimated on base year information from various vendors and service providers and discounted at 45 years. That is, it was figured as the base year value times the current value factor times the number of items times the discount factor. Some line items cover a variety of facilities where some are at full value, like a well and casing, and others are of reduced value, like a pump. A reasonable attempt was made at averaging.

8) Total Present Worth minus Residual Service Life values.

9) The initial construction (first line item in table) was not included because there will not be a full replacement required, but annual costs therefor will show up as debt payments. The frequency and cost of maintenance is based on information from several city public works directors, well drillers and pump service companies in general, and American Pump.

10) Based on 72.2 gallons per hour x 30 min a week for 52 weeks at average 70% load level is1313 gallons a year for exercise runs. Add 260 gallons for 4 hour outage per year = 1574 gallons per year. Figure $5 per gallon equals $7,870 per year of fuel.

11) Cummins annual maintenance contract is $2140 per year. Assumed reduced local maintenance costs.

12) General inspection and tightening of connections will cost approximately $300. An infrared check, which is much better, is approximately $1000. Figured the average using alternating years for each test.

13) The submersible motor brand is Indar and it is not hermetically sealed and thus can be seriviced and refurbished.

Table 8 - Alternative Comparisons[0]			
	Conforming Alternatives (w/o Regional Option)		
Description	Alternative #2 2 Wells (1&2) and medium tank	Alternative #3 3 Wells (1,2,3) and small tank	Alternative #4 4 Wells (1,2,3,4) and no tank
Total Capital Cost of Project Construction[1]	446,000	557,000	643,000
Total Present Worth (cost of system)[2]	1,891,867	2,033,921	2,136,829
Total Present Worth Life Cycle Cost[3]	1,798,216	1,921,786	2,005,023
Total Annual Sinking Fund Amount[4]	69,259	71,286	72,102
Pros	Lowest cost of conforming alternatives, 2 wells and 4 days storage for non-irrigation/fire flow--best redundancy solutions	Stored water recycles with each pump operation, reduces water quality concerns	No storage water quality concerns.
Cons	Stored water quality concerns	Storage is minimal at 1/2 day non-fire and non-irrigation flow (but there are three wells and backup power)	Highest cost of conforming alternatives
Footnotes			
0) Cost comparisons are based on a 45 year analysis period, with the discount rate at 4%.			
1) This is the cost of facilities constructed as part of the project THAT PERTAIN TO ALTERNATIVES ONLY and does not include improvements that are needed regardless of the alternative. These costs do not include corrosion correction, water rights, fire hydrants in Blackhawk Division 2, and an energy audit and operational optimization.			
2) This is the present worth or present value of all the ALTERNATIVE costs. Not included are non-alternative costs as per Footnote (1) above. The higher the cost, the less desirable.			
3) This is the present worth of all alternative costs minus the residual service life at 45 years. This is the best cost value for comparing alternatives.			
4) AFTER project construction, this is the amount of money that annually should be obtained each year to be able to meet all maintenance, operational, refurbishment, and replacement costs for the system over the next 45 years. It DOES NOT include costs for debt repayment for construction of correcting system deficiencies, nor the cost of other measures not associated with alternative comparisons (see footnote 1 above for exclusions). Furthermore, it does not include covering the increase in power consumption or meter and connection costs as more services connect, as the connection and service fees should cover those expenses.			

This section E is on alternative screening and comparisons and not total project costs. Consequently, not considered here are costs that include corrective measures not associated with an alternative. Thus, total project capital costs and financing, as requested on Form 5-A under E.1.b, will not be provided here, but instead will be covered under F.4 that addresses "Total project cost estimates (capital, debt service and O&M).

As for cost escalation factors for power per Form 5-A E.1.d, Table 7 Footnote 6 addresses this issue, but it is repeated here for convenience. HOA electricity costs are not linear with the number of active users. There is a demand charge that was 55% of the bill in an irrigation month, and it may also be similar in non-irrigation months as well. However, WEI did not figure an increase in power usage over time with an increase in users because it would result in current users paying additional now to cover increased power costs when later users hook up. If all current costs are spread among current users it will establish what the user rate arguably should be, and because the demand charge will not increase linearly with additional users, there may be a slight excess funds in time. If that occurred, the HOA could look at a service fee reduction. Currently, the opposite is true--fees have not been enough. Consequently, the approach here is to ignore the future increase in power consumption except when looking at potential future monthly rates, which is done in Table 11.

2. **Evaluation of Environmental Impacts** Alternative 2 would not involve drilling any more wells. Wells can be a means of introducing pollution into the groundwater. Alternatives 3 and 4 involve one or two additional wells, respectively, so in this respect, Alternative 2 is preferred. However, Alternatives 2 and 3 involve a tank. More extensive discussion on environmental impacts is provided in the EID report.

3. **Impacts to Water Supply Systems** Tom Wood of Clearwater Geosciences was involved in the original groundwater study. His influence study is provided on the DVD inside the back cover of WEI-furnished hard copies of this report. Alternative 2 involves no new wells, but only a pump upgrade in the existing Well 1 and connecting it to the system as previously designed and approved by DEQ and other agencies, but which was not done because of the contractor leaving the project because of the developer failing to pay for work completed. The wells should not present an unwarranted impact on the groundwater system. However, there will need to be a more water rights obtained before more than 65 users are connected.

4. **Water Reliability** The wells are in the edge of the Upper Snake River Aquifer and are believed to be very reliable. Again, reference is made to the report by Tom Wood.

5. **Comparison of Environmental Effects and Cost of Mitigation** Reference is made to the EID report.

6. **Evaluation of Final Public Input** Reports were made available November 13 to all property owners for review and comment. Only questions were received, and they were from several Blackhawk water board members, which questions were answered. Subsequently, all property owners were notified of a meeting that was to be held November 27 where WEI would be in attendance to discuss the study process, results, and recommendations. Questions were asked at the meeting, but no comments were made that would involve a change in the report. Subsequently, there was a joint meeting of the Blackhawk HOA and Water Board where the report recommended Alternative #2 was adopted, along with a rate structure that is a little different than mentioned in the report, but the net result is the same annual income to cover all the costs associated with Alternative #2. Information of meetings is presented in Appendix 6.

7. **Cost Effectiveness Analysis Per 40 CFR 35.2030.b.3** This regulation pertains to alternative wastewater treatment facilities and not water systems. However, applicable points have been covered. An LCCA for a period of at least 20 years was provided, showing both present worth and equivalent uniform annual cost,

and even the present worth cost minus residual service life. A discount rate of 4% was used.

F. SELECTED ALTERNATIVE DESCRIPTION AND IMPLEMENTATION ARRANGEMENTS

1. **Justification of Selected Alternative** From strictly a "belt and suspenders" redundancy protection perspective, which is to consider, all costs aside, which alternative best mitigates all considered failure scenarios, the best alternative is Alternative #2. It provides a backup well with backup power. It provides a tank with 4 days of storage without fire flows and irrigation, the former of which will not often occur, and the latter of which can be postponed if needed until other measures are corrected. Again, if cost were not an option, this would be the WEI recommendation. Adding cost considerations does not complicate the matter, because as noted before and as shown in Table 8, Alternative #2 is the lowest cost alternative of conforming alternatives investigated. The only conforming alternative not investigated is the regional alternative, but as noted earlier, even if that was an option, there is nothing proposed in Alternative #2 that would not have to be done anyway, and most likely Alternative #2 and other project recommendations would be required before a regional solution would even be an option. In other words, Alternative #2 most likely must happen before the regional solution of Alternative #5 is a viable option, and Alternative #5 would most likely involve the same Alternative #2 facilities plus a booster station and 2-3/8 mile of waterline, so it likely is not less overall cost, but only allows consolidation of services and potentially long run savings. Thus, Alternative #5 is an option that should be explored in the future, especially if and when this study project work is completed.

2. **Preliminary Design of the Selected Alternative** Improvements to Well #1 were designed as part of the Phase II improvements. The tank on the hill was recommended in the *Basis of Design,* but there was never any design provided other than commentary on size and elevation needs. The generator was also designed as part of Phase II, once by WEI and again by Bradley Engineering. The plans prepared by the latter can still be used, except that the HOA agrees to WEI recommended changes. First, rather than have a separate building for the generator, it can go on a concrete slab with an all-weather sound-attenuated housing. Second, it can be placed atop a dual wall 660 gallon fuel tank that has spill protection, which volume was shown to be adequate in *Basis of Design* report. This approach eliminates another slab and wall structure for spill containment with tank inside as shown on the Bradley plans. A dual wall tank has been approved by DEQ under the conditions proposed.

3. **Further Justification** Alternative #2 has been shown to have the lowest capital, present worth, and life-cycle cost. It adds no wells or additional points where pollutants could more easily get into the groundwater. Compared with other alternatives, the only negative is it requires a 20 foot high by 40 diameter tank on

the hill. This is not thought to be a sufficient negative to tip the scales to another alternative, the next best by function, protection, and costs being Alternative #3.

4. **Total Project Costs** Table 8 presented above shows total alternative costs. However, excluded from Table 8 are non-alternative costs that are shown in Table 9 below. Table 10 combines all system costs of capital construction, operation and maintenance (O&M), and rehabilitation or refurbishment and replacement (R&R) for a 45 year analysis cycle.

   Table 11 then uses these costs and adds debt service costs to come up with a monthly service rate. As a sample, numbers are provided where the HOA borrows 100% of the capital costs and where each equivalent residential unit (EDU), of which there is one per residential service and 1.5 for the church, pay $1000 and the balance is loaned. There could be other options. As shown, monthly service rates are high—perhaps high enough to exceed 2% of the Planning Area median household income (MHI). If such were the case, there may be opportunity for reduced interest rates and possible partial grants and/or loan "forgiveness."

Table 9 - Distribution and Non-Alternative System Costs[0]

Description	Units	Qty	Base Year Unit Cost[1]: Construction Cost: Unit $	Construction Cost: Extended	Study or Design	Total	Work Years[4]	Present Worth or Value[4]	Equivalent Uniform Annual Cost[2]	PW of Residual Service Life[3]
Corrosion correction[5]	Each	1	50,000	50,000	5,000	55,000	0	55,000	2,655	0
Fire hydrants in BH Div. 2	Each	12	5,000	60,000	0	60,000	0	60,000	2,896	0
Energy audit and operational optimization study & settings	Each	1	2,000	2,000	5,000	7,000	0	7,000	338	0
16" waterline, valves, & fittings	LF	14700	130	1,911,000	59,000	1,970,000	90	19,246	929	0
12" waterline, valves, & fittings	LF	2650	90	238,500	11,000	249,500	90	2,438	118	0
10" waterline, valves, & fittings	LF	1700	85	144,500	7,000	151,500	90	1,480	72	0
8" waterline, valves, & fittings	LF	14900	80	1,192,000	60,000	1,252,000	90	12,232	591	0
10" and 3" PRV unit on 12" line	Vault	3	62,000	186,000	0	186,000	45	31,843	1,537	31,843
8" and 3" PRV unit on 10" line	Vault	1	58,000	58,000	0	58,000	45	9,930	480	1,700
6" and 2" PRV unit on 8" line	Vault	5	50,000	250,000	0	250,000	45	42,800	2,066	0
Fire hydrants	Each	42	3,000	126,000	0	126,000	22.5,45	73,705	3,558	0
Service connections	Each	139	1,900	264,100	0	264,100	45	45,214	2,183	0
Service meters	Each	139	1,000	139,000	0	139,000	22.5,45	81,309	3,925	7,932
Service lines	Each	139	2,000	278,000	0	278,000	90	2,716	132	0
Misc Maintenance and repair	LS	1	5,000	5,000	0	5,000	Annual	103,600	5,000	0
Column Total					Year 0 Capital Cost:		122,000	548,511	26,480	41,475
Total PW Life Cycle Costs[6]								507,036		
Total Sinking Fund Amounts[7]									20,591	

Footnotes

0) Based on LCCA analysis period of: 45 years
Based on interest rates as follows: Discount rate on the cost of services: 4.00%

1) 2013 is the base year, using 2012 prices escalated somewhat by rounding up cost quotes. The constant or base year cost will NOT be adjusted for inflation/deflation as per standard LCCA practice, because "project benefits should be dependent only upon real gains (cost savings or expanded output), rather than purely price effects" (Life-Cycle Cost Analysis Primer, 2002, USDOT.

2) This is the annualized cost of expenditures over the 45 year analysis period.

3) Present Worth or Value estimated on base year information from various vendors and service providers and discounted at 45 years. That is, it was figured as the base year value times the current value factor times the number of items times the discount factor. Some line items cover a variety of facilities where some are at full value, like a well and casing, and others are of reduced value, like a pump. A reasonable attempt was made at averaging.

4) The pipeline life, both main and services, are assumed t ooverall have a design life at twice the analysis period of 45 years. However, for this evaluation, 1/3 is assumed to require replacement of equivalent cost in repairs by 45 years, so 1/3 base year cost will be used.

5) Per Infinity Corrosion Group, a corrosion study just of the PRVs would be approximately $3000, which would involve checking electrical currents that may be coming from power lines, but if impacts of soils were included, the cost would be approximately $5000. The cost for correction could vary substantially, but it was anticipated that maximum mitigative measures would not exceed $50,000.

6) Total Present Worth minus Residual Service Life values.

7) The initial construction (first 3 line items in table) were not included because there will not be a full replacement required, but annual costs therefor will show up as debt payments.

Table 10 - Summary of Costs (Excludes Debt Service)

Description	Project Capital Cost	45 Year Life-Cycle Costs: Present Worth Cost: Residual Service Life Excluded	Present Worth Cost: Residual Service Life Included	Total Annual Sinking Fund Amount
Alternative #2 (Upgrade Well 2, generator, 174,000 gallon tank, finish uncompleted Phase 2 work) [See Table 8]	446,000	1,891,867	1,798,216	69,259
Distribution and Non-Alternative System Costs [See Table 9]	122,000	548,511	507,036	20,591
Total (without debt service)	**568,000**	**2,440,378**	**2,305,252**	**89,850**

Table 11 - Loans and Service Rates		
Monthly User Rates to Cover O&M and R&R[1]		
Description	Current	Buildout
Equivalent dwelling units (EDUs) being serviced[2]:	57.5	139.5
Amount of proposed total annual sinking fund per Table 10[3]:	$89,850	$100,362
O&M and R&R annual expenses funded this past year[4]:	$56,456	
EDU monthly service fee needed to cover O&M and R&R costs[5]:	$131	$60
Monthly User Rates to Cover Debt Service[6]		
Description	HOA Share of Project Capital Cost	
Sample HOA shares of Project Capital Cost:	$0	$53,500
Total loan amount:	$568,000	$514,500
Total HOA monthly debt service amount:	$2,965	$2,686
Monthly debt service fee spread over 57.5 EDUs (current):	$52	$47
Monthly debt service fee spread over 139.5 EDUs (buildout):	$22	$20
Total Monthly EDU Rate to Cover All Costs		
O&M, R&R, and debt service costs per current EDU[7]:	**$153**	**$151**

Footnotes

1) O&M is operation and maintenance, and R&R is refurbishment or rehabilitation and replacement.

2) Each residential service counts as 1 EDU. The church counts as 1.5 EDUs. For the current condition, every connected user is used, whether active or not, plus the 3 requested and pending connections because they should be in place by the time. Unlike Table 1 that looks only at active users to check and verify original design demand assumptions, this table looks at the cost spread for the project, which should be across all then-connected users.

3) The 45 year LCCA analysis period covers the buildout case for the most part. Approximately 50% of the power bill is for demand charge, and the other 50% is for usage that will increase linearly with the number of users. Meter reading cost will slightly increase, and the purchase of water rights will also be required, but both are a fairly minimal charge. All other costs remain essentially fixed. Therefore, the buildout total annual sinking fund amount to cover costs will likely increase by an amount of the user ratio139.5/53.5 (using active users) times the annual power bill amount of $49,340 times approximately 50%, or $14,987.

4) Based on HOA expenditures between 10/1/2011 and 10/21/2012, minus meter costs for new users.

5) Proposed annual sinking fund divided by the number of EDUs serviced.This is a year around monthly fee rate based on current year around usage, and is NOT meant to be an irrigation season rate that could be reduced in the winter.

6) The median household income for the Planning Area is assumed to be above the threshold for grant money assistance, which was $36,997 two years ago. Thus, grant monies are not likely available, and the best loan rates are through DEQ at 2.25% over 20 or 30 years. This table is based on 20 year loans.

7) The service area Median Household Income (MHI) is unknown, but for Bonneville County it is $47,828. Using that MHI, it means that if the monthly service fees are above $79.71 per residence, then the DEQ rate of 2.25% might be reduced. Maximum reduction is to 0% interest. Please note that this is not a irrigation season rate that could be lowered during the winter--this is the average monthly rate year around to cover expenses as figured for the usage over the last year.

5. **System Owner Certification** The HOA cannot at this time certify having financial capacity to build and operate the project. Once the study recommendations are adopted by the HOA, every effort will be made to act towards obtaining financial capacity and to secure funding assistance to enable the project, which financing and managerial capacity would be in place before commencement of the project.

6. **Land Availability** The HOA has indicated that land is available where needed and for the cost shown in this report for the tank. All other proposed facilities are either on currently owned land or in public right-of-way.

7. **EID** This is a separate report prepared by others.

8. **Legal, Institutional, and Managerial** The answers below were obtained from the HOA.

    a. **Intermunicipal service agreements** have not been entered into by the HOA.

    b. **Financial arrangements** will be initiated once the study recommendations are adopted and the rate structure modified.

    c. **O&M Requirements** The operation and maintenance budget is still nascent. Once the HOA reviews and approves the report, they will establish an appropriate budget that includes staffing, training, laboratory requirements, special maintenance requirements, residuals disposal, etc.

    d. **The project schedule** will be promulgated after we determine the scope of the project. It is expected that we will proceed with WEI's recommended alternate 2, but that is not a sure thing at this point.

    e. **Operator Licensing** Currently there is one primary operator with a license one level higher than required for this system. The operator is Colvin E Jergins, PE, license number 13610. There is no backup operator.

G. WEI CONCLUSIONS AND RECOMMENDATIONS

1. **Project Alternative Selection** The lowest short and long term cost alternative is Alternative #2, which also is the alternative that provides the best overall balance and redundant protection; that is, it is the most reliable solution under anticipated conditions. It also has very little impact, requiring only an above ground water storage tank that other non-conforming alternatives do not have, but it does not involve an additional well or two penetrating to potable groundwater. WEI recommends Alternative #2 as the best alternative and implementation thereof.

    Another aspect not mentioned elsewhere in this report is the fact that currently the water in the 16" line above the last service is subject to going stagnant. With Alternative #2 (and #3), fresh water could fill the tank though a check valve, and supply back to the system from the tank could return through the currently dry 16" line that is installed from the previously proposed booster station up the hill past where the tank is proposed, which line could also have a check valve so that flow could only go downhill to service users. Using this approach, very little is needed besides interconnects and check valves to keep supply water going up to the tank in the existing connected line and circulating through the tank and back through the currently unused line, keeping water fresh. Without this, water in the upper 16" line would become stagnant and be drawn into use under low pressure conditions.

2. **Project Non-Alternative Recommendations**

    a. **Corrosion** Replacement of the 16" ductile iron waterline and PRVs is well over $2,000,000. These are not facilities that should be allowed to have less than normal or even maximum service life. These facilities have only been installed five years and already there has been substantial and unusual corrosion on the PRVs. This is not normal and is a clear indication that something out of the ordinary is involved—something that should be identified and mitigated. If an ounce of prevention is typically worth a pound of cure, in this case an ounce of prevention is worth more like a ton of cure. It would be irresponsible and poor management to not address this corrosion issue. WEI understands that there is a high voltage power line installed close to the 16" waterline, and there may be electrolysis caused by electromagnetics. It may be that insulators were not used between pipe sections, and electrical current travels along the pipe and corrosion is being manifest where visible in the PRV vaults. WEI recommends having Infinity Corrosion Group of Park City, Utah or another corrosion specialist perform at least an evaluation on the PRVs if not also on the soils. Having the problem identified, recommendations for mitigation could be made which, even if it was as high as the $50,000 used in the cost figures, would be worth it, but the probability is that anode packs or other means can counter the problem at much less cost.

A side note may be helpful regarding the purchase of PRV trim to replace corroded parts. Some of the parts, like tubing, are non-proprietary and can be replaced at much less cost than the PRV manufacturer recently charged the HOA. For a few stainless steel parts for PRV 2-1, the cost of $4,940.47 seems a bit steep, to say the least.

b. **Fire Hydrants** WEI recommends that fire hydrants are installed on water lines in Blackhawk Division 2. The line sizes and pressures are adequate for fire flow delivery—there just needs to be a means of accessing it.

c. **Energy Audit and Operational Optimization** WEI recommends that an energy audit along with operational processes and needs be performed. This involves the normal investigation of energy waste, but also combines the engineering perspective of pump operation and controls to meet flow and pressure needs. For example, at the highest flows is when the highest friction loss occurs that requires higher pressures. The target system pressure need not be at the highest level at all times. Using a PLC on the system, which will be needed anyway to allow alternating well operation, the target pressure could be governed by the flow rate. There could be benefit to having the well-pressurized system at a lower rate and a booster for upper Division 4 and Iron Rim, but preliminary investigation of flows and pressures of well pump curves seem to indicate that there could not be that much reduction in power usage, and the capital, O&M, and R&R cost of a booster part way up the hill, even a single booster for normal flows only, would not be cost effective. Moreover, using a Wesley Tool and dropping two half rate pumps at 500 gpm each in a single well was considered to increase efficiency and reduce power costs. But at 500 gpm, the existing high pressure pumps still operate at a fairly respectful 78% efficiency. The key to gaining dividends is to operate the system to reduce as much as possible the demand charge, which is a charge not for power used but for the power company having to have excess power available at all times to handle when the system needs to operate at full power. The charge is based on the highest average power use per 15 minute period during the month. The energy audit and operational optimization can, with use of the PLC, help reduce the demand change through better management of power consumption. How much difference can it make? As noted earlier, the September 2012 Well 2 and Well House power consumption charge was $1842.92 while the demand charge, which has nothing to do with the amount of power consumed, was $2,775.52. While only a portion of the current demand charge could be reduced, WEI considers that a charge worth minimizing—especially if the cost of evaluation and correction as anticipated can be covered in only an irrigation season of power bills.

d. **Irrigation Scheduling** In connection with the above, irrigation use should be staggered as much as possible. The system was designed for irrigation to occur over a 16 hour period each day (not during the hottest 8 hours) so that demands are spread out and flow rates kept more uniform at a lower rate and thus reduce peak usage and demand charges.

e. **Exposed Air Release Valve** A low cost item was not discussed as part of the study because it needs to be dealt with immediately and not wait for study completion, approval, and project implementation. However, it is mentioned here to be sure it is not overlooked. During a field check on existing facilities, it was noticed that at the upper end of the well-pressurized 16" waterline, on the south side of the road near where the water tank would be constructed, the end of the line has an air valve above ground that is subject to freezing and pipe bursting once thawed. This should be located in a vault below grade with a vent pipe and a drain line downhill to daylight.

f. **Surge Anticipator Valve** The well house has a surge anticipator valve installed which is vital to protect the system against horrific backflow water hammer potential. Currently the valve settings are not correct, so the valve is isolated and not operable in the system. This needs to be corrected as soon as possible!

g. **Rate Structure and Amount** WEI recommends the HOA evaluate costs and monthly fees and make changes as necessary to ensure adequate funding. More is said on this in subsection G.5 below.

h. **Cross Connection Control Program** The HOA should prepare and implement a program for cross connection protection.

3. **Recommended Total Project Cost** The recommended total cost is provided on Table 10.

4. **Potential Funding Options** As noted earlier, the best option appears to be a low interest loan through DEQ. If the median household annual income is less than 50 times the annual per residence charge for service rates, then grants, lower interest rates, or partial loan "forgiveness" may be available.

5. **Rate Structure** Table 11 shows the amount of monthly user rates required for O&M and R&R of existing and proposed facilities based on the 45 year LCCA. The amount of monthly user rates required for debt service will vary depending upon the amount of up front capital investment by the HOA, the interest rate on loans, and whether there are any grants. Table 11 also shows the rate initially with 57.5 EDU users and also after buildout with 139.5 EDU users. This fee is NOT based on irrigation season only, with a reduced amount allowed during the winter months. This is the amount required year around at current use rates. Once there is no debt service and buildout of the Planning Area occurs, the monthly user rate, aside from inflation, could be much lower. Currently the monthly rate is $50 for the first 10,000 gallons and $0.50 per 1000 gallons thereafter. It would probably be well to substantially raise both the base fee and base gallons allowed. Under the current structure, using the May 2012 daily flow rate of 200,600 gallons, the average cost per homeowner would have been approximately $103. The HOA should look at both summer and winter fees and ensure that there is sufficient funding.

   It may be well to point out that the monthly rates shown on Table 11 are designed to cover expenses over the long run. If the HOA has no cash reserve at the moment for any sizable expenditure, the actual cash flow may hit a snag, there not being enough accrued to cover the costs. The HOA probably should investigate charging a one-time fee to obtain adequate reserve funding, if necessary.

   The HOA must have a justifiable and equitable approach to setting rates, and the best way to do that is to base them on the costs presented in this study, because the study presents best estimates of long term costs, and also because presumably the study will be adopted by the HOA and Water Board. Using the study, there can be differentiation between "system" costs that are essentially unaffected by usage rates and which should be used to set the flat monthly rate, and "usage" rates that are essentially a result only of gallons pumped that should be used to set the variable water usage rate, which can start with the first 1000 gallons. Table 12 provides information on the division of these rates to obtain the overall annual fees needed to cover Alternative #2 life cycle costs.

Table 12 - Monthly Costs and Fee Structure		
Description	Water Usage Cost[1]	Water System cost[2]
Pump and motor O&M and R&R[3]	$171	
Electricity cost[4]	$4,167	
All other O&M and R&R[5]		$3,150
Debt burden for capital cost[6]		$2,965
Total Cost	**$4,338**	**$6,115**
Gallons used last year	49,739,000	
Average gallons per month	4,144,917	
Variable cost & Use rate per 1000 gallons (starting with 1st 1000 gallons)	**$1.05**	
Flat monthly fee per user (at 57.5 EDUs)		**$107.00**
Footnotes		

1) These are costs that are mostly affected by ***how much*** water is pumped and used as opposed to costs that will occur regardless of usage.

2) These are costs that are little affected by how much water is pumped and used. They pertain to having the system in place that equally serves all users.

3) Lines 2 through 6 of Table 7

4) Line 12 of Table 7. Ancillary electricity use is negligible compared to pumping use, so the full electrical power use costs could reasonably be applied to water usage. The question is about the demand charge. It could be a system cost in that every user needs the benefit of the system that has the capability of running the pumps. On the other hand, it is likely the high users that mostly cause the high flow rates and corresponding high power usage and demand rate. The HOA could look at this either way, but it seems that the more appropriate way is to keep the demand rate as a water use cost, and thus the entire electrical bill would be a part of the water use cost rather than system cost. That is the approach used in the table above.

5) Includes everything except what was is identified as water usage O&M

6) Assuming 2.25% interest over 20 years

APPENDICES

1. **Relevant Engineering Data** See *Basis of Design Report* on a DVD inside WEI prepared hard copies of the report.

2. **Fee Structure and O&M Budget** See Subsection B.7 of the narrative.

3. **Figures and Graphic Data** See well logs, WEI well house plans, and Bradley Engineering plans on a DVD inside WEI prepared hard copies of the report.

4. **Mailing List and Correspondence** Form 5-A list this appendix, and then describes what mostly pertains to the EID. However, in the course of performing this Engineering Report, the list of contacts are as follows:
   - Colvin Jergins, HOA, HOA liaison & water system operator, general issues – 390.7073
   - Kendall ?, HK Constructors, Lead of Utility Div., who was superintendent – 523.6600
   - Barry Hanson, HK Constructors, Henry Creek Road waterline superintendent – 523.6600
   - Matt Hartline, HK Constructors, Bidder for Henry Creek Road waterline, costs – 523.6600
   - Bill Manwill, former Foothill Properties engineer, as-built conditions – 522.0023
   - Nathan Taylor, EIPHD, changing from public to private water – 522.0310
   - Willie Teuscher, DEQ, changing from public to private water & misc – 528.2650
   - Carlin Feisthammel, DEQ, generator fuel spill issue, asbuilt plans & info – 528.2650
   - Dennis Dunn, IDWR, changing from public to private water – 525-7161
   - Suzanne ?, Booneville County Planning, changing from public to private water – 524.7920
   - Lynn Shearer, Electrical Equip., as-builts, stored materials, costs and lifespans – 522.4732
   - Greg Kittridge, Cummins Generator, generator system – 208-387.2866
   - Dan, Jody, & Mike Denning, Denning Well Drilling, wells – 390.4600, 589.4601, 317.8887
   - Joe Vollmer, Vollmer Well Drilling, wells – 552.0236
   - Tim Norman, HD Supply, materials costs – 523.3335
   - Jacob ?, American Pump, pump and motor costs and repair and replace cycles – 529-4517
   - Ken Anderson, Fire Marshall, fire flow requirements – 612.8495
   - Dan Gubler, Fire District Commissioner, 520.5968
   - Kevin ?, Sunstar, motor refurbishment and replacement cycles and cost – 806.793.2812
   - Goulds Pump, pump & motor refurbishment & replacement cycles and cost – 806.763.7867
   - Ted Cotton, Xerxes, underground fiberglass tank – 406.219.3199
   - Robert, National Tank, Dan Hartog underground plastic tanks – 888.686.8265
   - Anna ?, Tank Depot, underground plastic tanks – 866.926.5603
   - Tim ?, Loomis Tanks, underground plastic tanks – 800.549.5514
   - Mark Johnson, Johnson Precast, concrete Jersey barriers – 6556-9977
   - ??, Oldcastle, concrete Jersey barriers – 522.6150
   - Eric Lewellen, Infinity Corrosion Group, Inc, corrosion issues – 801.834.1159
   - Dale Fletcher, GC Systems, PRV vendor regarding corrosion issues – 253.939.8322
   - ??, Superior Tank, welded and bolted steel tank costs and cycles – 800.221.8265
   - Steve Bishop, Superior Tank Coating Div., tank maint. costs and cycles – 310.629.0547
   - ??, Columbian Tec Tank, bolted steel tanks – 661.636.1316
   - Michael ?, Pittsburg Tank, welded steel tanks - ??
   - Greg Lanning, Pocatello PWD, tank and pump O&M and R&R cost and cycles – 234.6189
   - John Millar, Rexburg PWD, tank, pump, & well O&M & R&R cost and cycles – 359.3020
   - David Richards, I.F. Water Mgr, tank & pump O&M and R&R cost and cycles – 612.8414
   - Craig Sturman, Ucon PWD, tank, pump, & well O&M & R&R cost and cycles – 523.3971
   - Tom Wood, Clearwater Geosciences, well and groundwater issues – 589.5555

In addition to the above, see email correspondence between Colvin Jergins and WEI provided on the DVD inside WEI prepared hard copies of the report.

5. **Hydraulic Analysis (current and proposed)** See *Basis of Design Report* on a DVD inside WEI prepared hard copies of the report.

6. **Pubic Participation Information** See subsequent

7. **Reference Documents** See *Basis of Design Report,* WEI 2009 memorandum, and Clearwater Geosciences groundwater report on a DVD inside WEI prepared hard copies of the report.

8. **Water Quality Tests** See B.4 in the narrative.

9. **DEQ Sanitary Survey** See on a DVD inside WEI prepared hard copies of the report.

Minutes of a Meeting of the Blackhawk and Iron Rim Home Owners

LDS Church, 7955 Ledgerock Rd
Idaho Falls, Idaho
November 27, 2012

The Blackhawk/Iron Rim Water System obtained a grant from the State of Idaho to commission a study of the system to determine what corrective action was necessary to bring the system into compliance with DEQ requirements. Williams Engineering Inc. (WEI) was commissioned to perform the study. One of the requirements imposed as a condition of receiving the grant was that the report of the study be presented at a public meeting. A meeting of the Homeowners and lot owners of Blackhawk and Iron Rim Estates was called on November 27, 2012 to publicly review the report.

Members of the HOA were notified of the meeting in three ways.

1. The meeting announcement was e-mailed to each member of the HOA who had an e-mail address on file.
2. Those who did not have an e-mail address on file were mailed a notice of the meeting to their USPS address of record.
3. A copy of the meeting notice was hand delivered to each residence in the Blackhawk and Iron Rim.

The meeting was called to order at the LDS Church on Ledgerock Road at 7:00 PM on November 27, 2012 by Colvin Jergins, Vice President of the Blackhawk HOA Board of Directors. Colvin introduced himself, briefly stated the reason for the meeting and then introduced Gerald Williams, the engineer who performed the study and authored the report.

Gerald presented the report and highlighted the three viable alternatives therein to bring the system into compliance with the DEQ requirements. Gerald pointed out that the WEI recommended that the HOA accept and implement alternative two. (Alternative two installs a new pump in well no one, installs the emergency generator and installs a storage tank at tank site one on Henry Creek Road.)

At the conclusion of Gerald's presentation, public comment was encouraged. Several questions were asked most of them relating to clarifications in the report and the source of information used to prepare the cost estimates and funding mechanism proposed. Some of the questions were relative to technical details of the proposal. All questions were answered by Gerald to the satisfaction of the members present.

Gerald then discussed some issues with the water system that need corrective action but do not rise to the level of making the system noncompliant with DEQ requirements. The issues were:

1. The surge anticipator valve in the well house is isolated and therefore not functional. This valve needs to be restored to service.

2. The air vent at the top of the water line on Henry Creek Rd is exposed to freezing temperatures and needs to be freeze protected.
3. Some of the deficiencies listed in the DEQ Sanitary Survey had not been corrected and those need to be addressed.
4. The system has experienced unexpectedly rapid corrosion and the cause needs to be identified and rectified.

Colvin then introduced Royce Lee who is the attorney for the HOA and asked him to brief the members on the status of a legal action.

Royce reported on the progress in filing legal action to recover the generator and pump with appurtenances from Electrical Equipment Co (EE). EE is holding the generator and pump along with other items as collateral for a debt that is owed them by the heirs to George McDaniels' estate. George had contracted EE to install the generator and pump along with other items of electrical distribution. When George died, the work stopped and EE was owed an amount of money reported to be in the neighborhood of $39,000.00 for labor performed to date. The generator, pump and appurtenances were in storage at EE shop waiting for installation. Those items had been paid for by George prior to his passing. EE did not file a lien for recovery of their labor expense from the estate. The estate executor, Wendy McDaniel then turned over all of the water system including all equipment to the HOA. The equipment included the generator, pump and appurtenances. Subsequent to the turn over of the system and equipment to the HOA, EE made a demand to the estate for payment of the labor expense as well as storage fees for the equipment. Absent that payment, EE then refused to release the generator and equipment even though it belonged to the HOA, not to the estate. The debt owed to EE is owed by the estate-not the HOA. The HOA had asked Royce Lee to file an action to recover the equipment and have it delivered to the well house for immediate installation. Royce reported that he had completed a draft of the complaint and had distributed it to the members of the Water Committee. He asked if there were any comments to the draft and for approval of the committee to file the action. Colvin requested a vote of the committee to approve filing the action. The members of the committee who were present (there was a quorum present) unanimously approved filing the action.

Rick Gordon asked whether the overdue debt to the HOA for water fees had been aggressively pursued. Colvin acknowledged that he had not aggressively pursued collection of the debt, but that a debt collection agency had been contacted and would be working on it soon.

The meeting conversation then digressed to items outside the scope of the public review and Colvin called for a vote on the recommendations of the report. Colvin reiterated the engineer's recommendation that alternative two be accepted and implemented along with funding the improvements with increased water rates. Colvin asked for a show of hands of those supporting that recommendation. The show of hands was nearly unanimous with only one or two abstentions. Colvin declared that Alternative two was accepted by majority vote of the members present.

The meeting ended at that point, at approximately 9:00 PM.
Members present were:
Colvin Jergins PE PMP,
    Vice president of Blackhawk HOA Board of Directors, member Blackhawk/Iron Rim Water Committee.
Greg Sellers
    Member Blackhawk HOA Board of Directors, member Blackhawk/Iron Rim Water Committee.
Mark Smith
    Member Blackhawk/Iron Rim Water Committee.
Frank Sadlon
    Member Blackhawk/Iron Rim Water Committee.
Clint Behrend MD.
    Member Blackhawk HOA Board of Directors
Kevin Miller
    Member Blackhawk HOA Board of Directors
Gerald Williams PE. CFM.
    Williams Engineering Co. Inc.
Royce Lee Esq.
    Attorney for Blackhawk HOA.

Gary Coffin PE	Sandy Whitmire
Marilyn Coffin	Nikla Lay.... Name not decipherable
Robin Jergins	Richard Penney
Rick Gordon	Glen Carpenter
Bryson Higley	Jeremy Jennings
Clayton Moore	Guy Lewis
Jena Moore	Wayne Ball
Richard Wyman	Peggy Wyman

Minutes of a Meeting to Adjust the Rates for Water for the Blackhawk/Iron Rim Water System

8070 Blackhawk Dr.
Idaho Falls, Idaho

The Blackhawk/Iron Rim Water System Committee was formed for the purpose of administering the Water system. The committee was formed pursuant to approval of the "WATER WELL AGREEMENT OF BLACKHAWK HOME OWNERS ASSOCIATION INC. AND IRON RIM RANCH HOME OWNERS ASSOCIATION, INC." (the agreement) by both Boards of Directors.

Pursuant to the authority granted the committee by the agreement, the committee met to adjust the water rates for the users on the system. In view of the fact that the agreement gives the right to the HOA boards of directors to overrule the action of the committee, it was felt to be prudent to have the two HOA boards of Directors attend the meeting. This meeting adjusts the rates charged to the homeowners for water used from the system. It was felt that both boards of directors should attend this meeting to ensure that the decision would not be overruled.

The authority for this specific water rate adjustment was granted the committee by action of a majority of the homeowners present at the meeting of November 27, 2012. In that meeting, the report of the water system study was presented. The decision of the members present was that Alternative two of the report would be implemented and the rates would be adjusted to finance the improvements.

Minutes of the meeting

The meeting was called to order by Colvin at approximately 7:40 pm on December 5, 2012. Present were

Colvin E Jergins PE	BH HOA and Water committee
Greg Sellers	BH HOA and Water committee
Mark Smith	Iron Rim HOA and Water committee
Steve Wetzel	Iron Rim HOA and Water committee
Alicia De la Cruz	BH HOA
Clint Behrend MD	BH HOA
Caren Smith	Iron Rim HOA
Kevin Miller	BH HOA

Colvin stated that the purpose of the meeting was to adjust the water rates in order to finance the system upgrades as directed in the meeting of Nov 27, 2012. Colvin proposed as a starting point setting the rates as recommended by Gerald Williams in his report. Gerald had, subsequent to the report presentation, prepared a new table, table 12 to recommend a rate schedule. With this new schedule as a starting point, the committee with input from the HOA board members present established the new rates as follows

$100.00 per month for the first 10,000 gallons and $.50 for each additional 1,000 gallons during the irrigation months of April through October inclusive.
$100.00 flat rate for the months of November through March inclusive.

The HOA dues will be increased from $250.00 per year to $500.00 per year.

The above rate schedule was proposed as a motion and voted on. It unanimously passed.

The issue of freeze protection for the vent line at the top of the hill was raised. Colvin was directed to hire a contractor to bury the device appropriately to provide freeze protection.

The issue of the isolated surge anticipator valve was discussed. Colvin was authorized to hire a contractor to place the surge protector back on line.

The issue of corrosion control was addressed. Colvin was directed to look into having a NACE Engineer evaluate the reason for the corrosion and make a recommendation for mitigation.

The issue of insurance payment for the damage to the well house was raised. Colvin was directed to have a contractor give us a bid to repair the damage so that we can see if the adjuster's estimate is accurate.

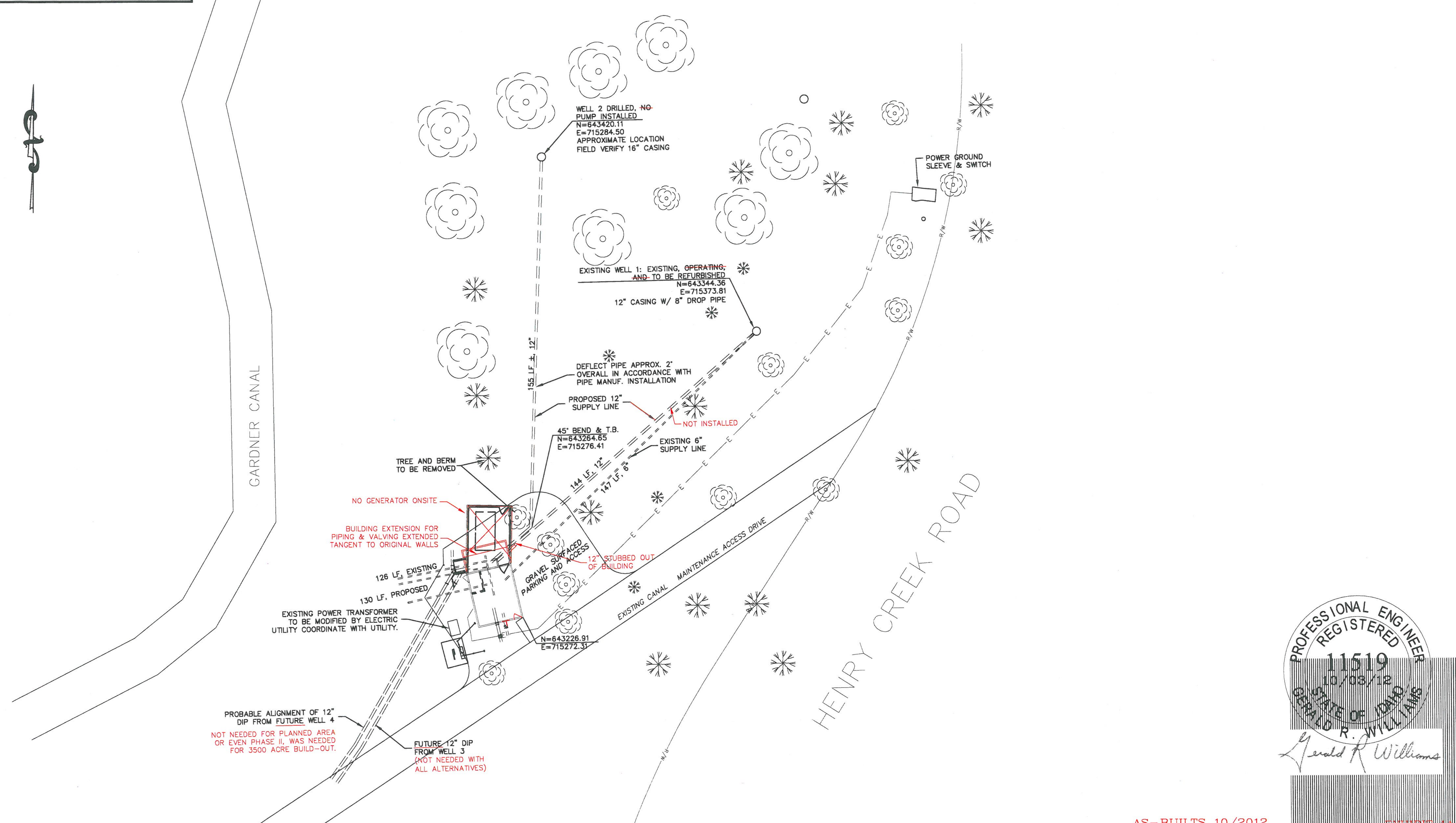
Colvin requested reimbursement for his, Greg's and Frank's out of pocket expenses for maintenance on the system. The request was approved.

Colvin brought up the issue of the broken heater for the well house. Colvin was directed to obtain the necessary repair parts and to repair the heater.

The meeting was adjourned at 9:30 PM
Colvin

GENERAL NOTES:

1. SEE WELL HOUSE SHEETS FOR LAYOUT DETAILS.
2. ALL PROPOSED PIPE SHALL BE CL 350 DIP.
3. EXISTING PIPING FROM WELL 1 SHALL BE ABANDONED.



AS-BUILTS 10/2012

EXHIBIT 1A

DESCRIPTION	DATE
REVISION 1 REMOVED "#" REFERENCES	3/19/07
REVISION 2 MODIFY WELL 2 SUPPLY LINE	8/9/07
REVISION 3 AS-BUILTS	10/03/12

SCALE	PLAN	PROFILE	SECTIONS	DETAILS
HORIZONTAL	0 10 20 40			
VERTICAL				

WILLIAMS ENGINEERING, INC.
343 E 4th N Suite 117 REXBURG, ID 83440
208-359-5353 PH. 208-359-8181 FAX

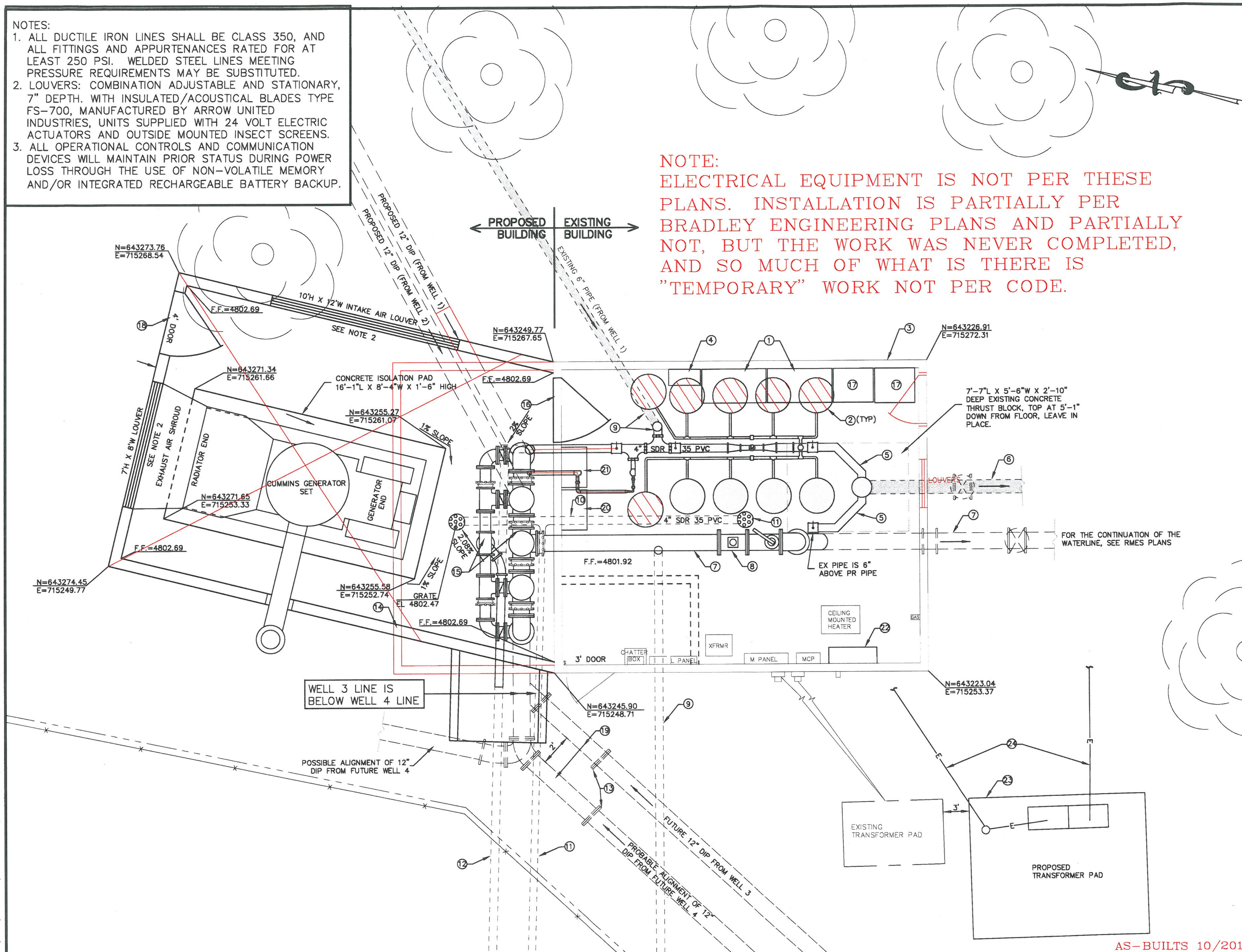
BLACKHAWK SUBDIVISION
WELL SITE 1 IMPROVEMENTS
BLACKHAWK SUBDIVISION

~~SHEET 3~~

EDIT DATE
10/03/2012

PATH: A:\PROJECTS\Idaho\2004-2010\1-DEVELOPMENT\D-Foothill Properties-Blackhawk\Technical\Entire Development\Water and Irrigation\DESIGN\BH-WELL-SITE asbuilt.dwg DATE: Nov 01, 2012 - 4:16pm Plotted by scheney

NOTES:
1. ALL DUCTILE IRON LINES SHALL BE CLASS 350, AND ALL FITTINGS AND APPURTENANCES RATED FOR AT LEAST 250 PSI. WELDED STEEL LINES MEETING PRESSURE REQUIREMENTS MAY BE SUBSTITUTED.
2. LOUVERS: COMBINATION ADJUSTABLE AND STATIONARY, 7" DEPTH. WITH INSULATED/ACOUSTICAL BLADES TYPE FS-700, MANUFACTURED BY ARROW UNITED INDUSTRIES, UNITS SUPPLIED WITH 24 VOLT ELECTRIC ACTUATORS AND OUTSIDE MOUNTED INSECT SCREENS.
3. ALL OPERATIONAL CONTROLS AND COMMUNICATION DEVICES WILL MAINTAIN PRIOR STATUS DURING POWER LOSS THROUGH THE USE OF NON-VOLATILE MEMORY AND/OR INTEGRATED RECHARGEABLE BATTERY BACKUP.



AS-BUILTS 10/2012

DRAWING KEY & NOTES

1. PROPOSED VFD'S FOR WELLS 1 & 2
2. EXISTING BLADDER TANKS
3. EXISTING 8" CMU WALL
4. PROPOSED PROGRAMMABLE LOGIC CONTROLLER (PLC)
5. EXISTING DISCHARGE LINE
6. EXISTING 10" WATER LINE
7. PROPOSED 12" DIP WATER LINE
8. PROPOSED FLOW METER, MX ULTRA MAG (SEE SHEETS 9H AND 9I)
9. EXISTING 6" LINE FOR SECOND WELL (REMOVE RISER IN HOUSE, FLOOR OPENING PLUGGED, AND UNDERGROUND TO BE ABANDONED)
10. REMOVE EXISTING 45° BEND, TRANSITION COUPLING, REPLACE WITH TEE, EXTEND DRAIN NORTH TO PROPOSED FLOOR DRAIN, AND CONNECT TEE TO EXISTING SCH 40 PVC DRAIN TO WEST. REALIGN AS NECESSARY TO AVOID 12" SUPPLY LINES FROM WELLS.
11. EXISTING FLOOR DRAIN, 4" SCH 40 PVC OUTSIDE OF EXISTING BLDG, 4" SDR 35 PVC UNDER BLDG
12. EXISITING FLUSH/WASTE DRAIN, 6" STEEL PIPE
13. PROPOSED BLIND FLANGE AT END OF SPOOL (PROJECT LIMIT)
14. PROPOSED 8" CMU WALL
15. PROPOSED DISCHARGE AND WASTE HEADERS
16. PROPOSED DOOR OPENING IN WALL, LINTEL REQUIRED, INSTALL SELF-CLOSING 1-HOUR-RATED FIREDOOR.
17. FUTURE SOFT STARTS FOR WELLS 3 & 4
18. PROPOSED DOOR SHALL BE 1-HOUR-RATED FIRE DOOR.
19. PROPOSED 5' LG FLxFL DIP SPOOL
20. PROPOSED AUTOMATIC TRANSFER SWITCH FOR WELLS 1 AND 2
21. FUTURE AUTOMATIC TRANSFER SWITCH FOR WELLS 3 AND 4
22. PROPOSED MOTOR POWER PANEL
23. PROPOSED TRANSFORMER PAD – SEE SHEET 7 FOR DETAILS
24. PROPOSED CONDUIT PER DETAIL SHEET 7

LEGEND

EXISTING FACILITIES TO BE REMOVED (PHASED)	EXISTING FACILITIES REMOVED
EXISTING FACILITIES TO BE ABANDONED IN PLACE (PHASED)	

SUGGESTED PHASED CONSTRUCTION SEQUENCE

1. INSTALL WELL 2 PUMP, MOTOR, DROP PIPE, AND PITLESS ADAPTER.
2. INSTALL ALL UNDERGROUND PIPING OUTSIDE AND UNDER PROPOSED BUILDING.
3. CONSTRUCT PROPOSED BUILDING FOUNDATION, ISOLATED GENERATOR SLAB, BUILDING FLOOR SLAB WITH GAP AROUND RISER PIPES, EXTERIOR SPLASH PAD, AND NEW TRANSFORMER PAD.
4. CONSTRUCT BLDG WALLS, LOUVERS, DOOR, SET GENERATOR AND FACILITIES, CONSTRUCT AND SET ROOF.
5. COORDINATE NEW TRANSFORMER INSTALLATION, INSTALL NEW ELECTRICAL SUPPLY, REMOVE EAST BANK OF BLADDER TANKS, AND INSTALL ELECTRICAL FACILITIES (SEE KEY/NOTES 1, 4, 20, & 22).
6. COMPLETE ALL PROPOSED PIPING AND APPURTENANCE INSTALLATION.
7. STARTUP AND TEST WELL 2 AND NEW FACILITIES, AND SWITCH OVER WATER SUPPLY TO SUBDIVISION FROM WELL 1 AND OLD LINE TO WELL 2 AND NEW LINE.
8. REMOVE AND ABANDON REMAINING EXISTING SYSTEM AS SHADED, SALVAGE MATERIALS TO OWNER.
9. INSTALL NEW WELL 1 PUMP, MOTOR, DROP PIPE, AND PITLESS ADAPTER, CONNECT, PERFORM START-UP, AND INTEGRATE INTO OPERATIONS.

PROFESSIONAL ENGINEER REGISTERED 11519 10/03/12 STATE OF IDAHO GERALD R. WILLIAMS

Gerald R Williams

EXHIBIT 1B

DESCRIPTION	DATE
REVISION 1 NOTES & SPLASH PAD	3/19/07
REVISION 2 MODIFY WELL 2 SUPPLY LINE	8/9/07
REVISION 3 AS-BUILTS	10/03/12

SCALE	PLAN	PROFILE	SECTIONS	DETAILS
HORIZONTAL	0 1.5 3 6			
VERTICAL				

WILLIAMS ENGINEERING, INC.
343 E 4th N Suite 117 REXBURG, ID 83440
208-359-5353 PH. 208-359-8181 FAX

BLACKHAWK SUBDIVISION
WELL SITE 1 IMPROVEMENTS
WELL HOUSE LAYOUT

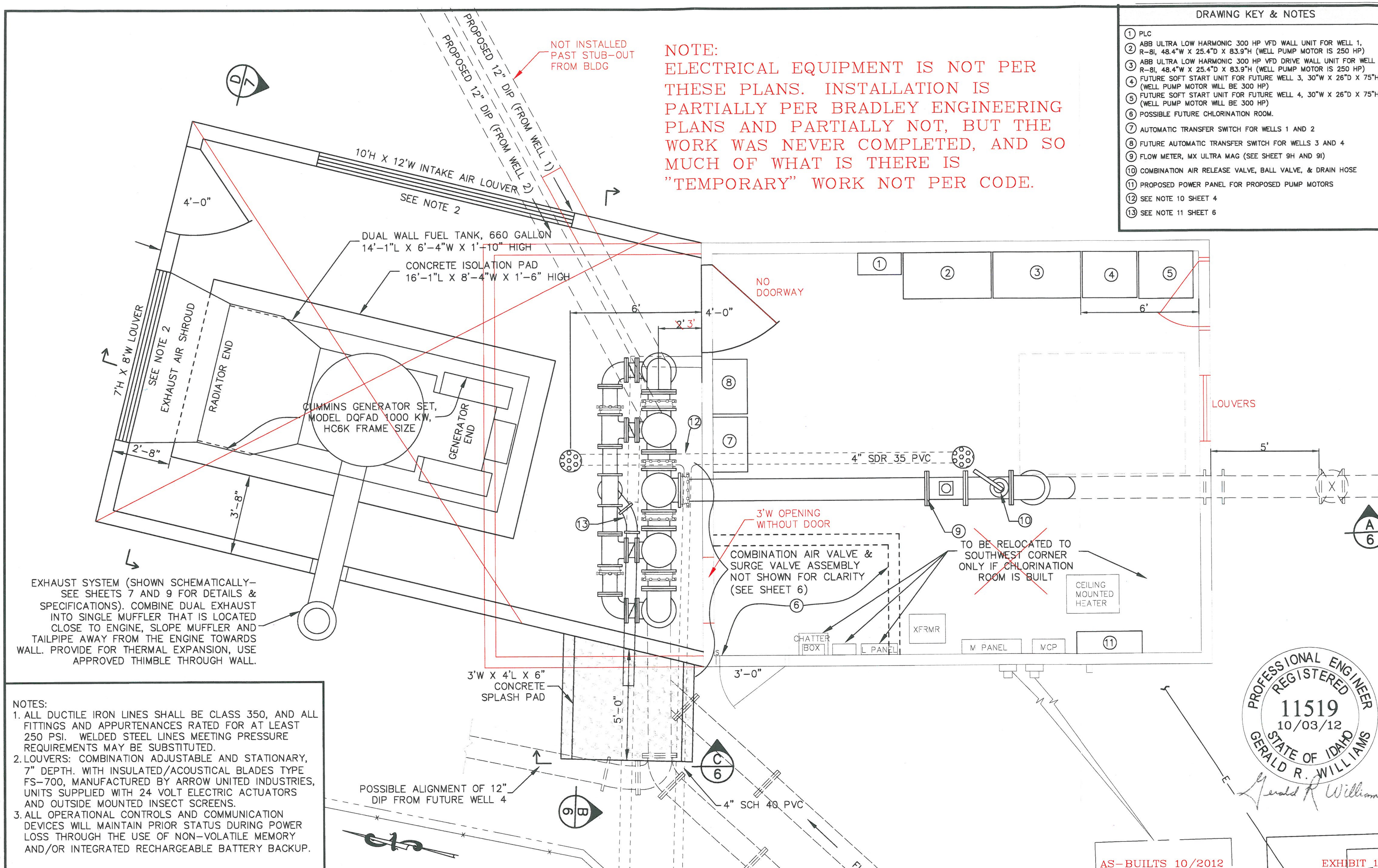
~~SHEET 4~~
EDIT DATE 10/03/2012

PATH: A:\PROJECTS\Idaho\2004-2010\1-DEVELOPMENT\D-Foothill Properties-Blackhawk\Technical\Entire Development\Water and Irrigation\DESIGN\BH-WELL-SITE asbuilt.dwg DATE: Nov 01, 2012 - 4:20pm Plotted by scheney

NOTE:
ELECTRICAL EQUIPMENT IS NOT PER THESE PLANS. INSTALLATION IS PARTIALLY PER BRADLEY ENGINEERING PLANS AND PARTIALLY NOT, BUT THE WORK WAS NEVER COMPLETED, AND SO MUCH OF WHAT IS THERE IS "TEMPORARY" WORK NOT PER CODE.

DRAWING KEY & NOTES

1. PLC
2. ABB ULTRA LOW HARMONIC 300 HP VFD WALL UNIT FOR WELL 1, R-8I, 48.4"W X 25.4"D X 83.9"H (WELL PUMP MOTOR IS 250 HP)
3. ABB ULTRA LOW HARMONIC 300 HP VFD DRIVE WALL UNIT FOR WELL 2, R-8I, 48.4"W X 25.4"D X 83.9"H (WELL PUMP MOTOR IS 250 HP)
4. FUTURE SOFT START UNIT FOR FUTURE WELL 3, 30"W X 26"D X 75"H (WELL PUMP MOTOR WILL BE 300 HP)
5. FUTURE SOFT START UNIT FOR FUTURE WELL 4, 30"W X 26"D X 75"H (WELL PUMP MOTOR WILL BE 300 HP)
6. POSSIBLE FUTURE CHLORINATION ROOM.
7. AUTOMATIC TRANSFER SWITCH FOR WELLS 1 AND 2
8. FUTURE AUTOMATIC TRANSFER SWITCH FOR WELLS 3 AND 4
9. FLOW METER, MX ULTRA MAG (SEE SHEET 9H AND 9I)
10. COMBINATION AIR RELEASE VALVE, BALL VALVE, & DRAIN HOSE
11. PROPOSED POWER PANEL FOR PROPOSED PUMP MOTORS
12. SEE NOTE 10 SHEET 4
13. SEE NOTE 11 SHEET 6



NOTES:
1. ALL DUCTILE IRON LINES SHALL BE CLASS 350, AND ALL FITTINGS AND APPURTENANCES RATED FOR AT LEAST 250 PSI. WELDED STEEL LINES MEETING PRESSURE REQUIREMENTS MAY BE SUBSTITUTED.
2. LOUVERS: COMBINATION ADJUSTABLE AND STATIONARY, 7" DEPTH. WITH INSULATED/ACOUSTICAL BLADES TYPE FS-700, MANUFACTURED BY ARROW UNITED INDUSTRIES, UNITS SUPPLIED WITH 24 VOLT ELECTRIC ACTUATORS AND OUTSIDE MOUNTED INSECT SCREENS.
3. ALL OPERATIONAL CONTROLS AND COMMUNICATION DEVICES WILL MAINTAIN PRIOR STATUS DURING POWER LOSS THROUGH THE USE OF NON-VOLATILE MEMORY AND/OR INTEGRATED RECHARGEABLE BATTERY BACKUP.

	DESCRIPTION	DATE
REVISION 1	NOTES & SPLASH PAD	3/19/07
REVISION 2	MODIFY WELL 2 SUPPLY LINE	8/9/07
REVISION 3	AS-BUILTS	10/03/12

SCALE	PLAN	PROFILE	SECTIONS	DETAILS
HORIZONTAL	0 1 2 4			
VERTICAL				

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BLACKHAWK SUBDIVISION
WELL SITE 1 IMPROVEMENTS
WELL HOUSE IMPROVEMENTS

SHEET 5
EDIT DATE
10/03/2012

EXHIBIT 2A
BLACKHAWK
WATER SYSTEM MAP

WILLIAMS ENGINEERING, INC.
343 E 4th N Suite 117 REXBURG, ID 83440
208-359-5353 PH, 208-359-8181 FAX

SCALE: 0 100 200 400

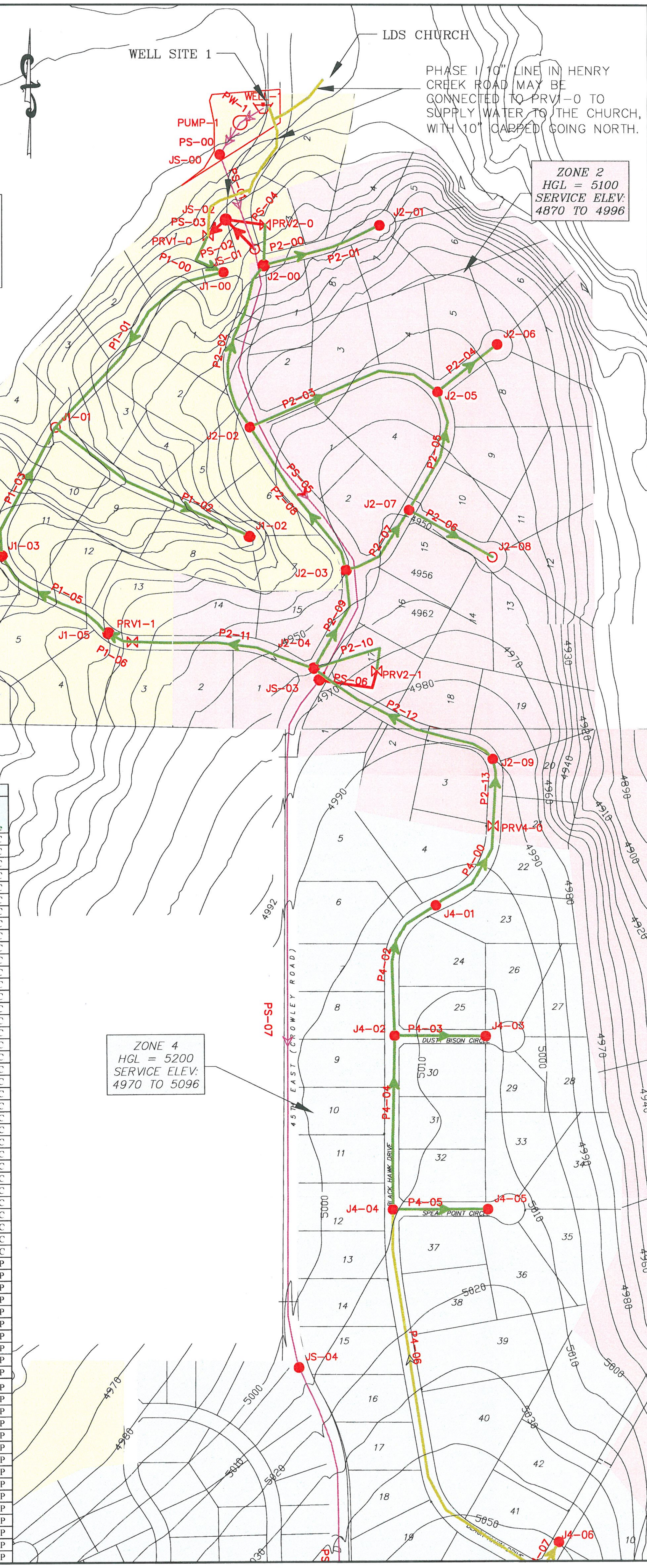
EDIT DATE 10/29/2012

GENERAL NOMENCLATURE & LEGEND

PS – ? PIPE I.D. ON TRANSMISSION SUPPLY LINE
JS – ? JUNCTION I.D. ON TRANSMISSION SUPPLY LINE
Px – y PIPE IN ZONE "X" WITH AN I.D. OF "Y"
Jx – y JUNCTION IN ZONE "X" WITH AN I.D. OF "Y"
PRVx – y PRV IN ZONE "X" WITH AN I.D. OF "Y"

Color Coding Legend
Link: Diameter (in)

<= 8.0
<= 10.0
<= 12.0
<= 16.0
<= 24.0



Junction Label	Elev. (ft)	Zone Name	Zone HGL (ft)	Pressure (psi)
Junctions: Supply Lines w/ No-Flow				
JS-00	4802	LTank	5350	237.09
JS-01	4850	LTank	5350	216.33
JS-02	4850	LTank	5350	216.33
JS-03	4962	LTank	5350	167.87
JS-04	5005	LTank	5350	149.27
JS-05	5055	LTank	5350	127.63
JS-06	5085	LTank	5350	114.65
JS-07	5110	LTank	5350	103.84
JS-08	5197	LTank	5350	66.2
JS-13	5267	LTank	5350	35.939
JS-14	5333	LTank	5350	7.361
JS-23	4858	LTank	5350	213.036
Junctions: Distribution Lines w/ No-Flow				
J1-00	4853	1	5040.07	80.94
J1-01	4822	1	5040.07	94.35
J1-02	4880	1	5040.07	69.25
J1-03	4860	1	5040.07	77.91
J1-04	4822	1	5040.07	94.35
J1-05	4910	1	5040.07	56.27
J2-01	4877	2	5100.09	96.52
J2-02	4920	2	5100.09	77.91
J2-03	4940	2	5100.09	69.26
J2-04	4961	2	5100.09	60.18
J2-05	4935	2	5100.09	71.43
J2-06	4926	2	5100.09	75.32
J2-07	4948	2	5100.09	65.8
J2-08	4948	2	5100.09	65.8
J2-09	4990	2	5100.09	47.63
J4-00	5110	4	5220.04	47.61
J4-01	5003	4	5220.06	93.91
J4-02	5008	4	5220.06	91.75
J4-03	5008	4	5220.06	91.75
J4-04	5009	4	5220.06	91.32
J4-05	5013	4	5220.06	89.58
J4-06	5050	4	5220.06	73.58
J4-07	5057	4	5220.06	70.55
J4-08	5056	4	5220.06	70.98
J4-32	5070	4	5220.06	64.92
J4-34	5085	4	5220.06	58.43
J4-35	5080	4	5220.06	60.6
J5-01	5170	5	5350	77.88
J5-16	5210	5	5350	60.57

PRV Data

Label	Dia. (in)	Ground Elev. (ft)	Static Zone HGL (ft)	Pressure Setting[1] Small PRV (psi)	Pressure Setting[1] Large PRV (psi)
PRV1-0	6	4850	5040	82.27	77.27
PRV1-1	6	4919	5040	*47.39*	42.39
PRV2-0	6	4860	5100	103.92	98.92
PRV2-1	8	4961	5100	60.19	55.19
PRV2-4	6	4996	5100	45.03	40.03
PRV4-1	10	5055	5220	71.45	66.45
PRV4-6	10	5110	5220	47.63	42.63
PRV4-8	6	5085	5220	*53.46*	48.46
PRV5-0	10	5201	5350	64.52	59.52

1) Italicized PRV values are 5 psi less than Zone HGL because another small PRV maintains peak pressure in the zone.

Pipe Data

Label	Model Length (ft)	Dia. (in)	Type
P1-00	239.25	8	PVC
P1-01	979.57	8	PVC
P1-02	929.45	8	PVC
P1-03	593.76	8	PVC
P1-04	987.74	8	PVC
P1-05	559.99	8	PVC
P1-06	108.04	8	PVC
P2-00	177.55	8	PVC
P2-01	515.57	8	PVC
P2-02	688.15	8	PVC
P2-03	853.65	8	PVC
P2-04	317.63	8	PVC
P2-05	537.23	8	PVC
P2-06	397.75	8	PVC
P2-07	382.29	8	PVC
P2-08	721.29	8	PVC
P2-09	450.29	8	PVC
P2-10	381.37	10	PVC
P2-11	770.55	8	PVC
P2-12	846.72	8	PVC
P2-13	283.48	8	PVC
P4-00	440.56	8	PVC
P4-02	631.66	8	PVC
P4-03	378.94	8	PVC
P4-04	726.39	8	PVC
P4-05	394.86	8	PVC
P4-06	1758.8	10	PVC
P4-07	144.34	10	PVC
P4-08	693.93	8	PVC
P4-17	409.75	12	PVC
P4-18	307.26	12	PVC
P4-38	332.33	8	PVC
P4-40	345.58	12	PVC
P4-43	298.1	8	PVC
P4-44	592.08	12	PVC
PS-00	157.15	16	DIP
PS-01	420.16	16	DIP
PS-02	172.7	10	DIP
PS-03	99.07	8	DIP
PS-04	165.25	8	DIP
PS-05	1991.71	16	DIP
PS-06	294.9	10	DIP
PS-07	2918.92	16	DIP
PS-08	1328.9	16	DIP
PS-09	309.44	16	DIP
PS-13	2804.75	16	DIP
PS-15	329.05	16	DIP
PS-19	835.8	16	DIP
PS-45	66.59	16	DIP
PS-46	109.55	16	DIP
PS-53	447.01	16	DIP
PS-63	866.33	16	DIP
PS-64	713.72	16	DIP
PS-65	1280.12	16	DIP
PS-66	767.26	16	DIP
PS-67	1098.86	16	DIP
PS-73	245.31	16	DIP
PS-74	783.43	16	DIP
PS-84	297.63	12	DIP
PS-86	293.23	8	DIP

EXHIBIT 2B
BLACKHAWK
WATER SYSTEM MAP

WILLIAMS ENGINEERING, INC.
343 E 4th N Suite 117 REXBURG, ID 83440
208-359-5353 PH. 208-359-8181 FAX

SCALE: 0 100 200 400

EDIT DATE 10/29/2012

GENERAL NOMENCLATURE & LEGEND

- PS – ? PIPE I.D. ON TRANSMISSION SUPPLY LINE
- JS – ? JUNCTION I.D. ON TRANSMISSION SUPPLY LINE
- Px – y PIPE IN ZONE "X" WITH AN I.D. OF "Y"
- Jx – y JUNCTION IN ZONE "X" WITH AN I.D. OF "Y"
- PRVx – y PRV IN ZONE "X" WITH AN I.D. OF "Y"

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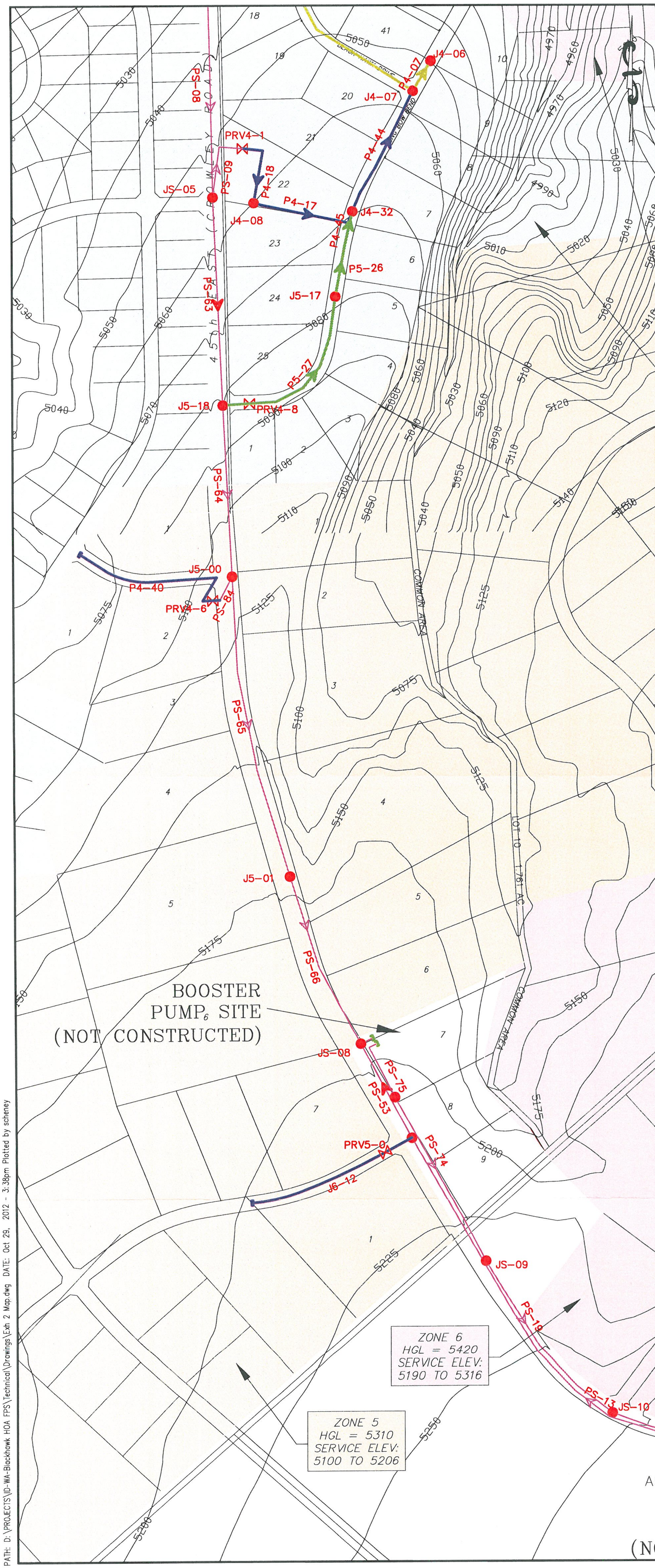

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J4-05	5013	4	5220.06	89.58
J4-06	5050	4	5220.06	73.58
J4-07	5057	4	5220.06	70.55
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PS-06	294.9	10	DIP
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PS-65	1280.12	16	DIP
PS-66	767.26	16	DIP
PS-67	1098.86	16	DIP
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PS-74	783.43	16	DIP
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