GRAN MUTUAL WATER COMPANY

ENGINEERS REPORT UPDATE

For

SYSTEM EXPANSION & UPGRADES

BUTTE COUNTY
CALIFORNIA

PREPARED BY OR UNDER THE SUPERVISION OF

NORTHSTAR ENGINEERING
Ross Simmons, P.E.
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I. BACKGROUND:

The Gran Mutual Water Company is to supply domestic and fire protection water for the existing Skansen Estates, Spanish Gardens, and Rocky Bluffs Subdivisions. The service area is located just east of Chico along the Skyway on the bluffs overlooking Butte Creek. The service area consists of 71 single family homes, 29 vacant & constructing lots, 2 active commercial lots, and 2 HOA irrigation connections. The total current connections are 75. At build out the complete number of connections will be approximately 104 services.

The original water system was installed between 1961 & 1965 for Skansen Unit 1 subdivision, including the current existing 12" well, a 67,000 gallon storage tank, 25 HP submersible pump, and enough 8" distribution main to serve the 32 lots. Multiple upgrades and system expansions have taken place over the following years. In 1985 the distribution system was expanded to the west to include 26 new lots (Spanish Bluffs) and a pressure reduction station was added to offset the decrease in elevation. The well and pump were also tested and found to be performing well. In 1992 the system was expanded again, this time for the 43 lot Rocky Bluffs subdivision. Among the upgrades was a new bolted steel storage tank of 85,000 gallons, a larger 50 HP pump was installed in the existing well, and a pressure system with booster pumps for the new subdivision was installed at the tank site. See attached appendix for complete descriptions and engineer's reports for the previous expansions.

II. SYSTEM UPGRADE DESCRIPTION:

G. DESIGN CRITERIA (Source Capacity & Storage Volume)

The California Waterworks Standards (Chapter 16 of Title 22 California Code of Regulations) (updated Feb 6, 2007) defines the requirements of a public water system. All analysis and design of the system were completed to these standards. Actual project construction is to conform to The American Water Works Association (AWWA) standards for construction of water systems.

Currently revisions to the California Waterworks Standards are working their way through legislation as R-14-03. The November 9, 2006 revision text has been reviewed to verify the upgraded systems compliance with these proposed changes. The upgraded system generally meets the proposed revisions though some interpretation of intent was required. There is no guarantee that the system will meet the revised standards upon legislative approval or that the revisions will not significantly change prior to passing. The revisions may not significantly affect the Gran Mutual Water system but will likely apply if any further expansion is proposed.

The design data for this system upgrade are shown below.

Residential Connections (single family homes 1+ Acre lots)

Existing Res. Connections	71
Lots with Construction Connections	4
Vacant Lots	13
Future Lots (Rocky Bluffs Ph. 3)	12
Commercial Connections	2
Home Owners Association Services	2
Total services at build out	104

Required Source Capacity

Existing Maximum Day Demand (MDD) is determined based on existing water system records for highest monthly use from 2004. The average August use in 2004 per day was recorded at 335,000 gallons and using an adjustment factor of 1.5 the MDD = 502,500 gallons/day.

Buildout Maximum Day Demand (MDD) is determined based on a linear projection of the existing water use. Upon buildout the system will be serving 28% more lots and require 28% more water. Multiplying the existing MDD by 1.28 the buildout MDD = 643,200 gallons/day. Peak Hour Demand (PHD) at buildout uses a 1.5 factor above the average MDD = (643,200 / 24) * 1.5 = 40,200 gallons/hour, equaling 670 GPM.

Provided Source Capacity

-Existing Well Production (limited by pump) ---------- 325 GPM
-New Well Production (Limited by pump) ---------- 325 GPM
-Total Well Production ---------- 650 GPM

Total production in one day = 936,000 gallons
This exceeds the max buildout MDD by 30%.
Hourly production falls slightly below the PHD by 20 GPM, putting a demand of 1,200 gallons on the storage capacity. This is less than 1% of the storage volume, meaning the storage should always be available for system equalization, emergency reserve, and fire protection.

Required Storage Volume

From Title 22 Chart 4 Flat Rate system storage requirements for 104 services is 150,000 gallons.

Provided Storage Volume

-Existing Bolted Steel Water Tank ---------- 85,000 g
-New Bolted Steel Water Tank ---------- 105,000 g
-Total Storage Volume ---------- 190,000 g

H. WELLS

The existing well is described in the attached engineer's reports.

The new deep well is located on the existing tank lot located on Lot B of The Rocky Bluffs Subdivision Phase 1 as recorded in Book 126 pages 59-65. Well drilling was started by Storey Drilling Services August 29, 2006 and was finished October 26, 2006. Using the mud rotary method a 22" diameter hole was drilled from 0' to 711' then reduced to 12 ¼" diameter to the total boring depth of 800 feet. An 12 ¾" diameter steel well casing was constructed down to 704.5 feet with solid and screened sections per the attached well completion report. A sanitary seal of cement cap was installed from 0' to 58' and the remaining well depth was gravel packed to 711 feet. Static water level in the well after construction was at 428 feet from the surface.

Durham Pump installed a 60 HP, 325 GPM submersible pump 672 feet from the surface of the well on November 7, 2006 with a discharge diameter of 6". Following installation several well tests were performed, including several 2-hour draw down tests. Testing was limited due to lack of storage space for pumped water. Additional testing is planned for this summer when a near 24-hour constant rate test can be completed. In the appendix there is a summary of these tests and results in the report by Durham Pump. New flow meters have been added to both wells to provide good source capacity flows and help detect system leaks & water loss.

The addition of the new well will allow for more regular repair & inspection service to the existing well and pump. The system can operate with only one well as long as both of the storage tanks are on-line. However, it is best to schedule well maintenance for shoulder or off-peak usage months as all components should be on-line during the peak flow months in the summer.

I. STORAGE

Two storage tanks were present on the site after the 85,000 gallon tank was added with the 1992 expansion for Rocky Bluffs subdivision. In 2005 the original storage tank installed in 1963 developed serious leaks and subsequently was taken permanently offline and later removed. This 2006 upgrade includes the construction of a new 105,000 gallon welded steel water tank in the approximate location of the original tank. This storage volume exceeds the minimum required for the subdivision and serves primarily as reserve storage for fire protection and peak hourly usage. The tank is designed to meet AWWA D103-97 Specifications. Tank location plans as well as structural calculations (by others) are included in the appendix.

The tanks are plumbed in parallel so that given the need one can be taken off-line and still maintain system functionality. This redundancy will allow for more regular service to the tanks thus promoting a longer useful life. The system can operate on a temporary basis with only one storage tank on-line as long as both wells are in operation. However, if possible schedule tank maintenance for shoulder or off-peak usage months. It is best to keep all components on-line during the peak flow months in the summer

J. TREATMENT

Part of the 2006 system upgrade was the installation of a chlorine injection unit to allow for treatment of well water prior to entering the storage tanks. Chlorine residual can be measured and recorded automatically as the water leaves the tanks to ensure that adequate free chlorine levels are maintained in the distribution system. Long contact times will occur in the tanks making for good disinfection of the tanks. Even injection is obtained through the use of a small flow induced pump. The maximum acceptable free chlorine shall be 0.5mg/l at any service point.

Currently the Mutual water company does not plan on continuously chlorinating the water but has installed the system to chlorinate if needed. If the company were to begin regular chlorination of the system an additional chlorine injection station would be needed at the existing well prior to connection with the distribution system. This well connects directly into the distribution system and back feeds the storage tank through the distribution line. During times of higher use water from the well goes directly into the distribution system without ever

going to the tank site thus bypassing the existing chlorination station. Given the short distance to the nearest service it would be difficult to achieve any significant contact time. The best permanent solution would be to install additional dedicated piping from the existing well to the tank site and route all water through the tanks prior to release into the distribution system.

K. DISTRIBUTION

Both storage tanks are interconnected and attached to both the gravity system and through piping to the pressure system as well. The pressure system is made up of 6" main lines and serves 37 lots of the Rocky Bluffs Subdivision from a pump house at the tank site. The pump house contains one 15 HP and two 7½ HP single stage centrifugal pumps capable of pumping approximately 650 GPM at 55 PSI (at the pump house). Powered by a variable frequency drive (VFD) installed in 2004 the 15 HP pump is the lead pump with the other two switching on only in case of fire. Prior to the installation of the VFD in 2004 the smaller 7.5 HP were the lead pumps. Once all of the lots in the pressure system develop they will draw an estimated PHD of 230 GPM. This number when added to the required fire flow of 500 GPM is close to the maximum capable by the existing booster pumps. As lots in this final phase come on line it will become critical to watch the actual use and potentially provide increased pumping capacity for the pressure system. New flow meters have been installed on the pressure system to quantify the water use.

The gravity system supplying water to the rest of the users is fed through an 8" main line from the tank site running through the existing well site and to the end of Oak Ridge Drive. From here the line is reduced in size to 6" and serves the Bluffs subdivision to the west.

The distribution system installed in 1961 is nearing the end of its useful life. It is probable that within the next 10 years to 15 years the original system installed in 1961 will need to be replaced. Leaks and ruptures should become more common as the pipes deteriorate. It is recommended that this area of the distribution system is watched closely. Additionally it would be a good idea to have the existing pipes physically inspected to determine actual wear and perform preventative maintenance. This inspection could provide Gran Mutual with a more solid time line for pipe replacement that will significantly affect the amount of capital replacement savings that need to occur.

L. POWER BACKUP SYSTEM

Prior to this upgrade the system contained no backup power and would cease to operate in a power outage. This upgrade installed a new Genset 100 KW self-starting generator at the existing tank site (site of new well). The Genset is sized to provide emergency power to run the new well, existing pressure system pumps, vital system controls, and monitoring equipment. The Genset

will be automatically programmed to start itself at the loss of power in the grid. Sufficient fuel in its tank will allow it to run for a minimum of 24 hours. Additionally another back-up generator a Genset 80 KW self-starting generator has been installed at the existing well site. This generator is set to run the existing 50 HP well pump but is sized large enough to run a 60 HP if the well ever upgrades. The generators are required by the County of Butte Fire Department to supply emergency water in case of a fire.

M. SYSTEM CONTAMINATION VULNERABILITY

Water tests of the well show no initial contamination for the drinking water source. Well installation documentation shows proper procedures taken in drilling and construction procedures. Possible contamination of water tanks comes from overflow devices and tank vents. All openings in the tank are screened to help prevent rodent & insect intrusions. Additionally the two tanks are in parallel to provide a system redundancy and allowing one to be taken off line for repairs / inspections. Disinfection of the tanks and distribution system should decrease the risks from waterborne diseases.

A Drinking Water Source Assessment and Protection (DWSAP) document dated June, 2000 is on file with the county for the Gran Mutual water system. This document is generated by the county staff and should be used to assess the general vulnerability of the system. Copies of the report can be obtained from the County offices.

The possibility of intentional water supply poisoning is reduced due to the locked and secure pump house structure, locks on tank ladders, fenced enclosure around well sites and tanks, and locked access gates. Additionally all pipes in the system are buried with the exception of some above ground welded steel pipes near the pump house and tanks inside of the fenced enclosure. In case of contamination gate valves present throughout the system can shut off water supply to all the services and the well pumps can be shutoff remotely. It is required that an emergency response & resident notification plan be in place to help prepare for the worst.

N. SYSTEM MONITORING

Part of the current upgrade includes the installation of a Watchman System. A Remote Monitoring System developed by IRIS Connection, Inc. of Chico, California. The Watchman System is a real time Internet-based technology that allows a remote operator to adjust and monitor a wide array of water system functions. The Watchman System has been installed at the tank site as well as the existing well site and is currently monitoring and controlling complete water system functionality including the following: tank water levels, new well pressure and flow rate, booster pump system pressure and flow rate, chlorination rate and residual, electric utility line voltage, generator status,

including battery charging levels, water surface elevation in the wells, existing well pump system pressure and flow rate and well panel controls. All monitored parameters include Alarm/Alert features that will instantly notify users of fault conditions, including communication failures between pump stations and tank level sensors as well as communications to the Internet.

The Watchman System also monitors all the critical factors in the water system and allows for easy reporting to local agencies. A complete history from date of installation on monitored parameters provides data to create reports showing system compliance to the local regulators. Continual monitoring of the system should help predict equipment failures and at a minimum notify the operator immediately and facilitate a quickened response.

Water use trends can change (generally increase) over the years, it is recommended that if the monitoring shows increases beyond those forecasted in this report that the monitoring company notify the engineer to verify that the source capacity is not being over extended.

III. SYSTEM ECONOMICS:

A. CAPITAL / REPLACEMENT COSTS

The total initial system start up costs and life expectancy of each item is detailed below. Annual replacement costs are calculated using an inflation rate of 4% and an estimated 8% return on investments. Investments of this type include a mixture of mutual funds and bond type investments and have a certain degree of risk associated with them. If funds are invested in safer securities the fee schedule below will need to be modified to reflect that and the annual cost amount will increase. The inflation rate is purposely set high to give a factor of safety to the equation.

This model is based on several assumptions including investment returns, inflation, unanticipated labor costs, modified life expectancies, changing legislation, and inflating replacement costs out of line with the rate of inflation shown above. This does however reflect the best estimate and judgment at this time.

Capital Improvement Replacement Program

	System Components	Replacement Cost 2007	Estimated Life Exp. (Years)	EPA Life Exp. (Years)	Estimated Date Installed	Remaining Life Expect. (Years)	Annual Costs
1	Existing Well	$230,000	60	25-35	1961	14	$16,448
2	*** Original 8" Water Main - 5,350'**	**$535,000**	**55**	**35-40**	**1962**	**10**	**$54,667**
3	*** Original 6" Water Main - 1,500'**	**$135,000**	**55**	**35-40**	**1962**	**10**	**$13,794**
4	*** Bluffs 6" Water Main - 5,500'**	**$495,000**	**55**	**35-40**	**1985**	**33**	**$12,374**
5	6" Pressure reducing valve	$10,000	40	35-40	1985	18	$541
6	6" Water Pressure Main - 4,040'	$363,600	55	35-40	1992	40	$6,738
7	50 HP Submersible Pump	$40,000	20	10-15	1992	5	$8,295
8	85,000 gallon storage tank	$100,000	50	30-60	1992	35	$2,290
9	Pump House	$80,000	60	30-60	1992	45	$1,209
10	Booster Pumps (3)	$35,000	20	10-15	1992	5	$7,259
11	Pressure Tanks	$10,000	20	10-15	1992	5	$2,074
12	Rocky Bluffs Fire Hydrants	$20,000	60	40-60	1992	45	$302
13	Replaced fire hydrants	$50,000	60	40-60	2007	60	$420
14	Backup Generators & Miscellaneous.	$65,000	30	10-15	2007	30	$1,861
15	Chlorination System	$20,000	20	10-15	2007	20	$958
16	New Well	$230,000	60	25-35	2007	60	$1,931
17	New 120,000 gallon Tank	$295,000	50	30-60	2007	50	$3,654
18	50 HP Submersible Pump	$40,000	20	10-15	2007	20	$1,915
19	System Monitoring	$50,000	20	10-15	2007	20	$2,394
20	Water Meters	$75,000	20	10-15	2008	21	$3,389
21	Misc Fencing	$16,000	20	10-15	2008	21	$723
22	Well/Booster Landscaping	$4,000	50	40-60	2008	51	$48
	Totals	$2,898,600					$143,283

* Additional Study on Existing Water lines is recommended to determine pipe conditions and possible replacement alternatives

The life expectancies shown are derived from the 2003 EPA guidelines, but have generally been lengthened to account for local conditions and on-going maintenance checks on system components. It is recommended that the distribution mains highlighted above be investigated for leaks and overall condition to verify the remaining useful life and explore non-removal methods of re-conditioning and extending their life. This will require the services of a qualified pipe inspection company, but could greatly reduce the overall yearly replacement cost if the pipes are found to be in better than expected condition, or a method such as interior pipe lining can be used at the site rather than full removal / replacement.

The main contributors to the yearly cost are the oldest system components as they will require replacement first and their replacement cost was not amortized over their life span but instead just their remaining useful life. The first 3 items all built in the 1960's account for 60% of the total replacement budget. It is important to recognize that once an item is replaced that the useful life span gets re-set and thus the yearly cost needs to be adjusted down. The yearly budget is currently large due to the fact that no replacement reserves have been collected in the past. The budget will decrease with time until the replacement of the recently installed upgrades occurs then it should mirror inflation.

Note that if 100% of the system were new as of 2007 then the total yearly replacement cost would be only $40,000. The newer the component is the longer time you have to save for its replacement and the more interest income you will make.

B. OPERATION AND MAINTENACE

Routine Maintenance / Water Sampling:

The existing system will require on-going maintenance and monitoring. An aggressive maintenance and operation schedule has been proposed for the water system by Durham Pump. This approach will likely catch small problems before they become large problems. By keeping up the maintenance of the system components their useful life will likely be extended and disruptions in service will be avoided. See attached Schedule "A" for the proposed operation plan. A Certified Water Distribution Operator will be required by law to oversee the system operations, manage all test results, and deliver the required reports.

Butte County has recently issued a memo to all small water systems in the County defining the roles and responsibilities of the Distribution Operator. The responsibilities outlined in the memo generally exceed the current scopes of most small system operators. In most systems this will require increased costs and services for on-going operation. See a copy of the memo in the appendix.

	Yearly O&M Costs (Compiled form historical budgets & current service contracts)	
	O&MExpense Item	Annual Estimated Cost
1	Electric Energy (Wells)	$20,000
2	Electric Energy (Booster Pumps)	$4,000
3	Water Testing	$500
4	Taxes	$3,000
5	Tax Preperation	$2,000
6	Legal Fees	$2,000
7	Office Administration	$2,000
8	Office Miscellaeous	$1,500
9	County Fees / Memberships	$1,000
10	Operations Contract (Durham Pump)	$22,000
11	Micellaneous Repairs (not replacement)	$3,000
12	Insurance	$6,000
	Annual Operation & Maintenance Cost	**$67,000**

C. PROPOSED BUDGET

The total system use for 2004 was approximately 67 million gallons for the 75 connected services. The large lot sizes between ¾ & 3 acres, significant landscaping, and high ridge temperatures are likely the causes for the higher than average water use. Individual lot use equates to approximately 900,000 gallons per year each. The remaining rate payers are vacant lots (13) or lots under construction (4) for a total of 92 current rate payers. Additionally there are 12 lots (not yet created but approved tentative map lots) in Rocky Bluffs Phase 3 that round out the Gran Mutual service area. Since the 13 vacant lots are not currently connected to the water system at this time they should not be involved in the on-going operation costs of the system but should contribute to the capital system replacement costs. Once the 12 Rocky Bluffs lots are recorded they too should contribute to the capital system replacement costs. This leaves 75 services to divide the yearly cost for the 67,000,000 gallons of expected water use.

Emergency Reserves:

An emergency reserve should be established that would provide approximately 2% of the total system capital costs. Based on a total system cost of nearly 3 million the reserve fund should be around $60,000. This reserve amount can be funded from the water company's general account, special assessment, or connection fees.

Capital Replacement Costs:

Capital Replacement Cost Flat Rate	
Annual Replacement Costs	$143,283
Monthly Fee Paid Per Parcel	$114.81
Yearly Fee Paid Per Parcel	$1,377.72
Calculation is for all 104 lots/services.	

Replacement and emergency reserves must be met in accordance with this report to ensure the longevity of the system. Alternately some systems do not collect for capital replacements but wait until the capital improvements fail or reach the end of their useful lives before enforcing a special assessment on the district to replace the failed component. This method has been proven to be a band aid and is not advised as it forces the water company into an emergency reactionary state which in turn increases costs for the replacement, results in down time for the system, and provides poor service for the users. Planning and saving for future major expenditures is the best way to maintain the systems functionality and level of service. Note that once the oldest system components are replaced this monthly fee should be reduced by as much as 55% to match the new replacement costs.

Water Use Costs:

Operations and Maintenance Metered Rate	
Annual O&M Cost	$67,000
Annual Water Usage in 100 Gallons	670,000
Cost per 100 gallons	$0.10
Annual Average Lot Water Use in 100 Gallons	8,933
Annual Average Bill	$893.33
Average Monthly Bill	$74.44
Calculation is for connected 75 lots/services.	

Operations and Maintenance rates are likely to be adjusted by the water company depending upon actual use and expenses. This rate can also be assessed as a flat rate fee but this is discouraged as it promotes water waste by the users. Meter reading is an additional burden on board or the operator but when implemented could result in a slight decrease in water use and promote a greater realization among users of over-use.

Connection Fees:

Unconnected lots in the subdivision will be required to pay into the capital replacement fund. This is needed to assure that when they are ready to connect to the system it is still in good repair and capable of serving them. At the time of connection it is typical to require a meter to be installed per the water companies sizing. Some water companies install the meter themselves to ensure the safety of the system as well as the accuracy of the meter and then back charge the customer. Typically a connection fee is required ranging from $1,500 to over $10,000 depending on the individual system, meter size, and governing body. Often times the higher connection fees are associated with "capacity buy in" and are for lots that have paid nothing into the replacement fund. It is recommended that because the vacant lot owners are paying into the system replacement that the connection fee be much smaller and intended to cover water companies expense to supply and install the meter, update book keeping, and other one time items associated with a new connection. A reasonable fee for connection to the Gran Mutual Water system is in the range of $2,000 to $5,000.

IV. OPINION ON WATER SYSTEM:

It is in my professional opinion that upgrades to the Gran Mutual Water supply, distribution, and fire protection system will adequately, dependably, and safely meet the total requirements for all water consumers under maximum consumption and will meet the requirements of Section 14314 of the California Code.

This opinion is based on the information contained in the appendix and a review of the existing and proposed water system and plans.

7-19-07

Ross Simmons Date:
RCE 68511 EXP 9-30-07