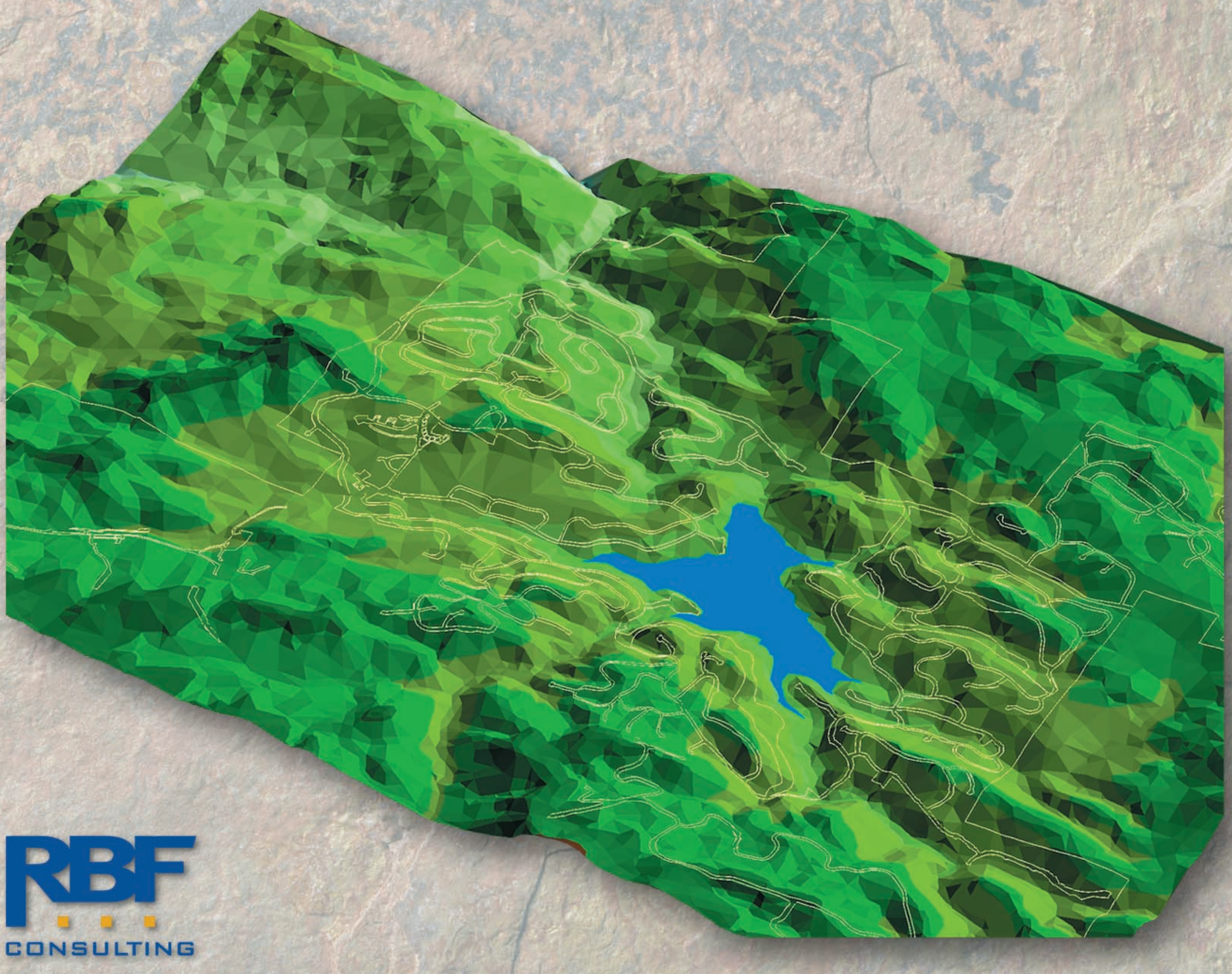
Water Master Plan

GROVELAND COMMUNITY SERVICES DISTRICT

OCTOBER 2001



RBF CONSULTING

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Water Master Plan

Groveland Community Services District
Groveland, California

October 2001

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EXECUTIVE SUMMARY

Groveland Community Services District (GCSD or the District) owns and operates the water system servicing the communities of Groveland, Big Oak Flat and Pine Mountain Lake. Located in southern Tuolumne County in the central Sierra Nevada Mountains, the system consists of two supply pumps with treatment facilities and clearwell storage, five storage tanks, 11 pressure zones, 17 pressure reducing valves (PRVs), three intra-system booster pumps, approximately 425 fire hydrants and 70 miles of water mains.

This Master Plan took an in-depth look at community growth, water demands, transmission capacity and water quality, with the following general conclusions:

- The transmission capacity within the majority of the water system can best be described as “robust.” Only certain older portions of the system within Groveland and Big Oak Flat do not meet fire flow requirements. Minor adjustments in PRV settings will help improve water circulation and “balance” the pressure zones.

- With the exception of Yosemite Highlands, adequate operational storage and short term emergency storage exists within the distribution system. However, the District is not prepared for an extended outage of the Hetch-Hetchy Aqueduct.

- Excellent quality source water results in good quality water within the water system. Problems with low chlorine residual near the airport and high school must be addressed as well as elevated total trihalomethane (TTHM) concentrations. Introducing a chloramination process (post-clearwell ammonia application) and a unidirectional flushing program should minimize these water quality issues and maintain the District within the Filtration Avoidance Permit.

Improvements have been grouped into five categories:

1. *Immediate Adjustments* – includes modifying PRV settings, improving system operations and initiating a unidirectional flushing program. These improvements can be performed as maintenance activities.

   Estimated Capital Cost: $0

2. *Required Improvements* – includes projects required to bring District’s facilities up to GCSD standards. Projects include improving transmission capacity in downtown Groveland and Big Oak Flat, increasing the storage in Tank No. 5 above Yosemite Highlands, closing the transmission loop in Skyridge Drive and constructing facilities for chloramination.

   Estimated Capital Cost: $1,075,275

3. *Reliability Improvements* – includes up-sizing the capacity of Second Garrotte (2G) Pump Station and supply pipeline, up-sizing the pipelines that interconnect the 2G and Big Creek subsystems, relocating Tank No. 4 and adding an extended water outage emergency supply option.

Estimated Capital Cost: $2,827,980 (not including emergency supply project)

4. *Long-Term System Improvements* – these projects look at recommended projects that can be applied system-wide more than ten years distant. These projects include replacing Tank No. 1 to increase storage and system flexibility and adding ultraviolet disinfection.

   Estimated Capital Cost: $1,012,500

5. Service Expansion – These projects include Yosemite Way Station and Long Gulch Ranch, and how developer-funded infrastructure improvements fit in with the District's water system. Also included is a discussion of the costs to provide water service to Yosemite Acres.

   Estimated Capital Cost: $1,419,525 (not including developer-funded improvements)

1.0 SECTION 1 - INTRODUCTION

1.1 Location/History

Groveland Community Services District (GCSD or the District) was established in 1953 to serve the communities of Groveland and Big Oak Flat. In the 1970s, Boise Cascade Company developed the area to the immediate northwest known as Pine Mountain Lake, potentially increasing the number of District customers twenty-fold.

GCSD is located on the Central Sierra due east from San Francisco in Tuolumne County, 30 miles south of Sonora and 26 miles from the west entrance to Yosemite National Park. **Exhibit 1** shows a vicinity map of the District.

Average temperatures range between 86°F to 51°F in the summer and 54°F to 31°F in the winter with an average rainfall of 36 inches[1].

Occupancy of Groveland area residences is seasonal and significantly higher during the summer months.

1.2 Physical Characteristics

Pine Mountain Lake (elevation 2,550 ft.) represents the dominant geographic feature within the District. Elevations range between the highest peak of 3,750 ft. in the south to 2,300 ft. where Big Creek exits the District in the northwest. Elevations served by the District fall between 2,400 and 3,300 ft. Topography map **Exhibit 2** shows 100-ft contours based on USGS data.

The major inflows to Pine Mountain Lake are Big Creek from the southeast, Second Garrotte Creek from the south and First Garrotte Creek from the southwest. Big Creek continues northward below Pine Mountain Lake Dam.

Exhibit 3 is an ArcView®-generated 3D image of the area surrounding Pine Mountain Lake color-coded by elevation.

1.3 Growth Projections

1.3.1 Current Buildout

The following data provided by GCSD (March 2001) and Pine Mountain Lake Association (Nov 2000) was used to calculate current buildout:

[1] Pine Mountain Lake Association website: http://www.pinemountainlake.com/about2.html

For Pine Mountain Lake (PML):

PML Total Parcels, P	3,760
PML Improved Parcels, I	2,670
PML % Developed (P/I)	71%

Using water meters to determine buildout:

Total Current Water Meters[2], M	2,879
PML Improved Parcels, I	2,670
Groveland/BOF Total Parcels, G (M-I)	209
% Developed [M/(P+G)]	73%

Using sewer connections to determine buildout:

Total Sewered Connections[3], S	1,384
Sewered Vacant Lots[4], V [(1)]	494
% Developed (S/[S+V]) [(2)]	74%

Notes:
(1) Vacant lots in sewered area
(2) Does not include areas within District currently using septic systems

These calculations assume that areas within GCSD currently not served by the District will not be provided water or sewer service in the future.

1.3.2 Growth Rate

Over the past decade, water demand has steadily risen at a rate of approximately 3%. At this rate, water demand would meet predicted demands at buildout (which are based on conservative demand factors and includes Yosemite Way Station, Phase I) in approximately 2024, which is a realistic forecasting horizon. **Figure 1.1** shows the water production trend.

Previous studies have recommended a growth rate based on new sewer connections of 1.9%. This Master plan will look at the affects of both rates.

[2] Data provided by GCSD, dated 9 March 2001
[3] IBID
[4] IBID

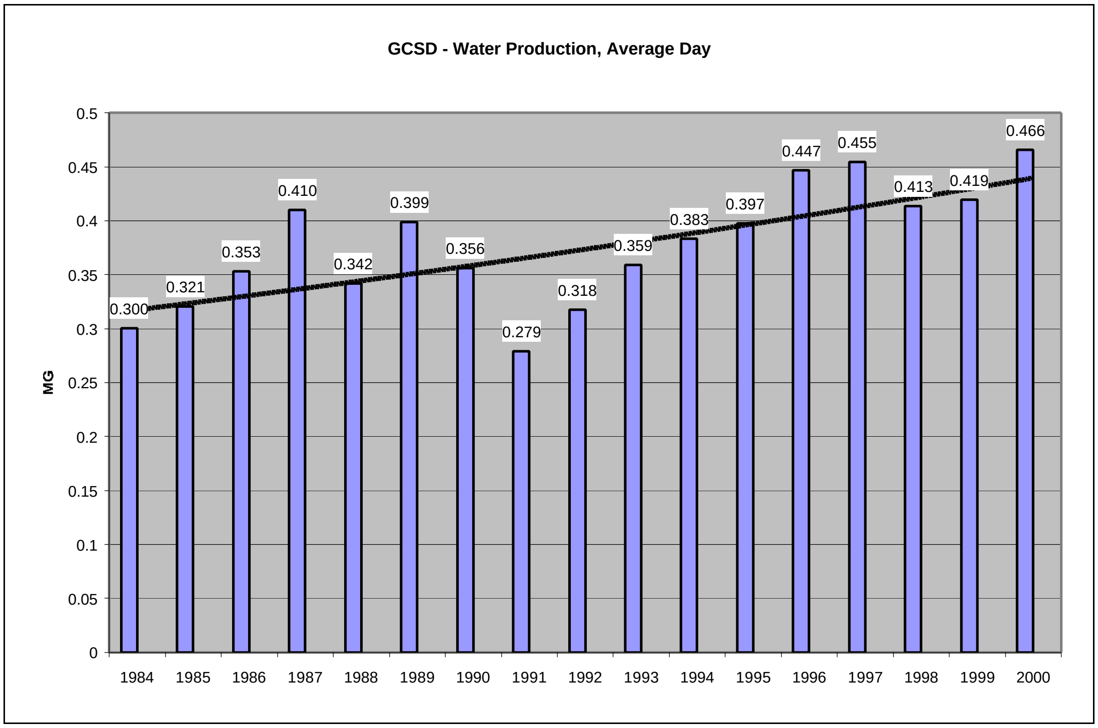

Figure 1.1: GCSD Water Production, Average Day

2.0 SECTION 2 – WATER DEMANDS

2.1 Land Use

2.1.1 Tuolumne County General Plan

The basis for planning future facilities is determining ultimate water demands based on categorized land use. Analysis performed in support of this Master Plan combined the type of land use along with parcel data to determine ultimate flows.

Land use data used in this analysis comes from the Tuolumne County General Plan adopted December 26, 1996 with the latest revision dated March 14, 2000. In support of this project, land use categorization as well as detailed parcel information was received from the county in digital GIS format.

Exhibit 4 shows the zoned land use within the GCSD boundary and the San Francisco Contract Service boundary. **Table 2.1** brakes down the area within GCSD into the county designated categories (with maximum building intensity in parenthesis).

Table 2.1: Land Use within GCSD

Land Use	Acres
Industrial/Business Park (1 du/7,500 sq. ft)	51
Mixed Use (15 du/acre or 1 du/2,500 sq. ft)	22
General/Neighborhood Commercial (1 du/2,500 sq. ft)	129
High Density Residential (15 du/acre)	3
Medium Density Residential (12 du/acre)	10
Low Density Residential (6 du/acre)	2,257
Estate/Homestead Residential (1 du/3 acres)	883
Rural Residential (1 du/5 acres)	2,045
Large Lot Residential (1 du/10 acres)	308
Public	1,399
Open Space	341
Agricultural (2 du/37 acres)	1,008
Parks and Recreation (1 du/5,000 sq. ft)	541
Lake	198
Roads	414
Total	9,616

2.1.2 Specific Plans within GCSD

Two specific plans currently exist within GCSD. This Master Plan acknowledges the presence of these developments; however, prior to acquiring permits to start construction, a detailed analysis of the impact to GCSD infrastructure will be required. From these analyses, the cost of improvements will be passed on to the developer in the form of connection/annexation fees.

Yosemite Way Station (Yosemite Gateway or the "Scar")

- Located between Groveland and Big Oak Flat.
- Phase 1: two motels, two office and retail buildings, two restaurants, two shopping buildings, a service station and bus stop
- Phase 2: a townhouse development, an RV park and a mobile home park

Based on discussions with Frank Walter and Assoc., the civil engineering firm associated with the Yosemite Way Station project, Phase 1 of the project is likely to occur but Phase 2 is highly speculative. For this reason, demand forecasting accounted for Phase 1 development and ignored Phase 2.

Long Gulch Ranch

- Located outside GCSD, south and east of the airport
- 74 ten-plus acre lots, six one- to three acre lots, 1.6 acres commercial

The tentative map dated May 03, 2001 indicates that the proposed 80 residential lots are expected to have domestic water provided by private, on-site wells. The plan anticipates water service to the 1.6 acres of commercial land use adjacent to the airport provided by GCSD.

No allowance for the Long Gulch area was given when PML facilities were originally designed and constructed. Fire flow requirements may be significantly higher than when the existing airport area was improved; therefore, significant additional storage and conveyance capacity may be required. The overall affect of this development upon the water system must be evaluated prior to any commitment to serve by the District.

2.1.3 Land Use Analysis

Land use within the area served by GCSD is overwhelmingly residential. Note the following (data does not included Yosemite Way Station):

- GCSD anticipates approximately 4,000 total water connections expected at buildout[5]
- GCSD expects approximately 1,878 total sewer connections[6] at buildout

[5] Data provided by GCSD, Utility Count, March 9, 2001

- The communities of Groveland and Big Oak Flat have fewer than 50 commercial connections[7]

- According to County data, fewer than 20 parcels within PML are zoned for commercial use

This data indicates that less than 2% of the total water connections and less than 4% of sewer connections within the District are commercial. Due to the scarcity of non-residential land use, all service connections were evaluated with equal influence except where noted.

Water demands associated with the Yosemite Way Station project were added to totals calculated from existing development using data provided by the developer.

2.2 Historic Demands

All water supplied to District customers originates at one of two sources: Big Creek Shaft or Second Garrotte Shaft. These pumps draw water from the Hetch Hetchy Aqueduct, an underground tunnel that supplies the City of San Francisco. GCSD has a long-term agreement with the City to pump water from the tunnel for municipal purposes.

Monthly pumping data from each supply source was provided as input for developing this Master Plan. The following information is based on those logs covering the years 1984-2000. This data is included as **Appendix A**.

2.2.1 Average/Maximum Day Demands

Potable water consumption has gradually increased over the past years due to a steady increase in connections. **Figure 2.1** illustrates average day and maximum day demands since 1984. Actual maximum day data was not provided, but was calculated at 1.3 times the average day in the maximum month[8]

Figure 2.2 shows the max day/average day ratio since 1984. The numbers are fairly consistent and typical for municipal water systems. Even though GCSD customers irrigate less than more urban communities, the seasonal summer influx of residents to the area causes the system to peak in a similar fashion. For planning purposes, this study used a peaking factor of 2.25.

Figure 2.3 shows the distribution of demands throughout the year. Non-resort communities exhibit this type of seasonal water use due to landscape irrigation. Because of the scarce landscaping in the mountainous Groveland communities, this behavior can be attributed to the high influx of seasonal summer occupants, particularly in the Pine Mountain Lake development.

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[6] IBID
[7] Thornton, Mark V., A History of the Groveland Community Services District, 1992
[8] Metcalf & Eddy, Wastewater Engineering Treatment, Disposal and Reuse, 3rd Ed., 1991

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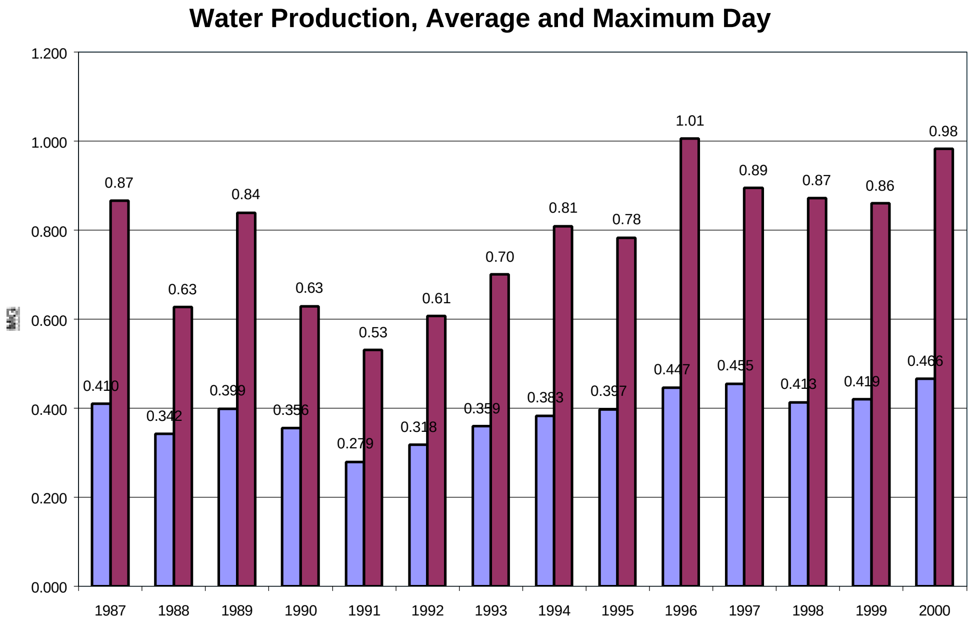


Figure 2.1: Water Production, Average and Maximum Day

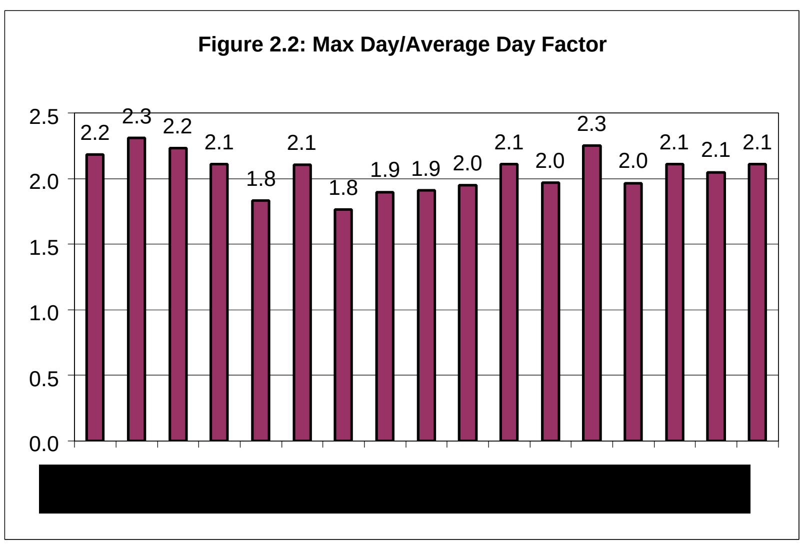


Figure 2.2: Max Day/Average Day Factor

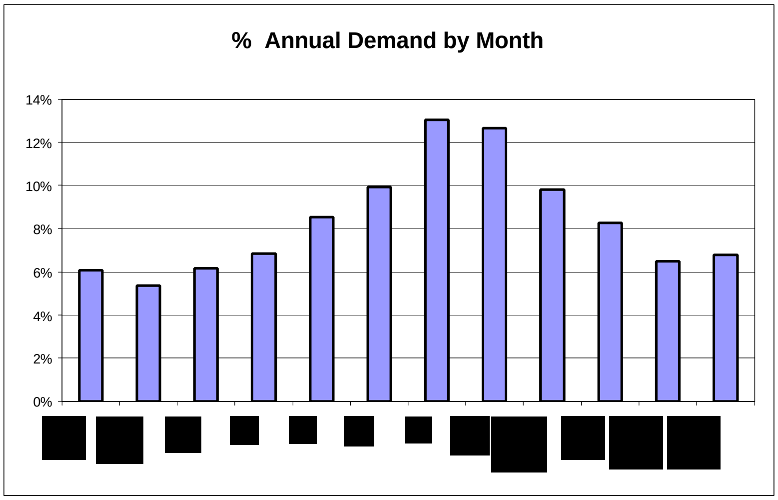


Figure 2.3: Percent Annual Demand by Month

Given:

- The vast majority of water connections within the District are residential customers, estimated at over 97%
- Little reliable information exists regarding seasonal occupancy of the residential population

Based on this, the system was evaluated on a "demand-per-connection" basis, taking the total demand divided by the number of connections. This Master Plan assumes no changes in the seasonal occupancy of the community.

The 1992 Kennedy/Jenks report provided the historic water meter quantities and the District provided 2001 data. Total connections for years 1991 through 1999 were estimated using a linear interpolation.

Figure **2.4** shows how water connections have increased in GCSD since 1985.

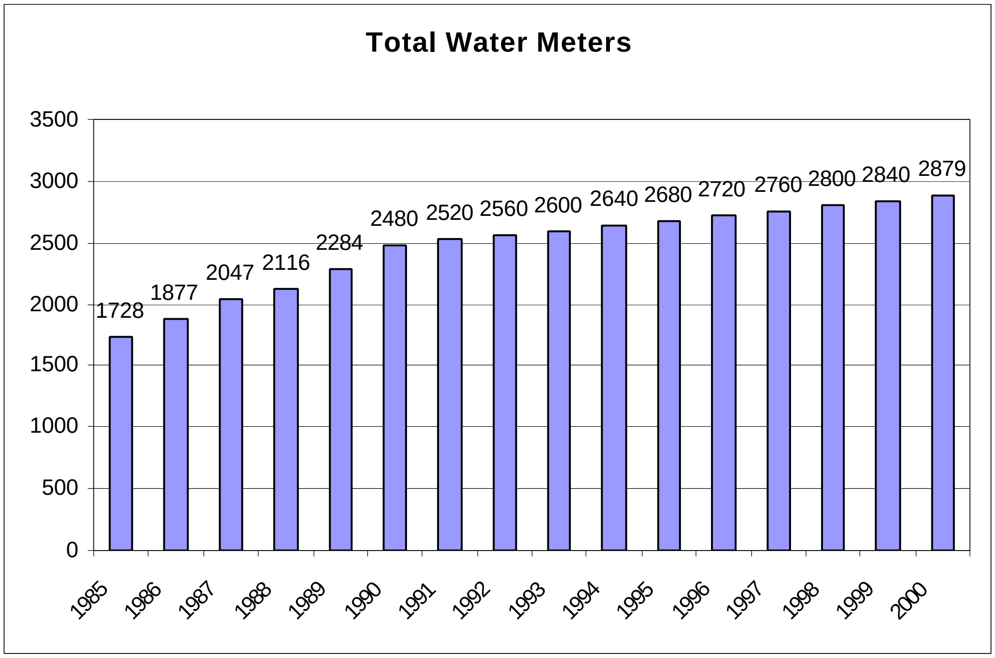


Figure 2.4: Total Water Meters

Figure 2.5 shows the demand per connection over years 1985-2000.

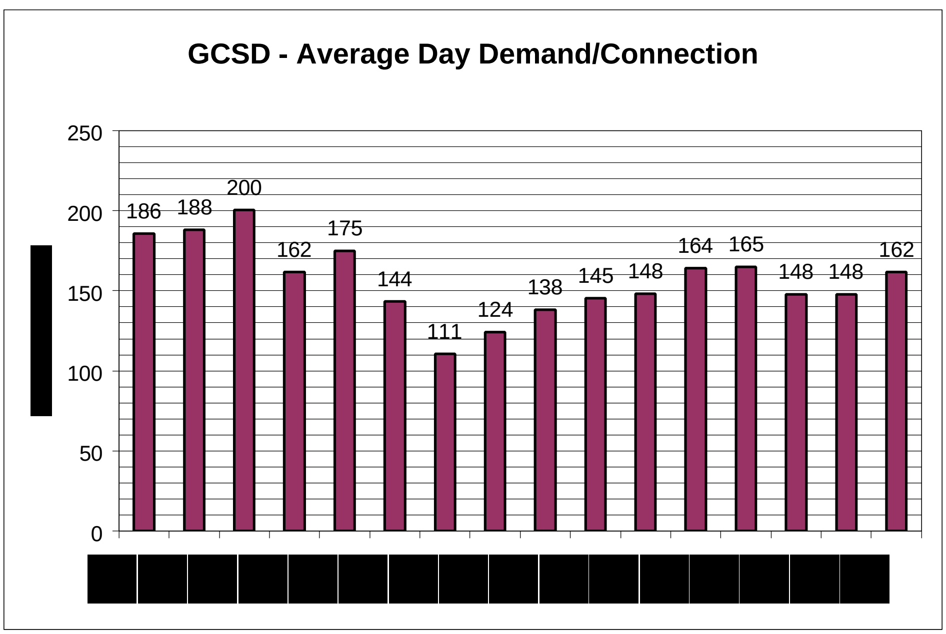


Figure 2.5: GCSD - Average Day Demand/Connection

For the purposes of this Master Plan, the maximum average day demand-per-connection observed in the last decade was used: 165 gpd/connection.

2.3 Projected Demands

2.3.1 Ultimate Demands, Currently Serviced Areas within GCSD

Table 2.2 calculates the ultimate demand within areas currently serviced by the GCSD water system. Yosemite Way Station land uses are included while Long Gulch Ranch is not since it lies outside the GCSD service boundary.

Table 2.2: Projected Ultimate Domestic Water Demands, by Land Use

Land Use	Water Use Area (ac)	Estimated DUs	Duty Factor		Average Annual Water Demand gpd	Average Annual Water Demand AF	Maximum Day Water Demand gpd
Pine Mountain Lake							
Residential	1,941	3372	165	gpd/DU	556,380	634.1	1,251,855
Commercial	7		1500	gpd/ac	10,650	12.1	23,963
Parks/Golf Course	345				0		
Open Space	332				0		
Lake	198				0		
Subtotal	2,823				567,030	646.2	1,275,818
Tuolumne County General Plan							
Residential							
High Density	3	7	165	gpd/DU	1,155	1.3	2,599
Medium Density	10	7	165	gpd/DU	1,155	1.3	2,599
Low Density	316	291	165	gpd/DU	48,015	54.7	108,034
Estate/Homestead	883	78	165	gpd/DU	12,870	14.7	28,958
Rural	2,045				0		
Large Lot	308				0		
Industrial/Business Park	51		1500	gpd/ac	76,500	87.2	172,125
Commercial	129		1500	gpd/ac	193,500	220.5	435,375
Mixed Use	22		1500	gpd/ac	33,000	37.6	74,250
Public	1,399				0		
Agriculture	1,008				0		
Parks/Recreation	196				0		
Open Space	9				0		
Roads	414				0		
Subtotal	6,793				366,195	417.3	823,939
Total	9,616				933,225	1063.5	2,099,756

2.3.2 Ultimate Demand - Expanding Water Service to Areas Not Currently Served

In order to lend perspective to the affect of increased development within the District's sphere of influence, future additional flows were calculated assuming rural/estate/homestead/large lot residential and agricultural land use areas were developed at 5 DUs/Acre. **Table 2.3** shows the additional demand within the existing GCSD boundary. **Table 2.4** shows the total additional demand within the San Francisco contract boundary.

Table 2.3: Additional Demand GCSD Boundary Fully Developed at 1 DU per 5 Acres

Unserviced Land Use	Acres	DUs	Duty Factor (gpd/DU)	Avg. Day Demand (gpd)	Annual Demand (AF/yr)	Max-Day Demand (gpd)
Rural Residential	2,045	409	165	67,485	77	151,841
Large Lot Residential	308	62	165	10,164	12	22,869
Agriculture	1,008	202	165	33,264	38	74,844
Totals	3,361	672		110,913	126	249,554

Table 2.4: Additional Demand San Francisco Contract Service Boundary Fully Developed at 1 DU per 5 Acres

Unserviced Land Use	Acres	DUs	Duty Factor (gpd/DU)	Avg. Day Demand (gpd)	Annual Demand (AF/yr)	Max-Day Demand (gpd)
Rural Residential	1,182	236	165	39,006	44	87,764
Homestead/Estate Residential	508	102	165	16,764	19	37,719
Large Lot Residential	60	12	165	1,980	2	4,455
Agriculture	8,602	1,720	165	283,866	323	638,699
Totals	10,352	2,070		341,616	389	768,636

2.4 Demand Growth

Two factors were considered in developing estimates for future water demands:

- Rate of demand increase experienced over the past decade
- Expected total demand at buildout, based on parcel data provided by Tuolumne County in GIS format

Using the data presented in **Figure 1.1**, demand growth over the past decade averaged 3.0% per year. The resulting demands from this expected increase are shown in **Figure 1.1** and summarized in **Table 2.5**.

Table 2.5: Demand Projected by Year, Currently Served Areas

Year	2000	2005	2010	2015	2020	2025
Average Day Demand (gpd)	466,000	540,000	626,000	726,000	841,000	975,000

3.0 EXISTING WATER SYSTEM EVALUATION

3.1 Introduction

Due to the mountainous terrain within the District, the domestic water system utilizes eleven discreet pressure zones, a high number considering GCSD currently has less than 3,000 customers. The challenge presented by this system is balancing the various supply sources (tanks, PRVs) to each zone and minimizing the pumping required to serve each meter within the District.

The majority of the water distribution system was constructed during the 1970s with the PML development. Much of the distribution system in Groveland and Big Oak Flat was constructed in the 1960s.

3.2 Source Information

The following drawings and documents provided the reference data used in development of this Master Plan:

- Initial Study – Water Treatment Facilities Evaluation, Kennedy/Jenks, 1992
- GCSD Overall As Built Water System, Dentoni & Assoc., Revised May 1986
- GCSD Water Treatment Summary Spreadsheets, District records
- Pressure Regulating Valve List, District records
- Existing EPANet® Models (for pump curves), District records
- Tuolumne County Fire Flow Test Results Data (supplied with the General Plan)

3.3 Existing System Description

The GCSD domestic water system consists of the following:

- 2 water supply pumps and treatment facilities with clearwell storage
- 5 water tanks
- 11 pressure zones
- 17 pressure reducing valves (PRVs)
- 3 intra-system booster pumps
- 9 pressure relief valves
- Approximately 70 miles of water mains

- Approximately 425 fire hydrants

A map of the existing system is included as **Figure 3.1**. This map coupled with discussions with District Staff, was used as the foundation for this Master Plan analysis. **Exhibit 16** further illustrates the distribution system by pipe size.

3.4 System Operation

Two sub-systems operate within the GCSD system: the Second Garrotte (2G) sub-system and the Big Creek (BC) sub-system.

The following system description comes from GCSD's public information program:

1. The water source … comes from the watershed within Yosemite National Park. The water is collected behind O'Shaughnessy Dam (Hetch Hetchy Reservoir) that is owned by the City of San Francisco. While the watershed is provided with excellent protection being within a National Park, it is still continuously monitored to keep it safe from possible pollution or contamination.

2. The water leaves O'Shaughnessy Dam through the Canyon Power tunnel where it is used to generate electrical power at the Kirkwood Powerhouse. The water then enters the Mountain tunnel on it way to [GCSD] and ultimately to San Francisco.

3. The Mountain tunnel was constructed in the early 1920's through solid rock several hundreds of feet below the surface. Eleven airshafts were constructed during the tunneling, which also provided for debris and rock removal. The District draws water from two of the airshafts known as Big Creek Shaft and Second Garrotte Shaft.

4. Big Creek Shaft is upstream of Second Garrotte Shaft. A 300 horsepower pump is used at Big Creek to draw water from a depth of 570 feet below ground, at a rate of 1,650 gallons per minute or 2,376,000 gallons per day. A 200 horsepower pump is used at Second Garrotte to draw water from a depth of 720 feet below ground, at a rate of 620 gallons per minute or 892,800 gallons per day.

5. A 2 million-gallon clearwell has been constructed at Big Creek and also at Second Garrotte Pump Stations. These large tanks are baffled to increase the chlorine contact time for disinfection. Current regulations for disinfectant contact times are being exceeded at Big Creek by 2.5 times and at Second Garrotte by 5.1 times. In addition, the clearwells also act like large settling tanks and provide for extra water storage during times of emergency.

6. Chlorine is used for the disinfection of the water. Chlorine is injected into the water before it enters the clearwell (Primary Disinfection) so that it will have the greatest amount of time to disinfect the water. Chlorine is also added as the water enters the distribution system (Secondary Disinfection) so that a detectable chlorine residual is maintained throughout the distribution system, per State and federal regulation.

7. The District adds lime to the water to raise its naturally low-pH. The water source, which is melted snow, is naturally void of minerals and low in alkalinity, which makes the water aggressive toward some piping materials. The addition of lime increases the pH and reduces the natural aggressive tendencies of the water.

8. The District generates its own chlorine supply for the disinfection for the water. The passing of DC electrical current through a salt brine solution produces liquid chlorine. Production of the chlorine is stopped when the current is stopped, one safety feature. More importantly, however, the solution strength is only 0.8% chlorine. To put this in perspective, the household bleach (chlorine), which is bought at the store for laundry purposes, is 5.25%. This makes the store bought chlorine 6.6 times stronger than what is being made by the chlorine generators being used by the District. The only waste byproduct being produced by the District's chlorine generator is hydrogen gas, which is safely vented to atmosphere.

9. Water from the two million-gallon clearwells is pumped into the distribution systems. Big Creek uses a 150 horsepower pump to put 1,500 gallons per minute into its distribution system. Second Garrotte uses a 100 horsepower pump to put 720 gallons per minute into its distribution system. There are two pumps at each station for redundancy.

10. The main pipeline leaving the Big Creek Pump station is about 4-¼ miles long between it and the primary distribution storage tank within PML, known as Tank No. 3 on Alcan Court. Tank No. 4, which is located at the airport, can either draw water from Tank No. 3 or from the main line if the pump station is operating. Tank No. 2 located on Cobden Court can only draw water from Tank No. 3.

11. The main pipeline leaving the Second Garrotte Pump Station is approximately two miles long between it and the primary distribution storage tank known as Tank No. 1 located above Tenaya School, or the townships of Groveland and Big Oak Flat. Distribution storage Tank No. 5 draws water from the main water line feeding the township of Big Oak Flat. Tank No. 5 supplies fire protection and water service for the upper parts of Merrell Road.

12. The District has a pipeline between the two water distribution systems for use during times when one of the pump stations is unable to provide water to its own system. During those times, the pipeline is used to transfer water from the operational water system to both water distribution systems, from just one pump station. This pipeline adds security for both water systems that neither will run out of water as long as one pump station is operational.

Exhibit 5 illustrates the various pressure zones within the system, tank, booster pump and PRV locations and normally closed valves.

Tuolumne County fire flow test results are also shown in Exhibit 5. This information was used to help pinpoint problem areas in the system.

3.5 Pressure Zones

Ten major pressure zones exist within the District's distribution system. A small zone located below GL-S serves approximately three parcels and is not addressed in this evaluation. **Table 3.1** describes the pressure zones as they currently are operated.

The following observations relate to current system operation:

- As shown in Table 3.1, not all zones within GCSD's distribution system are well balanced.
- PML-C is supplied by six (6) PRVs at four different HGL settings. PRV-PML-02, -05, -06, and –10 never open under normal demands.
- PML-NW is supplied by three (3) PRVs with PRV-PML-04 set at the highest HGL. For this reason, most (if not all) water supplied to the zone comes from Tank No. 3 via PML-E. This inhibits the ability of Tank No. 2 to drain.

The detailed evaluation of the existing system was performed after balancing the pressure zones by modifying PRV settings as described in **Table 3.2**.

- Tank No. 3, not Tank No. 4, feeds PML-E. The only way to drain Tank No. 4 is by boosting to PML-NE.
- PRV-PML-12 is currently being bypassed to service the homes located directly below Tank No. 3 with Tank No. 1 pressures.
- Tank No. 2 is always filled from Tank No. 3, and Tank No. 4 is sometimes filled in this manner. This is not the most economic means for filling the tanks since the volume of water must be pumped to the 100-foot higher tank before draining to the lower tanks. In each case, head is broken at the tank inlet, which puts the inlet and outlet piping in different pressure zones.

Exhibit 8 graphically illustrates the system as it is currently operated. Water supply and pressure sources to each zone are shown. Service area elevations are broken down into the following classes:

- < 40 psi (< 92 ft): Unacceptable pressures
- 40 – 58 psi (92 – 134 ft): Low pressures
- 58 – 80 psi (134 – 185 ft): Normal operating pressures
- 80 – 150 psi (185 – 347 ft): Private Pressure Regulator required pressures
- >150 psi (> 347 ft): System overpressure

Exhibit 9 shows the balanced system.

The following conclusions can be drawn from the exhibits:

- Pressures at service connections appear acceptable. Most pressures appear to fall within the range of normal operating pressures or at pressures high enough to require private pressure regulators at individual meters with the following exceptions:
- PML-NW and PML-W zones experience static pressure less than 40 psi.
- PML-E and PML-NW experience pressures greater than 150 psi. The over-pressurized portions of the PML-E system appear to exist in piping outside the service area.
- Few opportunities exist for combining zones. PML-S and PML-SW could be combined with the elimination of PRV-PML-01. However, this would eliminate the potential of serving PML-SW by Tank No.1 and increasing the supply pressure by 132 ft and requiring use of the PRV.

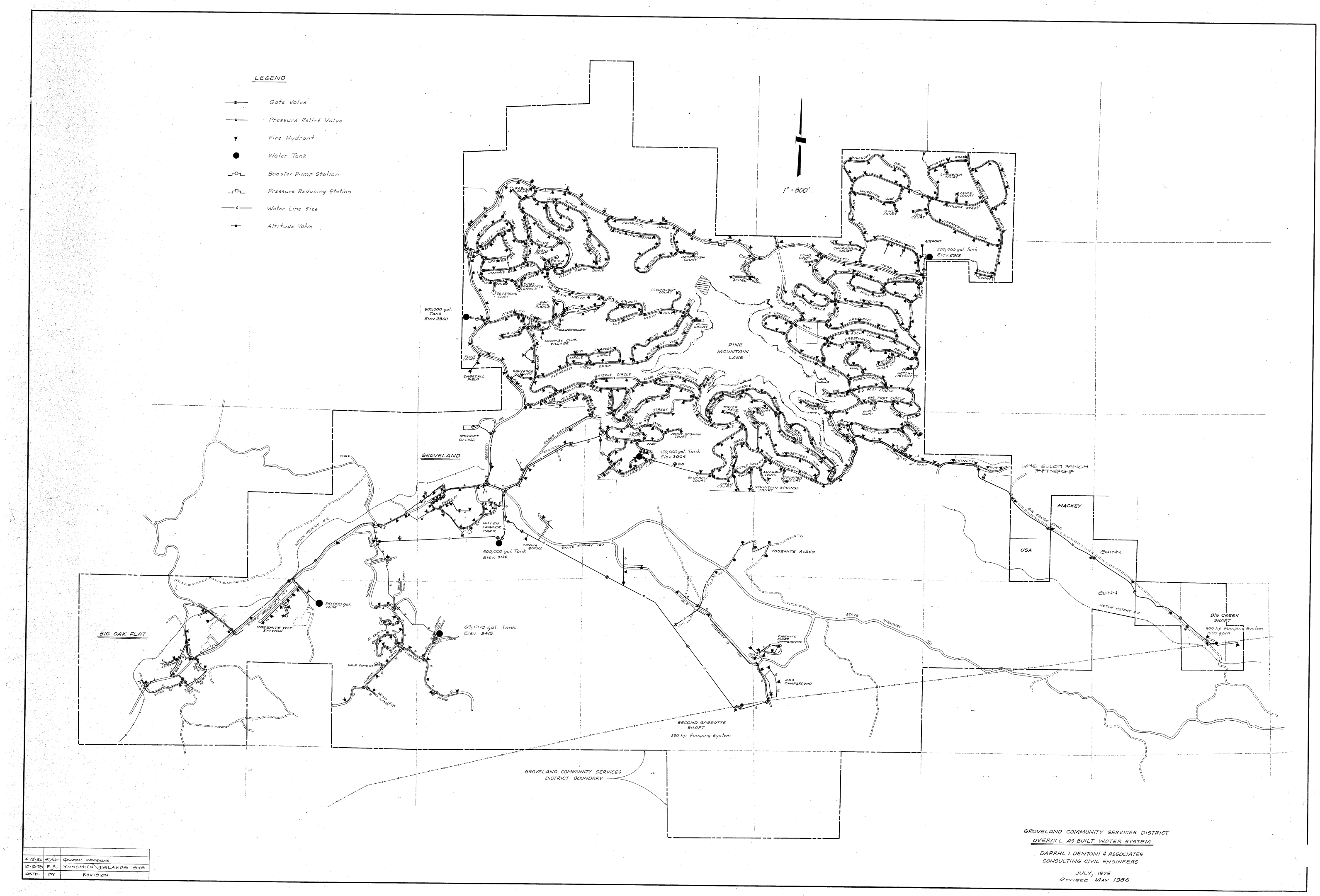


Figure 3.1: GCSD Water System

Table 3.1: Current Pressure Zone Description

Pressure Zone	Pressure Source	Elevation	Setting (psi)	HGL	Comment
GL-S	Tank No.5	*3415*		3435	Pump TDH assumed to equal T5 high water level
GL-SE	Tank No.1	3136		3160	
GL-C	PRV-GL-01	2900	65	3050	Well-balanced zone.
GL-C	PRV-GL-02	2930	54	3055	
GL-C	PRV-GL-03	2930	52	3050	
PML-NE	Boost	*2912*		*3092*	HGL assumed to provide optimum service pressures
PML-S	Tank No.3	3004		3028	
BOF	BOF-PRV-01	2920	34	2999	
PML-E	PML-PRV-09	2705	125	2994	Floats off T3. Zone fills T4.
PML-W	Tank No.2	2908		2932	T2 re-piped to allow to drain.
PML-SW	PML-PRV-01	2820	81	3007	
PML-C	PML-PRV-02	2680	84	2874	Poorly balanced zone. Supplied by two sources (PRV-08 and PRV-11) only. T3 provides entire. supply to zone.
PML-C	PML-PRV-06	2750	54	2875	
PML-C	PML-PRV-11	2770	50	2885	
PML-C	PML-PRV-05	2680	60	2819	
PML-C	PML-PRV-10	2710	61	2851	
PML-C	PML-PRV-08	2773	49	2886	
PML-NW	PML-PRV-03	2670	31	2742	Reasonably balanced zone. In current configuration, should reset PRVs so that T2, not T3 is primary supply source.
PML-NW	PML-PRV-07	2670	31	2742	
PML-NW	PML-PRV-04	2580	73	2749	

Table 3.2: Existing System - Balanced

Pressure Zone	Pressure Source	Elevation	Setting (psi)	HGL	Comment
GL-S	Tank No.5	*3415*		3439	No changes. Wide service area elevation range, high and low pressures
GL-SE	Tank No.1	3136		3160	No changes
GL-C	PRV-GL-01	2900	67	3055	Set PRV to 67 psi
GL-C	PRV-GL-02	2930	54	3055	No changes
GL-C	PRV-GL-03	2930	54	3055	Set PRV to 54 psi
PML-NE	Boost	*2912*		*3092*	Disch. Pressure of 80 psi will yield minimum user static head of 40 psi
PML-S	Tank No.3	3004		3028	
BOF	BOF-PRV-01	2920	34	2999	No changes
PML-E	PML-PRV-09	2705	125	2994	Minimum setting of 121 psi and maintain minimum service pressures to higher elevations within zone
PML-W	Tank No.2	2908		2932	
PML-SW	PML-PRV-01	2820	81	3007	No changes
PML-C	PML-PRV-02	2680	89	2886	Set PRV to 89 psi
PML-C	PML-PRV-06	2750	58	2886	Set PRV to 58 psi
PML-C	PML-PRV-11	2770	50	2885	No changes
PML-C	PML-PRV-05	2680	89	2886	Set PRV to 89 psi
PML-C	PML-PRV-10	2710	76	2886	Set PRV to 76 psi
PML-C	PML-PRV-08	2773	49	2886	No changes
PML-NW	PML-PRV-03	2670	31	2742	No changes
PML-NW	PML-PRV-07	2670	31	2742	No changes
PML-NW	PML-PRV-04	2580	69	2739	Set PRV to 69 psi so T2 (not T3) is primary supply

3.6 Water Demands by Pressure Zone

In order to evaluate the transmission and storage capacities, GCSD's distribution system was evaluated on a zone-by-zone basis.

Exhibit 6 shows a parcel map of the District broken down by pressure zone. **Exhibit 7** maps water transmission between zones within the system.

Flow factors derived in Section 2 were applied to determine current and ultimate demands. **Table 3.3** shows estimated current zone demands and **Table 3.4** lists the ultimate demands. These values were input into the EPANET® model.

Figure 3.2 shows the relative water demand between zones at buildout.

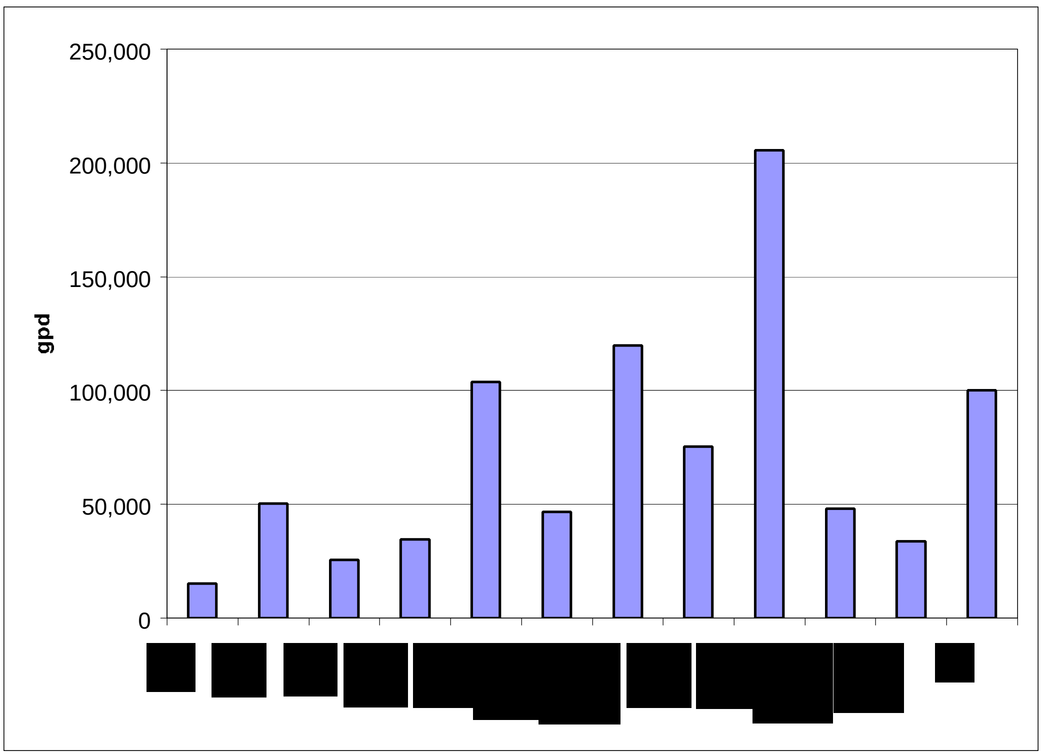


Figure 3.2: Average Day Demand at Buildout by Zone

Table 3.3: Estimated Current Demand by Zone

Pressure Zone	Pressure Source	Approx. Current Connections	Average Demand per Connection (gpd)	Other Demand	Average Day Demand (gpd)	Max-Day Factor	Max-Day Zone Demand (gpd)	Max-Day Zone Demand (gpm)
BOF	PRV-BOF-01	63	165		10,435	2.25	23,478	16
GL-C (Note 1)	PRV-GL-01, -02, -03	104	330		34,333	2.25	77,250	54
GL-S	T5, Groveland Highlands PS	106	165		17,503	2.25	39,382	27
GL-SE	2G PS, T1, Inter-system Booster	143	165		23,562	2.25	53,015	37
PML-E	PRV-PML-09	428	165		70,574	2.25	158,791	110
PML-NE	PML-NE PS	193	165		31,865	2.25	71,696	50
PML-NW (Note 2)	PRV-PML-03, -04, -07	477	165	4,000	82,764	2.25	186,220	129
PML-S	Big Creek PS, T3	311	165		51,275	2.25	115,370	80
PML-C	PRV-PML-02,-05,-06,-08,-10,-11	847	165		139,801	2.25	314,553	218
PML-SW	PRM-PML-01	199	165		32,762	2.25	73,715	51
PML-W	T2	139	165		23,001	2.25	51,752	36
	Total	3,010			517,876		1,165,221	809

Notes:
1. "Other Demand:" School = (200 students x 10 gpd/student) + (7.5 acres x 2AF/acre/yr) ~ 4000 gpd
2. Demand in this zone is assumed to be 2 X residential demand/connection due to commercial/industrial high density
3. Yosemite Way Station – Proposed

Table 3.4: Ultimate Demand by Zone

Pressure Zone	Pressure Source	Approx. Ultimate Connections	Avg. Demand per Connection (gpd)	Other Demand	Average Day Demand (gpd)	Max-Day Factor	Max-Day Zone Demand (gpd)	Max-Day Zone Demand (gpm)
BOF	PRV-BOF-01	93	165		15,345	2.25	34,526	24
GL-C	PRV-GL-01, -02, -03	153	330		50,490	2.25	113,603	79
GL-S	T5, Groveland Highlands PS	156	165		25,740	2.25	57,915	40
GL-SE	2G PS, T1, Inter-system Booster	210	165		34,650	2.25	77,963	54
PML-E	PRV-PML-09	629	165		103,785	2.25	233,516	162
PML-NE	PML-NE PS	284	165		46,860	2.25	105,435	73
PML-NW	PRV-PML-03, -04, -07	702	165	4,000	119,830	2.25	269,618	187
PML-S	Big Creek PS, T3	457	165		75,405	2.25	169,661	118
PML-C	PRV-PML-02,-05,-06,-08,-10,-11	1246	165		205,590	2.25	462,578	321
PML-SW	PRM-PML-01	292	165		48,180	2.25	108,405	75
PML-W	T2	205	165		33,825	2.25	76,106	53
YG	Yosemite Way Station Tank, PS	-	-	100,000	100,000	2.25	225,000	156
	Total	4,427			859,700		1,934,325	1,343

Notes:
1. “Other Demand:” School = (200 students x 10 gpd/student) + (7.5 acres x 2AF/acre/yr) ~ 4000 gpd
2. Demand in this zone is assumed to be 2 X residential demand/connection due to commercial/industrial high density
3. Yosemite Way Station – Proposed

3.7 Transmission Analysis

3.7.1 Hydraulic Model and Scenarios

The distribution system was modeled using EPANet® simulating the following scenarios under steady-state conditions:

- Static, no demand (maximum pressure scenario)
- Peak hour
- Maximum-day demand, fire flow (for critical zones)

The following fire flows were applied:

- Single family and duplex residential: 1,000 gpm*
- Townhouse, multiple residential: 1,000 gpm
- Commercial: 1,500 gpm

*GCSD Standards specify 500 gpm for these type residences; however, for conservatism, the 1997 Uniform Fire Code (UFC) specified minimum of 1,000 gpm for one- and two-family dwellings was used

All simulations were run at buildout demands. **Figure 3.3** shows the model.

Extended period simulations were run under average day and maximum day demands to evaluate water age in the system. The results for all model runs are included in **Appendix B**.

3.7.2 Design Criteria

- Pipelines will be evaluated against the following criteria:
- Minimum pressure at peak hour: 35 psi
- Maximum system static pressure: 150 psi
- Maximum velocity at peak hour: 5 fps
- Minimum pressure, fire demand at max day: 20 psi
- Maximum velocity, fire demand at max day: 15 fps

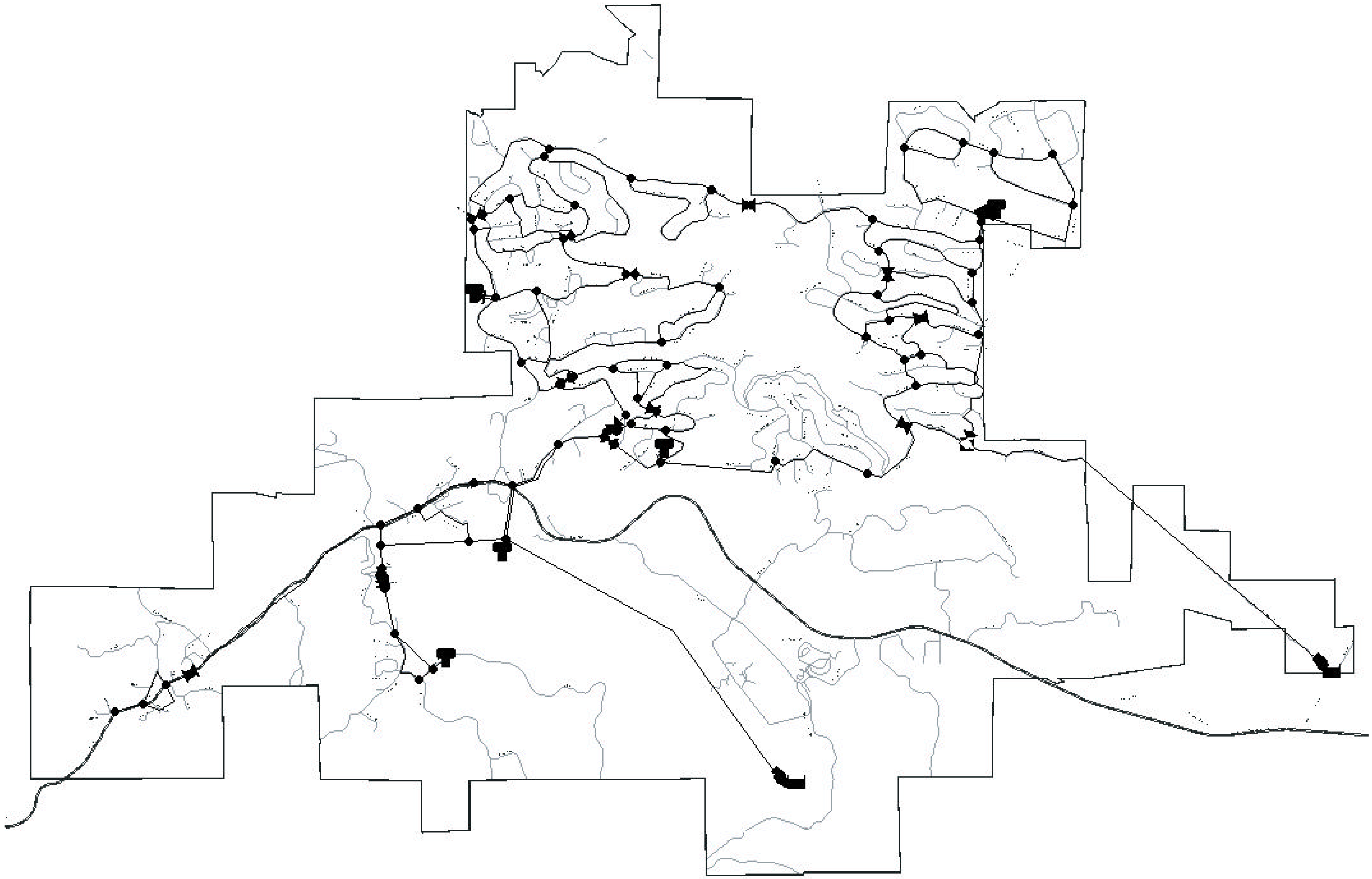


Figure 3.3: EPANet® Model

3.7.3 Transmission Analysis Results

In general, the GCSD system is well looped with good transmission capacity.

The model exposed several areas of concern caused by either undersized pipelines or high elevations. These areas include downtown Groveland, Big Oak Flat, homes located immediately below Tank No. 3, homes atop the hill on Rising Hill Circle and several dead-end pipes within the system. **Tables 3.5 and 3.6** list the nodes and pipes that fail to meet the criteria listed in Section 3.6.1. These results are supported by County hydrant test results shown graphically in Exhibit 5.

Table 3.5: Existing Balanced System Low Pressures

Scenario	Zone	Location	Pressure*
Peak Hour Demand	GL-C	Millen Trailer Park	17.49 psi
	PML-NW	Digger Pine St. adjacent to PRV-PML-03	31 psi
	PML-NW	Wells Fargo Dr. adjacent to PRV-PML-07	31 psi
GL-C Fire	GL-C	HWY 120	< 0.0 psi
	GL-C	Millen Trailer Park	3.62 psi
BOF Fire	BOF	Majority of Community	< 0.0 psi
PML-W Fire	PML-W	Mueller Dr. near PRV-PML-06	< 0.0 psi
	PML-W	Jackson Mill Rd.	< 0.0 psi
	PML-W	Ferretti Rd.	< 0.0 psi
GL-SE Fire	GL-SE	Hillhurst Circle below Tank No. 3	< 0.0 psi
	GL-SE	Elder Lane	< 0.0 psi
PML-C Fire	PML-C	Lower Skyridge Drive	< 0.0 psi

* A pressure of < 0.0 psi indicates that the fire demand would not be achieved

Commentary:

- Low pressures in PML-NW under peak hour loads are due to the users' location adjacent to the PRVs. The two subject PRVs are currently set such that static pressures at the lowest elevations within the zone are approximately 150 psi; therefore, adjusting the settings higher is not recommended. If the District is experiencing persistent customer complaints, homes could be repiped to the higher pressure zone, if necessary.

- Increasing the HGL of the GL-C pressure zone could possibly eliminate the low pressures at Millen Trailer Park. This action is recommended only if all users within the zone have private pressure regulators.

- The proximity of the water users to Tank No. 1 is the cause of low pressure at Millen Trailer Park and if the users' are within 92 vertical feet, small individual booster pumps for the small number of customers could be installed.

- Low pressures caused in a GL-C fire scenario are the result of a looped system with 4-in pipelines.

- BOF deficiencies are a result of the community being served by a single, 6-in dead-end pipeline. A 6-in unlooped pipe cannot support fire flows.

- PML-W low pressures result from closing the valve at PRV-PML-06 to separate this zone from PML-SW. The zone, as currently operated, is not looped.

- GL-SE deficiencies are caused by the single, 6-in dead-end run from Groveland to the base of Tank No. 3, inadequate for fire flows.

- The PML-C low pressures result from the unlooped dead-end pipe in Skyridge Drive.

Table 3.6: Existing Balanced System High Velocities

Scenario	Zone	Location	Velocity
Peak Hour Demand	PML-S	Butler Way	6.85 fps
	PML-SW	Elder Lane	5.58 fps
GL-C Fire	GL-C	Foote St.	26.42 fps
BOF Fire	BOF	HWY 120	38.71 fps
	GL-SE	HWY 120	17.38 fps

- The high velocities in Butler Way and Elder Lane under peak hour conditions are due to the entire demand from PML-SW, PML-W, portions of PML-C and PML-S and filling Tank No. 2 flowing through a single 10-in pipe.

- The GL-C and BOF deficiencies are due to 4-in and unlooped 6-in pipelines.

All of these deficiencies will be eliminated by the improvements proposed in Section 4.

3.8 Normal Storage Analysis

Normal storage is defined as storage not designed to accommodate and extended supply outage from the Hetch-Hetchy Aqueduct. Current normal storage capacity was evaluated against District criterion as follows:

Storage capacity shall be equal to the sum of the fire storage reservation, plus the allowance for system peaking, plus an allowance for emergency reserve.

- Fire Storage Reservation (FSR): Shall be FF for duration of 4 hours

- System Peaking Storage (SPS): 20% MDF

- Emergency Storage (ES): Four (4) hours of a maximum day flow

The total of these flows equates to FF plus 0.367 MDF.

GCSD storage capacity was also reviewed against an alternate criterion (see Section 4) defined as follows:

- Storage capacity shall be equal to maximum-day storage plus fire flow storage. Fire flow storage will be based on 2 hours as specified in the Uniform Fire Code (UFC)

Table 3.7 summarizes storage facilities and requirements based on the current storage configuration at ultimate buildout conditions. Currently, District storage criterion is met except for Tank No. 5 serving GL-S (Groveland Highlands).

Table 3.7: Storage Evaluation, District Criteria - Current Configuration at Ultimate Buildout

Tank	Pressure Zones Served as Primary Supply	Tank Volume (gal)	Max Day Demand (gal)	Fire Storage (gal)	Storage Req'd (gal)	Delta (gal)
1	BOF, GL-C, GL-SE	500,000	226,092	360,000	442,976	57,024
2	PML-NW, PML-W	750,000	345,724	360,000	486,881	263,119
3	PML-E, PML-C, PML-S, PML-SW	750,000	974,160	360,000	717,517	32,483
4	PML-NE	500,000	105,435	360,000	398,695	101,305
5	G-S	140,000	57,915	240,000	261,255	-121,255
	Total	2,640,000	1,709,326		2,307,323	

Further discussion of supply reliability and storage is included in Sections 4.4 and Section 5.

3.9 Supply Capacity Analysis

Table 3.9 compares the pumping capacity at both Second Garrotte Shaft (2G) and Big Creek Shaft (BC) with the demands of the two sub-systems and the ultimate demand of the District. Again, note that the ultimate demand includes Yosemite Way Station, but no other developments.

Table 3.9: Supply Capacity Analysis, Buildout Conditions

Supply Source	Capacity	Maximum-Day Sub-System Demand	% Sub-System	Maximum-Day GCSD Demand	% Entire District
2G	680 gpm	353 gpm	190%	1,343 gpm	51%
BC	1,330 gpm	990 gpm	134%	1,343 gpm	99%

Conclusion: On GCSD's highest demand day with the current development built-out, the District can afford 2G to be out-of-service and still meet customer demands. However, the District will not meet demands under these conditions if BC is taken out-of-service. For this reason, upgrading Second Garrotte pumping capacity is recommended in Section 4.

4.0 PROPOSED DISTRIBUTION SYSTEM IMPROVEMENTS

4.1 Categories of Recommendations

Improvements to the GCSD water distribution system can be classified into five categories:

- *Immediate Improvements*: Projects that can be initiated immediately to improve the system. Maintenance staff can implement these projects at little or no cost. These projects include PRV adjusting to balance the existing system.
- *Improvements Required to Meet District Criteria*: Proposed projects that will improve portions of the system that do not meet GCSD design standards.
- *Improvements to Improve Reliability*: While not required to meet District criteria, these projects will significantly improve system reliability.
- *Long-term System Improvements*: This section evaluates the big picture and explores system-wide alternatives for improving service while optimizing operations.
- *Expanded Service Improvements*: This section takes a cursory look at areas where service may be expanded both within and outside the District boundary. New developments are included in this section.

4.2 Immediate Improvements

These projects consist of adjusting the settings of various PRVs to balance various pressure zones that are currently not being operated at peak efficiency. The modifications are described in **Table 3.2** and shown in **Exhibit 10**.

4.3 Improvements to Meet District Criteria/Regulatory Requirements

Five projects fit solely into this category. The projects are shown in **Exhibit 11** and are described as follows:

Project 1: Groveland Pipeline – This project will solve the transmission capacity deficiency of the GL-C zone (inability to meet fire flow) and consists of approximately 4,000 lft of 8-in pipeline in HWY 120 between Ferretti and Merrell Roads.

Project 2: Big Oak Flat Pipeline – This project will solve the deficiencies of GL-SE and BOF pressure zones, and is recommended to be performed at the time of the Yosemite Way Station project. 6,500 feet of 8-inch diameter pipe would be extended in Hwy 120 from the new development to the westernmost customer in Big Oak Flat.

Project 3: Groveland Highlands Storage Tank – Replacing the existing 140,000-gallon storage tank with a 400,000-gallon tank at a slightly higher elevation from the existing Tank No. 5. This will solve the storage deficiency and improve service pressures to Groveland Highlands.

Project 4: PML-C Loop Completion Pipeline – This short run of pipe (250 lft) would connect the two dead-end pipes in Skyridge Drive, eliminating the fire flow capacity deficiency.

4.4 Reliability Improvements

The five proposed projects shown in **Exhibit 12** can significantly improve water service reliability within the District.

Project 1: Upgrade 2G to 1400 gpm – The District ultimate maximum-day demand was calculated to be 1,343 gpm (see Table 3.3). This upgrade will allow the District to meet worst-case summer peak days if Big Creek Shaft is unavailable for any reason.

Project 2: 2G to Tank No. 1 Supply Pipeline – This project will provide the transmission capacity of 1,400 gpm from the supply point to Tank No. 1. 9,600 lft of 12-in pipe would replace the existing 8-in supply pipe.

Project 3: Tank No. 1 to Tank No. 3 Pipeline – This project provides the capacity to fill Tank No. 3 from 2G under maximum-day conditions if BC is down and consists of approximately 6,300 lft of 12-in pipeline in Elder Lane to Hillhurst Circle up to Tank No. 3. This project also solves the fire flow deficiency to users at the base of Tank No. 3 that are supplied from Tank No. 1.

Project 4: Tank No. 4 Relocation - This project would relocate Tank No. 4 to an elevation that could gravity serve the PML-E and PML-NE pressure zones. The hydro-pneumatic system currently supplying PML-NE would be eliminated. The project consists of 2,000 lft of 8-in pipe heading east from McKinley Way to a new 500,000-gallon reservoir site. This project would best be pursued in conjunction with new development to the east of PML.

Project 5: Emergency Storage at Big Creek or Second Garrotte – Emergency storage criteria currently in use by the District is small, only one-sixth of a maximum day. In an extreme emergency (i.e. loss of low in Hetch Hetchy Aqueduct) this would hardly be workable. **Tables 4.1 and 4.2** evaluate sub-system storage if criteria was set at *maximum-day + fire flow* (typical for several other agencies) in the existing system and if improvements proposed in Sections 4.3 and 4.5 were implemented.

Table 4.1: Max-Day + Fire Storage, Existing Water System

	2G	Big Creek
Ultimate Max-Day Demand	509,006	1,425,319
Fire Storage	180,000	180,000
Total Storage	689,006	1,605,319
Existing Storage	640,000	2,000,000
Delta	49,006	-394,681

Table 4.2: Max-Day + Fire Storage, Proposed Water System

	2G	Big Creek
Max-Day Demand	509,006	1,425,319
Fire Storage	180,000	180,000
Total Storage	689,006	1,605,319
Existing Storage*	850,000	750,000
Delta	-160,994	855,319

* Assumes T1 storage increased to 600,000 gal, T2 abandoned, T4 considered unusable volume.

Note that several options exist for providing additional emergency storage – both location and amount of storage. The District may elect different storage projects based on a further evaluation of emergency storage (and potentially water treatment) needs.

4.5 Long-Term System Improvements

Five alternatives to modify the existing system-wide architecture were investigated to improve overall system performance, as shown in **Exhibit 13**. The improvements listed in Sections 4.2 thru 4.2 establish robust transmission capacity throughout the system. Operational advantages, storage capacity and cost proved to be the most influential factors in determining the preferred alternative.

4.5.1 Alternative 1: Maintain Existing System

The existing system capably provides water service to all GCSD customers. **Table 3.6** shows that storage capacity meets District criteria at buildout. Keeping the current system has the lowest capital cost, but several operational issues remain, including:

- Dead-end PML-NW pressure zone
- Under-utilized Tank No. 2 and 4 volumes

4.5.2 Alternative 2: Re-pipe Tank No. 4 Supply, Abandon Tank No. 2

This alternative provides many advantages. As shown in Exhibit 13, PRV-PML-09 could be re-piped such that PML-E and portions of PML-NW and PML-C could float off Tank No. 4. This demand shift eliminates the need for Tank No. 2 (freeing the tank for other uses) by transferring its demands to Tank No. 3. Tank No. 4 also would turn over much more often as it would be supplying more than just PML-NE.

Table 4.3 shows the storage analysis. The Tank No. 3 storage deficit would be accommodated since Tank No. 4 would supply portions of PML-C and PML–NW.

Pressure zones PML-W and PML-SW could be combined, eliminating the transmission deficiencies in PML-W.

However, this alternative has a fatal flaw. Approximately 30 homes atop Rising Hill Circle, Longview Street and Green Valley Circle in PML-E are less than 90 feet below Tank No. 4 high water level, which results in very low system pressures. This zone is best served from Tank No. 3.

Table 4.3: Alternative 2 Storage Analysis

Tank	Pressure Zones Served as Primary Supply	Tank Volume (gal)	Max Day Demand (gal)	Fire Storage (gal)	Storage Req'd (gal)	Delta (gal)
1	BOF, GL-C, GL-SE	500,000	226,092	360,000	442,976	57,024
2	abandoned	-	-	-	-	-
3	PML-C, PML-S, PML-SW, PML-NW, PML-W	750,000	1,086,368	360,000	758,697	-8,697
4	PML-NE, PML-E	500,000	338,951	360,000	484,395	15,605
5	G-S	140,000	57,915	240,000	261,255	-121,255
	Total		1,709,326			

4.5.3 Alternative 3: Replace Tank No. 1, Abandon Tank No. 2

This alternative is recommended for several reasons. First, Tank No. 1 is the oldest tank in the District, built in the 1960s (?). When the tank needs replacement, it can be upsized. Piping is already in place to connect PML-SW, PML-W and PML-NW to Tank No. 1. Tank No. 2 could be abandoned for other uses and PML-SW and PML-W could be combined. The storage analysis is shown in **Table 4.4**.

This option supports the 2G reliability improvements as well.

Table 4.4: Alternative 3 Storage Analysis

Tank	Pressure Zones Served as Primary Supply	Tank Volume (gal)	Max Day Demand (gal)	Fire Storage (gal)	Storage Req'd (gal)	Delta (gal)
1	BOF, GL-C, GL-SE, PML-SW, PML-W, PML-NW	600,000	571,816	360,000	569,856	30,144
2	abandoned	-	-	-	-	-
3	PML-E, PML-C, PML-S	750,000	974,160	360,000	717,517	32,483
4	PML-NE, PML-E	500,000	105,435	360,000	398,695	101,305
5	G-S	140,000	57,915	240,000	261,255	-121,255
Total			1,709,326			

4.5.4 Alternative 4: Raise Tank No. 2

This alternative is similar to the existing system with Tank No. 2 being raised approximately 50 feet, allowing PML-SW and PML-W to be combined. This alternative provides the same advantages at the same cost as Alternative No. 3, without extending the life of Tank No. 1 and is therefore not recommended.

4.5.5 Alternative 5: Increase Storage at Tank No 3.

This option provides the same benefits as Alternative 3, but would replace a newer tank.

4.6 Service Expansion Projects

Proposed service expansion projects are shown in **Exhibit 14**.

Project 1: Yosemite Acres Project – This project would provide water service to the approximately 70 estates within this community. The project consists of 18,000 lft of 8-in pipe and a 250,000-gallon tank set at the same HGL as Tank No. 1. Storage could be adjusted to provide additional reliability to the GCSD system.

Project 2: Long Gulch Ranch Project – This project would provide water service to the Long Gulch Ranch development. The developer anticipates using individual wells to provide water service; however, the District may eventually be asked to provide the utility. At this preliminary stage, it isn’t known the extent of infrastructure required. This project could be implemented concurrently with the Tank No. 4 relocation project discussed in Section 4.4.

Project 3: Yosemite Way Station Project – This project would provide water to the development of the large parcel between Groveland and Big Oak Flat. The proposed project includes two storage tanks and significant infrastructure. This project would improve storage within the District and would drastically improve transmission capacity in Big Oak Flat. The developer would be expected to fully fund these improvements, including up-sizing the 6-inch pipeline in Merrill Road and Hwy 120 between Groveland and the proposed development. It is recommended that the District explore a single-tank option set at an elevation equal to Tank No. 1.

5.0 SECTION 5 – WATER TREATMENT AND SUPPLY EVALUATION

5.1 Water Source

As previously discussed, the District water source is Hetch Hetchy Reservoir located in Yosemite National Park on the Tuolumne River. Hetch Hetchy is also one of the principal water sources for the City of San Francisco and a number of other utilities in the San Francisco Bay Area served by the City of San Francisco. Water flows from Hetch Hetchy through a tunnel just south of Groveland into Priest Regulating Reservoir. The District takes water from the tunnel prior upstream of Priest Regulating Reservoir. These locations are the Big Creek Shaft (the most upstream) and the Second Garrotte Shaft.

5.2 Existing Water Treatment

Water treatment facilities at each of the pump shafts are similar and consist only of disinfection and pH adjustment – the latter to mitigate corrosion. The supply is unfiltered. Water from the tunnel is pumped to the surface and chlorinated using sodium hypochlorite. A static mixer provides necessary mixing of the hypochlorite and the water. The hypochlorite feed is controlled on the basis of a preset residual. The chlorinated water then enters a baffled clearwell where sufficient contact time is provided to meet the CT requirements of the Surface Water Treatment Rule (SWTR). The raw water turbidity, clearwell level and temperature are measured continuously. Water flows from the clearwell to booster pumps, which lift the water into the distribution system. Prior to entering the booster pumps, there is another opportunity to add hypochlorite. Also at this point, lime is added to adjust the pH upward to about 9.5 to 10 to mitigate corrosion. The lime feed is controlled on the basis of maintaining a preset pH. A static mixer is provided at the point of hypochlorite and lime addition. The finished water turbidity, pH and chlorine residual is monitored continuously just downstream of the distribution system booster pumps.

5.3 Filtration Avoidance

The water source is relatively pristine and, as a result, the District has been able to avoid filtration. The City of San Francisco Public Utilities Commission (SFPUC) prepared an application for “filtration avoidance” in 1993. The conclusion was that the Hetch Hetchy water source met all of the eleven criteria for EPA filtration avoidance as of June 29 1993. SFPUC has provided routine monitoring of the watershed and has avoided the need to provide filtration ever since.

5.3.1 Compliance with CT Requirements

One of the requirements for filtration avoidance is the need to provide 3-log Giardia inactivation and 4-log virus inactivation. Compliance is determined on the basis of meeting specific CT values, i.e., a concentration of a disinfectant, C, over a period of time, T, before the first customer. The values of CT depend on the type of disinfectant used, the temperature of the water, and in some cases the pH of the water and the disinfection residual. Values of CT are given in the EPA's "Guidance Manual." It is also important to understand that the "T" value is actually the "T10" time, i.e., the time, in minutes, for 10 percent of the mass of a tracer to pass through the contact reactor – clearwell, in this case. Except for pipe flow, the T10 time is some fraction of the theoretical retention time in the reactor or clearwell. In spring of 2000, the District conducted tracer tests of the clearwells and found the T10 time to be about 30 percent of the theoretical retention time.

For Groveland, the CT value for 3-log inactivation of Giardia is greater than the CT value for 4-log inactivation of viruses, so the Giardia CT controls. Typically the lowest water temperatures experienced are around 8°C with pH around 7.3 in the raw water. The current typical residual is about 1.1 mg/L. The CT for 3-log Giardia inactivation is 147 mg-min/L.

The District calculates and reports a "CT Ratio" for the Second Garrote and Big Creek Clearwells. The CT ratio is the actual CT provided divided by the theoretical required. For compliance the ratio must always be above 1.0. Review of the records indicates that the ratio is above 1.0; however, there are times when the ratio comes very close to 1.0. (Data was not provided on what ratio is used by the District to calculate the T10 time; a ratio of 0.30 should be used to be conservative. In other words the T10 equals 0.30* Theoretical retention time)

The District can provide additional factor of safety in CT compliance by:

- Increasing the residual chlorine

  For example, if the residual is increased to 2 mg/L, the resulting CT is 161 mg-min/L. The T10 time is now 80 minutes, versus the 134 minutes if the residual is only 1.1 mg/L. This provides a significant increase in the safety factor. However, the District should be cautioned that the increased residual will likely result in increased disinfection by-products, e.g., total trihalomethanes. This is discussed later.

- Operating the clearwells in a batch or fill and draw mode

  Operating the clearwells on a fill and draw basis will ensure CT compliance. In this mode one of the clearwells is filled with chlorine being continuously added. During the filling process the booster pumps that transfer water into the distribution system are off. They are kept off through an electrical interlock. Then, once the reservoir is full, a timer starts, preset to the time required for disinfection. Since this is now a batch reactor, the T10 time is equal to the retention time. No reduction for "flow through" or short circuiting is required. Once the preset time has expired, the booster pumps can turn on and transfer the water into the distribution system. This is a failsafe and sure way to meet CT without increasing the chlorine residual. RBF believes this can be easily implemented.

- Constructing clearwell inlet diffusers (to prevent short-circuiting)

  Based on a tracer study performed in 1999, thermal stratification within the clearwell tanks was suspected of allowing cold water the "short circuit" the tank. The cold, dense water introduced into the clearwell appeared to be dropping to the bottom of the tank and decreasing the residence time. To fix this problem with any degree of certainty would require developing a physical model and study the density currents. A possible trial-and-error fix would be to modify the inlet pipe and use a perforated vertical pipe with the perforations turned backward into the baffle/tank wall intersection in hope that it would be uniformly diffused. Perforations would be designed to have 10 to 20 times the head loss in the straight pipe (traditional diffuser design for uniform flow distribution). The outlet should be similar to encourage horizontal flow through the tank.

- Innovative Treatment

  The "mop filter" by Smith and Loveless rotates on top to twist it close together, just like wringing out a floor mop. When it needs cleaning the "mop" opens and it is backwashed. This could be used in the winter and spring when the CT issue is most acute.

5.3.2 Other Compliance Considerations

Although filtration avoidance criteria focus on microbiological issues, there is a requirement to comply with the total trihalomethane (TTHM) maximum contaminant level (MCL). Coagulation and filtration remove a large portion of the TTHM precursors. The Surface Water Treatment Rule (SWTR) states, "if an unfiltered system fails any of the avoidance criteria, that system must install filtration within 18 months, regardless of future compliance with avoidance criteria." This is an area of concern for the District since TTHM compliance is a problem. This is discussed in more detail below.

5.4 Existing Water Quality

5.4.1 Hetch Hetchy Supply

Review of water quality data from the year 2000 City of San Francisco Public Utilities Commission Annual Sanitary Survey Report9 (SFPUCSS) showed that volatile organic chemicals (VOCs) including Methyl Tertiary Butyl Ether (MTBE), Inorganic Chemicals, Radionuclides, and Synthetic Organic Chemicals (SOCs) were all below the detection levels. All other chemical constituents were below the State of California Maximum Contaminant Level (MCL). Arsenic, total chromium, and perchlorate, chemicals, which have had some recent notoriety, are all below detection levels. The water is very low in mineral content (Total Dissolved Solids concentration around 20 mg/L) and very soft (total hardness of about 3 mg/L as calcium carbonate). This low mineral content, unfortunately makes the water quite corrosive to metal pipe and cement mortar. Because of this the District should try to maintain a slightly positive Langlier Saturation Index (LSI). (Review of the District's annual water quality report, and using average

[9] *2000 Annual Sanitary Survey Update Report and Drinking Water Source Assessment For the Hetch Hetchy Water Supply*, San Francisco Public Utilities Commission, Water Quality Bureau, Engineering Section, December 2000, Table 5-3.

values, a slightly negative LSI of – 0.71 was calculated.) It is best if a zero or slightly positive LSI is maintained.

Using average water quality conditions, an LSI = 0.07 can be achieved by adding slightly more lime. Assuming 100% pure hydrated lime, $Ca(OH)_2$, is used, about 1.7 mg/L more should be added. This is about 14 lb/million gallons more. Temperature affects the LSI, so in warmer water temperatures, less lime would be needed. There are computer programs or spreadsheets available for rapid calculation of the LSI. (Bob Clement, AWWA Opflow, Vol. 18, No. 3, March 1992.)

The District has asbestos cement pipe in the system. AWWA C401 provides some guidance on the aggressiveness of the water. Aggressive water will dissolve some of the Portland cement from the pipe, potentially releasing asbestos fibers into the drinking water. Review of the District's water quality data indicates this is not creating a violation of the asbestos fiber MCL.

The aggressivity index, per AWWA C401 is calculated as follows:

$$AI = pH + \log(A*H)$$

A = total alkalinity, mg/L as calcium carbonate

H = calcium hardness, mg/L as calcium carbonate

Using average water quality characteristics for the finished, or distribution system water, the Aggressivity Index is determined to be 11.4. This puts it in the "Moderately Aggressive" category. If the value is above 12, it is considered non-aggressive. Adding lime to raise the LSI, will also bring the AI above 12.

Because this is an unfiltered supply, the microbiological characteristics are important. Sampling for *Giardia* cysts and *Cryptosporidium* oocysts, as reported in SFPUCSS for the Kirkwood Powerhouse, (located upstream of the Second Garrotte and Big Creek Shafts) was performed quarterly from October 1999 to September 2000. Only one sample had a presumptive result for Giardia (5.28 presumptive cysts/100L). *Cryptosporidium* oocysts were detected in one of the samples (4.8 oocysts/100 L with 1.2 of the oocysts being possibly viable). These values are typical of relatively pristine watersheds.

5.4.2 District Water Quality

The District's Annual Water Quality Report for 2000 and system operational data were reviewed and the only areas of concern at the present time are:

- Total Trihalomethane Concentration (TTHM) – a disinfection by-product. (There are other disinfection by-products, such as haloacetic acids (HAAs); however, there was no data from the District on HAAs.)

- Low chlorine residual in some parts of the distribution system

5.4.3 Total Trihalomethanes

TTHMs are a disinfection by-product and are formed by the reaction of chlorine, particularly free chlorine, and natural organic matter in the raw water. This reaction continues throughout the time the water is in the distribution system. The current MCL for TTHMs is100 μg/L. The MCL will be reduced to 80 μg/L with the Stage 1 Disinfectant/Disinfection By-product rule, which requires compliance by December 16, 2003 for systems serving fewer than 10,000 people. The deadline is December 16, 2001 for systems greater than 10,000 people. It is likely the MCL will be reduced further in Stage 2 D/DBP rule.

The concentration of TTHMs is a function of the natural organic matter in the water, the free chlorine dose, temperature of the water, residence time in the water distribution system and the chemical characteristics of the water.

Compliance with the MCL is based on the running annual average (RAA) of all quarterly samples. TTHM samples are taken at two locations in the system:

- 20890 Elderberry (in the Pine Mountain Lake, North East pressure zone)
- Highway 120 at Miner's Market

The District also monitors TTHM at the Big Creek and Second Garrotte Clearwells. Data on TTHMs is presented in Table 1.

In reviewing the data, the following conclusions can be reached:

1. There is a substantial increase in TTHMs between the Clearwells and distribution system sampling points.
2. The TTHMs are greatest in the summer and fall months when water temperatures are higher. This occurs in spite of the increased demand, which would reduce the residence time in the distribution system.
3. The TTHMs leaving the Clearwells are quite high during the summer and fall months, approaching or even exceeding 80 μg/L. This increases significantly as the water moves through the distribution system. This will make compliance difficult because the District uses free chlorine disinfection to ensure CT and compliance with the SWTR.
4. *The District is not in current compliance with TTHMs and will not be in compliance with the pending MCL of 80 mg/L.* If the MCL is lowered in the future, as it likely will be, the District will have an even more difficult time of meeting the MCL. There are indications that locational running annual averages (LRAA) will become a part of the Stage 2 D/DBP Rule. This will make it very difficult to comply since each sampling location must comply with the MCL. Compliance with the TTHM MCL is necessary to ensure filtration avoidance.

Table 5.1: TTHM Concentrations, µg/L

(Range shown in parentheses)

Year	Clearwells		Distribution System	
	Second Garrotte	Big Creek	Hwy 120 @ Miners Market	20890 Elderberry
2000	55.5 (16.7 – 82.2)	46.8 (9.9 – 71.5)	118.6 (32.5 – 204.7)	108.1 (24.2 - 198.3)
1999	45.2 (18 – 82)	40.8 (14 – 88)	89.6 (27 – 159)	90.4 (5 – 182)
1998	52.2 (18.1 – 76.2)	43.6 (10 – 60.5)	73.7 (26.3 – 136)	75.1 (20 – 118.7)
1997	Data not available			
1996	67.1 (59 – 78)	71.3 (64 – 77)	Data not available	

Options for dealing with the TTHM problem are discussed later in this section.

5.4.4 Low Chlorine Residual at Certain Locations

The District takes routine chlorine residual samples at various locations in the distribution system. The disinfected water generally enters the system at 1 to 1.5 mg/L chlorine residual. As the water moves through the distribution system there is a loss of residual. Except for the sampling location at 11823 Powder House Dr., every sampling location in the system, the residual drops below a 0.05 mg/L at some time. The worst problems occur in the Pine Mountain Lake, Northeast area (Elderberry) and Pine Mountain Lake, Northwest (Gamble St.). This is a cause for concern as loss of residual could cause other water quality problems, e.g., taste and odors. But, in spite of the low residuals in the system, according to the 2000 annual water quality report, the District has been in full compliance with both total and fecal coliform. The District is also in compliance with the D/DPB rule, which requires at least 0.2 mg/L entering the system and a measurable residual at all sampling points.

5.4.5 Residence Time for Water in the System

The system computer model was run under average day demand and maximum day demand to determine the residence time in the distribution system. Under average day demand conditions, the water in the Pine Mountain Lake, northeast resides in the system for over 125 hours (more than 5 days); in Pine Mountain Lake, northwest, it approaches 125 hours. On the maximum day, the residence times in the above zones approach 3 days or more. This is part of the reason for the high TTHMs and the loss of chlorine residual. The problem is there is little demand in these zones and the reservoirs have low turnover. Increasing the turnover in the reservoir is possible, but there are limits. The fire storage requirement must be always in storage. Unfortunately the fire storage volume is large in comparison to the daily demand, which will keep turnover to a minimum.

Remote booster chlorination stations could be installed at reservoirs. A recirculation pump would take water from the reservoir, chlorine would be injected into the recirculated water, and the then the water re-introduced into the reservoir. A chlorine residual analyzer or periodic manual chlorine residual measurement could be made to control the amount of chlorine added. However, it is important to realize that increased free chlorine residuals will increase disinfection by-product formation. Switching to chloramine disinfection, as discussed later, may rectify this problem since the residuals are more persistent.

5.5 Pending Regulatory Impacts

There are a number of pending regulations on chromium, particularly hexavalent chromium; perchlorate, radon, arsenic, sulfate, etc. These will not be an issue with the District's supply. The Hetch Hetchy supply has "non-detect" for these substances. The Long Term 1, Enhanced Surface Water Treatment Rule (LT1ESWTR) will be promulgated shortly. Cryptosporidium control will be included as part of an overall watershed control program. Unfiltered systems must continue to comply with the filtration avoidance criteria. In summary this rule will have no impact on the District.

The Long Term 2, Enhanced Surface Water Treatment Rule (LT2ESWRT) will re-evaluate the risks posed by Cryptosporidium. According to the Federal Advisory Committee Agreement (FACA) in Principle (Federal Register 65:251:83015,December 29, 2000), unfiltered systems must:

- Continue to meet filtration avoidance criteria
- Provide 4-log virus inactivation
- Provide 3-log Giardia inactivation
- Provide 2-log Cryptosporidium inactivation

Overall inactivation requirements must be met using a minimum of 2 disinfectants. In addition the source water must have a Cryptosporidium occurrence level less than or equal to 1/100L or provide 3 logs of Cryptosporidium inactivation. This could be a problem with the District's water source as current sampling shows Cryptosporidum occurrences greater than 1/100L. The District needs to carefully monitor the development of this rule. It is also important to note that the availability of UV disinfection is a key premise to this proposed rule. It should be noted that achieving 2-log or even 3-log inactivation of Cryptosporidium with chlorine alone will likely not be practical. UV is shown to be very effective on Cryptosporidium.

According the above FACA, the Stage 2 D/DBP rule will contain a Locational Running Annual Average (LRAA) requirement in addition to a system wide running annual average. Implementation will be in phases. The first phase will establish a 120 µg/L TTHM/100 µg/L Haloacetic acid (HAA) MCL as a LRAA and will require compliance 3 years after promulgation of the rule. An additional 2 years will be granted if there are capital improvements needed. The second phase will reduce the LRAA to 80 µg/L TTHM/60 µg/L HAA. Compliance for small systems will be 8.5 years after promulgation.

An additional 2 years will be granted if capital facilities are needed. It may be difficult for the District to meet the phase 1 requirement; phase 2 will be very difficult with the current mode of disinfection.

This review clearly shows the District's biggest challenge will be controlling TTHMs and ensuring continued compliance with filtration avoidance criteria. It is also likely that a second form of disinfection, e.g., UV will be required in the future and budgeting for this over the next few years should be considered.

Continued filtration avoidance should not be a problem in the near term providing the District can get control of the TTHMs. However if the TTHM LRAA is ever reduced below 80 µg/L there will be a problem. At this point, it may necessitate precursor removal through coagulation/sedimentation/filtration or perhaps membrane treatment. However, RBF believes this is far into the future.

Installation of membrane treatment, perhaps ultrafiltration membranes, would accommodate the microbiological aspects of the regulations. How effective this technology would be on the TTHM precursors can only be determined through pilot testing.

5.6 Control of TTHMs

As indicated above, the biggest challenge will be the control of TTHMs. There are several methods to control TTHM formation:

- Remove the precursors that cause the TTHMs
- Change the disinfectant
- Use chloramines to control TTHM formation

5.6.1 Removal of Precursors

Removal of the precursors of TTHMs will require some form of conventional or membrane treatment. These treatment systems will be expensive and should be avoided if at all possible.

5.6.2 Changing of Disinfectant

Changing the disinfectant to one that does not generate TTHMs is an option. These include ozonation, chlorine dioxide, and ultraviolet irradiation (UV). For a system the size of the District's, ozonation is just too costly. Chlorine dioxide is not commonly used in California or elsewhere. El Paso, TX is the largest city known to use chlorine dioxide. Chlorine dioxide would solve the problem with TTHMs, but there may be other disinfection by-products formed, e.g., chlorites and chlorates. Occasionally there are consumer odor complaints when chlorine dioxide is used. Off-gassing at the tap and the subsequent reaction with other substances in indoor air creates very offensive odors. Whether this would be a problem with the Hetch Hetchy water is not known.

UV systems have not yet been accepted by DOHS for drinking water. At some point in the future, UV systems will likely be approved and may be part of the solution in the long term. UV could be used for disinfection followed by chloramination to maintain the required residual disinfectant in the distribution system. Theoretically this should keep TTHMs to an absolute minimum.

5.6.3 Chloramines

Chloramines cannot be effectively used as a disinfectant because the CT requirements for inactivation of Giardia are very high. Disinfection facilities would be very large and prohibitively expensive. However, chloramines can be used to control the formation of TTHMs in water disinfected with chlorine, i.e., chlorination followed by post-ammoniation after the required CT has been achieved with free chlorine. The addition of ammonia can be done by 1) feeding anhydrous ammonia (gas), 2) feeding aqua ammonia solution (ammonia water) or 3) dry ammonium sulfate mixed into a solution. Feeding ammonia as a gas is a simple way to feed ammonia, but it has some drawbacks. It is easy because the feeder is almost identical to a gas chlorinator. The primary drawback is that ammonia gas will require a Risk Management Plan since it is an acutely hazardous material. Using aqua ammonia is the most common form. For small systems, it may be appropriate to consider dry ammonium sulfate. It is batched as a chemical solution and fed using a liquid metering pump. The convenience here is that large storage tanks are avoided. However it may be more expensive than aqua ammonia.

Usually chlorine to ammonia-nitrogen ratios of 3:1 to 5:1 on a weight basis are used. The lower weight ratios result in larger amounts of free ammonia in the water. This can be problematic as discussed below. At a 3:1 ratio, about 2.25 gal aqua ammonia /million gallons of water will be needed. At 5:1 ratio, the feed rate would be reduced to 1.35 gal aqua ammonia/million gallons. For the District, the amount that would have to be fed is small. The District should see if aqua ammonia is available in 55 gallon drums or “totes” to reduce the chemical inventory.

If ammonium sulfate is used, the feed rates would be 19.6 and 11.8 lb/million gallons respectively for 3:1 and 5:1 ratios.

It is very important to have good mixing where ammonia is added to the chlorine to minimize or avoid breakpoint reactions occurring in part of the flow. This can waste chemicals and create taste and odor problems.

Use of chloramines is not without its own problems, i.e., nitrification. Ammonia oxidizing bacteria, (nitrifiers) oxidize the free ammonia in the water first forming nitrites then ultimately nitrates. The formation of nitrites in the first reaction consumes chlorine quickly leaving little or no residual. This promotes more microbiological growth and possible coliform violations. Most agencies that implement chloramination monitor nitrite concentrations in the remote parts of the distribution system and storage tanks. Any increase in nitrites should be met with increased chlorination. If the problem is severe, switching to free chlorination for a short period of time may be needed. Long residence times, low chloramine residuals and elevated temperatures encourage the nitrification process. The nitrification rate is slowed by elevated pH levels, i.e., 9 or above. If the District uses chloramines the elevated pH values and cooler water temperatures should help keep nitrification to a minimum. Also, since the District would not blending chloraminated with free chlorinated water, the chlorine to ammonia-nitrogen ratio can be increased to 5:1 to reduce the amount of free ammonia. This would also save on chemicals.

Because of problems with TTHMs in the distribution system, the District should begin chloramination. But prior to actually implementing the process, a public information campaign is needed. Chloraminated water is a problem for aquariums, tropical fish owners, pet stores and facilities with dialysis machines.

However, even with post-ammoniation for chloramination, the District will need to monitor TTHMs leaving the clearwell. Data from the year 2000 shows TTHMS exceeding the 80 µg/L LRAA MCL in the Stage 2 D/DBP rule only once. With careful monitoring and control, compliance should be achieved.

5.6.4 Low Chlorine Residual

To alleviate problems with low chlorine residual, booster chlorination stations may be needed. The chlorine residual leaving the clearwells is already in the 1.5 mg/L range and probably should not be increased appreciably. Higher residuals may result in consumer complaints and will result in greater TTHMs in the system. *The District may want to review its main flushing program to see if reducing slime buildup in some low flow lines or dead ends could reduce this problem.* If chloramination is practiced, residuals tend to last longer in the system and this may eliminate this low residual problem.

5.7 Water Supply Reliability

GCSD currently relies on a single-source of supply, the Hetch Hetchy Aqueduct. If, for whatever reason, that facility is lost for an extended period, the communities of PML, Groveland and Big Oak Flat may be forced into severe conservation measures. Reasons for discontinuance of flow through the aqueduct are many: fire, earthquake, terrorist acts or other unknown cause.

Additionally, the tunnel must be recognized as an aged facility and could require major improvements at some point in the future, causing an extended service interruption.

5.7.1 Time to Depletion

An analysis was performed in order to see how long it would take for all the tanks to drain if initially at full capacity. The maximum day average day demands were considered in the water duration analysis, current value used were from year 2000 demands. The results are tabulated in Table 3.8.

Table 3.8: Storage Duration - Time to Deplete Storage Capacity

(based on year 2000 demands)

Storage Capacity Scenarios	Storage	Current Avg. Day	Current Max. Day	Ultimate Avg. Day	Ultimate Max. Day
Normal Storage	2.64 MG	5.7 days	2.7 days	3.1 days	1.4 days
Normal Storage w/ clearwells	6.64 MG	14.2 days	6.8 days	7.7 days	3.4 days

5.7.2 Emergency Supply Alternatives

Storage

The District may elect to increase storage for emergency use. Using an average day use of 450,000 gallons (yr 2000), each additional million gallons of storage buys approximately two additional days of supply. Each million gallons of additional storage will cost approximately $675,000 capital cost. The advantage is a readily available and visible supply; however, water age increases and water quality can degrade.

Well Development

Groundwater has long been considered unreliable in the Groveland area. Development of this resource would be speculative and expensive.

Pine Mountain Lake

Another options would be the construction of a package water treatment plant on the banks of Pine Mountain Lake for emergency supply. A 0.5 MGD plant by Filter Tech would cost approximately $300,000 and would pump from the lake, through conventional treatment and disinfection and into the distribution system. This may be a viable option as an emergency supply source.

5.8 Recommendations

1. Evaluate methods to reduce the residence time in the water distribution system and turnover in the storage reservoirs to minimize TTHM formation. It may be possible to operate the pressure regulators feeding tanks T2 and T4 on the basis of water level in the tanks – allowing them to open only when the minimum fire storage volume is reached. The amount of water introduced can be adjusted based on the estimated demand in the systems served by the tanks and the time of the year. This problem should go away once chloramination is used; however, the District will need to monitor for nitrification during the warmer months. Booster chloramination may be needed at these tanks.
2. Implement a unidirectional flushing program to minimize the chlorine decay and potentially retard TTHM formation. The EPANet® model created for this study will provide useful flow velocity and scour information.
3. Implement chloramination as a means of complying with the current and Stage 1 D/DBP TTHM MCLs. Violation of DBP MCLs can create a problem for continued

filtration avoidance. Prior to implementation, develop a public information program to alert consumers of the change and the implications of the change.

4. Budget to install additional disinfection, i.e., UV, to comply with LT2ESWTR. The actual compliance date will likely be at least 10 years away or more; but planning for it now will minimize the financial impact should it be needed.
5. Investigate long-range alternative emergency supply sources, including additional emergency storage or PML water treatment.

6.0 SECTION 6 – CAPITAL IMPROVEMENT PROGRAM (CIP)

Exhibit 15 map illustrates the improvements contained in the CIP. The projects are outlined in the **Tables 6.1 through 6.5.** Inflation was assumed at 3.0%.

Table 6.1: Recommended Projects, Immediate Adjustments

Item No.	Project Name	Quantity	Unit Cost	Estimated Construct. Cost	Estimated Capital Cost	Escalated Cost 3.0%	Year
W1-1	PRV-PML-02 adjustment	1	$0	$0	$0	$0	0
W1-2	PRV-PML-04 adjustment	1	$0	$0	$0	$0	0
W1-3	PRV-PML-05 adjustment	1	$0	$0	$0	$0	0
W1-4	PRV-PML-06 adjustment	1	$0	$0	$0	$0	0
W1-5	PRV-PML-10 adjustment	1	$0	$0	$0	$0	0
W1-6	PRV-PML-11 adjustment	1	$0	$0	$0	$0	0
W1-7	PRV-GL-01 adjustment	1	$0	$0	$0	$0	0
W1-8	PRV-GL-02 adjustment	1	$0	$0	$0	$0	0
W1-9	Operational adjustments	1	$0	$0	$0	$0	0
W1-10	Unidirectional Flushing Program	1	$0	$0	$0	$0	0
	Total		$0	$0	$0	$0	

Table 6.2: Recommended Projects, Required Improvements

Item No.	Project Name	Quantity		Unit Cost	Estimated Construct. Cost	Estimated Capital Cost	Escalated Cost 3.0%	Year
W2-1	Groveland Pipeline (8-in)	4,000	lft	$48	$192,000	$259,200	$274,985	3
W2-2	Big Oak Flat Pipeline (8-in)	6,500	lft	$48	$312,000	$972,000	$474,064	4
W2-3	Tank No. 5 Replacement	250,000	gal	$0.75	$187,500	$253,125	$302,244	5
	New pipeline to tank 5	1,500	lft	$48	$72,000	$97,200	$109,399	4
W2-4	PML-C Loop (6-in)	250	lft	$36	$9,000	$12,150	$12,515	1
W2-5	Chloramination System	2	ea	$12,000	$24,000	$32,400	$33,372	1
Total					$796,500	$1,075,275	$1,160,694	

Table 6.3: Recommended Projects, Reliability Improvements

Item No.	Project Name	Quantity		Unit Cost	Estimated Construct. Cost	Estimated Capital Cost	Escalated Cost 3.0%	Year
W3-1	Upgrade 2G	250	hp	$2,300	$575,000	$776,250	$899,887	3
W3-2	2G-Tank 1 Pipeline (12-in)	9,600	lft	$72	$691,200	$933,120	$1,182,048	4
W3-3	Tank 1-Tank 3 Pipeline (12-in)	6,300	lft	$72	$453,600	$612,360	$822,961	6
W3-4	Tank No. 4 Relocation	500,000	gal	$0.75	$375,000	$506,250	$788,721	10
W3-5	2G and BC Storage	Note 1						
Total	l				**$2,094,800**	**$2,827,980**	**$3,693,617**	

Table 6.4: Recommended Projects, Long-Term System Improvements

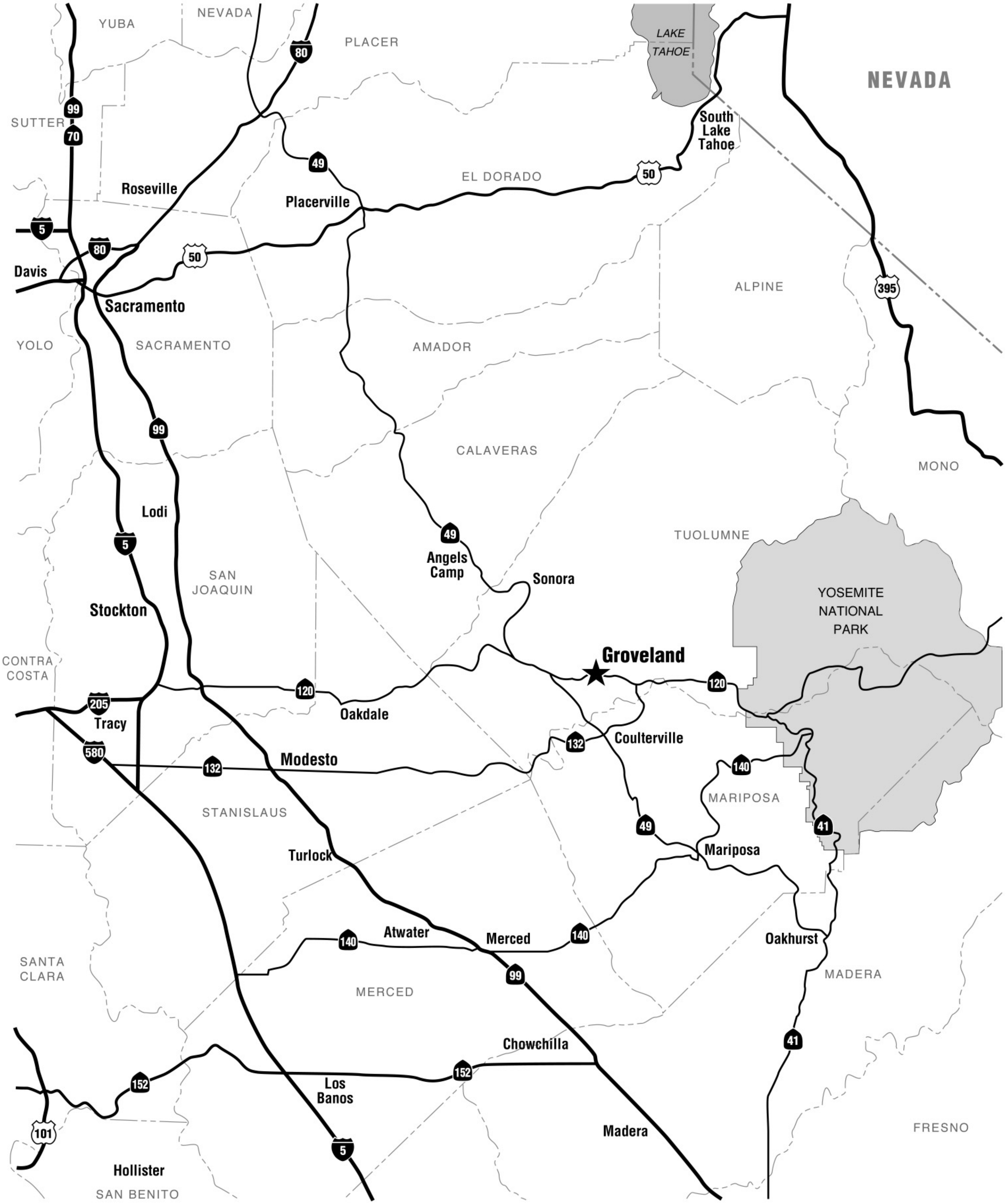
Item No.	Project Name	Quantity		Unit Cost	Estimated Construct. Cost	Estimated Capital Cost	Escalated Cost 3.0%	Year
W4-1	Tank No. 1 Replacement	600,000	gal	$0.75	$450,000	$607,500	$816,429	10
W4-2	UV Disinfection System	2	ea	$150,000	$300,000	$405,000	$544,286	10
Total					**$750,000**	**$1,012,500**	$1,360,715	

Table 6.5: Recommended Projects, Service Expansion

Item No.	Project Name	Quantity		Unit Cost	Estimated Construct. Cost	Estimated Capital Cost	Escalated Cost 3.0%	Year
W5-1	Yosemite Acres Project - Piping (8-in)	18,000	lft	$48	$864,000	$1,166,400	$1,352,177	5
	Yosemite Acres Project - Storage Tank	250,000	gal	$0.75	$187,500	$253,125	$293,441	5
W5-2	Long Gulch Ranch Project	Note 2						
W5-3	Yosemite Way Station Project	Note 2						
Total					**$1,051,500**	**$1,419,525**	**$1,645,619**	

Note 1: Placeholder. Actual storage, groundwater well or treatment options required further study

Note 2: Water system improvements to be paid for by developer



RBF CONSULTING

GROVELAND COMMUNITY SERVICES DISTRICT

Regional Vicinity

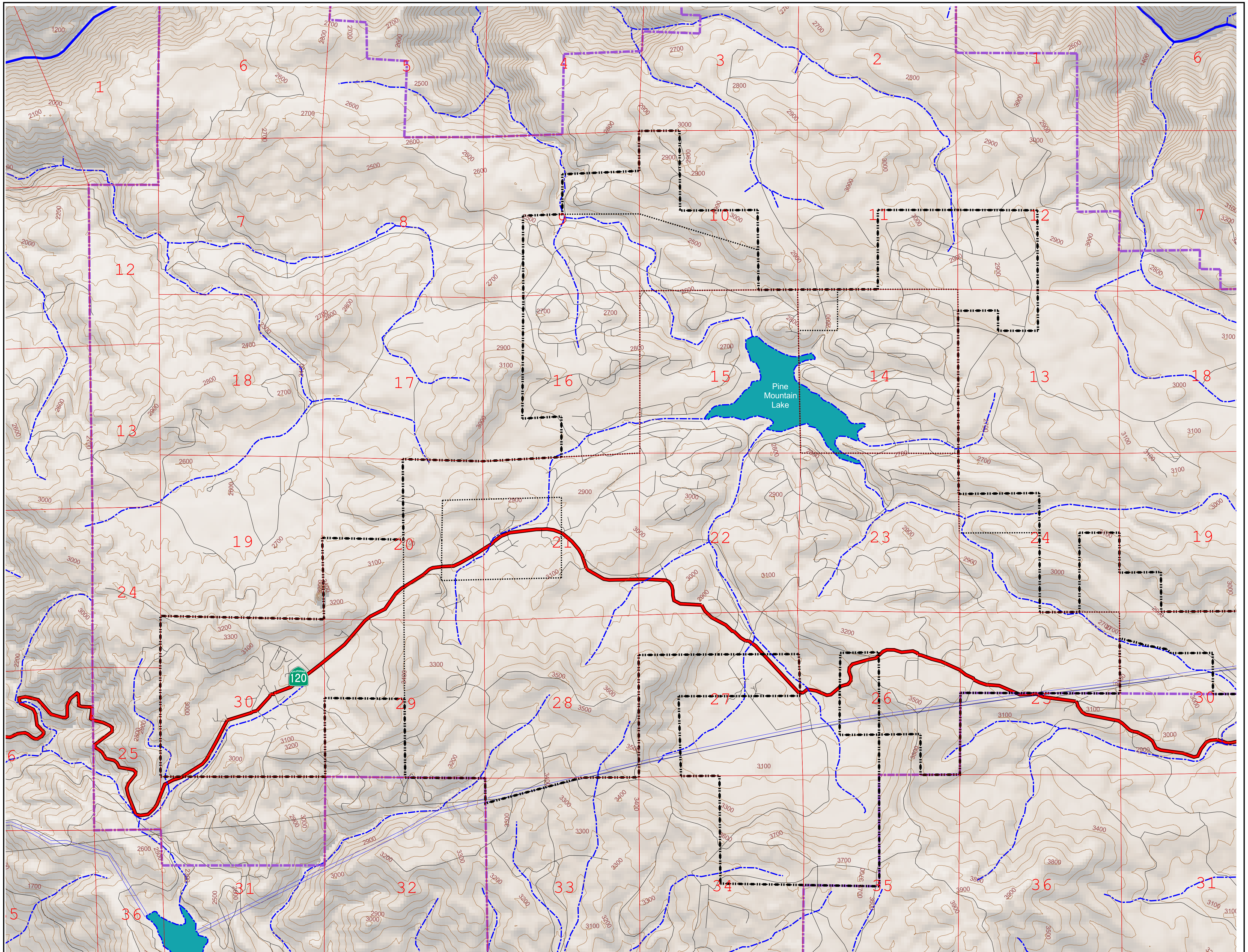
10101218-8496 • 5/29/01

Exhibit 1

Groveland Community Services District

Exhibit 2

Contour Map



Legend

- 100 Foot Contour
- Natural Streams & Creeks
- Ditch, Canal or Aqueduct
- Tuolumne River
- District Boundary
- County Boundary
- Studygrid
- Lakes
- Highway
- Minor Roads

N

3000 0 3000 Feet

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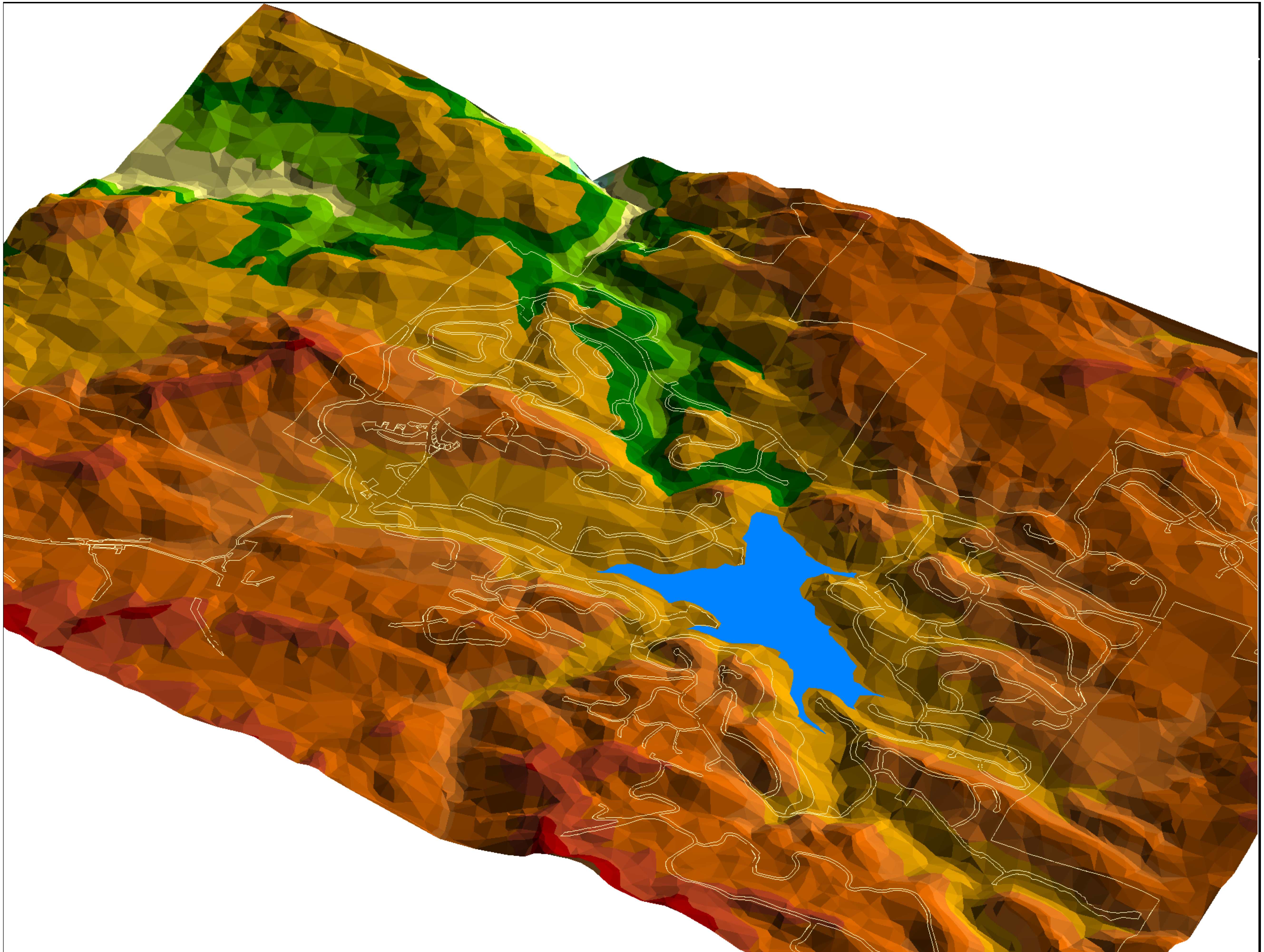

Groveland Community Services District

Exhibit 3

Three Dimensional Contour

Elevation Range

1800 - 1900
1900 - 2000
2000 - 2100
2100 - 2200
2200 - 2300
2300 - 2400
2400 - 2500
2500 - 2600
2600 - 2700
2700 - 2800
2800 - 2900
2900 - 3000
3000 - 3100
3100 - 3200
3200 - 3300
3300 - 3400
3400 - 3500
3500 - 3600

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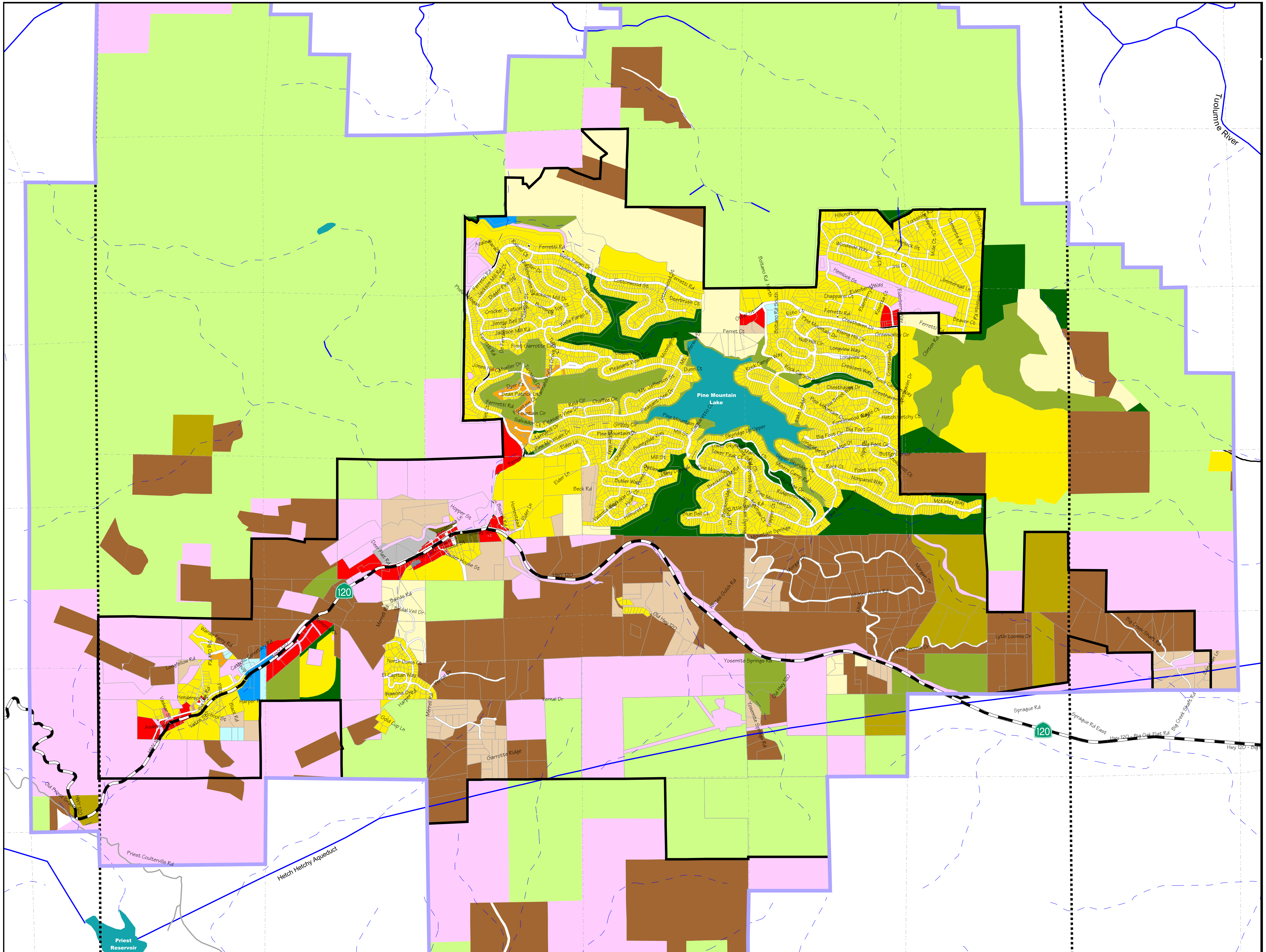
Exhibit 4

Land Use Map

Based on Toulumne County General Plan



Legend

- Stream
- River
- Minor Collector Roads
- Major Collector Roads
- Highway
- Township Range
- Sections
- Lakes

1996 General Plan

- Heavy Industrial
- Light Industrial
- Business Park
- Mixed Use
- General Commercial
- Neighborhood Commercial
- High Density Residential
- Medium Density Residential
- Low Density Residential
- Estate Residential
- Homestead Residential
- Rural Residential
- Large Lot Residential
- Public
- Open Space
- Agricultural
- Parks and Recreation
- District Boundary
- S.F. Contract Service Boundary

N

3000 0 3000 Feet

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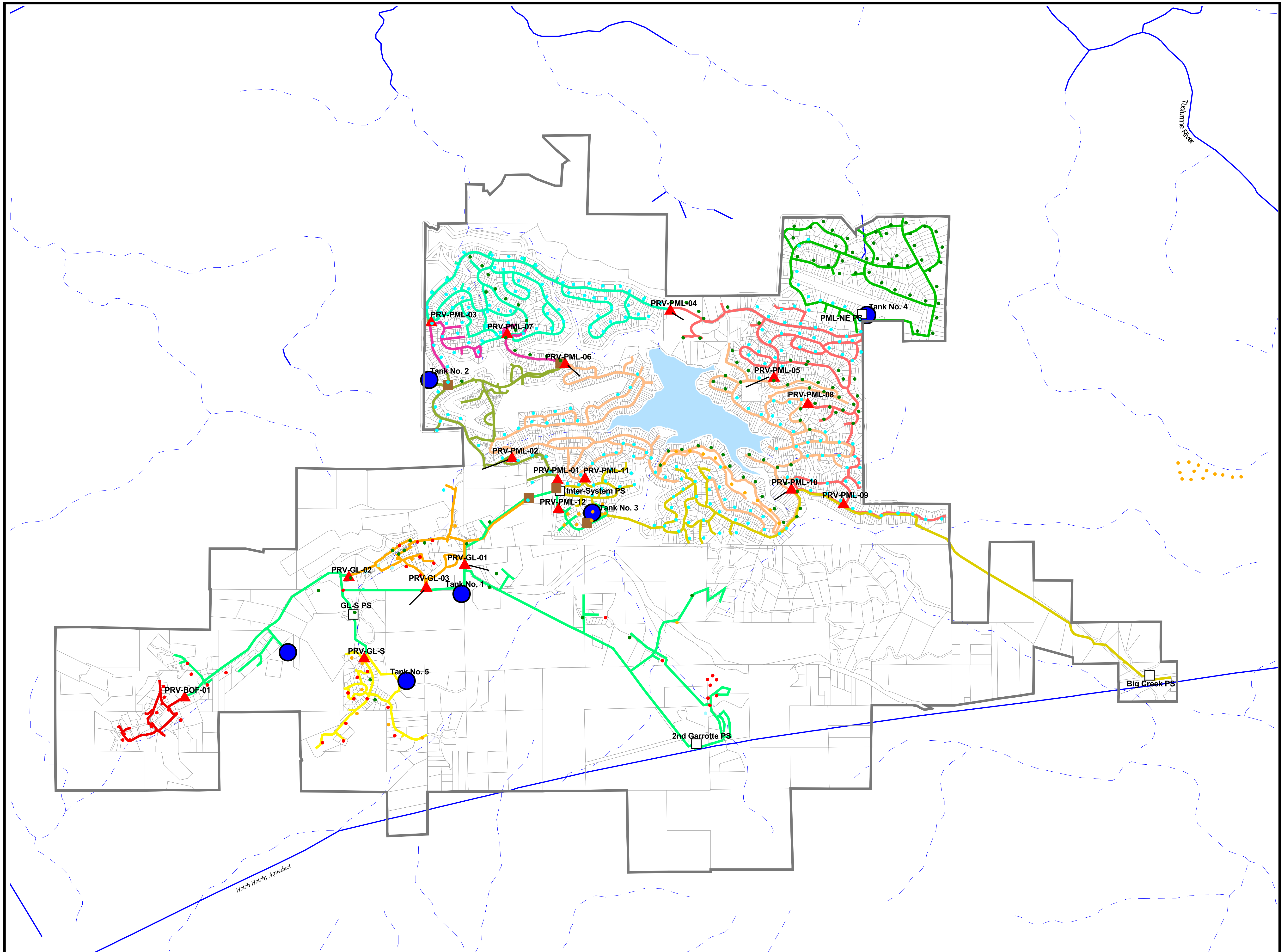
Groveland Community Services District

Exhibit 5

Water System Pressure Zone Map



Legend

Water Points

- Booster Pump Station
- Pressure Reducing Station
- Water Tank
- N.C. Gate Valve
- Water Mains
- Stream
- River
- Lakes
- Parcels
- District Boundary

Water Mains by Zone

- BOF
- G-S
- GL-C
- GL-SE
- PML-C
- PML-E
- PML-NE
- PML-NW
- PML-S
- PML-SW
- PML-W

County Hydrant Flow Tests

- 1,500 gpm or greater
- 1,000 - 1,499 gpm
- 500 - 999 gpm
- Less than 500 gpm

N

2000 0 2000 Feet

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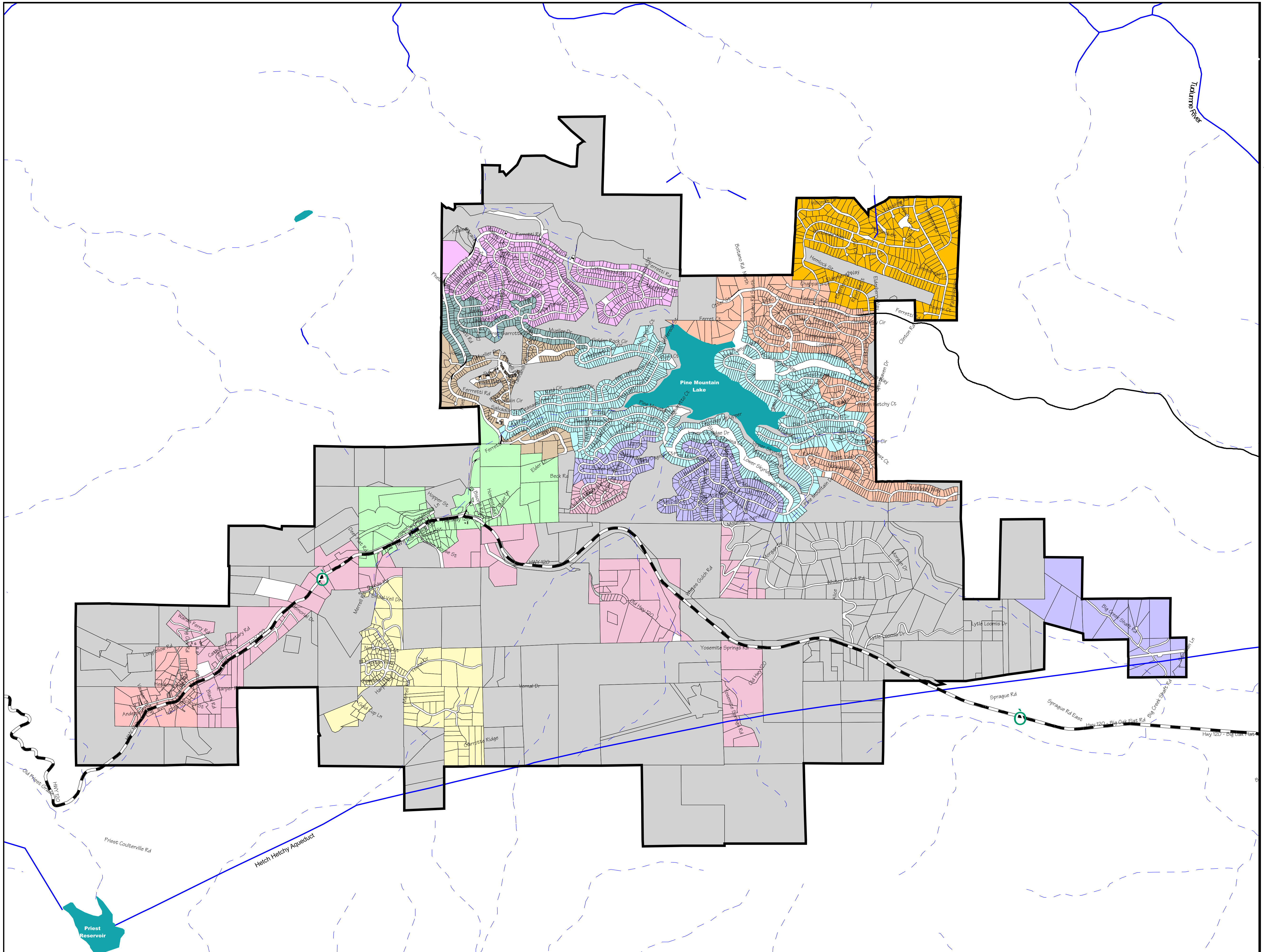

Groveland Community Services District

Exhibit 6

Water System
Parcels by Pressure Zone Map

Legend

Stream
River
Lakes
Parcels
District Boundary

Pressure Zones
BOF
GL-C
GL-S
GL-SE
PML-C
PML-E
PML-NE
PML-NW
PML-S
PML-SW
PML-W
No Service

N

2500 0 2500 Feet

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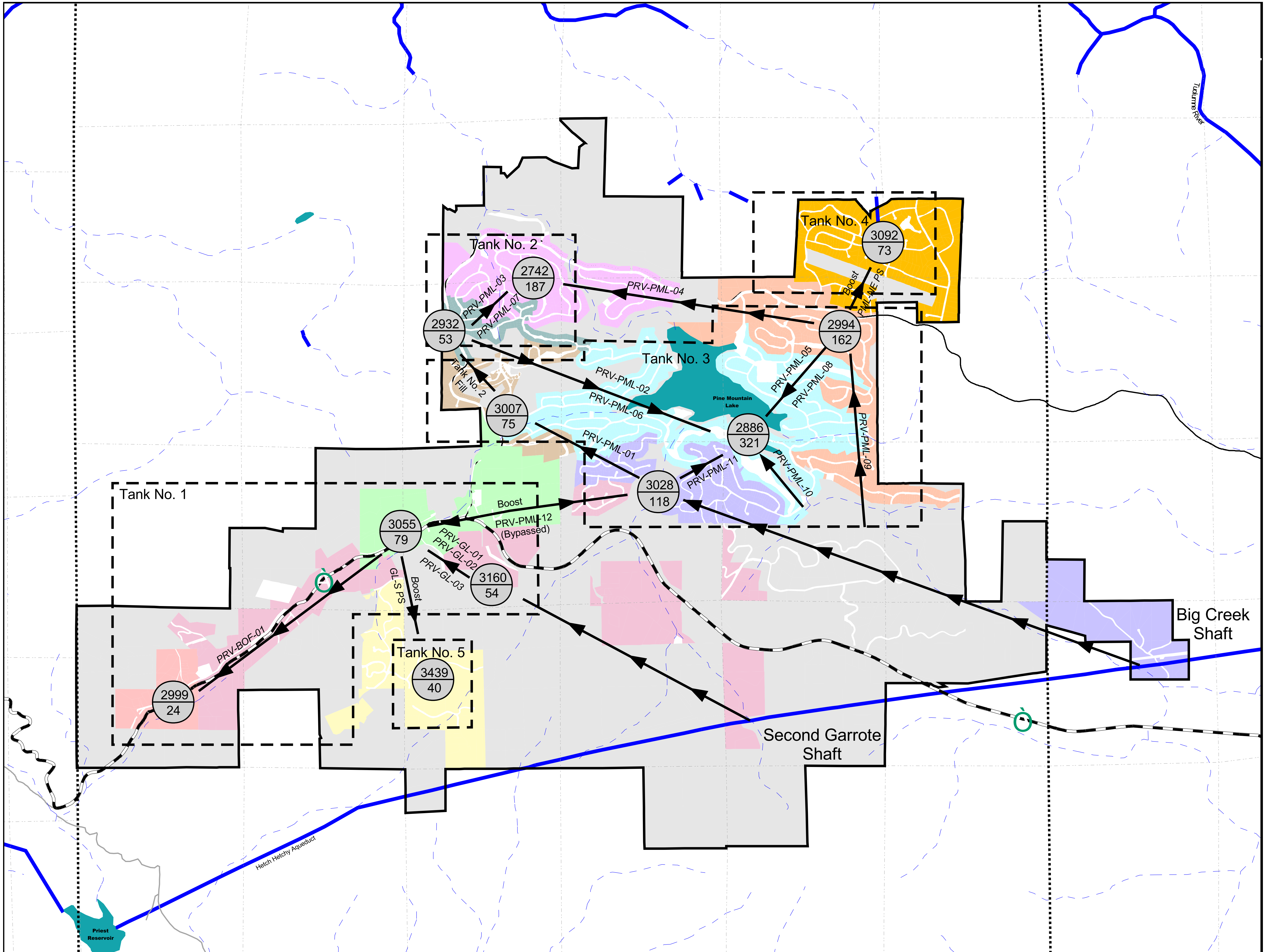
Exhibit 7

Existing Water Transmission Diagram (After PRV Balancing)



Legend

- Stream
- River
- Minor Collector Roads
- Major Collector Roads
- Highway
- Township Range
- Sections
- Lakes

Pressure Zones

- BOF (2999)
- GL-C (3055)
- GL-S (3439)
- GL-SE (3160)
- PML-C (2886)
- PML-E (2994)
- PML-NE (3092)
- PML-NW (2742)
- PML-S
- PML-SW (3007)
- PML-W (2932)
- No Service

District Boundary

HGL — Ultimate Max. Day Demand (GPM)

N

2000 0 2000 Feet

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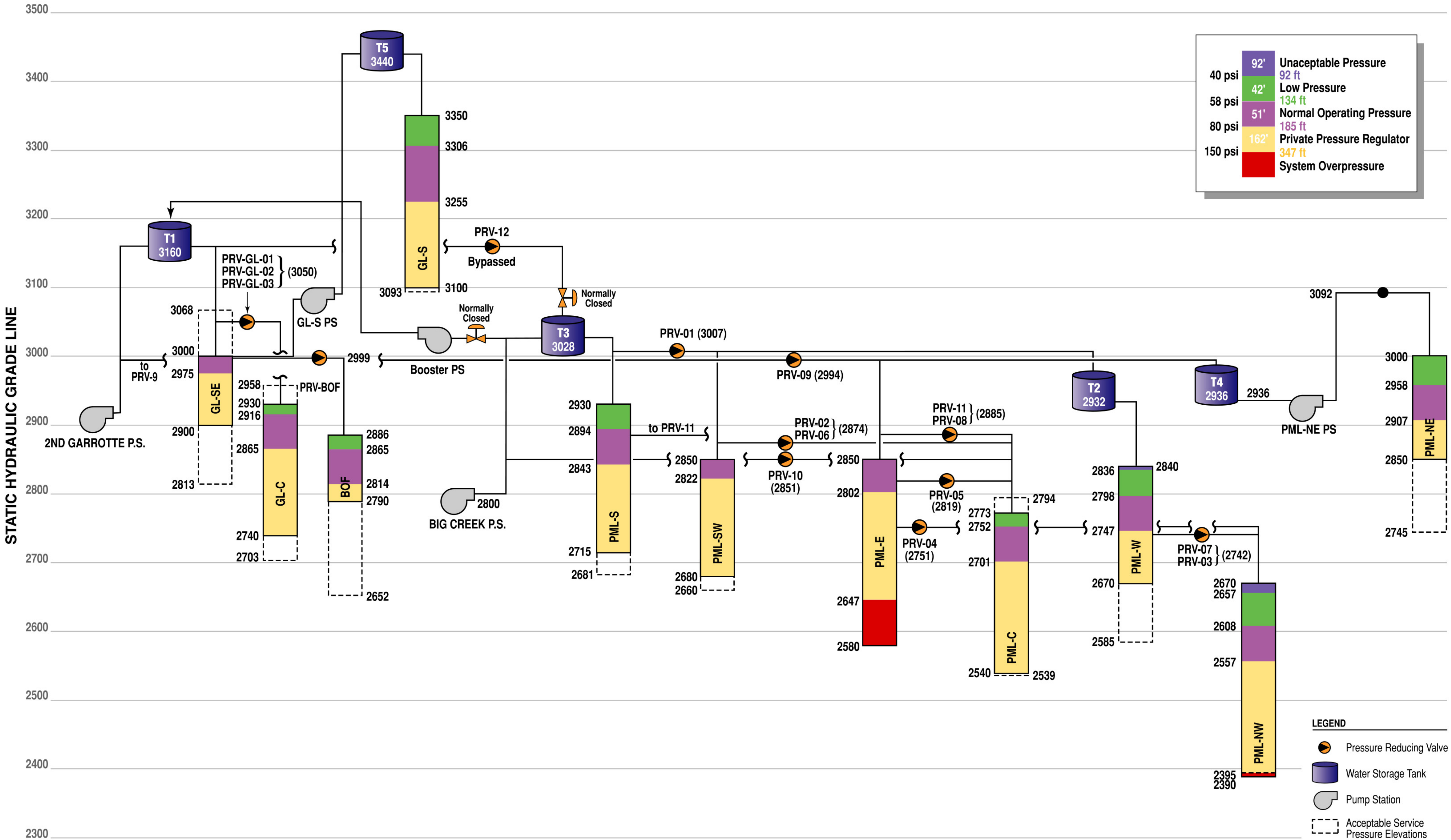

Note: All elevations depicted in the exhibit are in units of feet.
Elevations labeled on the water tanks are HGL elevations.

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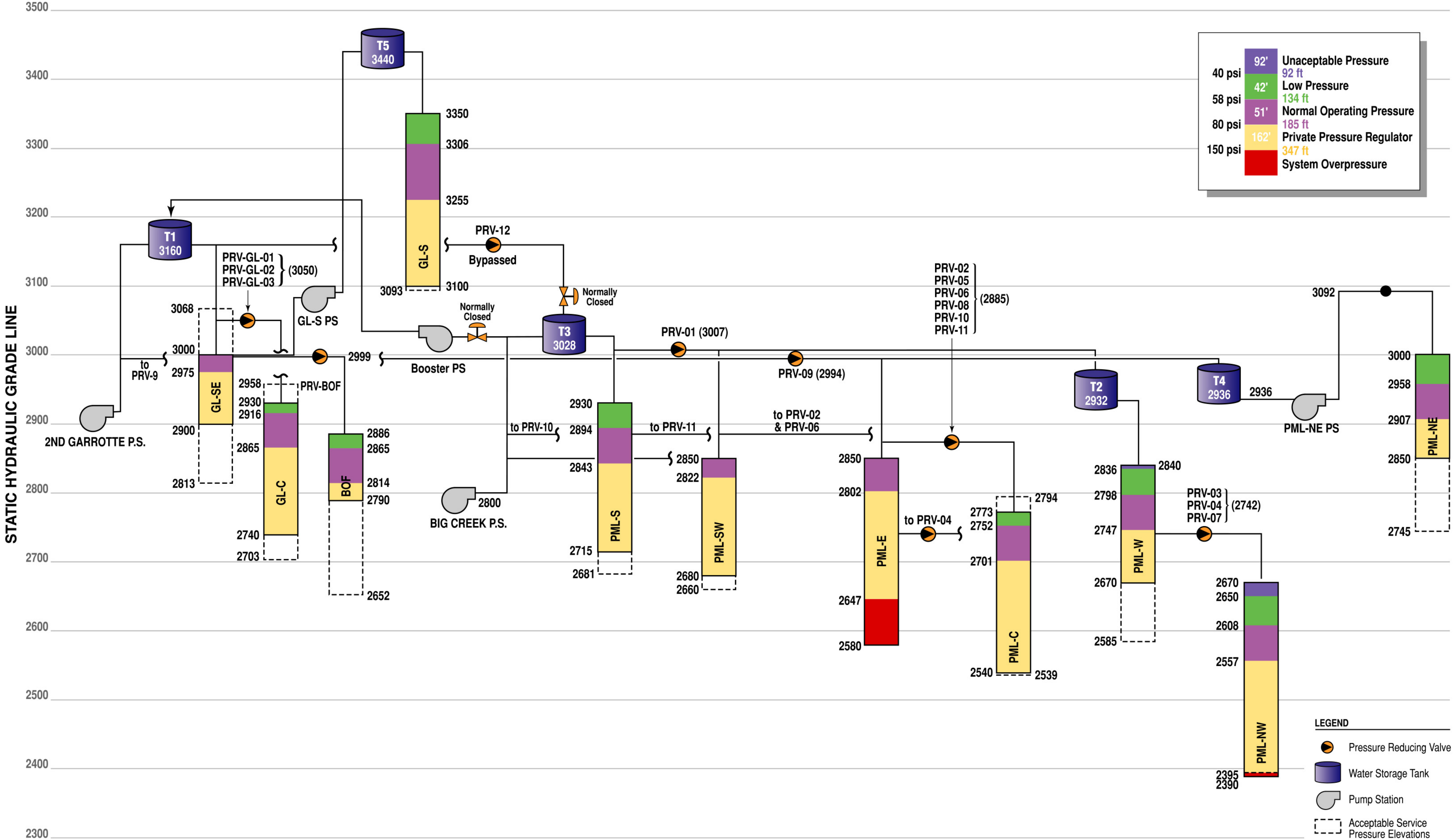
GROVELAND COMMUNITY SERVICES DISTRICT

Existing Water System • Static Hydraulic Grade Line Analysis

Exhibit 8



Note: All elevations depicted in the exhibit are in units of feet.
Elevations labeled on the water tanks are HGL elevations.

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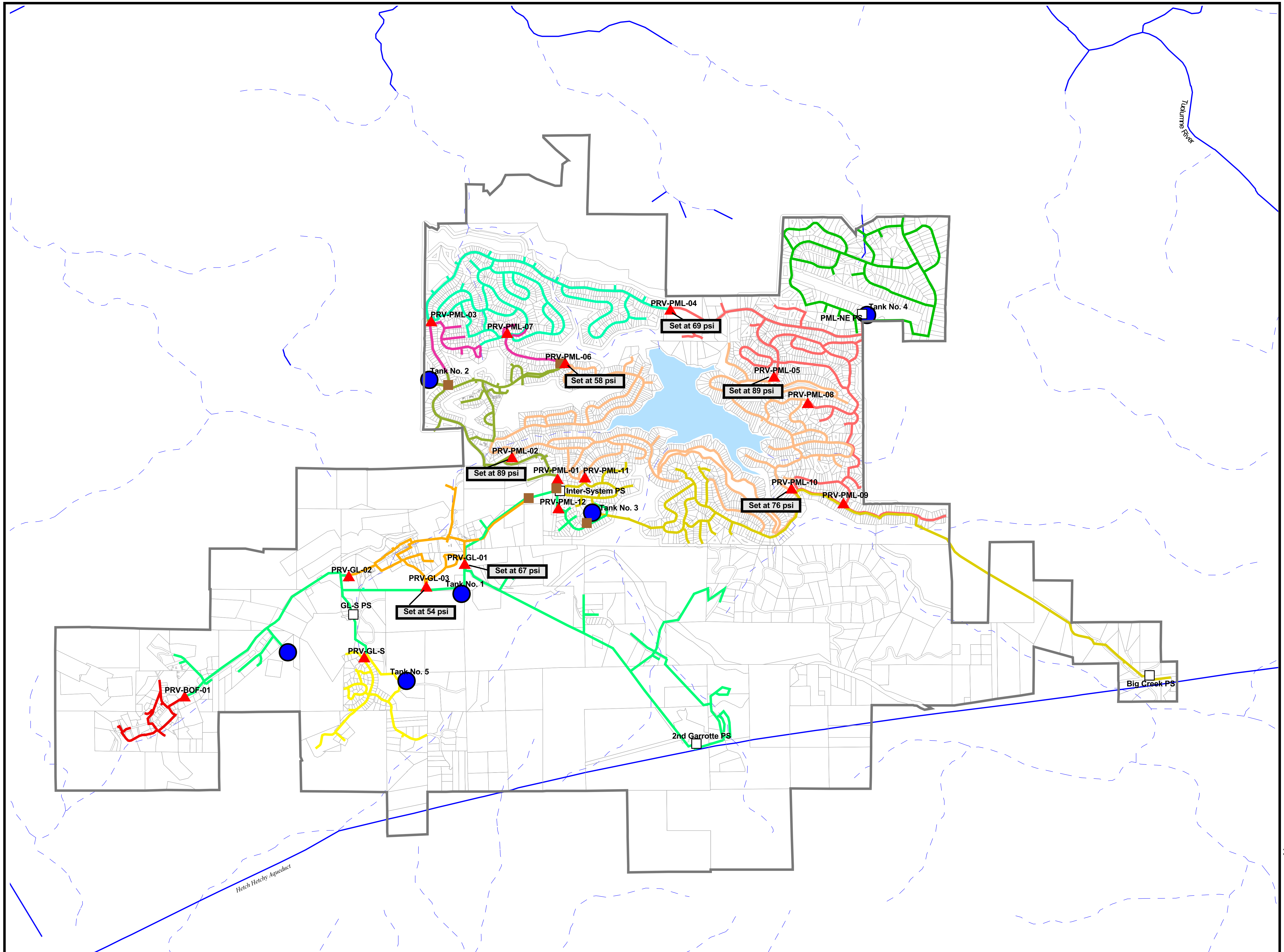
GROVELAND COMMUNITY SERVICES DISTRICT

Balanced Existing Water System • Static Hydraulic Grade Line Analysis

Exhibit 9



Groveland Community Services District

Exhibit 10

Water System
Existing System Balancing

Legend

Water Points
- Booster Pump Station
- Pressure Reducing Station
- Water Tank
- N.C. Gate Valve
- Water Mains
- Stream
- River
- Lakes
- Parcels
- District Boundary

Water Mains by Zone
- BOF
- G-S
- GL-C
- GL-SE
- PML-C
- PML-E
- PML-NE
- PML-NW
- PML-S
- PML-SW
- PML-W

N

3000 0 3000 Feet

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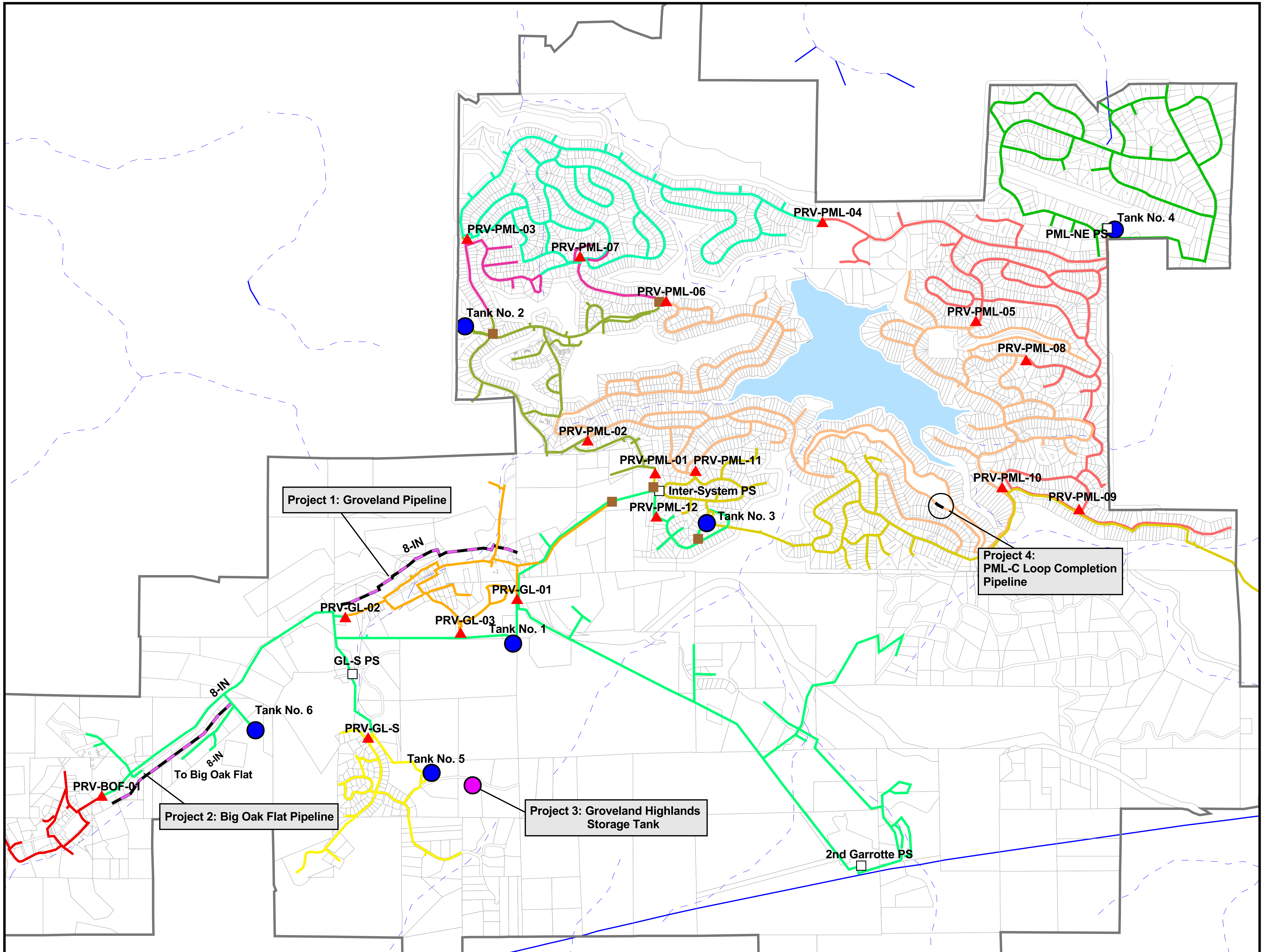

Groveland Community Services District

Exhibit 11

Water System Required Improvements

Legend

Water Points

- Booster Pump Station
- Pressure Reducing Station
- Water Tank
- N.C. Gate Valve
- Water Mains
- Stream
- River
- Lakes
- Parcels
- District Boundary
- Proposed Water Mains
- Proposed Water Tank

Water Mains by Zone

- BOF
- G-S
- GL-C
- GL-SE
- PML-C
- PML-E
- PML-NE
- PML-NW
- PML-S
- PML-SW
- PML-W

N

2000 0 2000 Feet

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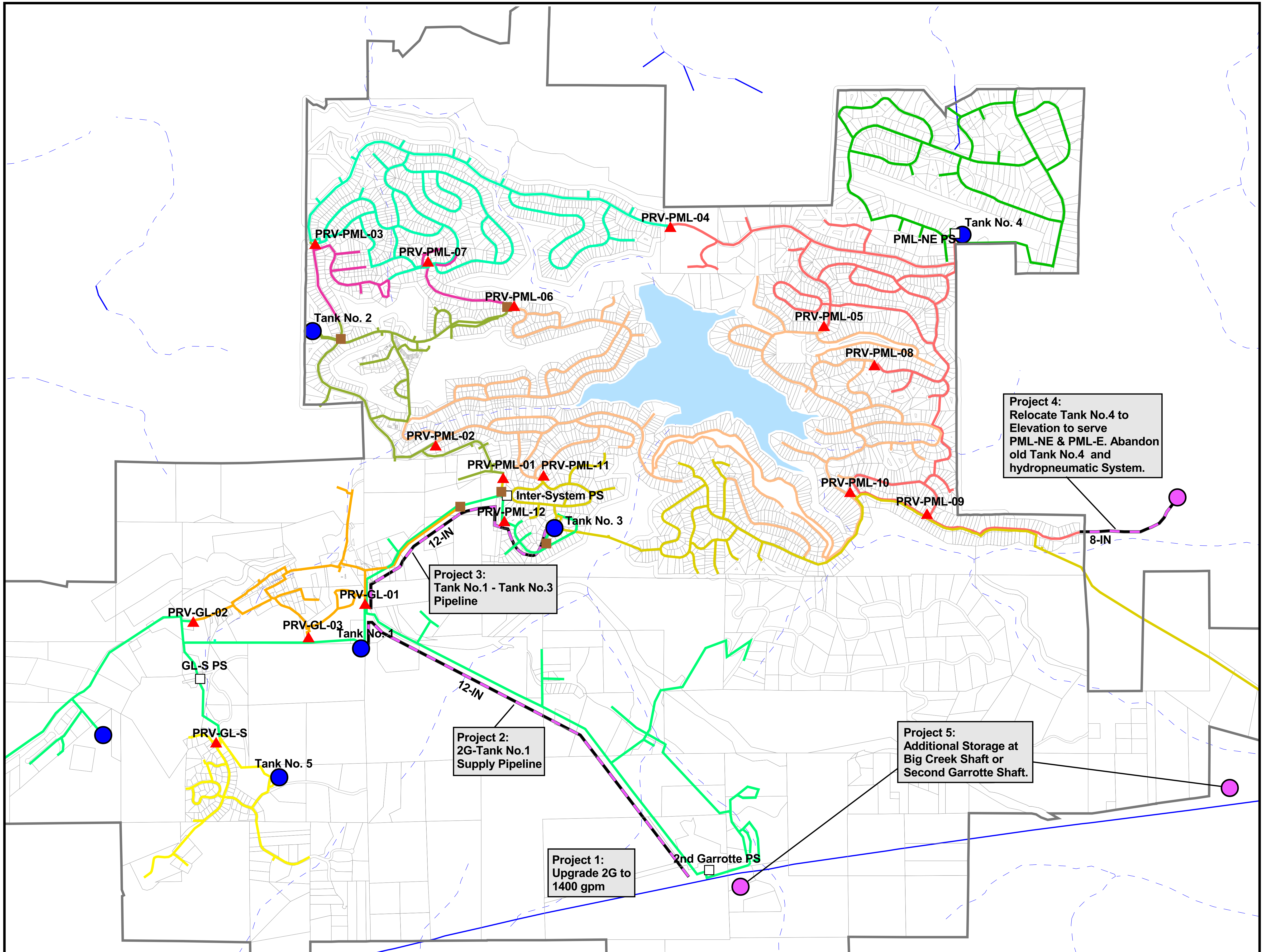

Exhibit 12

Water System Reliablity Improvements

Legend

Water Points

- Booster Pump Station
- Pressure Reducing Station
- Water Tank
- N.C. Gate Valve
- Water Mains
- Stream
- River
- Lakes
- Parcels
- District Boundary
- Proposed Water Mains
- Proposed Water Tank

Water Mains by Zone

- BOF
- G-S
- GL-C
- GL-SE
- PML-C
- PML-E
- PML-NE
- PML-NW
- PML-S
- PML-SW
- PML-W

N

2000 0 2000 Feet

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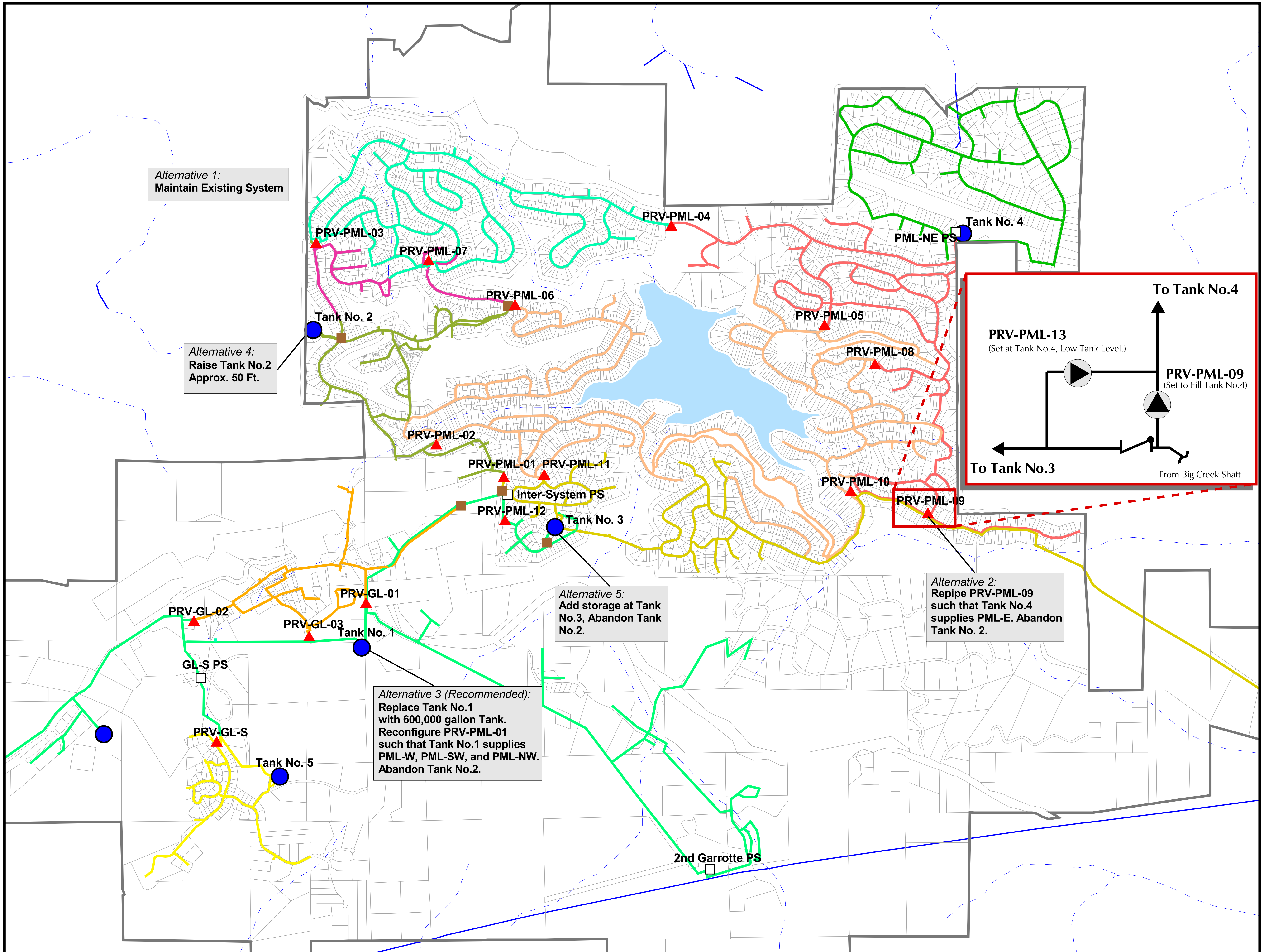
Exhibit 13

Water System Long-Term System Improvements



Legend

Water Points

- Booster Pump Station
- Pressure Reducing Station
- Water Tank
- N.C. Gate Valve
- Water Mains
- Stream
- River
- Lakes
- Parcels
- District Boundary

Water Mains by Zone

- BOF
- G-S
- GL-C
- GL-SE
- PML-C
- PML-E
- PML-NE
- PML-NW
- PML-S
- PML-SW
- PML-W

N

2000 0 2000 Feet

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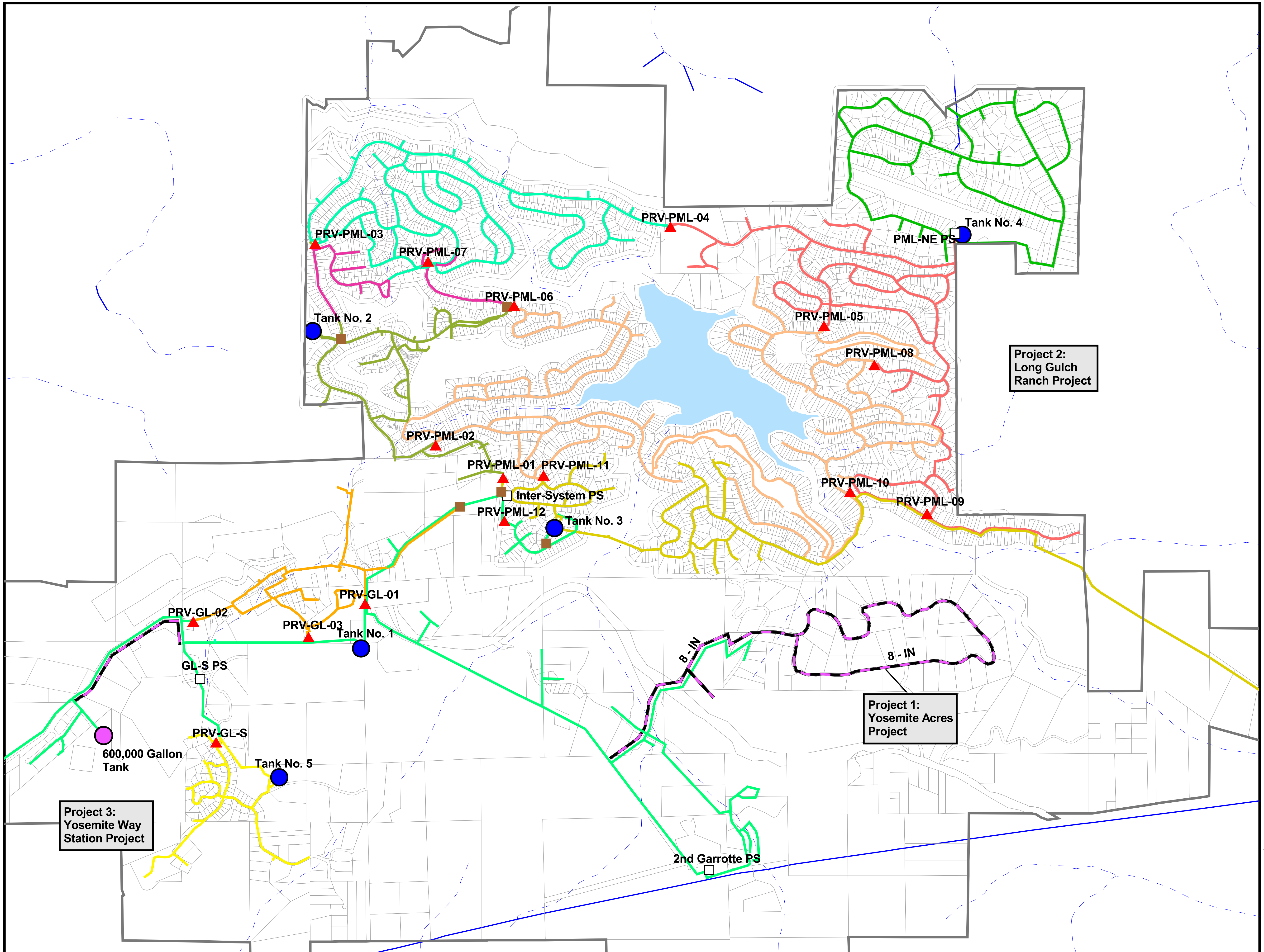
Exhibit 14

Water System Service Expansion Projects



Legend

Water Points
- Booster Pump Station
- Pressure Reducing Station
- Water Tank
- N.C. Gate Valve
- Water Mains
- Stream
- River
- Lakes
- Parcels
- District Boundary
- Proposed Water Mains
- Proposed Water Tank

Water Mains by Zone
- BOF
- G-S
- GL-C
- GL-SE
- PML-C
- PML-E
- PML-NE
- PML-NW
- PML-S
- PML-SW
- PML-W

N

2000 0 2000 Feet

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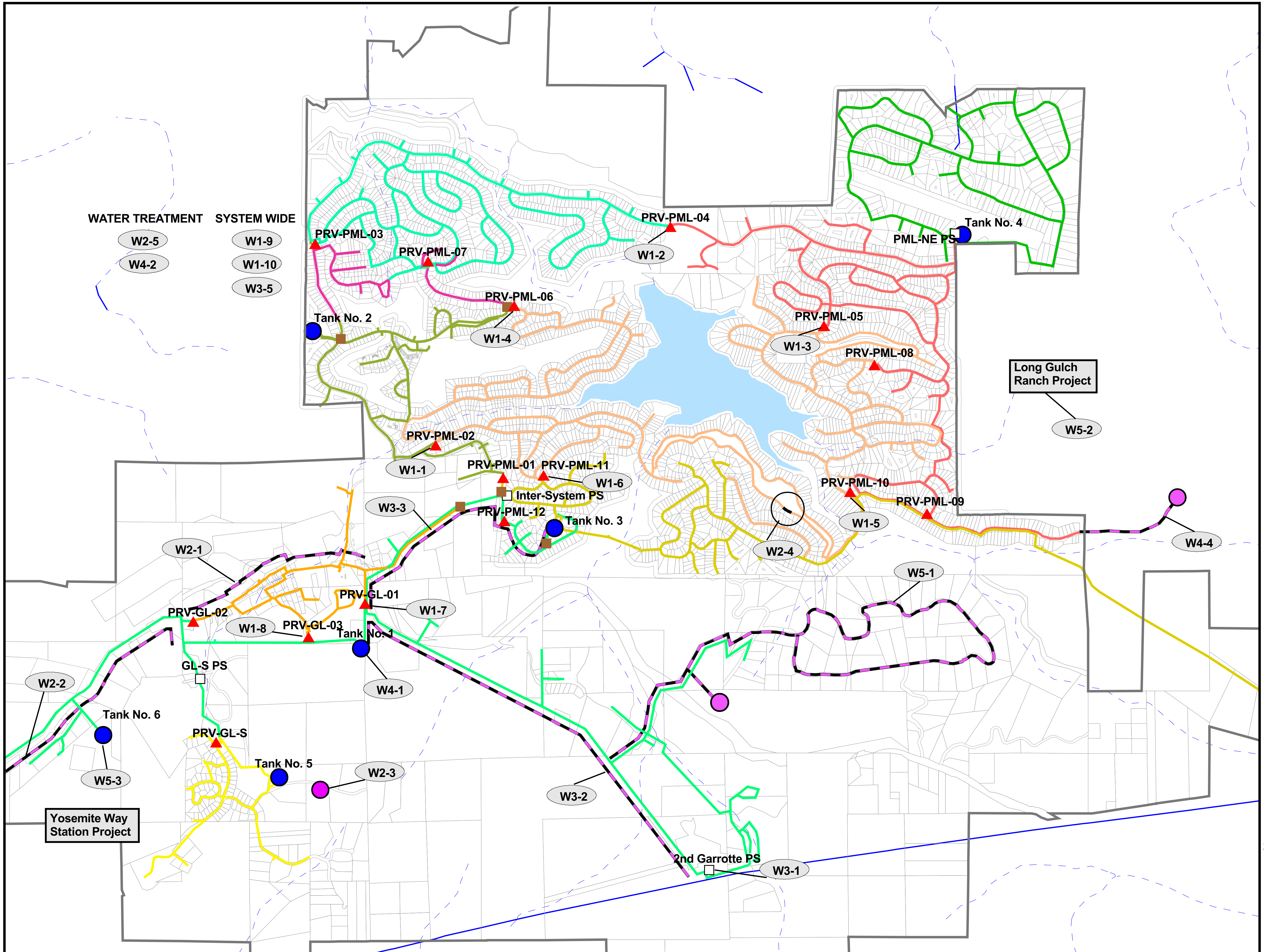
Exhibit 15

Water System Capital Improvement Program (CIP)



Legend

Water Points
- Booster Pump Station
- Pressure Reducing Station
- Water Tank
- N.C. Gate Valve
- Water Mains
- Stream
- River
- Lakes
- Parcels
- District Boundary
- Proposed Water Mains
- Proposed Water Tank

Water Mains by Zone
- BOF
- G-S
- GL-C
- GL-SE
- PML-C
- PML-E
- PML-NE
- PML-NW
- PML-S
- PML-SW
- PML-W

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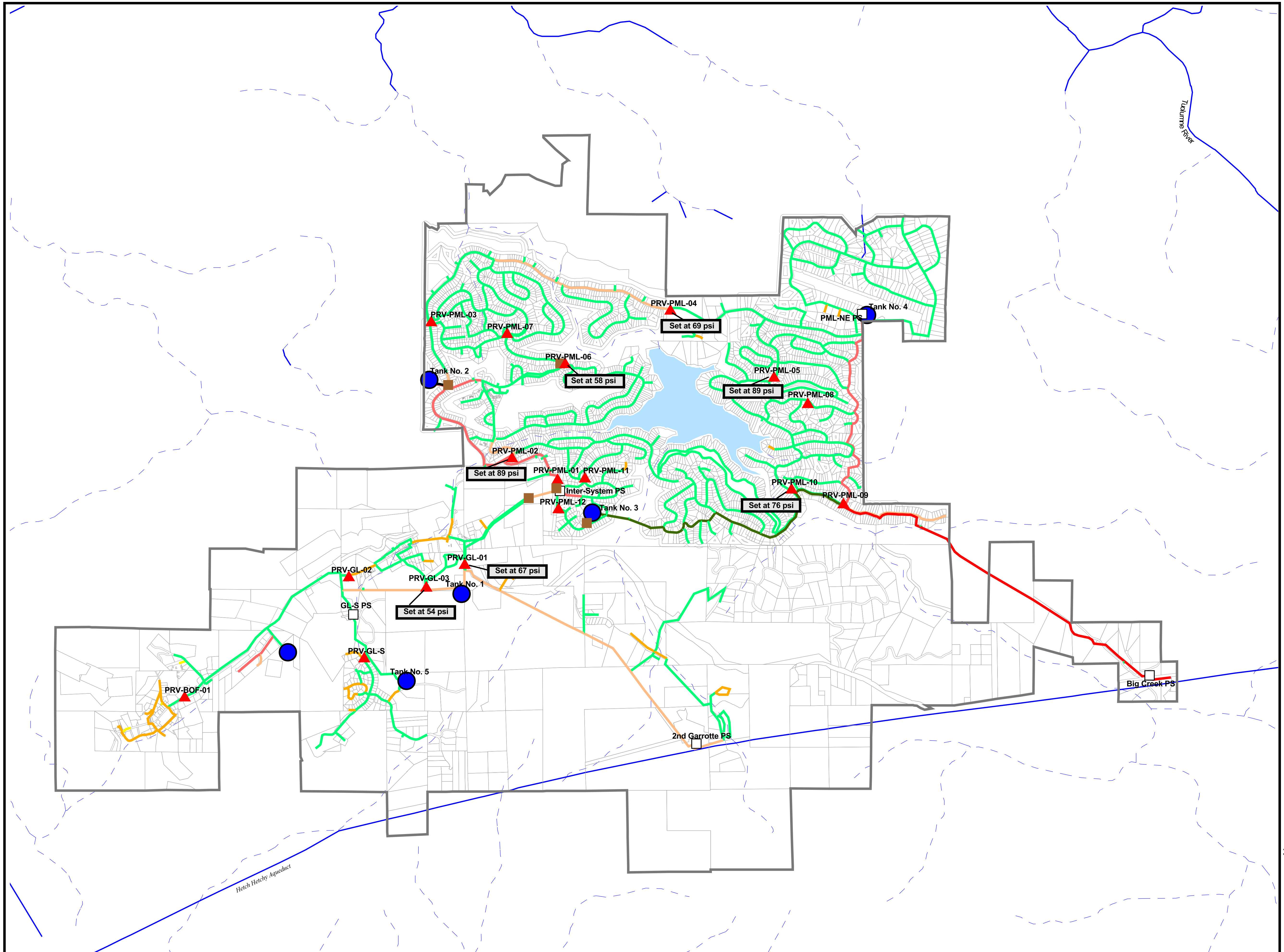

Groveland Community Services District

Exhibit 16

Water System
Existing Pipeline Diameters

Legend

Water Points

- Booster Pump Station
- Pressure Reducing Station
- Water Tank
- N.C. Gate Valve
- Water Mains
- Stream
- River
- Lakes
- Parcels
- District Boundary

Water Mains by Diameter

- 0
- 4 inches
- 6 inches
- 8 inches
- 10 inches
- 12 inches
- 14 inches
- 16 inches

N

3000 0 3000 Feet

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APPENDIX A
GCSD Water Treatment Summary

GCSD Water Treatment Summary

DATE	SECOND GARROTE PUMPAGE TOTAL PUMPAGE MG	SECOND GARROTE PUMPAGE TOTAL FLOW A.F.	SECOND GARROTE PUMPAGE TOTAL TIME HOURS	SECOND GARROTE PUMPAGE AVERAGE RATE GPM	BIG CREEK PUMPAGE TOTAL PUMPAGE MG	BIG CREEK PUMPAGE TOTAL FLOW A.F.	BIG CREEK PUMPAGE TOTAL TIME HOURS	BIG CREEK PUMPAGE AVERAGE RATE GPM	TOTAL PUMPAGE TOTAL PUMPAGE MG	TOTAL PUMPAGE TOTAL FLOW A.F.	RAW WATER TEMPERATURE C. 2G	RAW WATER TEMPERATURE C BC	LIME USAGE LBS / Month 2G	LIME USAGE LBS / Month BC	LIME USAGE mg / L / DAY 2G	LIME USAGE mg / L / DAY BC
Jan. 2000	2.060	6.323	63.9	535.9	6.407	19.667	76.3	1395.1	8.467	25.990	8.0	10.0	153	271	8.9	5.1
Feb.	1.882	5.777	57.1	550.5	5.525	16.959	64.5	1427.0	7.407	22.736	8.2	9.2	141	208	9.0	4.5
Mar.	4.717	14.479	141.1	557.8	11.135	34.179	128.3	1441.1	15.852	48.658	8.2	8.6	162	112	4.1	1.2
Apr.	7.268	22.309	216.5	561.2	7.462	22.905	86.0	1445.3	14.730	45.214	10.4	9.9	180	65	3.0	1.0
May	3.801	11.667	114.0	555.2	10.219	31.368	118.9	1433.3	14.020	43.035	12.7	10.4	246	535	7.8	6.3
June	4.491	13.785	136.8	547.5	12.460	38.246	146.3	1419.2	16.951	52.032	14.7	11.3	289	570	7.7	5.5
July	4.871	14.952	153.3	529.9	18.562	56.977	223.6	1385.3	23.433	71.928	15.8	12.6	300	855	7.4	5.6
Aug.	9.415	28.900	292.3	530.3	12.940	39.720	157.8	1366.5	22.355	68.620	13.4	12.2	393	670	6.0	6.2
Sept.	4.723	14.497	149.8	524.8	10.986	33.722	134.2	1363.9	15.709	48.219	13.4	12.8	354	595	9.0	6.5
Oct.	3.087	9.476	97.5	527.7	8.980	27.564	108.6	1376.1	12.067	37.040	13.6	12.6	224	480	8.7	6.4
Nov.	2.499	7.671	79.2	527.1	7.412	22.751	89.0	1389.7	9.911	30.422	10.1	11.4	200	435	9.6	7.0
Dec.	2.374	7.287	74.1	535.0	6.698	20.560	82.2	1346.9	9.072	27.847	9.5	11.2	156	345	7.9	6.2
Annual Total	51.19	157.1	1575.6		118.79	364.6	1415.7		170.0	521.7			2798	5141		
Average	4.266	13.094	131.3	540.2	9.899	30.385	118.0	1399.1	14.165	43.5	11.5	11.0	233.2	428.4	7.33	5.12
Maximum	9.415	28.900	292.3	561.2	18.562	56.977	223.6	1445.3	23.433	71.9	15.8	12.8	393	855	9.60	7.04
Minimum	1.882	5.777	57.1	524.8	5.525	16.959	64.5	1346.9	7.407	22.7	8.0	8.6	141	65	2.97	1.04

DATE	SECOND GARROTE PUMPAGE TOTAL PUMPAGE MG	SECOND GARROTE PUMPAGE TOTAL FLOW A.F.	SECOND GARROTE PUMPAGE TOTAL TIME HOURS	SECOND GARROTE PUMPAGE AVERAGE RATE GPM	BIG CREEK PUMPAGE TOTAL PUMPAGE MG	BIG CREEK PUMPAGE TOTAL FLOW A.F.	BIG CREEK PUMPAGE TOTAL TIME HOURS	BIG CREEK PUMPAGE AVERAGE RATE GPM	TOTAL PUMPAGE TOTAL PUMPAGE MG	TOTAL PUMPAGE TOTAL FLOW A.F.	RAW WATER TEMPERATURE C. 2G	RAW WATER TEMPERATURE C BC	LIME USAGE LBS / Month 2G	LIME USAGE LBS / Month BC	LIME USAGE mg / L / DAY 2G	LIME USAGE mg / L / DAY BC
Jan. 2001	2.842	8.724	87.2	542.7	6.286	19.295	76.0	1375.1	9.128	28.019	9.4	9.4	152	380	6.4	7.2
Feb.	2.656	8.153	76.9	576.1	4.738	14.543	54.8	1444.8	7.394	22.696	8.6	8.3	30	275	1.4	7.0
Mar.																
Apr.																
May																
June																
July																
Aug.																
Sept.																
Oct.																
Nov.																
Dec.																
Annual Total	5.5	16.9	164.1		11.0	33.8	130.8		16.5	50.7			182	655		
Average	2.749	8.438	82.1	559.4	5.512	16.919	65.4	1410.0	8.261	25.4	9.0	8.8	91.0	327.5	3.88	7.10
Maximum	2.842	8.724	87.2	576.1	6.286	19.295	76.0	1444.8	9.128	28.0	9.4	9.4	152	380	6.41	7.25
Minimum	2.656	8.153	76.9	542.7	4.738	14.543	54.8	1375.1	7.394	22.7	8.6	8.3	30	275	1.35	6.96

c:\excel\water\watersum.

GCSD Water Treatment Summary

DATE	AVERAGE CHLORINE USAGE LBS / Month 2G	LBS / Month BC	DOSAGE mg / L 2G	DOSAGE mg / L BC	RESIDUAL mg / L 2G	RESIDUAL mg / L BC	DEMAND mg / L 2G	DEMAND mg / L BC	AVERAGE TURBIDITY RAW WATER 2G	RAW WATER BC	FINISH WATER 2G	FINISH WATER BC	AVERAGE pH RAW WATER 2G	RAW WATER BC	FINISH WATER 2G	FINISH WATER BC
Jan. 2000	57.0	138.0	**3.32**	**2.58**	0.98	1.02	**2.34**	**1.56**	0.4	0.26	0.39	0.28	7.0	6.8	9.4	9.7
Feb.	52.0	144.0	**3.31**	**3.13**	1.00	1.03	**2.31**	**2.10**	0.33	0.3	0.36	0.30	7.0	6.7	9.5	9.4
Mar.	117.6	177.6	**2.99**	**1.91**	0.97	0.89	**2.02**	**1.02**	0.33	0.3	0.40	0.30	7.3	6.7	9.0	8.4
Apr.	160.5	182.5	**2.65**	**2.93**	1.01	1.21	**1.64**	**1.72**	0.27	0.28	0.29	0.26	6.7	6.9	9.1	8.3
May	126.1	258.4	**3.98**	**3.03**	1.22	1.21	**2.76**	**1.82**	0.4	0.4	0.35	0.36	7.0	7.1	9.5	9.4
June	175.6	329.4	**4.69**	**3.17**	1.21	1.24	**3.48**	**1.93**	0.56	0.5	0.42	0.47	7.0	6.9	9.4	9.3
July	164.2	463.0	**4.04**	**2.99**	1.42	1.42	**2.62**	**1.57**	0.53	0.46	0.52	0.50	6.9	6.7	9.0	9.1
Aug.	295.5	359.4	**3.76**	**3.33**	1.42	1.50	**2.34**	**1.83**	0.31	0.25	0.36	0.33	6.8	6.8	8.7	9.4
Sept.	149.8	272.7	**3.80**	**2.98**	1.23	1.21	**2.57**	**1.77**	0.27	0.24	0.30	0.26	6.8	6.6	9.0	9.2
Oct.	102.5	225.2	**3.98**	**3.01**	1.15	1.13	**2.83**	**1.88**	0.26	0.23	0.30	0.26	6.7	6.6	9.0	9.1
Nov.	80.6	192.1	**3.87**	**3.11**	1.11	1.12	**2.76**	**1.99**	0.34	0.3	0.40	0.49	6.4	6.5	9.1	9.2
Dec.	69.8	149.3	**3.53**	**2.67**	1.08	1.12	**2.45**	**1.55**	0.25	0.25	0.36	0.31	6.6	6.7	9.3	8.8
Annual Total	1551.1	2891.6														
Average	129.3	241.0	3.66	2.90	1.15	1.18	2.51	1.73	0.35	0.31	0.37	0.34	6.85	6.75	9.17	9.11
Maximum	295.5	463.0	4.69	3.33	1.42	1.50	3.48	2.10	0.56	0.50	0.52	0.50	7.3	7.1	9.5	9.7
Minimum	52.0	138.0	2.65	1.91	0.97	0.89	1.64	1.02	0.25	0.23	0.29	0.26	6.4	6.5	8.7	8.3

DATE	AVERAGE CHLORINE USAGE LBS / Month 2G	LBS / Month BC	DOSAGE mg / L 2G	DOSAGE mg / L BC	RESIDUAL mg / L 2G	RESIDUAL mg / L BC	DEMAND mg / L 2G	DEMAND mg / L BC	AVERAGE TURBIDITY RAW WATER 2G	RAW WATER BC	FINISH WATER 2G	FINISH WATER BC	AVERAGE pH RAW WATER 2G	RAW WATER BC	FINISH WATER 2G	FINISH WATER BC
Jan. 2001	79.6	123.2	**3.36**	**2.35**	1.05	1.12	**2.31**	**1.23**	0.25	0.21	0.29	0.23	7.0	6.7	8.7	9.2
Feb.	71.0	89.7	**3.20**	**2.27**	1.11	1.12	**2.09**	**1.15**	0.21	0.2	0.22	0.25	7.0	6.8	7.7	9.3
Mar.																
Apr.																
May																
June																
July																
Aug.																
Sept.																
Oct.																
Nov.																
Dec.																
Annual Total	150.6	212.9														
Average	75.3	106.5	3.28	2.31	1.08	1.12	2.20	1.19	0.23	0.21	0.26	0.24	7.00	6.75	8.20	9.27
Maximum	79.6	123.2	3.36	2.35	1.11	1.12	2.31	1.23	0.25	0.21	0.29	0.25	7.0	6.8	8.7	9.3
Minimum	71.0	89.7	3.20	2.27	1.05	1.12	2.09	1.15	0.21	0.20	0.22	0.23	7.0	6.7	7.7	9.2

GCSD Water Treatment Summary

DATE	COLOR FINISH WATER 2G	COLOR FINISH WATER BC	ODOR FINISH WATER 2G	ODOR FINISH WATER BC	CT RATIO, Minimum 3.0 Log Clearwell 2G	CT RATIO, Minimum 3.0 Log Clearwell BC	DISTRIBUTION Samples Collected 2G	DISTRIBUTION Samples Collected BC	% Reading < 0.5 NTU 2G	% Reading < 0.5 NTU BC	% Readin > 1.0 NTU 2G	% Readin > 1.0 NTU BC	% Reduction Turbidity 2G	% Reduction Turbidity BC	Department of Health Services WATER QUALITY COMPLAINTS Taste/Odor 2G	Taste/Odor BC	Color 2G	Color BC	Turbidity 2G	Turbidity BC	Susp.Solid 2G	Susp.Solid BC	Other 2G	Other BC	THM Clearwells 2G	THM Clearwells BC	THM Elderberry Miners 2G	THM Elderberry Miners BC	ASBESTOS 2G	ASBESTOS BC
Jan. 2000	2	2	1	1	6.53	2.89	5	7	100	100	0	0	22.60	-7.63	0	0	0	0	1	0	0	0	0	0	18.4	9.9	34.8	24.2	0.9	
Feb.	2	2	1	1	6.90	1.57	5	7	98	100	0	0	7.94	-0.21	0	0	0	0	1	0	0	0	0	0	16.7	14.5	32.5	28.4		
Mar.	2	2	1	1	4.05	2.30	6	9	100	100	0	0	10.89	0.38	0	0	0	0	1	0	0	0	0	0	44.3	34.0	86.5	83.8		
Apr.	2	2	1	1	4.64	2.69	5	7	100	100	0	0	10.33	3.31	0	0	1	5	0	0	0	0	0	0	36.2	39.8	64.1	58.8		
May	2	2	1	1	2.15	1.36	6	9	100	100	0	0	22.83	13.27	0	0	0	0	0	0	0	0	0	0	50.8	45.0	112.0	104.0		
June	2	2	1	1	3.51	1.73	5	7	93	34	0	0	23.11	7.02	0	0	0	0	0	0	0	0	0	1	70.2	71.5	163.0	139.0		
July	2	2	1	1	2.10	2.05	5	7	88	77	0	0	14.89	-1.79	0	0	0	1	0	0	0	0	0	0	70.9	53.8	139.6	130.6	0.4	
Aug.	2	2	1	1	2.08	1.19	7	8	98	99	0	0	3.69	-17.11	1	0	0	1	0	0	0	0	0	0	82.2	62.7	204.7	198.3		
Sept.	2	2	1	1	4.12	2.87	4	8	100	100	0	0	14.03	-3.48	0	1	0	0	0	0	0	0	0	0	78.0	63.0	170.6	163.2		
Oct.	2	2	1	1	2.40	1.10	4	8	100	100	0	0	17.05	-8.52	0	0	0	0	0	0	0	0	0	0	78.0	63.0	170.6	163.2		
Nov.	2	2	1	1	1.96	2.67	6	9	97	77	0	0	8.73	-37.97	0	0	0	0	0	0	0	0	0	0	70.7	63.7	125.9	88.3		
Dec.	2	2	1	1	2.93	3.00	5	7	100	100	0	0	-4.58	-11.41	0	0	0	0	0	0	0	0	0	0	49.0	41.3	118.4	115.7		
Annual Total																														
Average	2.0	2.0	1.0	1.0	3.614	2.118	5.3	7.8	97.8	90.6	0.0	0.0	12.6	-5.3	0.1	0.1	0.1	0.6	0.3	0.0	0.0	0.0	0.0	0.1	55.5	46.8	118.6	108.1	0.7	
Maximum	2	2	1	1	6.90	3.00	7	9	100	100			23	13	1	1	1	5	1					1	82.2	71.5	204.7	198.3	0.9	
Minimum	2	2	1	1	1.96	1.10	4	7	88	34															16.7	9.9	32.5	24.2	0.4	

DATE	COLOR FINISH WATER 2G	COLOR FINISH WATER BC	ODOR FINISH WATER 2G	ODOR FINISH WATER BC	CT RATIO, Minimum 3.0 Log Clearwell 2G	CT RATIO, Minimum 3.0 Log Clearwell BC	DISTRIBUTION SAMPLES COLLE[CTED] 2G	SAMPLES COLLE[CTED] BC	% Reading < 0.5 NTU 2G	% Reading < 0.5 NTU BC	% Readin > 1.0 NTU 2G	% Readin > 1.0 NTU BC	% Reduction Turbidity 2G	% Reduction Turbidity BC	Department of Health Services WATER QUALITY COMPLAINTS Taste/Odor 2G	Taste/Odor BC	Color 2G	Color BC	Turbidity 2G	Turbidity BC	Susp.Solid 2G	Susp.Solid BC	Other 2G	Other BC	THM Clearwells 2G	THM Clearwells BC	THM Elderberry Miners 2G	THM Elderberry Miners BC	ASBESTOS MFL 2G	ASBESTOS MFL BC
Jan. 2001	1	1	1	1	3.42	2.58	6	9	100	100	0	0	7.36	-4.84	0	0	0	0	0	0	0	0	0	0	48.0	40.0	99.0	95.0	0.4	
Feb.	1	2	1	1	3.72	2.99	5	7	100	100	0	0	9.41	-2.51	0	0	0	0	0	0	0	0	0	0	34.3	33.8	63.5	75.5		
Mar.																														
Apr.																														
May																														
June																														
July																														
Aug.																														
Sept.																														
Oct.																														
Nov.																														
Dec.																														
Annual Total																														
Average	1.0	1.5	1.0	1.0	3.570	2.785	5.5	8.0	100.0	100.0	0.0	0.0	8.4	-3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.1	36.9	81.3	85.3	0.4	
Maximum	1	2	1	1	3.72	2.99	6	9	100	100			9												48.0	40.0	99.0	95.0	0	
Minimum	1	1	1	1	3.42	2.58	5	7	100	100			7												34.3	33.8	63.5	75.5	0	

GCSD Water Treatment Summary

DATE	SECOND GARROTE PUMPAGE TOTAL PUMPAGE MG	SECOND GARROTE PUMPAGE TOTAL FLOW A.F.	SECOND GARROTE PUMPAGE TOTAL TIME HOURS	SECOND GARROTE PUMPAGE AVERAGE RATE GPM	BIG CREEK PUMPAGE TOTAL PUMPAGE MG	BIG CREEK PUMPAGE TOTAL FLOW A.F.	BIG CREEK PUMPAGE TOTAL TIME HOURS	BIG CREEK PUMPAGE AVERAGE RATE GPM	TOTAL PUMPAGE TOTAL PUMPAGE MG	TOTAL PUMPAGE TOTAL FLOW A.F.	RAW WATER TEMPERATURE C. 2G	RAW WATER TEMPERATURE C BC	LIME USAGE LBS / Month 2G	LIME USAGE LBS / Month BC	LIME USAGE mg / L / DAY 2G	LIME USAGE mg / L / DAY BC
Jan. 1998	2.908	8.926	69.3	697.9	5.850	17.957	66.7	1465.7	8.758	26.883	8.3	9.5	249	400	10.3	8.2
Feb.	2.823	8.665	67.2	700.0	5.078	15.587	57.8	1463.0	7.901	24.252	7.6	8.5	240	350	10.2	8.3
Mar.	3.882	11.916	92.6	697.6	5.875	18.034	67.0	1467.1	9.757	29.949	8.3	8.7	345	385	10.7	7.9
Apr.	3.538	10.860	84.7	694.9	6.198	19.025	70.0	1475.3	9.736	29.885	10.1	9.7	1060	405	35.9	7.8
May	3.244	9.958	78.5	688.1	7.113	21.834	82.0	1464.5	10.357	31.791	11.6	10.8	288	445	10.6	7.5
June	3.636	11.161	87.7	690.6	9.486	29.118	105.0	1542.1	13.122	40.278	12.8	11.3	279	505	9.2	6.4
July	5.066	15.550	120.9	707.5	15.351	47.120	168.9	1514.2	20.417	62.671	14.2	11.9	363	725	8.6	5.7
Aug.	5.628	17.275	134.8	695.1	15.161	46.537	177.1	1504.6	20.789	63.813	14.8	13.0	417	960	8.9	7.6
Sept.	3.607	11.072	87.5	743.1	11.132	34.170	123.1	1510.7	14.739	45.242	14.9	13.3	291	600	9.7	6.5
Oct.	3.338	10.246	81.4	682.2	8.628	26.484	97.2	1480.0	11.966	36.730	12.9	12.4	267	470	9.6	6.5
Nov.	2.981	9.150	73.5	674.2	6.961	21.367	78.7	1474.1	9.942	30.517	10.6	11.4	264	470	10.6	8.1
Dec.	3.506	10.762	83.7	697.7	9.883	30.336	110.9	1486.4	13.389	41.098	8.7	10.5	249	270	8.5	3.3
Annual Total	44.2	135.5	1061.8		106.7	327.6	1204.4		150.9	463.1			4312	5985		
Average	3.680	11.295	88.5	697.4	8.893	27.297	100.4	1487.3	12.573	38.6	11.2	10.9	359.3	498.8	11.90	6.97
Maximum	5.628	17.275	134.8	743.1	15.351	47.120	177.1	1542.1	20.789	63.8	14.9	13.3	1060	960	35.92	8.26
Minimum	2.823	8.665	67.2	674.2	5.078	15.587	57.8	1463.0	7.901	24.3	7.6	8.5	240	270	8.52	3.28

DATE	SECOND GARROTE PUMPAGE TOTAL PUMPAGE MG	SECOND GARROTE PUMPAGE TOTAL FLOW A.F.	SECOND GARROTE PUMPAGE TOTAL TIME HOURS	SECOND GARROTE PUMPAGE AVERAGE RATE GPM	BIG CREEK PUMPAGE TOTAL PUMPAGE MG	BIG CREEK PUMPAGE TOTAL FLOW A.F.	BIG CREEK PUMPAGE TOTAL TIME HOURS	BIG CREEK PUMPAGE AVERAGE RATE GPM	TOTAL PUMPAGE TOTAL PUMPAGE MG	TOTAL PUMPAGE TOTAL FLOW A.F.	RAW WATER TEMPERATURE C. 2G	RAW WATER TEMPERATURE C BC	LIME USAGE LBS / Month 2G	LIME USAGE LBS / Month BC	LIME USAGE mg / L / DAY 2G	LIME USAGE mg / L / DAY BC
Jan. 1999	2.375	7.290	57.2	692.0	6.568	20.161	74.3	1473.3	8.943	27.451	7.8	9.4	234	295	11.8	5.4
Feb.	2.348	7.207	56.4	693.9	5.167	15.860	58.5	1472.1	7.515	23.068	7.3	8.3	177	355	9.0	8.2
Mar.	2.327	7.143	68.4	567.1	6.217	19.084	69.2	1497.4	8.544	26.227	7.7	8.4	258	420	13.3	8.1
Apr.	2.779	8.530	81.1	571.1	6.617	20.310	73.5	1500.4	9.396	28.841	8.4	8.7	312	435	13.5	7.9
May	3.255	9.992	95.7	566.9	10.268	31.518	114.6	1493.3	13.523	41.511	10.8	9.8	339	685	12.5	8.0
June	4.253	13.055	124.1	571.2	13.448	41.278	150.7	1487.2	17.701	54.333	12.2	10.3	324	715	9.1	6.4
July	4.872	14.954	150.5	539.5	15.640	48.007	185.2	1407.5	20.511	62.961	13.7	11.5	285	745	7.0	5.7
Aug.	4.698	14.421	150.9	518.9	14.510	44.540	179.2	1349.6	19.208	58.961	14.0	11.9	268	725	6.8	6.0
Sept.	3.651	11.205	117.3	518.7	11.816	36.268	144.6	1361.9	15.466	47.474	14.1	12.2	222	435	7.3	4.4
Oct.	3.479	10.677	112.3	516.3	10.448	32.070	128.1	1359.3	13.926	42.747	13.6	12.1	298	730	10.3	8.4
Nov.	2.544	7.809	81.3	521.5	7.180	22.038	88.8	1347.5	9.724	29.847	11.4	11.6	219	480	10.3	8.0
Dec.	2.149	6.596	67.1	533.7	6.455	19.813	78.7	1367.0	8.603	26.409	8.6	10.6	192	440	10.7	8.2
Annual Total	38.7	118.9	1162.3		114.3	350.9	1345.4		153.1	469.8			3128	6460		
Average	3.227	9.907	96.9	567.6	9.528	29.246	112.1	1426.4	12.755	39.2	10.8	10.4	260.7	538.3	10.14	7.06
Maximum	4.872	14.954	150.9	693.9	15.640	48.007	185.2	1500.4	20.511	63.0	14.1	12.2	339	745	13.46	8.38
Minimum	2.149	6.596	56.4	516.3	5.167	15.860	58.5	1347.5	7.515	23.1	7.3	8.3	177	295	6.84	4.41

GCSD Water Treatment Summary

DATE	AVERAGE CHLORINE USAGE: LBS / Month 2G	LBS / Month BC	DOSAGE mg / L 2G	DOSAGE mg / L BC	RESIDUAL mg / L 2G	RESIDUAL mg / L BC	DEMAND mg / L 2G	DEMAND mg / L BC	AVERAGE TURBIDITY: RAW WATER 2G	RAW WATER BC	FINISH WATER 2G	FINISH WATER BC	AVERAGE pH: RAW WATER 2G	RAW WATER BC	FINISH WATER 2G	FINISH WATER BC
Jan. 1998	44.0	76.3	1.81	1.56	0.30	0.80	1.51	0.76	0.29	0.28	0.30	0.29	6.0	6.1	9.5	9.5
Feb.	41.9	89.5	1.78	2.11	0.47	0.66	1.31	1.45	0.36	0.35	0.36	0.34	6.3	6.3	9.3	9.7
Mar.	53.4	99.9	1.65	2.04	0.51	0.69	1.14	1.35	0.33	0.34	0.42	0.37	6.7	6.6	9.3	9.7
Apr.	53.6	158.1	1.82	3.06	0.54	0.71	1.28	2.35	0.38	0.40	0.42	0.41	6.8	6.7	9.3	9.7
May	34.2	183.3	1.26	3.09	0.50	0.76	0.76	2.33	0.47	0.52	0.53	0.49	6.8	6.9	9.4	9.5
June	33.4	226.5	1.10	2.86	0.49	0.56	0.61	2.30	0.66	0.67	0.53	0.56	7.0	7.0	9.6	9.6
July	48.5	370.4	1.15	2.89	0.62	0.83	0.53	2.06	0.95	0.90	0.81	0.91	7.1	7.1	9.8	9.3
Aug.	133.5	388.6	2.84	3.07	0.94	0.97	1.90	2.10	0.57	0.51	0.63	0.60	6.9	7.0	9.6	9.2
Sept.	100.1	365.7	3.33	3.94	0.94	1.09	2.39	2.85	0.42	0.35	0.53	0.42	6.8	6.9	9.4	9.2
Oct.	98.8	256.2	3.55	3.56	1.07	1.05	2.48	2.51	0.37	0.29	0.48	0.35	6.7	6.8	9.0	9.0
Nov.	43.0	181.7	1.73	3.13	1.14	1.19	0.59	1.94	0.32	0.26	0.49	0.33	6.6	6.7	9.3	9.4
Dec.	57.2	222.9	1.95	2.70	1.16	1.19	0.79	1.51	0.30	0.26	0.36	0.25	6.3	6.5	8.8	9.2
Annual Total	741.5	2619.1														
Average	61.8	218.3	2.00	2.84	0.72	0.88	1.27	1.96	0.45	0.43	0.49	0.44	6.67	6.72	9.36	9.42
Maximum	133.5	388.6	3.55	3.94	1.16	1.19	2.48	2.85	0.95	0.90	0.81	0.91	7.1	7.1	9.8	9.7
Minimum	33.4	76.3	1.10	1.56	0.30	0.56	0.53	0.76	0.29	0.26	0.30	0.25	6.0	6.1	8.8	9.0

DATE	AVERAGE CHLORINE USAGE: LBS / Month 2G	LBS / Month BC	DOSAGE mg / L 2G	DOSAGE mg / L BC	RESIDUAL mg / L 2G	RESIDUAL mg / L BC	DEMAND mg / L 2G	DEMAND mg / L BC	AVERAGE TURBIDITY: RAW WATER 2G	RAW WATER BC	FINISH WATER Post Clearwell 2G	FINISH WATER Post Clearwell BC	AVERAGE pH: RAW WATER 2G	RAW WATER BC	FINISH WATER 2G	FINISH WATER BC
Jan. 1999	40.6	160.1	**2.05**	**2.92**	1.21	1.23	**0.84**	**1.69**	0.29	0.27	0.37	0.23	6.4	6.4	9.2	8.5
Feb.	39.3	100.6	**2.00**	**2.33**	1.07	1.10	**0.93**	**1.23**	0.31	0.28	0.33	0.24	6.3	6.4	9.2	9.5
Mar.	43.2	144.4	**2.22**	**2.78**	1.00	1.09	**1.22**	**1.69**	0.25	0.27	0.26	0.26	6.4	6.4	9.5	9.8
Apr.	48.5	178.1	**2.09**	**3.23**	1.02	1.07	**1.07**	**2.16**	0.23	0.27	0.22	0.27	6.6	6.4	9.8	9.4
May	61.9	236.8	**2.28**	**2.77**	1.01	1.04	**1.27**	**1.73**	0.37	0.42	0.28	0.34	6.8	6.5	10.0	9.9
June	132.6	291.8	**3.74**	**2.60**	1.00	1.00	**2.74**	**1.60**	0.71	0.74	0.53	0.69	7.0	6.8	9.7	9.9
July	150.5	340.6	**3.70**	**2.61**	0.98	1.04	**2.72**	**1.57**	0.44	0.42	0.48	0.49	7.0	6.9	9.5	9.6
Aug.	141.7	323.9	**3.62**	**2.68**	0.99	1.05	**2.63**	**1.63**	0.33	0.27	0.44	0.35	7.1	7.0	9.1	9.3
Sept.	115.3	297.3	**3.79**	**3.02**	0.96	1.02	**2.83**	**2.00**	0.25	0.21	0.29	0.29	7.1	7.0	8.7	8.3
Oct.	109.8	281.4	**3.78**	**3.23**	0.98	1.03	**2.80**	**2.20**	0.29	0.25	0.42	0.30	6.9	7.0	9.3	9.6
Nov.	76.3	212.1	**3.60**	**3.54**	1.01	1.06	**2.59**	**2.48**	0.43	0.37	0.34	0.40	6.6	6.8	9.0	9.4
Dec.	66.3	177.1	**3.70**	**3.29**	0.98	1.03	**2.72**	**2.26**	0.4	0.35	0.41	0.43	6.7	6.7	9.1	9.8
Annual Total	1025.9	2744.2														
Average	85.5	228.7	3.05	2.92	1.02	1.06	2.03	1.85	0.36	0.34	0.36	0.36	6.74	6.69	9.34	9.41
Maximum	150.5	340.6	3.79	3.54	1.21	1.23	2.83	2.48	0.71	0.74	0.53	0.69	7.1	7.0	10.0	9.9
Minimum	39.3	100.6	2.00	2.33	0.96	1.00	0.84	1.23	0.23	0.21	0.22	0.23	6.3	6.4	8.7	8.3

GCSD Water Treatment Summary

DATE	COLOR FINISH WATER 2G	COLOR FINISH WATER BC	ODOR FINISH WATER 2G	ODOR FINISH WATER BC	CT RATIO 3.0 Log TANK #1 2G	CT RATIO 3.0 Log TANK #3 BC	DISTRIBUTION SAMPLES COLLECTED 2G	DISTRIBUTION SAMPLES COLLECTED BC	Department of Health Services % Reading < 0.5 NTU 2G	% Reading < 0.5 NTU BC	% Reading > 1.0 NTU 2G	% Reading > 1.0 NTU BC	% Reduction Turbidity 2G	% Reduction Turbidity BC	WATER QUALITY COMPLAINTS Taste/Odor 2G	Taste/Odor BC	Color 2G	Color BC	Turbidity 2G	Turbidity BC	Susp.Solid 2G	Susp.Solid BC	Other 2G	Other BC	THM Clearwells 2G	THM Clearwells BC	THM Elderberry Miners 2G	THM Elderberry Miners BC	ASBESTOS 2G	ASBESTOS BC
Jan. 1998	1	1	1	1	2.22	2.39	5	7	100	100	0	0	-3.2	-1.2	0	0	0	0	0	0	0	0	0	0			65.6	80.6	<0.2	
Feb.	1	1	1	1	1.80	2.40	5	7	96	100	0	0	0.0	2.4	2	0	0	1	0	0	0	0	0	0	36.8	44.0	69.3	88.1		
Mar.	1	1	1	1	2.62	1.43	5	7	79	100	0	0	-28.4	-7.5	0	0	0	0	0	3	0	0	1	0	40.4	41.1	34.5	80.5		
Apr.	1	1	1	1	1.87	1.77	6	9	90	100	0	0	-10.2	-2.8	0	0	1	0	0	0	0	0	0	0	48.4	48.5	84.8	86.9		
May	1	1	1	1	3.77	2.48	5	7	32	47	0	0	-12.7	5.1	0	0	1	0	0	0	0	0	1	2	51.8	60.5	52.5	59.6		
June	2	3	1	1	4.20	2.59	5	7	39	45	0	0	19.3	15.5	0	0	0	0	0	0	0	0	0	1	56.6	55.5	36.3	37.1		
July	2	3	1	1	7.90	3.78	7	8	0	0	0	0	14.3	-0.8	0	0	0	0	0	0	0	0	0	0	76.2	45.8	45.7	25.0	<0.2	
Aug.	2	2	1	1	15.10	4.50	5	7	0	2	0	0	-11.9	-15.9	0	0	0	0	0	0	0	0	0	0	18.1	10.0	26.3	20.0		
Sept.	1	2	1	1	10.48	4.21	7	9	44	98	0	0	-26.0	-19.7	0	0	0	0	0	0	0	0	0	1	67.3	42.1	123.1	118.7		
Oct.	1	2	1	1	9.51	3.72	5	7	55	100	0	0	-29.1	-23.0	0	0	0	0	0	0	0	0	0	0	72.0	55.0	136.0	117.0		
Nov.	1	1	1	1	14.09	5.44	5	7	53	100	0	0	-55.8	-27.3	0	0	0	0	0	0	0	0	0	0	58.2	43.2	119.2	101.0		
Dec.	1	1	1	1	11.22	5.73	6	9	89	100	0	0	-23.1	3.8	0	0	0	0	0	0	0	0	0	0	48.3	33.5	91.0	87.2		
Annual Total																														
Average	1.3	1.6	1.0	1.0	7.065	3.370	5.5	7.6	56	74	0	0	-13.9	-6.0	0.2	0.0	0.2	0.1	0.0	0.3	0.0	0.0	0.2	0.3	52.2	43.6	73.7	75.1		
Maximum	2	3	1	1	15.10	5.73	7	9	100	100			19.3	15.5	2		1	1		3			1	2	76.2	60.5	136.0	118.7		
Minimum	1	1	1	1	1.80	1.43	5	7																	18.1	10.0	26.3	20.0		

DATE	COLOR FINISH WATER 2G	COLOR FINISH WATER BC	ODOR FINISH WATER 2G	ODOR FINISH WATER BC	CT RATIO 3.0 Log Clearwell 2G	CT RATIO 3.0 Log Clearwell BC	DISTRIBUTION Samples Collected 2G	DISTRIBUTION Samples Collected BC	Department of Health Services % Reading < 0.5 NTU 2G	% Reading < 0.5 NTU BC	% Reading > 1.0 NTU 2G	% Reading > 1.0 NTU BC	% Reduction Turbidity 2G	% Reduction Turbidity BC	WATER QUALITY COMPLAINTS Taste/Odor 2G	Taste/Odor BC	Color 2G	Color BC	Turbidity 2G	Turbidity BC	Susp.Solid 2G	Susp.Solid BC	Other 2G	Other BC	THM Clearwells 2G	THM Clearwells BC	THM Elderberry Miners 2G	THM Elderberry Miners BC	ASBESTOS 2G	ASBESTOS BC
Jan. 1999	1	1	1	1	10.41	5.14	5	7	86	100	0	0	-24.86	6.29	0	0	0	0	0	0	0	0	1	0	82.0	56.9	159.4	182.3	<0.2	
Feb.	1	1	1	1	9.14	5.66	5	7	94	95	0	0	-7.63	-3.85	0	0	0	0	0	0	0	0	0	0	61.9	59.7	152.2	156.9		
Mar.	1	1	1	1	5.56	3.03	6	9	95	92	0	0	-63.38	-11.07	0	0	0	0	0	0	0	0	0	0	36.0	14.0	74.0	84.0		
Apr.	1	1	1	1	4.76	2.44	5	7	100	100	0	0	5.58	-2.50	0	0	0	0	3	0	0	0	0	0	61.0	49.0	94.0	86.0		
May	1	1	1	1	3.75	1.83	5	7	100	100	0	0	24.19	11.96	0	0	0	0	0	0	0	0	0	0	57.6	46.3	96.4	82.9		
June	1	1	1	1	2.63	1.84	7	8	37	3	0	0	25.13	13.64	0	1	0	0	0	0	0	0	0	0	ND	59.7	ND	161.0		
July	2	2	1	1	3.55	3.21	5	7	61	80	0	0	-9.68	-2.94	0	0	1	0	0	0	0	0	0	1	18.0	13.9	46.6	34.0	<0.2	
Aug.	2	2	1	1	4.71	3.71	5	7	100	99	0	0	1.41	-11.30	0	0	1	0	1	0	0	0	0	0	ND	ND	ND	ND		
Sept.	2	2	1	1	5.09	2.80	6	9	100	100	0	0	-13.53	-5.54	0	0	0	0	0	2	0	0	0	1	58.9	87.7	142.7	124.3		
Oct.	3	3	1	1	4.42	2.29	5	7	64	74	0	0	-9.18	-18.80	0	0	0	0	0	0	0	0	0	0	36.6	22.1	65.8	53.8		
Nov.	3	3	1	1	4.03	2.39	5	7	97	86	0	0	20.25	-3.43	0	0	0	0	0	0	0	0	0	0	22.0	25.2	26.7	5.2		
Dec.	2	2	1	1	5.71	3.93	6	9	82	76	0	0	-1.28	-28.56	0	0	0	0	0	0	0	0	0	0	17.8	14.2	38.0	24.4		
Annual Total																														
Average	1.7	1.7	1.0	1.0	5.313	3.189	5.4	7.6	85	84	0.0	0.0	-4.42	-4.68	0.0	0.1	0.2	0.0	0.3	0.2	0.0	0.0	0.1	0.2	45.2	40.8	89.6	90.4		
Maximum	3	3	1	1	10.41	5.66	7	9	100	100			25.13	13.64		1	1		3	2			1	1	82	88	159	182		
Minimum	1	1	1	1	2.63	1.83	5	7	37	3															18	14	27	5		

GCSD Water Treatment Summary

DATE	SECOND GARROTE PUMPAGE TOTAL PUMPAGE MG	SECOND GARROTE PUMPAGE TOTAL FLOW A.F.	SECOND GARROTE PUMPAGE TOTAL TIME HOURS	SECOND GARROTE PUMPAGE AVERAGE RATE GPM	BIG CREEK PUMPAGE TOTAL PUMPAGE MG	BIG CREEK PUMPAGE TOTAL FLOW A.F.	BIG CREEK PUMPAGE TOTAL TIME HOURS	BIG CREEK PUMPAGE AVERAGE RATE GPM	TOTAL PUMPAGE TOTAL PUMPAGE MG	TOTAL PUMPAGE TOTAL FLOW A.F.	RAW WATER TEMPERATURE C. 2G	RAW WATER TEMPERATURE C BC	LIME USAGE LBS / Month 2G	LIME USAGE LBS / Month BC	LIME USAGE mg / L / DAY 2G	LIME USAGE mg / L / DAY BC
Jan. 1996	2.369	7.272	77.9	506.7	6.527	20.035	95.0	1136.0	8.896	27.307	12	12	138	302	7.0	5.5
Feb.	2.226	6.833	69.6	532.8	6.242	19.160	82.2	1266.0	8.468	25.993	11	11	153	260	8.2	5.0
Mar.	2.415	7.413	75.7	532.6	7.130	21.886	95.2	1247.0	9.545	29.299	11	10	201	378	10.0	6.4
Apr.	3.214	9.865	99.5	538.7	6.933	21.281	91.2	1262.0	10.147	31.147	11	10	267	447	10.0	7.7
May	4.337	13.313	134.0	539.2	8.808	27.036	117.6	1248.0	13.145	40.349	11	10	342	426	9.5	5.8
June	4.731	14.522	148.4	531.5	10.851	33.308	144.8	1248.0	15.582	47.830	12	11	384	608	9.7	6.7
July	8.373	25.701	256.2	541.9	15.612	47.922	213.5	1220.0	23.985	73.623	13	12	603	898	8.6	6.9
Aug.	6.809	20.900	220.2	518.6	14.956	45.908	231.2	1078.0	21.765	66.808	13	12	471	910	8.3	7.3
Sept.	5.203	15.971	165.2	524.9	11.254	34.545	177.4	1055.0	16.457	50.515	13	12	336	745	7.7	7.9
Oct.	6.279	19.274	217.2	487.0	6.379	19.581	100.9	1054.0	12.658	38.854	13	12	474	415	9.1	7.8
Nov.	4.050	12.432	136.9	493.3	6.408	19.670	102.0	1044.0	10.458	32.101	13	13	276	456	8.2	8.5
Dec.	4.451	13.663	143.9	515.9	7.421	22.779	105.1	1069.0	11.872	36.442	12	12	405	376	10.9	6.1
Annual Total	54.5	167.2	1744.7		108.5	333.1	1556.1		163.0	500.3			4050	6221		
Average	4.538	13.930	145.4	521.9	9.043	27.759	129.7	1160.6	13.582	41.7	12.1	11.4	337.5	518.4	8.93	6.81
Maximum	8.373	25.701	256.2	541.9	15.612	47.922	231.2	1266.0	23.985	73.6	13	13	603	910	10.91	8.53
Minimum	2.226	6.833	69.6	487.0	6.242	19.160	82.2	1044.0	8.468	26.0	11	10	138	260	6.98	4.99

DATE	SECOND GARROTE PUMPAGE TOTAL PUMPAGE MG	SECOND GARROTE PUMPAGE TOTAL FLOW A.F.	SECOND GARROTE PUMPAGE TOTAL TIME HOURS	SECOND GARROTE PUMPAGE AVERAGE RATE GPM	BIG CREEK PUMPAGE TOTAL PUMPAGE MG	BIG CREEK PUMPAGE TOTAL FLOW A.F.	BIG CREEK PUMPAGE TOTAL TIME HOURS	BIG CREEK PUMPAGE AVERAGE RATE GPM	TOTAL PUMPAGE TOTAL PUMPAGE MG	TOTAL PUMPAGE TOTAL FLOW A.F.	RAW WATER TEMPERATURE C. 2G	RAW WATER TEMPERATURE C BC	LIME USAGE LBS / Month 2G	LIME USAGE LBS / Month BC	LIME USAGE mg / L / DAY 2G	LIME USAGE mg / L / DAY BC
Jan. 1997	12.149	37.292	392.4	516.0	2.852	8.754	64.5	737.0	15.001	46.046	8	8	189	381	1.9	16.0
Feb.	6.957	21.355	180.8	602.2					6.957	21.355	8		0			
Mar.	9.472	29.075	255.8	615.9					9.472	29.075	8		0			
Apr.	10.227	31.392	280.0	609.4					10.227	31.392	9		0	0		
May	10.125	31.079	267.5	731.8	6.583	20.207	70.0	1544.7	16.708	51.286	10	10	0	0		
June	3.530	10.835	98.7	596.9	13.444	41.267	149.5	1579.0	16.974	52.102	11	11	353	1055	12.0	9.4
July	5.902	18.116	172.2	568.4	15.427	47.354	166.6	1542.0	21.329	65.470	12	11	486	1060	9.9	8.2
Aug.	5.554	17.048	175.8	515.0	15.025	46.120	168.0	1501.9	20.579	63.168	12	12	381	805	8.2	6.4
Sept.	4.807	14.755	135.7	590.5	11.365	34.885	125.5	1523.0	16.172	49.641						
Oct.	4.378	13.438			8.319	25.535			12.697	38.974						
Nov.	4.511	13.847			5.976	18.344			10.487	32.190						
Dec.	3.058	9.387			6.311	19.372			9.369	28.758						
Annual Total	80.7	247.6	1958.9		85.3	261.8	744.1		166.0	509.5			1409	3301		
Average	6.723	20.635	217.7	594.0	9.478	29.093	124.0	1404.6	13.831	42.5	9.7	10.3	176.1	550.2	7.99	10.02
Maximum	12.149	37.292	392.4	731.8	15.427	47.354	168.0	1579.0	21.329	65.5	12	12	486	1060	11.99	16.02
Minimum	3.058	9.387	98.7	515.0	2.852	8.754	64.5	737.0	6.957	21.4	8	8			1.87	6.42

GCSD Water Treatment Summary

DATE	AVERAGE CHLORINE USAGE LBS / Month 2G	LBS / Month BC	DOSAGE mg / L 2G	DOSAGE mg / L BC	RESIDUAL mg / L 2G	RESIDUAL mg / L BC	DEMAND mg / L 2G	DEMAND mg / L BC	AVERAGE TURBIDITY RAW WATER 2G	RAW WATER BC	FINISH WATER 2G	FINISH WATER BC	AVERAGE pH RAW WATER 2G	RAW WATER BC	FINISH WATER 2G	FINISH WATER BC
Jan. 1996	43	124	2.30	2.34	1.37	1.16	0.93	1.18	0.33	0.32	0.32	0.34	6.2	6.2	8.9	9.1
Feb.	39	101	2.06	1.90	1.26	1.08	0.80	0.83	0.39	0.39	0.36	0.35	6.5	6.5	8.8	8.8
Mar.	49	151	2.48	2.47	1.37	1.28	1.11	1.19	0.31	0.31	0.30	0.27	6.5	6.5	8.8	9.0
Apr.	62	142	2.50	2.45	1.41	1.40	1.12	1.05	0.25	0.28	0.26	0.23	6.4	6.4	8.9	9.2
May	79	186	2.21	2.51	1.37	1.33	0.85	1.17	0.46	0.51	0.44	0.40	6.5	6.7	9.0	8.8
June	95	266	2.48	2.99	1.40	1.54	1.04	1.45	0.58	0.64	0.55	0.54	6.4	6.5	8.9	8.7
July	146	382	2.13	2.98	1.52	1.62	0.61	1.34	0.44	0.48	0.45	0.44	6.3	6.4	9.0	8.8
Aug.	129	340	2.26	2.71	1.42	1.70	0.84	1.01	0.35	0.36	0.36	0.35	6.3	6.3	8.9	8.8
Sept.	95	253	2.18	2.71	1.45	1.64	0.73	1.07	0.30	0.31	0.34	0.31	6.2	6.2	8.8	9.0
Oct.	124	140	2.25	2.59	1.34	1.41	0.91	1.18	0.27	0.30	0.29	0.30	6.3	6.2	9.0	9.0
Nov.	74	133	2.20	2.48	1.31	1.27	0.89	1.21	0.70	0.45	0.66	0.45	6.2	6.0	8.8	9.2
Dec.	114	198	3.21	3.29	2.16	2.14	1.05	1.15	0.36	0.38	0.36	0.37	5.8	5.8	8.8	8.0
Annual Total	1049	2416														
Average	87.4	201.3	2.36	2.62	1.45	1.46	0.91	1.15	0.40	0.39	0.39	0.36	6.30	6.31	8.88	8.87
Maximum	146	382	3.21	3.29	2.16	2.14	1.12	1.45	0.70	0.64	0.66	0.54	6.5	6.7	9.0	9.2
Minimum	39	101	2.06	1.90	1.26	1.08	0.61	0.83	0.25	0.28	0.26	0.23	5.8	5.8	8.8	8.0

DATE	AVERAGE CHLORINE USAGE LBS / Month 2G	LBS / Month BC	DOSAGE mg / L 2G	DOSAGE mg / L BC	FINISH RESIDUAL mg / L 2G	FINISH RESIDUAL mg / L BC	DEMAND mg / L 2G	DEMAND mg / L BC	AVERAGE TURBIDITY RAW WATER 2G	RAW WATER BC	FINISH WATER 2G	FINISH WATER BC	AVERAGE pH RAW WATER 2G	RAW WATER BC	FINISH WATER 2G	FINISH WATER BC
Jan. 1997	553	97	5.46	4.08	2.78	2.90	2.68	1.18	2.5	0.42	2.00	0.34	6.2	5.9	6.9	9.3
Feb.	345		5.95		2.58		3.37		1.44		1.50		6.3		6.5	
Mar.	467		5.91		1.54		4.37		0.79		0.89		6.5		6.7	
Apr.	504		5.91		1.56		4.35		0.4		0.41		6.6		6.7	
May	658	162	7.79	2.94	1.46	1.65	6.33	1.29	0.63	0.84	0.55	0.73	6.4	6.0	6.8	6.3
June	247	682	8.37	6.09	1.63	1.23	6.74	4.86	0.78	0.99	0.88	0.96	6.1	5.7	9.3	8.7
July	137	382	2.79	2.97	1.18	1.23	1.61	1.74	0.6	0.61	0.61	0.59	6.1	5.8	9.0	9.1
Aug.	162	394	3.50	3.15	1.24	1.27	2.26	1.88	0.33	0.35	0.40	0.36	6.0	5.7	8.9	9.0
Sept.							#VALUE!	#VALUE!								
Oct.							#VALUE!	#VALUE!								
Nov.							#VALUE!	#VALUE!								
Dec.							#VALUE!	#VALUE!								
Annual Total	3074	1717														
Average	384.2	343.5	5.71	3.84	1.75	1.66			0.93	0.64	0.91	0.60	6.28	5.82	7.60	8.48
Maximum	658	682	8.37	6.09	2.78	2.90	#VALUE!	#VALUE!	2.50	0.99	2.00	0.96	6.6	6.0	9.3	9.3
Minimum	137	97	2.79	2.94	1.18	1.23	#VALUE!	#VALUE!	0.33	0.35	0.40	0.34	6.0	5.7	6.5	6.3

GCSD Water Treatment Summary

DATE	COLOR FINISH WATER 2G	COLOR FINISH WATER BC	ODOR FINISH WATER 2G	ODOR FINISH WATER BC	CT RATIO 3.0 Log TANK #1 2G	CT RATIO 3.0 Log TANK #3 BC	DISTRIBUTION SAMPLES COLLE(2G	DISTRIBUTION SAMPLES COLLE(BC	% Reading < 0.5 NTU 2G	% Reading < 0.5 NTU BC	% Readin > 1.0 NTU 2G	% Readin > 1.0 NTU BC	% Reduction Turbidity 2G	% Reduction Turbidity BC	WATER QUALITY COMPLAINTS Taste/Odor 2G	Taste/Odor BC	Color 2G	Color BC	Turbidity 2G	Turbidity BC	Susp.Solid 2G	Susp.Solid BC	Other 2G	Other BC	THM 2G	THM BC	ASBESTOS 2G	ASBESTOS BC
Jan. 1996	3	2	1	1	0.36	0.91	7	8	100	93	0	0	-6.25	-6.25				1					1	1			5.1	
Feb.	4	4	1	1	0.31	0.78	5	7	100	100	0	0	10	10				1							64	77		
Mar.	4	4	1	1	0.32	0.80	5	7	100	100	0	0	14.8	14.8				1						1				
Apr.	3	4	1	1	0.32	0.81	5	7	100	100	0	0	17.8	17.8		2												
May	4	4	1	1	0.31	0.90	7	8	63	69	0	0	22	22	1			2										
June	3	3	1	1	0.35	1.13	5	7	22	29	0	0	16	16			1	2							78	73		
July	3	3	1	1	0.36	1.26	7	8	72	84	0	0	8	8		1				1		1						
Aug.	3	3	1	1	0.39	1.53	4	8	96	94	0	0	-2.8	2.8				1										
Sept.	3	3	1	1	0.41	1.41	6	6	100	98	0	0	0	0			1											
Oct.	3	3	1	1	0.37	1.24	7	8	100	100	0	0	0	0														
Nov.	3	3	1	1	0.40	1.10	13	17	60	69	0	0	0	0				1							59.25	63.8		
Dec.	4	3	1	1	0.57	2.25	9	12	100	100	0	0	0	2.6		2												
Annual Total																												
Average	3.3	3.3	1.0	1.0	0.373	1.177	6.7	8.6	84.4	86.3	0.0	0.0	6.6	7.3	1.0	1.7	1.0	1.3		1.0		1.0	1.0	1.0	67.1	71.3	5.1	
Maximum	4	4	1	1	0.57	2.25	13	17	100	100	0	0	22	22	1	2	1	2		1		1	1	1	78	77	5	
Minimum	3	2	1	1	0.31	0.78	4	6	22	29					1	1	1	1		1		1	1	1	59	64	5	

Department of Health Services

DATE	COLOR FINISH WATER 2G	COLOR FINISH WATER BC	ODOR FINISH WATER 2G	ODOR FINISH WATER BC	CT RATIO 3.0 Log TANK #1 2G	CT RATIO 3.0 Log TANK #3 BC	DISTRIBUTION SAMPLES COLLE(2G	DISTRIBUTION SAMPLES COLLE(BC	% Reading < 0.5 NTU 2G	% Reading < 0.5 NTU BC	% Readin > 1.0 NTU 2G	% Readin > 1.0 NTU BC	% Reduction Turbidity 2G	% Reduction Turbidity BC	WATER QUALITY COMPLAINTS Taste/Odor 2G	Taste/Odor BC	Color 2G	Color BC	Turbidity 2G	Turbidity BC	Susp.Solid 2G	Susp.Solid BC	Other 2G	Other BC	THM 2G	THM BC	ASBESTOS 2G	ASBESTOS BC
Jan. 1997	3	2	1	1	22.14	2.74	7	8	12	18	1	0	20	19	0	1	0	1	0	0	0	0	0	0				
Feb.	2		1		21.14		5	7	0		1		0		1	0	0	0	0	0	0	0	0	0				
Mar.	2		1		5.15		5	7	0		1		-13		1	0	0	0	0	0	0	0	0	0				
Apr.	2		1		7.07		7	8	96		0		-0.02		0	0	0	0	0	0	0	0	0	0				
May	2	1	1	1	7.48	6.47	5	7	72	0	2	1	0.116	0.13	0	0	0	0	0	0	0	0	0	0				
June	2	2	1	1	4.12	1.65	5	7	0	0	1	13	-0.1	0	0	0	0	0	0	0	0	0	0	2				
July	1	2	1	1	3.33	1.94	7	8	0	0.1	0	0	-0.01	0.034	0	1	0	0	0	0	0	0	0	0				
Aug.	2	2	1	1	1.47	2.02	5	7	94	95	0	0	-0.22	-0.04	0	1	0	2	0	0	0	0	0	0				
Sept.																												
Oct.																												
Nov.																												
Dec.																												
Annual Total																												
Average	2.0	1.8	1.0	1.0	8.988	2.964	5.8	7.4	34.3	22.6	0.8	2.8	0.8	3.8	0.3	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.3				
Maximum	3	2	1	1	22.14	6.47	7	8	96	95	2	13	20	19	1	1		2						2				
Minimum	1	1	1	1	1.47	1.65	5	7																				

GCSD Water Treatment Summary

DATE	SECOND GARROTE PUMPAGE				BIG CREEK PUMPAGE				TOTAL PUMPAGE		RAW WATER TEMPERATURE		LIME USAGE			
	TOTAL PUMPAGE MG	TOTAL FLOW A.F.	TOTAL TIME HOURS	AVERAGE RATE GPM	TOTAL PUMPAGE MG	TOTAL FLOW A.F.	TOTAL TIME HOURS	AVERAGE RATE GPM	TOTAL PUMPAGE MG	TOTAL FLOW A.F.	C. 2G	C BC	LBS / Month 2G	LBS / Month BC	mg / L / DAY 2G	mg / L / DAY BC
Jan. 1994	2.185	6.707	70.1	519.0	5.002	15.354	83.6	1226.0	7.187	22.061	11	11	93	190	5.1	4.6
Feb.	4.041	12.404	126.8	531.3	2.928	8.988	52.2	1176.0	6.969	21.392	10	10	164	69	4.9	2.8
Mar.	6.031	18.512	208.0	491.6	1.797	5.516	28.2	1085.0	7.828	24.028	10	10	236	56	4.7	3.7
Apr.	3.482	10.688	106.3	546.9	6.797	20.864	80.3	1409.0	10.279	31.552	10	10	133	202	4.6	3.6
May	3.039	9.328	93.5	541.3	8.176	25.097	97.6	1409.0	11.215	34.425	11	11	158	317	6.2	4.6
June	4.481	13.755	149.0	507.0	10.358	31.794	127.7	1356.0	14.839	45.549	12	11	288	496	7.7	5.7
July	4.779	14.669	164.9	486.6	14.521	44.573	178.8	1352.0	19.300	59.242	14	12	364	674	9.1	5.6
Aug.	6.612	20.296	206.2	533.4	12.373	37.979	158.3	1306.0	18.985	58.275	13	12	418	670	7.6	6.5
Sept.	5.247	16.106	167.1	520.4	9.630	29.560	124.2	1291.0	14.877	45.666	13	12	336	536	7.7	6.7
Oct.	2.870	8.810	77.3	532.3	8.075	24.787	86.0	1319.0	10.945	33.596	12	12	180	419	7.5	6.2
Nov.	2.461	7.554	90.3	529.1	6.770	20.781	101.2	1323.0	9.231	28.335	12	12	203	455	9.9	8.1
Dec.	2.162	6.636	75.2	476.1	6.077	18.654	74.2	1362.0	8.239	25.290	11	10	179	475	9.9	9.4
Annual Total	47.4	145.5	1534.7		92.5	283.9	1192.3		139.9	429.4			2752	4559		
Average	3.949	12.122	127.9	517.9	7.709	23.662	99.4	1301.2	11.658	35.8	11.6	11.1	229.3	379.9	7.08	5.62
Maximum	6.612	20.296	208.0	546.9	14.521	44.573	178.8	1409.0	19.300	59.2	14	12	418	674	9.93	9.37
Minimum	2.162	6.636	70.1	476.1	1.797	5.516	28.2	1085.0	6.969	21.4	10	10	93	56	4.58	2.83

DATE	SECOND GARROTE PUMPAGE				BIG CREEK PUMPAGE				TOTAL PUMPAGE		RAW WATER TEMPERATURE		LIME USAGE			
	TOTAL PUMPAGE MG	TOTAL FLOW A.F.	TOTAL TIME HOURS	AVERAGE RATE GPM	TOTAL PUMPAGE MG	TOTAL FLOW A.F.	TOTAL TIME HOURS	AVERAGE RATE GPM	TOTAL PUMPAGE MG	TOTAL FLOW A.F.	C. 2G	C BC	LBS / Month 2G	LBS / Month BC	mg / L / DAY 2G	mg / L / DAY BC
Jan. 1995	2.180	6.692	67.4	539.9	5.686	17.453	68.5	1387.0	7.866	24.145	9	9	175	445	9.6	9.4
Feb.	2.137	6.560	62.1	536.3	5.446	16.717	66.4	1364.0	7.583	23.276	9	8	210	435	11.8	9.6
Mar.	3.311	10.163	103.0	537.3	4.908	15.065	61.9	1322.0	8.219	25.229	9	8	404	415	14.6	10.1
Apr.	4.712	14.464	145.3	540.6	4.433	13.607	53.7	1378.0	9.145	28.071	10	9	591	346	15.0	9.4
May	4.029	12.367	122.6	549.6	7.212	22.138	85.9	1403.0	11.241	34.505	11	10	307	363	9.1	6.0
June	4.534	13.917	140.7	539.2	9.554	29.326	112.1	1424.0	14.088	43.244	11	10	365	471	9.7	5.9
July	4.770	14.642	150.1	530.3	13.708	42.077	163.9	1391.0	18.478	56.719	12	10	330	786	8.3	6.9
Aug.	5.566	17.085	175.6	527.3	13.109	40.239	164.7	1326.0	18.675	57.324	13	12	372	676	8.0	6.2
Sept.	10.926	33.538	354.2	511.7	5.558	17.060	75.6	1219.0	16.484	50.598	13	12	636	311	7.0	6.7
Oct.	4.361	13.386	138.4	529.8	9.014	27.669	140.0	1073.0	13.375	41.055	13	12	252	569	6.9	7.6
Nov.	3.241	9.948	105.2	513.0	7.833	24.044	124.1	1051.0	11.074	33.992	13	13	195	424	7.2	6.5
Dec.	2.661	8.168	87.7	504.6	6.177	18.961	94.4	1085.0	8.838	27.129	13	13	189	327	8.5	6.3
Annual Total	52.4	160.9	1652.3		92.6	284.4	1211.2		145.1	445.3			4026	5568		
Average	4.369	13.411	137.7	530.0	7.720	23.696	100.9	1285.3	12.089	37.1	11.3	10.5	335.5	464.0	9.65	7.55
Maximum	10.926	33.538	354.2	549.6	13.708	42.077	164.7	1424.0	18.675	57.3	13	13	636	786	15.04	10.14
Minimum	2.137	6.560	62.1	504.6	4.433	13.607	53.7	1051.0	7.583	23.3	9	8	175	311	6.93	5.91

GCSD Water Treatment Summary

DATE	AVERAGE CHLORINE USAGE LBS / Month		DOSAGE mg / L		RESIDUAL mg / L		DEMAND mg / L		AVERAGE TURBIDITY RAW WATER		FINISH WATER		AVERAGE pH RAW WATER		FINISH WATER	
	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC
Jan. 1994	33	109	1.81	2.61	1.15	1.34	0.66	1.27	0.29	0.29	0.19	0.22	5.9	6.0	8.4	8.8
Feb.	56	58	1.66	2.38	1.23	1.07	0.43	1.31	0.29	0.31	0.23	0.22	6.0	6.1	8.1	8.6
Mar.	87	29	1.73	1.94	1.01	1.02	0.72	0.92	0.2	0.27	0.19	0.23	5.6	5.8	8.0	8.2
Apr.	55	104	1.89	1.83	1.08	0.85	0.81	0.98	0.17	0.15	0.20	0.16	6.0	6.2	8.5	8.4
May	40	126	1.58	1.85	0.92	0.94	0.66	0.91	0.2	0.23	0.18	0.21	5.9	6.0	9.0	8.8
<u>June</u>	71	167	1.90	1.93	1.08	1.01	0.82	0.92	0.21	0.26	0.22	0.20	5.6	5.8	9.3	9.2
July	80	204	2.01	1.68	1.01	1.06	1.00	0.62	0.22	0.24	0.22	0.21	5.5	5.7	9.4	9.1
Aug.	100	221	1.81	2.14	1.02	1.15	0.79	0.99	0.3	0.37	0.29	0.33	5.7	5.8	9.3	9.2
Sept.	80	166	1.83	2.07	1.15	1.17	0.68	0.90	0.43	0.51	0.42	0.46	5.6	5.7	9.2	9.3
Oct.	48	113	2.01	1.68	1.10	1.08	0.91	0.60	0.42	0.44	0.40	0.40	5.6	5.7	8.9	9.0
Nov.	44	123	2.14	2.18	1.18	1.28	0.96	0.90	0.39	0.42	0.39	0.37	5.8	5.9	9.4	9.3
Dec.	43	108	2.38	2.13	1.26	1.30	1.12	0.83	0.24	0.31	0.25	0.24	5.7	5.8	9.5	9.7
Annual Total	737	1528														
Average	61.4	127.3	1.90	2.03	1.10	1.11	0.80	0.93	0.28	0.32	0.27	0.27	5.74	5.88	8.92	8.97
Maximum	100	221	2.38	2.61	1.26	1.34	1.12	1.31	0.43	0.51	0.42	0.46	6.0	6.2	9.5	9.7
Minimum	33	29	1.58	1.68	0.92	0.85	0.43	0.60	0.17	0.15	0.18	0.16	5.5	5.7	8.0	8.2

DATE	AVERAGE CHLORINE USAGE LBS / Month		DOSAGE mg / L		RESIDUAL mg / L		DEMAND mg / L		AVERAGE TURBIDITY RAW WATER		FINISH WATER		AVERAGE pH RAW WATER		FINISH WATER	
	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC
Jan. 1995	33	96	1.82	2.02	1.06	1.20	0.76	0.82	0.28	0.32	0.28	0.27	5.3	5.4	9.2	9.6
Feb.	29	97	1.63	2.14	1.02	1.11	0.61	1.03	0.29	0.32	0.37	0.31	5.5	5.6	9.3	9.6
Mar.	63	99	2.28	2.42	1.13	1.00	1.15	1.42	0.42	0.42	0.47	0.41	5.7	5.8	9.2	9.6
Apr.	92	95	2.34	2.57	1.14	1.13	1.20	1.44	0.35	0.38	0.42	0.33	5.9	6.0	9.2	9.4
May	70	142	2.08	2.36	1.10	1.05	0.98	1.31	0.42	0.45	0.42	0.41	6.1	6.1	8.2	8.5
<u>June</u>	96	234	2.54	2.94	1.33	1.24	1.21	1.70	1.02	1.05	0.89	0.95	5.9	6.0	8.6	8.4
July	102	302	2.56	2.64	1.33	1.44	1.23	1.20	1.05	1.05	0.93	0.99	6.1	6.1	8.6	8.6
Aug.	118	257	2.54	2.35	1.33	1.42	1.21	0.93	0.72	0.79	0.70	0.78	6.0	6.1	8.5	8.5
Sept.	197	134	2.16	2.89	1.31	1.60	0.85	1.29	0.48	0.65	0.48	0.60	6.4	6.4	8.6	8.9
Oct.	74	226	2.03	3.01	1.29	1.46	0.74	1.55	0.39	0.35	0.43	0.36	6.2	6.2	8.6	8.8
Nov.	56	170	2.07	2.60	1.30	1.37	0.77	1.23	0.35	0.33	0.37	0.34	6.2	6.2	8.5	8.5
Dec.	46	128	2.07	2.48	1.32	1.27	0.75	1.21	0.38	0.38	0.38	0.38	5.9	6.0	8.7	8.6
Annual Total	976	1980														
Average	81.3	165.0	2.18	2.54	1.22	1.27	0.96	1.26	0.51	0.54	0.51	0.51	5.93	5.99	8.77	8.92
Maximum	197	302	2.56	3.01	1.33	1.60	1.23	1.70	1.05	1.05	0.93	0.99	6.4	6.4	9.3	9.6
Minimum	29	95	1.63	2.02	1.02	1.00	0.61	0.82	0.28	0.32	0.28	0.27	5.3	5.4	8.2	8.4

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GCSD Water Treatment Summary

DATE	COLOR FINISH WATER 2G	COLOR FINISH WATER BC	ODOR FINISH WATER 2G	ODOR FINISH WATER BC	CT RATIO 3.0 Log TANK #1 2G	CT RATIO 3.0 Log TANK #3 BC	DISTRIBUTION SAMPLES COLLE(2G	DISTRIBUTION SAMPLES COLLE(BC	% Reading < 0.5 NTU 2G	% Reading < 0.5 NTU BC	% Readin > 1.0 NTU 2G	% Readin > 1.0 NTU BC	% Reduction Turbidity 2G	% Reduction Turbidity BC	Department of Health Services WATER QUALITY COMPLAINTS Taste/Odor 2G	Taste/Odor BC	Color 2G	Color BC	Turbidity 2G	Turbidity BC	Susp.Solid 2G	Susp.Solid BC	Other 2G	Other BC	THM 2G	THM BC	ASBESTOS 2G	ASBESTOS BC
Jan. 1994	2	2	1	1																								
Feb.	3	2	1	1																								
Mar.	3	3	1	1																								
Apr.	3	2	1	1	0.23	0.49	6	6	100	100	0	0	11.8	25														
May	3	3	1	1	0.21	0.57	4	8	100	100	0	0	22	26	1	2		2		7		2		2				
<u>June</u>	4	4	1	1	0.27	0.63	7	8	100	100	0	0	-4.8	23		1		2					1	3				
July	4	4	1	1	0.29	0.71	4	8	100	100	0	0	0	13										2				
Aug.	4	4	1	1	0.27	0.79	7	9	100	98	0	0	3.3	11				3					2	4				
Sept.	4	4	1	1	0.30	0.81	5	7	86	65	0	0	2	10	2				1	5								
Oct.	4	4	1	1	0.29	0.74	6	7	81	84	0	0	5	9				1										
Nov.	5	4	1	1	0.30	0.86	6	9	97	100	0	0	0	12				2										
Dec.	4	4	1	1	0.31	0.78	6	6	100	100	0	0	4	23														
Annual Total															3	3	0	10	1	12	0	2	3	11	0	0	0	0
Average	3.6	3.3	1.0	1.0	0.274	0.709	5.7	7.6	96.0	94.1	0.0	0.0	4.8	16.9	1.5	1.5		2.0	1.0	6.0		2.0	1.5	2.8				
Maximum	5	4	1	1	0.31	0.86	7	9	100	100			22	26	2	2		3	1	7		2	2	4				
Minimum	2	2	1	1	0.21	0.49	4	6	81	65				9	1	1		1	1	5		2	1	2				

DATE	COLOR FINISH WATER 2G	COLOR FINISH WATER BC	ODOR FINISH WATER 2G	ODOR FINISH WATER BC	CT RATIO 3.0 Log TANK #1 2G	CT RATIO 3.0 Log TANK #3 BC	DISTRIBUTION SAMPLES COLLE(2G	DISTRIBUTION SAMPLES COLLE(BC	% Reading < 0.5 NTU 2G	% Reading < 0.5 NTU BC	% Readin > 1.0 NTU 2G	% Readin > 1.0 NTU BC	% Reduction Turbidity 2G	% Reduction Turbidity BC	Department of Health Services WATER QUALITY COMPLAINTS Taste/Odor 2G	Taste/Odor BC	Color 2G	Color BC	Turbidity 2G	Turbidity BC	Susp.Solid 2G	Susp.Solid BC	Other 2G	Other BC	THM 2G	THM BC	ASBESTOS 2G	ASBESTOS BC
Jan. 1995	5	5	1	1	0.20	0.62	4	8	96	100	0	0	0	16														
Feb.	7	6	1	1	0.20	0.56	5	7	100	100	0	0	0	3														
Mar.	8	7	1	1	0.21	0.56	6	9	66	80	0	0	0	2				1										
Apr.	7	7	1	1	0.22	0.60	6	6	79	100	0	0	0	13				1					1					
May	5	5	1	1	0.24	0.59	6	9	91	96	0	0	0	9														
<u>June</u>	5	4	1	1	0.32	0.77	6	6	17	3	21	53	13	10		1		6						1				
July	4	4	1	1	0.32	0.93	5	7	0	0	40	35	11	6				1										
Aug.	3	3	1	1	0.32	0.96	7	8	14.5	2	2	4	3	1		2												
Sept.	3	3	1	1	0.33	1.07	4	8	79	43	0	1	0	.8		2		1					1					
Oct.	3	2	1	1	0.31	1.17	5	7	85	94	0	0	-10	-3				1					1					
Nov.	3	2	1	1	0.43	1.47	6	9	100	97	0	0	0	0														
Dec.	4	3	1	1	0.41	1.32	5	7	100	100	0	0	0	0										2				
Annual Total																												
Average	4.8	4.3	1.0	1.0	0.293	0.885	5.4	7.6	69.0	67.9	5.3	7.8	1.4	5.4		1.7		1.8					1.0	1.5				
Maximum	8	7	1	1	0.43	1.47	7	9	100	100	40	53	13	16		2		6					1	2				
Minimum	3	2	1	1	0.20	0.56	4	6								1		1					1	1				

GCSD Water Treatment Summary

DATE	SECOND GARROTE PUMPAGE TOTAL PUMPAGE MG	SECOND GARROTE PUMPAGE TOTAL FLOW A.F.	SECOND GARROTE PUMPAGE TOTAL TIME HOURS	SECOND GARROTE PUMPAGE AVERAGE RATE GPM	BIG CREEK PUMPAGE TOTAL PUMPAGE MG	BIG CREEK PUMPAGE TOTAL FLOW A.F.	BIG CREEK PUMPAGE TOTAL TIME HOURS	BIG CREEK PUMPAGE AVERAGE RATE GPM	TOTAL PUMPAGE TOTAL PUMPAGE MG	TOTAL PUMPAGE TOTAL FLOW A.F.	RAW WATER TEMPERATURE C. 2G	RAW WATER TEMPERATURE C BC	LIME USAGE LBS / Month 2G	LIME USAGE LBS / Month BC	LIME USAGE mg / L / DAY 2G	LIME USAGE mg / L / DAY BC
Jan. 1990	1.922	5.900	61.5	518.0	5.875	18.034	76.1	1299.0	7.797	23.933			255	195	15.9	4.0
Feb.	2.097	6.437	59.6	587.0	5.426	16.655	63.7	1423.0	7.523	23.092			260	270	14.9	6.0
Mar.	2.585	7.935	73.0	590.0	5.875	18.034	72.1	1367.0	8.460	25.968			345	380	16.0	7.8
Apr.	3.354	10.295	95.3	590.0	8.231	25.265	90.4	1528.0	11.585	35.561			371	500	13.3	7.3
May	7.546	23.163	220.3	572.0	4.165	12.785	55.6	1286.0	11.711	35.947			880	280	14.0	8.1
June	2.816	8.644	81.9	574.0	8.435	25.892	100.6	1402.0	11.251	34.535			358	358	15.2	5.1
July	3.683	11.305	110.0	559.0	11.316	34.735	148.5	1259.0	14.999	46.040			522	865	17.0	9.2
Aug.	3.492	10.719	104.3	550.0	10.103	31.012	139.5	1304.0	13.595	41.730			493	575	16.9	6.8
Sept.	2.577	7.910	82.9	519.0	9.120	27.994	122.3	1244.0	11.697	35.904			371	465	17.3	6.1
Oct.	1.158	3.555	33.2	625.0	8.591	26.370	121.3	1184.0	9.749	29.925			143	470	14.8	6.6
Nov.	7.238	22.217	190.6	631.0	0.739	2.268	14.0	958.0	7.977	24.486			1015	30	16.8	4.9
Dec.	7.633	23.430	199.8	632.0	5.947	18.255	85.6	1145.0	13.580	41.684			785	390	12.3	7.9
Annual Total	46.1	141.5	1312.4		83.8	257.3	1089.7		129.9	398.8			5798	4778		
Average	3.842	11.792	109.4	578.9	6.985	21.441	90.8	1283.3	10.827	33.2			483.2	398.2	15.37	6.63
Maximum	7.633	23.430	220.3	632.0	11.316	34.735	148.5	1528.0	14.999	46.0			1015	865	17.26	9.17
Minimum	1.158	3.555	33.2	518.0	0.739	2.268	14.0	958.0	7.523	23.1			143	30	12.33	3.98
Jan. 1991	3.450	10.590	92.1	622.0	4.002	12.284	56.9	1181.0	7.452	22.874			510	240	17.7	7.2
Feb.	4.046	12.419	116.2	591.0	1.894	5.814	28.3	1137.0	5.940	18.233			790	165	23.4	10.4
Mar.	1.814	5.568	51.8	584.0	3.763	11.551	54.3	1153.0	5.577	17.119			285	290	18.8	9.2
Apr.	1.658	5.089	58.0	476.0	4.217	12.944	56.4	1248.0	5.875	18.034			370	270	26.8	7.7
May	2.283	7.008	63.7	605.0	6.521	20.016	80.7	1348.0	8.804	27.024		10	245	435	12.9	8.0
June	0.554	1.701	21.2	435.0	10.265	31.509	128.3	1334.0	10.819	33.209	10	10	97	640	21.0	7.6
July	3.131	9.611	80.9	644.0	9.513	29.201	125.7	1258.0	12.644	38.811	11	11	379	755	14.5	9.5
Aug.	3.078	9.448	81.9	629.0	8.634	26.502	122.9	1178.0	11.712	35.950	12	12	348	745	13.6	10.3
Sept.	2.320	7.121	71.1	556.0	7.904	24.262	108.1	1225.0	10.224	31.383	12	11	290	635	15.0	9.6
Oct.	2.257	6.928	62.4	643.0	6.512	19.989	89.4	1342.0	8.769	26.917	13	12	301	525	16.0	9.7
Nov.	1.862	5.715	56.9	548.0	5.382	16.520	73.8	1219.0	7.244	22.236	12	12	265	450	17.1	10.0
Dec.	1.780	5.464	50.2	594.0	5.033	15.449	68.2	1230.0	6.813	20.913	12	12	250	405	16.8	9.6
Annual Total	28.2	86.7	806.4		73.6	226.0	993.0		101.9	312.7			4130	5555		
Average	2.353	7.222	67.2	577.3	6.137	18.837	82.8	1237.8	8.489	26.1	11.7	11.3	344.2	462.9	17.80	9.07
Maximum	4.046	12.419	116.2	644.0	10.265	31.509	128.3	1348.0	12.644	38.8	13	12	790	755	26.76	10.45
Minimum	0.554	1.701	21.2	435.0	1.894	5.814	28.3	1137.0	5.577	17.1	10	10	97	165	12.87	7.19

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GCSD Water Treatment Summary

DATE	AVERAGE CHLORINE USAGE								AVERAGE TURBIDITY				AVERAGE pH			
	LBS / Month		DOSAGE mg / L		RESIDUAL mg / L		DEMAND mg / L		RAW WATER		FINISH WATER		RAW WATER		FINISH WATER	
	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC
Jan. 1990	24	62	1.50	1.27	1.12	0.92	0.38	0.35	0.26	0.24	0.50	0.23	5.9	5.9	9.0	8.3
Feb.	34	48	1.94	1.06	1.49	1.21	0.45	-0.15	0.38	0.29	0.63	0.38	5.5	5.3	8.9	8.4
Mar.	39	68	1.81	1.39	1.45	1.01	0.36	0.38	0.35	0.33	0.55	0.33	6.4	6.4	9.7	9.5
Apr.	35	55	1.25	0.80	1.07	0.80	0.18	0.00	0.32	0.25	0.48	0.31	6.4	6.5	9.5	9.4
May	85	43	1.35	1.24	1.14	0.90	0.21	0.34	0.29	0.26	0.39	0.25	6.2	6.1	9.9	9.4
June	32	75	1.36	1.07	1.08	0.85	0.28	0.22	0.31	0.27	0.39	0.34	6.2	6.2	10.0	9.5
July	44	135	1.43	1.43	1.02	0.84	0.41	0.59	0.27	0.23	0.34	0.25	6.8	6.8	9.9	9.6
Aug.	43	125	1.48	1.48	1.03	0.89	0.45	0.59	0.27	0.27	0.34	0.25	6.9	6.9	10.0	8.7
Sept.	40	106	1.86	1.39	1.05	0.92	0.81	0.47	0.22	0.25	0.36	0.25	7.0	6.9	10.1	8.7
Oct.	11	99	1.14	1.38	0.95	0.78	0.19	0.60	0.52	0.36	0.57	0.36	6.9	6.9	9.3	8.7
Nov.	85	10	1.41	1.62	1.44	0.68	-0.03	0.94	0.54	0.45	0.69	0.40	7.0	6.8	9.0	8.7
Dec.	84	73	1.32	1.47	1.05	1.00	0.27	0.47	0.4	0.36	0.44	0.39	6.9	7.0	10.0	9.3
Annual Total	556	899														
Average	46.3	74.9	1.49	1.30	1.16	0.90	0.33	0.40	0.34	0.30	0.47	0.31	6.51	6.48	9.61	9.02
Maximum	85	135	1.94	1.62	1.49	1.21	0.81	0.94	0.54	0.45	0.69	0.40	7.0	7.0	10.1	9.6
Minimum	11	10	1.14	0.80	0.95	0.68	-0.03	-0.15	0.22	0.23	0.34	0.23	5.5	5.3	8.9	8.3

DATE	AVERAGE CHLORINE USAGE								AVERAGE TURBIDITY				AVERAGE pH			
	LBS / Month		DOSAGE mg / L		RESIDUAL mg / L		DEMAND mg / L		RAW WATER		FINISH WATER		RAW WATER		FINISH WATER	
	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC
Jan. 1991	35	50	1.22	1.50	1.06	1.10	0.16	0.40	0.57	0.52	0.63	0.50	7.0	7.0	10.2	8.7
Feb.	51	26	1.51	1.65	1.10	0.87	0.41	0.78	0.61	0.75	0.68	0.69	7.0	7.0	10.3	10.0
Mar.	28	75	1.85	2.39	1.06	0.93	0.79	1.46	2.15	1.87	1.68	1.49	6.8	6.8	9.3	9.4
Apr.	31	76	2.24	2.16	1.44	1.02	0.80	1.14	0.96	0.88	1.03	0.92	6.9	7.0	10.2	9.1
May	34	120	1.79	2.21	1.06	1.21	0.73	1.00	0.56	0.56	0.72	0.57	6.9	6.7	9.2	9.4
June	11	204	2.38	2.38	1.40	1.27	0.98	1.11	0.56	0.48	0.75	0.49	6.8	6.8	10.1	9.0
July	49	168	1.88	2.12	1.16	1.27	0.72	0.85	0.42	0.42	0.58	0.45	6.8	6.8	9.8	9.7
Aug.	55	205	2.14	2.85	1.44	1.42	0.70	1.43	0.41	0.4	0.52	0.41	6.7	6.7	9.8	9.8
Sept.	49	159	2.53	2.41	1.42	1.51	1.11	0.90	0.45	0.38	0.59	0.40	6.8	6.8	9.7	9.8
Oct.	40	124	2.13	2.28	1.51	1.44	0.62	0.84	0.37	0.36	0.49	0.42	6.9	6.9	9.8	9.8
Nov.	27	120	1.74	2.67	1.54	1.61	0.20	1.06	0.4	0.35	0.67	0.40	6.8	6.8	9.8	9.8
Dec.	31	88	2.09	2.10	1.58	1.62	0.51	0.48	0.44	0.47	0.53	0.41	6.8	6.8	9.6	9.4
Annual Total	441	1415														
Average	36.8	117.9	1.96	2.23	1.31	1.27	0.64	0.95	0.66	0.62	0.74	0.60	6.85	6.84	9.82	9.49
Maximum	55	205	2.53	2.85	1.58	1.62	1.11	1.46	2.15	1.87	1.68	1.49	7.0	7.0	10.3	10.0
Minimum	11	26	1.22	1.50	1.06	0.87	0.16	0.40	0.37	0.35	0.49	0.40	6.7	6.7	9.2	8.7

GCSD Water Treatment Summary

DATE	COLOR FINISH WATER 2G	COLOR FINISH WATER BC	ODOR FINISH WATER 2G	ODOR FINISH WATER BC	CT RATIO 3.0 Log TANK #1 2G	CT RATIO 3.0 Log TANK #3 BC	DISTRIBUTION SAMPLES COLLE(2G	DISTRIBUTION SAMPLES COLLE(BC	% Reading < 0.5 NTU 2G	% Reading < 0.5 NTU BC	% Readin > 1.0 NTU 2G	% Readin > 1.0 NTU BC	% Reduction > 80 % 2G	% Reduction > 80 % BC	WATER QUALITY COMPLAINTS Taste/Odor 2G	Taste/Odor BC	Color 2G	Color BC	Turbidity 2G	Turbidity BC	Susp.Solid 2G	Susp.Solid BC	Other 2G	Other BC	THM 2G	THM BC	ASBESTOS 2G	ASBESTOS BC
Jan. 1990	3	3	1	1			6	4																				
Feb.	3	3	1	1			5	3																				
Mar.	3	3	1	1			5	3																				
Apr.	3	3	1	1			4	4																				
May	3	3	1	1			4	4																				
June	4	3	1	1			6	2																				
July	3	3	1	1			4	4																				
Aug.	3	3	1	1			6	4																				
Sept.	3	3	1	1			5	3																				
Oct.	4	3	1	1			6	4																				
Nov.	3	2	1	1			5	3																				
Dec.	3	3	1	1			4	4																				
Annual Total																												
Average	3.2	2.9	1.0	1.0			5.0	3.5																				
Maximum	4	3	1	1			6	4																				
Minimum	3	2	1	1			4	2																				

Department of Health Services

DATE	COLOR FINISH WATER 2G	COLOR FINISH WATER BC	ODOR FINISH WATER 2G	ODOR FINISH WATER BC	CT RATIO 3.0 Log TANK #1 2G	CT RATIO 3.0 Log TANK #3 BC	DISTRIBUTION SAMPLES COLLE(2G	DISTRIBUTION SAMPLES COLLE(BC	% Reading < 0.5 NTU 2G	% Reading < 0.5 NTU BC	% Readin > 1.0 NTU 2G	% Readin > 1.0 NTU BC	% Reduction > 80 % 2G	% Reduction > 80 % BC	WATER QUALITY COMPLAINTS Taste/Odor 2G	Taste/Odor BC	Color 2G	Color BC	Turbidity 2G	Turbidity BC	Susp.Solid 2G	Susp.Solid BC	Other 2G	Other BC	THM 2G	THM BC	ASBESTOS 2G	ASBESTOS BC
Jan. 1991	3	3	1	1			6	4																				
Feb.	3	3	1	1			5	3																				
Mar.	7	6	1	1			4	4																				
Apr.	9	7	1	1			5	3																				
May	7	7	1	1			6	4																				
June	7	6	1	1			4	4																				
July	5	4	1	1			6	4																				
Aug.	6	6	1	1			5	3																				
Sept.	6	6	1	1			5	3																				
Oct.	6	5	1	1			6	4																				
Nov.	6	4	1	1			4	4																				
Dec.	4	3	1	1			5	3																				
Annual Total																												
Average	5.8	5.0	1.0	1.0			5.1	3.6																				
Maximum	9	7	1	1			6	4																				
Minimum	3	3	1	1			4	3																				

GCSD Water Treatment Summary

DATE	SECOND GARROTE PUMPAGE TOTAL PUMPAGE MG	TOTAL FLOW A.F.	TOTAL TIME HOURS	AVERAGE RATE GPM	BIG CREEK PUMPAGE TOTAL PUMPAGE MG	TOTAL FLOW A.F.	TOTAL TIME HOURS	AVERAGE RATE GPM	TOTAL PUMPAGE TOTAL PUMPAGE MG	TOTAL FLOW A.F.	RAW WATER TEMPERATURE C. 2G	C BC	LIME USAGE LBS / Month 2G	BC	mg / L / DAY 2G	BC
Jan. 1988	3.316	10.179			4.644	14.255			7.960	24.434			399	240	14.4	6.2
Feb.	3.568	10.952			4.711	14.461			8.279	25.413			394	330	13.2	8.4
Mar.	3.414	10.479	94.7	601.0	5.779	17.739	73.8	1300.0	9.193	28.218			341	395	12.0	8.2
Apr.	3.224	9.896	89.9	599.0	6.905	21.195	88.0	1300.0	10.129	31.091			216	470	8.0	8.2
May	3.099	9.512	87.2	592.0	7.489	22.988	145.5	1177.0	10.588	32.500			367	555	14.2	8.9
June	3.889	11.937	109.1	596.0	7.920	24.311	107.2	1235.0	11.809	36.248			436	595	13.4	9.0
July	4.255	13.061	121.2	591.0	10.699	32.841	144.2	1238.0	14.954	45.902			482	745	13.6	8.3
Aug.	3.911	12.005	113.2	577.0	9.951	30.545	130.1	1278.0	13.862	42.550			473	710	14.5	8.6
Sept.	3.628	11.136	106.1	569.0	8.106	24.882	108.5	1245.0	11.734	36.018			349	580	11.5	8.6
Oct.	3.573	10.967	104.2	571.0	6.487	19.912	88.1	1228.0	10.060	30.880			354	465	11.9	8.6
Nov.	2.727	8.371	82.8	558.0	5.016	15.397	63.9	1302.0	7.743	23.767			211	365	9.3	8.7
Dec.	4.369	13.411	127.4	571.0	4.204	12.904	54.8	1270.0	8.573	26.315			407	213	11.2	6.1
Annual Total	43.0	131.9	1035.8		81.9	251.4	1004.1		124.9	383.3			4429	5663		
Average	3.581	10.992	103.6	582.5	6.826	20.952	100.4	1257.3	10.407	31.9			369.1	471.9	12.27	8.14
Maximum	4.369	13.411	127.4	601.0	10.699	32.841	145.5	1302.0	14.954	45.9			482	745	14.50	9.01
Minimum	2.727	8.371	82.8	558.0	4.204	12.904	54.8	1177.0	7.743	23.8			211	213	8.03	6.08

DATE	SECOND GARROTE PUMPAGE TOTAL PUMPAGE MG	TOTAL FLOW A.F.	TOTAL TIME HOURS	AVERAGE RATE GPM	BIG CREEK PUMPAGE TOTAL PUMPAGE MG	TOTAL FLOW A.F.	TOTAL TIME HOURS	AVERAGE RATE GPM	TOTAL PUMPAGE TOTAL PUMPAGE MG	TOTAL FLOW A.F.	RAW WATER TEMPERATURE C. 2G	C BC	LIME USAGE LBS / Month 2G	BC	mg / L / DAY 2G	BC
Jan. 1989	3.419	10.495	95.2	603.0	4.697	14.418	66.0	1194.0	8.116	24.912			433	240	15.2	6.1
Feb.	9.459	29.035	263.4	598.0	1.576	4.838	20.6	1092.0	11.035	33.872			727	100	9.2	7.6
Mar.	5.782	17.748	164.5	586.0	1.239	3.803	17.2	1197.0	7.021	21.551			663	110	13.7	10.6
Apr.	2.830	8.687	79.9	591.0	5.759	17.677	71.3	1343.0	8.589	26.364			369	370	15.6	7.7
May	3.433	10.538	96.6	592.0	7.809	23.970	92.5	1409.0	11.242	34.508			421	430	14.7	6.6
June	5.408	16.600	154.3	584.0	9.244	28.375	111.3	1387.0	14.652	44.975			704	550	15.6	7.1
July	7.285	22.362	220.7	556.0	12.735	39.091	162.2	1316.0	20.020	61.452			844	805	13.9	7.6
Aug.	5.601	17.192	164.0	570.0	14.379	44.137	162.3	1467.0	19.980	61.329			734	912	15.7	7.6
Sept.	2.557	7.849	130.9	334.0	8.863	27.205	112.8	1309.0	11.420	35.054			435	530	20.4	7.2
Oct.	3.338	10.246	102.4	547.0	12.062	37.025	92.9	2168.0	15.400	47.271			372	450	13.4	4.5
Nov.	1.991	6.111	70.1	473.0	6.528	20.038	83.4	1329.0	8.519	26.149			319	402	19.2	7.4
Dec.	2.868	8.803	84.5	550.0	6.784	20.824	80.4	1387.0	9.652	29.627			373	435	15.6	7.7
Annual Total	54.0	165.7	1626.5		91.7	281.4	1072.9		145.6	447.1			6394	5334		
Average	4.498	13.805	135.5	548.7	7.640	23.450	89.4	1383.2	12.137	37.3			532.8	444.5	15.19	7.31
Maximum	9.459	29.035	263.4	603.0	14.379	44.137	162.3	2168.0	20.020	61.5			844	912	20.40	10.65
Minimum	1.991	6.111	70.1	334.0	1.239	3.803	17.2	1092.0	7.021	21.6			319	100	9.22	4.47

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GCSD Water Treatment Summary

DATE	AVERAGE CHLORINE USAGE: LBS / Month		DOSAGE mg / L		RESIDUAL mg / L		DEMAND mg / L		AVERAGE TURBIDITY: RAW WATER		FINISH WATER		AVERAGE pH: RAW WATER		FINISH WATER	
	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC
Jan. 1988	33	15	1.19	0.39	0.90	0.59	0.29	-0.20	0.47	0.46	0.66	0.41	6.7	6.8	9.7	8.8
Feb.	37	46	1.24	1.17	0.82	0.79	0.42	0.38	0.4	0.47	0.49	0.45	6.8	6.7	9.6	9.6
Mar.	36	56	1.26	1.16	0.83	0.88	0.43	0.28	0.49	0.5	0.58	0.47	6.8	6.8	9.6	9.6
Apr.	27	62	1.00	1.08	0.77	0.74	0.23	0.34	0.49	0.5	0.60	0.45	6.8	6.8	9.1	9.5
May	37	76	1.43	1.22	0.85	0.74	0.58	0.48	0.54	0.4	0.49	0.42	6.8	6.7	9.7	9.6
June	48	74	1.48	1.12	0.84	0.82	0.64	0.30	0.52	0.45	0.57	0.54	6.7	6.6	9.6	9.5
July	54	91	1.52	1.02	0.80	0.71	0.72	0.31	0.4	0.43	0.46	0.42	6.5	6.5	9.5	9.3
Aug.	65	103	1.99	1.24	1.03	0.76	0.96	0.48	0.46	0.37	0.45	0.36	6.4	6.4	9.3	9.2
Sept.	50	70	1.65	1.04	1.10	0.69	0.55	0.35	0.36	0.31	0.48	0.33	6.4	6.3	8.9	9.3
Oct.	55	74	1.85	1.37	1.06	0.64	0.79	0.73	0.3	0.26	0.43	0.47	6.5	6.4	8.7	9.1
Nov.	39	51	1.71	1.22	1.06	0.72	0.65	0.50	0.31	0.32	0.34	0.26	6.3	6.3	8.1	8.9
Dec.	60	52	1.65	1.48	1.25	0.86	0.40	0.62	0.39	0.32	0.43	0.26	6.4	6.2	8.5	8.9
Annual Total	541	770														
Average	45.1	64.2	1.50	1.13	0.94	0.75	0.56	0.38	0.43	0.40	0.50	0.40	6.59	6.54	9.19	9.28
Maximum	65	103	1.99	1.48	1.25	0.88	0.96	0.73	0.54	0.50	0.66	0.54	6.8	6.8	9.7	9.6
Minimum	27	15	1.00	0.39	0.77	0.59	0.23		0.30	0.26	0.34	0.26	6.3	6.2	8.1	8.8

DATE	AVERAGE CHLORINE USAGE: LBS / Month		DOSAGE mg / L		RESIDUAL mg / L		DEMAND mg / L		AVERAGE TURBIDITY: RAW WATER		FINISH WATER		AVERAGE pH: RAW WATER		FINISH WATER	
	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC
Jan. 1989	33	31	1.16	0.79	0.84	0.87	0.32	-0.08	0.41	0.37	0.51	0.27	6.4	6.3	9.6	8.9
Feb.	100	19	1.27	1.45	0.77	1.00	0.50	0.45	0.43	0.39	0.54	0.33	6.4	6.4	8.5	8.7
Mar.	54	16	1.12	1.55	0.82	0.90	0.30	0.65	0.67	0.64	0.57	0.46	6.5	6.5	9.4	9.6
Apr.	27	72	1.14	1.50	0.78	0.74	0.36	0.76	0.44	0.32	0.51	0.33	6.4	6.3	9.1	8.9
May	39	79	1.36	1.21	0.94	0.82	0.42	0.39	0.61	0.54	0.69	0.55	6.3	6.3	9.4	9.1
June	74	115	1.64	1.49	1.09	0.88	0.55	0.61	0.61	0.6	0.81	0.61	6.3	6.3	9.6	9.2
July	83	135	1.37	1.27	0.83	0.76	0.54	0.51	0.34	0.38	0.42	0.35	6.2	6.2	9.1	8.6
Aug.	53	123	1.13	1.03	0.86	0.76	0.27	0.27	0.3	0.25	0.39	0.28	6.1	6.1	9.3	9.1
Sept.	44	7	2.06	0.09	0.92	0.81	1.14	-0.72	0.3	0.18	0.44	0.26	6.1	5.9	9.0	8.9
Oct.	41	75	1.47	0.75	1.01	0.84	0.46	-0.09	0.24	0.21	0.49	0.24	6.2	6.2	8.7	8.8
Nov.	27	64	1.63	1.18	0.42	0.37	1.21	0.81	0.28	0.2	0.59	0.26	5.9	5.9	9.3	8.6
Dec.	29	56	1.21	0.99	1.12	0.79	0.09	0.20	0.28	0.21	0.56	0.24	6.0	6.0	9.4	9.0
Annual Total	604	792														
Average	50.3	66.0	1.38	1.11	0.87	0.80	0.51	0.31	0.41	0.36	0.54	0.35	6.23	6.20	9.20	8.95
Maximum	100	135	2.06	1.55	1.12	1.00	1.21	0.81	0.67	0.64	0.81	0.61	6.5	6.5	9.6	9.6
Minimum	27	7	1.12	0.09	0.42	0.37	0.09		0.24	0.18	0.39	0.24	5.9	5.9	8.5	8.6

GCSD Water Treatment Summary

Department of Health Services

DATE	COLOR		ODOR		CT RATIO		DISTRIBUTION								WATER QUALITY COMPLAINTS										THM		ASBESTOS	
	FINISH WATER		FINISH WATER		3.0 Log TANK #1	3.0 Log TANK #3	SAMPLES COLLE		% Reading < 0.5 NTU		% Readin > 1.0 NTU		% Reduction > 80 %		Taste/Odor		Color		Turbidity		Susp.Solid		Other					
	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC
Jan. 1988	2	3	1	1			5	3																				
Feb.	1	2	1	1			5	3																				
Mar.	2	3	1	1			6	4																				
Apr.	2	3	1	1			4	4																				
May	2	3	1	1			6	2																				
June	2	3	1	1			5	5																				
July	2	3	1	1			4	4																				
Aug.	2	3	1	1			6	4																				
Sept.	2	3	1	1			5	3																				
Oct.	3	3	1	1			5	3																				
Nov.	3	4	1	1			6	4																				
Dec.	2	3	1	1			4	4																				
Annual Total																												
Average	2.1	3.0	1.0	1.0			5.1	3.6																				
Maximum	3	4	1	1			6	5																				
Minimum	1	2	1	1			4	2																				

Department of Health Services

DATE	COLOR		ODOR		CT RATIO		DISTRIBUTION								WATER QUALITY COMPLAINTS										THM		ASBESTOS	
	FINISH WATER		FINISH WATER		3.0 Log TANK #1	3.0 Log TANK #3	SAMPLES COLLE		% Reading < 0.5 NTU		% Readin > 1.0 NTU		% Reduction > 80 %		Taste/Odor		Color		Turbidity		Susp.Solid		Other					
	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC
Jan. 1989	2	2	1	1			5	3																				
Feb.	3	2	1	1			5	3																				
Mar.	3	3	1	1			6	4																				
Apr.	3	3	1	1			4	4																				
May	4	4	1	1			6	4																				
June	6	6	1	1			6	2																				
July	5	4	1	1			4	4																				
Aug.	4	4	1	1			6	4																				
Sept.	4	3	1	1			5	3																				
Oct.	3	3	1	1			5	3																				
Nov.	4	3	1	1			6	4																				
Dec.	3	3	1	1			4	4																				
Annual Total																												
Average	3.7	3.3	1.0	1.0			5.2	3.5																				
Maximum	6	6	1	1			6	4																				
Minimum	2	2	1	1			4	2																				

GCSD Water Treatment Summary

DATE	SECOND GARROTE PUMPAGE TOTAL PUMPAGE MG	SECOND GARROTE PUMPAGE TOTAL FLOW A.F.	SECOND GARROTE PUMPAGE TOTAL TIME HOURS	SECOND GARROTE PUMPAGE AVERAGE RATE GPM	BIG CREEK PUMPAGE TOTAL PUMPAGE MG	BIG CREEK PUMPAGE TOTAL FLOW A.F.	BIG CREEK PUMPAGE TOTAL TIME HOURS	BIG CREEK PUMPAGE AVERAGE RATE GPM	TOTAL PUMPAGE TOTAL PUMPAGE MG	TOTAL PUMPAGE TOTAL FLOW A.F.	RAW WATER TEMPERATURE C. 2G	RAW WATER TEMPERATURE C BC	LIME USAGE LBS / Month 2G	LIME USAGE LBS / Month BC	LIME USAGE mg / L / DAY 2G	LIME USAGE mg / L / DAY BC
Jan. 1986	1.926	5.912			4.156	12.757			6.082	18.669			155	295	9.6	8.5
Feb.	1.905	5.847			3.585	11.004			5.490	16.852			152	245	9.6	8.2
Mar.	2.033	6.240			3.950	12.125			5.983	18.365			139	280	8.2	8.5
Apr.	2.471	7.585			5.559	17.064			8.030	24.648			201	380	9.8	8.2
May	3.293	10.108			8.667	26.604			11.960	36.712			268	530	9.8	7.3
June	5.133	15.756			10.473	32.147			15.606	47.903			405	700	9.5	8.0
July	4.803	14.743			12.901	39.600			17.704	54.343			421	835	10.5	7.8
Aug.	5.076	15.581			13.729	42.142			18.805	57.723			445	895	10.5	7.8
Sept.	3.745	11.495			8.613	26.438			12.358	37.933			337	590	10.8	8.2
Oct.	3.306	10.148			6.947	21.324			10.253	31.472			279	480	10.1	8.3
Nov.	2.796	8.582			6.067	18.623			8.863	27.205			250	435	10.7	8.6
Dec.	2.480	7.612			5.354	16.434			7.834	24.047			221	385	10.7	8.6
Annual Total	39.0	119.6			90.0	276.3			129.0	395.9			3273	6050		
Average	3.247	9.968			7.500	23.022			10.747	33.0			272.8	504.2	9.98	8.17
Maximum	5.133	15.756			13.729	42.142			18.805	57.7			445	895	10.79	8.62
Minimum	1.905	5.847			3.585	11.004			5.490	16.9			139	245	8.20	7.33

DATE	SECOND GARROTE PUMPAGE TOTAL PUMPAGE MG	SECOND GARROTE PUMPAGE TOTAL FLOW A.F.	SECOND GARROTE PUMPAGE TOTAL TIME HOURS	SECOND GARROTE PUMPAGE AVERAGE RATE GPM	BIG CREEK PUMPAGE TOTAL PUMPAGE MG	BIG CREEK PUMPAGE TOTAL FLOW A.F.	BIG CREEK PUMPAGE TOTAL TIME HOURS	BIG CREEK PUMPAGE AVERAGE RATE GPM	TOTAL PUMPAGE TOTAL PUMPAGE MG	TOTAL PUMPAGE TOTAL FLOW A.F.	RAW WATER TEMPERATURE C. 2G	RAW WATER TEMPERATURE C BC	LIME USAGE LBS / Month 2G	LIME USAGE LBS / Month BC	LIME USAGE mg / L / DAY 2G	LIME USAGE mg / L / DAY BC
Jan. 1987	2.828	8.681			7.524	23.095			10.352	31.776			257	470	10.9	7.5
Feb.	3.352	10.289			3.215	9.869			6.567	20.158			314	250	11.2	9.3
Mar.	5.910	18.141			0.784	2.407			6.694	20.547			485	55	9.8	8.4
Apr.	6.411	19.679			4.294	13.181			10.705	32.859			483	270	9.0	7.5
May	4.109	12.613			9.691	29.747			13.800	42.360			362	655	10.6	8.1
June	4.620	14.181			11.498	35.294			16.118	49.475			387	770	10.0	8.0
July	5.624	17.263			14.145	43.419			19.769	60.682			452	880	9.6	7.5
Aug.	6.072	18.638			14.572	44.729			20.644	63.368			519	940	10.2	7.7
Sept.	6.187	18.991			10.199	31.306			16.386	50.297			509	660	9.9	7.8
Oct.	4.159	12.766			8.371	25.695			12.530	38.461			15	540	0.4	7.7
Nov.	2.834	8.699			4.680	14.365			7.514	23.065			149	310	6.3	7.9
Dec.	2.696	8.275			5.853	17.966			8.549	26.241			303	428	13.5	8.8
Annual Total	54.8	168.2			94.8	291.1			149.6	459.3			4235	6228		
Average	4.567	14.018			7.902	24.256			12.469	38.3			352.9	519.0	9.30	8.02
Maximum	6.411	19.679			14.572	44.729			20.644	63.4			519	940	13.48	9.32
Minimum	2.696	8.275			0.784	2.407			6.567	20.2			15	55	0.43	7.46

GCSD Water Treatment Summary

DATE	AVERAGE CHLORINE USAGE: LBS / Month 2G	LBS / Month BC	DOSAGE mg / L 2G	DOSAGE mg / L BC	RESIDUAL mg / L 2G	RESIDUAL mg / L BC	DEMAND mg / L 2G	DEMAND mg / L BC	AVERAGE TURBIDITY: RAW WATER 2G	RAW WATER BC	FINISH WATER 2G	FINISH WATER BC	AVERAGE pH: RAW WATER 2G	RAW WATER BC	FINISH WATER 2G	FINISH WATER BC
Jan. 1986	25	56	1.56	1.62	0.86	0.93	0.70	0.69	0.38	0.28	0.42	0.35	6.7	6.8	10.0	10.1
Feb.	23	43	1.45	1.44	0.83	0.81	0.62	0.63	0.44	0.42	0.47	0.44	7.0	7.0	9.7	10.0
Mar.	26	52	1.53	1.58	0.72	0.79	0.81	0.79	0.54	0.57	0.63	0.58	6.8	6.8	9.2	10.0
Apr.	36	111	1.75	2.39	1.00	0.85	0.75	1.54	0.41	0.52	0.66	0.41	6.8	6.8	9.5	9.9
May	48	124	1.75	1.72	1.00	0.80	0.75	0.92	0.45	0.38	0.53	0.34	7.0	7.0	9.6	9.5
June	56	152	1.31	1.74	0.90	0.85	0.41	0.89	0.66	0.67	0.70	0.55	7.2	7.1	9.8	9.8
July	58	150	1.45	1.39	0.89	0.95	0.56	0.44	0.55	0.55	0.71	0.51	7.0	6.9	9.9	9.8
Aug.	57	205	1.35	1.79	0.78	0.96	0.57	0.83	0.29	0.34	0.39	0.31	6.6	6.5	9.7	9.5
Sept.	41	90	1.31	1.25	0.89	0.95	0.42	0.30	0.26	0.27	0.31	0.25	6.2	6.2	9.3	9.2
Oct.	43	116	1.56	2.00	0.92	1.10	0.64	0.90	0.26	0.29	0.32	0.20	6.5	6.5	9.8	9.6
Nov.	24	70	1.03	1.38	0.71	0.84	0.32	0.54	0.39	0.44	0.53	0.41	6.5	6.7	9.7	9.6
Dec.	22	62	1.06	1.39	0.64	0.87	0.42	0.52	0.43	0.58	0.50	0.55	6.7	6.6	9.8	9.7
Annual Total	459	1231														
Average	38.3	102.6	1.42	1.64	0.85	0.89	0.58	0.75	0.42	0.44	0.51	0.41	6.75	6.74	9.67	9.73
Maximum	58	205	1.75	2.39	1.00	1.10	0.81	1.54	0.66	0.67	0.71	0.58	7.2	7.1	10.0	10.1
Minimum	22	43	1.03	1.25	0.64	0.79	0.32	0.30	0.26	0.27	0.31	0.20	6.2	6.2	9.2	9.2

DATE	AVERAGE CHLORINE USAGE: LBS / Month 2G	LBS / Month BC	DOSAGE mg / L 2G	DOSAGE mg / L BC	RESIDUAL mg / L 2G	RESIDUAL mg / L BC	DEMAND mg / L 2G	DEMAND mg / L BC	AVERAGE TURBIDITY: RAW WATER 2G	RAW WATER BC	FINISH WATER 2G	FINISH WATER BC	AVERAGE pH: RAW WATER 2G	RAW WATER BC	FINISH WATER 2G	FINISH WATER BC
Jan. 1987	26	122	1.10	1.94	0.67	1.05	0.43	0.89	0.52	0.45	0.49	0.49	6.5	6.7	9.9	9.8
Feb.	27	62	0.97	2.31	0.92	0.92	0.05	1.39	0.44	0.45	0.50	0.46	6.7	6.5	9.5	9.7
Mar.	52	12	1.05	1.84	0.74	0.79	0.31	1.05	0.4	0.49	0.42	0.50	6.9	6.9	9.7	9.8
Apr.	55	49	1.03	1.37	0.74	0.89	0.29	0.48	0.39	0.33	0.40	0.35	6.8	6.7	9.7	9.2
May	43	122	1.25	1.51	0.79	0.86	0.46	0.65	0.38	0.39	0.43	0.43	6.7	6.7	9.4	9.6
June	35	106	0.91	1.11	0.74	0.81	0.17	0.30	0.42	0.42	0.47	0.43	6.6	6.6	9.4	9.3
July	45	149	0.96	1.26	0.75	0.87	0.21	0.39	0.37	0.38	0.41	0.41	6.5	6.5	9.0	9.2
Aug.	46	154	0.91	1.27	0.73	0.82	0.18	0.45	0.37	0.37	0.44	0.40	6.8	6.7	9.3	9.4
Sept.	54	113	1.05	1.33	0.74	0.86	0.31	0.47	0.36	0.36	0.43	0.40	6.5	6.5	9.4	9.4
Oct.	59	78	1.70	1.12	0.89	0.81	0.81	0.31	0.35	0.36	0.37	0.39	6.5	6.5	6.8	9.2
Nov.	28	37	1.18	0.95	0.70	0.70	0.48	0.25	0.38	0.37	0.40	0.42	6.5	6.4	8.0	9.3
Dec.	25	34	1.11	0.70	0.72	0.73	0.39	-0.03	0.53	0.45	0.44	0.44	6.6	6.6	9.2	9.4
Annual Total	495	1038														
Average	41.3	86.5	1.10	1.39	0.76	0.84	0.34	0.55	0.41	0.40	0.43	0.43	6.63	6.61	9.11	9.44
Maximum	59	154	1.70	2.31	0.92	1.05	0.81	1.39	0.53	0.49	0.50	0.50	6.9	6.9	9.9	9.8
Minimum	25	12	0.91	0.70	0.67	0.70	0.05		0.35	0.33	0.37	0.35	6.5	6.4	6.8	9.2

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GCSD Water Treatment Summary

DATE	COLOR FINISH WATER		ODOR FINISH WATER		CT RATIO 3.0 Log TANK #1	CT RATIO 3.0 Log TANK #3	DISTRIBUTION SAMPLES COLLE(		Department of Health Services % Reading < 0.5 NTU		% Readin > 1.0 NTU		% Reduction > 80 %		WATER QUALITY COMPLAINTS Taste/Odor		Color		Turbidity		Susp.Solid		Other		THM		ASBESTOS	
	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC
Jan. 1986	2	2	1	1			6	4																				
Feb.	2	1	1	1			5	3																				
Mar.	1	2	1	1			5	3																				
Apr.	2	2	1	1			6	4																				
May	1	2	1	1			4	4																				
June	1	2	1	1			5	3																				
July	2	2	1	1			6	4																				
Aug.	1	2	1	1			5	3																				
Sept.	2	2	1	1			5	3																				
Oct.	1	2	1	1			6	4																				
Nov.	1	2	1	1			5	3																				
Dec.	1	2	1	1			6	4																				
Annual Total																												
Average	1.4	1.9	1.0	1.0			5.3	3.5																				
Maximum	2	2	1	1			6	4																				
Minimum	1	1	1	1			4	3																				

DATE	COLOR FINISH WATER		ODOR FINISH WATER		CT RATIO 3.0 Log TANK #1	CT RATIO 3.0 Log TANK #3	DISTRIBUTION SAMPLES COLLE(		Department of Health Services % Reading < 0.5 NTU		% Readin > 1.0 NTU		% Reduction > 80 %		WATER QUALITY COMPLAINTS Taste/Odor		Color		Turbidity		Susp.Solid		Other		THM		ASBESTOS	
	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC
Jan. 1987	1	2	1	1			4	4																				
Feb.	1	2	1	1			5	3																				
Mar.	1	2	1	1			5	3																				
Apr.	2	2	1	1			6	4																				
May	1	1	1	1			5	3																				
June	1	1	1	1			5	3																				
July	1	1	1	1			6	4																				
Aug.	1	1	1	1			4	4																				
Sept.	1	2	1	1			6	4																				
Oct.	2	3	1	1			6	2																				
Nov.	1	3	1	1			4	4																				
Dec.	2	3	1	1			6	4																				
Annual Total																												
Average	1.3	1.9	1.0	1.0			5.2	3.5																				
Maximum	2	3	1	1			6	4																				
Minimum	1	1	1	1			4	2																				

GCSD Water Treatment Summary

DATE	SECOND GARROTE PUMPAGE TOTAL PUMPAGE MG	SECOND GARROTE PUMPAGE TOTAL FLOW A.F.	SECOND GARROTE PUMPAGE TOTAL TIME HOURS	SECOND GARROTE PUMPAGE AVERAGE RATE GPM	BIG CREEK PUMPAGE TOTAL PUMPAGE MG	BIG CREEK PUMPAGE TOTAL FLOW A.F.	BIG CREEK PUMPAGE TOTAL TIME HOURS	BIG CREEK PUMPAGE AVERAGE RATE GPM	TOTAL PUMPAGE TOTAL PUMPAGE MG	TOTAL PUMPAGE TOTAL FLOW A.F.	RAW WATER TEMPERATURE C. 2G	RAW WATER TEMPERATURE C BC	LIME USAGE LBS / Month 2G	LIME USAGE LBS / Month BC	LIME USAGE mg / L / Month 2G	LIME USAGE mg / L / Month BC
Jan. 1984	2.105	6.461			3.315	10.176			5.420	16.637			235	300	13.4	10.9
Feb.	1.906	5.851			3.317	10.182			5.223	16.032			215	285	13.5	10.3
Mar.	4.063	12.472			1.389	4.264			5.452	16.735			282	120	8.3	10.4
Apr.	4.188	12.855			3.121	9.580			7.309	22.435			153	250	4.4	9.6
May	3.448	10.584			7.052	21.646			10.500	32.230			252	495	8.8	8.4
June	3.681	11.299			8.193	25.149			11.874	36.448			310	550	10.1	8.0
July	4.733	14.528			10.890	33.427			15.623	47.955			423	705	10.7	7.8
Aug.	4.610	14.151			10.731	32.939			15.341	47.090			425	715	11.1	8.0
Sept.	3.851	11.821			8.347	25.621			12.198	37.442			348	575	10.8	8.3
Oct.	2.673	8.205			4.967	15.246			7.640	23.451			234	359	10.5	8.7
Nov.	2.363	7.253			3.500	10.743			5.863	17.997			244	235	12.4	8.1
Dec.	2.474	7.594			4.641	14.246			7.115	21.840			212	330	10.3	8.5
Annual Total	40.1	123.1			69.5	213.2			109.6	336.3			3333	4919		
Average	3.341	10.256			5.789	17.768			9.130	28.0			277.8	409.9	10.35	8.90
Maximum	4.733	14.528			10.890	33.427			15.623	48.0			425	715	13.53	10.85
Minimum	1.906	5.851			1.389	4.264			5.223	16.0			153	120	4.38	7.76

DATE	SECOND GARROTE PUMPAGE TOTAL PUMPAGE MG	SECOND GARROTE PUMPAGE TOTAL FLOW A.F.	SECOND GARROTE PUMPAGE TOTAL TIME HOURS	SECOND GARROTE PUMPAGE AVERAGE RATE GPM	BIG CREEK PUMPAGE TOTAL PUMPAGE MG	BIG CREEK PUMPAGE TOTAL FLOW A.F.	BIG CREEK PUMPAGE TOTAL TIME HOURS	BIG CREEK PUMPAGE AVERAGE RATE GPM	TOTAL PUMPAGE TOTAL PUMPAGE MG	TOTAL PUMPAGE TOTAL FLOW A.F.	RAW WATER TEMPERATURE C. 2G	RAW WATER TEMPERATURE C BC	LIME USAGE LBS / Month 2G	LIME USAGE LBS / Month BC	LIME USAGE mg / L / DAY 2G	LIME USAGE mg / L / DAY BC
Jan. 1985	2.476	7.600			3.279	10.065			5.755	17.665			206	210	10.0	7.7
Feb.	2.427	7.450			3.532	10.842			5.959	18.291			261	250	12.9	8.5
Mar.	2.142	6.575			3.796	11.652			5.938	18.227			224	270	12.5	8.5
Apr.	2.612	8.018			5.096	15.642			7.708	23.660			297	350	13.6	8.2
May	3.768	11.566			8.497	26.082			12.265	37.648			423	564	13.5	8.0
June	4.301	13.202			9.088	27.896			13.389	41.098			480	535	13.4	7.1
July	5.477	16.812			12.177	37.378			17.654	54.190			592	555	13.0	5.5
Aug.	5.092	15.630			11.146	34.213			16.238	49.843			439	760	10.3	8.2
Sept.	4.649	14.270			5.803	17.813			10.452	32.083			371	390	9.6	8.1
Oct.	3.482	10.688			5.086	15.612			8.568	26.300			287	360	9.9	8.5
Nov.	2.344	7.195			4.458	13.684			6.802	20.879			201	325	10.3	8.7
Dec.	2.269	6.965			4.029	12.367			6.298	19.332			189	300	10.0	8.9
Annual Total	41.0	126.0			76.0	233.2			117.0	359.2			3970	4869		
Average	3.420	10.498			6.332	19.437			9.752	29.9			330.8	405.8	11.58	7.98
Maximum	5.477	16.812			12.177	37.378			17.654	54.2			592	760	13.63	8.93
Minimum	2.142	6.575			3.279	10.065			5.755	17.7			189	210	9.57	5.46

GCSD Water Treatment Summary

DATE	AVERAGE CHLORINE USAGE LBS / Month		DOSAGE mg / L		RESIDUAL mg / L		DEMAND mg / L		AVERAGE TURBIDITY RAW WATER		FINISH WATER		AVERAGE pH RAW WATER		FINISH WATER	
	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC
Jan. 1984	18	39	1.03	1.41	0.67	0.94	0.36	0.47			0.74	0.46			8.0	8.2
Feb.	15	43	0.94	1.55	0.70	1.00	0.24	0.55			0.79	0.52			8.2	8.2
Mar.	36	21	1.06	1.81	0.73	1.00	0.33	0.81			0.68	0.61			8.4	9.1
Apr.	38	47	1.09	1.81	0.66	0.96	0.43	0.85			0.22	0.42			6.9	8.2
May	33	87	1.15	1.48	0.87	0.96	0.28	0.52			0.48	0.50			8.3	8.7
June	42	102	1.37	1.49	0.93	0.80	0.44	0.69			0.76	0.61			8.5	8.4
July	63	142	1.60	1.56	1.10	0.85	0.50	0.71			0.73	0.55			8.5	8.5
Aug.	69	141	1.79	1.58	1.20	0.92	0.59	0.66			0.70	0.47			8.7	8.6
Sept.	64	125	1.99	1.80	1.40	1.00	0.59	0.80			0.58	0.40			8.5	8.4
Oct.	29	76	1.30	1.83	1.10	1.00	0.20	0.83			0.58	0.45			8.0	8.3
Nov.	24	51	1.22	1.75	0.83	0.94	0.39	0.81			0.56	0.44			8.1	7.9
Dec.	21	76	1.02	1.96	0.88	1.30	0.14	0.66			0.63	0.56			8.8	9.5
Annual Total	452	950														
Average	37.7	79.2	1.30	1.67	0.92	0.97	0.37	0.70			0.62	0.50			8.24	8.50
Maximum	69	142	1.99	1.96	1.40	1.30	0.59	0.85			0.79	0.61			8.8	9.5
Minimum	15	21	0.94	1.41	0.66	0.80	0.14	0.47			0.22	0.40			6.9	7.9

DATE	AVERAGE CHLORINE USAGE LBS / Month		DOSAGE mg / L		RESIDUAL mg / L		DEMAND mg / L		AVERAGE TURBIDITY RAW WATER		FINISH WATER		AVERAGE pH RAW WATER		FINISH WATER	
	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC
Jan. 1985	25	42	1.21	1.54	0.95	1.20	0.26	0.34			0.51	0.55			8.4	8.7
Feb.	29	46	1.43	1.56	1.20	1.20	0.23	0.36			0.55	0.51			8.7	8.7
Mar.	22	52	1.23	1.64	0.90	1.10	0.33	0.54			0.73	0.45			8.4	8.4
Apr.	23	57	1.06	1.34	0.77	1.10	0.29	0.24			0.84	0.62			9.0	9.0
May	36	111	1.15	1.57	0.69	0.82	0.46	0.75			0.77	0.53			9.1	8.8
June	55	117	1.53	1.54	0.88	0.92	0.65	0.62			0.80	0.50			8.9	8.5
July	70	156	1.53	1.54	1.10	0.88	0.43	0.66			0.63	0.42			9.0	7.9
Aug.	67	126	1.58	1.36	1.00	0.87	0.58	0.49			0.46	0.41			8.2	8.5
Sept.	50	100	1.29	2.07	0.77	0.95	0.52	1.12	0.25	0.3	0.40	0.34	5.7	5.8	8.3	8.4
Oct.	34	75	1.17	1.77	0.70	1.00	0.47	0.77	0.4	0.29	0.58	0.40	5.5	5.2	8.2	8.6
Nov.	31	51	1.59	1.37	0.77	0.91	0.82	0.46	0.63	0.4	0.54	0.42	6.9	6.9	10.2	10.2
Dec.	31	63	1.64	1.87	1.10	1.10	0.54	0.77	0.48	0.4	0.48	0.47	6.9	6.9	10.1	10.2
Annual Total	473	996														
Average	39.4	83.0	1.37	1.60	0.90	1.00	0.46	0.59	0.44	0.35	0.61	0.47	6.25	6.20	8.88	8.83
Maximum	70	156	1.64	2.07	1.20	1.20	0.82	1.12	0.63	0.40	0.84	0.62	6.9	6.9	10.2	10.2
Minimum	22	42	1.06	1.34	0.69	0.82	0.23	0.24	0.25	0.29	0.40	0.34	5.5	5.2	8.2	7.9

GCSD Water Treatment Summary

DATE	COLOR FINISH WATER		ODOR FINISH WATER		CT RATIO 3.0 Log TANK #1	CT RATIO 3.0 Log TANK #3	DISTRIBUTION SAMPLES COLLE(		Department of Health Services % Reading < 0.5 NTU		% Readin > 1.0 NTU		% Reduction > 80 %		WATER QUALITY COMPLAINTS Taste/Odor		Color		Turbidity		Susp.Solid		Other		THM		ASBESTOS	
	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC
Jan. 1984	2	2	1	1			5	3																				
Feb.	1	1	1	1			6	4																				
Mar.	1	2	1	1			4	4																				
Apr.	0	0	1	1			6	2																				
May	0	0	1	1			6	4																				
June	0	0	1	1			4	4																				
July	0	0	1	1			5	3																				
Aug.	0	0	1	1			6	4																				
Sept.	0	0	1	1			5	3																				
Oct.	0	0	1	1			6	4																				
Nov.	0	0	1	1			4	4																				
Dec.	0	0	1	1			6	2																				
Annual Total																												
Average	0.3	0.4	1.0	1.0			5.3	3.4																				
Maximum	2	2	1	1			6	4																				
Minimum			1	1			4	2																				

DATE	COLOR FINISH WATER		ODOR FINISH WATER		CT RATIO 3.0 Log TANK #1	CT RATIO 3.0 Log TANK #3	DISTRIBUTION SAMPLES COLLE(		Department of Health Services % Reading < 0.5 NTU		% Readin > 1.0 NTU		% Reduction > 80 %		WATER QUALITY COMPLAINTS Taste/Odor		Color		Turbidity		Susp.Solid		Other		THM		ASBESTOS	
	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC	2G	BC
Jan. 1985	0	0	1	1			4	4																				
Feb.	0	0	1	1			4	4																				
Mar.	0	0	1	1			5	3																				
Apr.	0	0	1	1			5	3																				
May	0	0	1	1			6	4																				
June	0	0	1	1			4	4																				
July	0	0	1	1			6	4																				
Aug.	0	0	1	1			6	2																				
Sept.	0	0	1	1			4	4																				
Oct.	0	0	1	1			6	4																				
Nov.	2	2	1	1			5	3																				
Dec.	3	3	1	1			5	3																				
Annual Total																												
Average	0.4	0.4	1.0	1.0			5.0	3.5																				
Maximum	3	3	1	1			6	4																				
Minimum			1	1			4	2																				

APPENDIX B
EPANet® Output

BALANCED WATER SYSTEM

AREAS OF HIGH PRESSURE

Peak Hour
Mod. System

Network Table - Nodes

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 87	2928	0	0.00	-6.07
Resvr 2ndGarrotteRes	2937	#N/A	0.00	0.00
Resvr BigCreekRes	2820	#N/A	-0.00	0.00
Junc 86	2928	0	0.00	0.00
Junc 66	3395	10	20.00	2.53
Tank T3	3004	#N/A	-3034.68	2.60
Tank T4	2912	#N/A	360.17	2.60
Tank T5	3395	#N/A	-80.00	2.60
Tank T1	3136	#N/A	-324.00	2.60
Tank T2	2908	#N/A	596.51	2.60
Junc 27	2912	0	0.00	3.48
Junc 73	2917	0	0.00	8.67
Junc 67	3100	3	6.00	17.49
Junc 91	3100	0	0.00	18.20
Junc 104	3085	0	0.00	22.87
Junc 88	2852	0	0.00	29.95
Junc 5	2852	10	20.00	29.95
Junc 53	2670	15	30.00	31.00
Junc 56	2670	15	30.00	31.00
Junc 76	2900	0	0.00	34.00
Junc 89	2827	25	50.00	37.20

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 90	2750	25	50.00	42.02
Junc 9	3300	15	30.00	43.52
Junc 21	2820	10	20.00	44.97
Junc 48	2827	15	30.00	46.07
Junc 85	2826	0	0.00	46.50
Junc 69	2630	40	80.00	48.09
Junc 11	2773	0	0.00	49.00
Junc 17	2770	20	40.00	50.00
Junc 96	2760	5	10.00	53.70
Junc 102	2930	0	0.00	54.00
Junc 103	2925	12	24.00	54.80
Junc 77	2850	8	16.00	55.56
Junc 70	3010	0	0.00	56.12
Junc 47	2750	10	20.00	58.00
Junc 38	3000	10	20.00	59.90
Junc 37	2856	10	20.00	61.52
Junc 3	2790	22	44.00	61.92
Junc 129	2850	0	0.00	63.02
Junc 78	2825	8	16.00	66.17
Junc 83	2780	15	30.00	66.45
Junc 100	2900	11	22.00	67.00
Junc 31	2773	10	20.00	67.16

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 63	2980	0	0.00	68.99
Junc 72	2580	30	60.00	69.82
Junc 33	2580	11	22.00	70.00
Junc 1	2975	0	0.00	71.15
Junc 42	2820	8	16.00	71.49
Junc 41	2820	8	16.00	73.18
Junc 4	2756	20	40.00	74.26
Junc 59	2880	19	38.00	75.59
Junc 82	2710	30	60.00	75.76
Junc 30	2710	0	0.00	76.00
Junc 14	2743	15	30.00	76.60
Junc 79	2800	8	16.00	76.86
Junc 55	2670	13	26.00	77.03
Junc 46	2750	12	24.00	79.30
Junc 16	2800	10	20.00	81.80
Junc 134	2800	5	10.00	82.13
Junc 133	2800	5	10.00	82.14
Junc 20	2730	40	80.00	82.68
Junc 54	2675	20	40.00	82.71
Junc 130	2800	10	20.00	83.21
Junc 131	2800	5	10.00	83.26
Junc 43	2806	20	40.00	83.55

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 52	2670	20	40.00	84.76
Junc 128	2800	0	0.00	86.40
Junc 132	2795	5	10.00	86.62
Junc 99	2785	0	0.00	86.65
Junc 62	2540	20	40.00	87.21
Junc 60	2850	20	40.00	87.58
Junc 32	2680	0	0.00	89.00
Junc 50	2680	10	20.00	89.00
Junc 101	2930	9	18.00	90.67
Junc 49	2970	0	0.00	91.91
Junc 71	2925	5	10.00	92.73
Junc 127	2785	5	10.00	92.75
Junc 18	2660	25	50.00	97.39
Junc 22	2660	12	24.00	97.64
Junc 40	2910	8	16.00	98.92
Junc 8	2820	17	34.00	101.50
Junc 24	2650	10	20.00	102.03
Junc 75	2900	0	0.00	102.57
Junc 92	2900	5	10.00	103.21
Junc 135	2750	5	10.00	103.82
Junc 98	2900	9	18.00	104.02
Junc 68	2500	30	60.00	104.42

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 13	2680	15	30.00	104.68
Junc 121	2635	5	10.00	107.82
Junc 125	2745	5	10.00	110.08
Junc 119	2630	5	10.00	110.31
Junc 84	2680	10	20.00	111.65
Junc 51	2920	0	0.00	113.56
Junc 2	2705	0	0.00	113.70
Junc 29	2705	20	40.00	113.70
Junc 28	2620	12	24.00	114.94
Junc 7	2710	0	0.00	115.00
Junc 36	2715	25	50.00	116.81
Junc 6	2912	8	16.00	117.90
Junc 44	2680	15	30.00	118.02
Junc 122	2610	5	10.00	118.66
Junc 94	2610	10	20.00	118.77
Junc 93	2610	10	20.00	118.91
Junc 81	2610	20	40.00	118.94
Junc 118	2610	0	0.00	118.99
Junc 65	3125	15	30.00	119.36
Junc 124	2605	10	20.00	120.86
Junc 80	2600	20	40.00	123.02
Junc 123	2600	10	20.00	123.03

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 120	2600	10	20.00	123.07
Junc 45	2600	22	44.00	123.59
Junc 95	2590	5	10.00	127.44
Junc 26	2590	20	40.00	127.92
Junc 12	2590	20	40.00	127.94
Junc 64	2980	0	0.00	128.06
Junc 10	2980	0	0.00	128.06
Junc 23	2880	25	50.00	130.84
Junc 15	2880	25	50.00	130.91
Junc 25	2880	15	30.00	130.92
Junc 61	2430	10	20.00	134.82
Junc 58	2820	10	20.00	137.94
Junc 19	2560	15	30.00	140.52
Junc 97	2560	0	0.00	140.81
Junc 57	2411	16	32.00	143.01
Junc 34	2580	0	0.00	145.56
Junc 39	2777	0	0.00	156.55
Junc 74	2917	0	0.00	187.76
Junc 35	2800	0	0.00	259.98

MAX. DAY

FIRE GL-C

Network Table - Nodes

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 87	2928	0	0.00	-6.07
Junc 104	3085	0	0.00	-4.98
Resvr 2ndGarrotteRes	2937	#N/A	0.00	0.00
Resvr BigCreekRes	2820	#N/A	-0.00	0.00
Junc 86	2928	0	0.00	0.00
Junc 66	3395	10	10.00	2.58
Tank T1	3136	#N/A	-1661.95	2.60
Tank T5	3395	#N/A	-40.00	2.60
Tank T4	2912	#N/A	687.29	2.60
Tank T2	2908	#N/A	969.71	2.60
Tank T3	3004	#N/A	-2696.00	2.60
Junc 67	3100	3	3.00	3.62 ←
Junc 27	2912	0	0.00	4.46
Junc 73	2917	0	0.00	8.67
Junc 91	3100	0	0.00	18.20
Junc 70	3010	0	0.00	27.72
Junc 53	2670	15	15.00	31.00
Junc 56	2670	15	15.00	31.00
Junc 5	2852	10	10.00	31.47
Junc 88	2852	0	0.00	31.47
Junc 103	2925	12	12.00	31.55

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 76	2900	0	0.00	34.00
Junc 89	2827	25	25.00	37.56
Junc 63	2980	0	0.00	40.69
Junc 1	2975	0	0.00	42.85
Junc 9	3300	15	15.00	43.70
Junc 48	2827	15	15.00	46.67
Junc 38	3000	10	10.00	46.69
Junc 21	2820	10	10.00	47.05
Junc 85	2826	0	0.00	47.10
Junc 69	2630	40	40.00	48.27
Junc 11	2773	0	0.00	49.00
Junc 17	2770	20	20.00	50.00
Junc 101	2930	9	9.00	52.76
Junc 102	2930	0	0.00	52.76
Junc 96	2760	5	5.00	54.16
Junc 77	2850	8	8.00	55.64
Junc 8	2820	1517	1517.00	57.51
Junc 47	2750	10	10.00	58.45
Junc 37	2856	10	10.00	62.67
Junc 90	2750	25	25.00	63.04
Junc 60	2850	20	20.00	64.13
Junc 129	2850	0	0.00	64.38

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 71	2925	5	5.00	64.49
Junc 3	2790	22	22.00	64.75
Junc 78	2825	8	8.00	66.41
Junc 100	2900	11	11.00	67.00
Junc 83	2780	15	15.00	67.09
Junc 72	2580	30	30.00	69.95
Junc 33	2580	11	11.00	70.00
Junc 31	2773	10	10.00	70.84
Junc 59	2880	19	19.00	73.01
Junc 42	2820	8	8.00	73.05
Junc 41	2820	8	8.00	74.70
Junc 75	2900	0	0.00	75.05
Junc 82	2710	30	30.00	75.93
Junc 30	2710	0	0.00	76.00
Junc 4	2756	20	20.00	76.78
Junc 79	2800	8	8.00	77.20
Junc 14	2743	15	15.00	79.13
Junc 46	2750	12	12.00	80.06
Junc 16	2800	10	10.00	83.56
Junc 134	2800	5	5.00	84.09
Junc 133	2800	5	5.00	84.09
Junc 43	2806	20	20.00	84.41

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 130	2800	10	10.00	84.87
Junc 131	2800	5	5.00	84.93
Junc 20	2730	40	40.00	85.51
Junc 40	2910	8	8.00	85.69
Junc 62	2540	20	20.00	87.30
Junc 128	2800	0	0.00	87.41
Junc 98	2900	9	9.00	87.74
Junc 132	2795	5	5.00	88.06
Junc 99	2785	0	0.00	88.22
Junc 50	2680	10	10.00	89.00
Junc 32	2680	0	0.00	89.06
Junc 92	2900	5	5.00	90.02
Junc 49	2970	0	0.00	92.72
Junc 127	2785	5	5.00	93.80
Junc 18	2660	25	25.00	97.59
Junc 22	2660	12	12.00	97.73
Junc 54	2675	20	20.00	97.80
Junc 55	2670	13	13.00	97.80
Junc 52	2670	20	20.00	99.94
Junc 24	2650	10	10.00	102.12
Junc 68	2500	30	30.00	104.60
Junc 135	2750	5	5.00	105.76

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 13	2680	15	15.00	107.71
Junc 121	2635	5	5.00	108.31
Junc 119	2630	5	5.00	110.57
Junc 125	2745	5	5.00	111.13
Junc 64	2980	0	0.00	111.92
Junc 10	2980	0	0.00	111.92
Junc 84	2680	10	10.00	112.56
Junc 51	2920	0	0.00	114.38
Junc 28	2620	12	12.00	115.06
Junc 2	2705	0	0.00	116.56
Junc 29	2705	20	20.00	116.56
Junc 7	2710	0	0.00	117.75
Junc 6	2912	8	8.00	118.08
Junc 36	2715	25	25.00	119.02
Junc 122	2610	5	5.00	119.14
Junc 94	2610	10	10.00	119.17
Junc 93	2610	10	10.00	119.21
Junc 81	2610	20	20.00	119.22
Junc 118	2610	0	0.00	119.23
Junc 65	3125	15	15.00	119.53
Junc 44	2680	15	15.00	119.81
Junc 124	2605	10	10.00	121.32

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 80	2600	20	20.00	123.46
Junc 123	2600	10	10.00	123.49
Junc 120	2600	10	10.00	123.50
Junc 45	2600	22	22.00	123.68
Junc 58	2820	10	10.00	124.70
Junc 95	2590	5	5.00	127.84
Junc 26	2590	20	20.00	128.04
Junc 12	2590	20	20.00	128.06
Junc 23	2880	25	25.00	131.70
Junc 15	2880	25	25.00	131.71
Junc 25	2880	15	15.00	131.72
Junc 61	2430	10	10.00	134.94
Junc 19	2560	15	15.00	140.85
Junc 97	2560	0	0.00	140.94
Junc 57	2411	16	16.00	143.17
Junc 39	2777	0	0.00	143.32
Junc 34	2580	0	0.00	149.29
Junc 74	2917	0	0.00	187.76
Junc 35	2800	0	0.00	259.98

MAX DAY

FIRE BOF

Network Table - Nodes

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 79	2800	1516	1516.00	-1590.80
Junc 78	2825	8	8.00	-905.06
Junc 77	2850	8	8.00	-640.52
Junc 76	2900	0	0.00	-596.48
Junc 75	2900	0	0.00	-596.48
Junc 104	3085	0	0.00	-397.41
Junc 87	2928	0	0.00	-0.43
Resvr 2ndGarrotteRes	2937	#N/A	0.00	0.00
Resvr BigCreekRes	2820	#N/A	-0.00	0.00
Junc 86	2928	0	0.00	0.00
Junc 71	2925	5	5.00	0.43
Junc 103	2925	12	12.00	0.43
Junc 63	2980	0	0.00	1.29
Junc 1	2975	0	0.00	3.45
Tank T2	2908	#N/A	1096.67	8.23
Tank T4	2912	#N/A	699.31	8.23
Junc 73	2917	0	0.00	8.67
Tank T3	3004	#N/A	-2834.98	9.10
Junc 66	3395	10	10.00	9.51
Tank T5	3395	#N/A	-40.00	9.53
Junc 27	2912	0	0.00	10.15

< 0.00 PSI

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Tank T1	3136	#N/A	-1669.84	10.40
Junc 67	3100	3	3.00	11.29
Junc 70	3010	0	0.00	25.44
Junc 91	3100	0	0.00	26.00
Junc 56	2670	15	15.00	31.00
Junc 53	2670	15	15.00	31.00
Junc 5	2852	10	10.00	37.19
Junc 88	2852	0	0.00	37.19
Junc 89	2827	25	25.00	43.19
Junc 48	2827	15	15.00	47.27
Junc 85	2826	0	0.00	47.70
Junc 69	2630	40	40.00	48.27
Junc 11	2773	0	0.00	49.00
Junc 17	2770	20	20.00	50.00
Junc 9	3300	15	15.00	50.63
Junc 21	2820	10	10.00	52.82
Junc 102	2930	0	0.00	54.00
Junc 96	2760	5	5.00	54.16
Junc 38	3000	10	10.00	54.36
Junc 47	2750	10	10.00	58.45
Junc 101	2930	9	9.00	59.21
Junc 60	2850	20	20.00	66.51

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 100	2900	11	11.00	67.00
Junc 83	2780	15	15.00	67.69
Junc 90	2750	25	25.00	68.68
Junc 37	2856	10	10.00	69.09
Junc 72	2580	30	30.00	69.95
Junc 33	2580	11	11.00	70.00
Junc 3	2790	22	22.00	70.63
Junc 129	2850	0	0.00	70.79
Junc 59	2880	19	19.00	75.56
Junc 82	2710	30	30.00	75.93
Junc 30	2710	0	0.00	76.00
Junc 31	2773	10	10.00	76.72
Junc 42	2820	8	8.00	78.01
Junc 41	2820	8	8.00	79.95
Junc 46	2750	12	12.00	80.66
Junc 4	2756	20	20.00	82.59
Junc 14	2743	15	15.00	84.88
Junc 62	2540	20	20.00	87.30
Junc 16	2800	10	10.00	88.90
Junc 50	2680	10	10.00	89.00
Junc 32	2680	0	0.00	89.06
Junc 43	2806	20	20.00	90.27

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 134	2800	5	5.00	90.46
Junc 133	2800	5	5.00	90.46
Junc 130	2800	10	10.00	91.25
Junc 20	2730	40	40.00	91.27
Junc 131	2800	5	5.00	91.31
Junc 64	2980	0	0.00	91.65
Junc 10	2980	0	0.00	91.65
Junc 99	2785	0	0.00	93.17
Junc 40	2910	8	8.00	93.37
Junc 128	2800	0	0.00	93.84
Junc 132	2795	5	5.00	94.46
Junc 18	2660	25	25.00	97.59
Junc 92	2900	5	5.00	97.69
Junc 22	2660	12	12.00	97.73
Junc 98	2900	9	9.00	97.84
Junc 49	2970	0	0.00	98.35
Junc 127	2785	5	5.00	100.23
Junc 8	2820	17	17.00	100.69
Junc 24	2650	10	10.00	102.12
Junc 54	2675	20	20.00	103.44
Junc 55	2670	13	13.00	103.44
Junc 68	2500	30	30.00	104.60

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 52	2670	20	20.00	105.57
Junc 121	2635	5	5.00	108.31
Junc 119	2630	5	5.00	110.57
Junc 135	2750	5	5.00	112.13
Junc 13	2680	15	15.00	113.48
Junc 84	2680	10	10.00	113.59
Junc 28	2620	12	12.00	115.06
Junc 125	2745	5	5.00	117.56
Junc 122	2610	5	5.00	119.14
Junc 94	2610	10	10.00	119.17
Junc 93	2610	10	10.00	119.21
Junc 81	2610	20	20.00	119.22
Junc 118	2610	0	0.00	119.23
Junc 51	2920	0	0.00	120.01
Junc 124	2605	10	10.00	121.32
Junc 44	2680	15	15.00	122.26
Junc 29	2705	20	20.00	122.75
Junc 2	2705	0	0.00	122.75
Junc 80	2600	20	20.00	123.46
Junc 123	2600	10	10.00	123.49
Junc 120	2600	10	10.00	123.50
Junc 45	2600	22	22.00	123.68

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 6	2912	8	8.00	123.72
Junc 7	2710	0	0.00	124.01
Junc 36	2715	25	25.00	125.35
Junc 65	3125	15	15.00	126.46
Junc 95	2590	5	5.00	127.84
Junc 26	2590	20	20.00	128.04
Junc 12	2590	20	20.00	128.06
Junc 58	2820	10	10.00	132.37
Junc 61	2430	10	10.00	134.94
Junc 23	2880	25	25.00	137.33
Junc 15	2880	25	25.00	137.35
Junc 25	2880	15	15.00	137.35
Junc 19	2560	15	15.00	140.85
Junc 97	2560	0	0.00	140.94
Junc 57	2411	16	16.00	143.17
Junc 39	2777	0	0.00	150.99
Junc 34	2580	0	0.00	155.04
Junc 74	2917	0	0.00	187.76
Junc 35	2800	0	0.00	259.98

MAX. DAY
PML-W FIRE

Network Table - Nodes

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 90	2750	1025	1025.00	-290.06
Junc 55	2670	13	13.00	-161.76
Junc 54	2675	20	20.00	-20.15
Junc 52	2670	20	20.00	-17.99
Junc 87	2928	0	0.00	-6.07
Resvr 2ndGarrotteRes	2937	#N/A	0.00	0.00
Resvr BigCreekRes	2820	#N/A	-0.00	0.00
Junc 86	2928	0	0.00	0.00
Junc 66	3395	10	10.00	2.58
Tank T2	2908	#N/A	96.99	2.60
Tank T1	3136	#N/A	-162.00	2.60
Tank T5	3395	#N/A	-40.00	2.60
Tank T3	3004	#N/A	-2710.02	2.60
Tank T4	2912	#N/A	574.03	2.60
Junc 27	2912	0	0.00	3.98
Junc 73	2917	0	0.00	8.67
Junc 67	3100	3	3.00	18.00
Junc 91	3100	0	0.00	18.20
Junc 104	3085	0	0.00	24.19
Junc 56	2670	15	15.00	29.39
Junc 53	2670	15	15.00	29.41

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 88	2852	0	0.00	30.73
Junc 5	2852	10	10.00	30.73
Junc 76	2900	0	0.00	34.00
Junc 89	2827	25	25.00	35.21
Junc 9	3300	15	15.00	43.70
Junc 21	2820	10	10.00	46.24
Junc 48	2827	15	15.00	46.67
Junc 69	2630	40	40.00	46.72
Junc 85	2826	0	0.00	47.10
Junc 11	2773	0	0.00	49.00
Junc 17	2770	20	20.00	50.00
Junc 102	2930	0	0.00	54.00
Junc 96	2760	5	5.00	54.16
Junc 77	2850	8	8.00	55.64
Junc 103	2925	12	12.00	55.79
Junc 70	3010	0	0.00	56.90
Junc 47	2750	10	10.00	58.45
Junc 38	3000	10	10.00	61.08
Junc 37	2856	10	10.00	62.58
Junc 3	2790	22	22.00	64.03
Junc 129	2850	0	0.00	64.27
Junc 78	2825	8	8.00	66.41

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 100	2900	11	11.00	67.00
Junc 83	2780	15	15.00	67.09
Junc 72	2580	30	30.00	68.38
Junc 63	2980	0	0.00	69.86
Junc 33	2580	11	11.00	70.00
Junc 31	2773	10	10.00	70.12
Junc 1	2975	0	0.00	72.03
Junc 42	2820	8	8.00	73.05
Junc 41	2820	8	8.00	74.70
Junc 59	2880	19	19.00	75.65
Junc 82	2710	30	30.00	75.93
Junc 4	2756	20	20.00	75.98
Junc 30	2710	0	0.00	76.00
Junc 79	2800	8	8.00	77.20
Junc 14	2743	15	15.00	77.51
Junc 46	2750	12	12.00	80.06
Junc 16	2800	10	10.00	83.56
Junc 134	2800	5	5.00	83.94
Junc 133	2800	5	5.00	83.94
Junc 20	2730	40	40.00	84.28
Junc 43	2806	20	20.00	84.41
Junc 130	2800	10	10.00	84.73

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 131	2800	5	5.00	84.80
Junc 62	2540	20	20.00	86.96
Junc 128	2800	0	0.00	87.33
Junc 132	2795	5	5.00	87.95
Junc 99	2785	0	0.00	88.22
Junc 60	2850	20	20.00	88.37
Junc 50	2680	10	10.00	89.00
Junc 32	2680	0	0.00	89.06
Junc 101	2930	9	9.00	91.53
Junc 49	2970	0	0.00	92.72
Junc 71	2925	5	5.00	93.67
Junc 127	2785	5	5.00	93.72
Junc 18	2660	25	25.00	97.59
Junc 22	2660	12	12.00	97.73
Junc 40	2910	8	8.00	100.08
Junc 8	2820	17	17.00	101.62
Junc 24	2650	10	10.00	102.12
Junc 68	2500	30	30.00	103.26
Junc 75	2900	0	0.00	104.23
Junc 92	2900	5	5.00	104.40
Junc 98	2900	9	9.00	104.62
Junc 135	2750	5	5.00	105.61

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 13	2680	15	15.00	106.58
Junc 121	2635	5	5.00	108.31
Junc 119	2630	5	5.00	110.57
Junc 125	2745	5	5.00	111.05
Junc 84	2680	10	10.00	112.56
Junc 51	2920	0	0.00	114.38
Junc 28	2620	12	12.00	115.06
Junc 2	2705	0	0.00	116.20
Junc 29	2705	20	20.00	116.20
Junc 7	2710	0	0.00	117.47
Junc 6	2912	8	8.00	118.08
Junc 36	2715	25	25.00	118.82
Junc 122	2610	5	5.00	119.14
Junc 94	2610	10	10.00	119.17
Junc 93	2610	10	10.00	119.21
Junc 81	2610	20	20.00	119.22
Junc 118	2610	0	0.00	119.23
Junc 65	3125	15	15.00	119.53
Junc 44	2680	15	15.00	119.81
Junc 124	2605	10	10.00	121.32
Junc 80	2600	20	20.00	123.46
Junc 123	2600	10	10.00	123.49

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 120	2600	10	10.00	123.50
Junc 45	2600	22	22.00	123.68
Junc 95	2590	5	5.00	127.84
Junc 26	2590	20	20.00	128.04
Junc 12	2590	20	20.00	128.06
Junc 64	2980	0	0.00	128.58
Junc 10	2980	0	0.00	128.58
Junc 23	2880	25	25.00	131.70
Junc 15	2880	25	25.00	131.71
Junc 25	2880	15	15.00	131.72
Junc 61	2430	10	10.00	134.25
Junc 58	2820	10	10.00	139.08
Junc 19	2560	15	15.00	140.85
Junc 97	2560	0	0.00	140.94
Junc 57	2411	16	16.00	141.96
Junc 34	2580	0	0.00	144.28
Junc 39	2777	0	0.00	157.71
Junc 74	2917	0	0.00	187.76
Junc 35	2800	0	0.00	259.98

MAX. DAY
GL-SE FIRE

Network Table - Nodes

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 92	2900	1005	1005.00	-163.64
Junc 38	3000	10	10.00	-112.92
Junc 40	2910	8	8.00	-58.60
Junc 58	2820	10	10.00	-10.49
Junc 87	2928	0	0.00	-6.07
Junc 86	2928	0	0.00	0.00
Resvr 2ndGarrotteRes	2937	#N/A	0.00	0.00
Resvr BigCreekRes	2820	#N/A	-0.00	0.00
Junc 39	2777	0	0.00	0.00
Junc 66	3395	10	10.00	2.58
Tank T5	3395	#N/A	-40.00	2.60
Tank T1	3136	#N/A	-1161.99	2.60
Tank T4	2912	#N/A	687.29	2.60
Tank T3	3004	#N/A	-2696.00	2.60
Tank T2	2908	#N/A	969.71	2.60
Junc 27	2912	0	0.00	4.46
Junc 73	2917	0	0.00	8.67
Junc 67	3100	3	3.00	10.68
Junc 104	3085	0	0.00	16.87
Junc 91	3100	0	0.00	18.20
Junc 53	2670	15	15.00	31.00

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 56	2670	15	15.00	31.00
Junc 5	2852	10	10.00	31.47
Junc 88	2852	0	0.00	31.47
Junc 76	2900	0	0.00	34.00
Junc 89	2827	25	25.00	37.56
Junc 9	3300	15	15.00	43.70
Junc 48	2827	15	15.00	46.67
Junc 21	2820	10	10.00	47.05
Junc 85	2826	0	0.00	47.10
Junc 69	2630	40	40.00	48.27
Junc 11	2773	0	0.00	49.00
Junc 70	3010	0	0.00	49.58
Junc 17	2770	20	20.00	50.00
Junc 102	2930	0	0.00	54.00
Junc 96	2760	5	5.00	54.16
Junc 77	2850	8	8.00	55.64
Junc 103	2925	12	12.00	55.79
Junc 47	2750	10	10.00	58.45
Junc 63	2980	0	0.00	62.54
Junc 37	2856	10	10.00	62.67
Junc 90	2750	25	25.00	63.04
Junc 129	2850	0	0.00	64.38

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 1	2975	0	0.00	64.71
Junc 3	2790	22	22.00	64.75
Junc 78	2825	8	8.00	66.41
Junc 100	2900	11	11.00	67.00
Junc 83	2780	15	15.00	67.09
Junc 72	2580	30	30.00	69.95
Junc 33	2580	11	11.00	70.00
Junc 31	2773	10	10.00	70.84
Junc 42	2820	8	8.00	73.05
Junc 41	2820	8	8.00	74.70
Junc 59	2880	19	19.00	75.65
Junc 82	2710	30	30.00	75.93
Junc 30	2710	0	0.00	76.00
Junc 4	2756	20	20.00	76.78
Junc 79	2800	8	8.00	77.20
Junc 14	2743	15	15.00	79.13
Junc 46	2750	12	12.00	80.06
Junc 16	2800	10	10.00	83.56
Junc 134	2800	5	5.00	84.09
Junc 133	2800	5	5.00	84.09
Junc 101	2930	9	9.00	84.21
Junc 43	2806	20	20.00	84.41

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 130	2800	10	10.00	84.87
Junc 131	2800	5	5.00	84.93
Junc 20	2730	40	40.00	85.51
Junc 71	2925	5	5.00	86.35
Junc 62	2540	20	20.00	87.30
Junc 128	2800	0	0.00	87.41
Junc 132	2795	5	5.00	88.06
Junc 99	2785	0	0.00	88.22
Junc 60	2850	20	20.00	88.37
Junc 50	2680	10	10.00	89.00
Junc 32	2680	0	0.00	89.06
Junc 49	2970	0	0.00	92.72
Junc 127	2785	5	5.00	93.80
Junc 75	2900	0	0.00	96.91
Junc 98	2900	9	9.00	97.30
Junc 18	2660	25	25.00	97.59
Junc 22	2660	12	12.00	97.73
Junc 54	2675	20	20.00	97.80
Junc 55	2670	13	13.00	97.80
Junc 52	2670	20	20.00	99.94
Junc 8	2820	17	17.00	101.62
Junc 24	2650	10	10.00	102.12

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 68	2500	30	30.00	104.60
Junc 135	2750	5	5.00	105.76
Junc 13	2680	15	15.00	107.71
Junc 121	2635	5	5.00	108.31
Junc 119	2630	5	5.00	110.57
Junc 125	2745	5	5.00	111.13
Junc 84	2680	10	10.00	112.56
Junc 51	2920	0	0.00	114.38
Junc 28	2620	12	12.00	115.06
Junc 29	2705	20	20.00	116.56
Junc 2	2705	0	0.00	116.56
Junc 10	2980	0	0.00	116.70
Junc 64	2980	0	0.00	116.70
Junc 7	2710	0	0.00	117.75
Junc 6	2912	8	8.00	118.08
Junc 36	2715	25	25.00	119.02
Junc 122	2610	5	5.00	119.14
Junc 94	2610	10	10.00	119.17
Junc 93	2610	10	10.00	119.21
Junc 81	2610	20	20.00	119.22
Junc 118	2610	0	0.00	119.23
Junc 65	3125	15	15.00	119.53

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 44	2680	15	15.00	119.81
Junc 124	2605	10	10.00	121.32
Junc 80	2600	20	20.00	123.46
Junc 123	2600	10	10.00	123.49
Junc 120	2600	10	10.00	123.50
Junc 45	2600	22	22.00	123.68
Junc 95	2590	5	5.00	127.84
Junc 26	2590	20	20.00	128.04
Junc 12	2590	20	20.00	128.06
Junc 23	2880	25	25.00	131.70
Junc 15	2880	25	25.00	131.71
Junc 25	2880	15	15.00	131.72
Junc 61	2430	10	10.00	134.94
Junc 19	2560	15	15.00	140.85
Junc 97	2560	0	0.00	140.94
Junc 57	2411	16	16.00	143.17
Junc 34	2580	0	0.00	149.29
Junc 74	2917	0	0.00	187.76
Junc 35	2800	0	0.00	259.98

MAX. DAY
PMC-C FIRE

Network Table - Nodes

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 121	2635	1005	1005.00	-32.74
Junc 87	2928	0	0.00	-6.07
Resvr 2ndGarrotteRes	2937	#N/A	0.00	0.00
Resvr BigCreekRes	2820	#N/A	-0.00	0.00
Junc 86	2928	0	0.00	0.00
Junc 66	3395	10	10.00	2.58
Tank T4	2912	#N/A	589.09	2.60
Tank T5	3395	#N/A	-40.00	2.60
Tank T1	3136	#N/A	-162.00	2.60
Tank T2	2908	#N/A	771.88	2.60
Tank T3	3004	#N/A	-3399.97	2.60
Junc 27	2912	0	0.00	4.04
Junc 73	2917	0	0.00	8.67
Junc 67	3100	3	3.00	18.00
Junc 91	3100	0	0.00	18.20
Junc 104	3085	0	0.00	24.19
Junc 96	2760	5	5.00	24.29
Junc 5	2852	10	10.00	30.82
Junc 88	2852	0	0.00	30.82
Junc 53	2670	15	15.00	31.00
Junc 56	2670	15	15.00	31.00

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 76	2900	0	0.00	34.00
Junc 89	2827	25	25.00	37.56
Junc 122	2610	5	5.00	38.73
Junc 9	3300	15	15.00	43.70
Junc 48	2827	15	15.00	45.85
Junc 21	2820	10	10.00	46.05
Junc 85	2826	0	0.00	46.28
Junc 69	2630	40	40.00	48.27
Junc 11	2773	0	0.00	49.00
Junc 17	2770	20	20.00	50.00
Junc 102	2930	0	0.00	54.00
Junc 77	2850	8	8.00	55.64
Junc 103	2925	12	12.00	55.79
Junc 70	3010	0	0.00	56.90
Junc 47	2750	10	10.00	58.45
Junc 38	3000	10	10.00	61.08
Junc 37	2856	10	10.00	61.10
Junc 129	2850	0	0.00	62.47
Junc 3	2790	22	22.00	62.85
Junc 90	2750	25	25.00	63.04
Junc 83	2780	15	15.00	66.24
Junc 78	2825	8	8.00	66.41

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 100	2900	11	11.00	67.00
Junc 42	2820	8	8.00	68.58
Junc 31	2773	10	10.00	68.94
Junc 63	2980	0	0.00	69.86
Junc 72	2580	30	30.00	69.95
Junc 33	2580	11	11.00	70.00
Junc 41	2820	8	8.00	70.10
Junc 1	2975	0	0.00	72.03
Junc 82	2710	30	30.00	74.52
Junc 16	2800	10	10.00	74.88
Junc 4	2756	20	20.00	75.38
Junc 59	2880	19	19.00	75.65
Junc 30	2710	0	0.00	76.00
Junc 79	2800	8	8.00	77.20
Junc 14	2743	15	15.00	78.29
Junc 46	2750	12	12.00	79.21
Junc 134	2800	5	5.00	81.44
Junc 133	2800	5	5.00	81.44
Junc 43	2806	20	20.00	81.77
Junc 130	2800	10	10.00	82.49
Junc 131	2800	5	5.00	82.59
Junc 99	2785	0	0.00	83.74

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 20	2730	40	40.00	84.54
Junc 128	2800	0	0.00	86.03
Junc 132	2795	5	5.00	86.10
Junc 62	2540	20	20.00	87.30
Junc 60	2850	20	20.00	88.37
Junc 50	2680	10	10.00	89.00
Junc 32	2680	0	0.00	89.06
Junc 124	2605	10	10.00	91.45
Junc 101	2930	9	9.00	91.53
Junc 127	2785	5	5.00	92.39
Junc 49	2970	0	0.00	92.72
Junc 71	2925	5	5.00	93.67
Junc 18	2660	25	25.00	95.93
Junc 22	2660	12	12.00	97.73
Junc 54	2675	20	20.00	97.80
Junc 55	2670	13	13.00	97.80
Junc 123	2600	10	10.00	98.38
Junc 52	2670	20	20.00	99.94
Junc 40	2910	8	8.00	100.08
Junc 119	2630	5	5.00	100.31
Junc 8	2820	17	17.00	101.62
Junc 94	2610	10	10.00	101.67

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 24	2650	10	10.00	102.12
Junc 120	2600	10	10.00	102.96
Junc 135	2750	5	5.00	103.11
Junc 75	2900	0	0.00	104.23
Junc 92	2900	5	5.00	104.40
Junc 68	2500	30	30.00	104.60
Junc 98	2900	9	9.00	104.62
Junc 13	2680	15	15.00	106.64
Junc 118	2610	0	0.00	108.98
Junc 125	2745	5	5.00	109.72
Junc 95	2590	5	5.00	110.33
Junc 93	2610	10	10.00	110.58
Junc 84	2680	10	10.00	111.13
Junc 2	2705	0	0.00	112.22
Junc 29	2705	20	20.00	112.22
Junc 7	2710	0	0.00	112.87
Junc 81	2610	20	20.00	114.36
Junc 51	2920	0	0.00	114.38
Junc 28	2620	12	12.00	115.06
Junc 36	2715	25	25.00	115.56
Junc 44	2680	15	15.00	116.41
Junc 6	2912	8	8.00	118.08

Node ID	Elevation ft	Base Demand GPM	Demand GPM	Pressure psi
Junc 65	3125	15	15.00	119.53
Junc 80	2600	20	20.00	123.46
Junc 45	2600	22	22.00	123.68
Junc 10	2980	0	0.00	124.45
Junc 64	2980	0	0.00	124.45
Junc 26	2590	20	20.00	128.04
Junc 12	2590	20	20.00	128.06
Junc 23	2880	25	25.00	131.70
Junc 15	2880	25	25.00	131.71
Junc 25	2880	15	15.00	131.72
Junc 61	2430	10	10.00	134.94
Junc 97	2560	0	0.00	135.55
Junc 58	2820	10	10.00	139.08
Junc 19	2560	15	15.00	140.85
Junc 57	2411	16	16.00	143.17
Junc 34	2580	0	0.00	148.46
Junc 39	2777	0	0.00	157.71
Junc 74	2917	0	0.00	187.76
Junc 35	2800	0	0.00	259.98

BALANCED WATER SYSTEM

AREAS OF HIGH VELOCITY

Peak Hour Demand

Network Table - Links

Link ID	Diameter in	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
Pipe 113	6	0.00	0.00	0.00	Closed
Pipe 42	16	0.00	0.00	0.00	Closed
Pipe 96	8	0.00	0.00	0.00	Closed
Pipe 104	8	0.00	0.00	0.00	Closed
Pipe 69	6	0.00	0.00	0.00	Closed
Pipe 144	8	0.00	0.00	0.00	Closed
Pump P3	#N/A	0.00	0.00	-580.00	Open
Pump P2	#N/A	0.00	0.00	0.00	Closed
Pipe 14	6	0.00	0.00	0.00	Closed
Valve PRVGL02	4	0.00	0.00	0.00	Closed
Pump P5	#N/A	0.00	0.00	0.00	Closed
Pump P1	#N/A	0.00	0.00	-413.34	Open
Pump P4	#N/A	146.00	0.00	-266.10	Open
Pipe 11	6	0.00	0.00	0.00	Open
Pipe 94	8	0.00	0.00	0.00	Open
Pipe 5	6	0.00	0.00	0.00	Open
Pipe 18	8	0.00	0.00	0.00	Open
Pipe 52	6	1.57	0.02	0.00	Open
Pipe 72	6	1.83	0.02	0.00	Open
Pipe 149	4	1.66	0.04	0.00	Open
Pipe 120	6	-6.29	0.07	0.01	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
Pipe 54	6	6.76	0.08	0.01	Open
Pipe 63	6	6.76	0.08	0.01	Open
Pipe 10	6	7.33	0.08	0.01	Open
Pipe 59	10	25.72	0.11	0.00	Open
Pipe 64	6	-9.41	0.11	0.02	Open
Pipe 56	6	10.00	0.11	0.02	Open
Pipe 126	6	-10.00	0.11	0.02	Open
Pipe 123	6	10.00	0.11	0.02	Open
Pipe 125	6	10.00	0.11	0.02	Open
Pipe 118	6	-10.00	0.11	0.02	Open
Pipe 131	6	-10.00	0.11	0.02	Open
Pipe 116	6	-10.00	0.11	0.02	Open
Pipe 86	6	-12.11	0.14	0.02	Open
Pipe 45	6	-12.32	0.14	0.03	Open
Pipe 33	6	12.47	0.14	0.03	Open
Valve PRV6	4	5.56	0.14	49.16	Active
Pipe 46	6	13.09	0.15	0.03	Open
Pipe 57	6	13.53	0.15	0.03	Open
Pipe 41	6	14.01	0.16	0.03	Open
Pipe 87	6	-14.44	0.16	0.03	Open
Pipe 102	6	-17.97	0.20	0.05	Open
Pipe 132	6	-20.00	0.23	0.06	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
Pipe 119	6	-20.00	0.23	0.09	Open
Pipe 105	10	-55.72	0.23	0.03	Open
Pipe 78	8	-36.67	0.23	0.05	Open
Pipe 62	6	22.94	0.26	0.08	Open
Pipe 74	6	-23.44	0.27	0.08	Open
Pipe 32	6	24.15	0.27	0.09	Open
Pipe 79	8	-44.56	0.28	0.07	Open
Pipe 76	8	-46.00	0.29	0.07	Open
Pipe 114	6	26.29	0.30	0.10	Open
Pipe 88	6	26.62	0.30	0.10	Open
Pipe 1	6	-26.62	0.30	0.10	Open
Pipe 47	6	-27.06	0.31	0.11	Open
Pipe 8	4	-12.09	0.31	0.17	Open
Pipe 44	6	-27.56	0.31	0.11	Open
Pipe 89	6	-27.82	0.32	0.11	Open
Pipe 67	6	-28.57	0.32	0.12	Open
Pipe 15	6	29.33	0.33	0.12	Open
Pipe 53	6	-29.34	0.33	0.12	Open
Pipe 106	6	29.56	0.34	0.13	Open
Pipe 55	6	-30.00	0.34	0.13	Open
Pipe 73	6	30.54	0.35	0.13	Open
Pipe 99	4	13.90	0.35	0.23	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
Pipe 91	6	32.25	0.37	0.15	Open
Pipe 6	8	-58.00	0.37	0.11	Open
Pipe 68	6	35.21	0.40	0.17	Open
Pipe 142	6	35.54	0.40	0.18	Open
Pipe 101	4	16.00	0.41	0.29	Open
Pipe 90	6	-37.33	0.42	0.20	Open
Pipe 100	4	18.10	0.46	0.37	Open
Pipe 37	6	41.54	0.47	0.24	Open
Pipe 95	6	-43.28	0.49	0.26	Open
Pipe 124	6	-43.71	0.50	0.26	Open
Pipe 115	6	46.00	0.52	0.28	Open
Pipe 50	6	46.29	0.53	0.29	Open
Pipe 130	6	46.94	0.53	0.30	Open
Pipe 26	8	84.44	0.54	0.22	Open
Pipe 49	6	48.00	0.54	0.31	Open
Pipe 98	6	48.00	0.54	0.31	Open
Pipe 12	6	48.00	0.54	0.31	Open
Pipe 117	6	-50.00	0.57	0.33	Open
Pipe 145	6	50.09	0.57	0.34	Open
Pipe 9	4	-22.67	0.58	0.56	Open
Pipe 150	4	24.00	0.61	0.62	Open
Pipe 82	8	-96.67	0.62	0.28	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
Valve PRV5	4	24.30	0.62	36.19	Active
Pipe 75	6	-54.73	0.62	0.40	Open
Pipe 66	6	54.87	0.62	0.40	Open
Pipe 110	6	-55.80	0.63	0.42	Open
Pipe 109	6	55.80	0.63	0.41	Open
Pipe 136	6	-56.29	0.64	0.42	Open
Pipe 135	6	56.29	0.64	0.42	Open
Pipe 4	6	-58.00	0.66	0.44	Open
Pipe 143	6	-58.17	0.66	0.44	Open
Pipe 2	6	63.53	0.72	0.52	Open
Pipe 127	12	-256.13	0.73	0.33	Open
Pipe 23	6	64.29	0.73	0.53	Open
Pipe 39	6	64.65	0.73	0.54	Open
Pipe 7	4	-29.02	0.74	0.88	Open
Pipe 80	6	-66.00	0.75	0.56	Open
Pipe 25	24	1057.84	0.75	0.12	Open
Pipe 16	6	-66.47	0.75	0.57	Open
Pipe 122	6	73.71	0.84	0.69	Open
Pipe 35	6	73.86	0.84	0.69	Open
Pipe 148	4	34.98	0.89	1.25	Open
Pipe 92	6	80.00	0.91	0.80	Open
Pipe 28	6	-83.19	0.94	0.86	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
Pipe 31	6	-89.68	1.02	0.99	Open
Pipe 83	8	160.25	1.02	0.71	Open
Pipe 146	6	91.75	1.04	1.03	Open
Pipe 27	6	-92.87	1.05	1.05	Open
Pipe 147	6	102.25	1.16	1.26	Open
Valve PRVBOF	4	48.00	1.23	158.25	Active
Pipe 3	4	-50.94	1.30	2.50	Open
Pipe 107	6	-115.28	1.31	1.57	Open
Pipe 40	6	-118.67	1.35	1.66	Open
Pipe 103	6	-121.25	1.38	1.73	Open
Pipe 36	6	-137.49	1.56	2.18	Open
Pipe 134	6	139.19	1.58	2.23	Open
Pipe 70	6	155.41	1.76	2.74	Open
Pipe 34	6	158.46	1.80	2.84	Open
Valve PRVGL01	4	73.75	1.88	85.43	Active
Pipe 112	10	461.33	1.88	1.70	Open
Pipe 133	6	-169.19	1.92	3.20	Open
Pipe 19	10	-506.17	2.07	2.02	Open
Pipe 121	10	506.17	2.07	2.02	Open
Pipe 93	8	-324.00	2.07	2.63	Open
Valve PRVGL03	4	84.25	2.15	84.64	Active
Valve PRV10	4	85.53	2.18	90.01	Active

Link ID	Diameter in	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
Pipe 29	10	-581.97	2.38	2.62	Open
Pipe 17	6	210.09	2.38	4.78	Open
Pipe 71	6	-215.92	2.45	5.03	Open
Pipe 129	6	226.13	2.57	5.48	Open
Pipe 128	6	236.13	2.68	5.94	Open
Pipe 30	10	-691.65	2.83	3.61	Open
Pipe 13	12	1032.13	2.93	4.37	Open
Valve PRV3	4	115.41	2.95	124.07	Active
Valve PRV4	4	118.67	3.03	174.39	Active
Pipe 140	12	1081.00	3.07	3.40	Open
Pipe 139	12	1081.00	3.07	3.40	Open
Pipe 138	12	1101.00	3.12	3.51	Open
Pipe 141	12	1107.95	3.14	3.55	Open
Pipe 43	12	1111.60	3.15	3.58	Open
Pipe 48	12	-1197.14	3.40	4.10	Open
Valve PRV8	4	138.46	3.54	41.90	Active
Pipe 21	10	-869.15	3.55	5.51	Open
Valve PRV7	4	139.92	3.57	106.23	Active
Pipe 137	12	1357.14	3.85	5.17	Open
Valve PRV2	4	168.73	4.31	66.98	Active
Pipe 20	10	1057.84	4.32	7.93	Open
Pipe 24	10	-1071.60	4.38	8.12	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
Pipe 111	6	411.33	4.67	16.60	Open
Pipe 108	10	-1167.40	4.77	9.52	Open
Pipe 60	10	1366.13	5.58	12.73	Open
Valve PRV11	4	219.42	5.60	103.39	Active
Pipe 38	10	1382.13	5.65	13.01	Open
Pipe 65	10	-1427.46	5.83	13.81	Open
Valve PSVT2	8	1057.84	6.75	14.00	Active
Pipe 51	10	1677.55	6.85	18.62	Open
Valve PRV9	6	1111.60	12.61	0.00	Open
Valve PRV1	6	1382.13	15.68	0.00	Open

Max - Day
GL-C Fire

Network Table - Links

Link ID	Diameter in	Flow GPM	Velocity fps	Status
Pipe 69	6	0.00	0.00	Closed
Pipe 113	6	0.00	0.00	Closed
Pipe 42	16	0.00	0.00	Closed
Pipe 104	8	0.00	0.00	Closed
Pipe 14	6	0.00	0.00	Closed
Pipe 96	8	0.00	0.00	Closed
Pipe 144	8	0.00	0.00	Closed
Pump P3	#N/A	0.00	0.00	Open
Valve PRV5	4	0.00	0.00	Closed
Valve PRV6	4	0.00	0.00	Closed
Valve PRVGL02	4	0.00	0.00	Closed
Pump P2	#N/A	0.00	0.00	Closed
Pump P5	#N/A	0.00	0.00	Closed
Pump P1	#N/A	0.00	0.00	Open
Pump P4	#N/A	73.00	0.00	Open
Pipe 32	6	0.00	0.00	Open
Pipe 94	8	0.00	0.00	Open
Pipe 11	6	0.00	0.00	Open
Pipe 5	6	0.00	0.00	Open
Pipe 18	8	0.00	0.00	Open
Pipe 72	6	1.13	0.01	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Status
Pipe 118	12	-5.00	0.01	Open
Pipe 33	6	1.26	0.01	Open
Pipe 120	6	-3.19	0.04	Open
Pipe 54	6	3.38	0.04	Open
Pipe 63	6	3.38	0.04	Open
Pipe 10	6	3.66	0.04	Open
Pipe 64	6	-4.71	0.05	Open
Pipe 123	6	5.00	0.06	Open
Pipe 116	6	-5.00	0.06	Open
Pipe 56	6	5.00	0.06	Open
Pipe 131	6	-5.00	0.06	Open
Pipe 126	6	-5.00	0.06	Open
Pipe 125	6	5.00	0.06	Open
Pipe 86	6	-6.14	0.07	Open
Pipe 57	6	6.76	0.08	Open
Pipe 102	6	-8.78	0.10	Open
Pipe 87	6	-10.00	0.11	Open
Pipe 132	6	-10.00	0.11	Open
Pipe 119	6	-10.00	0.11	Open
Pipe 78	8	-18.72	0.12	Open
Pipe 62	6	11.47	0.13	Open
Pipe 74	6	-11.62	0.13	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Status
Pipe 106	6	12.00	0.14	Open
Pipe 79	8	-22.59	0.14	Open
Pipe 76	8	-23.00	0.15	Open
Pipe 114	6	13.19	0.15	Open
Pipe 1	6	-13.25	0.15	Open
Pipe 45	6	-13.26	0.15	Open
Pipe 47	6	-13.53	0.15	Open
Pipe 67	6	-14.25	0.16	Open
Pipe 53	6	14.44	0.16	Open
Pipe 88	6	14.67	0.17	Open
Pipe 55	6	-15.00	0.17	Open
Pipe 73	6	15.16	0.17	Open
Pipe 89	6	-15.33	0.17	Open
Pipe 99	4	6.95	0.18	Open
Pipe 41	6	15.91	0.18	Open
Pipe 91	6	16.20	0.18	Open
Pipe 6	8	-29.00	0.19	Open
Pipe 46	6	16.84	0.19	Open
Pipe 142	6	17.80	0.20	Open
Pipe 68	6	17.88	0.20	Open
Pipe 101	4	8.00	0.20	Open
Pipe 90	6	-18.67	0.21	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Status
Pipe 52	6	19.60	0.22	Open
Pipe 100	4	9.05	0.23	Open
Pipe 95	6	-21.60	0.25	Open
Pipe 124	6	-21.81	0.25	Open
Pipe 115	6	23.00	0.26	Open
Pipe 50	6	23.19	0.26	Open
Pipe 44	6	-23.68	0.27	Open
Pipe 98	6	24.00	0.27	Open
Pipe 49	6	-24.00	0.27	Open
Pipe 12	6	24.00	0.27	Open
Pipe 117	6	-25.00	0.28	Open
Pipe 26	8	45.00	0.29	Open
Pipe 9	4	-11.34	0.29	Open
Pipe 150	4	12.00	0.31	Open
Pipe 75	6	-27.25	0.31	Open
Pipe 66	6	27.37	0.31	Open
Pipe 82	8	-48.72	0.31	Open
Pipe 136	6	-28.19	0.32	Open
Pipe 135	6	28.19	0.32	Open
Pipe 4	6	-29.00	0.33	Open
Pipe 143	6	-29.00	0.33	Open
Pipe 59	10	81.97	0.33	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Status
Valve PRV10	4	13.76	0.35	Active
Pipe 2	6	31.76	0.36	Open
Pipe 23	6	32.42	0.37	Open
Pipe 80	6	-33.00	0.37	Open
Pipe 16	6	-33.24	0.38	Open
Pipe 37	6	34.66	0.39	Open
Pipe 105	10	-96.97	0.40	Open
Pipe 122	6	36.81	0.42	Open
Pipe 92	6	40.00	0.45	Open
Pipe 110	6	47.81	0.54	Open
Pipe 109	6	-47.81	0.54	Open
Pipe 130	6	52.21	0.59	Open
Pipe 39	6	52.52	0.60	Open
Valve PRVBOF	4	24.00	0.61	Active
Pipe 127	12	-217.04	0.62	Open
Pipe 31	6	-56.00	0.64	Open
Pipe 35	6	57.91	0.66	Open
Pipe 40	6	-59.72	0.68	Open
Pipe 103	6	-60.38	0.69	Open
Pipe 15	6	-66.00	0.75	Open
Pipe 25	24	1199.99	0.85	Open
Pipe 70	6	77.53	0.88	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Status
Pipe 112	10	230.28	0.94	Open
Pipe 28	6	-106.53	1.21	Open
Pipe 71	6	-107.75	1.22	Open
Pipe 34	6	120.44	1.37	Open
Pipe 36	6	-121.53	1.38	Open
Pipe 27	6	-122.53	1.39	Open
Pipe 107	6	-123.97	1.41	Open
Valve PRV3	4	57.53	1.47	Active
Pipe 134	6	129.82	1.47	Open
Valve PRV4	4	59.72	1.52	Active
Pipe 133	6	-144.82	1.64	Open
Valve PRV7	4	69.75	1.78	Active
Pipe 149	4	79.60	2.03	Open
Pipe 17	6	185.38	2.10	Open
Valve PRV2	4	87.42	2.23	Active
Pipe 129	6	202.04	2.29	Open
Pipe 111	6	205.28	2.33	Open
Pipe 128	6	207.04	2.35	Open
Pipe 139	12	959.17	2.72	Open
Pipe 140	12	959.17	2.72	Open
Pipe 138	12	969.17	2.75	Open
Valve PRV11	4	109.38	2.79	Active

Link ID	Diameter in	Flow GPM	Velocity fps	Status
Valve PRV8	4	110.44	2.82	Active
Pipe 141	12	1001.38	2.84	Open
Pipe 29	10	-722.48	2.95	Open
Pipe 43	12	1092.44	3.10	Open
Pipe 121	10	760.29	3.11	Open
Pipe 19	10	-760.29	3.11	Open
Pipe 48	12	-1106.20	3.14	Open
Pipe 13	12	1118.03	3.17	Open
Pipe 30	10	-788.48	3.22	Open
Pipe 137	12	1186.20	3.37	Open
Pipe 21	10	-930.01	3.80	Open
Pipe 7	4	151.72	3.87	Open
Pipe 145	6	349.58	3.97	Open
Pipe 24	10	-1072.45	4.38	Open
Pipe 148	4	183.72	4.69	Open
Pipe 20	10	1199.99	4.90	Open
Pipe 146	6	449.13	5.10	Open
Pipe 108	10	-1251.99	5.11	Open
Pipe 65	10	-1304.41	5.33	Open
Pipe 60	10	1354.41	5.53	Open
Pipe 38	10	1362.41	5.57	Open
Pipe 51	10	1509.80	6.17	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Status
Pipe 83	8	1176.82	7.51	Open
Valve PSVT2	8	1199.99	7.66	Active
Pipe 8	4	-330.58	8.44	Open
Pipe 93	8	-1661.95	10.61	Open
Valve PRVGL01	4	440.13	11.24	Active
Valve PRV9	6	1092.45	12.40	Open
Pipe 147	6	1147.82	13.02	Open
Valve PRV1	6	1362.41	15.46	Open
Pipe 3	4	-1034.70	26.42	Open
Valve PRVGL03	4	1138.82	29.08	Open

Network Table - Links

Max. Day
Fire BoF

Link ID	Diameter in	Flow GPM	Velocity fps	Status
Pipe 113	6	0.00	0.00	Closed
Pipe 42	16	0.00	0.00	Closed
Pipe 96	8	0.00	0.00	Closed
Pipe 69	6	0.00	0.00	Closed
Pipe 14	6	0.00	0.00	Closed
Pipe 144	8	0.00	0.00	Closed
Pipe 104	8	0.00	0.00	Closed
Pump P2	#N/A	0.00	0.00	Closed
Valve PRV5	4	0.00	0.00	Closed
Valve PRV6	4	0.00	0.00	Closed
Pump P4	#N/A	73.00	0.00	Open
Pump P3	#N/A	0.00	0.00	Open
Pump P5	#N/A	0.00	0.00	Closed
Pump P1	#N/A	0.00	0.00	Open
Pipe 32	6	0.00	0.00	Open
Pipe 94	8	0.00	0.00	Open
Pipe 18	8	0.00	0.00	Open
Pipe 5	6	0.00	0.00	Open
Pipe 11	6	-0.00	0.00	Open
Pipe 72	6	1.13	0.01	Open
Pipe 33	6	1.26	0.01	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Status
Pipe 120	6	-3.19	0.04	Open
Pipe 54	6	3.38	0.04	Open
Pipe 63	6	3.38	0.04	Open
Pipe 10	6	3.66	0.04	Open
Pipe 149	4	1.75	0.04	Open
Pipe 64	6	-4.71	0.05	Open
Pipe 123	6	5.00	0.06	Open
Pipe 118	6	-5.00	0.06	Open
Pipe 116	6	-5.00	0.06	Open
Pipe 131	6	-5.00	0.06	Open
Pipe 126	6	-5.00	0.06	Open
Pipe 125	6	5.00	0.06	Open
Pipe 56	6	5.00	0.06	Open
Pipe 86	6	-6.14	0.07	Open
Pipe 57	6	6.76	0.08	Open
Pipe 102	6	-8.78	0.10	Open
Pipe 87	6	-10.00	0.11	Open
Pipe 119	6	-10.00	0.11	Open
Pipe 132	6	-10.00	0.11	Open
Pipe 78	8	-18.72	0.12	Open
Pipe 62	6	11.47	0.13	Open
Pipe 74	6	-11.62	0.13	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Status
Pipe 106	6	12.00	0.14	Open
Pipe 79	8	-22.59	0.14	Open
Pipe 76	8	-23.00	0.15	Open
Pipe 114	6	13.19	0.15	Open
Pipe 1	6	-13.25	0.15	Open
Pipe 45	6	-13.26	0.15	Open
Pipe 47	6	-13.53	0.15	Open
Pipe 67	6	-14.25	0.16	Open
Pipe 53	6	14.44	0.16	Open
Pipe 88	6	14.67	0.17	Open
Pipe 55	6	-15.00	0.17	Open
Pipe 73	6	15.16	0.17	Open
Pipe 89	6	-15.33	0.17	Open
Pipe 41	6	15.91	0.18	Open
Pipe 91	6	16.20	0.18	Open
Pipe 46	6	16.84	0.19	Open
Pipe 142	6	17.80	0.20	Open
Pipe 68	6	17.88	0.20	Open
Pipe 90	6	-18.67	0.21	Open
Pipe 52	6	19.60	0.22	Open
Pipe 95	6	-21.60	0.25	Open
Pipe 124	6	-21.81	0.25	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Status
Pipe 115	6	23.00	0.26	Open
Pipe 50	6	23.19	0.26	Open
Pipe 44	6	-23.68	0.27	Open
Pipe 117	6	-25.00	0.28	Open
Pipe 26	8	45.00	0.29	Open
Pipe 9	4	-11.34	0.29	Open
Pipe 75	6	-27.25	0.31	Open
Pipe 66	6	27.37	0.31	Open
Pipe 82	8	-48.72	0.31	Open
Pipe 135	6	28.19	0.32	Open
Pipe 136	6	-28.19	0.32	Open
Pipe 143	6	-29.00	0.33	Open
Valve PRV10	4	13.76	0.35	Active
Pipe 2	6	31.76	0.36	Open
Pipe 23	6	32.42	0.37	Open
Pipe 80	6	-33.00	0.37	Open
Pipe 16	6	-33.24	0.38	Open
Pipe 59	10	94.56	0.39	Open
Pipe 37	6	34.66	0.39	Open
Pipe 122	6	36.81	0.42	Open
Pipe 105	10	-109.56	0.45	Open
Pipe 92	6	40.00	0.45	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Status
Pipe 110	6	49.33	0.56	Open
Pipe 109	6	-49.33	0.56	Open
Pipe 39	6	52.52	0.60	Open
Pipe 130	6	52.89	0.60	Open
Pipe 127	12	-219.14	0.62	Open
Pipe 31	6	-56.18	0.64	Open
Pipe 35	6	57.91	0.66	Open
Pipe 40	6	-59.72	0.68	Open
Pipe 145	6	60.10	0.68	Open
Pipe 103	6	-60.38	0.69	Open
Pipe 70	6	77.53	0.88	Open
Pipe 15	6	-80.51	0.91	Open
Pipe 146	6	82.45	0.94	Open
Pipe 112	10	230.28	0.94	Open
Pipe 25	24	1326.94	0.94	Open
Pipe 8	4	-41.10	1.05	Open
Pipe 71	6	-107.75	1.22	Open
Pipe 28	6	-107.87	1.22	Open
Pipe 34	6	120.44	1.37	Open
Pipe 36	6	-122.87	1.39	Open
Pipe 27	6	-124.05	1.41	Open
Valve PRV3	4	57.53	1.47	Active

Link ID	Diameter in	Flow GPM	Velocity fps	Status
Pipe 134	6	131.25	1.49	Open
Valve PRV4	4	59.72	1.52	Active
Pipe 107	6	-136.56	1.55	Open
Pipe 133	6	-146.25	1.66	Open
Valve PRV7	4	69.75	1.78	Active
Valve PRVGL01	4	73.45	1.88	Active
Valve PRV2	4	87.42	2.23	Active
Pipe 17	6	199.89	2.27	Open
Pipe 129	6	204.14	2.32	Open
Pipe 111	6	205.28	2.33	Open
Pipe 128	6	209.14	2.37	Open
Pipe 140	12	969.08	2.75	Open
Pipe 139	12	969.08	2.75	Open
Pipe 138	12	979.08	2.78	Open
Valve PRV11	4	109.38	2.79	Active
Valve PRV8	4	110.44	2.82	Active
Pipe 141	12	1011.98	2.87	Open
Pipe 29	10	-732.98	2.99	Open
Pipe 43	12	1104.47	3.13	Open
Pipe 19	10	-772.31	3.15	Open
Pipe 121	10	772.31	3.15	Open
Pipe 48	12	-1118.23	3.17	Open

Link ID	Diameter in	Flow GPM	Velocity fps	Status
Pipe 30	10	-799.16	3.26	Open
Pipe 137	12	1198.23	3.40	Open
Pipe 3	4	-134.03	3.42	Open
Pipe 13	12	1232.38	3.50	Open
Pipe 147	6	319.31	3.62	Open
Pipe 21	10	-942.04	3.85	Open
Pipe 7	4	-158.13	4.04	Open
Pipe 24	10	-1084.47	4.43	Open
Pipe 148	4	178.79	4.56	Open
Pipe 20	10	1326.94	5.42	Open
Pipe 108	10	-1378.94	5.63	Open
Pipe 65	10	-1416.86	5.79	Open
Pipe 60	10	1481.37	6.05	Open
Pipe 38	10	1489.37	6.08	Open
Pipe 51	10	1636.75	6.69	Open
Valve PRVGL02	4	304.92	7.78	Open
Pipe 6	8	-1232.08	7.86	Open
Valve PRVGL03	4	310.31	7.92	Active
Pipe 150	4	316.92	8.09	Open
Valve PSVT2	8	1326.94	8.47	Active
Pipe 83	8	1551.39	9.90	Open
Pipe 93	8	-1669.84	10.66	Open

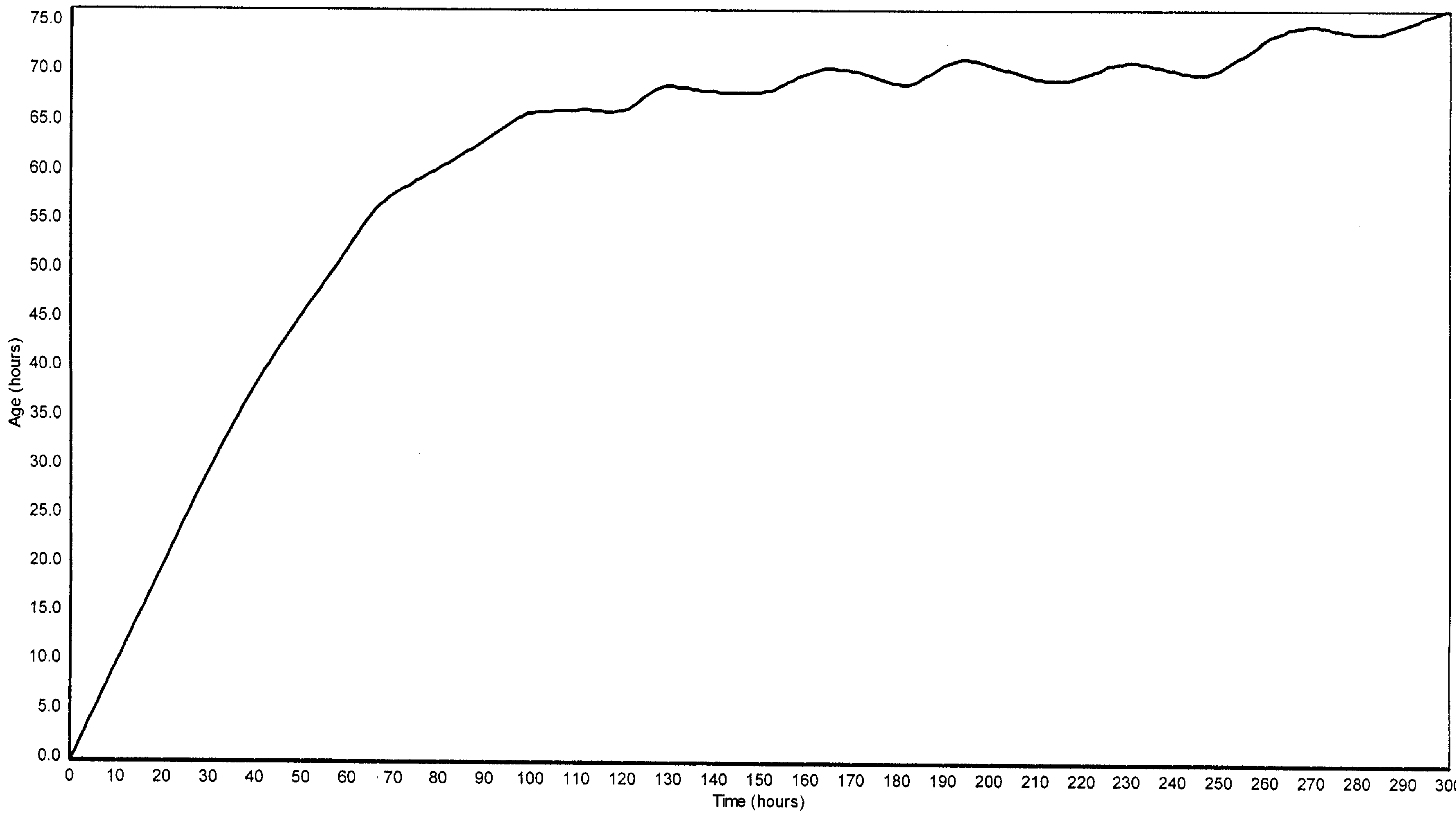
Link ID	Diameter in	Flow GPM	Velocity fps	Status
Valve PRV9	6	1104.47	12.53	Open
Pipe 4	6	-1232.08	13.98	Open
Valve PRV1	6	1489.37	16.90	Open
Pipe 99	4	662.11	16.90	Open
Pipe 49	6	1532.00	17.38	Open
Pipe 98	6	1532.00	17.38	Open
Pipe 12	6	1532.00	17.38	Open
Pipe 100	4	861.89	22.00	Open
Pipe 101	4	1516.00	38.71	Open
Valve PRVBOF	4	1532.00	39.11	Open

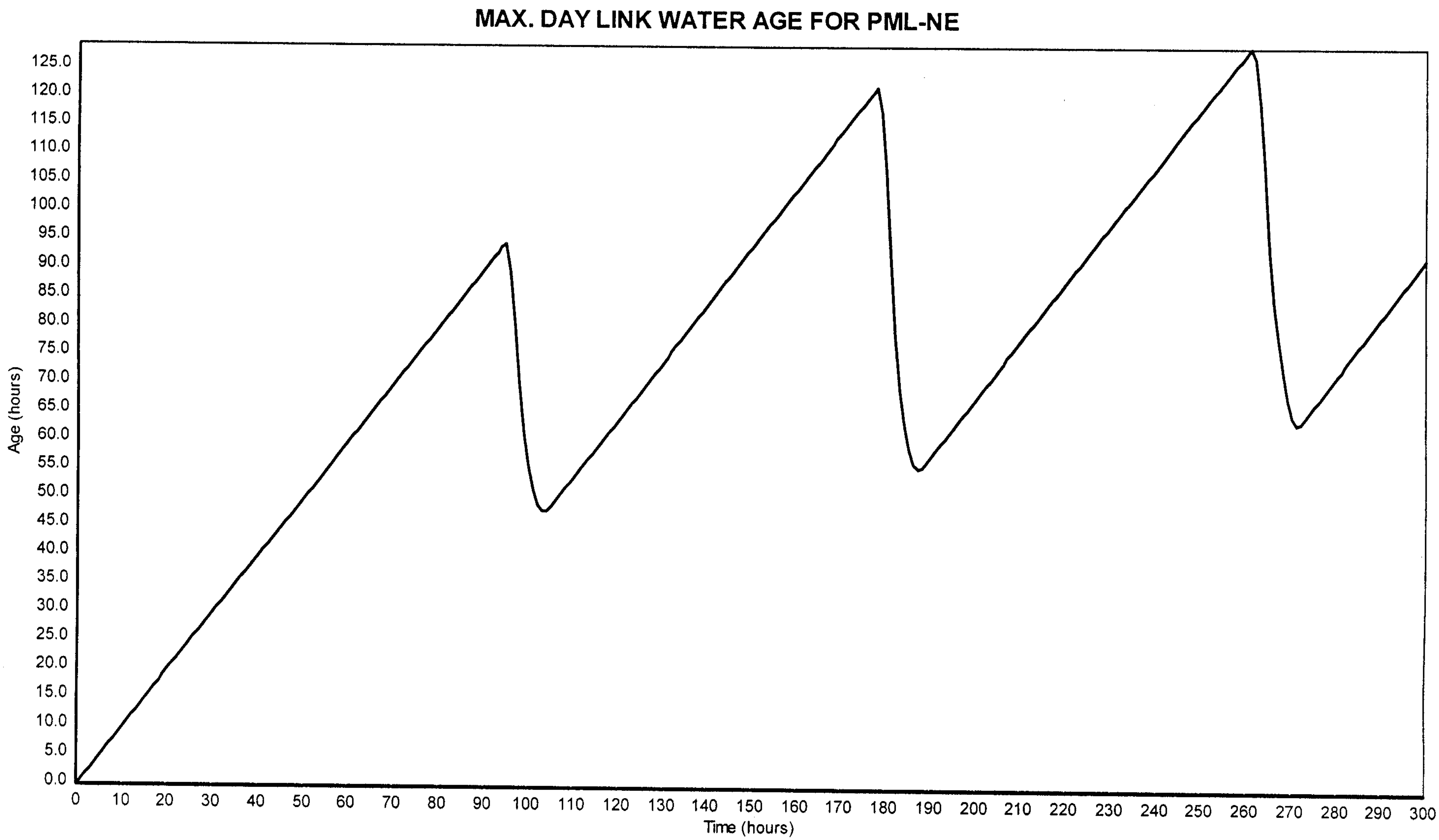
BALANCED WATER SYSTEM

MAXIMUM DAY DEMAND

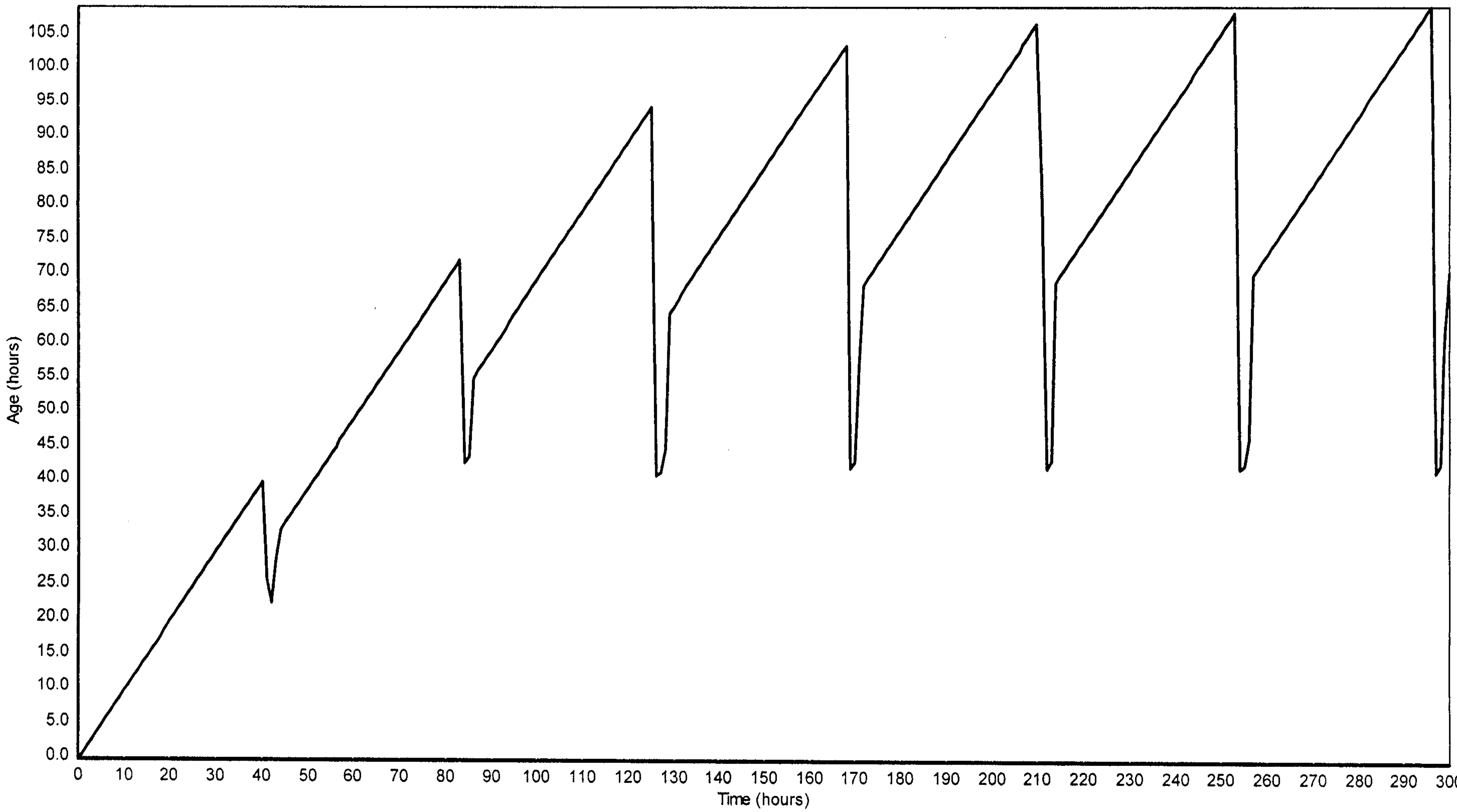
WATER AGE BY PRESS. ZONE

MAX. DAY LINK WATER AGE FOR PML-NW

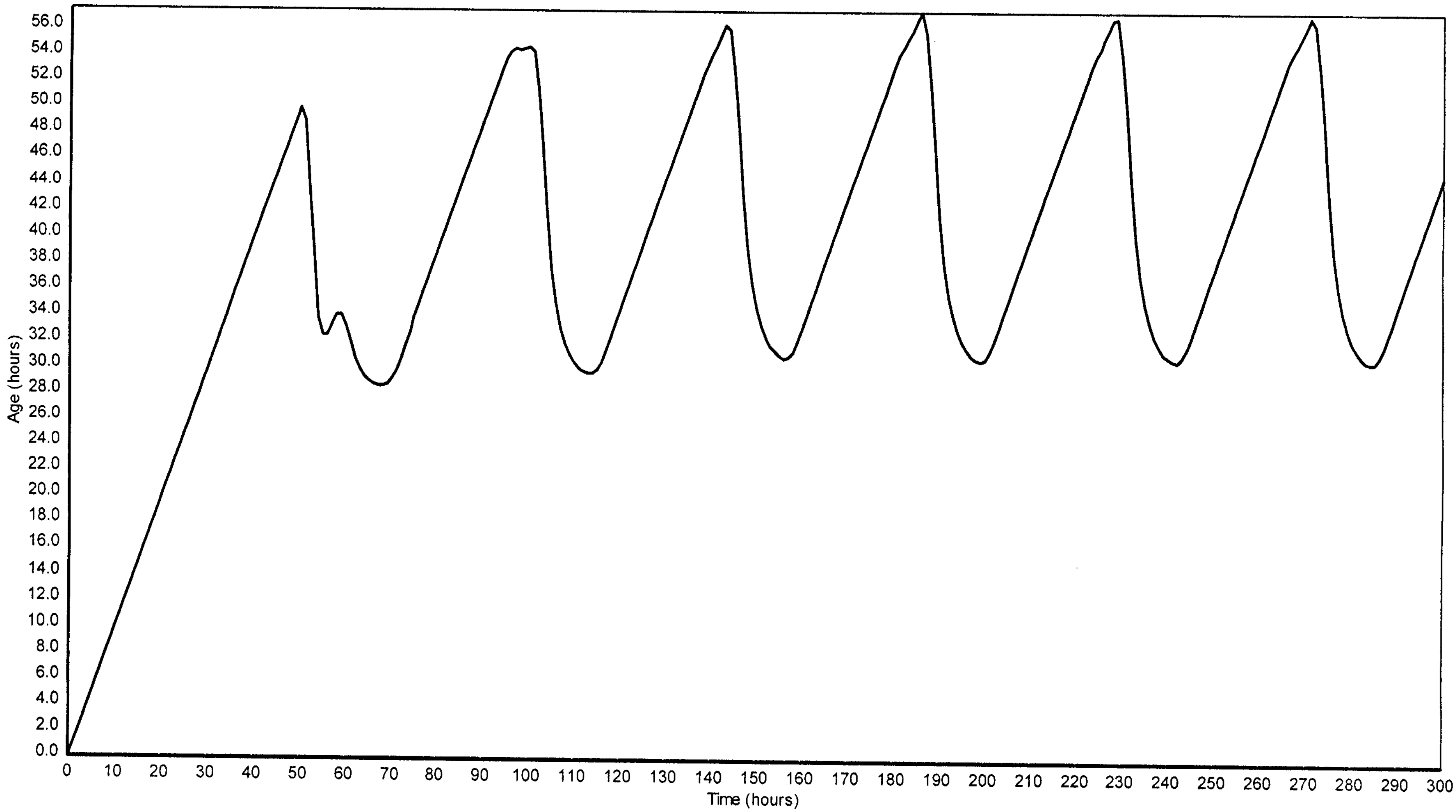



MAX. DAY LINK WATER AGE FOR PML-NE
Age (hours)
125.0
120.0
115.0
110.0
105.0
100.0
95.0
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
280
290
300
Time (hours)

MAX. DAY LINK WATER AGE FOR GL-S



MAX. DAY LINK WATER AGE FOR BOF

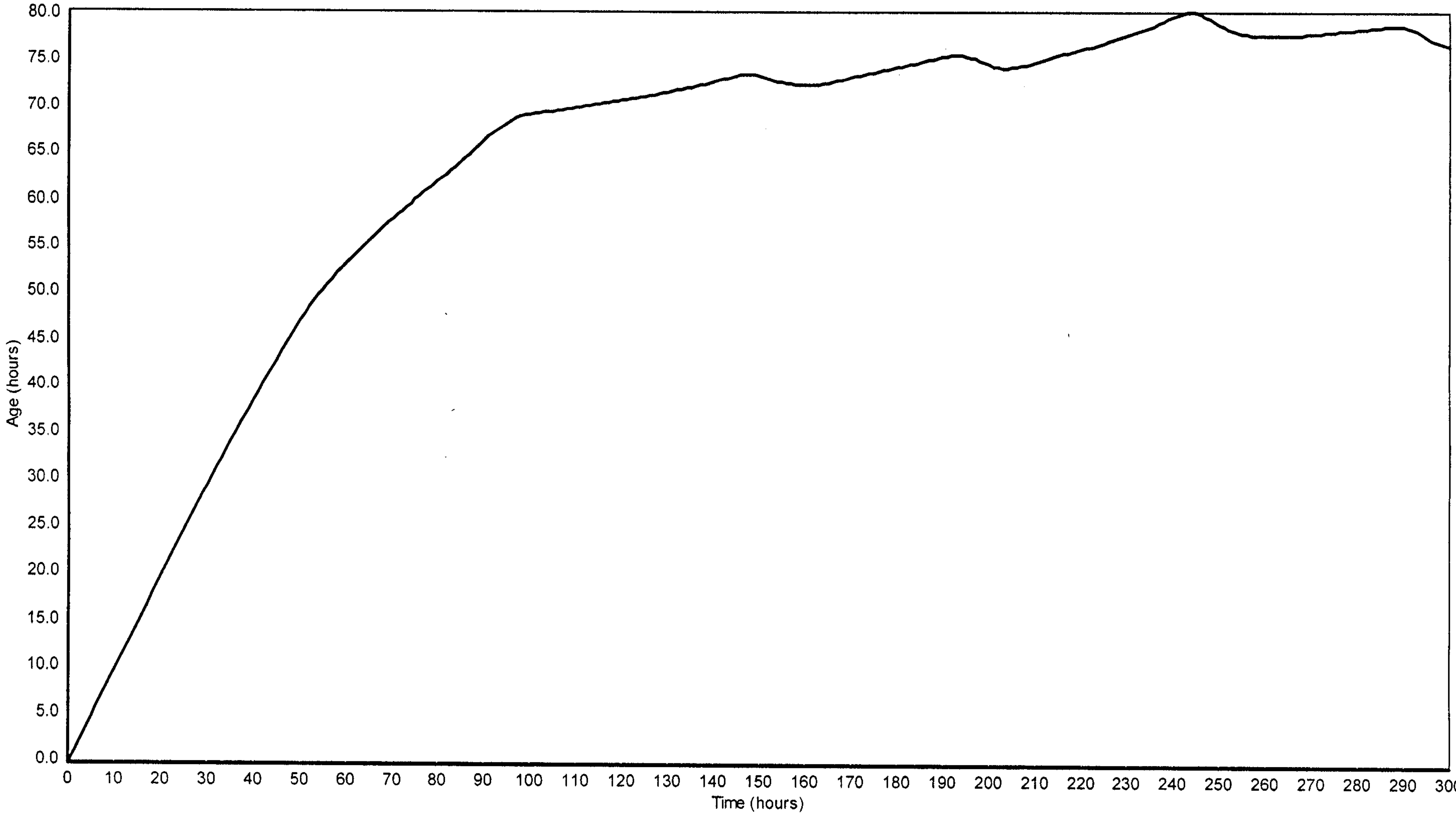


BALANCED WATER SYSTEM

AVERAGE DAY DEMAND

WATER AGE BY PRESS. ZONE

AVG. DAY LINK WATER AGE FOR PML-NW



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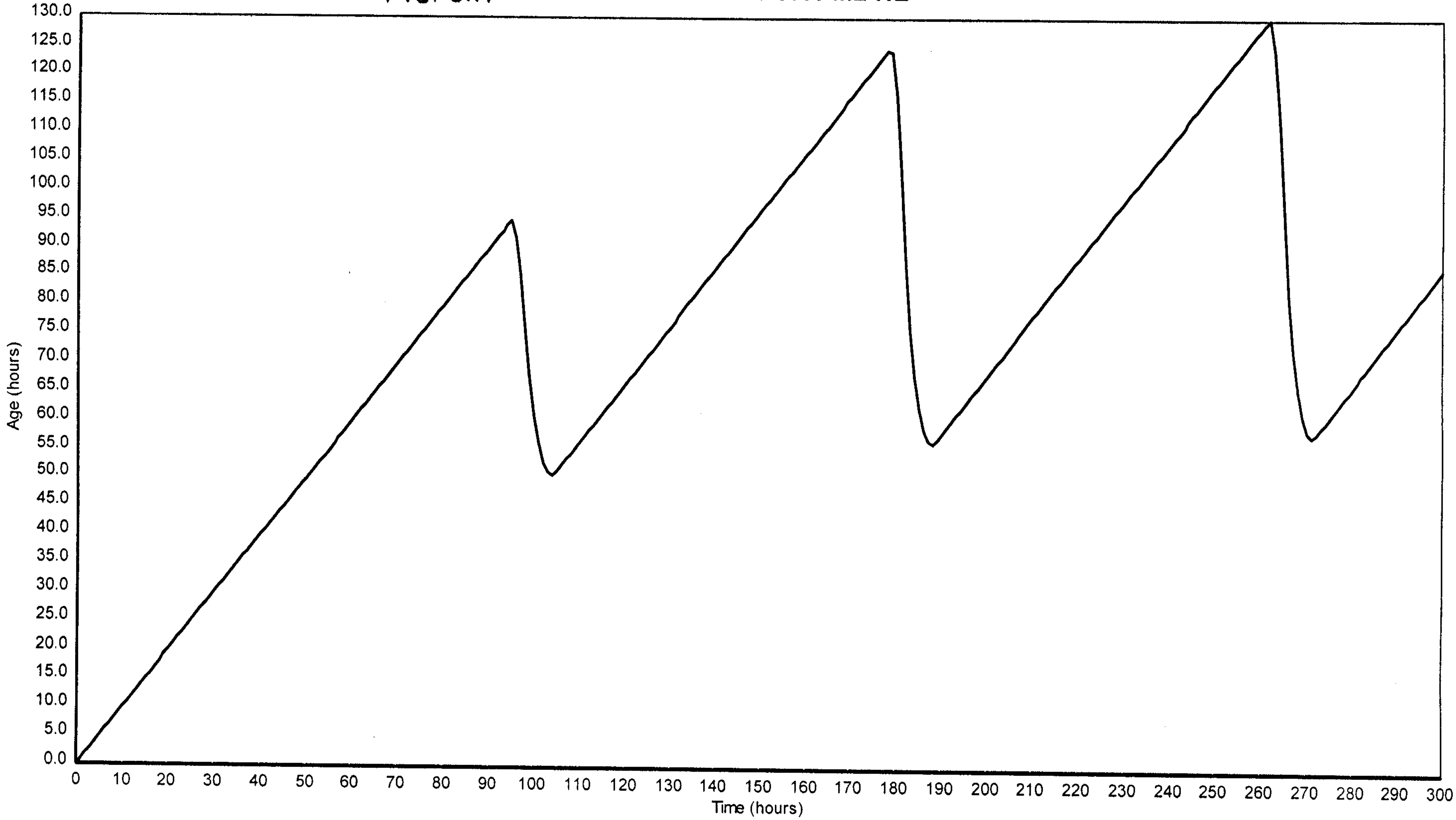
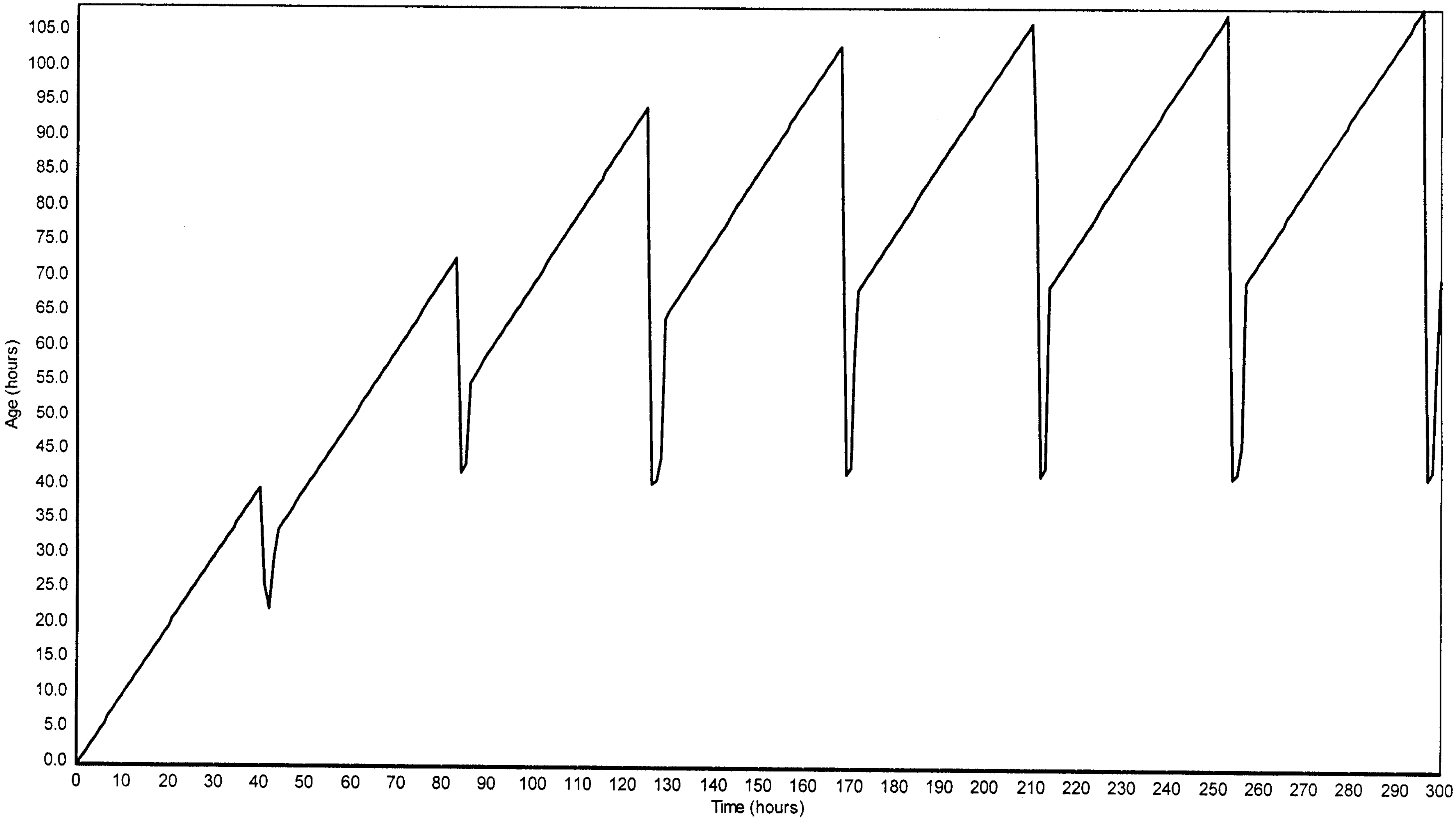


AVG. DAY

LINK WATER AGE FOR GL-S



AVG. DAY LINK WATER AGE FOR BOF