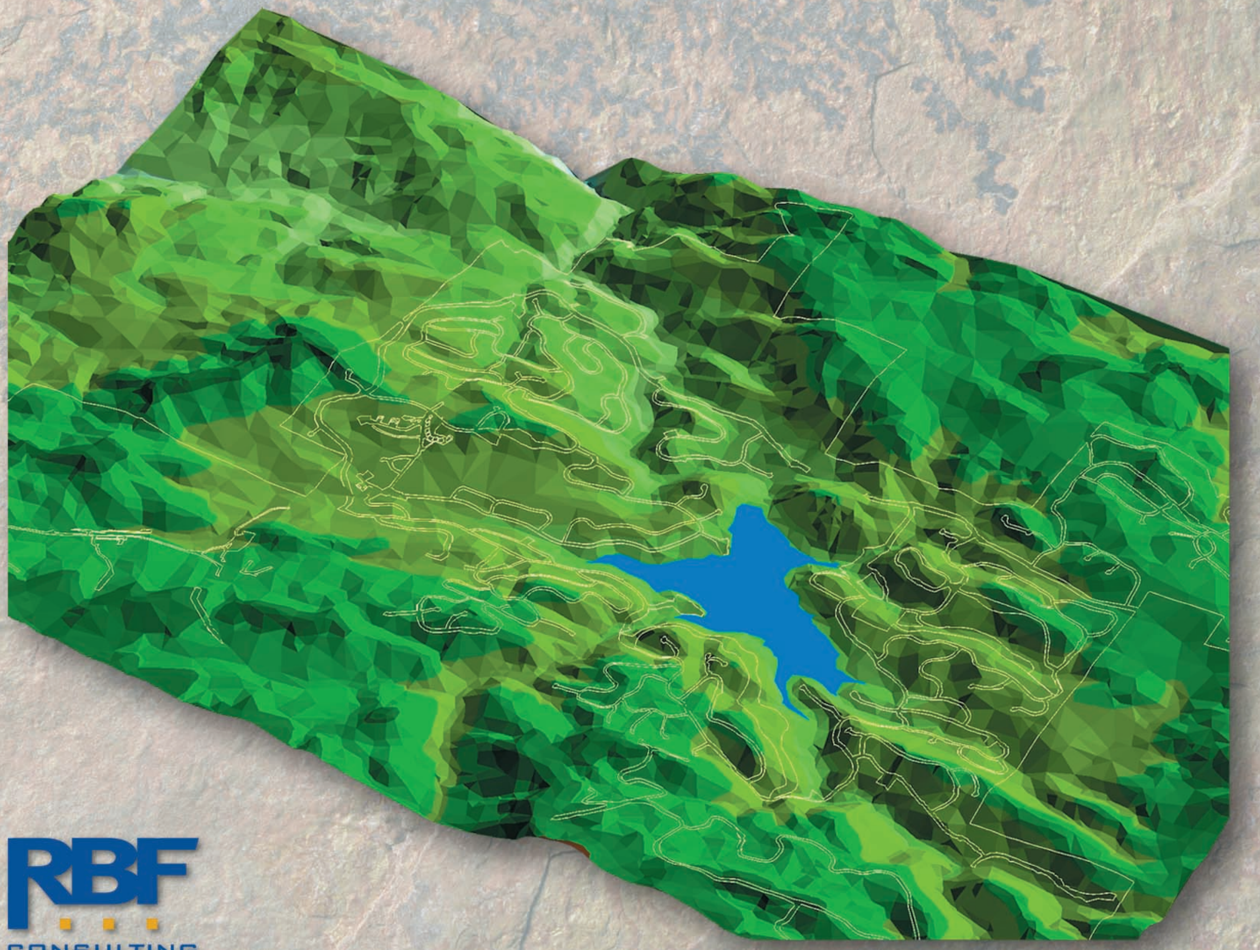
Wastewater Master Plan

GROVELAND COMMUNITY SERVICES DISTRICT

OCTOBER 2001



RBF CONSULTING

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Wastewater 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 wastewater 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 16 lift stations, 35 miles of gravity mains, seven miles of force mains and a wastewater treatment plant.

Most facilities in the system are approaching 30-years old and are experiencing more frequent failures, manifesting themselves as sewage spills and discharge permit violations. The existing system was not designed to live far into the 21st Century and the District is faced with embarking on a major capitol program designed to satisfy the community's needs and meet regulatory requirements.

This Master Plan looked in-depth at community growth, wastewater generation, conveyance and treatment and analyzed the existing infrastructure's ability to process that wastewater. It was concluded:

1. The existing wastewater treatment plant (WWTP) is either at or beyond capacity in several process units, including screening, equalization basin, activated sludge, secondary clarifier and aerobic digester. A significant expansion or the development of a new treatment plant is required.
2. The collection system was designed with adequate capacity for ultimate flows. However, the system relies heavily upon poorly designed, spill-prone lift stations, fixable with improved and properly sized pumps.

Locating GCSD's treatment plant is the primary factor in determining the future of the wastewater system. The key issue in determining the location is the answer to the effluent disposal question.

This plan recommends a Capital Improvement Program based on a review of three alternatives:

Alternative 1: Expansion of the existing Ferretti Road WWTP
Alternative 2: Upgrading the existing WWTP and creating a satellite plant near Ferretti Road and Big Creek, in the northwest part of the District
Alternative 3: Phased transition to a new treatment plant off Ferretti Road in the northwest part of the District

Given *today's* regulatory environment, the most cost-effective treatment plant alternative is to expand the existing site to meet ultimate expected flows. However, current conditions and regulations can change. These changes include:

- Climatic changes
- Land application changes
- Ground/surface water quality degradation
- Spill risk mitigation
- New disposal alternatives
- California Environmental Quality Act issues

These uncertainties impact the decision of where best to locate the treatment plant and merit further investigation before the District makes significant financial commitments.

GCSD's current financial situation must be considered in planning future improvements. The District has a limited customer base. These limited resources must also fund improvements to the collection system.

Improving the wastewater system will require significant capital. For this reason, the District must have a carefully calculated approach to attack the deficiencies in the existing system.

The future plan should have the following priorities:

- Improve the existing system enough to minimize the potential for spills and comply with permitted disposal requirements
- Perform a feasibility analysis to determine the best option for effluent disposal
- Establish a financing plan to implement a major capital program
- Design/construct existing plant expansion or a new treatment plant that best suits the Groveland community and wastewater characteristics
- Compliance with the California Environmental Quality Act (CEQA)
- Maintain the system as the community grows

While the District conducts the Feasibility Phase of the project, the District needs to prepare itself financially for the expansion and improvement of the wastewater system. Current user rates are not adequate to address the wastewater system's existing treatment deficiencies or to meet new customer demands. Some of the issues or actions involved in Financial Readiness are:

- The District will need to develop a phased financial plan to meet the capital program needs.
- Community support will be essential for completion of the program.
- The District will need to consider the kinds of financing instruments best suited to their needs. These may include building up cash reserves, applying for State Revolving Fund loans and grants, or issuing Certificates of Participation.
- The District will want to make sure its credit rating is as high as possible.
- The revenue streams to be pledged for any indebtedness need to be identified.
- The District may want to consider its policies on how much capital assets are funded by current user fees and new customer impact fees.
- The District may need time to ramp up user rates or impact fees to avoid "rate shock." Changes in rates will have to be conducted in accordance with Proposition 218.

Capital improvements were broken-down into three categories:

- Short-term projects, to be executed as soon as possible
- Intermediate projects, to be executed in the next five years
- Long-term projects, to be executed beyond five years

The following flowchart outlines the plan:

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Key Issues Considered:
Problems Due to Poor Collection System Design
Problems Due to Inadequate WWTP Capacity
District has $0.1M/Year in Capital Improvement Budget

	STATUS TODAY	SHORT-TERM *(This Year)*	INTERMEDIATE-TERM *(1-3 Years)*	LONG-TERM *(5+ Years)*
COLLECTION SYSTEM	• Chronic spill problems due to poor system design • One gravity sewer significantly over-capacity, one frequently fails due to shallow slope • 11 other sewers operating over design criteria but not considered a spill threat	• Lift Station Rehabilitation - Replace vacuum prime systems - Install bypass capability - Purchase/lease standby pumps/power - Electrical/instrument. Upgrades - Ventilation upgrades • Prepare/implement preventative maintenance program • Monitor First Garrotte sewer • Locate major inflows	• Redesign/reconstruct First Garrotte sewer • Replace pumps in trouble lift stations with submersible types • Replace lift stations piping/valves • Install VFDs on over-capacity lift stations (starting with LS 1) • Create inflow/infiltration control plan • Perform spill risk analysis	• Replace existing lift stations with optimum designed facilities • Reconfigure system to agree with WWTP
WWTP	• Currently experiencing BOD, coliform and settleable solids violations • Poor location for spill/ energy reasons • Process units at or beyond capacity: - screening - equalization basin - activated sludge - secondary clarifier - aerobic digester - air supply - instrumentation plant-wide • Reservoir No. 1 used as high-flow bypass	• Tune plant to operate at peak process capacity and meet discharge requirements. Steps include: steps include: - monitoring - operations coaching	• Feasibility studies - effluent disposal - biosolids disposal - WWTP location/design - CEQA • Financial planning - improve revenue streams - create funding plan - foster public awareness/support - improve district credit rating • On-going operations improvements to remain in compliance	• Expand existing WWTP and/or construct new facility • Develop new wastewater and biosolids disposal methods

The following table outlines the costs associated with each aspect of the plan. These costs include the entire replacement scope; however, the District realizes that these projects must be prioritized and worked based on existing resources and facility condition. The estimated project costs can also be used as a guideline in determining the ultimate financing plan the District will undertake to execute the capital program.

		Escalated Cost to Middle Year @ 3%		
Description	**Years**	**Collect. Sys.**	**WWTP**	**Total**
Short-Term Projects	2001-02	$260,000	$100,000	$360,000
Intermediate-Term Projects	2002-05	$326,000	$166,000	$492,000
Long-Term, all Alternatives	2005-26	$1,739,000	$0	$1,739,000
Long-Term, Alternative 1	2005-26	$2,281,000	$8,222,000	$10,503,000
Long-Term, Alternative 2	2005-26	$2,992,000	$12,886,000	$15,878,000
Long-Term, Alternative 3	2005-26	$3,810,000	$17,393,000	$21,203,000
Totals, Including Alt 1 only		$4,606,000	$8,488,000	$13,094,000

1.0 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 1970, Boise Cascade Company developed the area to the immediate northwest known as Pine Mountain Lake, potentially increasing the number of District customers 20 fold.

GCSD is located on the western slope of the Sierra due east from San Francisco. These communities are found 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 within the District is characterized as seasonal, with a significantly higher population during the summer months. 2000 Census

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

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:

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, M	2,879
PML Improved Parcels, I	2,670
Groveland/BOF Total Parcels, G (M-I)[2]	209
Total Ultimate Water Meters, W (P+G)	3,969
% Developed [M/W]	73%

Using sewer connections to determine buildout:

Total Sewered Connections, S	1,384
Sewered Vacant Lots, V[3]	494
Total Ultimate Sewer Connections, C (S+V)	1,878
% Developed (S/C)[4]	74%

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

For reference, in PML, approximately 2,200 parcels of the total number of 3,760 (59%) either use or will use private or on-site systems when improved.

[2] From County GIS data, assumes Groveland and BOF are currently 100% built out.
[3] Vacant lots in sewered area
[4] Does not include areas within District currently using septic systems

1.3.2 Growth Rate

Given that flows into the treatment plant are more sensitive to rain events than growth, the data of historic flow into the sewage treatment plant (STP) was deemed inconclusive with respect to analyzing community growth. 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.

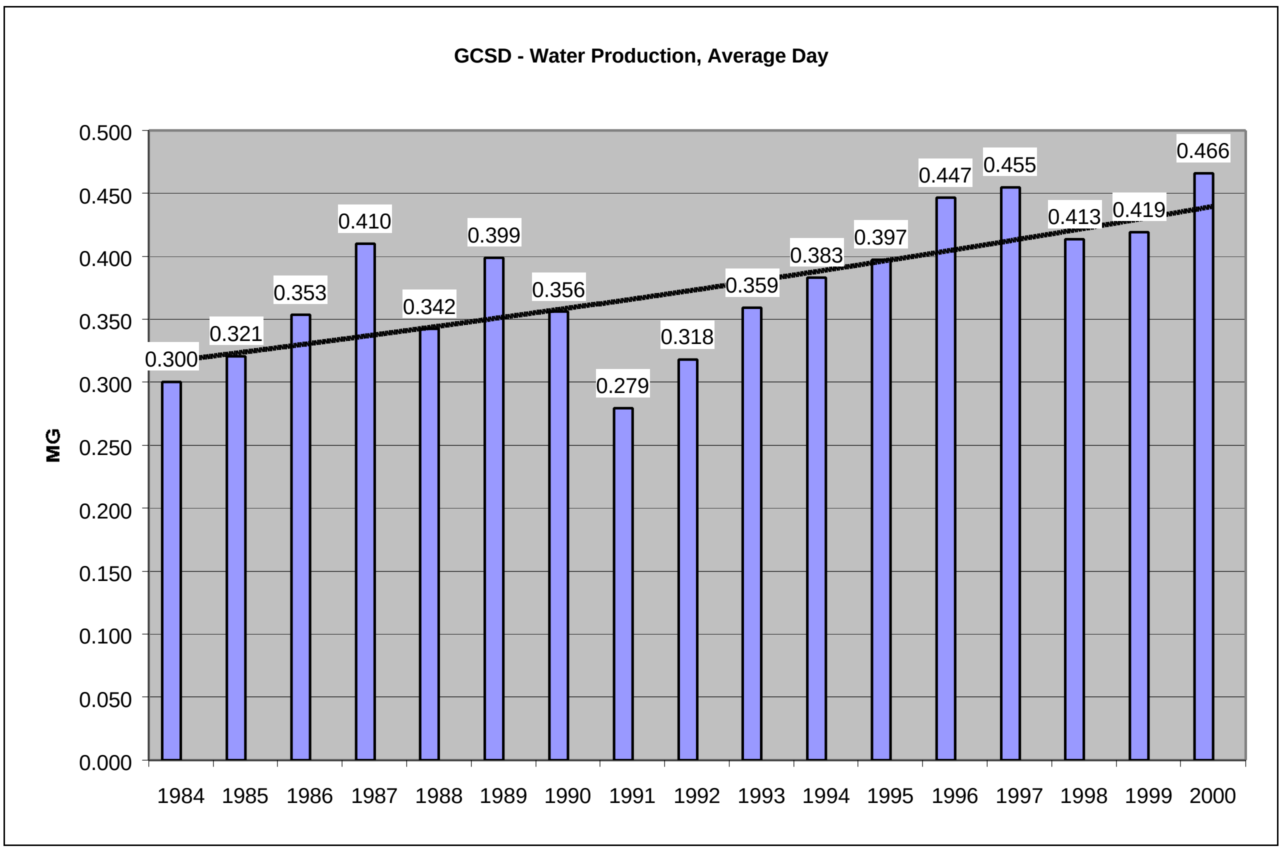

Figure 1.1: GCSD Water Production, Average Day

Several other factors could significantly affect growth, including:

- Conversion of septic lots to sewer service, either because of failure of the on-site system or expansion of the existing collection system within PML
- Additional development within the region

2.0 Land Use, Wastewater Generation

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 employ on-site wastewater disposal systems (i.e. septic). The plan anticipates sewer service to the 1.6 acres of commercial land use adjacent to the airport provided by GCSD. While this development falls outside the study area, it should be noted that the resulting additional wastewater flows must be evaluated for the affect upon Lift Stations 12 and 13 and the regional treatment facility.

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
- 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 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.

[5] Data provided by GCSD, Utility Count, March 9, 2001
[6] IBID
[7] Thornton, Mark V., A History of the Groveland Community Services District, 1992

2.2 Flow Factor Development

2.2.1 Source Information

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

- Sewage Transmission Facilities and Upgrade Requirements Study, Boyle Engineering, 1990
- GCSD Wastewater Monitoring Reports and Water Treatment Summary, 1992-2000
- GCSD Sewer Spill History 1990 to Present
- Big Oak Flat/Groveland Sewage Collection System Drawings, Dentoni & Assoc., 1973
- Initial Sewerage Collection System Map, Pine Mountain Lake, Vail & Assoc., 1973
- Construction plans for Pine Mountain Lake Sewer Project Nos. 1 thru 6, 1972-1975
- Construction plans for Groveland Sewer Trunk Line, Dentoni & Assoc., 1973

According to the Initial Sewerage Collection System Map, the facilities were sized for 350 gpd/lot peaked at 2.5 (875 gpd/lot).

2.2.2 Historic Flows

Table 2.2 shows the flow data used in development of this Master Plan. The table lists WWTP influent broken down by month over the years 1992-2000, data provided by the District. Other data provided by the District includes the maximum day in each month (which were segregated into maximum wet day and maximum dry day) and the number of connections. The table also includes the calculated average day and average dry day (June thru September), the calculated maximum wet day/average day ratio and maximum dry day/average day ratio. Lastly, the average flow, maximum dry and wet day flow per connection were calculated.

Appendix B contains the District-provided flow data.

Table 2.3 summarizes the important factors used in this analysis.

Table 2.2: WWTP Flow Data

	Treatment Plant Influent (MG)									
	1992	1993	1994	1995	1996	1997	1998	1999	2000	Average (mgd)
January	6.081	7.08	4.391	8.769	6.021	7.955	5.804		5.199	0.207
February	4.116	5.754	4.787		7.617	4.817	7.283		7.918	0.214
March	4.192	5.88	4.182	5.561	7.836	4.225	7.716	4.96	7.983	0.188
April	4.463	6.047	4.833	8.218	6.512	4.487	7.065		5.181	0.195
May	4.928	5.564	5.505	5.42	5.942	4.867	5.265	3.317	5.158	0.165
June	4.787	5.273	4.802	6.048	5.219		5.006	4.959	4.963	0.171
July	5.952	5.921	5.461	6.039	7.124		6.005	5.527	6.039	0.194
August	5.48	5.402	5.361		5.823		5.788	5.322	5.169	0.177
September	4.452	5.39	5.143		7.254		4.654	4.17	4.082	0.167
October	5.213	4.349	4.348	4.042	4.782		4.298	3.936	3.917	0.141
November	4.582	3.965	4.452	4.479		3.84	4.289	3.981	3.732	0.139
December	4.693	4.243	4.644	4.459		4.612		3.874	3.949	0.140
TOTAL	**58.939**	**64.868**	**57.909**	**53.035**	**64.130**	**34.803**	**63.173**	**40.046**	**63.290**	
Ave Day	0.161	0.178	0.159	0.193	0.210	0.163	0.188	0.146	0.173	0.173
Ave Day - No rain	0.169	0.180	0.170	0.198	0.208		0.176	0.164	0.166	
Max Day - Rain	0.338	0.428	0.296	0.553	0.395	**0.638**	0.592	0.444	0.454	
Max day/ave day - Wet	2.1	2.4	1.9	2.9	1.9	3.9	3.1	3.0	2.6	
Max Day - No rain	0.274	0.327	0.291	0.277	**0.397**	0.336	0.294	0.262	0.249	
Max day/ave day - Dry	1.7	1.8	1.8	1.4	1.9	2.1	1.6	1.8	1.4	
Connections-estimated	1,280	1,330	1,345	1,362	1,365	1,365	1,370	1,380	1,384	
Ave. WW flow/con	126	134	118	142	154	119	137	106	125	127
Max day WW flow/con (rain)	264	322	220	406	289	467	432		328	
Max day WW flow/con (no rain)	214	246	216	203	291	246	215	190	180	
Ave. WW flow/con (no rain)	132	135	127	145	153		128	119	120	

Table 2.3: Flow Data Used in Factor Development

Flow Characteristic	Flow Value over the years 1992-2000
Average Day	173,000 gpd
Average Flow per Connection	127 gpd/connection
Maximum Day – Wet	638,000 gal
Maximum Day - Dry	397,000 gal

Figure 2.1 graphically depicts the historic flows into the WWTP. No obvious trends can be concluded from this data.

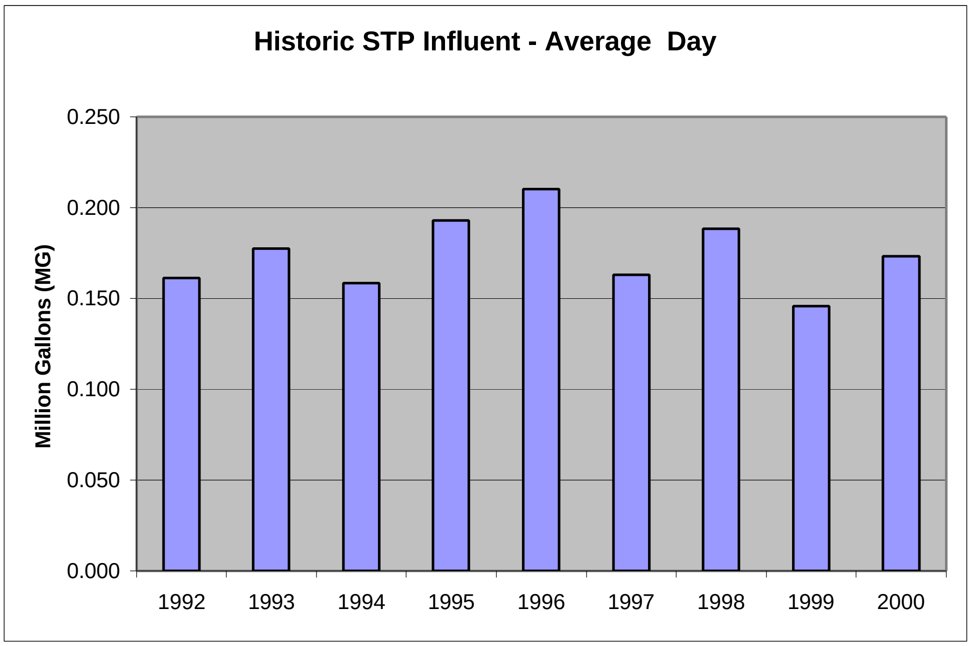

Figure 2.1: Historic STP Influent – Average Day

Inflow and infiltration (I/I) heavily influences GCSD WWTP influent. A review of summer WWTP influent (where GCSD experiences little rainfall) could possibly provide more insight into wastewater generation trends within the community.

Figure 2.2 shows the historic summer flows into the WWTP. Removal of the I/I component similarly appears to randomly scattered and shows no obvious trend. 1997 data was incomplete during the summer months.

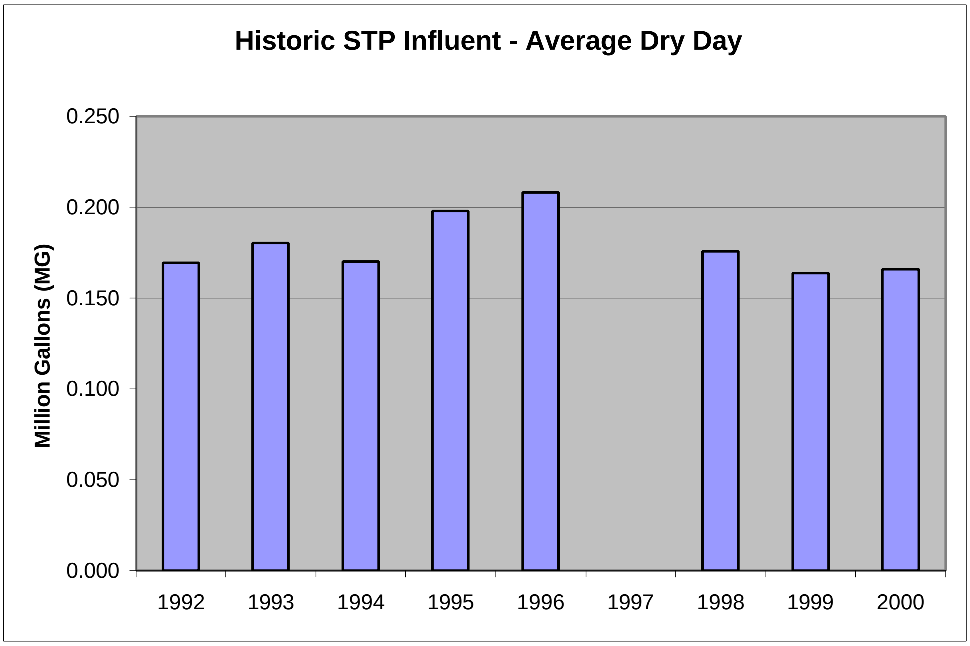

Figure 2.2: Historic STP Influent – Average Dry Day

2.2.3 Flow Factors

Defining the current flows through GCSD's collection system presents several challenges due to two highly-influential variables: the seasonal occupancy of the residents and the high inflow/infiltration (I/I) into the sewer system.

Previously published reports have listed historic summer and winter occupancies near 50% and 25%[8], respectively. In the absence of any support data, these assumptions could not be confirmed and were not used.

Since occupancy is highest in the summer months, wastewater generation would be expected to be greatest during July and August. **Figure 2.3** shows the average treatment plant influent by month since 1992. The highest flows are seen in the winter (wet) months, not summer. This is due to high I/I, water entering the system from points other than home and business laterals.

In calculating the peak load on the collection system, the following determinations were used:

- As discussed previously, GCSD customers are overwhelmingly residential (see Section 1.3.1); therefore, flow factors were developed treating each connection equally, commercial or residential. An exception was made in the downtown Groveland area, where the wastewater generation per connection was doubled due to the higher commercial density.

[8] 1992 Wastewater Discharge Report (Osborne)

- Because of the seasonal behavior of the District's customers, rather than estimate the number of people habiting a dwelling at any given time, the collection system was evaluated assuming the case where every lot would be occupied at the same time (i.e. July 4th, Labor Day). This type of cul-de-sac level analysis was used to evaluate the collection system, not the WWTP.

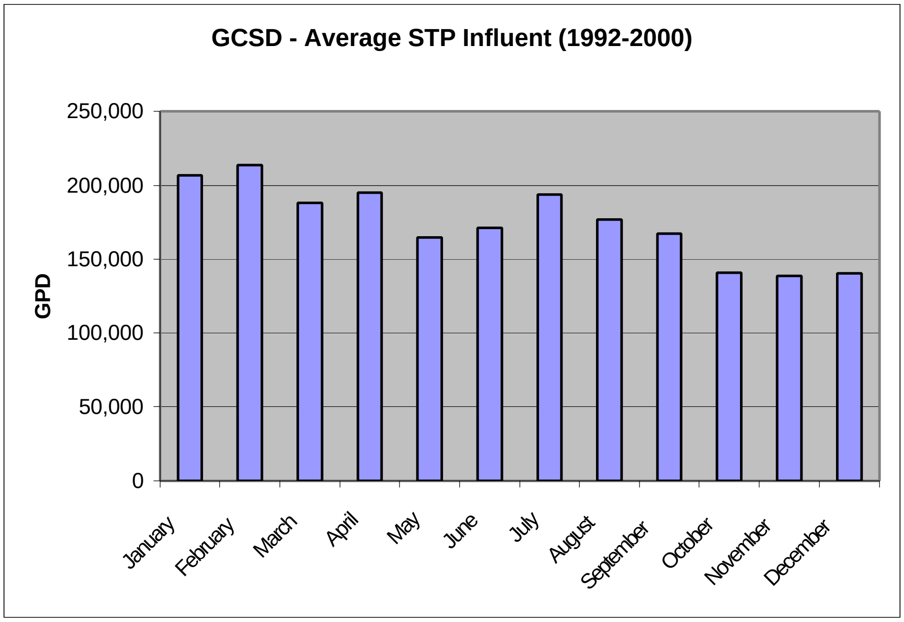

Figure 2.3: GCSD – Average STP Influent (1992-2000)

- The maximum demand per connection was determined by evaluating two scenarios: the maximum daily flow (MDF) wet day and MDF dry day observed since 1992.

A factor of 2.5 was applied to dry weather MDF to get peak-hour flows, conservative for municipal, residential systems[9].

For wet days, the estimated municipal component (average day equal to 173,000 gal) of the waste stream was peaked at 2.5, with the balance (I/I) not diurnally peaked. This method resulted in a composite peaking factor of 1.4[10].

Table 2.4 shows the dry/wet day peak flow comparison.

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[9] Metcalf & Eddy, Wastewater Engineering – Treatment, Disposal and Reuse, 3rd Ed., 1991. From comparison of maximum-hour and maximum day flowrates at Lake Arrowhead, CA. Peak hour: max-day ratios varied from 1.4 – 2.7.

[10] Typically, an agency will either calculate the peak flow then add I/I (i.e. Rancho California Water District) or apply a peaking factor, based on flow, to the average day that includes I/I (i.e. City of Lathrop, Irvine Ranch Water District). In the case of Lathrop and IRWD, the maximum peaking factor is 4.0 (the methodology used for GCSD resulted in an average day: peak hour ratio of 5.1).

Table 2.4: Peak Flow Comparison – Dry vs. Wet Day

	Date	STP Influent	# Connections	Max Day Flow	Peaking Factor	Peak Flow	Peak Flow
MDF Rain	Jan-97	638,000 gal	1,365	467 gpd/con	1.4	654 gpd/con	0.454 gpm/con
MDF No-Rain	Sep-96	397,000 gal	1,365	290 gpd/con	2.5	727 gpd/con	0.505 gpm/con

This table illustrates that the peak flow expected in a sewer line at any time of the year is during the summer peak-use periods. Based on this, a max-day flow value of 290 gpd/connection was used to evaluate lift station and sewer line capacities. Note that the resulting peak flow of 727 gpd/con is less than the 875 gpd/con used as the basis for the existing system.

2.2.4 Septic Conversion Effect

Failure of aging on-site disposal systems or future direction from the Regional Groundwater Quality Control Board may cause members of the community to connect to GCSD's collection system. These conversions represent the potential for a major impact to the District's collection system and treatment facilities.

Current regulations discuss connecting to sewer if improvements lie within a horizontal distance of 330 ft downhill or 100 ft uphill to a sewer main. A GIS analysis of a 300 ft buffer zone around the existing sewer system reveals that connections would increase by the numbers listed in **Table 2.5. Exhibit 10** maps the affected parcels.

Table 2.5: Approximate Number of Septic Parcels Within 300 ft. of Existing Sewer

Lift Station	Septic Conversion Lots
1	27
2	27
3	0
4	0
5	104
6	20
7	31
8	0
9	17
10	60
11	30
12	0
13	112
14	31
15	27
Total	486

The 486 additional sewer connections represent an increase of approximately 25% over the existing total connections (1,878) within the GCSD collection system.

The total number of lots using on-site systems within PML is estimated at 2,206.

2.2.5 Projected WWTP Influent

Table 2.6 projects the average flows into the treatment plant under several conditions.

Table 2.6: WWTP Average Flow Projections

Description	# Connections	Duty Factor	Average Day Flow into WWTP
Current Connections	1,384	127 gpd/con	175,768 gpd
Currently Sewered Lots at Buildout	1,878	127 gpd/con	296,106 gpd Note 1
Sewered Lots plus Lots w/in 300’	2,364	127 gpd/con	357,828 gpd Note 1
All PML Sewered at Buildout	4,084	127 gpd/con	576,268 gpd Note 1

Note 1: Includes 57,600 gpd from Yosemite Way Station

Figure 2.4 predicts WWTP influent assuming various growth rates. Also shown are the buildout plateaus described above.

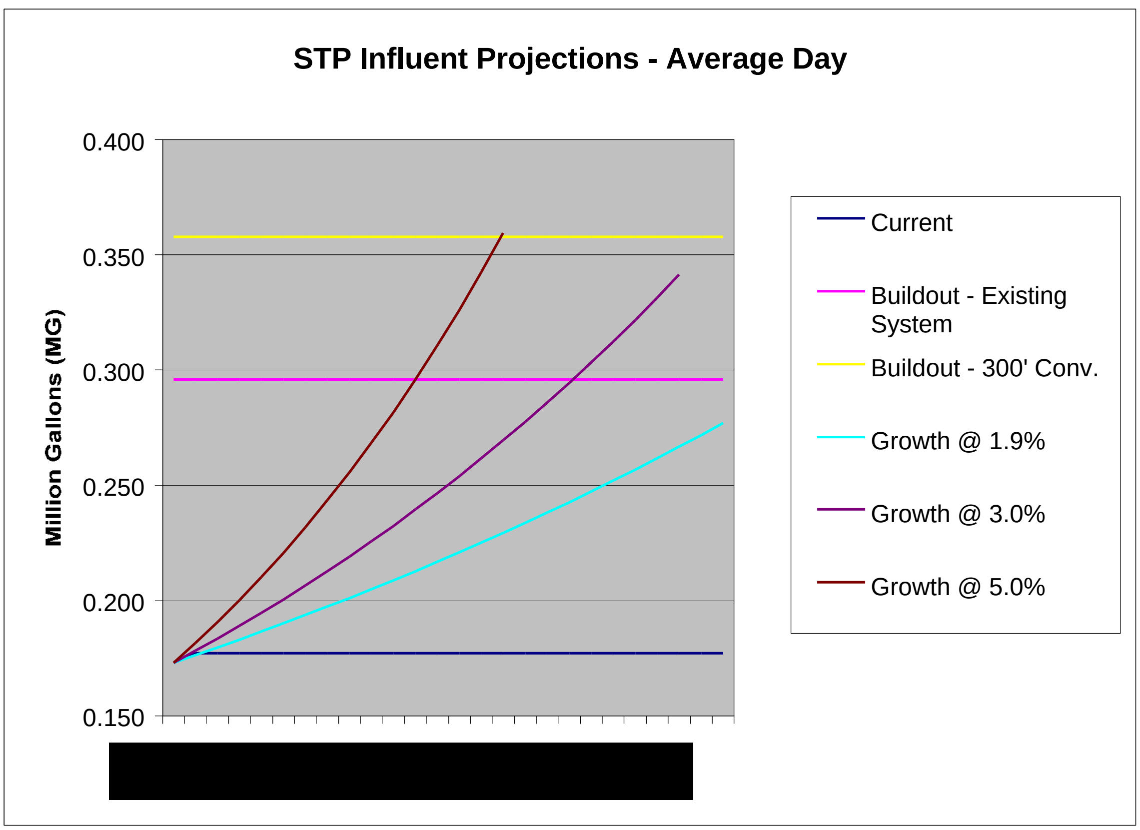


Figure 2.4: WWTP Average Day Influent Growth Predictions

3.0 Wastewater Treatment Evaluation

3.1 Historic and Current Wastewater Loading/Quality

Wastewater loading for Biochemical Oxygen Demand (BOD) and Suspended Solids (SS) were analyzed for the last 12 years and 5 years respectively. During a number of those years, flow-metering data was missing or miscalibrated. Therefore, the hydraulic balance and mass balance for the plant were incomplete. Some estimated flow data was used for certain analyses. The District experiences a wide range of fluctuation in flow and loading, making estimates unreliable. The fluctuations in the District's flow and loading most strongly correlate to the pattern and amount of rainfall and to the demographics of the community. However, there are flow and loading events that do not match weather and resort activities, for which further explanation would be beneficial.

Tables 3.1 and 3.2 summarize the last 12 years of BOD and SS loading to the WWTP. BOD loading appears to be staying in a range near 150,000 pounds per year, although 2000 saw a strong upward deviation from that range to 185,000 pounds, a 23 % percent increase. The Suspended Solids loading is showing a significant rising trend in both concentration and total pounds of SS. **Figure 3.1** shows how the SS loading has begun to rise significantly in the last 12 years, while the BOD loading has remained within a range near 130,000 pounds until 2000.

Table 3.1: 12-Year History of Influent Flow and BOD Loading

	Year Avg. Flow/yr[11]	Annual Avg. Infl. BOD Conc.	Pounds Of BOD/yr.	Month	Flow MG	Maximum Month BOD Conc.	Pounds
1989	59 MG est.	323 mg/l	142,600	Sept	4.22	423	15,137
1990	55 MG est.	363	149,300	July	4.79	523	21,244
1991	54 MG est.	331	133,700	July	4.40	440	16,417
1992	59 MG	315	139,000	July	5.89	375	18,730
1993	65 MG	253	123,000	July	5.92	373	18,725
1994	59 MG	272	120,000	July	5.46	341	15,789
1995	74 MG	175	96,900	July	6.04	209	10,705
1996	78 MG	214	125,000	Aug	5.82	299	14,757
1997	63 MG est.	262	124,500	Apr[12]	4.49	326	12,413
1998	67 MG	201	101,500	Aug	5.79	247	12,128
1999	66 MG est.	244	120,500	July	4.96	370	15,562
2000	63	346	185,700	Aug	5.17	493	21,614
Average:	64 MG	268 mg/l	130,100 pounds/yr.				

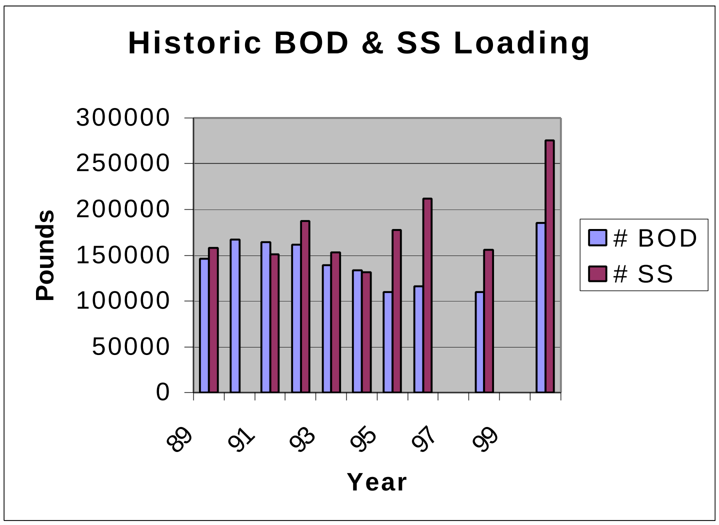
[11] Some annual flows were estimated due to missing monthly monitoring data while the influent meter was out of service. The missing data is a source of ± 5% uncertainty in this analysis.
[12] Flow data missing for July through October.

Table 3.2: 12-Year History of Influent Flow and Suspended Solids Loading

	Year Avg. Flow/yr[13]	Avg. Infl. Pounds of SS Conc.	SS/yr.	Month	Maximum Month Flow	Maximum Month SS Conc..	Pounds Of SS
1989	59 MG est.	348	157,822	Nov	4.35	618	22,797
1990	55 MG est.	367	169,333	March	5.65	389	18,638
1991	54 MG est.	305	151,304	May	4.45	607	22,906
1992	59 MG	364	187,117	May	4.79	568	23,072
1993	65 MG	277	153,152	May	5.80	322	15,837
1994	59 MG	268	131,586	Sept	5.14	398	17,348
1995	74 MG	283	177,756	June	6.05	365	18,726
1996	78 MG	390	212,058	May	5.94	671	33,799
1997	63 MG est.	531	156,790	Dec[14]	4.61	806	31,509
1998	67 MG	285	155,980	Apr	7.07	416	24,941
1999	66 MG est.	423	143,661	Aug[15]	5.32	584	26,346
2000	63 MG	514	275,863	Aug	5.17	857	37,572
Average:	64 MG	362 mg/l	188,870 pounds/yr.				

Figure 3.1 shows the total BOD and SS loading by year.

Figure 3.1: BOD and SS Loading



[13] Some annual flows were estimated due to missing monthly monitoring data while the influent meter was out of service. The missing data is a source of ± 5% uncertainty in this analysis.
[14] Flow meter data not available for July through October. Settleable solids violations occurred in July, August, September and October.
[15] Flow meter data not available for January, February and April.

Metcalf & Eddy (1979) report an average United States BOD loading of 220 mg/l and an average SS loading of 220 mg/l in domestic sewage. The high amount of suspended solids in the District's sewage, at the same time that it has average BOD loading, gives weight to the idea that there is some unidentified, more concentrated source of solids to the system.

Possible causes for high Suspended Solids concentrations include the demographics of a resort community; illegal connections from roof drain leaders, vandalism, and deterioration of the collection system allowing soil erosion into the pipes. A resort community does not have the same pattern of wastewater usage and loading that a full service city would have. Holidays create very large peak flows and loads. A mountain community with winter snow as the main precipitation may have different wastewater characteristics.

PVC gravity sewers serve Pine Mountain Lake. This type of construction is less common than vitrified clay pipe (VCP). PVC pipe has different durability and pipe strength than VCP. This difference may be a source of sewer loading due to openings at pipe joints and service connections. It is recommended that the causes of the high suspended solids be investigated further. Source control, to minimize the loading to the WWTP, may be the most cost effective short-term response to the WWTP loading problem.

To better understand the pattern of the elevated Suspended Solids loading, each month's loading for the last 12 years was graphed. **Figures 3.2 through 3.13** show that SS loading has been increasing especially in the winter-spring months of December through April. This increase does not seem to be strongly correlated to the amount of rainfall. 1996 was a wet year, with 54.8 inches of rainfall, and SS loading was 212,058 pounds, 13% above the 12-year average of 188,000 pounds. But 1998 had 57.2 inches of rainfall, a wet year, with 155,980 pounds of SS loading, 18% below the 12-year average of 188,000 pounds. Average rainfall over the 12 years was 36.4 inches

Missing bars for SS loading indicate missing monthly flow data.
December through April show an upward trend in the pounds of Suspended Solids arriving at the WWTP. May through June show a generally stable loading of SS. The sample size for this analysis is small. So one can only consider the general trends of the data. The analysis of the wastewater treatment plant cannot make numerical projections based on the trendlines shown. **Appendix A** shows the calculation of total BOD and suspended solids loading for every month since 1989 for which flow and concentration data is available.

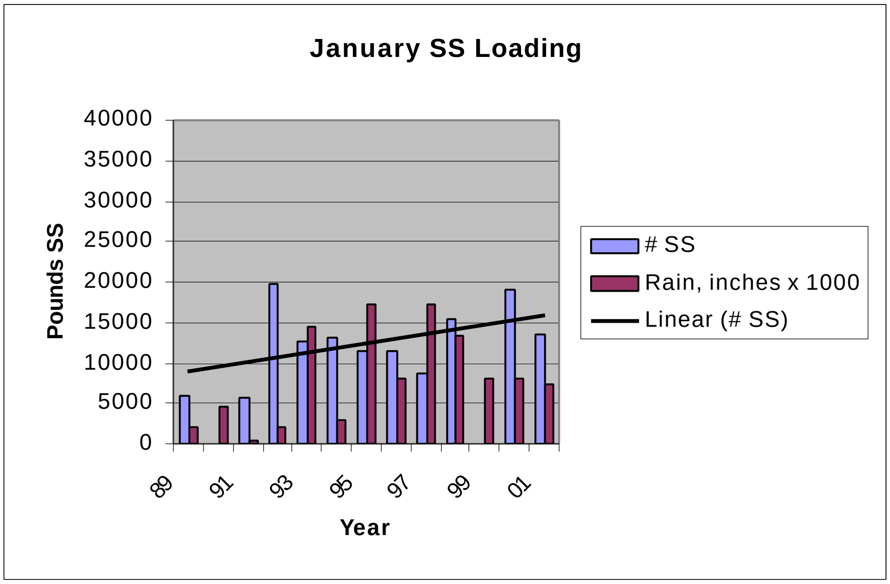


Figure 3.2: January 22 Loading

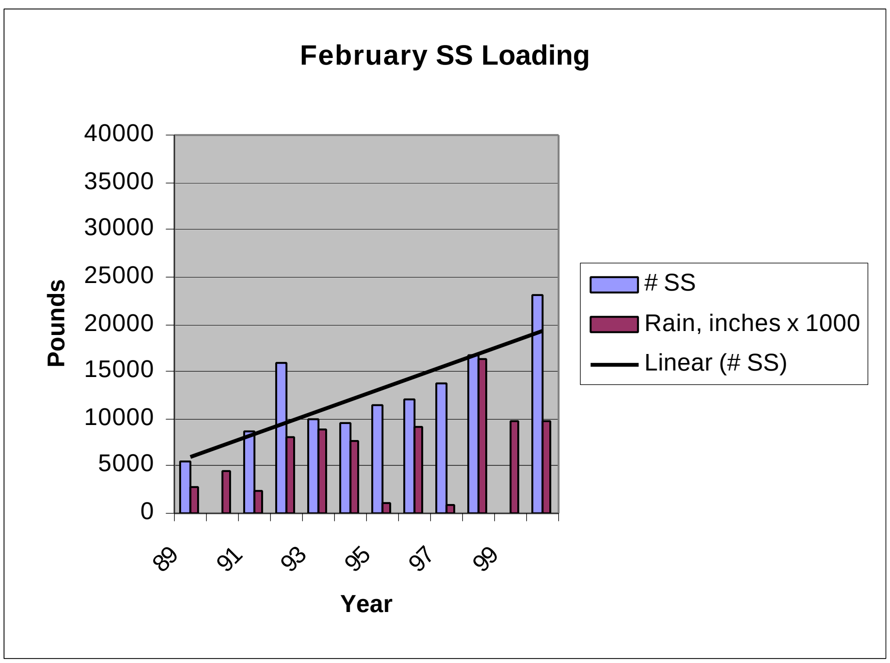


Figure 3.3: February SS Loading

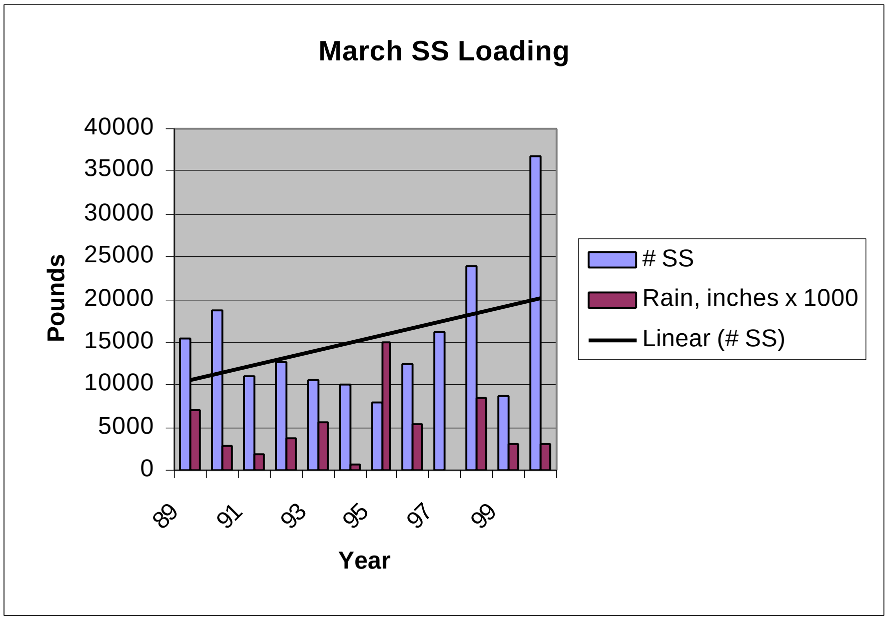


Figure 3.4: March SS Loading

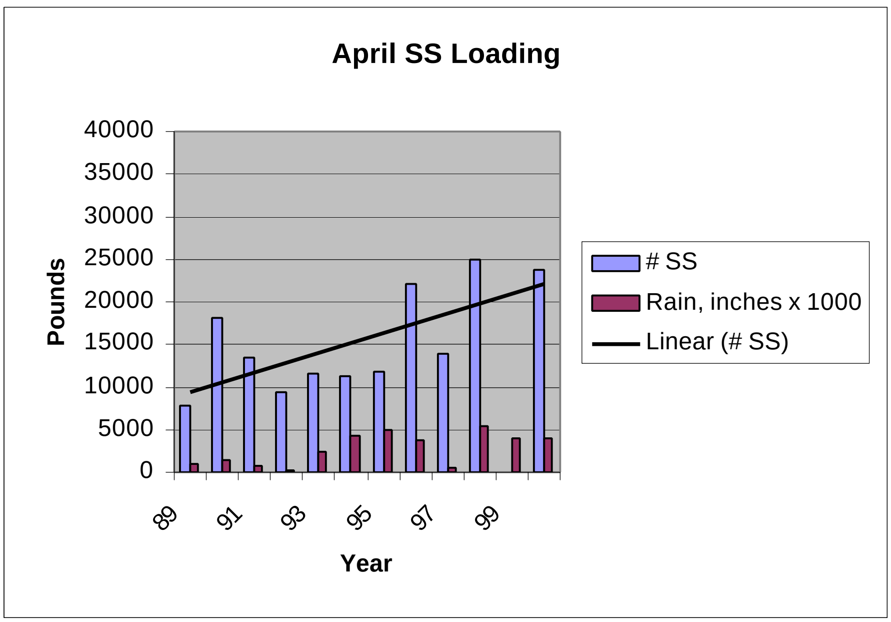


Figure 3.5: April SS Loading

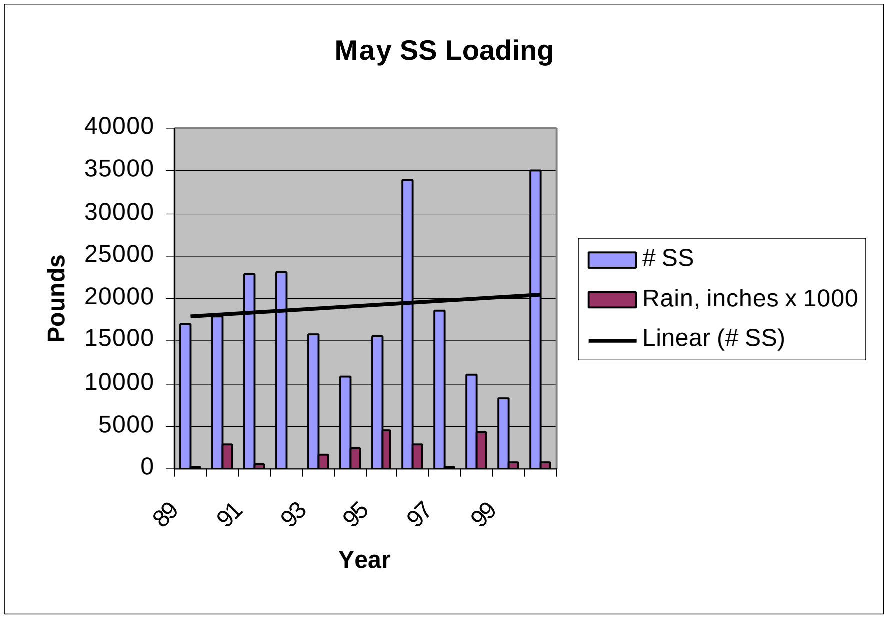


Figure 3.6: May SS Loading

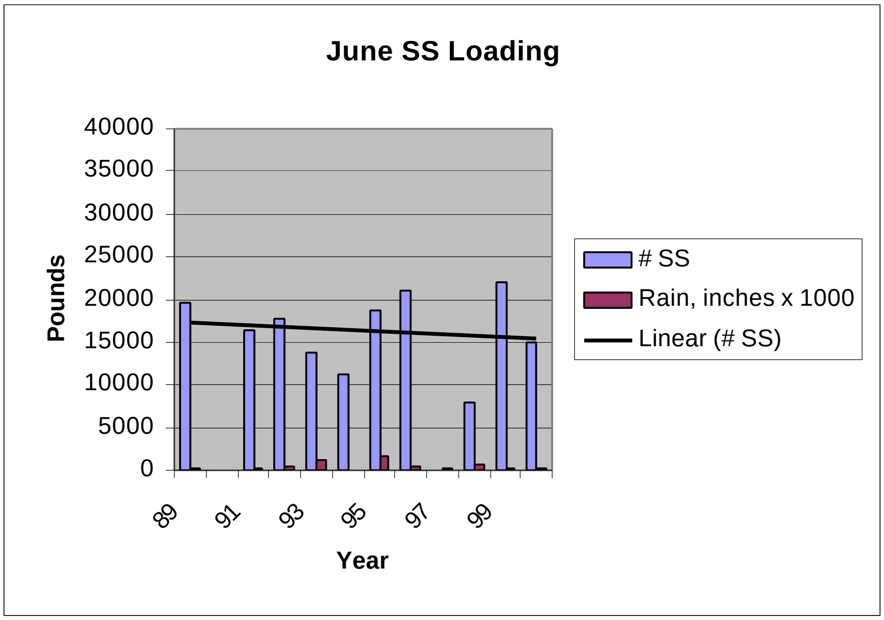


Figure 3.7: June SS Loading

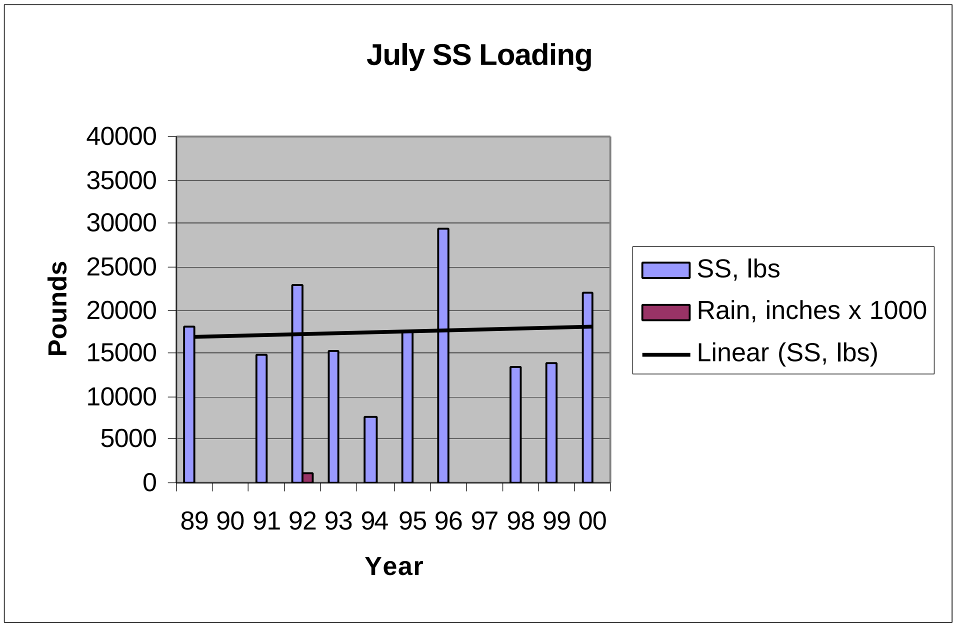


Figure 3.8: July SS Loading

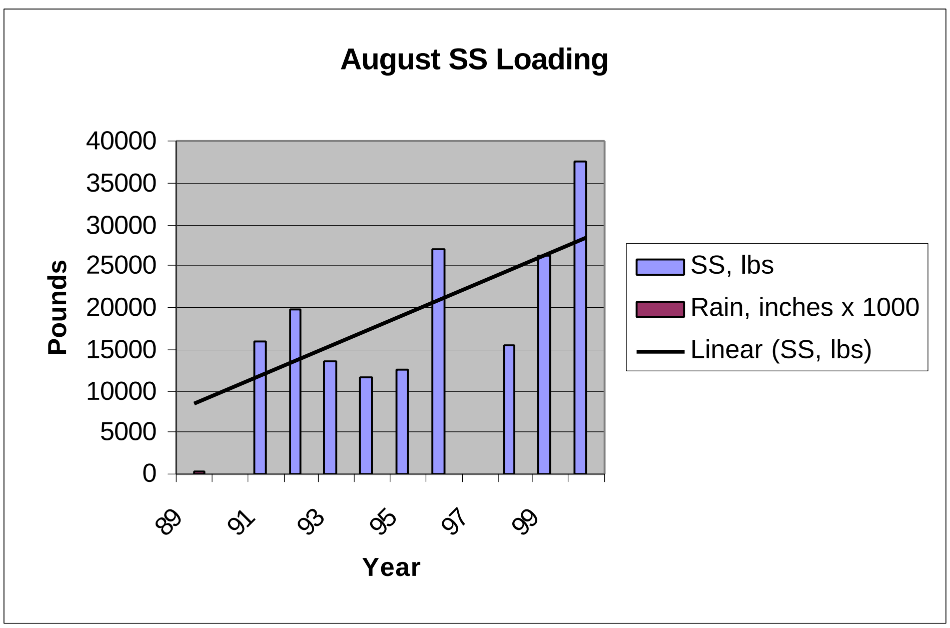


Figure 3.9: August SS Loading

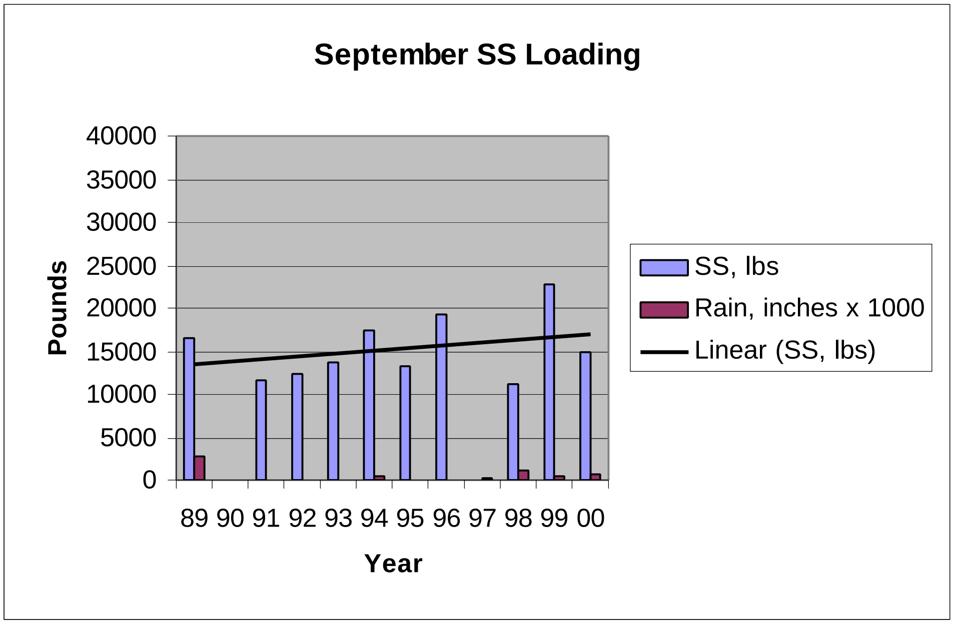


Figure 3.10: September SS Loading

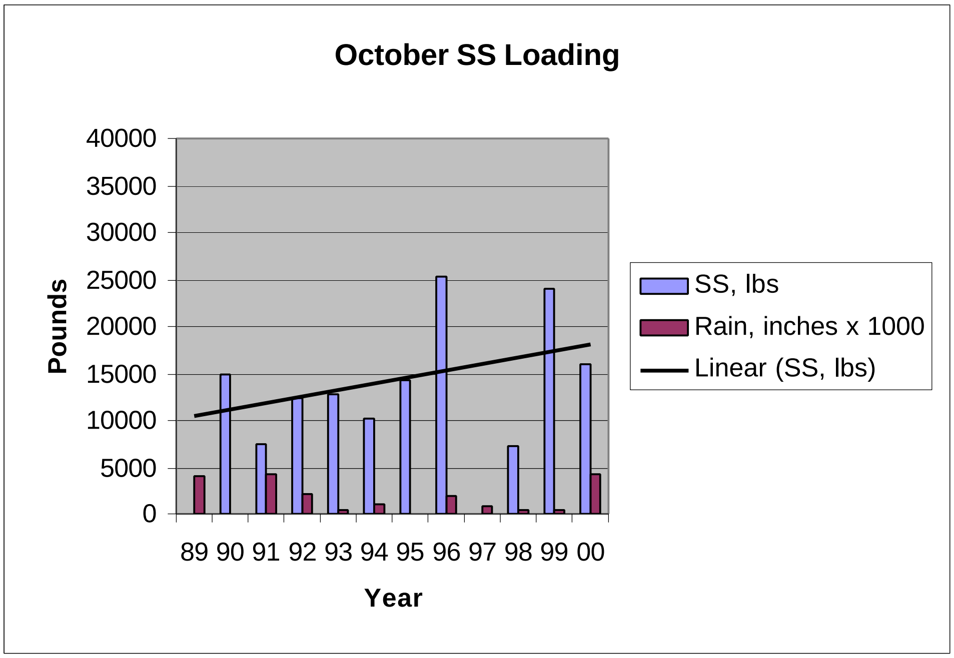


Figure 3.11: October SS Loading

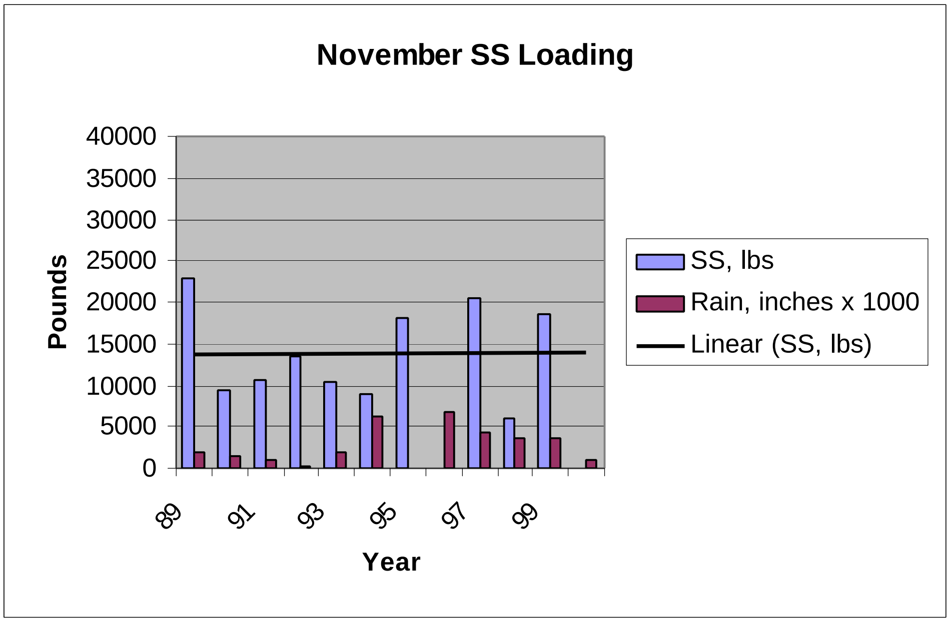


Figure 3.12: November SS Loading

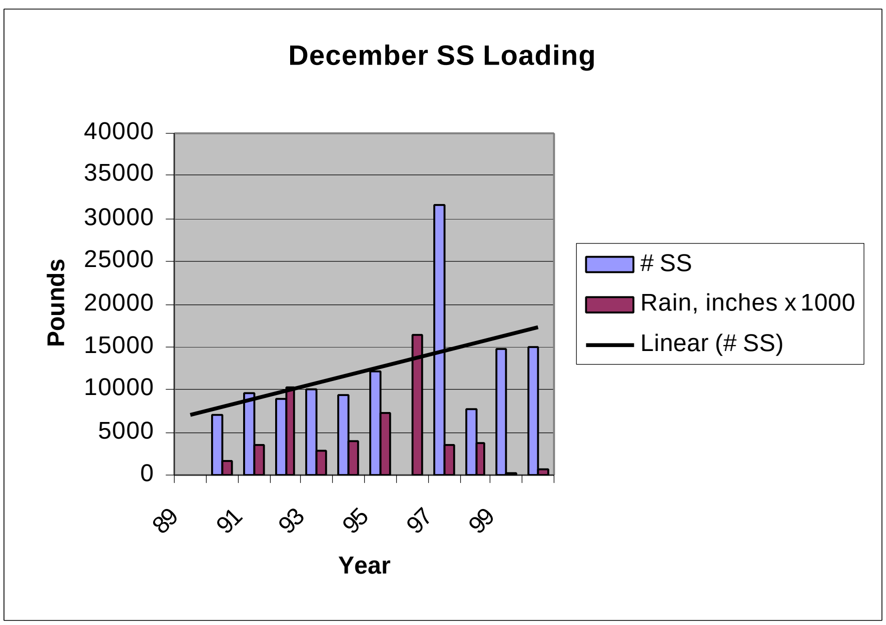


Figure 3.13: December SS Loading

3.2 Projected 2021 Wastewater Loading

In order to project future wastewater treatment plant loading, the concentrations of BOD and SS, and the projected wastewater flows within the District must be estimated. Limitations on the wastewater system's probable growth must also be considered.

This section does not consider service to areas outside the District sewer service area. If a project is proposed for new service areas, to be annexed to the District, the District will need to evaluate the impact of such annexations to both the collection system and the WWTP capacity on a case-by-case basis. It is too speculative to consider extra-territorial projects in this Master Plan, if the specific locations are unknown.

Based on the review of the historical flow and loading data, the current BOD and SS concentrations will be assumed for future average loading concentrations to the Wastewater Treatment Plant. These are 250 mg/l of BOD and 450 mg/l of SS. Although the reason for the elevated levels of SS may be understood and mitigated, we cannot assume that for this analysis.

The determination of the projected Average Daily Discharge (ADD) to the wastewater treatment plant requires a two-step analysis. The projected flows can be estimated based on past growth rates, or upon the remaining developable lots in the District. These will be discussed separately.

The past growth rate in sewer customer connections has been 1.9%, as discussed in the March 2000 Wastewater Treatment Plant Capacity Study. The past growth rate in water demand, based on the water system records, has been 3%. The current ADD can be escalated by these growth rates over the next 20 years. **Table 3.3** shows the hypothetical flows at 1.9% and 3% growth rates.

Table 3.3: Hypothetical Escalated Flows

	ADD	Corresponding # of Customers
Current	180,000 gpd	1,384
Escalated by 1.9% for 20 years	262,000 gpd	2107[16]
Escalated by 3% for 20 years	325,000	3,040

As discussed in Section 2, the 20-year horizon is approximately when the remaining developable, sewered lots in Pine Mountain Lake will be built out. In addition, the projection in Section 2 lists the potential wastewater flows to the WWTP if the unsewered PML lots become sewered. The potential for unsewered lots to convert to sewers is considered low, due to the high capital costs of building new sewers. Property owners typically fund such extensions of the system through an improvement district. Therefore, it is recommended that the projected wastewater plant loads assume the build out of existing sewered lots.

[16] At 130 gal/connection/day

If the available sewered, developable lots are 73% built out now, the maximum number of sewered lots available for build out is 1,878. Assuming 130 gpd wastewater flow per day, and adding in 57,600 gpd for commercial development of the Yosemite Gateway property results in a maximum average daily flow of 300,000 gpd.

Table 3.4: ADD at Total Buildout

Number of Lots	1,878
ADD/Lot	130 gpd
Subtotal	244,000 gpd
Yosemite Gateway	57,600 gpd
ADD at Total Build Out	300,000 gpd

Based on this analysis, it appears that build out will occur in about 20-25 years. Therefore, for purposes of projecting future wastewater loading, this analysis will assume 300,000 gpd of ADD wastewater flow. **Table 3.5** shows the projected wastewater loading based on these flows and BOD/SS concentrations.

Table 3.5: Projected 2021 Future Loading to the WWTP

	2000	12-Yr. Avg.	2021 Estimate
Avg. Daily Flow	172,600 gpd	180,000 gpd	300,000 gpd
Maximum Daily Flow	454,000 gpd	638,000 gpd	750,000 gpd[17]
Biochemical Oxygen Demand (BOD)			
Average Conc.	346 mg/l	268 mg/l	250 mg/l
Annual Loading	185,000 lbs.	130,100 lbs.	228,000 lbs.
Peak Month	21,600 lbs.	16,100 lbs.	32,000 lbs.[18]
Suspended Solids (SS)			
Average Conc.	514 mg/l	362 mg/l	450 mg/l
Annual Loading	275,863 lbs.	188,870 lbs.	410,000 lbs.
Peak Month	37,600 lbs.	24,457 lbs.	58,000 lbs.

These loads are intended for planning purposes only. It is typical for actual future loads to vary from planning projections.

[17] Assumed peak factor of average day to peak wet weather day of 2.5.
[18] Assumes dry weather peak factor of 1.7.

3.3 Wastewater Treatment Regulations

Groveland's wastewater treatment plant exists because of the numerous federal, state and local regulations that require the treatment and management of domestic sewage. The most important regulations to the District's wastewater treatment plant are the federal Clean Water Act and the state Porter-Cologne Act. Under these laws, the District holds a Waste Discharge Requirements permit (WDR #87-121) from the Central Valley Regional Water Quality Control Board (CVRWQCB).

As the District contemplates the future of the wastewater treatment plant, this section summarizes the current and upcoming regulations that will have a bearing on the decisions the District makes. A number of the upcoming regulatory actions by the RWQCB are expected to be highly controversial, and will take years to be resolved. So it will be a constant challenge for the District to determine which regulations will apply to the District's actions and how to find the most responsible approach for ratepayers and the environment.

3.3.1 Summary of Current WDR #87-121 Requirements

The District's current WDR permit was adopted in 1987. It is based on secondary treatment of domestic wastewater. The governing state regulations are contained in Title 22 of the California Code of Regulations. The WDR permits Groveland's wastewater plant to treat up to 400,000 gallons per day of sewage in dry weather, provided certain discharge water quality limits are met. Water quality limits are set for BOD, coliform organisms, settleable solids and flow.

Table 3.6: WDR #87-121 Discharge and Operating Limitations

BOD5[19]	
Monthly Average	30 mg/l
Daily Maximums	80 mg/l
Total Coliform Organisms	
Weekly Median	23 MPN/100 ml
Daily Maximum	240 MPN/100 ml
Settleable Solids	
Monthly Average	0..5 ml/1-hr
Daily Maximums	1.0 ml/1-hr
Dry Weather Influent Flow	
Daily Maximum	400,000 gpd
Wet Weather Influent Flow	
Daily Maximum	500,000 gpd
Reservoirs	
Minimum Freeboard	2 feet
Minimum Dissolved Oxygen	1.0 mg/l for 16 hrs in any 24 hr

The permit includes numerous narrative performance and monitoring requirements as well as these numeric requirements.

The permit requires land disposal of all treated wastewater, with no tailwater release to First Garrotte Creek or Pine Mountain Lake. The permit requires a specific program of monitoring and reporting to the RWQCB on a daily, monthly and annual basis. The biosolids, which result from wastewater treatment, are land applied on the District's property on Ferretti Road.

If the District adds treatment units, or changes the nature or location of wastewater or biosolids land application, that action may trigger an update of the District's permit. Many of the regulatory mandates described below are being included in new wastewater permits issued by the CVRWQCB.

3.3.2 Sanitary Sewer Overflows

New regulations have recently been proposed by the EPA to control sanitary sewer overflows in satellite sewer system. GCSD is not a satellite of another entity's treatment plant, so these rules will not apply to GCSD directly. But the content of the regulation could be an indication of the kind of provisions the District should expect to see if its current WDR permits were reviewed by the RWQCB. The provisions include a written program regarding the Capacity, Management, Operation and Maintenance (CMOM) of the sewage collection system. A CMOM must include provisions preventing discharge of sewage to streams and lakes, requiring certain forms of public notification of discharges, requiring monitoring, and implementing of an overflow emergency response

[19] Biochemical Oxygen Demand, a biochemical measure of the concentration of nutrients in the wastewater available for bacterial and algal growth.

plan. These are similar to actions the District has already been implementing for the collection system.

3.3.3 California Toxics Rule

The federal California Toxics Rule (CTR) was adopted by the USEPA in May 2000.[20] It set numeric water quality standards for California waters, for 57 priority toxic pollutants, mostly organics, pesticides and metals. In some cases, the numeric standard for a pollutant in a discharge to a stream is stricter than the standard in drinking water. This stricter standard applies where the pollutant tends to accumulate in the food chain.

In some cases, the numeric standard was set to protect aquatic life or human health without taking into consideration whether there are treatment technologies available to reduce pollutants to the levels required, or whether laboratories can test to the parts-per-billion levels adopted. The CTR has been controversial, and further changes in the rule may occur. It is estimated that it will take $2 billion for existing dischargers to comply with the regulation. The very low numeric discharge standards would need to be met by the District if it decides to use a live stream discharge strategy for future wastewater disposal.

Because the Groveland community is mostly resort residential, it has a lower probability of exceeding the CTR limits, compared to a full service city. However, it is possible that the CTR could be a consideration for live stream discharge of the District's treated wastewater.

3.3.4 State Implementation Policy for CTR

The State Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California (SIP) was adopted by the State in March 2000. It is the state's implementing document for the federal CTR. It provides guidelines for how the CTR's numeric standards are included in individual permits. It allows compliance schedules for wastewater facilities to meet the CTR within the next 15 years. The SIP is being challenged in court, for failing to require immediate compliance.

3.3.5 Narrative Objectives

Under provisions of the state Porter-Cologne Act, the state includes narrative water quality objectives in wastewater permits. These narrative objectives include broad statements to protect the beneficial uses of streams and groundwater. During recent permit renewals, the RWQCB has been translating these narrative objectives into stringent numeric effluent limitations. The rationale for the numeric standards has generated controversy. It is likely that GCSD's current WDR permit would be reevaluated during implementation of the actions recommended in this Master Plan, and would be subject to these more stringent standards.

[20] 40 CFR Part 131

An example of narrative objectives is the groundwater anti-degradation provision. This provision is included in most NPDES and WDR permits in the Central Valley Region. The District's 1987 WDR permit includes the following discharge specification:

"2. The discharge shall not cause degradation of any water supply."

This prohibition has not been a problem for wastewater treatment plants in the past, but there is increasing concern that the RWQCB may begin to take enforcement action where land application of wastewater has altered the groundwater quality. RWQCB staff mentioned specific concerns in the Central Valley about the concentration of salts and nitrogen compounds rising in groundwater. Human use of water increases the concentration of salts and nitrogen compounds. To remove the accumulated salts and nitrates requires higher levels of secondary treatment or membrane waste treatment technologies.

3.3.6 Total Maximum Daily Load

TMDL stands for Total Maximum Daily Load. The State's Basin Plan has listed 500 water bodies that have impaired water quality for one or more beneficial uses, such as drinking water supply, wildlife habitat or irrigation supply. Federal law requires the State to develop TMDLs for each impaired water body, for each impairing pollutant (1400 TMDLs est.) in the next 10 years. This means that many streams and lakes are receiving too much pollution. Existing man-made sources will need to reduce their discharges to meet the Total Maximum Daily Load.

This will make it extremely difficult for new discharges to be permitted into live streams on impaired water bodies. Under the "tributary rule," discharges of pollutants in the upstream tributaries of an impaired water body, like the Tuolumne River, will be included in the limitations of a TMDL, not just the dischargers in the impaired reach of the river. Pollutants of concern in the Tuolumne River watershed include nitrate, ammonia, metals, ortho phosphates, and salinity. Although TMDLs will take years to be developed, CVRWQCB permit renewals are including strict numeric discharge standards that are intended to be protective of the water body until the TMDL is developed. These "interim" permit provisions are being challenged in court. Wastewater organizations have calculated that the cost to comply with TMDLs in California could range from $1B to $5B.

Table 3.7 is an extract of the 1998 California Section 303(d) list showing the impairments in the watersheds to which the Groveland CSD is tributary.

Table 3.7 Tributary Stream Impairments

Water Body	Impairments
San Joaquin-Sacramento Delta	Chlorpyrifos, DDT, Diazinon, EC, Group A Pesticides, Mercury, Low Dissolved Oxygen, Unknown Toxicity
Deep Water Ship Channel	Dioxin, Furans
San Joaquin River	Boron, Chlorpyrifos, DDT, Diazinon, EC, Group A Pesticides, Selenium, Unknown Toxicity
Tuolumne River	Diazinon, Group A Pesticides, Unknown Toxicity

Although TMDLs have not been developed for the impairments on the Tuolumne River, the renewal of existing wastewater permits are including requirements that a WWTP will comply with any applicable TMDLs when they are adopted. Permittees cannot be sure what this requirement will ultimately mean. The RWQCB is not issuing new discharge permits until TMDLs are developed for the affected water body.

3.3.7 Mandatory Minimum Penalties SB 709

The California Legislature adopted Mandatory Minimum Penalties (SB 709) last year. These mandatory penalties apply to wastewater permit violations by NPDES[21] permit holders. NPDES permits are issued to wastewater plants that discharge to a lake or stream. GCSD does not have an NPDES permit. It has a WDR permit because all wastewater is required to be disposed of by land application. However, SB 709 is indicative of the approach the RWQCBs are taking lately. The number of enforcement actions, both civil and criminal, for permit violations of all kinds is sharply higher statewide. Negligent (i.e. careless) conduct is all that is required for criminal conviction under the Clean Water Act.[22]

3.3.8 Odors

The state Porter-Cologne Water Quality Control Act provides the RWQCB the authority to prevent and abate water pollution and nuisance. Groveland's WDR permit includes the following provision:

"B.1 Neither the treatment nor the discharge shall cause a pollution or nuisance as defined by the California Water Code, section 13050."

Wastewater conveyance and treatment can be a source of objectionable odors, which would be considered a nuisance. The District has the duty to control odors associated with the collection system, the treatment plant and the land application of treated wastewater and biosolids.

[21] National Pollutant Discharge Elimination System: The federal regulations that apply to dischargers to waters of the United States.
[22] US v. Hanousek, 176 Fed. 3d

3.3.9 Biosolids

The land application or recycling of biosolids is regulated by 40 Code of Federal Regulations, Part 503. Biosolids is the term used to specify sewage sludge, which has been thoroughly treated in accordance with the 503 regulations. The biosolids must be low in metals content. They must be disinfected by an approved method such as lime addition or heating. They must meet standards for the destruction of salmonella, E. coli bacteria and helminth ova. They must not be attractive to vectors like flies and rodents. Land application of the biosolids must be conducted in accordance with the procedures and safeguards required by the 503 regulations.

The SWRCB has been working on developing a General Permit for the land application of Class B biosolids. This permit, if adopted, will set additional standards for the land application of biosolids.

In addition, many California county governments have enacted regulations about land application of biosolids, which must be included in a WWTP's biosolids management plan. Under the federal, state and local regulations, it is possible to land apply biosolids as a soil amendment for horticultural, agricultural or forestry purposes. 49% of the sewage sludge generated in the United States is land applied.

GCSD's biosolids meet the standards for Class B biosolids. If a sewage sludge does not meet the standards in 40 CFR Part 503, it is not considered biosolids. Such sludge must be disposed of in a controlled landfill. It may be incinerated first, and it may be used as Alternative Daily Cover at a landfill. But it may not be land applied.

3.3.10 Clean Air Act

The Clean Air Act regulates pollutants released to the atmosphere. The District is already familiar with the typical requirements for its stationary generators and mobile equipment. New generators are subject to limitations on emissions. Generators are limited in the number of hours per month that they may be run. The San Joaquin Valley is considered to be one of the top 10 non-compliance air quality regions in the United States. So, permits on new air emissions will be restrictive. The Clean Air Act has provisions that regulate odor emissions as well.

3.4 WWTP Performance

This section reviews the current performance of each treatment unit in the WWTP. Biosolids and effluent storage and disposal are discussed in Sections 6 and 7. There are two objectives of this section:

1. To determine the loading at which the WWTP could consistently comply with its WDR permit.
2. To determine whether improvements to individual treatment units would provide adequate additional capacity for current or future demands.

3.4.1 Dataset

For purposes of analyzing the current performance of the treatment plant, the following flow and loading rates were used:

Table 3.8: WWTP Performance Dataset

Data Period	1989-2000
Average Daily Flow	180,000 gpd
Avg. Daily Dry Weather flow	175,000 gpd (June, July 1999)
Avg. Daily Wet Weather Flow	398,000 gpd (Jan, Feb 1998)
Peak Daily Dry Weather flow	281,000 gpd
Peak Daily Wet Weather flow	638,000 gpd
1989-1999 (11-Year Average)	
Average Influent BOD	244 mg/l
Max. Monthly Influent BOD	370 mg/l
Average SS	423 mg/l
Max.Daily	SS 1900 mg/l[23]
2000	
Average Influent BOD	346 mg/l
Max. Monthly Influent BOD	493 mg/l
Average SS	514 mg/l
Max. Daily SS	1758 mg/l [24]

3.4.2 Violations

Appendix A tabulates the history of the WWTP's WDR permit violations. From 1989 to 1993, the plant experienced a chronic problem with BOD and coliform violations. From 1994, BOD and coliform compliance was greatly improved. However, in June 1999 to August 2000, high plant loading caused another series of BOD and coliform violations.

The plant flows have usually remained within permit limits. Only 3 high flow violations have occurred in 12 years.

The Settable Solids limit was not violated between 1989 and 1992. Then, sporadic Settable Solids violations began. By 1997, episodes of several successive months of Settable Solids violations occurred. The latest was during the high loading period of June 1999 to August 2000.

3.4.3 Current Treatment Unit Performance

Screening

Wastewater arrives at the wastewater plant either by force main up from the Pine Mountain Lake system, or by gravity main down from Groveland and Big Oak Flat. The only primary treatment unit is the Rotascreen, which removes solids, rags and debris

[23] 5/16/91
[24] 8/29/00, after decanting supernate from Digester to Equalization Basin

more than 65/1000 inch in size. A Rotascreen is classified as a self-cleaning continuous screen.

Operations report that the screening capacity appears to be at capacity for current demands. Operational problems, such as debris overflow, occur at high flows. Manual high-pressure cleaning of the screens, which is necessary on a daily basis, causes a lot of backspray towards the operator, who wears protective clothing.

The GCSD WWTP has a unit for removal of grit, but it is inoperable. Operations report that they experience a significant amount of wear on bearings, pumps and other downstream treatment units. Grit accumulates in the Equalization Basin. Data is not available on the quantity of grit bypassing the Rotascreen. An evaluation should be performed to determine whether an unacceptable level of grit is interfering with the treatment process, or causing accelerated wear of equipment.

Equalization Basin

The Equalization Basin has a volume of 570,000 gallons, and has a medial berm that allows shutdown of half the basin for maintenance during low flow conditions. The basin now has 20 fine bubble membrane tube diffusers that serve to increase the dissolved oxygen (DO) in the wastewater during the holding period, and thereby reduce odor potential. Over 10 years, the influent DO averages 1.06 mg/l year-round. However, August DO averages 0.2 mg/l, with regular occurrences of non-detect (0.00 mg/l) of DO. In 2000, DO averaged 0.0 mg/l. Low DOs especially during the warm months are a source of odors at the WWTP. New aerators were recently installed. These may improve the minimum DO concentration.

Operations report that since the medial berm was installed in 2000, at low flows they are able to operate the two sides of the Equalization Basin independently. During decant of the digester, this allows them to isolate the very concentrated decant supernate and regulate its reintroduction at the headworks. Before the berm, the decant supernate was a concentrated batch load to the Activated Sludge system. High concentrations of SS and BOD in the decant supernate is indicative of recycling of untreated waste in the plant.

The Equalization Basin is designed to equalize the flow and loading into the treatment process. The loading concentrations from the community are relatively stable, but the flow rates can vary by a factor of 3 or more. With an average daily flow of approximately 180,000 gpd, the Equalization Basin has an emergency storage volume of 2 days, assuming the basin typically operates at one third full. However, during an adverse weather period, with peak daily wet weather flow of 450,000 gpd, and operating 60% full during winter, the emergency storage volume is about 12 hours. This approximates the time available to store water coming into the plant from the collection system if the plant pumping systems were out of service. Limited additional wastewater storage capacity is present in the collection system upstream of each lift station. This collection system and Equalization Basin storage time has been adequate in the past to avoid overflow from the Equalization Basin.

The Equalization Basin appears to be adequately sized for current demands. If hydraulic loading increases by 67% to buildout, compared to 2000 loading, a proportional increase in equalization capacity will be needed.

Headworks Pumping

Average daily flow into the plant is approximately 180,000 gpd. Peak daily flow into the plant has been as high as 638,000 gpd. The two 390 gpm variable speed, influent pumps can pump at a continuous rate of 850,000 gpd. Influent pumping is not a limiting factor on operation of the WWTP. The usefulness of the existing influent pumps for future capacity will depend on the location, configuration and hydraulic grade line of the selected expansion alternative.

Reservoir #1

Reservoir #1 serves several purposes for the WWTP. First, Reservoir #1 is used to store treated effluent from the WWTP that does not quite meet the WDR permit standards. For example, Settleable Solids may have been reduced by 95% but fail to meet the daily maximum standard of 1.0 ml/l-hr. The treated wastewater is diverted to Reservoir #1 for a few days until the Settleable Solids meet the standard. The frequency of this occurrence may be zero to several times a year. The diverted wastewater is retested and either returned to the Equalization Basin, or, if it meets the standards, it is blended with fully treated effluent in the chlorine contact basin and pumped to Reservoir #2.

During extreme wet weather flows, excess inflow is pumped from the Equalization Basin to Reservoir #1. After the storm flows have subsided, the water in Reservoir #1 is returned to the Equalization Basin for full treatment. The frequency of this use of Reservoir #1 varies with the type of winter weather the District experiences. In several years, the WWTP has been able to handle all storm events without diverting to Reservoir #1. During the El Niño storm events, storm flows were diverted several times. Since this flow is diluted but untreated sewage, it is returned as soon as possible to the treatment process after the storm flows subside, within a few days.

Reservoir #1 is used during periods when effluent in Reservoir #2 is used to irrigate the Pine Mountain Lake golf course. This is done to avoid the possibility of applying chlorinated water to the grass. The water diverted to Reservoir #1 is fully treated wastewater. It is blended back into the chlorine contact basin and pumped to Reservoir #2 after the golf course irrigation cycle is complete. The frequency of this diversion to Reservoir #1 depends on the demand for golf course irrigation, with higher usage during summer months.

Reservoir #1 was also used in 2000 to hold raw sewage during the shutdown of the Equalization Basin for repairs. The shutdown lasted a few days. Then all water in Reservoir #1 was returned for full treatment. This is an unusual use for Reservoir #1.

Activated Sludge Treatment

Groveland's Activated Sludge process can be operated in one of two modes, Step Aeration or Contact Stabilization. They were analyzed in detail in the March 2000 Wastewater Capacity Study, the results of which are summarized here.

In Step Aeration, the wastewater is first introduced to the Activated Sludge process at a series of locations, or steps, along the length of the Reaeration Basin. This step feeding of the bacteria avoids the problem of overloading the Reaeration Basin at the head end. The wastewater has a long detention time in the Reaeration Basin. This process is used during moderate loading periods.

Contact Stabilization is the mode of operation used during higher loading periods. This process takes advantage of one of the characteristics of the bacterial environment. The wastewater is first introduced in the Contact Basin, which has a short detention time. The nutrients become concentrated on the exterior of the bacteria, before the waste stream moves into the Reaeration Basin. This enhances the treatability of the wastewater at the plant's higher flowrates.

Mean Cell Residence Time (MCRT) is a measure of the time that the average bacterial cell is resident in the Activated Sludge process. The 1999 annual average of the MCRT for the Activated Sludge process was 5.3 days. The shortest MCRT in that year was 2.9 days in October. A MCRT of less than 5 days is a clear indication that the system is exceeding its capacity. Inadequate time is available to the microorganisms to metabolize and destroy the BOD and SS in the wastewater. Solids' recycling is a serious problem for this WWTP.

A look at the history of the solids concentration in the Return Activated Sludge (RAS) illustrates the apparent increase in solids recycling in the plant. **Figure 3.14** shows the upward trend.

The WWTP is able to achieve solids removal efficiencies of 85-95%. This is consistent with the performance of typical activated sludge processes. However, the high influent levels of Suspended Solids and the substantial solids recycling means the effluent is not able to consistently meet the WDR discharge requirements.

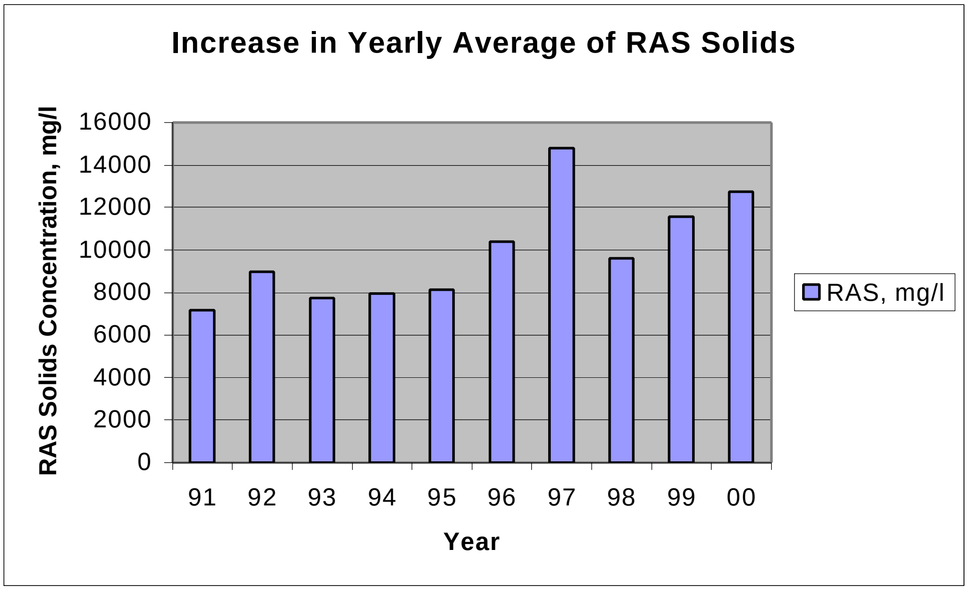


Figure 3.14: Increase in Yearly Average of RAS Solids

Secondary Clarifier

Operations staff reports that they have observed signs of limitations in the treatment capacity of the Secondary Clarifier. During periods of high hydraulic loading, above 175 gpm (250,00 gpd), they observe the re-suspension of solids in the Clarifier. This reduces the removal efficiency of the Clarifier, and results in higher suspended solids (SS) in the finished effluent. This problem has also been observed during periods of flow under 175 gpm, when the settlability of the solids is low. The highest flowrate at which they can meet the SS criteria, provided they are achieving very settleable solids, is 300,000 gpd. Peak daily flows can be as high as 638,000 gpd. Based on these observations, operations staff believes the system has exceeded its capacity.

Average loading rates to a secondary clarifier should be in the range of 0.6 to 1.2 lb/ft^2-hr. The GCSD average loading rate is substantially higher. Peak loading rates should be not more than 1.8 lb/ft^2-hr. GCSD peak loading rates are 1.8 lb/ft^2-hr. Both the average and peak loading rates are exceeding the industry standard. This confirms the operations staff's observations that the clarifier's capacity is being exceeded. The overflow rate indicates that hydraulic loading is not a problem. But the excessive loading rates indicate that solids coming to the clarifier are too concentrated to meet the necessary finished water quality standards.

Table 3.9 lists the secondary clarifier size and performance measures.

Table 3.9: Secondary Clarifier Design Parameters

1992-2000	
Volume	25,600 gal
Hydraulic Detention Time	
@ avg. flow	4.1 hr
@ max hour flow	1.4 hr
Surface Overflow Rate	
@ avg. flow	530 gal/ft^2-day
@ peak flow	810 gal/ft^2-day
Loading Rate	
@ avg. flow	1.5 lb/ft^2-hr
@ peak flow	1.8 lb/ft^2-hr

Aerobic Digestion

Aerobic digestion is the process by which the more concentrated sludge that is drawn off the bottom of the Secondary Clarifier is digested by aerobic bacteria. The digestion further reduces the volume of solids and reduces the potential for odors when the biosolids are spread on the drying beds. Biosolids are the solids separated at the bottom of the digester after each digestion interval. GCSD's digesters are operated in quarterly batches between wasting to the drying beds. Lime stabilization and polymers are used at the end of each quarterly batch to concentrate the biosolids as much as possible.

Solids reduction is the performance measure of a digester. In order to calculate solids reduction, we need to know the amount of solids sent to the digester, the amount of solids removed to the drying beds and the amount of solids recycled in the decant liquid which is returned to the Equalization Basin. The WWTP does not have a sample point to monitor the flow and concentration of the decant liquid. The operators estimate the volume based on the percent of the 32,000-gallon digester that is released. Without the pounds of solids recycled to the Equalization Basin, the efficiency of the digesters cannot be quantified.

However, **Figure 3.15** provides some insight. Over the last 12 years, the amount of biosolids released to the drying beds has remained about the same. But the amount of solids sent to the digester has increased steadily. As retention times in the digester have dropped over time, we must assume that less, rather than more, destruction of solids is occurring in the digester. An increasing amount of solids are apparently recirculating in the plant, making permit compliance increasingly difficult.

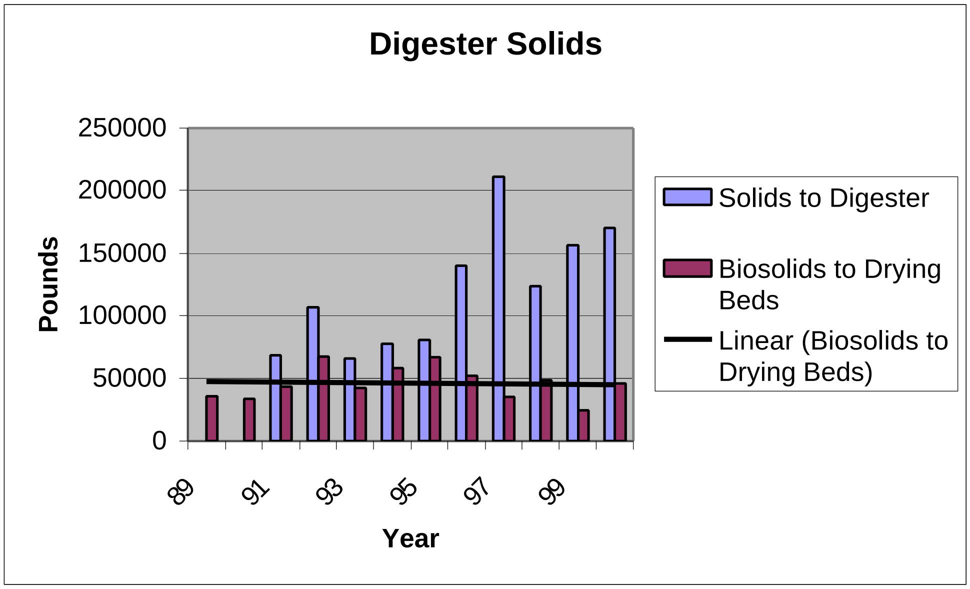


Figure 3.15: Digester Solids

Chlorine Contact Basin

The performance of the chlorine contact basin is evaluated on whether the effluent meets the coliform bacteria criteria in the WDR permit. **Appendix A** includes notations on the months in which coliform violations have occurred. **Table 3.10** shows the pattern of coliform violations by month and year. Between 1988 and 1993, coliform violations were nearly a monthly occurrence. Operational changes or system improvements around 1994 resulted in a sharp drop in the occurrence of coliform problems. 1997 and 1999 had a cluster of coliform violations in late summer and early fall. In 1999, suspended solids loading was particularly high during these months (see Appendix A).

Table 3.10: Occurrence of Coliform Violations

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1988	×	×	×	×				×	×	×	×	×
1989												
1990		×	×	×	×		×	×	×	×	×	×
1991		×		×	×	×	×	×	×	×		×
1992			×		×			×	×	×	××	
1993	×			×			×	×			×	
1994												
1995								×				
1996												
1997	×	×				×	×		×			
1998												
1999							×	×		×		
2000		×										

The chlorine dosage needed for adequate disinfection will vary for each WWTP's wastewater. Typical dosage in GCSD's plant is in the range of 25-40 mg/l. Keri, in *Operation of Wastewater Treatment Plants*, vol. 1, p. 355, (1994) indicates that dosage rates for Activated Sludge effluent are typically in the range of 2-8 mg/l. The District's chlorine dosage level is high.

The high levels of dosage with sporadic coliform violations indicate that the chlorination system is under stress. Increasing the dosage is not the solution. Addressing the fundamental high loading to the treatment plant will allow a reduction in chlorination and its associated costs while achieving the required disinfection.

The WDR permit does not have a requirement for the effluent free chlorine residual, probably because any residual will be exhausted by chemical reaction or evaporation during the effluent's long residence time in Reservoir #2. The average free residual chlorine is consistently maintained above 1.0 mg/l. The monthly minimum free chlorine residual over the last 3 years has been 0.42 mg/l in March 2000.

In order to serve future growth in wastewater flows, chlorination units and apparatus proportional to the increased flow will be required.

Effluent Pumping

Average daily flow into the plant is approximately 180,000 gpd. Peak daily flow into the plant has been as high as 638,000 gpd. The three fixed speed, influent pumps can pump at a continuous rate of 570,000 gpd. There is more influent pumping capacity than effluent capacity. Effluent pumping is near capacity for operation of the WWTP. During peak flow events, the irrigation pump is used to provide additional pump capacity by use of creative valving. The usefulness of the existing effluent pumps for future capacity will depend on the location, configuration and hydraulic grade line of the selected expansion alternative.

Air Supply

Total air demand in the plant has increased as wastewater loading has increased. The low oxygen concentrations in the Equalization Basin, the Activated Sludge process and the Digester at times indicates that air supply and transfer are inadequate for the current demands, especially during summer months. The lack of adequate air supply to meet the demand means that solids and BOD are inadequately destroyed in the aerobic treatment processes. This is a contributing factor to the overall solids problem at the WWTP. The District should evaluate how additional supply could be provided, perhaps by segregating the air supply system by process unit, and providing additional blowers.

Instrumentation and Controls

The lack of reliable metering throughout the plant is a major concern. The technical analysis of the treatment process' performance is dependent on the hydraulic balance and mass balance through the plant as well as the concentrations of the chemical and biological parameters of the treatment units. The analysis in this master plan often depended on approximations, estimates and extrapolations of data. Therefore only limited confidence should be placed on the analytical results. A full review of the metering and monitoring equipment and controls and procedures of the plant should be conducted, including the following items:

- Influent metering before the Equalization Basin.
- Measurement of screenings volume.
- Measurement of grit.
- Flow monitoring to and from Reservoir #2
- Flow monitoring and sampling point between the Aerobic Digester and the Equalization Basin
- Effluent metering and monitoring after the chlorine contact basin.
- Metering and monitoring of flow, BOD and SS in the reclaimed water irrigated on the spray fields.

Table 3.11: Summary of Treatment Unit Status

Treatment Unit	Status
Screening	At capacity for current demands
Equalization Basin	Adequate capacity for current demands
Headworks Pumping	Adequate capacity for current average and peak day flows.
Activated Sludge	**Demand exceeds capacity.**
Secondary Clarifier	**Demand exceeds capacity.**
Aerobic Digestion	**Demand exceeds capacity.**
Chlorine Contact Basin	High chlorine dosage requirement is consistent with overcapacity of the WWTP.
Effluent Pumping	Adequate capacity for current and future demands.
Air Supply	**Demand exceeds capacity.**
Instrumentation and Monitoring	**Lacks adequate metering and monitoring equipment to evaluate hydraulic balance and mass balance of the wastewater treatment system.**

3.4.4 Rated Capacity and Constraints

From Section 3.4.3, it is apparent that current wastewater demands have exceeded the capacity of the Activated Sludge process, the Clarifier and the Digester. The determination of what is a reasonable level of loading is a nonlinear function of flow rates, waste concentration, temperature, pH, and interference from other chemicals like industrial waste and pesticides that may enter the system. This means that the rated capacity is not a proportional fraction of how much the system is overloaded.

One approach is to look at a statistical distribution of loading that caused or did not cause a violation. The dataset used in **Figure 3.16** was January 1998 through June 2000. In July 2000, operations staff began drawing down water stored in Reservoir #2, in preparation of shutting down the Equalization Basin for a new liner. Data during the shutdown of the Equalization Basin was not used.

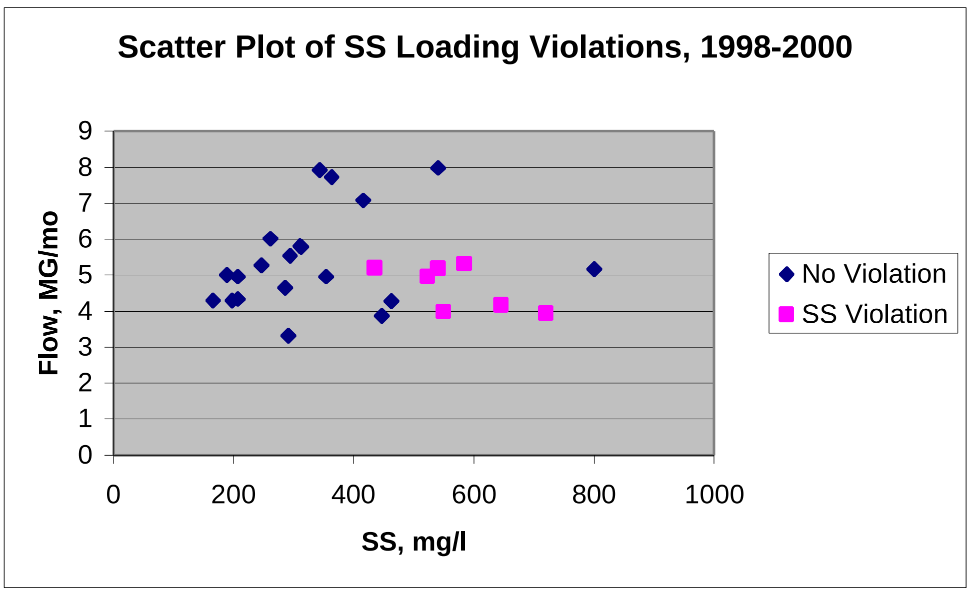


Figure 3.16: Scatter Plot of Flow and Suspended Solids Concentrations v. Settable Solids Violations

The scatter plot suggests that monthly average SS concentrations above 450 mg/l put the WWTP at risk for a settleable solids violation. When flows are above 4 MG/mo, 450 mg/l results in a maximum acceptable load of 13,500 pounds per month.

Figure 3.17 makes the same evaluation of BOD loading. The data set used was January 1998 through June 2000. The scatter plot suggests that BOD concentrations above 240 mg/l at 4 MG/month would put the WWTP at risk for a BOD violation. This is equal to a load of 7,100 pounds of BOD per month.

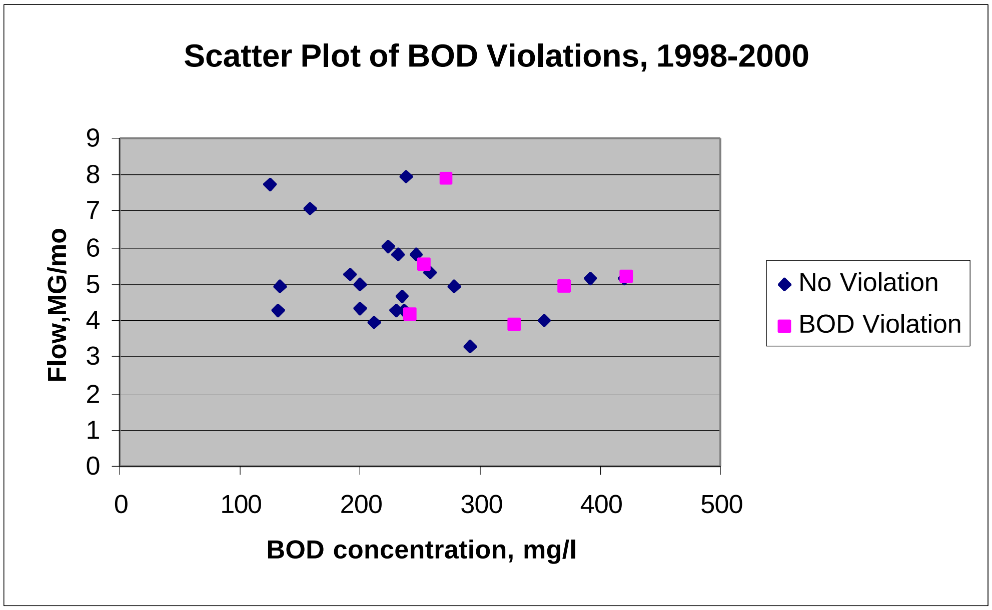


Figure 3.17: Scatter Plot of Flow and Loading v. BOD Violations

Table 3.12 assembles the results of this simple statistical analysis. In order to avoid all possibility of BOD or settable solids violations on the District's WDR permit, the WWTP would need to have substantially greater treatment capacity, and roughly twice what it has now. This can be partly justified by the high concentration of SS loading compared to a typical treatment plant. It is a reasonable assumption that when Boise Cascade designed the original plant, they assumed the industry standard of 200-250 mg/l of both BOD and SS concentrations. The actual wastewater is more concentrated.

Table 3.12: Capacity Status

Year 2000	Statistical Acceptable Load
BOD Loading	7,100 pounds/month
Average	15,475 pounds
Peak Month	21,614 pounds
SS Loading	13,500 pounds/month
Average	23,000 pounds
Peak Month	37,572 pounds

The core treatment units, Activated Sludge, Digestion and Clarification, are substantially over capacity. The WWTP situation is not one where one process unit is limiting the treatment capacity. So, it would not be a fruitful effort to expand just one of these treatment units. A full expansion of treatment capacity is needed to meet both current and future demands on the GCSD wastewater system.

We can make a speculative comparison of these results with a reconstruction of the WWTP's original design capacity. If the original design was for 13,500 pounds of SS, but at a SS concentration of 250 mg/l, which is typical of full service cities, the WWTP's hydraulic capacity (ADD) would have been about 240,000 gpd. Assuming a peak factor for maximum day demand (MDD) of 2.0, the peak design flow for the plant would have been about 480,000 gpd. The WDR permit allows a MDD flow of 500,000 gpd.

3.4.5 Conclusions Regarding WWTP Capacity

1. The BOD and SS loads to the WWTP have exceeded its capacity. The recirculation of SS is increasing.
2. To avoid any BOD and Settable Solids violations of the WDR permit, the current loading to the WWTP would need to be reduced to 7,100 and 13,500 pounds per month respectively.
3. A full expansion of treatment capacity is needed to meet both current and future demands on the GCSD wastewater system. A partial expansion of the WWTP would not meet these demands.
4. Inadequate air supply has decreased the WWTP's ability to treat the rising solids loading to the plant.
5. The WWTP lacks adequate metering and monitoring equipment. The operational monitoring program needs to be reviewed and updated, especially in regard to upcoming regulatory mandates. Lack of data hinders a reliable understanding of the hydraulic balance and mass balance of the WWTP.
6. Inadequate grit removal may be causing accelerated wear of operating equipment.

3.5 Effluent Disposal Alternatives

3.5.1 Decision Criteria

Ultimately, the District's treated wastewater must be disposed of. This section looks at the alternatives for Groveland's wastewater. Selection of the most suitable alternative was based on the following criteria:

<u>Ability to Meet Regulatory Requirements:</u> Can the regulatory requirements for the disposal alternative be met?

<u>Capacity:</u> Does the alternative have the potential to reuse or disposed of an average of 300,000 gallons per day?

<u>Public Acceptance:</u> To what extent would the public support or oppose the proposed disposal alternative based on environmental and public health concerns, or cost concerns?

<u>Site Availability:</u> Is an appropriate site available for the type of disposal proposed? Does it involve the acquisition of real estate?

<u>Reliability:</u> Is the reliability of the system acceptable? What are the backup provisions in case of system shutdown or failure?

Track Record: What is the track record in other locations for this type of disposal?

CEQA: Are there any apparent environmental issues raised by the alternative that could make the alternative unacceptable or impractical?

Life Cycle Cost: What are the capital and annual operating costs for the proposed disposal alternative?

3.5.2 Alternatives Considered

The following alternatives are available for the reuse or disposal of treated municipal wastewater. They are discussed in the following sections with respect to the decision criteria.

1. Agricultural and Landscape Irrigation (Land Disposal)
2. Direct Groundwater Recharge
3. Industrial Reuse
4. Recreational or Environmental Enhancement (Live Stream Discharge)
5. Potable Reuse

3.5.3 Agricultural and Landscape Irrigation

Currently, the District disposes of its treated wastewater by irrigation of its own spray fields and by irrigation of the Pine Mountain Lake golf course. This alternative would continue to use these disposal locations and would consider additional locations for agricultural and landscape irrigation.

The regulations that control the reuse of wastewater for agricultural or landscape purposes are contained in "Wastewater Reclamation Criteria," California Administrative Code, Title 22, Div. 4, Environmental Health, Department of Health Services (1997). **Table 3.13** summarizes the level of wastewater treatment required to reclaim wastewater for certain uses.

Table 3.13: Wastewater Treatment and Water Quality Criteria, Title 22

Use	Irrigation Method	Requirements
Food Crops	Spray	Disinfected, oxidized, coagulated, clarified, filtered, coliform < 2.2/100 ml
FoodCrops,Except Orchards & Vineyards	Surface	Disinfected, oxidized, coliforms <2.2/100 ml
Orchards & Vineyards	Surface	Primary Effluent
Fodder, Fiber & Seed*	Surface or Spray	
Pasture for Milking Animals	Surface or Spray	Disinfected, oxidized, coliform <23/100 ml
Landscape Irrigation	Surface or Spray	Disinfected, oxidized, coliform <23/100 ml
* Includes irrigation of pasture for non-dairy animals.		

Under Title 22, the land application of treated wastewater may only need primary treatment, assuming a fodder crop only, similar to the District's spray field use. However, the District's WDR permit requires the District's effluent to meet secondary treatment standards. The water used to irrigate the golf course meets Title 22 standards for landscape irrigation, i.e., disinfection, oxidization, and coliform count.

The water applied to spray fields is lost mostly through evaporation, but partly through percolation into the ground. The application rates are controlled to prevent any runoff to surface streams.

The District may consider increasing the capacity of its land application process by increasing the evapo-transpiration rate. This would be accomplished by more active disposal practices such as the cultivation of a high water use crop or poplar trees. The Ferretti Road site could be evaluated for additional areas where these practices would be beneficial.

The District may consider developing a third location on which to dispose of its treated wastewater by irrigation. Nearby ranch land is a possible location. If the ranching does not involve dairy production, the wastewater would need to be at least primary effluent to meet Title 22. For odor control purposes, for operational simplicity, and for additional public health assurance, the District may consider treating all wastewater to the same level of secondary treatment before storage.

Public acceptance of reclaiming wastewater for pasture irrigation has generally been good in other locations. The site's operation and access can be controlled. Finding a suitable site and coming to a reasonable agreement with a property owner will require considerable effort on the part of the District. Success is not guaranteed.

Reclamation of wastewater by pasture irrigation is considered a reliable system. This disposal method has a long positive track record in other locations and at the District. The District's storage pond provides flexibility for an irrigation system to manage shutdowns and maintenance activities on the disposal system. The reclamation system can be operated in a way to work well with the rancher's irrigation operations. This alternative has the potential to use up to 300,000 gallons per day, depending on the available acreage and soil percolation rate.

CEQA environmental review would need to be made for the land application of wastewater at a new location. The level of environmental impact that may result would depend on the particular site and irrigation system selected.

Irrigation improvements in Section 4 include a conceptual cost estimate of $700,000 for a reclaimed water system. It assumes a site for pasture irrigation in the vicinity of Phelan Mogan Road. Actual capital and operating costs will differ from this conceptual cost estimate.

Agricultural reuse of treated wastewater can provide a number of benefits. The farmer or rancher can receive a greater amount of a reliable water supply. Nutrients in the reclaimed water can contribute to the macronutrient and micronutrient requirements of the irrigated crops. Reuse of wastewater is consistent with the California State Water Code. The Code considers the use of potable water for irrigation as a waste or unreasonable use of such water when suitable reclaimed water is available. Water reuse is inherently a water conservation measure.

There are a number of constraints on agricultural reuse of reclaimed water. The farming community has been reluctant to use reclaimed water because of concerns that the marketability of crops might be affected. Reclaimed water used for irrigation must meet the regulatory requirements described above. Irrigation water must meet certain physical and chemical water quality criteria for optimum crop growth. The reclaimed water quality needs to be compatible with the soil chemistry at the irrigation site. The reclaimed water must not cause distribution piping problems such as sedimentation or corrosion. The economics of water reuse will determine whether the project is feasible for the District and for the rancher. Methods and timing of irrigation must be coordinated with the storage and disposal requirements of the District.

3.5.4 Groundwater Recharge

Some wastewater treatment plants dispose of treated wastewater by recharging groundwater. This occurs more often in areas where groundwater is depleted. This alternative would consider the feasibility of recharging groundwater within the District's boundaries.

Groundwater is not the principle source of supply of the District's drinking water. But there are a number of private wells that rely on the groundwater supply. The amount of water withdrawn by wells is small due to the decomposed bedrock nature of the local geology. Private wells typically produce at a rates less than 100 gpm in the area. This indicates that the capacity of the local geology to receive additional recharge is small.

For groundwater recharge, the Department of Health Services typically requires that the recharge waters are fully potable. This would require full potable water treatment, including filtration and advanced treatment for virus removal. These are expensive treatment processes. Public acceptance of groundwater recharge with treated wastewater has been problematic for water districts considering this alternative.

Groundwater recharge has a satisfactory track record in permeable soils, such as the recharge basins along Southern California riverbeds. The soils in the Groveland area are shallow, decomposed schists and granites overlying solid or fractured metamorphic rock formations. The success of a groundwater recharge project is dependent on the geologic conditions in the area of interest. The complexities of advanced treatment and operational problems can be significant. These factors make the reliability of a recharge system less than for some of the other alternatives.

A suitable location for recharge depends on two components. The site would have to be within a reasonable pumping distance from the Ferretti Road site. It would also have to be located where an adequate amount of recharge could be accomplished, based on the geologic conditions. The environmental impact of recharging groundwater is expected to be significant. If the District is required to conduct any groundwater investigations in the future, it should include measurements to assess the potential for direct groundwater recharge of treated effluent.

The cost of a groundwater recharge system would be significant. Based on the estimated well production rates of 100 gpm, it was assumed that each recharge well could accept 70,000 gpd on a sustained basis. If the amount of treated wastewater to be recharged in the future was in the range of 300,000 gal per day, 4-5 recharge well sites would be needed located over suitable strata. Each recharge well is estimated to cost $100,000 to construct. But the most significant cost would be for the advanced waste treatment and full filtration plant, in the range of $5-10 M. The system would be very energy consumptive. O&M and staffing costs would be substantial.

Because this alternative may be dependent on geologic conditions that do not exist, may cause significant public acceptance and environmental concerns, and is likely to be very expensive, it was eliminated from further consideration.

3.5.5 Industrial Reuse

Reclaimed wastewater is increasingly used by industry for supplemental water supply. Groveland does not have a significant component of industrial water users. There are not enough users to make further consideration of this alternative worthwhile.

3.5.6 Recreational or Environmental Enhancement

This alternative would use treated wastewater to provide additional water for recreational or environmental purposes. These uses could include water for non-contact water bodies, wetlands, and terrestrial and aquatic wildlife habitat.

Recent discussions with the Regional Water Quality Control Board have indicated that live-stream discharge may be an option worth investigating when re-permitting the existing plant.

Title 22 requires higher levels of wastewater treatment depending on the extent of public contact. This alternative may be attractive by providing additional water for in-stream environmental or recreational uses in the Groveland area. However, live stream discharge of treated wastewater is subject to additional federal and state regulations. The Big Creek watershed is tributary to the Tuolumne River. The regulatory challenges described in Section 3.3 would be involved for a discharge of the District's wastewater to a live stream. Particularly, the Tuolumne River needs to reduce impairments in the lower river reaches due to man-made sources of salts, metals, and organic compounds. To the extent that the District's wastewater contained these compounds, the District may have to provide offsetting reductions in them by another discharge downstream.

The capacity of Big Creek to accept up to 300,000 gallons per day of additional water will need to be evaluated carefully. This water is essentially imported from the Hetch Hetchy system. It is unknown what impact additional year round flow would have on the hydraulic and biologic conditions of the creek. The District may need to consider a combination of land application, and live stream discharge, with appropriate storage facilities, to minimize environmental impacts on Big Creek.

Other possible recreational or environmental enhancements would be facilities to provide recreational or environmental benefits not tributary to a stream. Examples include parks, environmental teaching centers, and landscape water bodies in new development. Such sites may have only a small percentage of the capacity needed to dispose of 300,000 gallons per day.

Public acceptance of the reuse of treated wastewater can vary widely. It depends on the type of reuse, the proximity of the reuse to human activities, and the level of confidence citizens have in the safety of the treatment process. It is too soon to assess public acceptance of recreational or environmental enhancement projects until more specifics are known.

The District's territory is favorably located for live stream discharge project. Flow from either the Ferretti Road site or a new site near Big Creek could be piped to discharge to Big Creek. A more detailed feasibility study will be needed to evaluate the possible locations for a new treatment plant near Big Creek.

Live stream discharge is a reliable method of reusing treated wastewater. It has a long track record of use by many WWTPs.

Creating a new live stream discharge may present a number of environmental impacts, as well as the possibility of enhancing in-stream flows. The CEQA compliance process will need to be thorough in order to obtain the necessary permits. Based on available information, the possible impacts to be evaluated include biological impacts on sensitive species, changes in riparian habitat, impacts on cultural resources, soil erosion, change in water quality, change in stream hydraulics, population growth, impacts on other public services due to population growth, recreational impacts, temporary traffic impacts during construction, and cumulative impacts with other projects.

The life cycle cost of live stream discharge is difficult to estimate at this point. Section 4 estimates the capital cost of expanding the existing WWTP at near $5 million, and building a new plant near Big Creek at near $11 million. These estimates assumed secondary treatment would be adequate for their respective disposal methods. However, the capital and operating costs for enhanced waste treatment to meet live stream discharge standards cannot be known until the specific standards are determined by the RWQCB. Treating for salinity removal, enhanced BOD removal, metals, diazinon, or the unknown toxicity in the Tuolumne River may be costly.

3.5.7 Potable Reuse

In certain circumstances, if no other source of water supply was available, an extremely water short area may consider direct or indirect reuse of wastewater for potable uses. This alternative is not widely use in the water industry because of concerns of long-term public health and system reliability. This alternative has often been more expensive than water transfers or desalinization plants for new water supplies. Groveland is not in a serious water supply deficit situation.

Regulatory requirements for either direct or indirect potable reuse are strict. Advanced treatment of wastewater and full potable water filtration treatment requirements must be met. Additional barriers to potential pollution, such as large storage reservoirs to intercept a problem upstream of the filtration plant may be required by the Department of Health Services. Significantly more real estate is needed for the advanced waste treatment, treated wastewater storage, filtration plant and potable water storage. Potable reuse projects are major undertakings with unpredictable outcomes from both the regulators and the public. This alternative would be the most challenging for public acceptance.

Because this alternative would be the most speculative, with no reasonable way to estimate costs at this stage, it was eliminated from further consideration.

3.5.8 Summary

Table 3.14 evaluates each of the five alternatives against the decision criteria. Reclamation of the District's treated wastewater for irrigation purposes continues to be the preferred alternative. This recommendation becomes the basis for determining the level of wastewater treatment and the extent of storage facilities needed by the WWTP, in Section 8.

Table 3.14: Narrative Evaluation of Disposal and Reuse Alternatives

Alternative	Regulatory Requirements	Capacity	Public Acceptance	Site Availability	Reliability	Track Record	CEQA	Probable Annual Cost
Agricultural or Landscape Irrigation (Land Disposal)	Secondary Treatment	Adequate	Probable acceptance	Good	Good	Many successful examples	Moderate impacts	Lowest ($700K capital cost)
Groundwater Recharge	Drinking Water Standards plus advanced virus removal	Inadequate	Not acceptable	Poor	Poor	Few successful examples	Significant impacts	Very high
Industrial Reuse	Depends on industry needs	Inadequate	Probable acceptance	None	Good	Some successful examples	Moderate impacts	High
Recreational or Environmental Enhancement (Live Stream Discharge)	Tuolumne River TMDL standards	May be adequate	Unknown	Good	Good	Successful examples under old regulations	Significant impacts	Very high
Potable Reuse	Drinking Water Standards plus advanced virus removal	Unknown	Not acceptable	Fair	Poor	Developmental	Significant impacts	Extremely high

3.6 Biosolids Management

3.6.1 Capacity and Status of Existing Biosolids Management System

When the sludge from domestic wastewater is treated in accordance with and meets the requirements of 40 Code of Federal Regulations, Part 503, it is considered to be Class A or B biosolids. Groveland's treatment system meets the requirements for Class B biosolids. The treatment criteria are comprised of three areas: pathogen destruction, low heavy metals content, helminth ova reduction, and vector control.

Groveland's aerobic digester and sludge drying beds provide the treatment for the first criteria, pathogen removal. These treatment units are a Process to Significantly Reduce Pathogens (PSRP) as required by the regulations to treat to a Class B standard. The biosolids are oxidized in the Aerobic Digester and treated with lime. Lime raises the temperature in a proscribed manner to destroy pathogens.

The 503 regulations control the content of heavy metals in biosolids, and sets standards for the cumulate amount of metals in biosolids that can be land applied to a particular field. **Table 3.15** summarizes the quality of GCSD's biosolids with respect to these metals standards.

Table 3.15: Biosolids Metals Content

Metal	503 Regs, Table 1 Ceiling Concentration (mg/kg)	Table 3 "Exceptional Quality"	GCSD Biosolids Conc. (mg/kg)
Arsenic	75	41	ND – 2.0
Cadmium	85	39	ND – 13.0
Chromium	3,000	3,000	8.0 – 57.0
Copper	4,300	1,500	130 – 400
Lead	840	300	9 – 63
Mercury	57	17	0.63 – 3.70
Molybdenum	75	18	ND – 35
Nickel	420	420	6 – 39
Selenium	100	36	ND – 8
Zinc	7,500	2,800	440 – 1,200

In **Table 3.16**, the second column shows Table 2 from the 503 regulations, a lower level of metals content that is considered "exceptional quality (EQ)." Groveland's biosolids would be considered "EQ" for metals except for an elevated level of molybdenum. Most domestic sewer plants, with little industry in the community, are able to meet the "EQ" standards. Molybdenum is an element in many lubricants used in the community and in wastewater plants. The District should evaluate the lubricants it uses to minimize the introduction of molybdenum to biosolids.

Table 3.16 evaluates the concentration of metals in Spray Field #2. These may result from background levels in the soil and from previous applications of biosolids. The District may apply biosolids until certain cumulative limits are reached. To minimize risk, it is recommended that the District use half of the cumulative limit as the trigger for finding a new disposal option for biosolids. It appears that spray field #2 has adequate metals levels to accept biosolids for a number of years. Annual testing of soils content is recommended to monitor the accumulation of metals.

Table 3.16: Cumulative Pollutant Loading Rates

Metal	503 Regs, Table 2 Cum. Pollutant Loading Rates In Soils (mg/kg)	GCSD Spray Field #2 Soil (mg/kg)
Arsenic	41	ND
Cadmium	39	0.5
Chromium	3,000	37
Copper	1,500	38
Lead	300	5
Mercury	17	0.08
Molybdenum	18	ND
Nickel	420	9.0
Selenium	100	ND
Zinc	2,800	80

3.6.2 Drying Beds Capacity

The District currently operates eight drying beds. After decanting the supernatant liquid from the Aerobic Digesters, the sludge is "wasted" to the drying beds. Currently, this wasting is occurring on a quarterly basis. In the early 1990s, wasting to the drying beds occurred at least monthly. Operations made the change in beginning in 1997 in an effort to increase the volatile suspended solids reduction in the Activated Sludge and Digester process. During 1995-98, Operations staff experimented with polymer and lime additions to determine the optimum dosage for digester solids settling. As a result, they eliminated routine addition of polymer during aeration and digestion. Lime and polymer are only added to the Aerobic Digesters at the end of each quarterly digestion cycle to aid in settling before decanting. Lime addition is necessary to meet the Class B PSRP biosolids requirements.

The biosolids wasted to the drying beds contain about 2-3% solids. The biosolids are air-dried to about 15% solids, over the next 6-12 months, before each bed is cleaned and reused. At 15% solids, the biosolids can then be handled with a backhoe, and are stockpiled outside the drying beds for the next favorable period to land apply them to Spray Field #2. The soil is Spray Field #2 is decomposed schist with low permeability. One benefit of land application of the biosolids on site is that the amending the soil with biosolids will increase the long-term permeability of this field.

Due to lack of drying bed capacity, some biosolids have been air dried in two unlined ponds below the drying beds. Earthen drying beds are more susceptible to dispersal of biosolids by rodent activity and nearby traffic than concrete drying beds. The earthen beds are next to a marsh used to contain the WWTP site runoff. Many wastewater treatment plants use earthen drying beds, provided they are properly constructed and managed during loading and cleaning. The District should consider reviewing the containment and operation of the earthen beds.

The drying beds are not large enough for air-drying to 50% solids or better. Handling of wet biosolids is difficult. The stockpile area has the potential for uncontrolled dispersal of biosolids on site, due to rodent activity and nearby traffic. Additional drying beds would allow the biosolids to be contained in the beds until suitable weather for land application. 50% more drying bed area would address this need.

3.6.3 Projections of Future Biosolids Quantities

On average, 46,000 dry pounds of solids biosolids are generated per year. This quantity can vary widely. 1992 produced a peak quantity of 67,000 dry pounds of biosolids.

Based on the assumed future sewer flows in Section 3, flows will increase 60-70% over the next 20 years. Biosolids are expected to increase by a similar percentage. Average biosolids per year will be about 76,000 dry pounds. A peak year for biosolids could produce as much as 110,00 dry pounds.

3.6.4 Alternatives for Biosolids Treatment, Handling and Disposal

Several alternatives were considered for the future treatment, handling and disposal of biosolids.

a. Enlarge Existing Drying Beds. The first alternative would be to enlarge the existing drying beds to meet current and future biosolids production. Four additional drying beds similar to the existing ones are needed for current demand. The estimated cost for concrete structures, piping and appurtenances is $100,000.

   The sizing of drying beds for future demand will depend on the type and location of expanded wastewater treatment capacity built. Expansion of the existing drying beds should be delayed until these future demand decisions are made. The location of the existing drying beds may be needed for other purposes if the plant expansion occurs at Ferretti Road.

b. Mechanical Dewatering. Another alternative to improve the drying of biosolids is mechanical dewatering. A number of devices are commercially available to do this, including a sludge dewatering belt press, vacuum assisted dewatering, or wedgewire block dewatering. It would probably not be economical for the District to acquire its own press for quarterly use. The estimated cost of a small, skid-mounted dewatering press is on the order of $200,000 including piping and appurtenances. One alternative that merits additional investigation is whether a contractor could provide quarterly truck-mounted dewatering services for the District. This would allow the biosolids to be reduced to about 25-50 % solids before spreading in the drying beds, or hauling away.

c. Separate Decant Tank. The District could consider installing a small tank adjacent to the digester area to be used as a separate decant tank. This could be used to further separate the solids after decant of the digester, increasing the percent solids of sludge sent to the drying beds. A pilot test would be needed to determine the effectiveness of this approach. Estimated cost is in the range of $20,000 to $50,00 depending on the piping and pumping layout needed.

d. Separate Sludge Clarifier. This alternative would construct a separate sludge clarifier after the Aerobic Digester. The sludge clarifier would allow more frequent small withdrawals of sludge from the digester and increase the net detention time in digestion. This would improve solids destruction and decrease the total amount of biosolids generated. Better decanting in a batch clarifier would reduce the amount of water to be evaporated in the drying beds, and the amount of solids escaping in the digester supernate to the Equalization Basin. Capital costs for a sludge clarifier, operated in a batch mode, are estimated at $200,000.

e. Land Application on Site. The District currently practices land application of its Class B biosolids on site, on Spray Field #2. As the quantity of biosolids increases 60-70% over the next 20 years, Spray Field #2 will not be able to accept all the biosolids generated by the District. Additional areas within the Ferretti Road site will need to be evaluated for biosolids disposal.

The dual use of the existing spray fields for wastewater and biosolids disposal will use up the available agronomic and metals capacity of the soil at a more rapid rate than if only wastewater disposal occurred. The District may need to develop a soils management plan to optimize the long term usefulness of the spray fields. This plan should include elements to address nutrients, salts, metals, BOD application rates, and hydraulic control.

f. Land Application at a New Site. Due to the capacity of Spray Field #2 to accept biosolids for a number of years, there is little urgency to find a new site for land application. However, if the District decides to acquire real property for other wastewater purposes, the possibility of using the new site for future land application of biosolids should be included in the project evaluation.

The District owns several recreation facilities. Because the District produces Class B biosolids, it would not be able to use the recreation facilities for land application of biosolids. Class A biosolids are required for public contact areas.

g. Contract Recycling of Biosolids Off-Site. There are a number of companies that can transport and land apply biosolids at permitted locations. Many counties have enacted local regulations controlling the land application of biosolids, beyond the requirements of the Federal 503 regulations. These companies are experienced in the proper management of biosolids. As the WWTP expands, the District will need an alternative to land application of biosolids on the Ferretti Road property. The District should evaluate contract dewatering and recycling of biosolids off site.

h. Landfilling. Under certain conditions, biosolids may be landfilled. This alternative would involve the hauling of the District's biosolids to a landfill permitted to accept biosolids. This alternative is expensive compared to the District's current practice due to the transportation and tipping fees. Not all landfills will accept biosolids, due to the mandate of AB 939 to minimize solid waste in California. This alternative was eliminated from further consideration due to cost and regulatory constraints.

3.6.5 Recommendations – Biosolids

1. Conduct a pilot test for a separate decant tank down stream of the digester decant process, to assess the feasibility of improving the percent solids of biosolids sent to the drying beds.
2. Evaluate the availability and cost of contract services for a sludge dewatering belt press on a quarterly basis.
3. Construct four additional drying beds once the site of the WWTP expansion is determined.
4. Evaluate the containment and management of the earthen drying beds.
5. Plan for the disposal of biosolids in the design of the WWTP expansion. Compare the costs-benefits of contract services for land application of biosolids off-site to land application on District owned property. Include drying bed capacity in the design of the WWTP expansion.
6. Set a trigger at 50% of the cumulative limits of Table 2 of the 503 regulations to change the location of land application of biosolids.
7. Consider developing an Agronomic Management Plan for the existing spray fields, to include nutrients, salts, metals, BOD application rates, and hydraulic control.
8. Investigate and reduce the sources of molybdenum in biosolids.

4.0 Wastewater Treatment Alternatives

4.1 WWTP Short-Term Response Measures

The analysis for the Master Plan brought out a number of short-term measures for the WWTP and collection system that GCSD could undertake to minimize the potential for exceeding their current WDR. The following items are recommended to be implemented within the next five years.

4.1.1 WWTP - Meters and Monitoring

The WWTP has inadequate metering and monitoring to fully understand the operation of the plant. Year 2000 was a prime example. Before and during the replacement of the Equalization Basin liner, unmeasured flow and loading was circulating through Reservoir #1. First, Reservoir #1 was drawn down in anticipation of the shutdown of the Equalization Basin. These flows from Reservoir #1 were noted, but could not be quantified for lack of metering. During the shutdown, unmetered flows were diverted to Reservoir #1 for later treatment. This lack of metering of flows and their associated loads to and from Reservoir #1 results in double counting of influent flows.

A similar lack of meters and monitoring applies to the Activated Sludge and Aerobic Digestion chambers. The operators have no reliable way of measuring the flows released to the drying beds and recycled to the Equalization Basin. This is also a source of double counting or omissions.

Meters are inadequate to quantify the flow of treated wastewater to the spray fields. Without operational metering, the quantity of water applied to the spray fields is a operational judgment, which may be resulting in under- or over-utilization of this process.

The overall result of the inadequate metering and monitoring is a large error term in the hydraulic balance and mass balance analyses of the wastewater treatment plant's performance. The estimated error may be ± 20%.

There are also deficiencies in operational monitoring equipment. For example, an on-line turbidity meter in the chlorine contact basin would give immediate warning of clarifier malfunctions. Operators rely on visual observation now.

An upgrade of the WWTP's metering and monitoring equipment is critical to meeting the WDR permit until the system capacity can be expanded. The estimated budget for flow meters, turbidimeter, and appurtenances is $30,000. District staff may be able to conduct the upgrade themselves. The two objectives of the upgrade are:

1. Provide data for a reliable hydraulic balance and mass balance of the WWTP.
2. Provide improved real time data for operational control of the WWTP.

4.1.2 Demand Management

Section 3 discusses the unusual levels of Suspended Solids loading to the WWTP. If the source of this loading could be better understood and controlled, the WWTP would recapture significant treatment capacity. This could have two outcomes for the District, depending on the degree of capacity recaptured. If moderate reductions in load occur as a result of demand management measures, the District gains some operational flexibility while it expands the wastewater treatment system. If more substantial reductions in load occur, the timing of the treatment system expansions could be delayed.

The Demand Management Program would involve several elements:

Collection System Investigation

A more detailed investigation of the source of the elevated Suspended Solids loading is needed. This element would consist of targeted television inspection and mandrel testing of the collection system, in areas where infiltration/inflow (I/I) is high. A suggested initial study area is Unit 11, near the Airport. A combination of several factors may be causing the high SS. Suspects include illegal connections, roof drain leaders connected to sewers, PVC pipe failures, and vandalism. Other sources of loading may be discovered.

If a pilot investigation finds that the sources of SS loading are fixable and cost effective compared to expanding the WWTP, the District can formulate a plan of SS load reductions. Some alternatives to be considered, depending on the source of the SS loading, are slip lining or replacement of failed pipes, and elimination of illegal connections and roof drain leaders.

Public Information Program

The community will benefit from knowing more about the status of the WWTP's capacity. The District should embark on a program of providing information about the WWTP and encouraging customers to minimize the load to the treatment plant. This can be done in collaboration with the County's waste minimization program and the District's water conservation program.

A public information program should also include targeted discussions with certain types of customers that may pose significant loads to the WWTP. For example, painting and automotive repair businesses should be contacted to assure that proper waste disposal of solvents and hazardous materials is occurring. If discharged to the sewer, these can kill the microorganisms in the digester, upsetting the WWTP. Restaurants can be a source of grease and concentrated waste.

Incentives or Enforcement of Roof Drain Prohibition

The District has a policy of prohibiting roof drainage to the sewers. A visual survey of the Pine Mountain Lake subdivisions showed that only a few houses have their roof drains apparently connected to an underground disposal of some kind. The District should conduct a more thorough study of its service area to determine the extent to which roof drains may be a source of Suspended Solids. If this is determined to be a significant source, the District should consider an incentive plan to help homeowners and businesses to redirect their runoff in a more appropriate manner.

A first year budget for the Demand Management Program would include:

Collection System Investigation	
Pilot Study (Unit 11 – Airport)	$25,000
Public Information Program	$10,000
Incentives for Roof Drain Prohibition	$5,000 (If warranted)
First Year Total	$40,000

The budget for subsequent years would be based on the effectiveness of the first year and the remaining needs.

4.1.3 Innovative Technology

Innovative technologies are available to address high Suspended Solids loading. A technology assessment was conducted on one of these, membrane bioreactor. The manufacturer contacted was Zenon. They manufacture large cartridge unit that contain many tube membranes. The cartridges can be installed into an existing activated sludge unit. A slight vacuum is pulled across the membrane which pulls treated wastewater through the membrane, leaving the solids behind. The exterior of the membrane tubes are constantly scoured by coarse bubble aeration. Suspended solids are removed to 0 (zero) mg/l. The units are energy intensive. Additional operations activities include backpulsing and chemical rinsing of the cartridges on a frequent basis.

The increased SS removal efficiency of membrane bioreactors would send more of the SS load to the digesters. These units are currently undersized, so additional digestion capacity would be required for actual destruction of solids before discharge to the drying beds. The estimated cost to retrofit the WWTP is on the order of $500,000 to $1 million. This retrofit for clarification and additional digestion would only address the current system deficiency, without providing additional capacity for future growth.

It is difficult to justify a significant expenditure on a partial fix of the existing WWTP capacity, when the District is facing a major expansion of the treatment system. And it does not appear that improved clarification with membranes would resolve the wastewater treatment plant's problem. However, as part of an overall plant expansion, innovative technologies should be evaluated further.

4.1.4 Operations Support

Until the fundamental capacity of the wastewater system is increased, Operations staff will be responsible for operating a plant under stress. There is less latitude to respond to system upsets and peak demand periods. The Operations staff should have the availability of an expert in operations to address these extreme conditions. The selected expert should be an experienced Grade 5 operator. Registration as a civil engineer is desirable but not required. The expert operator would be provided with an initial orientation to Groveland's plant, and then be on-call for consultation about particular operating problems as they occur. The proposed budget for the expert operator is $30,000 per year needed.

4.1.5 Recommendations

- It is recommended that the WWTP's meters and monitoring equipment be upgraded immediately.
- It is recommended that a Demand Management Program be conducted over the five years.
- It is **not** recommended that innovative technology be used to address the existing WWTP's constraints.
- It is recommended that an expert operator be contracted to assist Operations staff.

Table 4.1 details the costs associated with the WWTF immediate action plan

Table 4.1: WWTF Immediate Action Plan and Costs

Action	Estimated Cost
Metering devices	$30,000
Demand management	$40,000
Optimize STP operations	$30,000
Total	**$100,000**

4.2 Long Term WWTP Alternatives

The Groveland CSD Wastewater Treatment Plant is not able to meet all the current demands from the sewage system. New development will increase the demand on the system. New regulations will raise the standard to which wastewater must be treated. GCSD needs additional treatment capacity to serve the area within District boundaries.

This section looks at the alternatives available for additional wastewater treatment capacity. The decision on which approach to take will have a bearing on the alternatives for the collection system as well.

4.2.1 Selection Criteria for New Treatment Alternatives

GCSD will need to consider a number of factors before deciding which alternative is best to meet their current and future wastewater treatment needs. This analysis used the following monetary and non-monetary criteria in ranking the possible treatment alternatives. Sections 6 and 7 discussed the alternatives available for ultimate reuse of the District's treated effluent and biosolids. This chapter assumes that the land application of reclaimed wastewater and of biosolids on District controlled land is the preferred alternative for reuse of these products.

Each alternative will be evaluated based on the following decision criteria:

Ability to Meet Regulatory Requirements: Will the treatment alternative be able to treat the wastewater to the standards necessary for the ultimate disposal of wastewater and biosolids?

Flexibility for Future Conditions: To what extent does the alternative provide flexibility to meet future uncertainties, such as changes in regulations and opportunities for water reclamation partnerships?

Wastewater Storage Required: Does the alternative need storage for treated wastewater? To what extent can the alternative use the existing or expanded Reservoir #2 storage capacity? Is adequate storage capacity available at a reasonable cost?

Odor and Spill Potential: What is the potential for the treatment alternative to generate odors, or to mitigate any current source of odors? Where does the water go if there is a spill from the WWTP?

Availability of Real Estate: Would the District need additional real estate to implement the alternative? Is it available at reasonable cost and effort?

CEQA[25]. Are there any apparent environmental issues raised by the alternative that could make the alternative impractical?

Initial Capital Cost: What is the probable order-of-magnitude of the capital cost to implement each alternative?

Relative Annual Operating Cost: What is the relative annual cost of operations between the alternatives? (Operating expense includes staffing costs.)

Order-of-magnitude cost estimates are provided for screening purposes only. Further detail will be needed to define the probable capital and operating costs of the preferred alternative. Capital and operating costs are annualized for comparison purposes. Actual costs will vary from these estimates.

4.2.2 Long Term Alternatives Considered

There are three main long-term approaches considered for the GCSD Wastewater Treatment Plant. More capacity is needed to meet the approximately 65% growth in demand for wastewater services through buildout in about 20 years.

Alternative 1: Expansion at Ferretti Road Site

Alternative 2: Split the Collection System and Build A Satellite WWTP

Alternative 3: Phased Transition of the WWTP to a New Site

[25] California Environmental Quality Act

The "no action" alternative would be to cap the wastewater system at its current capacity, essentially a moratorium on additional growth in the community. This alternative was not evaluated in the planning process, but will be considered under the project's CEQA review.

4.2.3 Alternative 1 – Expansion at the Ferretti Road Site

Under this alternative, significant additional capacity would be built at the existing Wastewater Treatment Plant (WWTP) site at Ferretti Road. A conceptual evaluation was performed on two different implementation scenarios for this alternative.

Based on the evaluation of each treatment unit in Section 5, it is apparent that in order to provide capacity for future growth, the District needs to consider a complete WWTP expansion. Therefore, Alternative 1 would provide approximately 65% more capacity by constructing a parallel treatment plant at the Ferretti Road site.

The plant would be designed to best available technology with provision for reliability and future flexibility. For purposes of this master plan, it was assumed that the following treatment processes would be provided:

- Screening and grit removal
- Expansion of the Equalization Basin
- Flow splitting at expanded headworks pumping
- Step aeration Activated Sludge treatment
- Increased Aerobic Digestion capacity, interconnected with the existing digester
- Secondary clarification
- Disinfection
- Drying bed expansion
- Monitoring, metering and SCADA control
- Increased storage in Reservoir #2
- Additional acreage for WW reclamation and biosolids land application

If this alternative proves to be the most advantageous, the Design Development Phase of the project should revisit the type of treatment to be provided. Design Development should compare the treatment efficiency and cost-benefit of conventional secondary treatment with treatment alternatives such as oxidation ditches, fixed film reactors, and natural marsh treatment systems, etc. Design Development should also prepare a complete hydraulic analysis of the WWTP and disposal processes to determine the phasing of certain expansion elements, such as Reservoir #2.

This alternative assumes that the area available for land application of wastewater by irrigation is increased by approximately 30 acres, tentatively planned in the vicinity of Phelan Mogan Road.

Under Alternative 1, the new treatment plant would be located near the existing facility, possibly where the drying beds are located. The drying beds would be relocated and expanded.

Estimate of Probable Capital Cost

Table 4.2 summarizes the probable capital cost for Alternative 1.

Table 4.2: Alternative 1 - Ferretti Road WWTP Expansion

Probable Capital Cost		
CEQA Review – Program EIR		
WWTP Expansion Construction		$100,000
(Additional 120,000 gpd))		
Design	$120,000	
Site Work	$100,000	
Concrete	$210,000	
Process Equipment, Piping, and Pumping	$1,320,000	
Metals	$50,000	
Electrical and Instrumentation	$350,000	
Construction Administration & Contingency	$250,000	
Total WWTP Expansion Construction		$2,400,000
Raise Reservoir #2		$2,000,000
Irrigation Reclamation Pipeline		
(Reservoir #2 to Phelan Mogan Road Area)		
Land Acquisition, ≈ 30 acres	$150,000	
Pipeline Construction	$450,000	
Design, Const. Admin & Contingency	$100,000	
Total Irrigation Reclamation Pipeline		$700,000
Engineer's Opinion of Probable Cost (+/- 30%)		$5,100,000

This estimate assumes that secondary treatment would be adequate to meet discharge standards for ultimate disposal of the wastewater and biosolids.

If debt is used to fund the project, assume an additional 15% or $800,000 in debt issuance costs. A $5,900,000 debt issue would result. Estimated annual payments would be approximately $520,000 per year, assuming a 6% interest rate over 20 years. The actual payments will depend on the District's credit rating and market conditions at the time of issuance. The project can be phased which will determine the timing of any financing instruments.

Discussion of Decision Criteria

The expansion of the secondary treatment system to meet current and future demands would be designed to meet the applicable wastewater treatment regulations at the time of construction. The plant design could include features such as valving and layout to allow for possible future treatment units for future regulatory requirements. The existence of two parallel treatment systems would provide increased flexibility in the event that one or the other treatment train is offline for repairs or maintenance. It is too speculative at this time to construct treatment units for possible future water transfer opportunities with third parties. However, the significant acreage at the Ferretti Road plant, would provide a flexible site for advanced waste treatment to meet the partner's water quality needs. The spray fields might be converted to another use.

The total capacity of the Ferretti Road site for land application of wastewater is not known. An estimated 20-25 acres are developed as spray fields now. Additional area may be available on site. In order to develop a cost-benefit analysis to compare the Ferretti Road site with a new location for land application of wastewater, a site survey and soil percolation tests would be needed at both locations. The existing spray fields appear to be adequate for the disposal of approximately 200 AF per year, which is the estimated amount the spray field have been receiving.

Alternative 1 would continue to require the use of water storage for irrigation. Reservoir #2 was designed to allow an additional 15 feet of elevation on the dam. This would provide an additional 50 AF of storage, a 30% increase. A year-round hydraulic balance analysis of any expanded irrigation system would be essential to calculate how much storage will be needed.

The existing plant has been a source of wastewater odors particularly during discharge of sludge to the drying beds. In Alternative 1, longer sludge digestion times would be designed into the plant, reducing the potential for odors. Interconnecting the existing and new digesters would allow more flexibility in digestion and lime stabilization, thereby reducing odors. In Alternative 1, the location of odors in the community, i.e., near PML Unit 1, would remain the same. A potential new source of odors would occur at a new wastewater irrigation site, in the area along Phelan Mogan Road.

The existing plant has been a source of treated wastewater spills into First Garrotte Creek and Pine Mountain Lake. By keeping wastewater treatment at the existing site, the location of potential spills will remain unchanged. The District has an ongoing plan to minimize the occurrence of spills due to operational or equipment failure. The design of the new facilities could include catchment features as a safeguard against the release of treated wastewater to First Garrotte Creek.

The District already owns the Ferretti Road site, so no additional real estate would be needed for the treatment plant expansion. However, the Ferretti Road site is limited on the acreage suitable for additional wastewater irrigation. A few additional acres of spray field can be developed there. The District may need to consider acquiring additional land. The nearest suitable land area is located in the vicinity of Phelan Mogan Road. There are several ranches in this area that might benefit from a source of reliable irrigation supply on the cattle pastures. No specific location has been evaluated. The terrain is rolling grasslands. The area is approximately 200 feet lower than Reservoir #2, making conveyance of the water less expensive than pumping to a higher or more distant site.

Expansion of a wastewater treatment plant has the potential for a variety of environmental impacts, which the District will need to review under the provisions of the California Environmental Quality Act (CEQA). At this early stage, some potential impacts may be anticipated with respect to biological resources, water quality, odors, and community growth.

Capital costs of $4.1M for Alternative 1 are presented above. Annual operating costs will rise when the plant is expanded. Under Alternative 1, it can be estimated that the scope of new operating costs will be proportional to the existing plant because a similar treatment process will be provided for the expanded capacity. A working estimate for the additional operating expenses is $100-150,000 per year.

The estimated implementation schedule for Alternative 1 to expand the existing WWTP is 5 years. This includes feasibility and pilot testing, CEQA review, land acquisition, financing, design, construction and startup.

4.2.4 Alternative 2 - Split the Collection System, Build A Satellite WWTP

In Alternative 2, the collection system would be split to divert approximately 30% of current and future flows to a new satellite wastewater treatment plant. This alternative is being considered because of the natural terrain of the collection system. Pine Mountain Lake dam divides the collection system into eastern and western sections. A force main pumps the eastern area across the dam and up the hill to the Ferretti Road site. Under this alternative, the eastern service area would be served by gravity flow to a new satellite wastewater treatment plant located near the high school, within a small watershed that drains to below the dam on Big Creek. Wastewater treated at this site would be pumped either directly to a new wastewater irrigation site along Phelan Mogan Road, or up to Reservoir #2 for storage and later irrigation disposal.

This alternative could include the possibility of a new storage reservoir for treated wastewater if a suitable site could be found near the new satellite plant. Field surveying and geological analysis would be needed to determine whether a viable new storage site is available. For purposes of this master plan, storage was assumed to be provided by Reservoir #2.

This alternative assumes 90,000 gpd of secondary treatment with aerobic digestion at the new satellite plant. This flow is 30% of the existing flow, increased 65% for future buildout of the easterly service area. During preliminary design, the District would want to consider a cost-benefit analysis on whether the new facilities would be provided by constructed-on-site treatment units, or by a package plant.

Splitting the collection system will not solve all the wastewater system's treatment problems. Splitting the collection system now would result in a diversion of approximately 30% of the current flows, or 54,000 gpd. That would leave the current ADD flow to the Ferretti Road site at 126,000 gpd. At 450 mg/l, the current SS load would be 13,000 pounds/month. The statistical analysis in **Figure 3.16** concluded that the existing WWTP can safely handle about 13,500 pounds/month.

Splitting the flow would help the existing WWTP to meet its current demand. But it would create no new capacity for the westerly service area at the Ferretti Road site. An additional 82,000 gpd of capacity will still be needed to meet 2021 demand in the westerly area.

4.2.4.1 Probable Capital Cost

Table 4.3 summarizes the probable capital cost for splitting the collection system and constructing a satellite plant in the vicinity of the high school.

Table 4.3: Alternative 2 – Split the Collection System and Build Satellite Plant Probable Capital Cost

CEQA Review – Program EIR		$150,000
Land Acquisition		$500,000
Satellite WWTP Construction		
(New 90,000 gpd capacity for easterly service area)		
Design	$170,000	
Site Work	$150,000	
Concrete	$250,000	
Process Equipment, Piping, and Pumping	$1,800,000[26]	
Metals	$60,000	
Electrical and Instrumentation	$400,000	
Construction Administration & Contingency	$400,000	
Total WWTP Expansion Construction		$3,300,000
Raise Reservoir #2		$2,000,000
Expand Ferretti Road Plant		
(Additional 82,000 gpd capacity for westerly service area)		$1,500,000
Irrigation Reclamation Pipeline		
(Reservoir #2 to Phelan Mogan Road Area)		
Land Acquisition, ≈ 30 acres	$150,000	
Pipeline Construction	$450,000	
Design, Const. Admin & Contingency	$100,000	
Total Irrigation Reclamation Pipeline		$700,000
Engineer's Opinion of Probable Cost (+/- 30%)		$8,200,000

Costs to split the collection system are shown in Section 6. This estimate assumes secondary treatment is adequate to meet the discharge standards for wastewater and biosolids disposal.

If debt is used to fund the project, assume an additional 15% or $1,200,000 in debt issuance costs. A $9,400,000 debt issue would result for the WWTP portion, not including the collection system costs. Estimated annual payments would be approximately $820,000 per year, assuming a 6% interest rate over 20 years. The actual payments will depend on the District's credit rating and market conditions at the time of issuance. The project can be phased which will determine the timing of any financing instruments.

In Alternative 2, wastewater storage is assumed to be provided by Reservoir #2. However, if a suitable new dam site could be located near the new satellite WWTP, the capital costs for the project would change. The cost of a pipeline and pumping up to

[26] Includes pipeline from satellite WWTP to Reservoir #2.

Reservoir #2 could be avoided. The cost of building a new storage facility or dam would be added. For operating expenses, the difference between pumping power costs to Reservoir #2 and pumping power costs directly to the Phelan Mogan area from the new reservoir would be saved. A site-specific cost-benefit analysis should be performed to determine the optimum location for wastewater storage if Alternative 2 is selected as the preferred alternative.

Discussion of Decision Criteria

A new satellite secondary treatment plant to meet current and future demands would be designed to meet the applicable wastewater treatment regulations at the time of construction. The plant design could include features such as valving and layout to allow for possible future treatment units for future regulatory requirements. The existing WWTP would be relieved of approximately 30 % of its current demand. This would reduce the amount of flow and loading to WWTP and decrease the potential for permit violations under its current demand. Additional capacity is still needed at Ferretti Road for future demand.

The new satellite facility could be designed with provisions for future flexibility, such as valving and layout. The new facility could also be designed with extra capacity and connection to the existing plant to provide a certain amount of backup capacity in the event that one or the other plant is offline.

A new satellite plant would require storage for treated wastewater. Wastewater irrigation is not always possible during winter wet weather. As discussed above, this alternative assumes that Reservoir #2 will still be expanded and used for wastewater storage. A year-round hydraulic balance analysis of the expanded irrigation system would be essential to calculate how much storage will be needed.

The establishment of a new wastewater treatment location at a satellite plant will create a new potential source of odors. The new plant can be designed to mitigate the sources of odors, but upsets may still occur. A site specific assessment of the impacts of potential odors will need to be part of the site selection process. Eliminating some of the lift stations will reduce the risk of raw sewage spills in the community.

The development of a new satellite WWTP will involve the acquisition of real property for public purposes. Due to the terrain in the District, the amount of property may be as much as 50-100 acres, not including a potential reservoir site. Possible locations include the properties along Phelan Mogan Road and in the vicinity of the high school.

Development of a new wastewater treatment plant has the potential for a variety of environmental impacts, which the District will need to review under the provisions of the California Environmental Quality Act (CEQA). At this early stage, some potential impacts may be anticipated with respect to biological resources, water quality, odors, and community growth.

Capital costs of $7.2M for constructing Alternative 2 are presented above. The cost for splitting the collection system is estimated in Section 9. Annual operating costs will rise when the satellite plant is completed. Under Alternative 2, it can be estimated that the scope of operating costs will be proportional to the existing plant because a similar treatment process will be provided for the expanded capacity. The probable annual operating expense of a satellite plant is on the order of $150,000 per year. Additional staffing may be needed to cover the new facilities.

The implementation schedule to split the collection system and construct a new satellite treatment plant is 5-10 years. This includes feasibility and pilot testing, CEQA review, land acquisition, financing, design, construction and startup.

4.2.5 Alternative 3 - Phased Transition of the WWTP to a New Site

Alternative #3 provides a phased approach to providing wastewater treatment for the future of the District. It would begin with the concept of a satellite wastewater treatment plant, as in Alternative 2. In the second phase of this alternative, the existing wastewater treatment plant on Ferretti Road would be retired. An expansion of the satellite plant would convert it to the primary plant. In this way, the entire treatment process for the Groveland CSD would be updated with the least system disruption. In 10 years, new regulations may force the retirement of the existing WWTP.

Wastewater storage would remain an important element of the new treatment system. Reservoir #2 would remain an important asset to the District, unless a favorable new reservoir site can be developed near a new treatment plant site.

Probable Capital Cost

Table 4.4 summarizes the probable capital cost for a two-phase transition of the WWTP to a new site. The second phase would include collection system changes to redirect the westerly part of the collection system, serving the west side of PML, Groveland and Big Oak Flat, to the new treatment plant site.

Table 4.4: Alternative 3 – Phased Transition to a New WWTP Site

Probable Capital Cost	
CEQA Review – Program EIR	$150,000
Land Acquisition	$500,000
Phase One (from Table 4.3)	
Satellite Treatment Plant	$3,300,000
New Wastewater Storage Facilities	$2,500,000
Irrigation Reclamation Pipeline	$700,000
Phase Two – Retirement of the Ferretti Road WWTP	
Expansion of Satellite Treatment Plant	$3,500,000
Collection System Changes	$350,000
Opinion of Probable Capital Cost (+/- 30%)	$11,000,000

Costs to address the phased redirection of flows to the new plant site are discussed in Section 6. A significant unknown in this cost estimate is the cost for new wastewater storage facilities. If live stream discharge is determined to be feasible, the need for wastewater storage may be less than for land disposal of wastewater. The availability of a suitable site for wastewater storage facilities, whether that is a reservoir or a tank, is unknown. Both a geologic investigation and a hydraulic analysis will be necessary to determine the need for and best approach for wastewater storage. These investigations should be conducted during the Feasibility Phase of the project.

This estimate assumes that state-of-the-art secondary treatment with denitrification is adequate to meet discharge standards for wastewater and biosolids disposal. It is too speculative to include cost estimates for treatment units for salinity, metals or organics at this point. This estimate may understate the actual cost of this alternative.
Further evaluation would be needed in conjunction with the determination of the required discharge standards with the RWQCB.

f debt is used to fund the project, assume an additional 15% in debt issuance costs. **Table 4.5** shows the two phases of debt issues. Assume a 6% interest rate over 20 years. The actual payments will depend on the District's credit rating and market conditions at the time of issuance. The project can be phased which will determine the timing of any financing instruments.

Table 4.5: Alternative 3 - Possible Debt Structure

	Capital Cost	Debt Issue	Cumulative Annual Debt Service
Phase One	$7.2 M	$8.3 M	$720,000/yr
Phase Two	$3.8 M	$4.4 M	$1.100,000/yr.
Total		$12.7M	

Discussion of Decision Criteria

The first phase of this alternative, accompanied by the splitting of the collection system, would be designed to meet the current and short-term treatment demands on the wastewater system. The second phase would provide an opportunity to meet the long-term demands more precisely. This alternative provides more flexibility in "right-sizing" the treatment plant over the next 20 years. If opportunities to reclaim wastewater under a partnership with a second party materialize, perhaps by advanced waste treatment and live stream discharge, the second phase could be designed for these multiple purposes.

Wastewater storage will remain important. Development of 50 AF of storage can be accomplished either by increasing Reservoir #2 storage. If a future opportunity with an outside partner for wastewater reclamation occurs, storage will be important to matching the availability of water to the time of its need by the second party. A year-round hydraulic balance analysis of the expanded irrigation system would be essential to calculate how much storage will be needed.

The establishment of a new wastewater treatment location at a satellite plant will create a new potential source of odors and wastewater spills. The new plant can be designed to mitigate the sources of odors and spills, but treatment upsets and pipeline breaks may still occur. A site-specific assessment of the impacts of potential odors and spills will need to be part of the site selection process. Eliminating some of the existing lift stations will reduce the potential for raw sewage spills in the community.

The development of a new satellite WWTP will involve the acquisition of real property for public purposes. Due to the terrain in the District, the amount of property may be as much as 50-100 acres, not including a potential reservoir site. Possible locations include the properties along Phelan Mogan Road and in the vicinity of the high school.

Expansion of a wastewater treatment plant has the potential for a variety of environmental impacts, which the District will need to review under the provisions of the California Environmental Quality Act (CEQA). At this early stage, some potential impacts may be anticipated with respect to biological resources, water quality, odors, and community growth.

Capital costs of $9.5 million for Alternative 3 for phased transition of the WWTP to a new site are presented above. The cost for phased redirection of the collection system is estimated in Section 9. Annual operating costs will rise when the satellite plant is completed. Under Alternative 3, operating costs are expected to be higher than Alternative 1 operating expenses during Phase 1. However, economies in operating expense are likely to occur once the existing WWTP is taken off line.

The implementation schedule to construct a new treatment plant and reconfigure the collection system is 8-10 years. This includes feasibility and pilot testing, CEQA review, land acquisition, financing, design, construction and startup.

4.2.6 Recommended Wastewater Treatment Alternative

Table 4.6 is a decision matrix summarizing the decision factors for each alternative. Based on our current understanding of the available information, Alternative 1, WWTP Expansion at the Existing Ferretti Road site, is the recommended alternative. It meets the regulatory requirements in the least time, with the least cost. It capitalizes on the important value of Reservoir #2’s storage capacity. It has the fewest potential environmental impacts. However, it does not provide as much flexibility for future water reclamation opportunities as a new site might.

This conclusion is largely influenced by one determination that warrants further investigation before making the final decision regarding the wastewater system's future. The **Feasibility Phase** needs to test the conclusion that land application of treated wastewater is more feasible and cost effective than live stream discharge. There are several aspects of this conclusion to be investigated:

1. The regulatory requirements for live stream discharge into Big Creek.
2. The hydraulic need for wastewater storage capacity for live stream discharge, land application or a combination of these.
3. The hydraulic impact of sustained, increased flows to Big Creek.
4. The geologic availability of a site for wastewater storage facilities at a new WWTP site.
5 The interest of nearby parties in land application of wastewater.
6. The hydraulic and agronomic suitability of nearby ranch land for land application of wastewater.
7. Cost-benefit analysis of the alternatives, including operating, capital and environmental mitigation costs.

Table 4.6: Narrative Comparison of WWTP Alternatives

Decision Criteria	Alternative 1: Expansion at Ferretti Road Site	Alternative 2: Split the Collection System and Build New Satellite Site	Alternative 3: Phased Transition to a New WWTP Site
Ability to Meet Regulatory Requirements	Expansion will be designed to meet permit requirements.	Satellite plant will be designed to meet permit requirements.	New plant phases will be designed to meet permit requirements.
Spill Risk	No change in potential spill locations.	New potential spill location along Big Creek. Fewer lift stations to spill.	New potential spill location on Big Creek, but eventually eliminates spill potential on First Garrotte Creek. Fewer lift stations to spill.
Flexibility for Future Conditions	Good for both new regulations and opportunities for water reclamation transfers.	Better due to proximity to Big Creek for reclamation opportunities. Same as Alt. 1 re new regulations.	Better due to proximity to Big Creek for reclamation opportunities. Same as Alt. 1 re new regulations.
Wastewater Storage Requirement	Increased storage readily available at Reservoir #2.	New storage site required, or pipeline to use Reservoir #2.	Alternative site for storage not determined.
Odor Potential	Some odors near PML Unit 1. Potential new odor source at wastewater irrigation site.	Continued some odors at PML Unit 1 and new potential odor sources near high school and at wastewater irrigation site.	Continued odors at PML Unit 1 until transition completed. New potential odor sources near high school and at wastewater irrigation site.
Availability of Real Estate	Property already owned by GCSD. New site needed for land application of wastewater.	New sites needed for satellite plant and land application of wastewater.	New sites needed for new WWTP site and land application of wastewater.
CEQA	Fewer potential environmental impacts.	More potential environmental impacts.	More potential environmental impacts.
Initial Capital Cost	$5,100,000	$8,200,000	$11,000,000 +
Relative Operating Cost	Moderate. Operating costs will rise after expansion is complete.	Higher than Alt. 1 due to operations at two locations. Possible pumping savings.	Higher than Alt. 1 at first, then operating costs drop when existing WWTP is decommissioned. Possible pumping savings.
Implementation Schedule	5 years	5-10 years	8-10 years

5.0 Collection System Description and Evaluation

5.1 Introduction

Due to the mountainous terrain and the concentration of residences around the low-lying Pine Mountain Lake, the vast majority of wastewater flows within GCSD require pumping to the Wastewater Treatment Plant (WWTP). The entire system consists of 16 lift stations, 35 miles of gravity mains and 7 miles of force mains.

5.2 System Description

Exhibit 5 represents a plan view schematic of the backbone system. **Exhibit 6** shows the relative elevations of the existing facilities, data extracted from as-built construction drawings. Note the following:

- Some wastewater flows can flow through as many as seven lift stations before reaching the treatment plant.
- The collection system can be isolated into three sub-systems.
  - o The PML-East system flows to LS 13 and is pumped over the dam
  - o The PML-West system is added to the PML-East flows and is pumped from LS 5 to LS 6 to LS 7 to the WWTP
  - o The Groveland/Big Oak Flat system gravity flows to the WWTP from the south (BOF wastewater is pumped to the Groveland Grade Break and then gravity flows.)
- The treatment plant is located near the highest elevation in the wastewater system.

Typical, well-planned wastewater systems locate the treatment plant at the lowest possible elevation to take advantage of gravity flows and minimize pumping costs. A lift station dependent system, while minimizing up-front costs, significantly increases operation and maintenance costs and decreases reliability.

The 16 lift stations represent the dominant features of the collection system. **Exhibit 7** illustrates the entire collection system broken-down by parcels tributary to each lift station.

A color-coded map obtained from the District outlined the parcels within PML that immediately fronted sewers. When totaled, the number of parcels indicated as sewered equaled the total number of sewer connections anticipated by the District at buildout, validating the map. This map was used as the basis for buildout calculations.

Only the parcels fronting sewer lines are connected to the sewer – all others employ private septic systems (see Section 2.10).

Table 5.1 lists the available connections, the estimated current connections and the number of septic systems tributary to each lift station.

Table 5.1: Lift Station Connections

Lift Station	Available Connections	Estimated Current Connections	Tributary Septic Systems
1	132	98	51
2	107	79	238
3	9	7	0
4	3	2	0
5	299	221	276
6	16	12	21
7	143	106	83
8	94	70	0
9	33	24	103
10	58	43	810
11	160	118	80
12	37	27	0
13	315	233	297
14	131	97	179
15	100	74	68
Big Oak Flat	111	111	0
Groveland (gravity)	130	130	0
Total	**1,878**	**1,452**	**2,206**

5.3 Spill History

GCSD has experienced approximately 43 spills within the collection system between the years 1990 – 2000. **Exhibit 8** shows spill locations by year. The District outlined the factors involved in the recurring spills in a letter to the Regional Water Quality Control Board dated April 6, 2001. The elements include:

- Area topography: GCSD's terrain is characterized as mountainous with numerous steep drainage courses, most of which feed directly to Pine Mountain Lake. The gravity collection system generally follows the drainage courses, sometimes within the course itself. Therefore, any spill causes an immediate impact. Since the lake is at a low point in the valley with many lakeside residences, ten lift stations are located immediately adjacent to the lake.
- Inefficient System Design and Layout: Due to the location of the treatment plant, wastewater may pass through as many as seven lift stations before it reaches the plant headworks. The plant is about 200 feet above the lake and lies within the First Garrotte Creek drainage course to PML.
- Minimal Initial System: The project developer, Boise Cascade, provided the collection system that was then turned over to GCSD for operation. The system lacks the following items that would typically be associated with a system constructed with direct municipal oversight:
    - o Dedicated sites for pump station facilities

- o Most facilities lack buildings or other enclosures to provide secondary containment and protection from the elements or vandalism
- o Most piping is not installed within roadways, but behind homes making maintenance and repair difficult
- o Lift stations were a pre-packaged design with little regard for site-specific constraints such as wet-well capacity and stand-by power

- Overly Complex Systems: The system relies heavily on pumping. Each employs a secondary mechanical priming system (vacuum prime). When these systems fail, the lift station fails. Many of the historical lift station failures are a direct result of the component failure with this system. **Figure 5.1** illustrates lift station failures. Lift Stations 1 thru 5, 8, and 13 thru 15 are located adjacent to the lake.

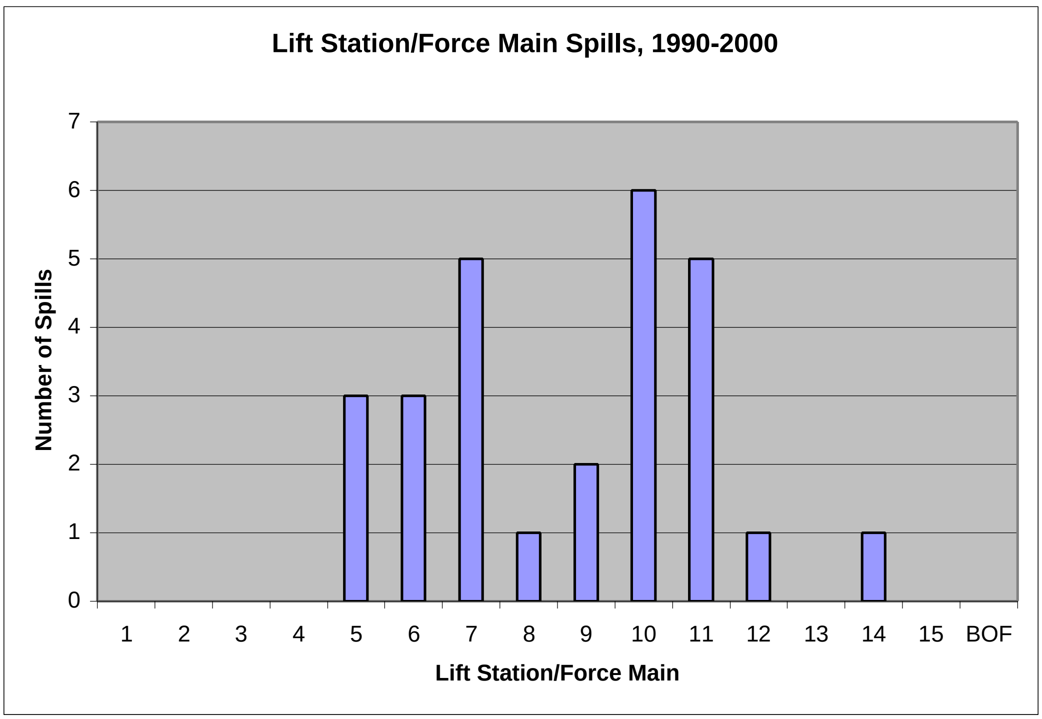


Figure 5.1: Lift Station/Force Main Spills, 1990-2000

- Age/Technology: Most lift stations are approaching 30-years old, approximately their design life. Force mains have experienced thousands, if not millions, of pump cycles.

Appendix C lists the District's entire spill history over years 1990-2000. The majority of spills have been attributed to mechanical failures or blockages. The following section of the Master Plan looks at facility capacities and how the system design has contributed to spills or failures.

5.4 Collection System Evaluation Criteria

The following criteria were used to determine whether or not GCSD's collection system is acceptable under current or future conditions.

1. Design Slopes: The following table, from GCSD's Standards, governs any recommended gravity sewer improvements:

Table 5.2: Gravity Sewer Criteria

Diameter	Slope
6-in	0.0050
8-in	0.0035
10-in	0.0025
12-in	0.0020
15-in	0.0015
18-in	0.0012

Note: Many of the District's sewer problems stem from minimum slopes caused by "stair step" designed facilities that follow grade and become shallow in flat areas. The District should consider adopting a design standard that allows it to reject any design with slopes less than 1% if grade is locally available.

2. Depth of Flow: The maximum depth-to-diameter ratio for sewers is as follows:
   a. ≤ 10-inch, 50%
   b. ≥ 12-inch, 75%

3. Pipeline Velocity: Minimum velocity shall be two (2) fps when the pipe is at maximum flow as dictated in No. 2 above.

4. Manning's roughness coefficient = 0.014

5. Maximum force main velocity = 5 fps

6. Lift station pumping capacity is considered acceptable if a single pump capacity is greater than or equal to the peak inflow.

5.5 Projected flows by LS

Projected flows have been broken down by lift station. **Tables 5.3 and 5.4** calculate the wastewater peak flows into each wetwell currently and at buildout. These numbers provide the basis for evaluating lift station and pipeline capacities.

Table 5.3: Estimated Existing In-Basin Flows

Lift Station	Est. Current Connections	Average Duty Factor (gpd/conn)	Average In-Basin Flow (gpd)	Peak Flow Duty Factor (gpm/conn)	Peak In-Basin flow (gpm)
1	98	127	12,405	0.505	49
2	79	127	10,056	0.505	40
3	9	127	1,143	0.505	5
4	3	127	381	0.505	2
5	221	127	28,100	0.505	112
6	12	127	1,504	0.505	6
7	106	127	13,439	0.505	53
8	70	127	8,834	0.505	35
9	24	127	3,101	0.505	12
10	43	127	5,451	0.505	22
11	118	127	15,037	0.505	60
12	27	127	3,477	0.505	14
13	233	127	29,604	0.505	118
14	97	127	12,311	0.505	49
15	74	127	9,398	0.505	37
Big Oak Flat	82	127	10,432	0.505	41
Groveland (gravity)	96	127	12,217	0.505	49
Total	**1,393**		**176,891**		**704**

Table 5.4: Ultimate In-Basin Flows – Currently Sewered Lots

Lift Station	Ultimate Connections	Avg Duty Factor (gpd/conn)	Avg In-Basin Flow (gpd)	Peak Flow Duty Factor (gpm/conn)	Peak In-Basin flow (gpm)
1	132	127	16,764	0.505	67
2	107	127	13,589	0.505	54
3	9	127	1,143	0.505	5
4	3	127	381	0.505	2
5	299	127	37,973	0.505	151
6	16	127	2,032	0.505	8
7	143	127	18,161	0.505	72
8	94	127	11,938	0.505	47
9	33	127	4,191	0.505	17
10	58	127	7,366	0.505	29
11	160	127	20,320	0.505	81
12	37	127	4,699	0.505	19
13	315	127	40,005	0.505	159
14	131	127	16,637	0.505	66
15	100	127	12,700	0.505	51
Big Oak Flat	111	127	14,097	0.505	56
Groveland (gravity)	130	127	16,510	0.505	66
Yosemite Way Station			57,600		100
Total	**1,878**		**296,106**		**1,048**

5.6 Lift Station Capacity Evaluation – Current and Buildout Conditions

Table 5.5 shows current flows into each lift station. **Table 5.6** and **Exhibit 9** illustrate the flows into each lift station at buildout in the current system configuration. The table exposes which lift stations experience greater inflows than pump outflow capacity as well as force main velocities. The exhibit shows the system impacts of these deficiencies.

Tables 5.5 and 5.6 indicate that lift stations 5, 7 and 8 currently experience higher inflows than pumping capacity (not taking into account the LS 7 pump replacement of Spring 2001). The table also shows that the force mains from lift stations 5, 6 10 and 14 experience velocities greater than 5 ft/s. Failures in the force mains leading from Lift Stations 5 and 10 have led to spills in the past.

The major reason for the under-capacity pumps is the over-capacity of upstream lift stations. For example, Lift Station 1 has a peak inflow of 66 gpm, yet the pump discharges at 250 gpm. This increased flow is transferred to downstream Lift Station 5 and must be accommodated.

Part of the plan to upgrade the poorly designed and aging lift stations is to better size pump capacities or add variable frequency drives (VFDs). The recommended capacities are discussed in Section 6.

Table 5.5: Lift Station and Force Main Evaluation, Estimated Current Flows

Lift Station	In-Basin Peak Inflow (gpm)	Current Single Pump Capacity (gpm)	Current Dual Pump Capacity (gpm)	Contributing LS Flows (gpm)	Total Peak Inflow (gpm)	Current Wetwell Capacity (gal)	Storage Time at Peak Flows (min)	Force Main Size (in)	Force Main Velocity (fps)
1	49	250	425	0	49	1,164		6	4.8
2	40	220	320	250	290	1,674		6	3.6
3	5	100	120	0	5	1,163		4	3.1
4	2	55	70	0	2	1,311		3	3.2
5	112	420	460	745	857	6,159	**15.5**	6	**5.2**
6	6	430	490	460	466	5,303		6	**5.6**
7	53	430	490	630	683	6,231	**32.2**	12	1.4
8	35	300	425	600	635	3,276	**15.6**	8	2.7
9	12	90	120	0	12	1,480		4	3.1
10	22	140	250	0	22	1,607		4	3.6
11	60	120	145	0	60			4	3.7
12	14	120	145	0	14	752		4	3.7
13	118	525	600	395	513	4,518		8	3.8
14	49	275	340	120	169	1,797		4	**8.7**
15	37	120	170	0	37	1,336		4	4.3
Big Oak Flat	56	108	113	0	56			4	3
Notes		1	1	2		1			

Notes:
(1) Total wet well volume
(2) Contributions as follows: 0 if inflow to contributor < 25, single pump if inflow < single pump capacity, dual pump capacity all other cases

Table 5.6: Lift Station and Force Main Evaluation, Current Configuration at Buildout

Lift Station	In-Basin Peak Inflow (gpm)	Current Single Pump Capacity (gpm)	Current Dual Pump Capacity (gpm)	Contributing LS Flows (gpm)	Total Peak Inflow (gpm)	Current Wet well Capacity (gal)	Storage Time at Peak Flows (min)	Force Main Size (in)	Force Main Velocity (fps)
1	66	250	425	0	66	1,164		6	4.8
2	54	220	320	250	304	1,674		6	3.6
3	5	100	120	0	5	1,163		4	3.1
4	2	55	70	0	2	1,311		3	3.2
5	151	420	460	745	896	6,159	**14.1**	6	**5.2**
6	8	430	490	460	468	5,303		6	**5.6**
7	72	430	490	630	702	6,231	**29.4**	12	1.4
8	47	300	425	600	647	3,276	**14.7**	8	2.7
9	17	90	120	0	17	1,480		4	3.1
10	29	140	250	0	29	1,607		4	3.6
11	81	120	145	0	81			4	3.7
12	19	120	145	0	19	752		4	3.7
13	159	525	600	395	554	4,518		8	3.8
14	66	275	340	120	186	1,797		4	**8.7**
15	50	120	170	0	50	1,336		4	4.3
BOF	56	108	113	0	56			4	3
Notes		1	1	2		1			

Notes:
(1) Total wet well volume
(2) Contributions as follows: 0 if inflow to contributor < 25, single pump if inflow < single pump capacity, dual pump capacity all other cases

5.7 Gravity Sewer Capacities

Existing gravity pipelines were evaluated using the flow balance described in **Table 5.6** and **Exhibit 9**. Construction plans were reviewed to find minimum slopes of each line and a Manning's Roughness coefficient of 0.014 was used (typical value for older pipes). The pipelines were evaluated on a reach-by-reach basis at buildout condition using Flowmaster® and Hydra 6® software. **Tables 5.7 and 5.8** summarize the current and ultimate flows in the existing gravity sewers.

Pipelines were evaluated at the most downstream location for a given pipe size. The numbering convention used corresponds with either the lift station inlet pipe (in) or the force main outlet to gravity line (out). Directional labels were given to lift stations with more than one inlet.

Appendix D contains the Hydra 6® model output.

5.8 Existing Collection System Summary

Table 5.9 summarizes the collection system facilities that currently exceed District criteria.

Table 5.7: Reach Analysis – Estimated Current Flows, Current Pumping Capacities

		Peak Flows at Buildout (gpm)						d/D = .50		d/D = .67 (6-in), .75 (>6-in)	
Reach	Description	In-Basin Flow	U/S LS Flow	Total Flow	Dia. (in)	Min Slope	Location (1)	Existing Pipe Capacity (gpm)	Flow Surplus (Deficit) (gpm)	Existing Pipe Capacity (gpm)	Flow Surplus (Deficit) (gpm)
1-In	LS 1 Inlet	49	0	66	6	0.005	LS 1 - MH 21+81	89	32	140	77
1-Out	LS 1 Discharge	10	250	263	6	0.005	MH 24+75 - 23+97	89	(179)	140	(134)
2-In	LS 2 Inlet - E	25	250	284	8	0.0035	LS 2 - MH 29+24	160	(127)	293	(1)
2-Out	LS 2 Discharge	1	320	322	8	0.031	MH 6+20 - MH 2+46	477	118	-	-
5-In-N	LS 5 Inlet - N	74	425	525	12	0.0035	MH 65 - MH 64	473	(59)	863	300
5-In-S	LS 5 Inlet - S	38	320	371	10	0.003	LS 5 - MH 25+09	269	(106)	491	96
6-In	LS 6 Inlet	6	460	468	8	0.031	LS 6 - MH 22+50	477	(26)	-	-
7-In	LS 7 Inlet	53	630	772	12	0.036	MH 9+00 - MH 6+76	1409	637	-	-
8-In	LS 8 Inlet	35	600	647	12	0.005	LS 8 - MH 33+00	565	(110)	1031	321
9-Out	LS 9 Discharge	10	90	103	6	0.005	MH 13 - MH 12	89	(19)	140	26
11-In	LS 11 Inlet	60	0	81	6	0.005	MH 3+87 - MH -1+09	89	21	-	-
11-Out	LS 11 Discharge	19	120	145	6	0.005	MH 213+50-MH 210+00	89	(58)	140	(13)
12-Out	LS 12 Discharge	30	120	160	6	0.0051	MH 414 - MH 416	89	(64)	140	(19)
13-In-N	LS 13 Inlet - N	81	120	229	8	0.005	LS 13 - MH 360	192	(26)	350	127
13-In-S	LS 13 Inlet - S	37	275	325	10	0.0035	LS 13 - MH 338	291	(38)	530	182
14-In	LS 14 Inlet	49	120	186	8	0.005	LS 14 - MH 286	192	6	350	159
15-In	LS 15 Inlet	37	0	50	6	0.005	MH 231 - MH 232	89	44	-	-
15-Out	LS 15 Discharge	24	120	153	6	0.005	MH 281 - MH 282	89	(64)	140	(19)
BOF-In(2)	BOF Inlet	41	0	56	6	0.009	MH 38 - MH 37	119	71	-	-
G-E	Groveland East	49	0	66	6	0.01	MH 101 - MH 101A	126	68	-	-
G-W(3)	Groveland West	49	108	157	8	0.0031	MH 2003 - MH 2004	140	(17)	256	99

Notes:
(1) Most downstream location
(2) Split BOF flows 50/50 between two trunk lines
(3) BOF + 50% Groveland

Table 5.8: Reach Analysis – Currently Sewered Lots at Ultimate Buildout, Current Pumping Capacities

Reach	Description	Peak Flows at Buildout (gpm)			Dia. (in)	Min Slope	Location (1)	d/D = .50		d/D = .67 (6-in), .75 (>6-in)	
		In-Basin Flow	U/S LS Flow	Total Flow				Existing Pipe Capacity (gpm)	Flow Surplus (Deficit) (gpm)	Existing Pipe Capacity (gpm)	Flow Surplus (Deficit) (gpm)
1-In	LS 1 Inlet	66	0	66	6	0.005	LS 1 - MH 21+81	89	23	140	74
1-Out	LS 1 Discharge	13	250	263	6	0.005	MH 24+75 - 23+97	89	**(174)**	140	(123)
2-In	LS 2 Inlet - E	34	250	284	8	0.0035	LS 2 - MH 29+24	160	**(124)**	293	9
2-Out	LS 2 Discharge	2	320	322	8	0.031	MH 6+20 - MH 2+46	477	155	-	-
5-In-N	LS 5 Inlet - N	100	425	525	12	0.0035	MH 65 - MH 64	473	**(52)**	863	338
5-In-S	LS 5 Inlet - S	51	320	371	10	0.003	LS 5 - MH 25+09	269	**(102)**	491	120
6-In	LS 6 Inlet	8	460	468	8	0.031	LS 6 - MH 22+50	477	9	-	-
7-In	LS 7 Inlet	72	630	772	12	0.036	MH 9+00 - MH 6+76	1409	637	-	-
8-In	LS 8 Inlet	47	600	647	12	0.005	LS 8 - MH 33+00	565	**(82)**	1031	384
9-Out	LS 9 Discharge	13	90	103	6	0.005	MH 13 - MH 12	89	**(14)**	140	37
11-In	LS 11 Inlet	81	0	81	6	0.005	MH 3+87 - MH -1+09	89	8	-	-
11-Out	LS 11 Discharge	25	120	145	6	0.005	MH 213+50-MH 210+00	89	**(56)**	140	(5)
12-Out	LS 12 Discharge	40	120	160	6	0.0051	MH 414 - MH 416	89	**(71)**	140	(20)
13-In-N	LS 13 Inlet - N	109	120	229	8	0.005	LS 13 - MH 360	192	**(37)**	350	121
13-In-S	LS 13 Inlet - S	50	275	325	10	0.0035	LS 13 - MH 338	291	**(34)**	530	205
14-In	LS 14 Inlet	66	120	186	8	0.005	LS 14 - MH 286	192	6	350	164
15-In	LS 15 Inlet	50	0	50	6	0.005	MH 231 - MH 232	89	39	-	-
15-Out	LS 15 Discharge	33	120	153	6	0.005	MH 281 - MH 282	89	**(64)**	140	(13)
BOF-In(2)	BOF Inlet	56	0	56	6	0.009	MH 38 - MH 37	119	63	-	-
G-E	Groveland East	66	0	66	6	0.01	MH 101 - MH 101A	126	60	-	-
G-W(3)	Groveland West	66	333	399	8	0.0031	MH 2003 - MH 2004	140	**(259)**	256	(143)

Notes:
(1) Most downstream location
(2) Split BOF flows 50/50 between two trunk lines
(3) BOF + 50% Groveland + Yosemite Way Station (225 gpm lift station)

Table 5.9: GCSD Collection System Facilities Currently Exceeding Criteria

Lift Stations Exceeding Criteria	Force Mains Exceeding Criteria	Gravity Mains Exceeding Criteria
LS 5	LS 5	1-Out
LS 6 (note 1)	LS 6	2-In
LS 7 (note 2)	LS 10	5-In-N
LS 8	LS 14	5-In-S
		8-In
		9-Out
		11-Out
		12-Out
		13-In-N
		13-In-S
		15-Out
		G-W (note 3)

Notes:
1. LS 6 would exceed capacity if LS 5 were sized to meet incoming flows
2. Does not account for Spring 2001 improvement project
3. Groveland-West gravity main in First Garrotte Creek.

6.0 Collection System Proposed Improvements, Alternatives

The GCSD collection system requires improvements for two reasons:

- Spill elimination – frequent spills are predominantly attributable to equipment failure. Because of its current condition (see Section 2.3), this equipment requires replacement
- Inadequate capacity - the equipment in place is not sized for existing flows or the expected flows at buildout.

The District Board of Directors has declared a District State of Emergency in order to deal with chronic problems of sewage spills. See Board Resolution 5-2001 dated April 2, 2001. See also the CRWQCB Notice of Violation dated February 7, 2001, the GCSD April 2001 Response Package, and the CRWQCB May 15, 2001 Draft Cleanup and Abatement Order for additional background information. The District has been directed to "cleanup and abate, forthwith, all releases and threatened releases of wastewater from within the confines of the collection system." The District has been directed to prepare, submit, and implement a Sewer Overflow Prevention and Mitigation Plan.

While the completion of such a plan is beyond the scope of the Wastewater Master plan, the elements described herein can be a resource for preparing such a plan. The costs associated with activities planned beyond the immediate year are included in Section 11 of this Master Plan.

6.1 Sewage Pipeline Improvements

6.1.1 Immediate Action Plan

Implement the GCSD April 2001 Response Package Plan

The intensive 12 week inspection, cleaning, repairing, and testing of 500 manholes and 20 miles of the most critical pipeline as described in the April 2001 plan should be completed as scheduled. Critical pipelines that have had a history of spilling should be videotaped, cleaned, repaired and/or replaced.

Installation of Grease Removal System/Grease Trap Enforcement and Education

The District should either install a grease trap or chemical de-grease system on the line from the downtown Groveland area as this line has had chronic spills due to grease build-up. GCSD should consider implementing a public education and grease trap enforcement program with the businesses in downtown Groveland.

Replacement of Forcemains

Forcemains of PVC material on critical and/or major lift stations or lift stations with a history of spills should be replaced.

6.1.2 Short-Term Action Plan

The following pipeline improvements programs or modifications should be made within a one to five year time frame.

Grease Removal Program

Install grease removal systems on other commercial areas within the District Boundaries.

Preventative Maintenance Program

A sewer pipeline preventative maintenance program that has as its major goal to reduce inflow and infiltration should be implemented. Elements should include regular monitoring and inspection with video tapping equipment and line improvement through cleaning, flushing, root and grit removal, repairing, sliplining, and/or replacement. The program should include regular illegal connection investigation. The program should have checklists to assure compliance and for data gathering and should be implemented on a constant basis.

Revision of District Ordinance

District ordinances should be revised or new ones implemented with regards to illegal connections to the District's collection system. These ordinances should be aimed at eliminating existing illegal connections and preventing new ones. They should require stricter enforcement and they should establish appropriate penalties or fines for violations. Ordinances regarding the septic tank usage and conversion should be drafted and implemented. Septic tank owners should be required to pay an annual fee to fund monitoring of the ground water quality and to implement future conversion to the sewered system.

6.2 Sewage Lift Station Improvements

6.2.1 Immediate Action Plan

The first item that needs to be completed is a detailed evaluation of each Lift Station site. This evaluation will determine which of the following items need to be implemented. A typical existing lift station is shown in **Exhibit 11**.

Mechanical Rehabilitation

- Replacement of Vacuum Priming Systems

  The existing vacuum priming systems that are on nearly all the lift stations should be replaced with a water or reclaimed water priming system. An air gap tank or back flow preventers will be required if the water is from a potable source. A check valve is required on the pump suction pipe.

- Installation of Pump By-pass

Piping with a shut-off valve should be installed from a point on the discharge pipe to an above ground location. This will allow a temporary pump to be installed, which will bypass a failed pump if required.

- Temporary Bypass Pumps

  Several temporary bypass pumps should be purchased which have the capability to handle a range of flow rates and head conditions. Temporary piping and valving should be available to connect the pump to the bypass system.

- Temporary Power

  The temporary pumps could utilize gas-powered engines or portable generators could be provided to run electric motor driven pumps.

- Install Ventilation System Upgrades

  A reliable ventilation system that can ensure 12 air exchanges per hour is needed in each wet well (note the exception below). The discussion under the Electrical, Instrumentation, and Controls section below provides a discussion of why this is crucial.

Electrical, Instrumentation, and Control Rehabilitation

- Install Transfer Switch and Generator Plug

  In order to bypass an existing generator with a portable generator, a manual transfer switch and plug will be required to be installed. This would be in addition to the automatic transfer switch that already exists at the site.

- Upgrade System to Meet Safety Regulations

  Improvements are required in order to meet Cal OSHA and State Electrical Safety Orders. Wet wells are classified as Class I Division 1 (CID1) environments. Since there is an opening between the wet well and the pump enclosure, the pump enclosure area is also classified as a CID1 environment. These areas can be de-rated to a Class I Division 2 (CID2) area if they are ventilated at a minimum of 12 air exchanges per hour and if all electrical systems are programmed to shut off if the air within either area reaches 25% of the lower explosive level (LEL). All electrical equipment and instrumentation should be rated for a CID2 environment. For this option air monitoring equipment is required.

  Another option is to replace all electrical equipment within the wetwell and pump area with explosive proof equipment rated for the CID1 area.

SCADA System Rehabilitation

Minimum Requirements

- High Water Level and High High Water Level Alarms
- Pump Status
- Emergency Generator Status

6.2.2 Rehabilitation Program (1 to 5 years)

Once the highest priority items are completed, the lift stations require additional improvements as indicated below.

Structural Rehabilitation

- Wet Well Repair

  The wet-wells should be cleaned, patched and coated with a protective coating such as manufactured by Sancon.

- Structural Members

  The steel structural members supporting the fiberglass enclosures should be replaced.

Mechanical Rehabilitation

- Replace Pumps

  All above the wet-well pumps should be replaced with submersible pumps on a slide-rail support system. At this stage the existing wet wells would be utilized. Installation of variable frequency drives (VFD's) are recommended on major stations so these station's pumping rate can match the inflow rate and so that the starting and stopping of the pumps can happen gradually thus minimizing the water hammer, surges and stress on the force mains.

- Replace Discharge Piping and Valves

  The discharge piping within the pump enclosures are of special fabrication and can not be replaced with readily available components. Therefore these fittings should be replaced with standard ones. The shut-off valves and check valves should be relocated to a pre-cast concrete vault located outside of the pump enclosure. This will enable most maintenance operations to be completed without entering the wet-well area. Gate valves should be replaced with plug valves. Slam check valves should be replaced with slow closing check valves.

- Surge Analysis

  The District should perform a surge analysis on the forcemains where failures have been frequent.

Civil Rehabilitation

- Fiberglass Enclosures

  The fiberglass enclosures that housed the old pumps are deteriorating and should be replaced with pre-cast concrete rings and a top slab with a hatch should be installed.

- Upgrade Access

  All weather access roads should be provided to all sites with slope gradients of 10 to 15% maximum.

- Increase Emergency Storage

  Additional storage is required on the sites to contain overflows. This should be done with below grade pre-cast concrete vaults. Additional emergency storage could be realized in the existing wet wells if VFD's are installed which would lower the operating level of the fluid thus freeing up additional volume for emergencies.

  Some emergency storage could be added above ground by building a wall around the site.

6.2.3 Replacement Program

A long-term program of lift station replacement should be implemented in the 10 to 20 year timeframe. Elements of this program would include the following:

Property Acquisition

Property in the vicinity of the existing lift stations should be acquired for the new lift stations.

Replacement of Major Stations

Major lift stations should be replaced with those with a wet-well/dry pump pit type configuration.

Replacement of Remaining Stations

The remaining stations should be replaced with standard wet-well submersible lift stations. Existing wet-wells would be utilized as emergency storage facilities. **Exhibits 12, 13 and 14** show examples of a typical lift station configuration.

6.3 Other Elements

6.3.1 Public Education and Outreach Program

Elements of a public education and outreach program would include development of a web page with public interaction features, production and distribution of billing stuffers, handouts, fact sheets, Q&A sheets, resource lists, posters, development of Public Service Announcements, implementing surveys, opinion polls and questionnaires.

6.4 Collection System Alternatives/Analysis

The bad news: Section 2 details the deficiencies in the existing collection system. In all, four lift stations and four force mains are undersized and twelve gravity mains are at flows greater than allowed by criteria.

The good news: Altering the capacities of each lift station, by either re-sizing a replacement pump or installing VFDs, eliminates all the deficiencies (with the possible exception of the Groveland West gravity main in First Garrotte Creek).

6.4.1 Lift Station Improvement Program

Due to the chronic mechanical problems resulting from poor design and age, all lift stations should be rehabilitated as described in Section 6. As the pumps are replaced, they can be re-sized, with a corresponding flow reduction that can be accommodated by the existing gravity and force mains.

Alternative 1 represents the worst-case flow scenario, where all wastewater generated must be pumped to the existing WWTF site. This scenario will be discussed in more detail later; however, **Tables 6.1 and 6.2** show the affect of optimizing pump capacities of each lift station.

The table shows that by reducing lift station pumping capacities, the number of gravity sewers exceeding District criteria decreases from 12 to 5 (refer to existing capacities listed in **Table 5.8**). Only LS 5 force main would require up-sizing.

The only gravity main that significantly lacks capacity is the Groveland West main, which lies in First Garrotte Creek. This is due to the shallow slopes in certain reaches between manholes. The analysis is validated by the nine spills in the 1990s in this reach of pipe.

Table 6.1: Lift Station and Force Main Analysis – Currently Sewered Lots at Ultimate Buildout, Revised Pumping Capacities

Lift Station	In-Basin Peak Inflow (gpm)	Proposed Single Pump Capacity (gpm)	Contributing LS Flows (gpm)	Total Peak Inflow (gpm)	Current Wetwell Capacity (gal)	Storage Time at Peak Flows (min)	Force Main Size (in)	Force Main Velocity (fps)
1	66	70	0	66	1,164		6	0.8
2	54	125	70	124	1,674		6	1.4
3	5	10	0	5	1,163		4	0.3
4	2	10	0	2	1,311		3	0.5
5	231	810	570	801	6,159		6	**9.2**
6	ABANDONED							
7	ABANDONED							
8	47	415	365	412	3,276		8	2.6
9	17	20	0	17	1,480		4	0.5
10	29	30	0	29	1,607		4	0.8
11	81	85	0	81			4	2.2
12	19	25	0	19	752		4	0.6
13	159	365	205	364	4,518		8	2.3
14	66	120	50	116	1,797		4	3.1
15	50	50	0	50	1,336		4	1.3
Big Oak Flat	56	60	0	56			4	1.5

Table 6.2: Reach Analysis – Currently Sewered Lots at Ultimate Buildout, Revised Pumping Capacities

		Peak Flows at Buildout (gpm)						d/D = .50		d/D = .67 (6-in), .75 (>6-in)	
Reach	Description	In-Basin Flow	U/S LS Flow	Total Flow	Dia. (in)	Min Slope	Location (1)	Existing Pipe Capacity (gpm)	Flow Surplus (Deficit) (gpm)	Existing Pipe Capacity (gpm)	Flow Surplus (Deficit) (gpm)
1-In	LS 1 Inlet	66	0	66	6	0.005	LS 1 – MH 21+81	89	23	-	-
1-Out	LS 1 Discharge	13	70	83	6	0.005	MH 24+75 – 23+97	89	6	-	-
2-In	LS 2 Inlet – E	34	70	104	8	0.0035	LS 2 – MH 29+24	160	56	-	-
2-Out	LS 2 Discharge	2	125	127	8	0.031	MH 6+20 – MH 2+46	477	350	-	-
5-In-N	LS 5 Inlet – N	100	415	515	12	0.0035	MH 65 – MH 64	473	(42)	863	348
5-In-S	LS 5 Inlet – S	51	125	176	10	0.003	LS 5 – MH 25+09	269	93	-	-
6-In	LS 6 Inlet	8	700	708	8	0.031	LS 6 – MH 22+50	477	(231)	809	101
7-In	LS 7 Inlet	72	710	772	12	0.036	MH 9+00 – MH 6+76	1409	637	-	-
8-In	LS 8 Inlet	47	365	412	12	0.005	LS 8 – MH 33+00	565	153	-	-
9-Out	LS 9 Discharge	13	20	33	6	0.005	MH 13 – MH 12	89	56	-	-
11-In	LS 11 Inlet	81	0	81	6	0.005	MH 3+87 – MH –1+09	89	8	-	-
11-Out	LS 11 Discharge	25	85	110	6	0.005	MH 213+50-MH 210+00	89	(21)	140	30
12-Out	LS 12 Discharge	40	25	65	6	0.0051	MH 414 – MH 416	89	24	-	-
13-In-N	LS 13 Inlet – N	109	85	194	8	0.005	LS 13 – MH 360	192	(2)	350	156
13-In-S	LS 13 Inlet – S	50	120	170	10	0.0035	LS 13 – MH 338	291	121	-	-
14-In	LS 14 Inlet	66	50	116	8	0.005	LS 14 – MH 286	192	76	-	-
15-In	LS 15 Inlet	50	0	50	6	0.005	MH 231 – MH 232	89	39	-	-
15-Out	LS 15 Discharge	33	50	83	6	0.005	MH 281 – MH 282	89	6	-	-
BOF-In(2)	BOF Inlet	56	0	56	6	0.009	MH 38 – MH 37	119	63	-	-
G-E	Groveland East	66	0	66	6	0.01	MH 101 – MH 101A	126	60	-	-
G-W(3)	Groveland West	66	160	226	8	0.0031	MH 2003 – MH 2004	140	(86)	256	30

6.5 Improvements Regardless of Alternative

Certain projects are recommended, regardless of the WWTP location chosen. These lift stations are either remotely located or are located lakeside, with no opportunity for elimination. LS 6 is proposed to be eliminated in all alternatives. The following projects could be performed concurrent with feasibility studies or any other analysis relative to choosing a final WWTP location.

- Groveland trunk line (8-in), 1000 lft
- Upgrade LS1, 70 gpm
- Upgrade LS2, 125 gpm
- Upgrade LS3, 10 gpm
- Upgrade LS4, 10 gpm
- Upgrade LS11, 85 gpm
- Upgrade LS12, 25 gpm
- Upgrade LS14, 120 gpm
- Upgrade LS15, 50 gpm
- Upgrade LS16, (Big Oak Flat), 60 gpm

Estimated costs of these projects are included in Section 12.2

6.6 Alternative 1 – Single WWTP, Existing Site

Exhibit 15 schematically represents Alternative 1. LS 6 and LS 7 are abandoned, with gravity mains added to tie in-basin flows from these lift stations down to LS 5. Projects specific to this alternative follow:

- Upgrade LS5, 810 gpm
- Upgrade LS8, 415 gpm
- Upgrade LS9, 20 gpm
- Upgrade LS10, 30 gpm
- Upgrade LS13, 365 gpm
- Gravity main from old LS7 to LS5 (8-in), 3650 lft
- Force main from LS5 to old LS7 (10-in), 4400 lft

Estimated costs for these projects are included in Section 12.3.

6.7 Alternative 2 – Dual WWTPs, Existing and Satellite Site

Exhibit 16 schematically represents Alternative 2. LS 6, LS 7, LS 9 and LS 10 are abandoned, with gravity mains added to tie in-basin flows from these lift stations either down to LS 5 or to the satellite site. Projects specific to this alternative follow:

- Upgrade LS5, 410 gpm
- Upgrade LS8, 50 gpm
- Upgrade LS13, 365 gpm
- G.M. old LS9 to Big Creek Pipeline (8-in), 500 lft
- G.M. from dam to satellite plant (10-in), 7000 lft
- G.M. from old LS10 to satellite plant (8-in), 3800 lft
- Gravity main from old LS7 to LS5 (8-in), 3650 lft
- Force main from LS5 to old LS 7 (8-in), 4400 lft

Estimated costs for these projects are included in Section 12.4.

6.8 Alternative 3 – New WWTF,

Exhibit 17 schematically represents Alternative 3. Two options for conveying flows from the existing WWTP site to the new site: gravity flowing through the existing LS 7 force main and pumping to the new site, or gravity flowing through the golf course from the existing plant to the new site. The pumping option was more economically attractive. Projects specific to this option include:

- Upgrade LS5, 340 gpm
- Upgrade LS8, 50 gpm
- Upgrade LS13, 365 gpm
- Add a new LS7, 380 gpm
- F.M. from LS5 towards old LS9 (8-in), 1150 lft
- G.M. - end F.M. LS5 to old LS9 (10-in), 1000 lft
- G.M. - old LS9 to Big Creek pipeline (10-in),550 lft
- G.M. from old LS10 to new site (10-in), 3800 lft
- Dam to LS9 connection (10-in), 1700 lft
- LS9 connection to new site (15-in), 5300 lft
- F.M. from LS7 to top hill Mueller (6-in), 2600 lft
- G.M. from end F.M. LS7 to old LS10 (10-in), 2550 lft

- Gravity main from old LS6 to LS5 (8-in), 1350 lft

Estimated costs for these projects, as well as the comparison of the two conveyance options are included in Section 8.

6.9 Alternatives 2 and 3 – Cost Impacts

6.9.1 New Connections

The new gravity lines proposed leading from abandoned LS 9 and LS 10 to a new WWTP site in Alternatives 2 and 3 provide an opportunity to sewer existing septic lots, with the advantages of replacing aging on-site systems and improving groundwater/surface water quality while providing the District with new revenue possibilities.

Approximately 50,000 lf of 8-in sewer placed in the LS 10 basin could potentially connect approximately 933 lots either currently or planning to use septic. At $48/lf, the collection system costs would be $2.4 million or $2,572 per connection.

6.9.2 Pumping Cost Savings

If it is determined that effluent from a new treatment plant located near Tioga High School could discharge directly into Big Creek, significant pumping savings could be realized, since wastewater would not have to be pumped to Reservoir No. 2 for storage and to the spray fields for disposal. Wastewater would gravity-feed from the collection system to the plant.

Assuming the following:

Spray field elevation: 2800 ft
New treatment plant elevation: 2450 ft
Pipe head losses: 100 ft
Pumping efficiency: 65%
Power costs: $0.12/kW-hr

It is estimated that the District could save $85/AF of effluent discharged directly into the creek.

7.0 Decision Plan

7.1 Overview

Locating GCSD's treatment plant is the primary factor in determining the future of the wastewater system. The key issue in determining the location is the answer to the effluent disposal question.

As detailed in Section 4, given today's regulatory environment, the most cost-effective treatment plant alternative is to expand the existing site to meet ultimate expected flows. However, current conditions and regulations can change. These changes include:

- Climatic changes – severe drought or wet weather may provide the opportunity to explore live-stream discharge under the motivation of recreational enhancement or downstream environmental benefits.
- Land application changes – the ability of the existing spray fields to accept biosolids waste and treated effluent may decrease over time. Alternate methods of disposal may be required.
- Ground/surface water quality degradation– increasing failures of septic systems within the District could potentially degrade groundwater or lake water quality to the point where connecting to sewer may be ultimately required. This would increase the demand on the GCSD system.
- Spill risk mitigation – a treatment plant located in the lowest elevation within the District provides several spill-reducing features, such as fewer lift stations and less sewage flowing along Pine Mountain Lake.
- New disposal alternatives – agreements with local ranchers may provide new locations for irrigating effluent in different locations. In addition, new uses for recycled water, possibly with additional treatment, may be developed.
- CEQA – Environmental factors could impact siting decision

These uncertainties impact the decision of where best to locate the treatment plant and merit further investigation before the District makes significant financial commitments.

GCSD's current financial situation must be considered in planning future improvements. The District has a limited customer base. These limited resources must also fund improvements to the collection system.

Expanding the wastewater system will require significant capital. For this reason, the District must have a carefully calculated approach to attack the deficiencies in the existing system.

The future plan should have the following priorities:

1. Improve the existing system enough to minimize the potential for spills and comply with permitted disposal requirements
2. Perform a feasibility analysis to determine the best option for effluent disposal
3. Establish a financing plan to implement a major capital program
4. Design/construct existing plant expansion or a new treatment plant that best suits the Groveland community and wastewater characteristics

5. Compliance with the California Environmental Quality Act (CEQA)
6. Maintain the system as the community grows

7.2 Financial Readiness Plan

While the District is conducting the Feasibility Phase of the project, the District needs to prepare itself financially for the expansion and improvement of the wastewater system. Current user rates are not adequate to address the wastewater system's existing treatment deficiencies or to meet new customer demands. Some of the issues or actions involved in Financial Readiness are:

1. The District will need to develop a phased financial plan to meet the capital program needs.

2. Community support will be essential for completion of the program.

3. The District will need to consider the kinds of financing instruments best suited to their needs. These may include building up cash reserves, applying for State Revolving Fund loans and grants, or issuing Certificates of Participation.

4. The District will want to make sure its credit rating is as high as possible.

5. The revenue streams to be pledged for any indebtedness need to be identified.

6. The District may want to consider its policies on how much capital assets are funded by current user fees and new customer impact fees.

7. The District may need time to ramp up user rates or impact fees to avoid "rate shock." Changes in rates will have to be conducted in accordance with Proposition 218.

7.3 Plan Timeline

Figure 7.1 provides a schematic schedule for the events needed to meet the wastewater system needs.

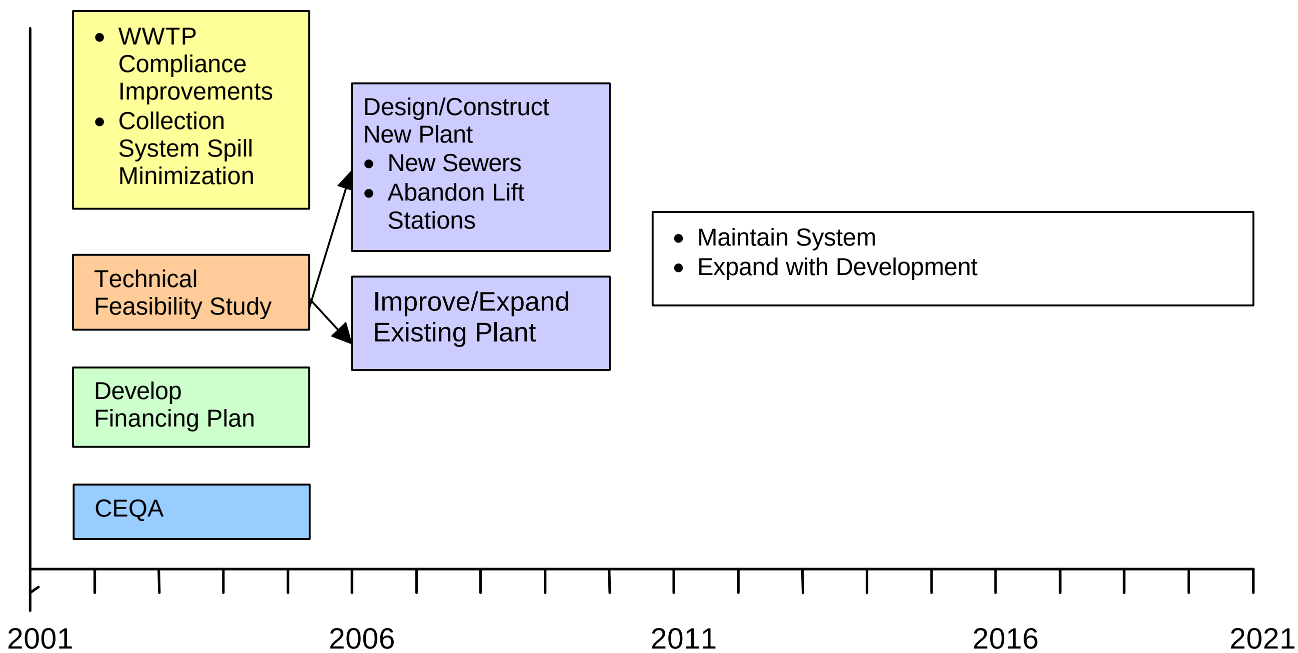


Figure 7.1: Long –Term Plan

7.4 Site Comparison

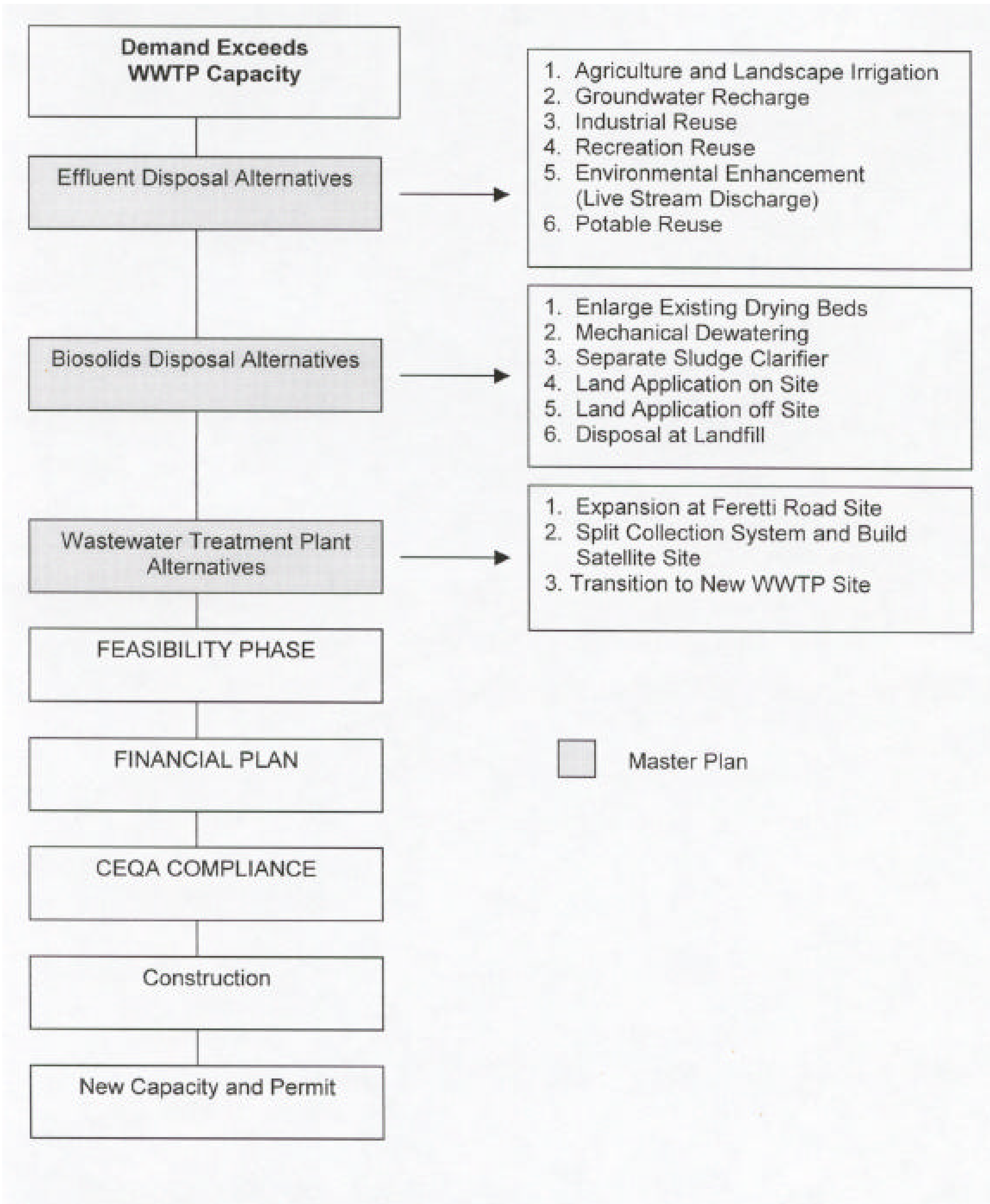
Table 7.1 evaluates the treatment plant site issue from a current perspective. The two sites were evaluated against the major criteria that affect site selection. The list is objective and criteria are not weighted.

Table 7.1: WWTP Site Evaluation

Existing WWTP Site	Decision Criteria	New WWTP Site
v	District Owns Land	
	Location Minimizes Capital and Operating Costs	v
	Choice of Treatment Process/Flexibility	v
v	Seasonal Storage Availablility	
	Future Expansion Flexibility – Treatment Plant or System	v
	Increased Customer Base	v
	Pumping Costs Minimized	v
v	Overall Capital Cost Minimized	
	Spill Risk Minimization	v
v	CEQA Factors	

7.5 Decision Process

The following flowchart outlines the process that could be followed in order to determine the optimum treatment plant location.



8.0 Project Costs, CIP

This section outlines the costs for all the improvements proposed in this master plan. It is recognized that the District does not have the financial capabilities to execute each of these projects; however, the data is provided to convey the breadth of improvements required. The District will determine which projects to appropriate funds based on the available resources and the project priority.

Projects and associated costs are based on what is known *today*. The feasibility studies described in Section 7 need to be completed in order to determine the optimum treatment plant location and disposal method.

Item Nos. are associated with the project numbers found on **Exhibit 18 and 19** maps.

8.1 Short-Term Plan (FY 2001 - 2002)

Table 8.1 lists the activities to be performed as part of an Immediate Action Plan, designed to minimize spills and improve the performance of the WWTF.

Table 8.1: Immediate Action Plan

Item No.	Project Name	Quantity	Unit Cost	Estimated Construct. Cost	Estimated Capital Cost
WWTP-1-1	Metering devices				$30,000
WWTP-1-2	Demand management operations				$40,000
WWTP-1-3	Optimize STP operations				$30,000
Subtotal					***$100,000***
CS-1-1	Grease Trap Installation				$5,000
CS-1-2	Lift station rehab---	12 L.S.	$20,000 ($/LS)		$240,000
	Install pump bypass Replace vacuum prime system				
	Ventilation upgrades				
	Electrical upgrades				
CS-1-3	Purchase temp. bypass pump and power				$15,000
CS-1-4	SCADA System upgrades				$5,000
Subtotal					*$265,000*
TOTAL					**$365,000**

8.2 Intermediate-Term Projects (FY 2002 – 2005)

Table 8.2 lists the activities to be performed as part of an Intermediate-Term Plan, designed to further minimize spills, increase system reliability and determine the optimum treatment plant site.

Table 8.2: Projects Independent of Alternative Chosen

Item No.	Project Name	Quantity	Unit Cost	Est Construct. Cost	Estimated Capital Cost	Escalated Cost 3.0%	Year
WWTP-2-1	Effluent/Biosolids Disposal Study				$50,000	$54,636	02--04
WWTP-2-2	Financial Planning				$50,000	$54,636	02--04
WWTP-2-3	Initial WWTP Study CEQA Prelim. Invest.				$50,000	$56,275	03--05
Subtotal				***$0***	***$150,000***	***$165,548***	
CS-2-1	Groveland trunk line improvements (8 in.)	1500 (ft)	$48 ($/ft)	$72,000	$97,200	$101,607	03--04
CS-2-2	Rehabilitate LS1 (note 1)	70 (gpm)		$25,000	$25,000	$27,318	02--03
CS-2-3	Rehabilitate LS2 (note 1)	125 (gpm)		$25,000	$25,000	$27,318	03--04
CS-2-4	Rehabilitate LS3 (note 1)	10 (gpm)		$15,000	$15,000	$16,391	02--03
CS-2-5	Rehabilitate LS4 (note 1)	10 (gpm)		$15,000	$15,000	$16,391	02--04
CS-2-6	Rehabilitate LS11 (note 1)	85 (gpm)		$25,000	$25,000	$27,318	02--05
CS-2-7	Rehabilitate LS12 (note 1)	25 (gpm)		$25,000	$25,000	$27,318	02--06
CS-2-8	Rehabilitate LS14 (note 1)	120 (gpm)		$25,000	$25,000	$27,318	03--04
CS-2-9	Rehabilitate LS15 (note 1)	50 (gpm)		$25,000	$25,000	$27,318	03--04
CS-2-10	Rehabilitate LS16 (note 1)	60 (gpm)		$25,000	$25,000	$27,318	03--04
Subtotal				***$277,000***	***$302,200***	***$325,616***	
TOTAL					**$452,200**	**$491,164**	

8.3 Alternative Independent Improvements (FY 2001-2002 thru 2006-2007)

Table 8.3 lists the recommended tasks that are independent of the alternative chosen.

Table 8.3: Projects Independent of Alternative Chosen

Item No.	Project Name	Quantity		Unit Cost	Estimated Construct. Cost	Estimated Capital Cost	Escalated Cost 3.0%	Year
CS-3-1	replace LS1	70	(gpm)		$150,000	$150,000	$237,175	05--26
CS-3-2	replace LS2	125	(gpm)		$150,000	$150,000	$237,175	05--26
CS-3-3	replace LS3	10	(gpm)		$50,000	$50,000	$79,058	05--26
CS-3-4	replace LS4	10	(gpm)		$50,000	$50,000	$79,058	05--26
CS-3-5	replace LS11	85	(gpm)		$150,000	$150,000	$237,175	05--26
CS-3-6	replace LS12	25	(gpm)		$100,000	$100,000	$158,116	05--26
CS-3-7	replace LS14	120	(gpm)		$150,000	$150,000	$237,175	05--26
CS-3-8	replace LS15	50	(gpm)		$150,000	$150,000	$237,175	05--26
CS-3-9	replace LS16	60	(gpm)		$150,000	$150,000	$237,175	05--26
TOTAL					**$1,100,000**	**1,100,000**	**$1,739,281**	**TOTAL**

Note 1: Cost based on data provided by Liquid Handling Systems, July 2001

8.4 Alternative 1 Costs – Single WWTF, Ferretti Site

Table 8.4 lists the costs specific to Alternative 1.

Table 8.4: Alternative 1-Specific Costs

Item No.	Project Name	Quantity	Unit Cost	Estimated Construct. Cost	Estimated Capital Cost	Escalated Cost 3.0%	Year
WWTP-4-1	STP Expansion				$2,500,000	$3,952,911	05--26
WWTP-4-2	Increase Reservoir No. 2 Capacity				$2,000,000	$3,162,328	05--26
WWTP-4-3	Spray Field Improvements				$700,000	$1,106,815	05--26
Subtotal					***$5,200,000***	***$8,222,054***	
CS-4-1	replace LS5	810 (gpm)		$250,000	$250,000	$395,291	05--26
CS-4-2	replace LS8	415 (gpm)		$175,000	$175,000	$276,704	05--26
CS-4-3	replace LS9	20 (gpm)		$125,000	$125,000	$197,646	05--26
CS-4-4	replace LS10	30 (gpm)		$125,000	$125,000	$197,646	05--26
CS-4-5	replace LS13	365 (gpm)		$175,000	$175,000	$276,704	05--26
CS-4-6	Gravity main from old LS7 to LS5(8in)	3650 (lft)	$48 ($/ft)	$175,200	$236,520	$373,977	05--26
CS-4-7	Force main from LS5 to oldLS7(10in)	4400 (lft)	$60 ($/ft)	$264,000	$356,400	$563,527	05--26
Subtotal				***$1,289,200***	***$1,442,920***	***$2,281,494***	
TOTAL					**$6,642,920**	**$10,503,548**	

8.5 Alternative 2 Costs – Dual WWTPs

Table 8.5 lists the costs specific to Alternative 2.

Table 8.5: Alternative 2-Specific Costs

Item No.	Project Name	Quantity		Unit Cost		Estimated Construct. Cost	Estimated Capital Cost	Escalated Cost 3.0%	Year
WWTP-5-1	New Satellite Plant						$3,950,000	$6,245,599	05--26
WWTP-5-2	Existing Sewer Treatment Plant						$1,500,000	$2,371,746	05--26
WWTP-5-3	Spray Field Improvements						$700,000	$1,106,815	05--26
WWTP-5-4	Increase Reservoir No. 2 Capacity						$2,000,000	$3,162,328	05--26
Subtotal							***$8,150,000***	***$12,886,489***	
CS-5-1	replace LS5	410	(gpm)			$175,000	$175,000	$276,704	05--26
CS-5-2	replace LS8	50	(gpm)			$175,000	$175,000	$276,704	05--26
CS-5-3	replace LS13	365	(gpm)			$175,000	$175,000	$276,704	05--26
CS-5-4	G.M. from old LS9 to Big Creek (8in)	500	(lft)	$48	($/ft)	$24,000	$32,400	$51,230	05--26
CS-5-5	G.M. from dam to P_STP(10)	7000	(lft)	$60	($/ft)	$420,000	$567,000	$896,520	05--26
CS-5-6	G.M. from old LS10 to P_STP(8in)	3800	(lft)	$48	($/ft)	$182,400	$246,240	$389,346	05--26
CS-5-7	Gravity main from old LS7 to LS5(8in)	3650	(lft)	$48	($/ft)	$175,200	$236,520	$373,977	05--26
CS-5-8	Force main from LS5 to oldLS7(8in)	4400	(lft)	$48	($/ft)	$211,200	$285,120	$450,822	05--26
Subtotal						***$1,537,800***	***$1,892,280***	***$2,992,005***	
TOTAL							**$10,042,280**	**$15,878,494**	

8.6 Alternative 3a Costs – New WWTF, Pump from LS7 to New Site

Table 8.6 lists the costs specific to Alternative 3a.

Table 8.6: Alternative 3a-Specific Costs

Item No.	Project Name	Quantity		Unit Cost		Estimated Construct. Cost	Estimated Capital Cost	Escalated Cost 3.0%	Year
WWTP-6-1	New WWTP - Phase One						$7,150,000	$11,305,324	05--26
WWTP-6-2	New WWTP - Phase Two						$3,850,000	$6,087,482	05--26
Subtotal							**$11,000,000**	**$17,392,807**	
CS-6-1	upgrade LS5	340	(gpm)			$175,000	$175,000	$276,704	05--26
CS-6-2	upgrade LS8	50	(gpm)			$175,000	$175,000	$276,704	05--26
CS-6-3	upgrade LS13	365	(gpm)			$175,000	$175,000	$276,704	05--26
CS-6-4	add a new LS7	380	(gpm)			$175,000	$175,000	$276,704	05--26
CS-6-5	F.M. from LS5 towards old LS9(8in)	1150	(lft)	$48	($/ft)	$55,200	$74,520	$117,828	05--26
CS-6-6	G.M. from end F.M. LS5 to old LS9(10in)	1000	(lft)	$60	($/ft)	$60,000	$81,000	$128,074	05--26
CS-6-7	G.M. from old LS9 to Big Creek pipeline(10in)	550	(lft)	$60	($/ft)	$33,000	$44,550	$70,441	05--26
CS-6-8	G.M. from old LS10 to P_STP(10in)	3800	(lft)	$60	($/ft)	$228,000	$307,800	$486,682	05--26
CS-6-9	Dam to LS9 connection(10in)	1700	(lft)	$60	($/ft)	$102,000	$137,700	$217,726	05--26
CS-6-10	LS9 connection to P_WWTP (15in)	5300	(lft)	$90	($/ft)	$477,000	$643,950	$1,018,191	05--26
CS-6-11	F.M. from LS7 to top hill Mueller(6in)	2600	(lft)	$36	($/ft)	$93,600	$126,360	$199,796	05--26
CS-6-12	G.M. from end F.M. LS7 to old LS10(10in)	2550	(lft)	$60	($/ft)	$153,000	$206,550	$326,589	05--26
CS-6-13	Gravity main from old LS6 to LS5(8in)	1350	(lft)	$48	($/ft)	$64,800	$87,480	$138,320	05--26
Subtotal						***$1,966,600***	***$2,409,910***	***$3,810,464***	
TOTAL							**$13,409,910**	**$21,203,270**	

8.7 Alternative 3b Costs – New WWTF, Gravity from Ferretti Site to New Site

Table 8.7 lists the costs specific to Alternative 3b.

Table 8.7: Alternative 3b-Specific Costs

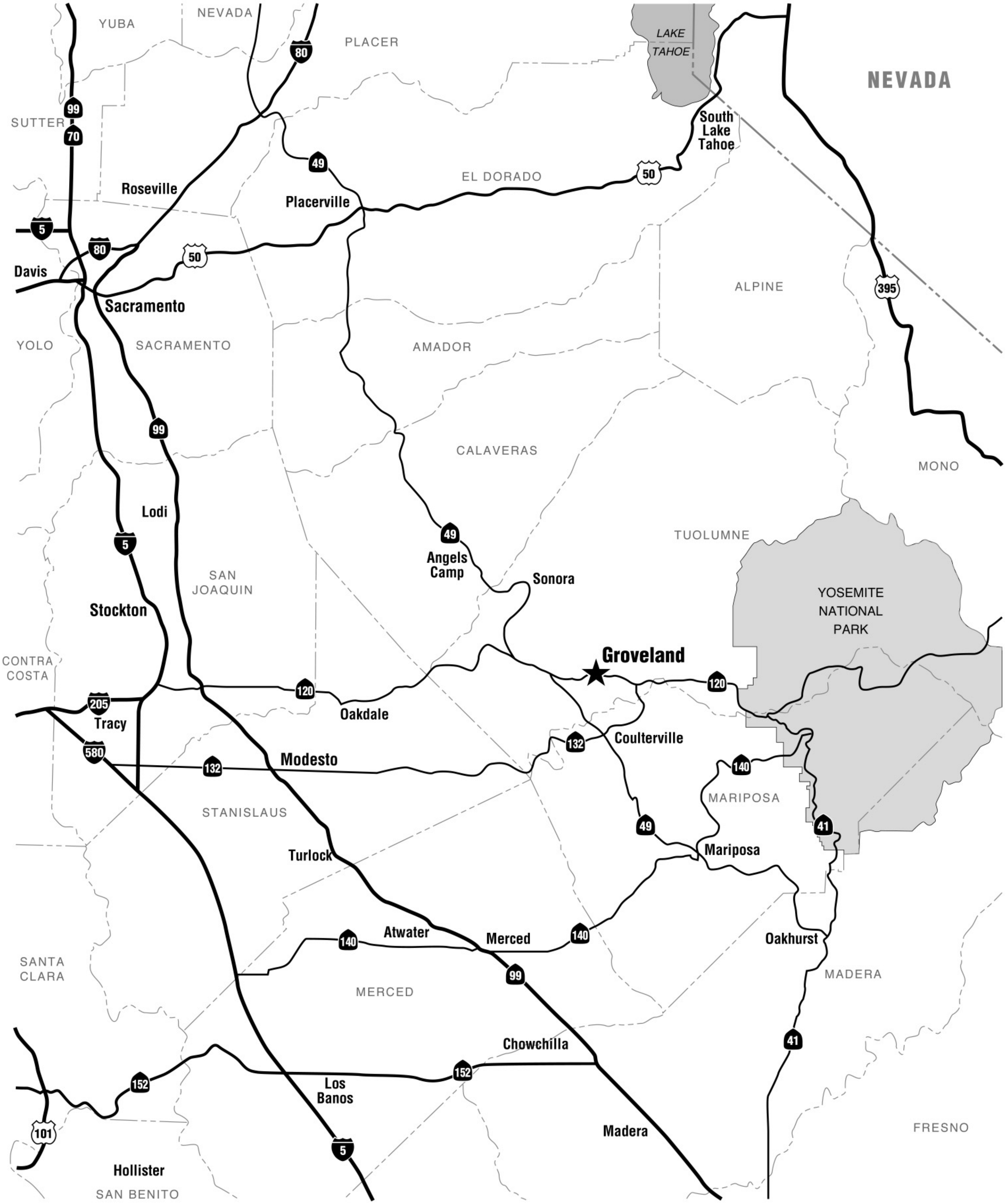
Item No.	Project Name	Quantity		Unit Cost		Estimated Construct. Cost	Estimated Capital Cost	Escalated Cost 3.0%	Year
WWTP-7-1	New WWTP - Phase One						$7,150,000	$11,305,324	05--26
WWTP-7-2	New WWTP - Phase Two						$3,850,000	$6,087,482	05--26
Subtotal							***$11,000,000***	***$17,392,807***	
CS-7-1	replace LS5	410	(gpm)			$175,000	$175,000	$276,704	05--26
CS-7-2	replace LS8	50	(gpm)			$175,000	$175,000	$276,704	05--26
CS-7-3	replace LS13	365	(gpm)			$175,000	$175,000	$276,704	05--26
CS-7-4	G.M. from Existing STP to old LS9(10in)	6500	(lft)	$60	($/ft)	$390,000	$526,500	$832,483	05--26
CS-7-5	G.M. from old LS7 to LS5(8in)	3650	(lft)	$48	($/ft)	$175,200	$236,520	$373,977	05--26
CS-7-6	F.M. from LS5 towards old LS9(8in)	1350	(lft)	$48	($/ft)	$64,800	$87,480	$138,320	05--26
CS-7-7	G.M. from end F.M. CS-6-7 to old LS9(10in)	752	(lft)	$60	($/ft)	$45,120	$60,912	$96,312	05--26
CS-7-8	G.M. from old LS9 to Big Creek pipeline(12in)	500	(lft)	$72	($/ft)	$36,000	$48,600	$76,845	05--26
CS-7-9	G.M. from dam to old LS9 connection(10in)	1700	(lft)	$60	($/ft)	$102,000	$137,700	$217,726	05--26
CS-7-10	G.M. along Big Creek beyond LS9 conn.(15in)	5300	(lft)	$18 0	($/ft)	$954,000	$1,287,900	$2,036,381	05--26
Subtotal						***$2,292,120***	***$2,910,612***	**$4,602,156**	
Total							**$13,910,612**	**$21,994,962**	

8.8 Recommended Alternative

A cost comparison of the various alternatives shows that *today*, Alternative 1 is the most cost effective. Based on this, the CIP will reflect this project. Note that recommendations may change based on the results of the disposal studies and CEQA evaluation.

8.9 Capital Improvement Program (CIP) Map

Exhibit 19 depicts a map showing the CIP recommended for GCSD.



GROVELAND COMMUNITY SERVICES DISTRICT

Regional Vicinity

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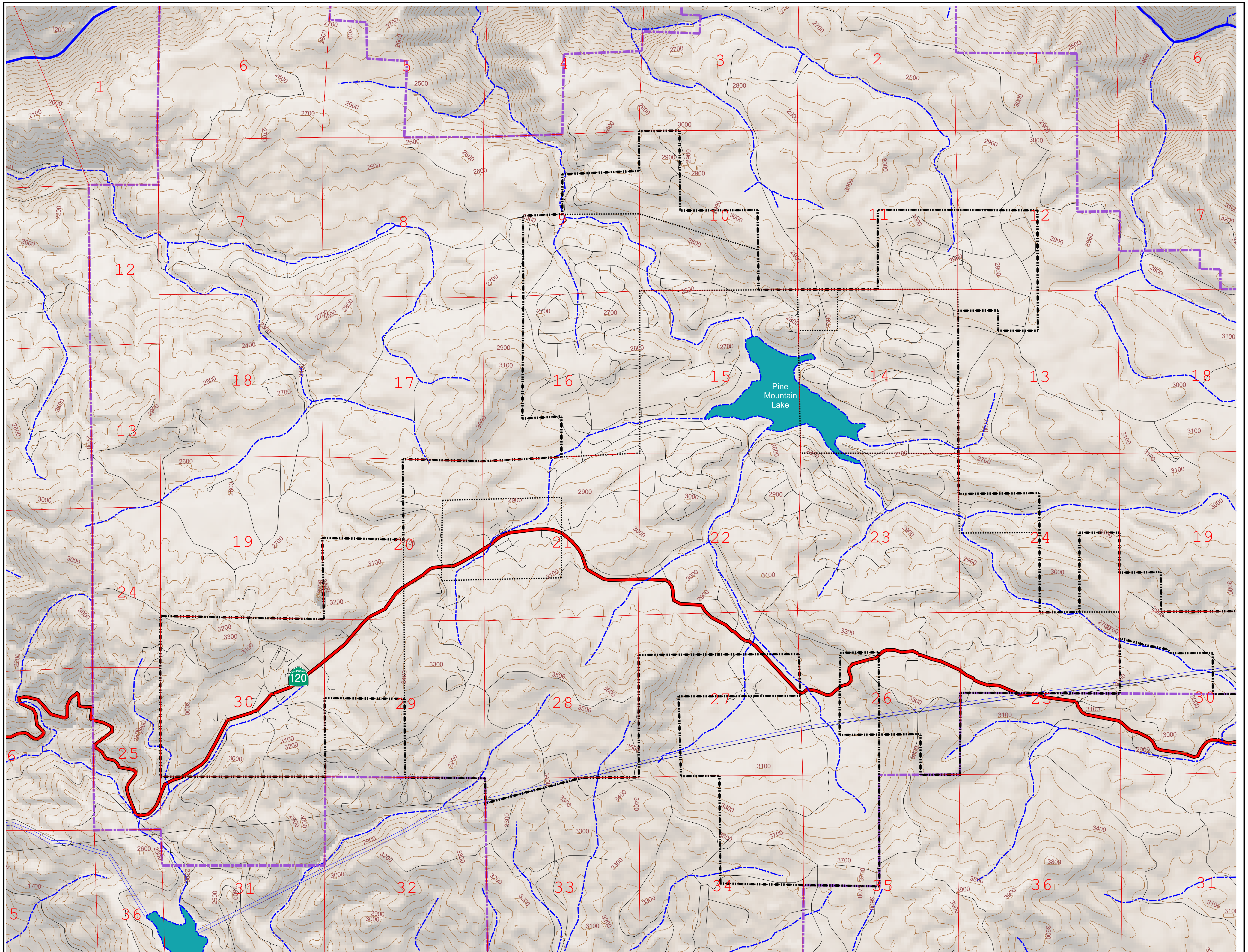
Exhibit 1



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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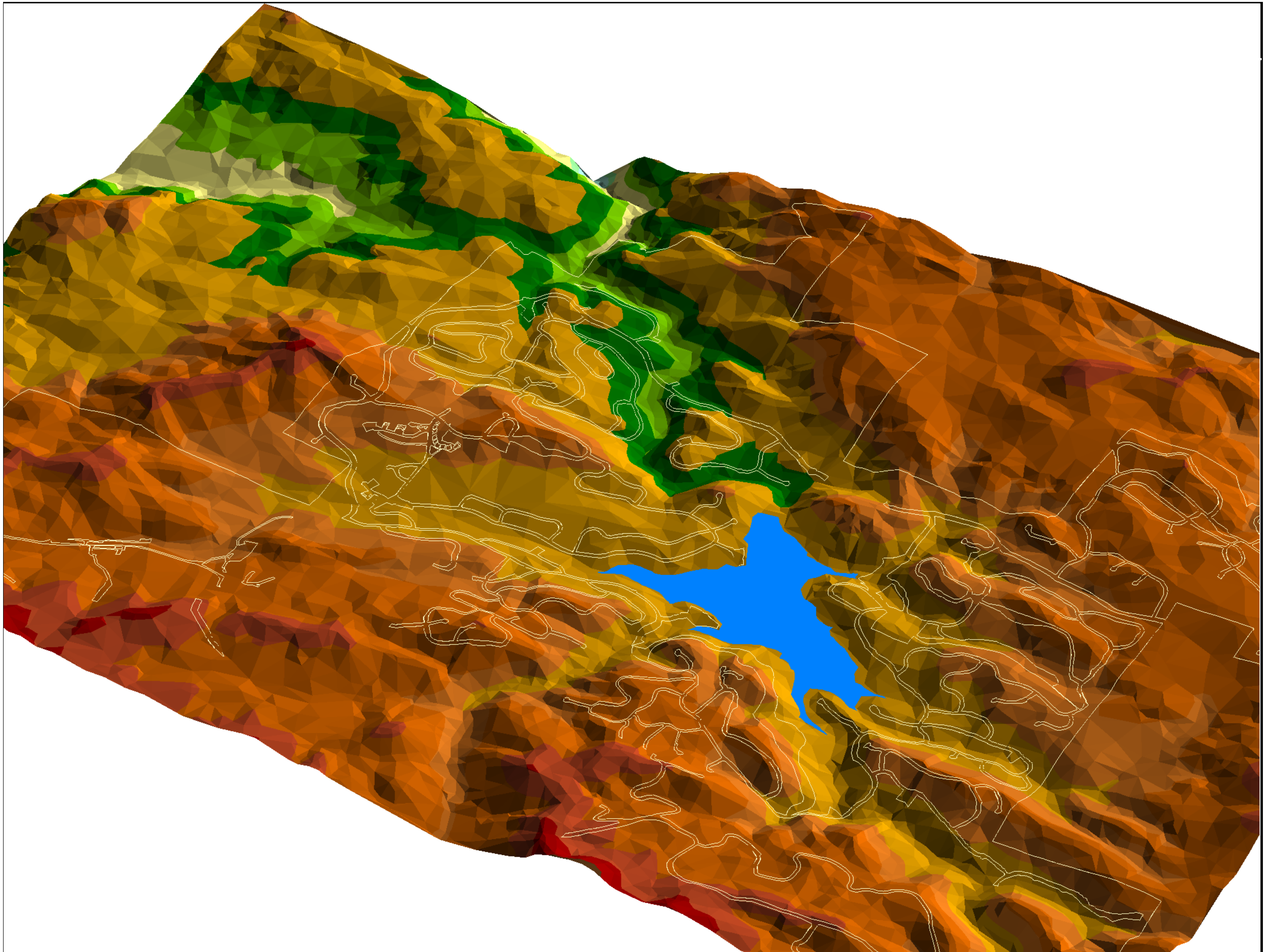
Groveland Community Services District

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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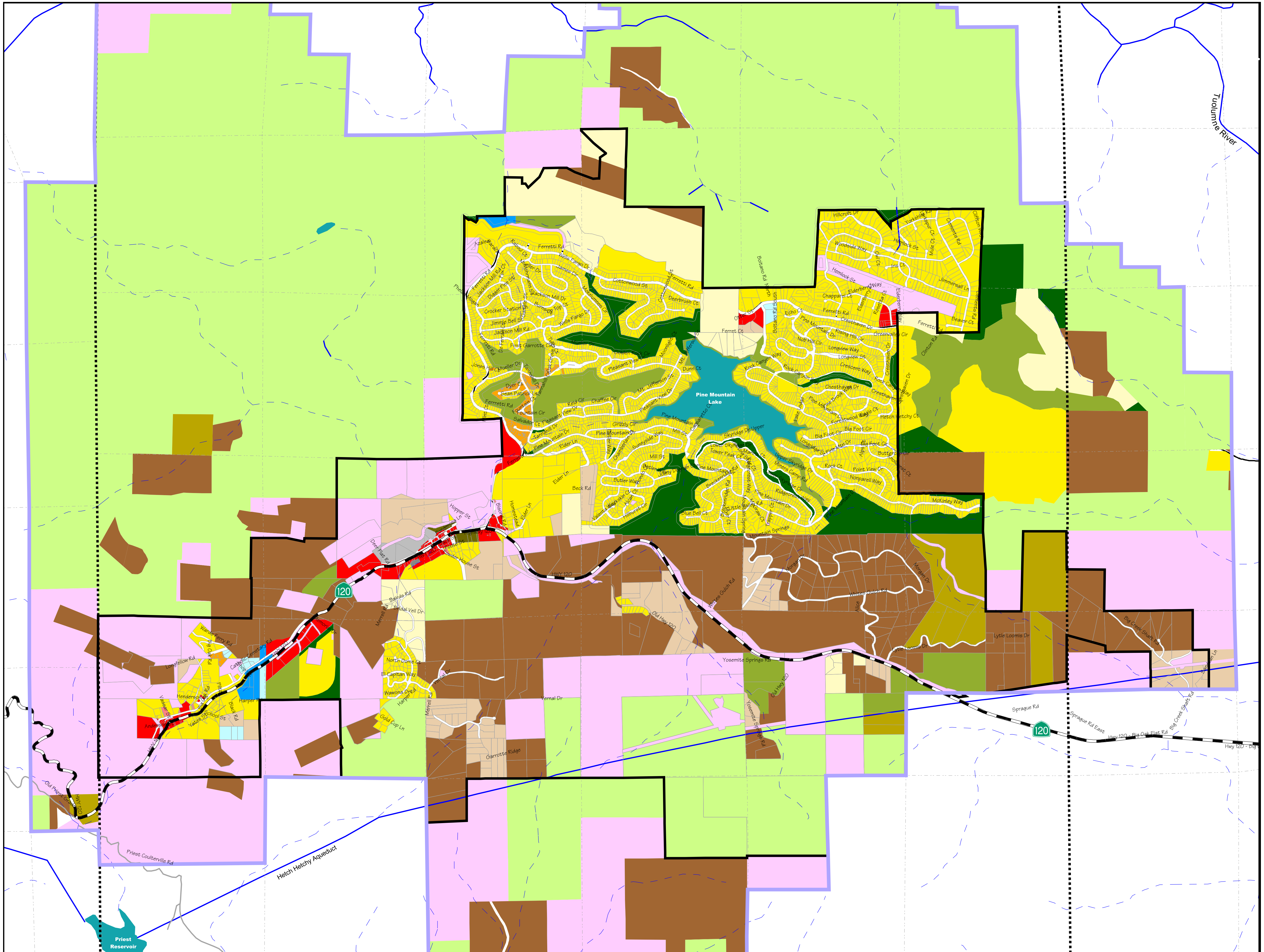
Groveland Community Services District

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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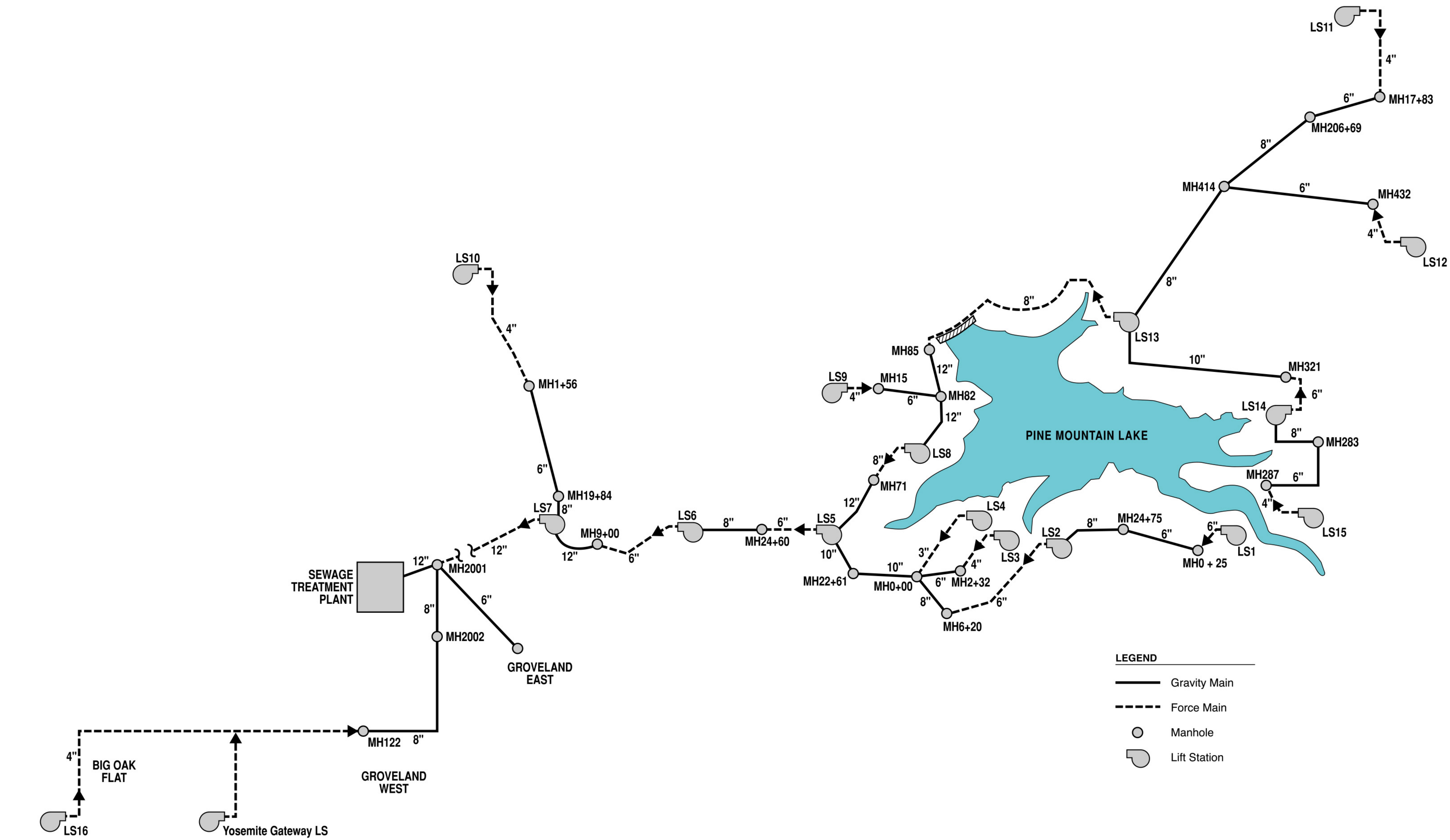

GROVELAND COMMUNITY SERVICES DISTRICT

Existing GCSD Collection System Schematic

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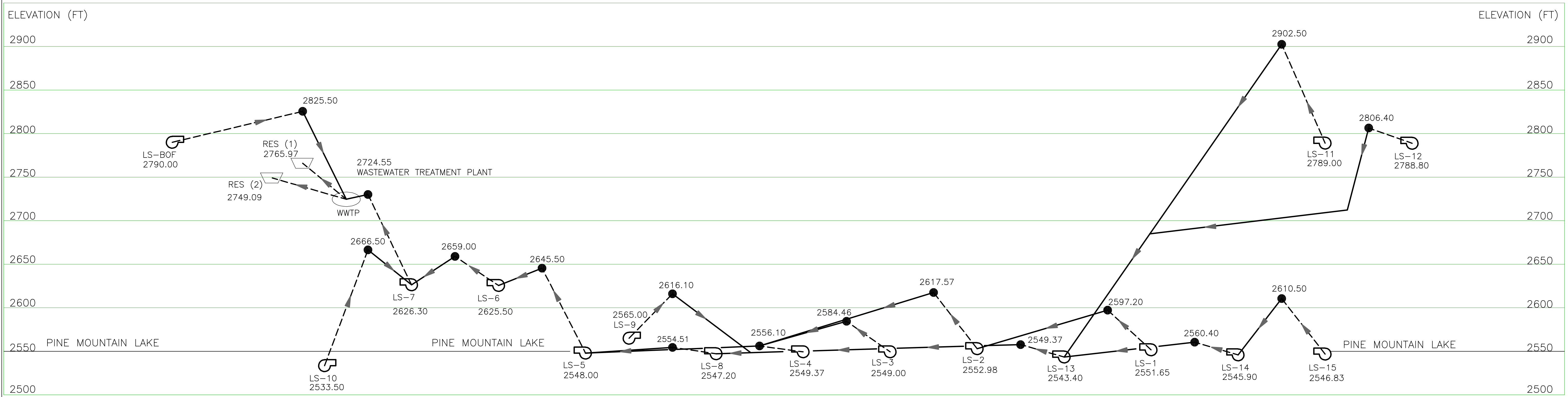
Exhibit 5



LEGEND

LIFT STATION-----------------

SEWER MANHOLE--------------

WASTEWATER TREATMENT PLANT---- WWTP

GRAVITY SEWERLINE-------------

FORCE MAIN-----------------

WASTEWATER EFFLUENT STORAGE---

NOTE:

ALL ELEVATIONS ARE GIVEN IN FEET
RESERVOIR (1) USEABLE CAPACITY = 13 AC-FT
RESERVOIR (2) USEABLE CAPACITY = 101 AC-FT

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GROVELAND COMMUNITY SEWER DISTRICT

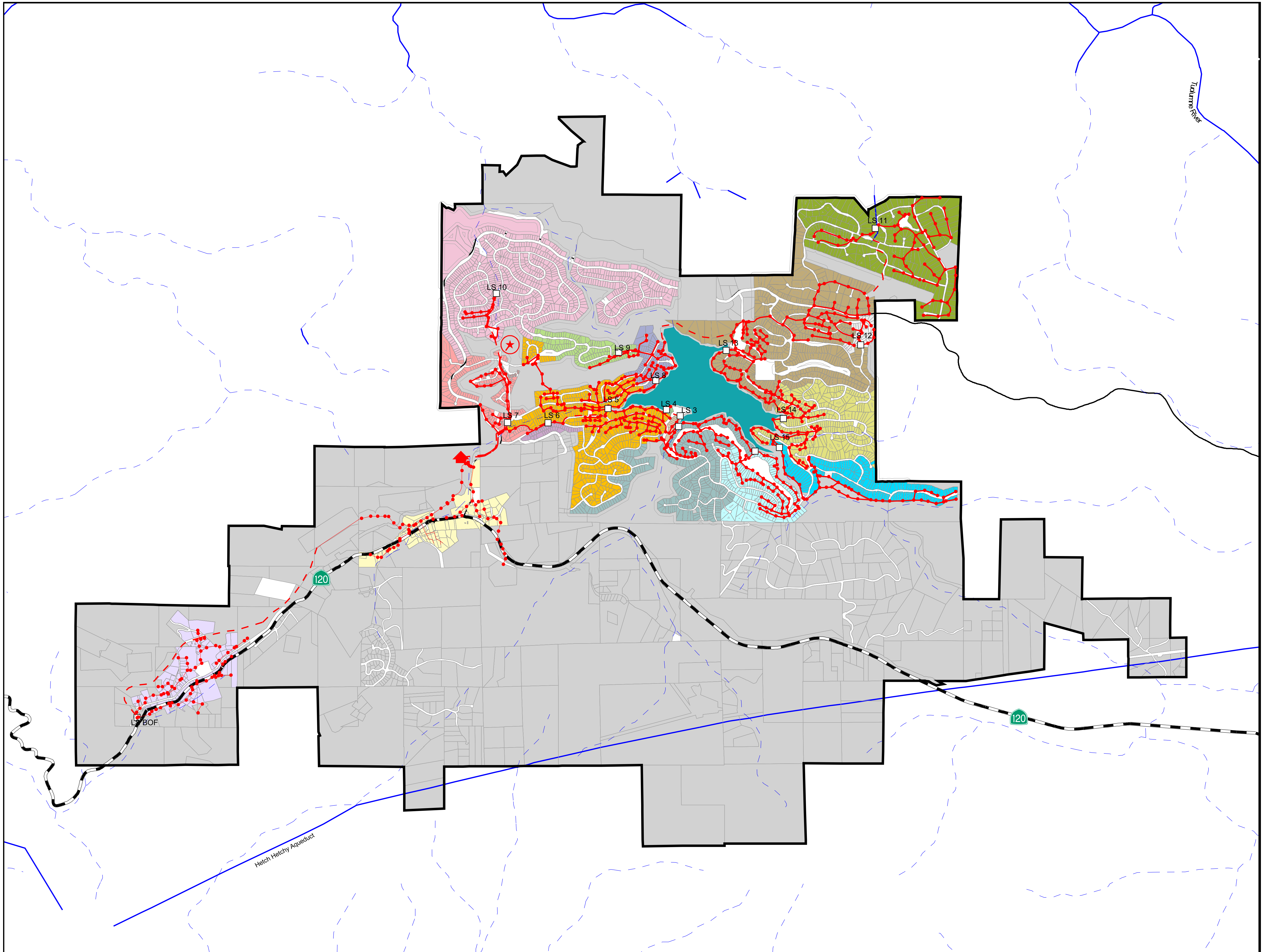
LIFT STATION HYDRAULIC SCHEMATIC

EXHIBIT 6

Groveland Community Services District

Exhibit 7

Sewer System Map



Legend

- Stream
- River
- Minor Collector Roads
- Major Collector Roads
- Highway
- Township Range
- Sections
- Lakes
- Force Main
- Gravity Main
- Lift Station
- Manhole
- Reservoir
- Treatment Plant

Lift Stations

- Lift Station 1
- Lift Station 2
- Lift Station 3
- Lift Station 4
- Lift Station 5
- Lift Station 6
- Lift Station 7
- Lift Station 8
- Lift Station 9
- Lift Station 10
- Lift Station 11
- Lift Station 12
- Lift Station 13
- Lift Station 14
- Lift Station 15
- Big Oak Flats Lift Station
- Groveland - No lift
- Unsewered

District Boundary

N

3000 0 3000 Feet

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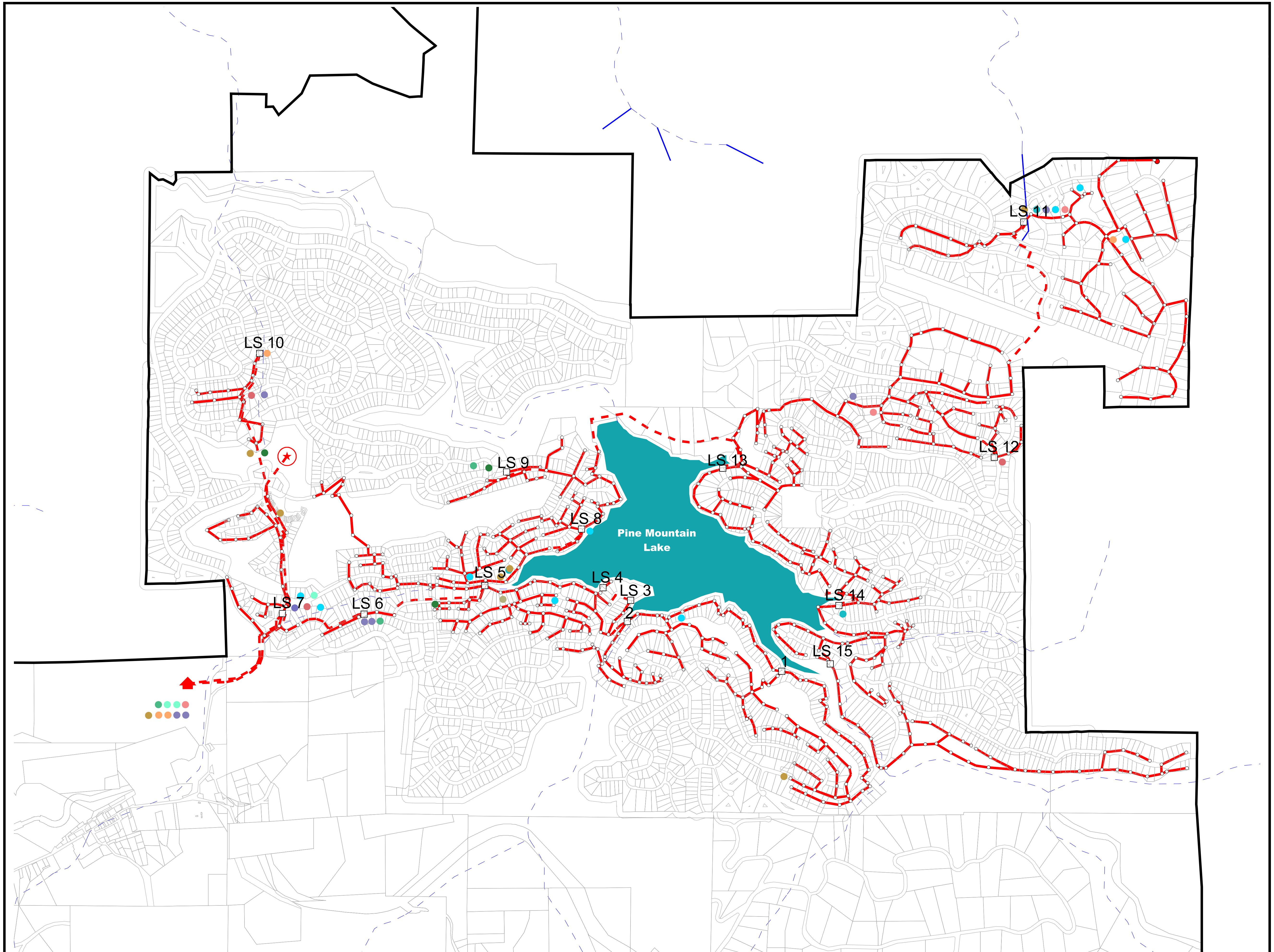
Groveland Community Services District

Exhibit 8

GCSD Collection System Spill History 1990 - January 2001



Legend

Sewer Points
- Lift Station
- Manhole
- Recycled Water
- Treatment Plant

Sewer Mains
- Gravity Mains
- Force Stream
- River
- Stream
- Lakes
- Parcels
- District Boundary

Spill Event

1990	1996
1991	1997
1992	1998
1993	1999
1994	2000
1995	2001

N

1500 0 1500 Feet

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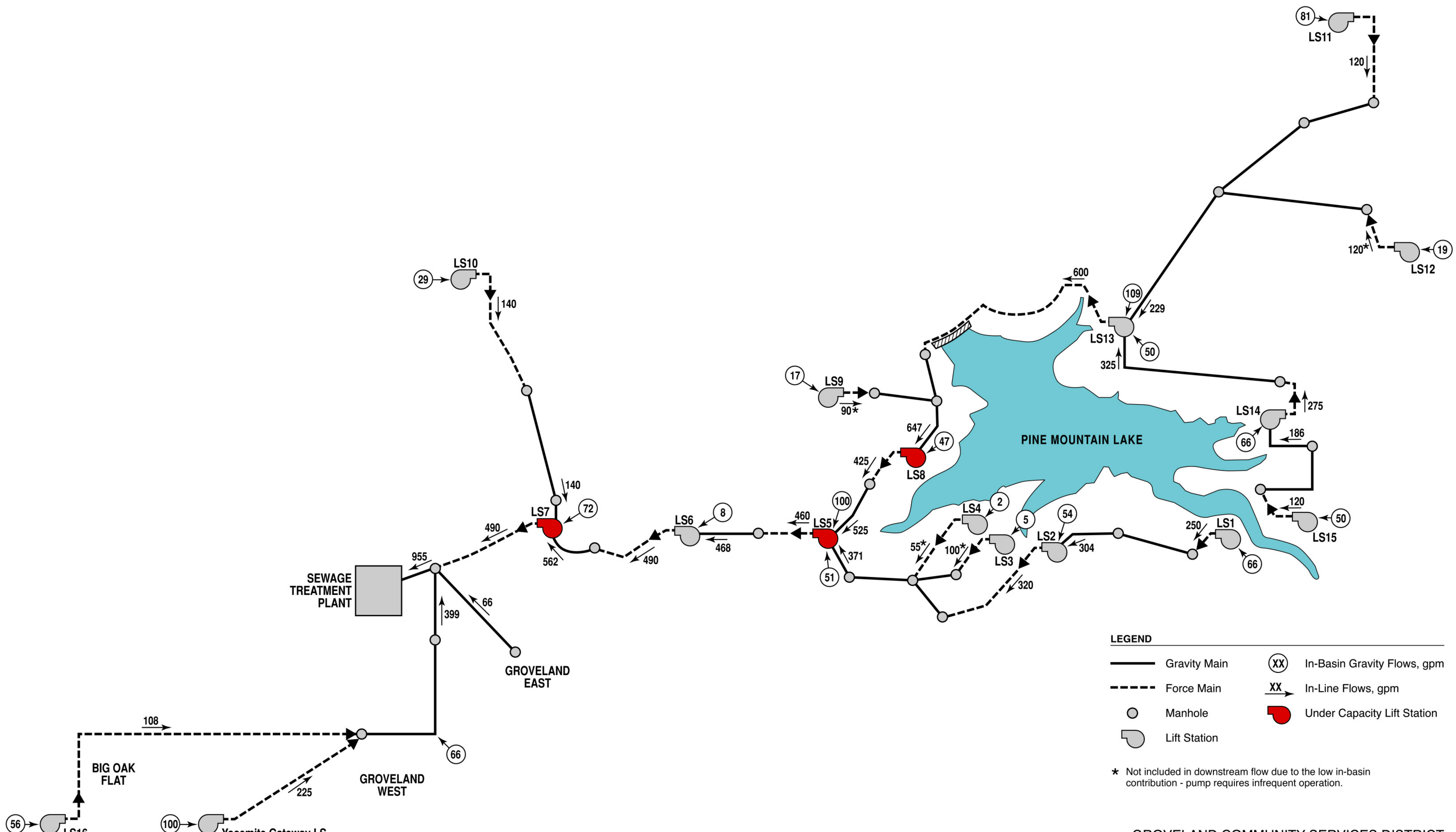

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Note: Does not include spring 2001 improvements to L.S. 7.

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GROVELAND COMMUNITY SERVICES DISTRICT

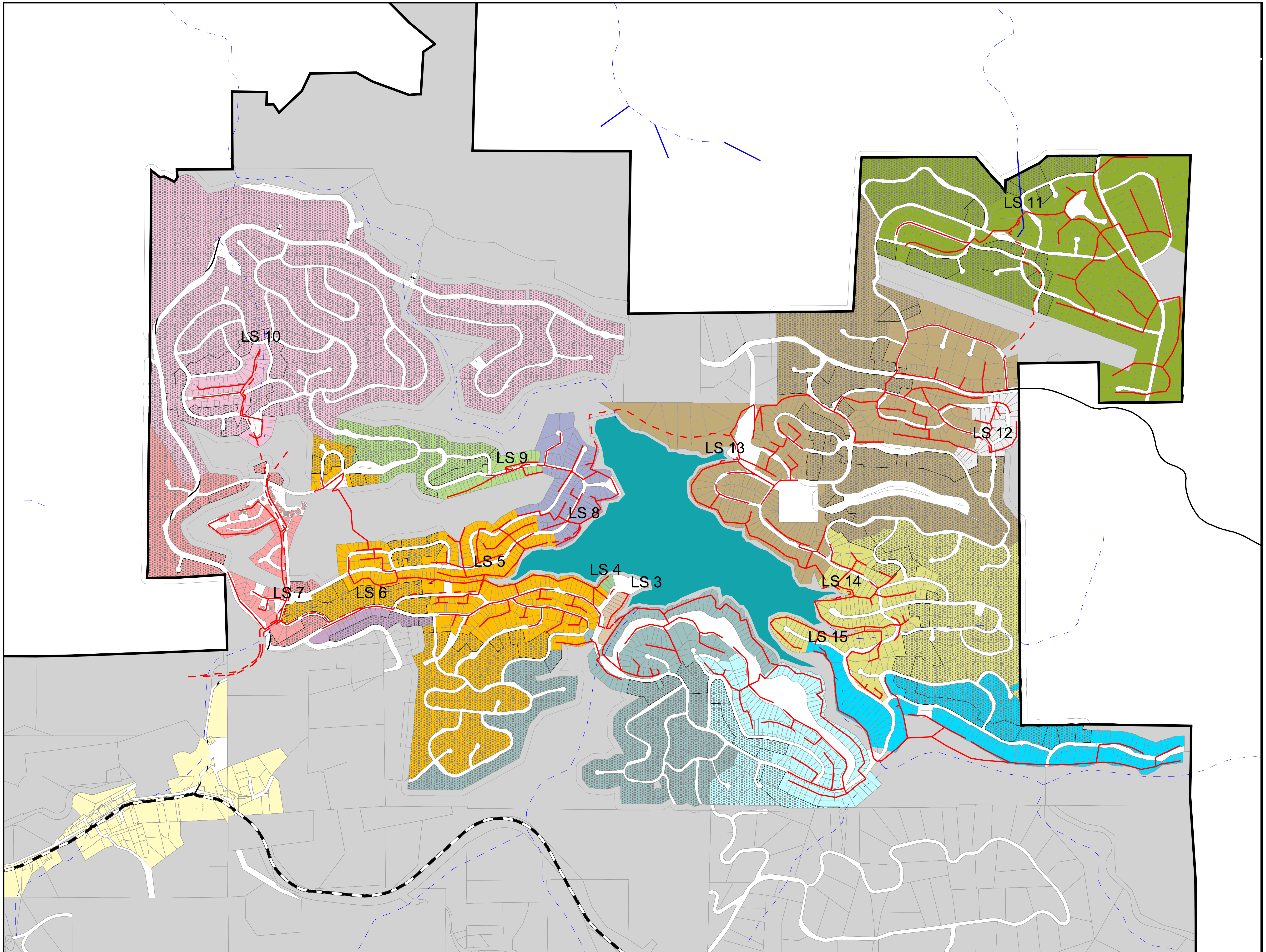
Existing GCSD Collection System Flows at Buildout

Exhibit 9

Groveland Community Services District

Exhibit 10

Septic Parcels and Conversion Candidates



Legend

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

- Lakes

Septic
- Currently Septic
- Septic Conversion Areas

Lift Stations
- Lift Station 1
- Lift Station 2
- Lift Station 3
- Lift Station 4
- Lift Station 5
- Lift Station 6
- Lift Station 7
- Lift Station 8
- Lift Station 9
- Lift Station 10
- Lift Station 11
- Lift Station 12
- Lift Station 13
- Lift Station 14
- Lift Station 15
- Big Oak Flats Lift Station
- Groveland - No lift
- Unsewered

- District Boundary

N

750 0 750 1500 2250 Feet

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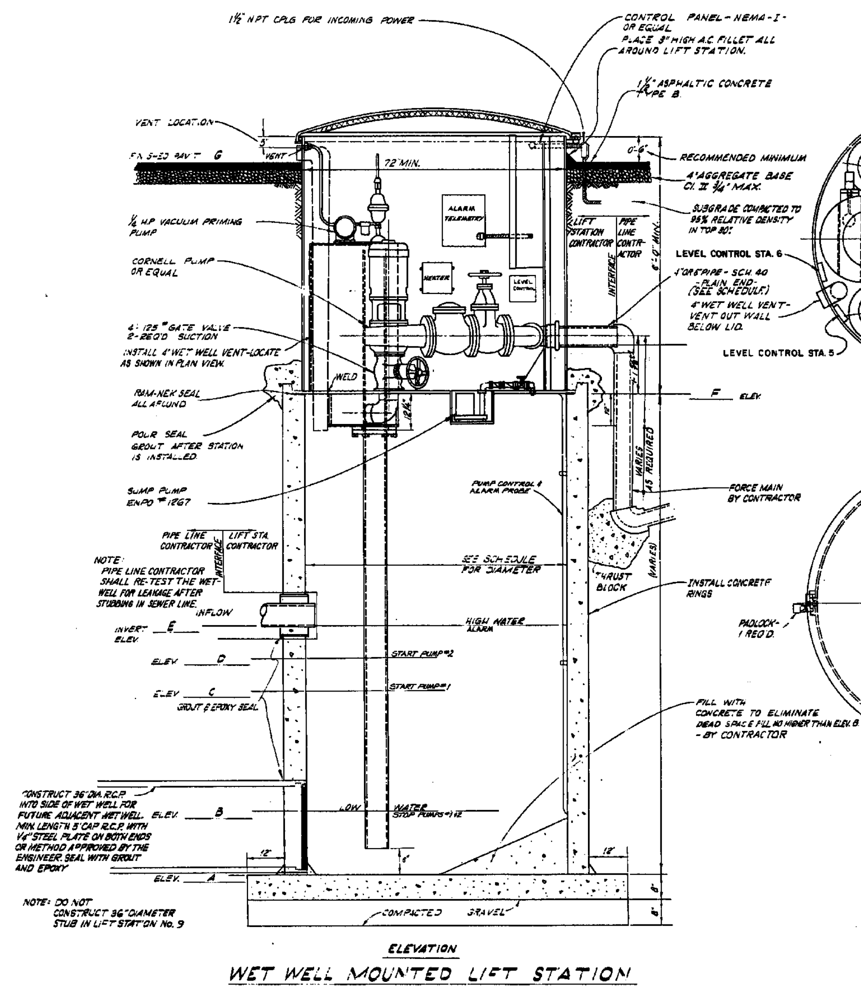

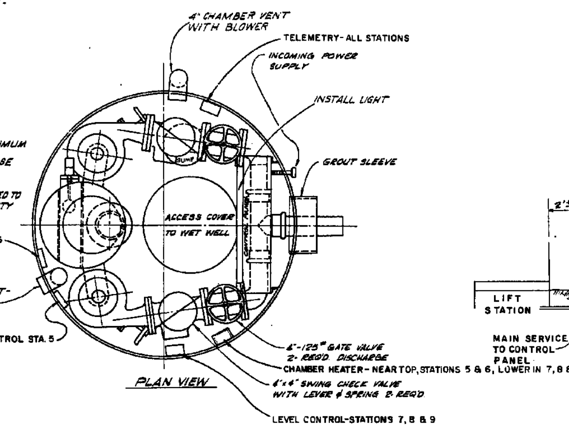

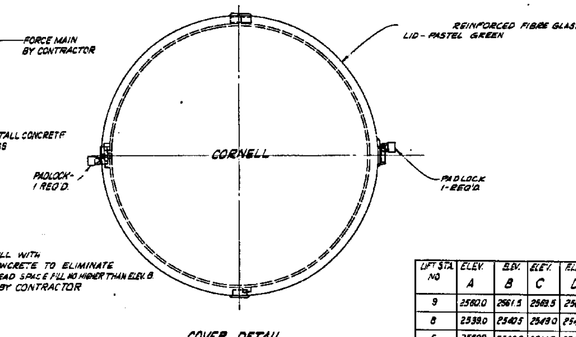

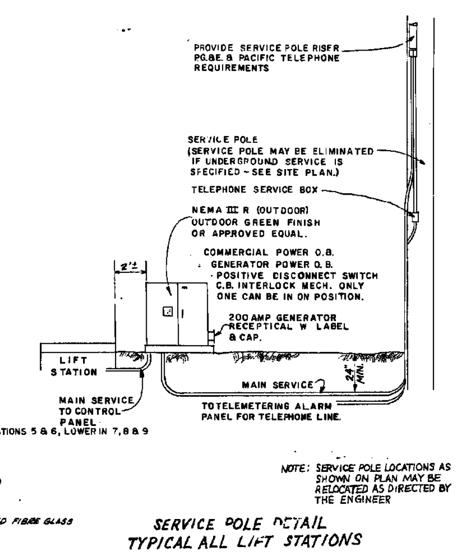

NOTE: SERVICE POLE LOCATIONS AS SHOWN ON PLAN MAY BE RELOCATED AS DIRECTED BY THE ENGINEER

SERVICE POLE DETAIL
TYPICAL ALL LIFT STATIONS

LIFT STA. NO	ELEV. A	ELEV. B	ELEV. C	ELEV. D	ELEV. E	ELEV. F	ELEV. G	DIA. OF WETWELL	FORCE MAIN DIA.	INLET ELEVATIONS
9	2560.0	2561.5	2563.5	2564.0	2565.0	2567.0	2572.5	72"	4"	MH-2564.98
8	2539.0	2540.5	2543.0	2543.5	2547.2	2554.5	2558.2	72"	3"	[illegible]
5	2540.9	2542.9	2544.7	2545.2	2548.3	2553.85	2556.6	108"	6"	[illegible]
6	2618.1	2620.1	2622.1	2622.6	2625.5	2629.25	2634.0	108"	6"	[illegible]
7	2616.2	2618.2	2620.7	2620.7	2626.5	2629.3	2634.0	108"	6"	12" 2626.50

AS BUILT
8-2-94

APPROVED: [signature]
DISTRICT ENGINEER - GROVELAND COMMUNITY SERVICES DISTRICT
DATE: 1/29/93

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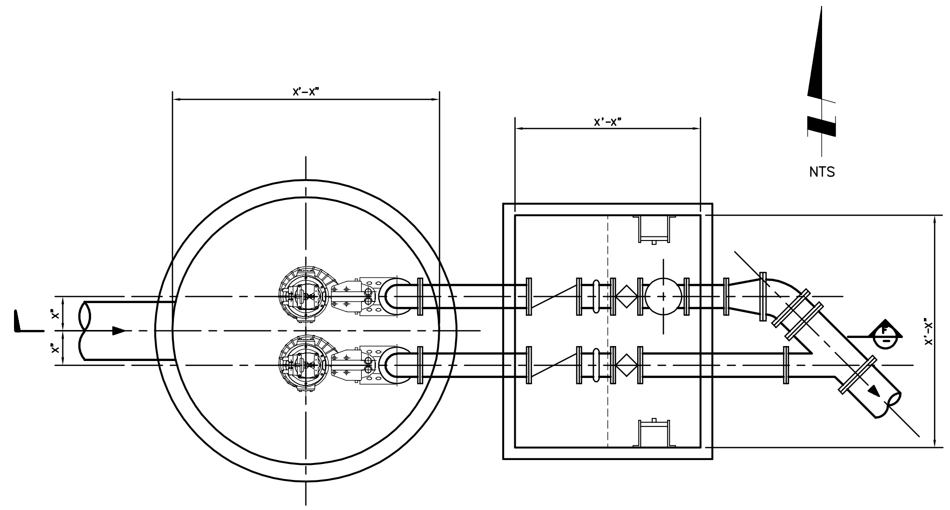
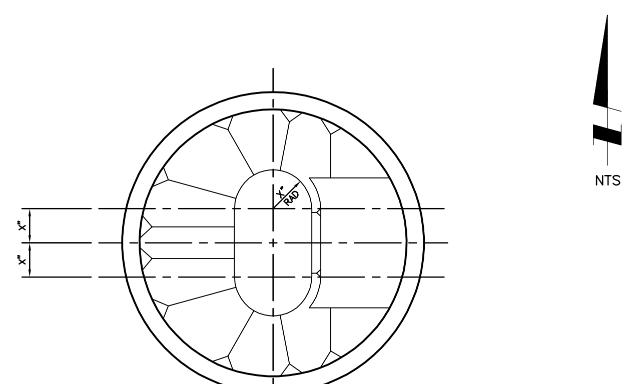
GROVELAND COMMUNITY SERVICES DISTRICT

TYPICAL EXISTING LIFT STATION

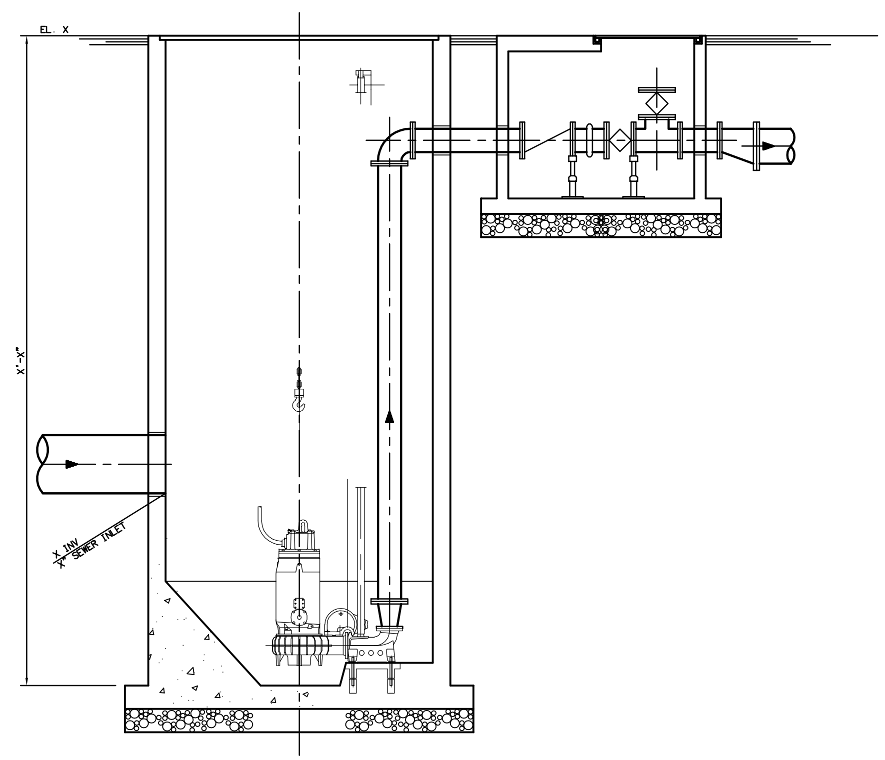
EXHIBIT 11



LIFT STATION PLAN



BASE PLAN



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TYPICAL SUBMERSIBLE LIFT STATION

EXHIBIT 12

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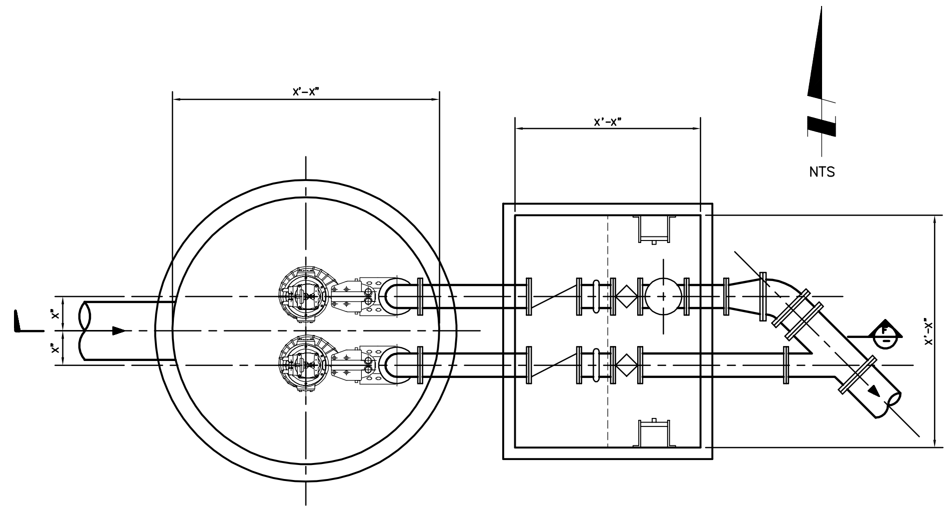
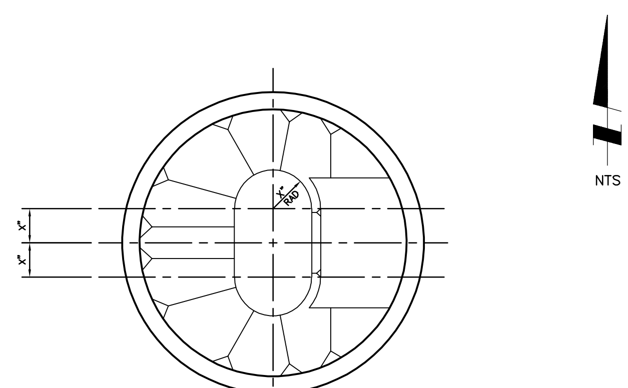
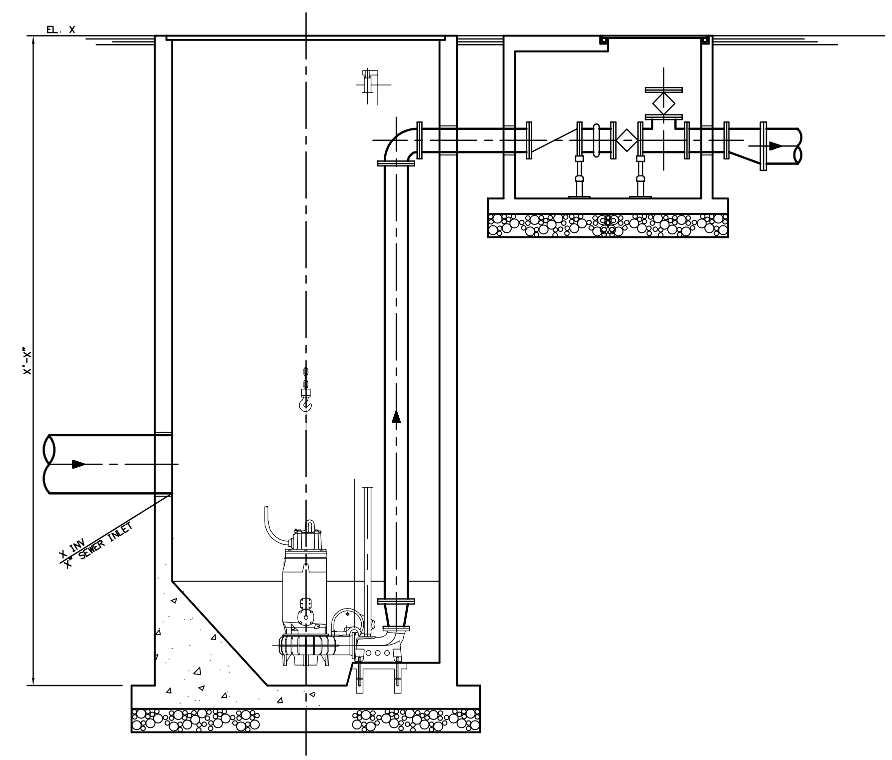


LIFT STATION PLAN



BASE PLAN



SECTION
NTS

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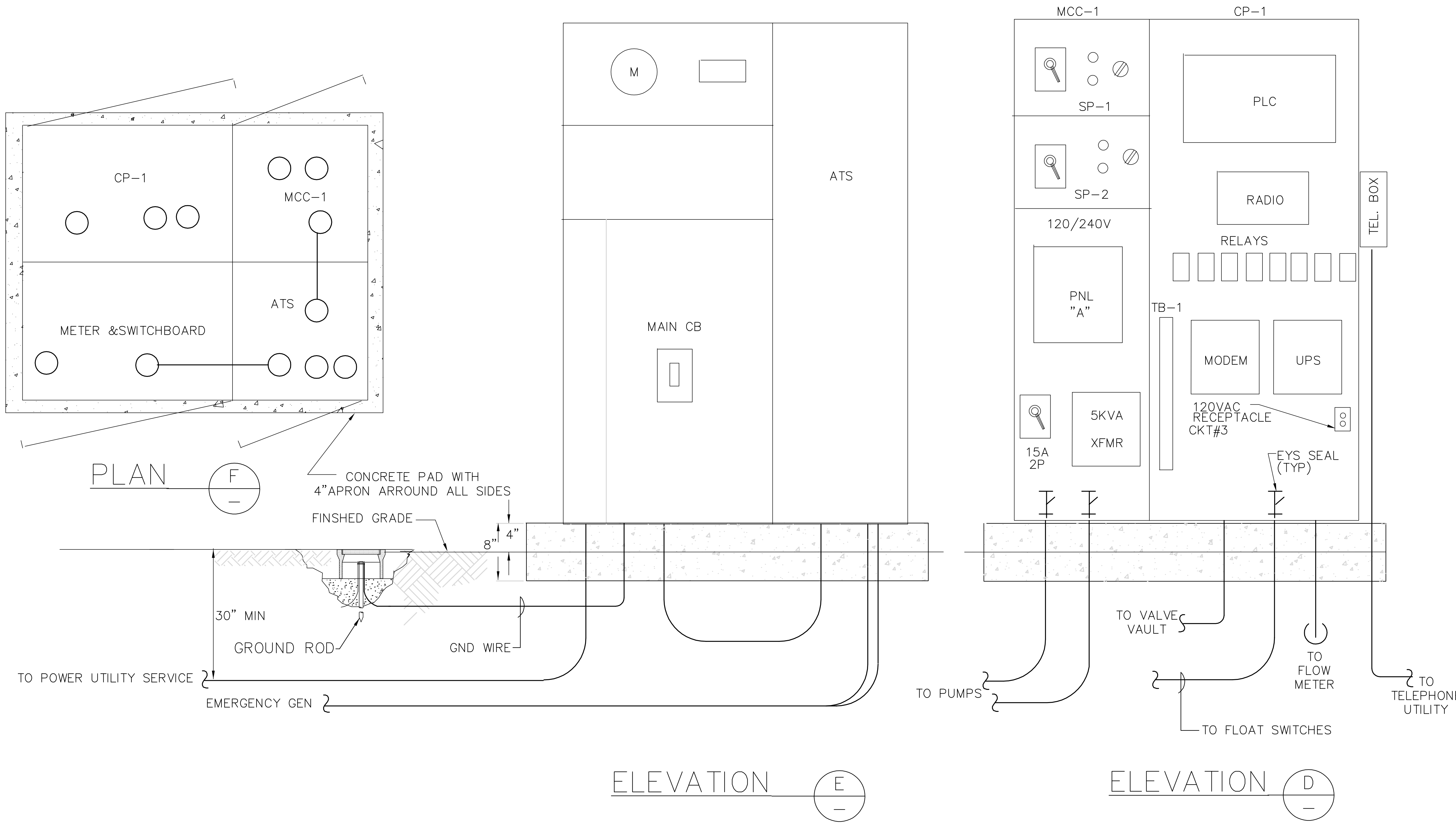
TYPICAL SUBMERSIBLE LIFT STATION

EXHIBIT 13



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TYPICAL LIFT STATION ELECTRICAL DETAILS

EXHIBIT

14

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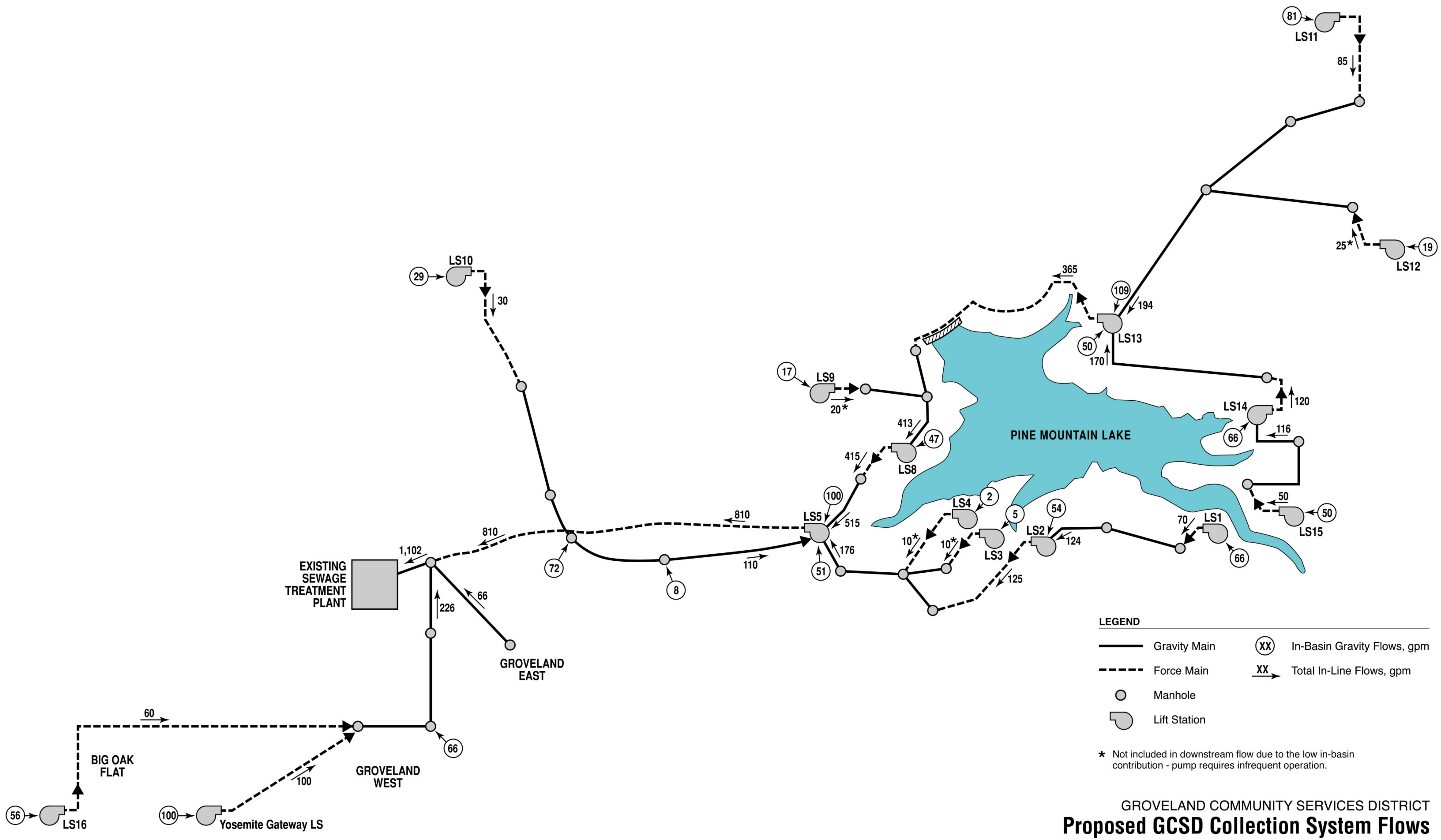

GROVELAND COMMUNITY SERVICES DISTRICT

Proposed GCSD Collection System Flows Alternative 1: Single Treatment Plant - Current Location

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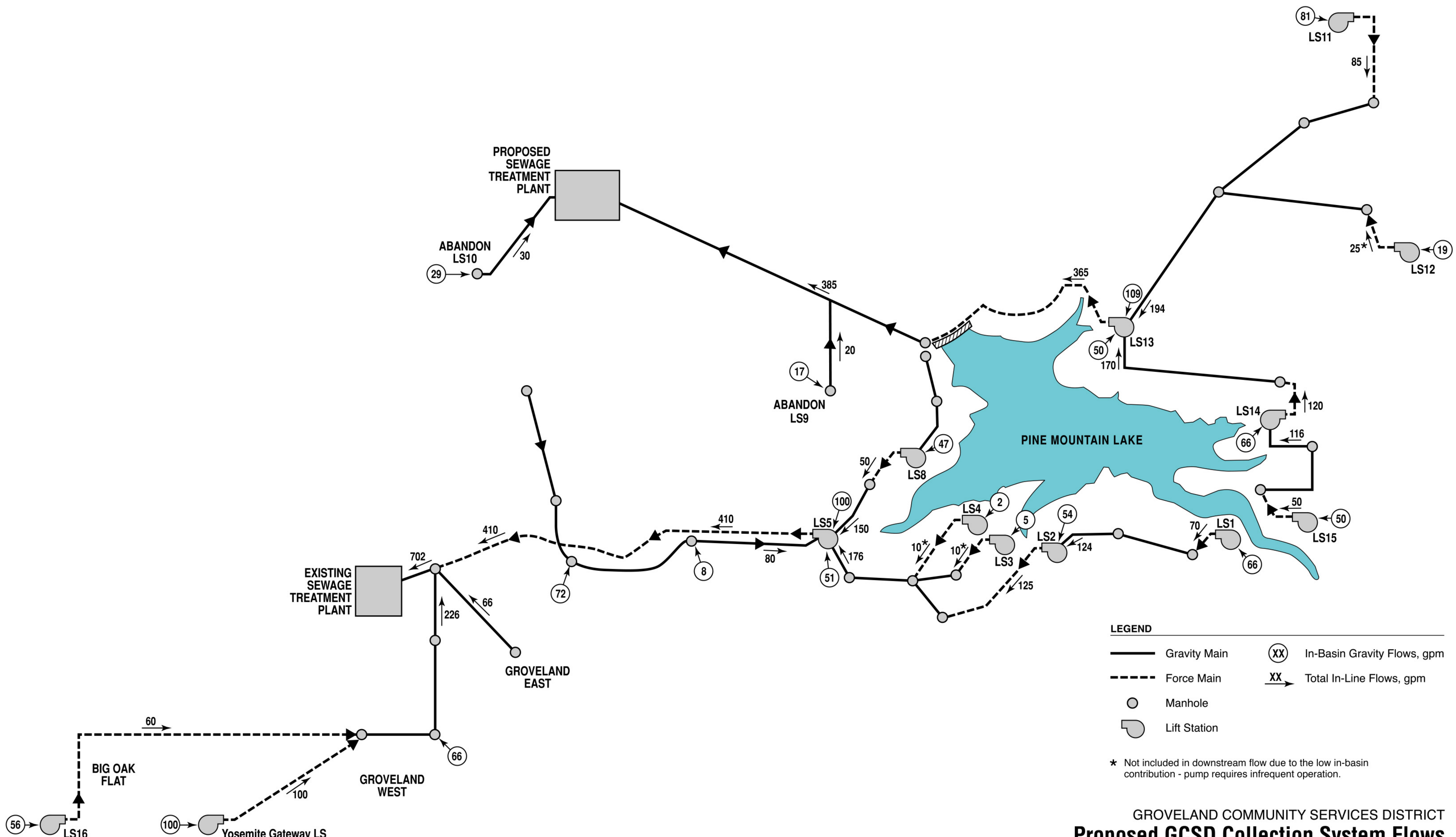
Exhibit 15



GROVELAND COMMUNITY SERVICES DISTRICT

Proposed GCSD Collection System Flows Alternative 2: Two Treatment Plants in Operation

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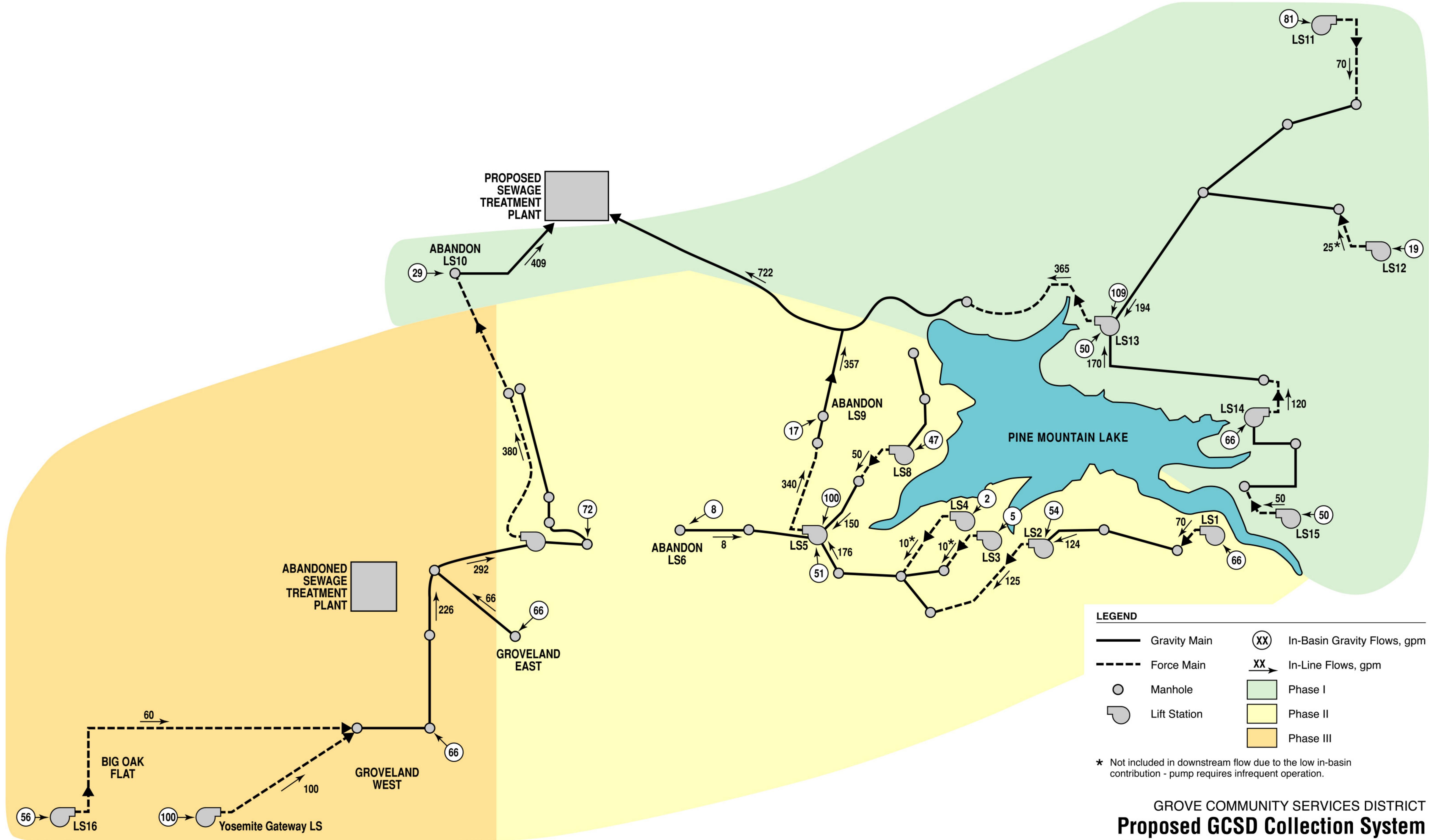
Exhibit 16



GROVE COMMUNITY SERVICES DISTRICT

Proposed GCSD Collection System Alternative 3: Proposed Treatment Plant in Full Operation

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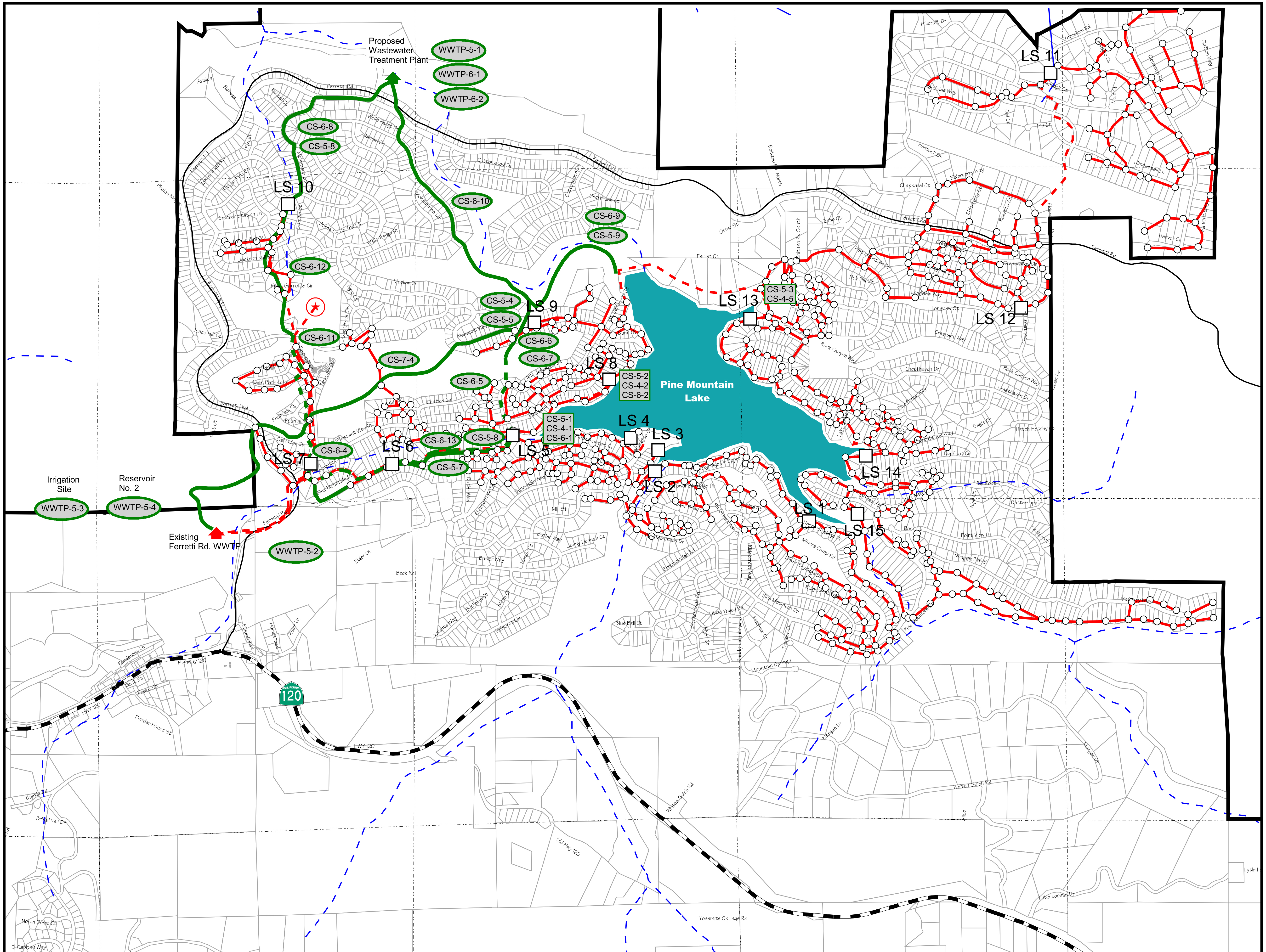
Exhibit 17

Groveland Community Services District

Exhibit 18

Alternative Projects
Map of Alternatives Two and Three



Legend

Proposed Sewer Mains
- Force Main
- Gravity

Proposed Projects
- WWTP-#-# Sewer Treatment Plant Improvements
- CS-#-# Pipeline Improvements
- CS-#-# Lift Station Improvements

Sewer Points
- Lift Station
- Manhole
- Reservoir
- Treatment Plant

Sewer Mains
- Force Main
- Gravity
- Interceptor

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

- Lakes

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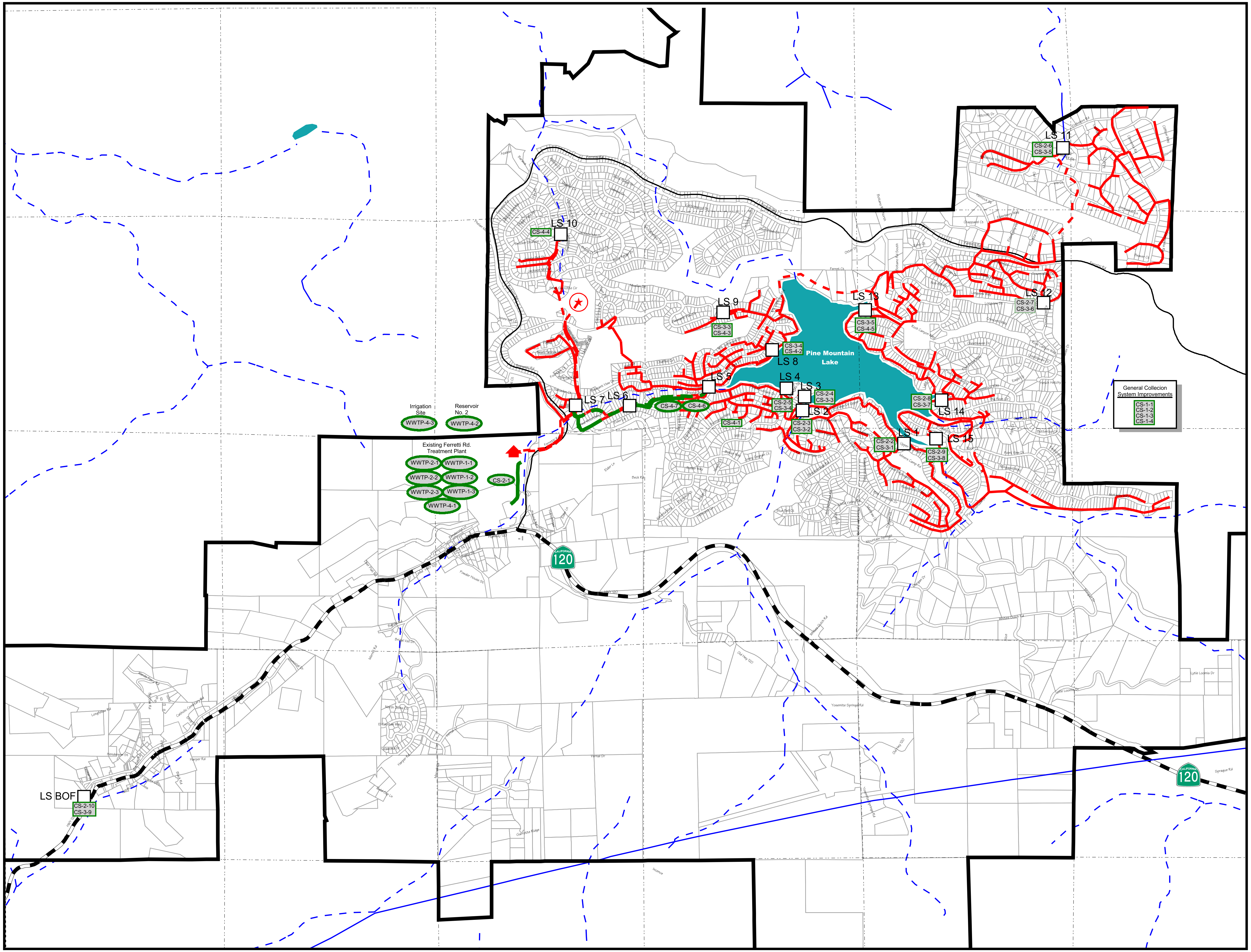

Groveland Community Services District

Exhibit 19

Capital Improvement Plan (CIP) (Includes Alternative 1)

Legend

Proposed Sewer Mains
- Force Main
- Gravity

Proposed Projects
- WWTP-#-# Sewer Treatment Plant Improvements
- CS-#-# Pipeline Improvements
- CS-#-# Lift Station Improvements

Sewer Points
- Lift Station
- Manhole
- Reservoir
- Treatment Plant

Sewer Mains
- Force Main
- Gravity
- Interceptor

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

- Lakes

N

2250 0 2250 Feet

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Groveland Community Services District

APPENDIX A
Historic BOD and SS Loading, Violations

Appendix A
Historic BOD and SS Loading, Violations

Month	Infl. Q MG	Rain	Avg. [BOD] mg/l	# BOD	Avg. [SS] mg/l	# SS	Violations
J 89	4.23	2.00	209	7497	167	5990	--
F	4.21	2.65	221	7890	154	5498	--
M	5.08	7.10	311	13397	358	15422	BOD
A	4.76	0.90	260	10495	193	7790	BOD
M	3.51	0.15	386	11489	573	17055	BOD
J	4.24	0.20	375	13483	545	19596	na
J	5.13	0.00	321	13964	414	18010	"
A	4.89	0.20	365	15136		0	"
S	4.22	2.70	423	15137	461	16497	"
O	4.31	4.10	338	12353		0	"
N	4.35	2.00	345	12726	618	22797	"
D	4.55	0.00	323	12463		0	"
	53.48	22.00	323	146484	348	157822	
J 90	5.26	4.50	307	13694		0	BOD
F	5.24	4.50	314	13953		0	BOD, C
M	5.65	2.75	351	16817	389	18638	C
A	4.80	1.50	372	15142	446	18154	C
M	4.97	2.90	413	17406	424	17870	C
J	4.22	0.00	478	17106		0	BOD
J	4.79	0.00	523	21244		0	BOD, C
A	3.45	0.00	270	7899		0	C
S	4.03	0.00	362	12371		0	BOD, C
O	3.68	0.10	455	14199	477	14885	BOD, C
N	4.38	1.55	241	8951	256	9508	BOD, C
D	3.94	1.55	265	8854	207	6916	BOD, C
	54.41	19.35	362	167026	367	169333	
J 91	3.80	0.40	310	9989	180	5800	BOD
F	3.43	2.35	374	10878	299	8697	BOD, C
M	6.50	17.60	181	9977	198	10914	BOD
A	6.78	0.80	192	11039	234	13454	C
M	4.45	0.55	423	15962	607	22906	BOD, C
J	4.79	0.25	370	15029	401	16288	BOD, C
J	4.40	0.00	440	16417	396	14776	BOD, C
A	4.71	0.00	321	12821	398	15896	C
S	4.42	0.00	292	10945	308	11544	BOD, C
O	4.75	4.30	367	14783	186	7492	BOD, C
N	5.09	1.00	323	13942	245	10575	--
D	5.38	3.50	379	17291	210	9581	C
	58.50	30.75	331	164202	305	151304	

Month	Infl. Q MG	Rain	Avg. [BOD] mg/l	# BOD	Avg. [SS] mg/l	# SS	Violations
J 92	5.92	2.05	338	16968	393	19729	--
F	5.67	8.10	295	14184	329	15819	--
M	5.28	3.70	314	14059	283	12671	C
A	4.37	0.25	337	12488	255	9450	--
M	4.79	0.00	405	16451	568	23072	BOD, C
J	4.70	0.55	386	15384	445	17736	--
J	5.89	1.15	375	18730	460	22976	--
A	5.28	0.00	321	14373	441	19746	C
S	4.42	0.00	317	11882	326	12219	C
O	5.17	2.20	216	9470	282	12363	C
N	4.55	0.15	245	9453	351	13543	C
D	4.58	10.25	233	9049	231	8972	BOD, C
	60.62	28.40	315	161928	364	187117	
J 93	7.08	14.50	139	8345	212	12728	BOD, C, StS
F	5.75	8.90	144	7021	205	9996	BOD, C, StS
M	5.88	5.65	148	7380	210	10471	--
A	6.05	2.30	229	11749	227	11646	C
M	5.80	1.55	271	13329	322	15837	--
J	5.26	1.10	287	12802	310	13827	--
J	5.92		373	18725	304	15261	BOD, C, StS
A	5.55		348	16378	285	13413	BOD, C, StS
S	5.57		280	13225	291	13745	BOD
O	4.06	0.45	286	9847	372	12808	--
N	3.96	2.00	332	11149	310	10410	C
D	4.32	2.90	193	7070	277	10148	--
	65.20	39.35	252	139330	277	153152	
J 94	4.39	3.00	227	8451	351	13067	--
F	4.79	7.70	200	8124	232	9424	StS
M	4.18	0.60	292	10350	282	9996	--
A	4.83	4.35	282	11550	275	11264	--
M	5.51	2.25	253	11821	230	10747	BOD, C, StS
J	4.80		291	11845	274	11153	--
J	5.46		341	15789	167	7732	--
A	5.36		330	14999	257	11681	StS
S	5.14	0.40	328	14297	398	17348	--
O	4.35	1.15	296	10919	275	10144	--
N	4.45	6.30	230	8679	237	8943	--
D	4.64	3.90	191	7515	237	9325	StS
	57.90	29.65	272	133550	268	131586	

Month	Infl. Q MG	Rain	Avg. [BOD] mg/l	# BOD	Avg. [SS] mg/l	#SS	Violations
Change to Secondary Influent Meter							
J 95	8.77	17.26	140	10412	155	11527	BOD, StS
F	9.07	1.00	82	6307	135	10383	--
M	5.56	15.05	111	5234	170	8015	Q
A	8.16	4.85	119	8234	170	11763	--
M	7.1	4.40	156	9392	259	15594	--
J	6.05	1.55	208	10671	365	18726	--
J	6.04	0.05	209	10705	341	17466	--
A	5.34	0.00	212	9600	277	12543	C
S	4.91	0.00	221	9202	320	13324	StS
O	4.3	0.00	235	8569	391	14257	--
N	4.31	0.05	219	8004	492	17982	--
D	4.46	7.25	193	7299	319	12065	--
	74.07	51.46	175	109920	283	177756	
J 96	6.02	8.00	185	9444	223	11384	na
F	7.62	9.20	129	8336	187	12083	"
M	7.84	5.45	103	6848	187	12432	"
A	6.51	3.65	165	9109	402	22192	"
M	5.94	2.85	200	10074	671	33799	"
J	5.22	0.55	217	9606	473	20938	"
J	7.12	0.05	222	13404	488	29464	"
A	5.82	0.00	299	14757	545	26898	"
S	7.25	0.00	218	13403	315	19366	"
O	4.78	1.95	332	13457	623	25253	"
N		6.82	303	0	316	0	"
D		16.31	190	0	214	0	"
	64.12	54.83	214	116360	390	212058	
						0	
J 97	7.96	17.17	96	6480	131	8843	Q, C, StS
F	4.82	0.80	210	8583	336	13734	C
M	4.23	0.05	323	11586	447	16034	--
A	4.49	0.46	326	12413	362	13783	--
M	4.87	0.19	265	10944	450	18584	--
J		0.25	270	0	462	0	C
J		0.05	352	0	791	0	BOD,C,StS
A		0.00	281	0	559	0	StS
S		0.12	288	0	747	0	C, StS
O		0.75	224	0	646	0	StS
N	3.84	4.35	265	8629	630	20515	--
D	4.61	3.40	249	9734	806	31509	StS
	34.82	27.59	262	77362	531	156790	--

Month	Infl. Q MG	Rain	Avg. [BOD] mg/l	# BOD	Avg. [SS] mg/l	# SS	Violations
J 98	5.8	13.30	232	11411	311	15296	--
F	4.28	16.35	131	4755	463	16804	Q
M	7.72	8.50	125	8183	363	23764	--
A	7.07	5.50	159	9533	416	24941	--
M	5.27	4.20	192	8580	247	11038	--
J	5.01	0.59	200	8497	189	8030	--
J	6.01	0.00	224	11416	261	13302	--
A	5.79	0.00	247	12128	313	15368	--
S	4.65	1.15	235	9267	286	11278	--
O	4.3	0.40	230	8387	198	7220	--
N	4.3	3.50	236	8606	166	6053	--
D	4.34	3.70	200	7361	207	7618	--
	64.54	57.19	201	110007	285	155980	
J 99		8.10	195	0	346	0	--
F		9.80	22	0	302	0	--
M	4.96	2.95	134	5636	207	8707	--
A		3.90	73	0	168	0	--
M	3.32	0.80	292	8221	291	8193	--
J	4.96	0.30	370	15562	523	21998	BOD, StS
J	5.53	0.00	253	11864	294	13787	BOD, C
A	5.32	0.00	258	11639	584	26346	C, StS
S	4.17	0.35	242	8558	646	22844	BOD, StS
O	3.94	0.51	211	7050	720	24056	C, StS
N	3.98	3.54	353	11914	550	18563	StS
D	3.87	0.32	328	10764	447	14669	BOD
	40.05	30.57	244	82868	423	143661	
J 00	5.2	12.89	421	18564	435	19182	BOD, StS
F	7.92	15.34	271	18201	344	23104	BOD, C
M	7.98	3.96	238	16106	541	36610	--
A	5.18	3.57	391	17175	541	23764	StS
M	5.16	2.59	420	18378	800	35005	--
J	4.96	0.96	279	11735	354	14890	--
J	6.04	0.00	420	21512	431	22075	StS
A	5.17	0.05	493	21614	857	37572	StS
S	4.08	0.60	396	13701	431	14912	--
O	3.92	4.24	356	11834	477	15856	--
N	3.73	0.93	197	6231		0	--
D	3.95	0.78	275	9211	445	14906	--
	63.29	45.91	346	185698	514	275863	

Legend to Violations: Q = flow, BOD = biochemical oxygen demand
C = coliform, StS = settable solids

APPENDIX B
District-Provided Wastewater Flow and Connection Data

GROVELAND COMMUNITY SERVICES DISTRICT
UTILITIES COUNT
March 9, 2001

WATER METERS	2879
SEWER CONNECTIONS	1384
→ ACTIVE BOND	2539
VACANT LOT BONDS	1381
SEWER STANDBY VAC LOTS	494 Of the 1381

GROVELAND COMMUNITY SERVICES DISTRICT

Wastewater Treatment Monitoring Analysis

Mth /	Rain	Influent Flow MG				Effluent Flow MG				Effluent BOD mg/L				
	inchs	Ave	Max	Min	Total	Ave	Max	Min	Total	Ave	R1 30	Max	R2 80	Min
2001					4.658				4.362					
Dec														
Nov														
Oct														
Sept														
Aug														
July														
June														
May														
April														
Mar.														
Feb.														
Jan	7.38	0.150	0.212	0.115	4.658	0.141	0.198	0.063	4.362	32	1	45		22
2000					63.29				67.52	Polymer used to reduce BOD				
Dec	0.78	0.127	0.178	0.099	3.949	0.123	0.266	0.095	3.704	23	1	34		12
Nov	0.93	0.124	0.170	0.089	3.732	0.119	0.164	0.085	3.557	22	1	41		13
Oct	4.24	0.126	0.157	0.105	3.917	0.127	0.193	0.097	3.947	19		28		13
Sept	0.60	0.136	0.200	0.097	4.082	0.185	0.350	0.101	5.551	20	1	40		11
Aug	0.05	0.167	0.201	0.133	5.169	0.219	0.354	0.145	6.783	20		26		15
July	-	0.195	0.249	0.169	6.039	0.205	0.264	0.163	6.356	30	3	66		22
June	0.96	0.165	0.264	0.062	4.963	0.164	0.248	0.123	4.913	23	2	32		14
May	2.59	0.166	0.224	0.070	5.158	0.156	0.214	0.063	4.834	21		28		11
April	3.57	0.173	0.270	0.122	5.181	0.249	0.318	0.127	7.481	18	1	40		8
Mar.	3.96	0.258	0.287	0.207	7.983	0.249	0.313	0.195	7.712	28	4	49		11
Feb	15.34	0.273	0.413	0.220	7.918	0.254	0.401	0.180	7.366	56	12	77		30
Jan	12.89	0.168	0.454	0.104	5.199	0.172	0.384	0.110	5.321	60	11	122	2	24
1999					40.05				59.05					
Dec	0.32	0.129	0.169	0.097	3.874	0.130	0.195	0.048	4.044	48	9	80	2	9
Nov	3.54	0.133	0.193	0.098	3.981	0.129	0.185	0.087	3.872	28	5	70		7
Oct	0.51	0.127	0.188	0.096	3.936	0.127	0.188	0.087	3.951	21	5	86	4	8
Sept	0.35	0.139	0.242	0.108	4.170	0.227	0.307	0.115	6.810	35	6	98	1	7
Aug	-	0.172	0.225	0.114	5.322	0.159	0.195	0.121	4.942	43	10	77		13
July	-	0.178	0.251	0.133	5.527	0.203	0.265	0.145	6.292	53	10	103	1	23
June	0.30	0.165	0.262	0.132	4.959	0.198	0.262	0.125	5.931	50	11	126	1	18
May	0.80	0.166	0.281	0.135	3.317	0.180	0.279	0.106	4.496	16		30		4
April	3.90	na	na	na	na	na	na	na	na	8		12		4
Mar.	2.95	0.160	0.184	0.126	4.960	0.215	0.268	0.166	6.670	19	1	34		5
Feb.	9.80	na	na	na	na	0.228	0.444	0.158	6.379	27	3	48		12
Jan	8.10	na	na	na	na	0.183	0.391	0.094	5.662	17	2	45		3

Mth /	Effluent Coliform MPN					Eff. Settleable Slds mL/L/hr					Res. # 1 Level ft.				R#1 days		Res. # 2 Level ft.			
	Med	R1 23	Max	R2 240	Min	Ave	R1 0.5	Max	R2 1.0	Min	Ave	Max	R1 24	Min	To	From	Ave	Max	R1 28.5	Min
2001																				
Dec																				
Nov																				
Oct																				
Sept																				
Aug																				
July																				
June																				
May																				
April																				
Mar.																				
Feb.																				
Jan	5		13		<2	0.1		0.2		0.1	6.6	11.8		0.1	1	13	12.2	13.9		10.8
2000																				
Dec	5		13		<2	0.1		0.2		0.1	0.7	7.4		0	1	2	11.1	11.4		10.8
Nov	2		8		<2	0.1		0.1		0.1	9.1	10.3		0.0		27	11.2	11.7		10.8
Oct	2		5		<2	0.1		0.2		0.1	1.6	6.0		0.0		5	11.3	12.7		10.8
Sept	<2		5		<2	0.4	1	0.8		0.0	6.3	11.5		1.0	5	11	15.4	17.4		13.0
Aug	2		4		<2	1.2	2	8.5	1	0.3	13.8	15.9		12.7	6	22	18.6	19.3		17.1
July	2		13		<2	1.7	2	7.8		0.2	15.2	17.7		9.2	18	16	20.8	22.5		19.6
June	2		7		<2	0.2		0.5		0.1	9.2	10.3		0.0	6	17	23.6	24.7		22.5
May	4	2	33		<2	0.3		0.5		0.1	-	-		-			24.5	25.0		24.0
April	5		23		<2	0.4	1	1.3	1	0.1	14.4	19.1		0.0	4	25	23.6	24.4		23.1
Mar.	5		23		<2	0.4	1	1.0		0.1	22.6	24.1	2	19.1	1	28	21.7	23.1		19.6
Feb	5	1	<1600		<2	0.4		0.5		0.2	19.1	23.5		15.9	13	17	17.1	19.6		15.2
Jan	2		13		<2	0.4	2	1.3	1	0.1	14.8	19.1		13.3	15	2	12.6	14.6		11.4
1999																				
Dec	2		11		<2	0.4	2	0.9		0.1	11.0	11.8		9.5	14		11.2	11.7		10.4
Nov	8		23		<2	0.3	1	1.0		0.1	8.2	9.2		6.0	16	10	9.8	10.4		9.5
Oct	2		11		<2	0.2		0.4		0.1	8.7	11.2		6.0	25	9	10.5	11.7		9.8
Sept	2		4		<2	0.8	4	2.3	2	0.1	15.0	18.2		6.5	7	20	11.9	12.7		11.4
Aug	2	1	540	1	<2	0.7	5	2.0	3	0.1	13.1	17.7		8.0	16	1	14.0	15.2		12.7
July	<2		9		<2	0.1		0.2		0.1	10.4	13.3		5.4	8	26	16.7	18.0		15.5
June	5		14		<2	0.4	3	1.5	1	0.1	15.7	16.8		13.9	13	16	19.4	20.6		18.0
May	<2		13		<2	0.1		0.2		0.1	13.6	14.4		9.5	3	8	21.2	21.5		20.9
April	2		7		<2	0.2		0.6		0.1	12.7	14.1		8.9	2		14.0	20.0		6.8
Mar.	2		8		<2	0.2	1	0.6		0.1	11.8	14.7		8.0	25	15	20.3	20.9		19.3
Feb.	2		17		<2	0.2		0.5		0.1	16.6	20.0		12.7	10		17.1	19.3		14.9
Jan	2		13		<2	0.3	1	0.6		0.1	16.5	18.0		14.1	na	na	12.8	14.2		12.0

GROVELAND COMMUNITY SERVICES DISTRICT

Wastewater Treatment Monitoring Analysis

Mth /	Rain	Influent Flow MG				Effluent Flow MG				Effluent BOD mg/L					Effluent Coliform MPN					Eff. Settleable Slds mL/L/hr					Res. # 1 Level ft.				R#1 days		Res. # 2 Level ft.			
	inchs	Ave	Max	Min	Total	Ave	Max	Min	Total	Ave	R1 30	Max	R2 80	Min	Med	R1 23	Max	R2 240	Min	Ave	R1 0.5	Max	R2 1.0	Min	Ave	Max	R1 24	Min	To	From	Ave	Max	R1 28.5	Min
1998					63.16				66.02																									
Dec	3.70	na	na	na	na	0.140	0.185	0.109	4.337	15	2	41		7	2		13		<2	0.2		0.5		0.1	14.4	14.7		13.9	3		11.3	12.0		10.1
Nov	3.50	0.143	0.204	0.114	4.289	0.139	0.196	0.110	4.159	14		28		5	2		8		<2	0.1		0.2		0.0	10.8	12.4		9.2	na	na	9.0	9.8		8.2
Oct	0.40	0.139	0.167	0.109	4.298	0.150	0.194	0.115	4.490	13		24		6	2		8		<2	0.1		0.5		0.0	10.0	12.7		8.0	na	na	8.5	8.9		8.2
Sept	1.15	0.155	0.229	0.112	4.645	0.164	0.272	0.077	4.911	19	3	39		6	2	1	79		<2	0.3		0.5		0.0	13.7	18.0		13.0	na	na	7.3	8.9		4.7
Aug	-	0.187	0.231	0.159	5.788	0.219	0.269	0.186	6.775	31	7	49		17	5		23		<2	0.5	2	2.0		0.2	18.0	20.3		15.6	29		Reservoir work			
July	-	0.194	0.294	0.145	6.005	0.217	0.331	0.140	6.712	31	6	49		16	5		17		<2	0.2		0.3		0.1	15.4	19.1		11.8	31					
June	0.59	0.167	0.201	0.138	5.006	0.181	0.233	0.134	5.436	20	1	31		14	5		23		<2	0.2		0.3		0.1	15.2	17.1		11.8	14	2	13.3	16.8		9.5
May	4.20	0.170	0.255	0.124	5.265	0.173	0.251	0.126	5.350	16		29		9	7		14		<2	0.2	1	0.6		0.1	14.4	16.2		11.2	14	10	19.8	20.9		17.7
[illegible]	5.50	0.235	0.303	0.152	7.065	0.189	0.273	0.132	5.679	17	1	31		4	2		23		<2	0.3		0.5		0.2	17.5	24.1	1	5.7	3	12	22.0	23.7		18.3
Mar.	8.50	0.249	0.438	0.211	7.716	0.192	0.430	0.109	5.953	21	1	35		10	4		13		<2	0.2	1	0.9		0.0	16.1	23.2		5.4			18.7	19.9		17.4
Feb.	16.35	0.260	**0.592**	0.189	7.283	0.234	**0.509**	0.139	6.564	18		27		11	4	2	50		<2	0.1		0.3		0.1	21.9	22.9		20.0	12	3	15.1	18.7		9.5
Jan	13.30	0.187	0.281	0.071	5.804	0.184	0.276	0.050	5.650	22	3	52		7	2		7		<2	0.2	1	0.9		0.0	17.5	21.2		8.9	31		Reservoir work			
1997					34.8				9.017																									
Dec	3.40	0.149	0.191	0.117	4.612	0.151	0.188	0.091	4.693	24	5	46		9	2		13		<2	0.5	4	1.2	1	0.1	14.9	19.4		10.6	31		Reservoir work			
Nov	4.35	0.128	0.236	0.105	3.840	0.144	0.233	0.104	4.324	11		23		6	8		23		<2	0.4	2	1.0		0.1	13.3	15.0		11.8						
Oct	0.75	na	na	na	na	na	na	na	na	14		26		8	<2		14		<2	0.3	1	0.7		0.0	15.1	18.2		13.3	19	11	7.8	10.7		5.1
Sept	0.12	na	na	na	na	na	na	na	na	18	2	48		6	2		13		<2	1.0	7	6.5		0.2	19.5	20.6		18.0	16	11	12.7	15.8		9.5
Aug	-	na	na	na	na	na	na	na	na	22	3	48		6	2	2	130		<2	0.7	11	2.7	2	0.2	15.8	17.7		12.4	13	15	17.3	19.0		15.8
July	0.05	na	na	na	na	na	na	na	na	32	6	62		12	2	1	280	1	<2	0.8	5	2.5	2	0.4	14.6	16.8		12.4	7	17	21.4	22.8		19.3
June	0.25	na	na	na	na	na	na	na	na	24	1	42		14	23	4	280	1	23	0.6	3	1.0		0.2	9.8	13.6		0.0	16		23.8	24.0		23.4
May	0.19	0.168	0.336	0.114	4.867	na	na	na	na	16		26		9	13	4	70		2	0.4	2	0.8		0.0	7.9	9.5		0.0	8	12	24.4	25.0		24.0
April	0.46	0.150	0.181	0.120	4.487	na	na	na	na	16	1	33		8	5	2	140		<2	0.1		0.3		0.0	10.3	10.3		0.0	3		25.0	25.3		24.7
Mar.	0.25	0.136	0.165	0.111	4.225	na	na	na	na	15		25		9	8	3	49		<2	0.2		0.5		0.0	-	-		-			25.4	25.6		25.3
F[illegible]	0.80	0.172	0.272	0.131	4.817	na	na	na	na	17		26		6	8	3	920	1	8	0.4		0.9		0.2	11.3	14.7		0.0		16	26.9	29.1	7	25.3
Jan	17.17	0.257	0.638	0.133	7.955	na	na	na	na	17	1	64		7	13	3	>1600	1	2	0.4	2	1.2	1	0.2	16.8	20.0		13.3	5	20	25.8	28.5		23.7
1996					64.13				42.17																									
Dec	16.31	na	na	na	na	0.266	**0.582**	0.161	na	23	6	45		8	4	3	130		<2	0.6	4	1.8	1	0.1	16.9	18.5		0.0	11	7	17.8	21.2		14.9
Nov	6.82	na	na	na	na	na	na	na	na	13	1	34		4	8		23		<2	0.3	1	0.7		0.1	-	-		-			13.1	14.6		12.3
Oct	1.95	0.154	0.184	0.099	4.782	na	na	na	na	11		24		3	<2		4		<2	0.4	1	0.9		0.2	-	-		-			11.8	14.2		10.4
Sept	[illegible]	0.242	0.397	0.115	7.254	na	na	na	na	25	3	63		5	<2		23		<2	0.4	1	0.9		0.2	12.7	15.9		0.0	4	20	15.1	16.4		13.9
Aug	-	0.188	0.263	0.148	5.823	na	na	na	na	30	1	170		9	2	1	33		<2	1.2	6	4.3	3	0.4	8.7	11.2		0.0	6		15.9	17.7		15.2
July	0.05	0.230	0.289	0.154	7.124	0.174	0.223	0.094	5.397	21		70		11	<2	1	33		<2	0.8	3	2.0	3	0.3	12.5	15.0		0.0	8	13	20.6	23.4		17.7
June	0.55	0.174	0.218	0.150	5.219	0.166	0.254	0.123	4.974	17	1	44		9	<2		2		<2	0.5	1	1.6	1	0.2	11.3	13.0		0.0			25.0	27.5		22.3
May	2.85	0.192	0.278	0.113	5.942	0.176	0.258	0.108	5.463	11		13		6	4	1	49		<2	0.2	1	1.0		0.1	10.3	11.5		8.0	3	15	27.2	27.5		26.6
April	3.65	0.217	0.284	0.140	6.512	0.208	0.296	0.133	6.245	14		18		10	7	1	130		<2	0.2		0.3		0.1	9.6	14.7		0.0	3	22	27.4	27.8		26.9
Mar.	5.45	0.253	0.395	0.169	7.836	0.237	0.362	0.153	7.360	9		17		2	8	3	33		<2	0.4	2	0.9		0.1	16.1	17.4		13.6	4	13	24.3	25.9		22.1
Feb.	9.20	0.263	0.379	0.120	7.617	0.246	0.371	0.123	7.125	14		26		1	8	2	33		2	0.4	2	0.7		0.1	14.0	14.7		0.0	5	3	20.2	22.1		18.3
Jan	8.00	0.194	0.349	0.105	6.021	0.194	0.349	0.105	5.603	13	1	35		6	2		13		<2	0.3	1	1.0		0.1	14.0	17.4		0.0	8	3	15.6	17.7		14.2

GROVELAND COMMUNITY SERVICES DISTRICT

Wastewater Treatment Monitoring Analysis

Mth /	Rain	Influent Flow MG				Effluent Flow MG				Effluent BOD mg/L					Effluent Coliform MPN					Eff. Settleable Slds mL/L/hr					Res. # 1 Level ft.				R#1 days		Res. # 2 Level ft.			
	inchs	Ave	Max	Min	Total	Ave	Max	Min	Total	Ave	R1 30	Max	R2 80	Min	Med	R1 23	Max	R2 240	Min	Ave	R1 0.5	Max	R2 1.0	Min	Ave	Max	R1 24	Min	To	From	Ave	Max	R1 28.5	Min
1995					53.04				75.27																									
Dec	7.25	0.144	0.222	0.107	4.459	0.135	0.210	0.101	4.198	12		21		2	<2		13		<2	0.3		0.5		0.1	-	-		-			11.9	13.7		9.8
Nov	0.05	0.144	0.207	0.097	4.479	0.149	0.300	0.089	4.306	16		29		1	<2		49		<2	0.2	1	0.6		0.1	11.0	12.4		0.0	7	3	10.8	11.7		9.5
Oct	-	0.139	0.157	0.116	4.042	0.137	0.167	0.114	4.233	19	1	47		10	<2		79		<2	0.3		0.5		0.1	-	-		-			12.2	13.6		11.7
Sept	-	na	na	na	na	0.158	0.228	0.122	4.902	18	1	37		9	<2		6		<2	0.6	2	1.5	1	0.2	9.3	10.3		0.0		7	16.4	19.0		13.9
Aug	-	na	na	na	na	0.172	0.207	0.126	5.335	22	1	49		12	2	3	540	1	<2	0.4	3	0.8		0.2	10.8	10.9		0.0	5	1	21.5	23.1		19.3
July	0.05	0.195	0.277	0.113	6.039	0.191	0.265	0.153	5.922	18		28		4	2		20		<2	0.5	3	1.0		0.1	-	-		-			24.9	25.9		23.7
June	1.55	0.202	0.274	0.126	6.048	0.200	0.263	0.128	6.010	19	1	38		7	2		8		<2	0.4	2	0.9		0.2	8.6	10.9		0.0	1	21	27.2	28.1		26.3
May	4.40	0.229	0.293	0.176	5.420	0.232	0.336	0.173	7.181	17		24		3	2	1	110		<2	0.1		0.4		0.1	10.4	11.5		9.2	5	11	27.1	28.1		25.3
[illegible]l	4.85	0.272	0.366	0.227	8.218	0.257	0.328	0.218	7.720	21		30		10	2		23		<2	0.1		0.2		0.1	18.6	23.2		10.3		26	24.9	27.5		22.5
Mar.	15.05	0.278	0.553	0.156	5.561	0.261	0.543	0.151	8.091	26	6	45		8	5	1	49		<2	0.2		0.4		0.1	20.5	23.5		0.0	17		28.6	29.1	19	27.5
Feb.	1.00	na	na	na	na	0.324	0.403	0.244	9.070	24		44		9	2		79		<2	0.3		0.4		0.1	17.6	22.0		9.5		28	26.1	27.5		25.0
Jan	17.26	0.283	0.441	0.097	8.769	0.268	0.406	0.091	8.299	53	5	220	2	7	2		17		<2	0.7	3	2.2	3	0.1	20.0	22.6		0.0	14	15	22.1	24.7		20.2
1994					57.91				58.41																									
Dec	3.83	0.150	0.216	0.101	4.644	0.143	0.192	0.063	4.693	22		43		10	2		23		<2	1.8		7.5		0.1	-	-		-			18.6	19.6		17.4
Nov	6.30	0.148	0.288	0.097	4.452	0.148	0.208	0.113	4.438	25	3	70		4	<2		13		2	0.3	1	0.7		0.1	-	-		-			16.1	17.4		14.9
Oct	1.15	0.140	0.203	0.107	4.348	0.142	0.197	0.108	4.388	13	1	32		3	2	1	34		2	0.3		0.4		0.3	12.1	13.6		0.0	4	10	14.6	15.2		13.9
Sept	0.40	0.171	0.246	0.132	5.143	0.170	0.230	0.127	5.104	19	2	53		5	<2		23		<2	1.1	3	4.8	2	0.1	15.3	17.1		10.6	13	16	13.7	14.9		13.0
Aug	-	0.173	0.233	0.128	5.361	0.175	0.215	0.128	5.425	17		29		7	<2		14		<2	3.8	2	28.0	2	0.3	8.8	13.3		0.0	10	4	17.2	19.0		15.2
July	-	0.176	0.291	0.103	5.461	0.177	0.273	0.127	5.489	20	3	41		4	<2		5		<2	0.2		0.5		0.1	-	-		-			20.5	22.5		19.0
June	-	0.160	0.191	0.135	4.802	0.165	0.199	0.128	4.935	20	4	47		4	<2		9		<2	0.1		0.2		0.1	-	-		-			23.9	24.7		22.5
May	2.25	0.178	0.188	0.134	5.505	0.173	0.185	0.139	5.377	28	3	125	1	8	2	1	70		<2	4.6	2	40.0	1	0.1	10.7	12.1		0.0	4	9	25.0	25.3		24.7
April	4.35	0.161	0.278	0.121	4.833	0.162	0.240	0.088	4.872	15		20		5	11	2	46		<2	0.1		0.2		0.1	-	-		-			24.0	24.7		23.4
Mar.	0.60	0.135	0.177	0.093	4.182	0.141	0.186	0.078	4.357	17		26		9	<2		11		<2	0.1		0.1		0.1	5.0	7.4		0.0		6	23.6	23.7		23.1
F[illegible]	7.70	0.171	0.296	0.093	4.787	0.190	0.268	0.127	4.858	21	1	49		4	2		13		<2	1.0	2	6.0	2	0.1	8.1	11.2		0.0	10	11	21.8	23.1		20.2
Jan	3.00	0.142	0.222	0.102	4.391	0.144	0.199	0.106	4.478	25	4	44		8	2		13		<2	0.1		0.4		0.1	7.1	8.0		0.0	2	6	19.9	20.6		19.3
1993					64.87				65.95																			-						
Dec	2.90	0.139	0.186	0.099	4.243	0.131	0.167	0.101	4.068	17		30		9	<2		11		<2	0.1		0.1		0.1	7.6	7.7		0.0	4	2	18.5	19.3		17.4
Nov	2.00	0.132	0.204	0.099	3.965	0.128	0.185	0.085	3.832	25	6	40	1	11	<2	1	110		<2	0.1		0.1		0.1	-	-		-			16.7	17.4		16.1
Oct	0.45	0.131	0.196	0.014	4.349	0.168	0.293	0.116	5.222	26	3	42		15	<2	1	46		<2	0.2		0.4		0.1	10.9	14.1		0.0		7	16.4	17.1		15.5
Sept	-	0.186	0.283	0.135	5.390	0.333	Drug Dump		6.666	40	3	260	1	12	<2		13		<2	0.3	1	1.0		0.1	19.8	23.2		14.5		20	16.0	16.8		15.5
Aug	-	0.179	0.236	0.144	5.402	0.157			4.393	79	10	200	5	5	<2	2	920	1	2	13.6	4	40.0	3	0.1	22.4	23.2		21.0	16		19.3	21.8		17.1
July	-	0.191	0.327	0.106	5.921	0.175			5.414	109	11	340	6	10	<2	3	240		2	23.0	8	40.0	8	0.3	15.9	22.4		0.0	28		24.3	26.9		21.8
June	1.10	0.175	0.337	0.139	5.273	0.187	0.238	0.112	5.608	22	4	43		5	<2		11		2	0.2		0.4		0.1	7.4	9.7		0.0	8	11	27.6	28.1		27.2
May	1.55	0.187	0.284	0.141	5.564	0.188	0.245	0.115	5.821	21	1	62		8	<2		8		2	0.2		0.2		0.1	8.2	13.3		0.0	3	17	28.2	28.8	1	27.5
April	2.30	0.202	0.259	0.135	6.047	0.208	0.258	0.145	6.252	19	1	44		7	8	2	1600	2	2	0.2	1	0.8		0.1	21.1	22.9		15.8	3	14	27.8	28.5		26.9
Mar.	5.65	0.190	0.334	0.135	5.880	0.193	0.333	0.131	5.997	19	3	40		3	3	1	30		2	0.1		0.2		0.1	24.1	25.0		22.9		17	25.1	26.6		24.0
Feb.	8.90	0.205	0.277	0.116	5.754	0.204	0.294	0.111	5.723	75	12	140	4	40	2	1	140		2	0.6	2	2.0	1	0.1	23.6	24.9		22.0	21		22.4	23.7		21.8
Jan	14.50	0.228	0.428	0.140	7.080	0.224	0.381	0.147	6.956	64	13	110	2	42	2	2	900	1	2	0.5	1	1.7	1	0.2	17.4	21.3		11.5	17	8	20.5	22.1		18.3

GROVELAND COMMUNITY SERVICES DISTRICT

Wastewater Treatment Monitoring Analysis

Mth /	Rain inchs	Influent Flow MG				Effluent Flow MG				Effluent BOD mg/L				
		Ave	Max	Min	Total	Ave	Max	Min	Total	Ave	R1 30	Max	R2 80	Min
1992					58.94				56.02					
Dec	10.25	0.148	0.279	0.094	4.693	0.161			4.995	62	9	170	3	6
Nov	0.15	0.152	0.211	0.098	4.582	0.159			4.460	19	1	44		9
Oct	2.20	0.167	0.259	0.116	5.213	0.167			4.016	19	2	54		7
Sept		0.147	0.274	0.104	4.452	0.152			4.545	29	5	94	1	6
Aug		0.170	0.234	0.131	5.480	0.165			5.107	27	5	46		16
July	1.15	0.190	0.278	0.100	5.952	0.184			5.711	30	7	48		13
June	0.55	0.157	0.242	0.123	4.787	0.147			4.415	29	5	44		14
May		0.155	0.249	0.114	4.928	0.151			4.673	33	6	62		11
[illegible]	0.25	0.145	0.200	0.120	4.463	0.143			4.291	27	7	43		9
Mar.	3.70	0.170	0.223	0.125	4.192	0.144			4.454	27	7	49		8
Feb.	8.10	0.195	0.338	0.128	4.116	0.164			4.764	22	3	37		3
Jan	2.05	0.191	0.259	0.156	6.081	0.148			4.591	28	3	70		8

Mth /	Effluent Coliform MPN					Eff. Settleable Slds mL/L/hr					Res. # 1 Level ft.				R#1 days		Res. # 2 Level ft.			
	Med	R1 23	Max	R2 240	Min	Ave	R1 0.5	Max	R2 1.0	Min	Ave	Max	R1 24	Min	To	From	Ave	Max	R1 28.5	Min
1992																				
Dec	2	2	50		<2	0.2		0.3		0.1	5.4	10.4		0.0	9	5	16.5	18.0		15.5
Nov	4	1	1600	1	2	0.1		0.2		0.1	8.8	14.0		0.0	13	13	15.0	15.5		14.2
Oct	2	3	300	2	2	0.2		0.3		0.1	9.5	13.7		2.8	2	22	14.0	15.5		12.3
Sept	8	5	1600	3	2	0.1		0.2		0.0	13.1	15.5		0.0	17	11	12.4	13.7		10.8
Aug	<2	2	350	1	2	0.3	1	0.9		0.1	8.6	8.6		0.0		4	14.8	18.0		13.3
July	<2		17		2	1.0	2	6.0	2	0.0	10.4	14.4		0.0	10	16	19.1	20.2		18.0
June	<2		8		2	0.1		0.2		0.1	7.2	7.2		0.0		3	20.3	20.6		19.6
May	<2	2	<1600	1	2	0.1		0.2		0.1	7.8	9.7		0.0	10		21.4	22.1		20.2
[illegible]	<2		23		2	0.1		0.1		0.1	12.8	15.1		0.0	9	11	22.7	23.4		21.8
Mar.	13	3	300		2	0.1		0.1		0.1	9.2	11.5		0.0	9		23.2	24.0		20.6
Feb.	<2		8		2	0.1		0.3		0.1	-	-		-			22.1	23.4		20.6
Jan	<2		22		2	0.1		0.1		0.1	7.3	10.8		0.0	6	8	20.4	20.9		18.7

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	PRIMARY FLOWS PML FLOW MG.	GRO/BOF FLOW MG.	TOTAL FLOW MG.	TOTAL FLOW A.F.	EQUALIZATION HOLDING AVE. GAL	SECONDARY FLOWS AVE FLOW MGD	TOTAL FLOW MG.	TOTAL FLOW A.F.	RAINFALL Inches	RAINFALL SEASON Total to Date	TREATED EFFLUENT AVE FLOW MGD	TOTAL FLOW MG.	TOTAL FLOW A.F.	IRRIGATION ON - SITE Field # 1 MG.	Field # 1 A.F.	Field # 2 MG.	Field # 2 A.F.	Field # 3 MG.	Field # 3 A.F.	Field # 4 MG.	Field # 4 A.F.
Jan. 1995	2.647	2.136	6.559	**20.133**	244,133	0.283	8.769	**26.917**	17.26	29.01	0.268	8.299	**25.47**	0.531	**1.63**						
Feb.	BROKEN	FLOW METER			281,177	0.324	9.070	**27.841**	1.00	30.01	0.324	9.070	**27.84**	6.425	**19.72**						
Mar.	3.211	3.161	5.098	**15.649**	204,097	0.278	5.561	**17.070**	15.05	45.06	0.261	8.091	**24.84**	10.466	**32.13**						
Apr.	3.390	2.004	8.218	**25.225**	250,907	0.272	8.159	**25.044**	4.85	49.91	0.257	7.720	**23.70**	19.369	**59.45**						
May	3.671	2.193	5.420	**16.637**	233,382	0.229	7.101	**21.797**	4.40	54.31	0.232	7.181	**22.04**	8.165	**25.06**						
June	3.244	1.690	4.934	**15.145**	243,096	0.202	6.048	**18.565**	1.55	55.86	0.200	6.010	**18.45**	12.321	**37.82**						
July	3.823	1.481	5.304	**16.281**	196,090	0.195	6.039	**18.537**	0.05	55.91	0.191	5.922	**18.18**	13.226	**40.60**						
Aug.	BROKEN	FLOW METER			191,458	0.172	5.335	**16.376**	0.00	55.91	0.172	5.335	**16.38**	23.466	**72.03**						
Sept.	BROKEN	FLOW METER			197,317	0.163	4.902	**15.047**	0.00	Season 55.91	0.163	4.902	**15.05**	28.021	**86.01**						
Oct.	2.655	1.387	4.042	**12.407**	156,931	0.139	4.296	**13.187**	0.00	0.00	0.137	4.233	**12.99**	0.765	**2.35**	0.099	**0.30**	0.714	**2.19**	0.745	**2.29**
Nov.	3.043	1.436	4.479	**13.748**	127,694	0.144	4.306	**13.217**	0.05	0.05	0.149	4.479	**13.75**	2.355	**7.23**						
Dec.	3.276	1.584	4.860	**14.918**	152,790	0.144	4.459	**13.688**	7.25	7.30	0.135	4.198	**12.88**	0.586	**1.80**						
Annual Total	28.960	17.072	48.914	150.14			74.045	227.285	51.46			75.440	231.56	125.7	385.83						
				AVERAGE	206,589					AVERAGE	0.207										

DATE	PRIMARY FLOWS PML FLOW MG.	GRO/BOF FLOW MG.	TOTAL FLOW MG.	TOTAL FLOW A.F.	EQUALIZATION HOLDING AVE. GAL	SECONDARY FLOWS AVE FLOW MGD	TOTAL FLOW MG.	TOTAL FLOW A.F.	RAINFALL Inches	RAINFALL SEASON Total to Date July to June	TREATED EFFLUENT AVE FLOW MGD	TOTAL FLOW MG.	TOTAL FLOW A.F.	IRRIGATION ON - SITE Field # 1 MG.	Field # 1 A.F.	Field # 2 MG.	Field # 2 A.F.	Field # 3 MG.	Field # 3 A.F.	Field # 4 MG.	Field # 4 A.F.
Jan. **1996**	3.779	2.272	6.051	**18.574**	187,027	0.194	6.021	**18.480**	8.00	15.30	0.181	5.603	**17.20**	0.000							
Feb.	4.029	2.772	6.800	**20.874**	223,481	0.263	7.617	**23.381**	9.20	24.50	0.246	7.125	**21.87**	0.641	**1.97**						
Mar.	4.106	2.819	6.925	**21.257**	211,480	0.253	7.836	**24.053**	5.45	29.95	0.237	7.360	**22.59**	0.000							
Apr.	3.881	2.313	6.193	**19.011**	217,814	0.217	6.512	**19.990**	3.65	33.65	0.208	6.245	**19.17**					0.684	**2.10**	0.684	**2.10**
May	3.822	2.281	6.103	**18.734**	159,132	0.192	5.942	**18.240**	2.85	36.50	0.176	5.463	**16.77**					1.620	**4.97**	1.620	**4.97**
June	3.696	0.531	4.227	**12.975**	173,545	0.174	5.219	**16.020**	0.55	Season 37.10	0.166	4.974	**15.27**								
July	5.086	0.474	5.560	**17.067**	224,559	0.230	7.124	**21.867**	0.05	0.05	0.174	5.397	**16.57**	28.116	**86.30**						
Aug.	4.491	1.117	6.400	**19.645**	192,660	0.188	5.823	**17.874**	0.00	0.05	0.188	5.823	**17.87**								
Sept.	3.267	1.714	4.981	**15.289**	230,818	0.242	7.254	**22.266**	0.00	0.05	0.242	7.254	**22.27**					3.810	**11.69**		
Oct.	3.192	1.218	4.782	**14.679**	146,401	0.154	4.782	**14.679**	1.95	2.00	0.154	4.782	**14.68**								
Nov.	3.260		3.260	**10.007**	173,977	" "	" "		6.82	8.82	" "	" "									
Dec.	5.029		5.029	**15.437**	193,424	" "	" "		16.31	25.13	" "	" "									
Annual Total	47.637	17.511	66.312	203.55			64.130	196.850	54.83			60.026	184.25	28.8	88.27	0.000	0.00	6.114	18.77	2.304	7.07
				AVERAGE	194,527					AVERAGE	0.197										

STP-sum.xl

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	IRRIGATION and EFFLUENT DISPOSAL: ON - SITE TOTAL MG.	ON - SITE TOTAL A.F.	PML TOTAL MG.	PML TOTAL A.F.	CONSTRUCTION THOU. GAL.	CONSTRUCTION A.F.	TOTAL DISPOSAL A.F.	EFFLUENT IN-STORAGE: RESERVOIR # 1 LEVEL FT.	RES. # 1 VOLUME A.F.	RES. # 1 D.O.mg/L AVE.	RES. # 1 TEMP. C AVE.	RESERVOIR # 2 LEVEL FT.	RES. # 2 VOLUME A.F.	RES. # 2 D.O.mg/L AVE.	RES. # 2 TEMP. C AVE.	RES. # 1 RE-TREAT A.F.	CHLORINE: APPL. # / DAY AVE.	APPL. mg / L	FREE RESID. mg/L	DEM. mg/L
Jan. 1995	0.53	1.63					1.63	20	6.90	6.5		22.1	55.00	11.9			52.0	24.40	0.77	23.60
Feb.	6.43	19.72					19.72	17.6	4.60	10.1		26.1	86.00	14.6		9.40	63.0	23.60	0.62	23.00
Mar.	10.47	32.13					32.13	20.5	7.50	7.2		28.6	101.00	4.1			58.0	29.10	0.72	28.40
Apr.	19.37	59.45	15.888	48.77			108.22	18.6	5.50	12.8		24.9	72.00	8.0		10.03	62.0	29.30	0.92	28.40
May	8.17	25.06					25.06	10.4	0.88	6.7		27.1	90.50	10.3		1.18	57.0	30.30	1.12	29.10
June	12.32	37.82	6.120	18.79			56.61	8.6	0.50	5.3	22.9	27.2	91.00	7.5	24.3	0.80	58.0	35.30	1.20	34.10
July	13.23	40.60	5.766	17.70			58.30					24.9	72.00	7.3	26.6		64.0	40.80	1.14	39.70
Aug.	23.47	72.03	0.454	1.39			73.42	10.8	1.00	4.0	22.3	21.5	51.00	5.6	25.8		56.0	39.60	1.13	38.50
Sept.	28.02	86.01	2.579	7.92			93.93	9.3	0.66	6.1	23.8	16.4	23.00	7.5	23.0	1.00	51.0	38.50	1.22	37.30
Oct.	2.32	2.35	0.459	1.41			3.76					12.2	10.40	10.6	15.9		47.0	41.00	0.95	40.10
Nov.	2.35	7.23	0.000		34.00	0.10	7.33	11	1.10	5.6	14.6	10.8	9.00	9.5	12.0	1.10	51.0	43.30	1.34	42.00
Dec.	0.59	1.80					1.80					11.9	10.00	10.1	8.4		45.0	38.80	1.58	37.20
Annual Total	127.25	385.83	31.266	95.97	34.00	0.10	481.90									23.51				
							AVERAGE	14	3.18	7.1	20.9	21	55.91	8.9	19.4	AVERAGE	55.3	34.5	1.1	33.5

DATE	IRRIGATION and EFFLUENT DISPOSAL: ON - SITE TOTAL MG.	ON - SITE TOTAL A.F.	PML TOTAL MG.	PML TOTAL A.F.	CONSTRUCTION THOU. GAL.	CONSTRUCTION A.F.	TOTAL DISPOSAL A.F.	EFFLUENT IN-STORAGE: RESERVOIR # 1 LEVEL FT.	RES. # 1 VOLUME A.F.	RES. # 1 D.O.mg/L AVE.	RES. # 1 TEMP. C AVE.	RESERVOIR # 2 LEVEL FT.	RES. # 2 VOLUME A.F.	RES. # 2 D.O.mg/L AVE.	RES. # 2 TEMP. C AVE.	RES. # 1 RE-TREAT A.F.	CHLORINE: APPL. # / DAY AVE.	APPL. mg / L	FREE RESID. mg/L	DEM. mg/L
Jan. 1996		0.00						14	2.20	9.8	6.7	15.6	19.50	10.0	8.0		63.0	42.20	0.94	41.30
Feb.	0.64	1.97					1.97	13.4	2.00	7.0	5.8	20.2	43.00	10.2	10.3	2.00	68.0	34.00	0.73	33.30
Mar.		0.00					0.00	16.1	3.50	9.2	12.6	24.3	68.50	13.9	12.2	2.40	56.0	27.90	0.87	27.00
Apr.	1.37	4.20					4.20	9.6	0.72	5.7	16.8	27.4	91.80	7.8	15.8	2.70	66.0	37.90	0.87	37.00
May	3.24	9.94					9.94	10.3	0.88	5.0	20.8	27.2	90.10	3.0	19.1	0.80	43.0	27.60	0.82	26.80
June	8.16	0.00	1.853	5.69			5.69	11.3	1.15	6.6	22.9	25	73.00	4.5	24.2	0.40	48.0	33.20	0.69	32.50
July	11.98	86.30	2.268	6.96			93.26	12.5	1.60	7.8	25.2	20.6	45.00	5.1	26.4	2.80	54.0	29.40	1.04	28.30
Aug.	4.64	0.00	0.930	2.85			7.49	11.2	1.15	1.6	23.5	15.9	21.00	7.5	24.0	0.00	49.0	31.10	1.05	30.10
Sept.	3.81	11.69	0.000		43.00	0.13	11.92	12.7	1.60	5.0	22.2	15.1	18.00	8.1	20.3	3.40	53.0	28.50	1.05	27.40
Oct.	3.98	12.22					12.22	0	0.00			11.8	8.90	9.0	14.9	0.00	42.0	19.10	1.87	17.30
Nov.	1.87	5.74					5.74	0	0.00			13.1	12.10	11.0	11.7	0.00		0.00	1.26	-1.26
Dec.	0.69	2.13					2.13	16.9	4.00	6.5	7.6	17.8	29.75	13.9	8.7	0.00	56.9	1.36	0.92	0.44
Annual Total	40.39	134.2	5.051	15.50	43.00	0.13	154.56									14.50				
							AVERAGE	11	1.57	6.4	16.4	20	43.39	8.7	16.3	AVERAGE	54.4	26.0	1.0	25.0

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	INFLUENT D.O. mg/L	INFLUENT TEMP C	EFFLUENT D.O. mg/L	EFFLUENT TEMP C	CONTACT D.O. mg/L	CONTACT TEMP C	REAERATION D.O. mg/L	REAERATION TEMP C	TURB EFFL NTU	CLF BLKT FT.	PH EFFL S.U. AVE.	PH INFL S.U. AVE.	PH CONT S.U. AVE.	PH REAER S.U. AVE.	PH DIG S.U. AVE.	IMHOFF SET.S. INFL ML	IMHOFF SET.S. EFFL. ML	COD 2hr INFL. mg/L	COD 2hr EFFL. mg/L	COD % RED.	BOD 5 day INFL. mg/L	BOD 5 day EFFL. mg/L	BOD 5 day RED. %	COLIF. EFFL MPN 100mL		NITRITE EFFL N mg/L
Jan. 1995	5.1	10.1	3.3	10.6	5.6	10.5	1.3	11.2	21.5	2.6	6.9	7.2	7.2	7.1	7.2	9.0	0.70	256	93	63.7	140	53	62.1	2.0		1.95
Feb.	5.8	11.0	2.8	11.6	5.5	11.5	1.6	12.3	18.3	0.6	6.9	7.1	7.0	6.7	6.4	8.0	0.30	218	109	50.0	82	24	70.7	2.0		3.00
Mar.	3.4	11.9	3.5	12.5	5.6	12.5	1.2	13.0	19.6	0.4	6.9	7.1	7.0	6.7	7.4	9.0	0.20	238	99	58.4	111	26	76.6	5.0		6.00
Apr.	0.9	14.2	1.3	14.7	3.6	14.6	1.0	15.1	11.0	0.5	6.9	7.0	6.9	6.7	7.0	6.0	0.10	296	78	73.6	119	21	82.4	2.0		3.00
May	0.3	16.4	1.4	17.1	4.0	17.0	0.8	17.8	9.5	0.6	7.1	7.2	7.1	6.8	7.0	10.0	0.10	512	81	84.2	156	17	89.1	2.0		2.00
June	0.5	19.7	0.8	20.9	1.2	20.7	0.6	21.5	15.4	2.3	7.0	7.3	7.1	7.0	7.5	14.0	0.40	632	88	86.1	208	19	90.9	2.0		2.00
July	0.2	22.5	0.7	23.9	0.9	23.8	0.7	24.6	11.6	2.9	7.1	7.4	7.1	7.0	7.9	17.0	0.50	689	80	88.4	209	18	91.4	2.0		4.00
Aug.	0.2	23.4	0.6	24.2	1.0	24.4	0.4	25.0	18.4	1.0	7.2	7.5	7.2	7.0	7.6	20.0	0.40	729	46	93.7	212	22	89.6	2.0		4.00
Sept.	0.2	22.1	1.8	22.7	2.2	22.8	0.8	23.2	10.2	1.3	7.1	7.6	6.9	6.8	7.6	19.0	0.60	713	95	86.7	221	18	91.9	2.0		5.00
Oct.	0.4	18.5	0.9	19.0	3.6	19.1	0.5	19.5	15.0	0.5	6.9	7.4	6.8	6.4	7.2	16.0	0.30	661	101	84.7	235	19	91.9	2.0		3.00
Nov.	1.8	15.6	2.0	16.3	4.0	16.5	1.2	16.7	18.2	0.6	6.8	7.5	6.9	6.6	6.9	14.0	0.20	723	133	81.6	219	16	92.7	2.0		3.00
Dec.	1.4	12.4	1.4	13.0	3.8	13.0	1.2	13.2	9.3	0.5	6.8	7.2	6.9	6.7	6.8	14.0	0.30	514	93	81.9	193	12	93.8	2.0		3.00
Annual Total																										
AVERAGE	1.7	16.5	1.7	17.2	3.4	17.2	0.9	17.8	14.8	1.2	7.0	7.3	7.0	6.8	7.2	13.0	0.34	515.1	91.3	77.7	175.4	22.1	85.3	2.3		3.329

DATE	INFLUENT D.O. mg/L	INFLUENT TEMP C	EFFLUENT D.O. mg/L	EFFLUENT TEMP C	CONTACT D.O. mg/L	CONTACT TEMP C	REAERATION D.O. mg/L	REAERATION TEMP C	TURB EFFL NTU	CLF BLKT FT.	PH EFFL S.U. AVE.	PH INFL S.U. AVE.	PH CONT S.U. AVE.	PH REAER S.U. AVE.	PH DIG S.U. AVE.	IMHOFF SET.S. INFL ML	IMHOFF SET.S. EFFL. ML	COD 2hr INFL. mg/L	COD 2hr EFFL. mg/L	COD % RED.	BOD 5 day INFL. mg/L	BOD 5 day EFFL. mg/L	BOD 5 day RED. %	COLIF. EFFL MPN 100mL	NITRATE EFFL mg/L	NITRITE EFFL N mg/L
Jan. 1996	2.4	10.9	2.4	11.6	5.4	11.7	1.1	11.8	8.3	0.8	7.1	7.3	7.2	7.0	7.2	14.0	0.30	534	89	83.3	185	13	93.0	2.0		2.0
Feb.	1.9	11.0	1.4	11.6	4.2	11.6	0.9	12.0	15.5	0.7	7.1	7.2	7.0	6.8	6.8	8.0	0.40	389	68	82.5	129	14	89.1	8.0	3.7	6.0
Mar.	1.6	11.9	3.0	12.5	4.4	12.6	0.8	13.2	7.6	0.5	7.2	7.2	7.1	6.9	7.3	8.0	0.40	334	43	87.1	103	9	91.3	8.0	2.6	3.0
Apr.	0.4	14.9	1.7	15.9	3.4	15.8	0.5	16.5	37.5	1.2	6.9	7.0	6.9	6.7	7.0	10.0	0.20	645	72	87.0	165	14	91.5	7.0	3.4	6.0
May	0.5	17.7	1.0	18.9	2.7	18.8	0.6	19.8	12.0	1.0	7.4	7.5	7.4	7.1	7.6	16.0	0.20	978	92	90.6	200	11	94.5	4.0	4.0	5.0
June	0.3	20.7	0.9	22.4	2.2	22.1	0.9	22.9	14.9	1.3	7.0	7.3	7.0	6.7	7.3	15.0	0.50	983	90	90.8	217	17	92.2	<2	10.0	4.0
July	0.3	24.5	1.1	25.3	2.8	25.4	0.3	26.6	24.3	2.2	7.2	7.3	7.2	7.0	7.8	14.0	0.80	965	86	91.1	222	21	90.5	<2	5.0	3.0
Aug.	0.3	23.8	0.9	24.9	2.4	24.9	0.5	25.9	26.5	1.7	7.3	7.3	7.3	6.9	7.7	23.0	1.20	999	122	87.8	299	30	90.0	2.0	3.0	4.0
Sept.	0.1	21.0	0.9	21.8	3.1	21.9	0.6	22.5	19.2	0.9	7.1	7.3	7.0	6.6	7.5	15.0	0.40	639	101	84.2	218	25	88.5	<2	8.0	5.0
Oct.	0.2	17.6	1.4	17.6	3.0	18.3	0.4	18.5	9.2	1.5	6.9	7.3	6.9	6.8	7.5	16.0	0.40	975	69	92.9	332	11	96.7	<2	9.0	4.0
Nov.	0.1	13.5	1.4	14.2	3.1	14.3	0.7	14.5	10.1	1.3	6.8	7.1	6.7	6.6	7.0	14.0	0.30	818	65	92.1	303	13	95.7	8.0	7.0	3.6
Dec.	2.3	11.1	2.2	11.3	4.1	11.4	0.7	11.6	22.6	2.4	6.8	6.9	6.7	6.6	6.7	9.0	0.60	522	72	86.2	190	23	87.9	4.0	3.0	3.0
Annual Total																										
AVERAGE	0.9	16.6	1.5	17.3	3.4	17.4	0.7	18.0	17.3	1.3	7.1	7.2	7.0	6.8	7.3	13.5	0.48	731.8	80.8	88.0	213.6	16.8	91.7	4.1	5.3	4.1

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	SLUDGE VOLUME INDEX SVI 30 CONT. mL/L	SVI 30 REAER mL/L	SVI 30 AVE mL/L	SVI	CONTACT MLSS mg/L	CONTACT MLVSS mg/L	REAERATION MLSS mg/L	REAERATION MLVSS mg/L	TOTAL SOLIDS MLSS mg/L	TOTAL SOLIDS MLVSS mg/L	RAS SOLIDS MLSS mg/L	RAS SOLIDS MLVSS mg/L	RAS SOLIDS TOTAL mg/l	DIGESTER SOLIDS MLSS mg/L	DIGESTER SOLIDS MLVSS mg/L	DIGESTER SOLIDS TOTAL mg/l	RESPIROMETER INF. O.U.R. ml/L/hr	EFFL. O.U.R. ml/L/hr	CONT. O.U.R. ml/L/hr	REAR. O.U.R. ml/L/hr	RAS O.U.R. ml/L/hr	DIG O.U.R. ml/L/hr	CENTRIFUGE CON %	REA %	RAS %	DIG %
Jan. 1995	200	969	722	129	1740	1319	7434	5488	5603	4147	7291	5448	8018	12878	8922	12176							2.7	11.3	13.6	15.5
Feb.	109	807	582	107	1463	1123	7372	5619	5442	4174	6951	5230	7525	12777	8725	13749							2.0	10.0	10.0	18.0
Mar.	87	559	408	84	1324	1002	6516	4859	4847	3619	7212	5440	6927	10753	9153	14117							2.0	8.0	8.0	15.0
Apr.	131	443	343	68	2207	1750	5934	4603	4736	3686	6415	4945	6339	16651	12837	27892							3.0	8.0	8.0	21.0
May	160	740	554	92	2529	1945	7669	5818	6017	4573	8586	6687	9098	11291	8567	13540							4.0	12.0	13.0	19.0
June	257	841	653	86	4169	3172	9331	6998	7672	5768	10196	8027	17066	12493	9222	11319							6.0	13.0	14.0	17.0
July	284	844	664	89	3776	2849	9133	6671	7411	5443	10579	7857	10737	14738	10299	16105							6.0	13.0	14.0	19.0
Aug.	198	709	545	79	3166	2492	8492	6497	6780	5210	9690	7306	10176	14611	10841	14152							5.0	11.0	13.0	18.0
Sept.	211	792	605	96	3184	2541	7815	6179	6329	5009	8612	6775	8895	13180	9794	19517							4.0	11.0	12.0	19.0
Oct.	107	629	462	92	1727	1408	6560	5228	5006	4000	7312	5810	8040	11630	9849	13961							3.0	9.0	10.0	20.0
Nov.	115	519	389	75	1865	1504	6662	5294	5120	4076	7276	5753	7212	20832	14268	19443							3.0	8.0	10.0	23.0
Dec.	96	409	308	69	1775	1531	5714	4537	4448	3571	7557	5949	8048	15625	11830	16524							2.0	7.0	9.0	19.0
Annual Total																										
AVERAGE	163	688	520	89	2410	1886	7386	5649	5784	4440	8140	6269	9007	13955	10359	16041							3.6	10.1	11.2	18.6

DATE	SLUDGE VOLUME INDEX SVI 30 CONT. mL/L	SVI 30 REAER mL/L	SVI 30 AVE mL/L	SVI	CONTACT MLSS mg/L	CONTACT MLVSS mg/L	REAERATION MLSS mg/L	REAERATION MLVSS mg/L	TOTAL SOLIDS MLSS mg/L	TOTAL SOLIDS MLVSS mg/L	RAS SOLIDS MLSS mg/L	RAS SOLIDS MLVSS mg/L	RAS SOLIDS TOTAL mg/l	DIGESTER SOLIDS MLSS mg/L	DIGESTER SOLIDS MLVSS mg/L	DIGESTER SOLIDS TOTAL mg/l	RESPIROMETER INF. O.U.R. ml/L/hr	EFFL. O.U.R. ml/L/hr	CONT. O.U.R. ml/L/hr	REAR. O.U.R. ml/L/hr	RAS O.U.R. ml/L/hr	DIG O.U.R. ml/L/hr	CENTRIFUGE CON %	REA %	RAS %	DIG %
Jan. 1996	126	566	424	92	2093	1690	5810	4648	4616	3697	8659	6816	8629	16835	12379	17142							3.0	8.0	12.0	21.0
Feb.	104	657	480	94	1778	1359	6732	5030	5140	3850	6917	5143	7322	16978	12273	18689							3.0	9.0	9.0	22.0
Mar.	89	678	488	95	1564	1199	6766	5030	5094	3798	6933	5140	7756	15492	10781	14251							2.0	9.0	10.0	17.0
Apr.	122	841	610	98	1914	1445	8380	6131	6301	4625	8875	6542	9563	20685	14011	19387							4.0	13.0	14.0	28.0
May	153	878	645	74	2953	2645	11500	8541	8752	6646	14478	10080	14286	19252	12108	20913							4.0	14.0	17.0	23.0
June	229	734	572	84	4205	3057	9334	6573	7516	5320	11627	8161	11730	29459	18235	28428							5.0	12.0	14.0	34.0
July	213	837	636	72	3690	2739	11086	8082	8709	6365	14020	10051	14771	28011	18032	25366							5.0	14.0	17.0	29.0
Aug.	177	874	650	92	2463	1899	9527	7192	7256	5490	12171	9196	12438	24504	17618	23384							4.0	12.0	16.0	28.0
Sept.	138	743	548	92	2170	1729	6818	5340	5324	4179	9121	7162	9541	18467	13647	20789							3.0	10.0	13.0	28.0
Oct.	169	674	512	97	2527	1978	6446	5031	5186	4050	10773	8255	11120	22111	16215	20951			32.0	61.0	95.0		4.0	10.0	15.0	27.0
Nov.	165	492	387	73	2686	2165	5950	4750	4901	3919	9095	7162	10215	25561	19515	24407			39.0	85.0			4.0	8.0	13.0	29.0
Dec.	128	549	414	74	2347	1823	7867	6140	6093	4753	12183	9652	12494	26909	21117	23947							3.0	9.0	19.0	29.0
Annual Total																										
AVERAGE	151	710	531	86	2533	1977	8018	6041	6241	4724	10404	7780	10822	22022	15494	21471	#####	#####	35.5	73.0	95.0	#####	3.7	10.7	14.1	26.3

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	DIGESTER DECANTING SUPERNATE TURBIDITY				DIGESTER DECANTING SUPERNATE BOD				DIGESTER DECANTING SUPERNATE COD				DIGESTER DECANTING SUPERNATE MLSS				DIGESTER DECANTING SUPERNATE MLVSS				DIGESTER DECANTING SUPERNATE TOTAL SOLIDS			
	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4
Jan. 1995	5.0	6.0	6.3	6.5					81	87	96	89	35	28	26	25	20	13	14	18	600	675	635	635
Feb.	6.4	6.6	3.3	5.3					119	110	77	99	108	39	18	56	75	42	34	56	593	557	614	630
Mar.	19	10.0	12.0	16.0					271	179	396	278	213	177	386	215	163	122	288	176	658	533	798	583
Apr.	22	25.0	22.0	22.0					628	541	125	598	726	821	286	967	500	567	214	675	818	1475	665	1548
May	18	17.0	16.0	17.0					338	123	133	183	297	103	75	213	319	96	63	226	543	430	393	487
June	85	62.0	63.0	61.0					780	697	778	733	225	128	122	122	190	122	111	116	727	687	713	663
July	70	57.0	55.0	52.0					440	313	308	338	219	75	72	77	179	67	64	69	580	695	710	670
Aug.	53	67.0	76.0	77.0					313	371	384	410	88	63	54	74	76	60	50	67	575	555	565	535
Sept.	14	14.0	20.0	14.0					135	140	220	340	44	67	25	75	43	59	23	69	435	440	490	490
Oct.	82	6.0	5.0	5.0					230	80	175	110	290	58	246	94	231	43	230	64	905	887	1000	920
Nov.	67	37.0	6.0	8.0					228	269	130	320	335	338	102	314	297	285	92	246	483	690	440	600
Dec.	39	37.0	27.0						273	75	65		262	191	67		212	156	67		880	813	640	
Annual Total																								
AVERAGE	40.0	28.7	26.0	25.8					319.7	248.8	240.5	318.0	236.8	174.0	123.3	202.9	192.0	136.0	104.1	162.0	649.8	703.1	####	705.5

DATE	DIGESTER DECANTING SUPERNATE TURBIDITY				DIGESTER DECANTING SUPERNATE BOD				DIGESTER DECANTING SUPERNATE COD				DIGESTER DECANTING SUPERNATE MLSS				DIGESTER DECANTING SUPERNATE MLVSS				DIGESTER DECANTING SUPERNATE TOTAL SOLIDS			
	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4
Jan. 1996	18	17	14	10					165	178	119	125	76	172	30	133	151	135	25	111	658	623	633	540
Feb.	23	19	26	73	7				168	185	140	340	155	180	121	996	128	142	93	741	575	582	503	1320
Mar.	65	15	12	15	20				203	114	121	107	279	37	37	34	205	32	36	32	488	378	390	390
Apr.	21	16	15		35				175	156	165		97	39	36		83	34	29		320	398	476	
May	23	23	19	11	23				327	274	253	110	129	118	79	42	103	90	66	33	490	497	555	513
June	48	26	57	40	50				252	155	305	240	236	81	373	221	185	75	283	161	436	400	415	410
July	90	79	31		70				568	761	573		2916	691	609		2140	518	457		4358	3498	895	
Aug.	34	21	22		53				229	195	203		221	138	191		178	106	140		815	748	1050	
Sept.	43	29	27		44				837	586	220		2838	2345	131		2139	1752	124		3518	2984	810	
Oct.	38	23							390	40			325	51			241	33			800	440		
Nov.	126	22	3		4				636	141	45		2320	413	4		1728	222	1		2463	296	400	
Dec.	513	31	16		17				388	160	189		981	240	141		756	179	132		1653	500	505	
Annual Total																								
AVERAGE	86.8	26.8	22.0	29.8	32.3				361.5	245.4	212.1	184.4	881.1	375.4	159.3	285.2	669.8	276.5	126.0	215.6	1381.2	945.3	####	634.6

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	DIGESTER					DIGESTER CHEMICALS			DRYING BED DISCHARGED	
	WASTE TOTAL GALS.	DECANT TOTAL GALS.	DRYING BEDS GALS.	SOLIDS BEDS mg/L	TOTAL SOLIDS LBS.	LIME USED LBS	POLYMER USED mL	POLYMER DRYING BED mL	#	#
Jan. 1995	77,100	40,875	61,510	21,100	**10824**	1600	20000	45000	3*4	5*6
Feb.	96,484	62,945			**0**		20500			
Mar.	92,771	64,854	33,792	23,210	**6541**	800	27000	26000	2	7*8
Apr.	80,100	79,024	14,993	22,800	**2851**	850	21000	5000	1	
May	97,692	68,940	70,130	17,053	**9974**	1625	16000	20000	5*6*2	3*4
June	99,960	67,035	27,795	17,430	**4040**	800	35000	34000	6	8
July	140,128	74,394	63,209	19,290	**10169**	1800	26000	47000	2*5	1*3
Aug.	128,628	50,958	74,857	16,060	**10026**	800	16000	57000	7*8	4*6
Sept.	112,672	70,578	32,700	18,580	**5067**	800	23000	24000	1*2	
Oct.	136,524	101,644	35,970	17,910	**5373**	800	32000	24000	3	5
Nov.	125,610	146,604			**0**		67000			
Dec.	131,626	76,572	38,423	23,470	**7521**	800	18000	31500	1*2	3*4
Annual Total	1,319,295	904,423	453,379	196,903	72387	10675	321500	313500		
AVERAGE	109,941	75,369	45,338	19,690	(WET)	1068	26792	31350		

DATE	DIGESTER					DIGESTER CHEMICALS			DRYING BED DISCHARGED	
	WASTE TOTAL GALS.	DECANT TOTAL GALS.	DRYING BEDS GALS.	SOLIDS BEDS mg/L	TOTAL SOLIDS LBS.	LIME USED LBS	POLYMER USED mL	POLYMER DRYING BED mL	#	#
Jan. 1996	112530	93196	29430	22110	**5427**	800	51000	21000	5*6	8.0
Feb.	135981	139248			**0**		37000			
Mar.	149389	94560	37332	22530	**7015**	900	28000	29000	1.0	7*8
Apr.	135840	132000	33517	30650	**8568**	900	15500	32172	5.0	6.0
May	179036	342552	13897	34830	**4037**	900	78500	0	2*3	4.0
June	153957	130255			**0**		93000			
July	197836	168302	17985	24040	**3606**	1800	146000	3000	1.0	7*8
Aug.	177398	133273	41147	49550	**17004**	900	147000		3,4,7,8	5,7,1,3
Sept.	133698	111179	28895	24690	**5950**	900	89000		3,4	5,7
Oct.	148517	116903	15533	23850	**3090**	900	101000		1,2	5,6
Nov.	139241	102733	27250	22680	**5154**	900	77300		1,3	4,5
Dec.	130795	119355					94000			
Annual Total	1794218	1683556	244986	254930	59850	8900	957300	85172		
AVERAGE	149518	140296	27220.7	28326	(WET)	988.9	79775.0	17034.4		

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	PRIMARY FLOWS PML FLOW MG.	PRIMARY FLOWS GRO/BOF FLOW MG.	PRIMARY FLOWS TOTAL FLOW MG.	PRIMARY FLOWS TOTAL FLOW A.F.	EQUALIZATION HOLDING AVE. GAL	SECONDARY FLOWS AVE FLOW MGD	SECONDARY FLOWS TOTAL FLOW MG.	SECONDARY FLOWS TOTAL FLOW A.F.	RAINFALL Inches	RAINFALL SEASON Total to Date	TREATED EFFLUENT AVE FLOW MGD	TREATED EFFLUENT TOTAL FLOW MG.	TREATED EFFLUENT TOTAL FLOW A.F.	IRRIGATION ON - SITE Field # 1 MG.	Field # 1 A.F.	Field # 2 MG.	Field # 2 A.F.	Field # 3 MG.	Field # 3 A.F.	Field # 4 MG.	Field # 4 A.F.
Jan. **1997**	5.303		7.955	**24.418**	200,359	0.257	7.955	**24.418**	17.17	42.30	0.257	7.955	**24.42**								
Feb.	3.348		4.817	**14.786**	149,271	0.172	4.817	**14.786**	0.80	43.10	0.172	4.817	**14.79**								
Mar.	3.260		4.225	**12.969**	184,575	0.136	4.225	**12.969**	0.05	43.35	0.136	4.225	**12.97**								
Apr.	3.142		4.487	**13.773**	234,186	0.150	4.487	**13.773**	0.46	43.81	0.150	4.487	**13.77**								
May	4.580		4.867	**14.939**	211,830	0.168	4.867	**14.939**	0.19	44.00	0.168	4.867	**14.94**								
June	FLOW METER FAILURE				175,756	" "	" "		0.25	Season 44.25	" "	" "									
July		" "			183,581	" "	" "		0.05	0.05	" "	" "									
Aug.		" "			201,068	" "	" "		0.00	0.05	" "	" "									
Sept.		" "			203,985	" "	" "		0.12	0.17	" "	" "									
Oct.		" "			187,503	" "	" "		0.75	0.92	" "	" "									
Nov.		" "			178,990	0.128	3.840	**11.787**	4.35	5.27	0.144	4.324	**13.27**								
Dec.		" "			193,658	0.149	4.612	**14.157**	3.40	8.67	0.151	4.693	**14.41**								
Annual Total	19.633	0.000	26.351	80.89			34.803	106.829	27.59			35.368	108.56	0.0	0.00	0.000	0.00	0.000	0.00	0.000	0.00
				AVERAGE	192,064					AVERAGE	0.168										

DATE	PRIMARY FLOWS PML FLOW MG.	PRIMARY FLOWS GRO/BOF FLOW MG.	PRIMARY FLOWS TOTAL FLOW MG.	PRIMARY FLOWS TOTAL FLOW A.F.	EQUALIZATION HOLDING AVE. GAL	SECONDARY FLOWS AVE FLOW MGD	SECONDARY FLOWS TOTAL FLOW MG.	SECONDARY FLOWS TOTAL FLOW A.F.	RAINFALL Inches	RAINFALL SEASON Total to Date	TREATED EFFLUENT AVE FLOW MGD	TREATED EFFLUENT TOTAL FLOW MG.	TREATED EFFLUENT TOTAL FLOW A.F.	IRRIGATION ON - SITE Field # 1 MG.	Field # 1 A.F.	Field # 2 MG.	Field # 2 A.F.	Field # 3 MG.	Field # 3 A.F.	Field # 4 MG.	Field # 4 A.F.
Jan. **1998**		" "			229,935	0.187	5.804	**17.816**	13.30	22.75	0.183	5.650	**17.34**								
Feb.		" "			254,608	0.260	7.283	**22.355**	16.35	38.32	0.234	6.564	**20.15**								
Mar.		" "			179,908	0.249	7.716	**23.685**	8.50	46.82	0.192	5.953	**18.27**								
Apr.		" "			184,434	0.235	7.065	**21.686**	5.50	52.32	0.189	5.679	**17.43**								
May		" "			176,242	0.170	5.265	**16.161**	4.20	56.52	0.173	5.350	**16.42**								
June		" "			213,629	0.167	5.006	**15.366**	0.59	Season 57.11	0.181	5.436	**16.69**								
July		" "			221,456	0.194	6.005	**18.433**	0.00	0.00	0.217	6.712	**20.60**								
Aug.		" "			230,702	0.187	5.788	**17.766**	0.00	0.00	0.219	6.775	**20.80**								
Sept.		" "			187,567	0.155	4.645	**14.258**	1.15	1.15	0.164	4.911	**15.07**								
Oct.		" "			163,979	0.139	4.298	**13.193**	0.40	1.55	0.150	4.490	**13.78**								
Nov.		" "			208,692	0.143	4.289	**13.165**	3.50	5.05	0.139	4.159	**12.77**								
Dec.		" "			179,080	0.140	4.337	**13.313**	3.70	8.75	0.140	4.337	**13.31**								
Annual Total	0.000	0.000	0.000	0.00			67.501	207.197	57.19			66.016	202.64	0.0	0.00	0.000	0.00	0.000	0.00	0.000	0.00
				AVERAGE	202,519					AVERAGE	0.182										

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	IRRIGATION and EFFLUENT DISPOSAL: ON - SITE TOTAL MG.	ON - SITE TOTAL A.F.	PML TOTAL MG.	PML TOTAL A.F.	CONSTRUCTION THOU. GAL.	CONSTRUCTION A.F.	TOTAL DISPOSAL A.F.	EFFLUENT IN-STORAGE: RESERVOIR # 1 LEVEL FT.	RES. # 1 VOLUME A.F.	RES. # 1 D.O.mg/L AVE.	RES. # 1 TEMP. C AVE.	RESERVOIR # 2 LEVEL FT.	RES. # 2 VOLUME A.F.	RES. # 2 D.O.mg/L AVE.	RES. # 2 TEMP. C AVE.	RES. # 1 RE-TREAT A.F.	CHLORINE: APPL. # / DAY AVE.	APPL. mg / L	FREE RESID. mg/L	DEM. mg/L
Jan. 1997	0.05	**0.15**					**0.15**	16.8	3.80	5.8	8.2	25.8	80.0	12.9	8.7	6.30	81.3	37.93	0.86	37.07
Feb.	2.07	**6.34**	14.25	**43.73**			**50.06**	11.3	1.15	14.7	10.9	26.9	89.0	12.8	11.1	2.70	73.5	51.26	1.11	50.15
Mar.	2.98	**9.15**					**9.15**	0	0.00	0.0	0.0	25.4	76.5	7.7	17.2	0.00	54.4	47.93	0.99	46.94
Apr.	2.58	**7.92**					**7.92**	10.3	0.88	8.0	20.1	25	73.0	7.8	17.7		42.2	33.74	0.80	32.94
May	3.38	**10.38**					**10.38**	7.9	0.38	9.2	25.1	24.4	69.0	9.4	24.0		42.0	30.00	3.23	26.77
June	2.86	**8.78**					**8.78**	9.8	0.74	10.2	26.3	23.8	66.0	10.0	24.4		36.4	" "	1.43	" "
July	7.77	**23.84**					**23.84**	14.6	2.69	7.7	25.5	21.4	51.0	6.4	24.8		66.6	" "	0.81	" "
Aug.	6.31	**19.35**					**19.35**	15.8	3.30	9.5	25.6	17.3	27.0	5.2	24.9		69.8	" "	3.09	" "
Sept.	5.29	**16.23**					**16.23**	19.5	5.80	4.3	21.8	12.7	11.0	4.0	21.3		47.0	" "	3.59	" "
Oct.	4.80	**14.71**					**14.71**	15.1	2.90	4.7	16.3	3.3	0.7	6.6	17.8		53.4	" "	1.86	" "
Nov.	0.00						**0.00**	13.3	1.90	5.4	12.8	0	0.0	0.0	0.0		34.3	32.12	3.19	28.93
Dec.	0.00						**0.00**	14.9	2.70	5.0	9.8	0	0.0	0.0	0.0		51.8	41.72	1.70	40.02
Annual Total	38.08	116.9	14.25	43.73	0.00	0.00	160.58									9.00				
							AVERAGE	12	2.19	7.0	16.9	17	45.3	6.9	16.0	AVERAGE	54.4	39.2	1.9	37.5

DATE	IRRIGATION and EFFLUENT DISPOSAL: ON - SITE TOTAL MG.	ON - SITE TOTAL A.F.	PML TOTAL MG.	PML TOTAL A.F.	CONSTRUCTION THOU. GAL.	CONSTRUCTION A.F.	TOTAL DISPOSAL A.F.	EFFLUENT IN-STORAGE: RESERVOIR # 1 LEVEL FT.	RES. # 1 VOLUME A.F.	RES. # 1 D.O.mg/L AVE.	RES. # 1 TEMP. C AVE.	RESERVOIR # 2 LEVEL FT.	RES. # 2 VOLUME A.F.	RES. # 2 D.O.mg/L AVE.	RES. # 2 TEMP. C AVE.	RES. # 1 RE-TREAT A.F.	CHLORINE: APPL. # / DAY AVE.	APPL. mg / L	FREE RESID. mg/L	DEM. mg/L
Jan. 1998	0.00							17.5	4.8	5.6	9.8	0.0	0.0	0.0	0.0		55.7	35.73	1.02	34.71
Feb.	0.00							21.9	9.3	6.9	9.5	15.1	18.1	8.7	9.3		48.3	22.27	0.85	21.42
Mar.	0.00							16.1	3.3	9.3	13.9	18.7	33.5	8.2	13.6		52.6	25.33	0.98	24.35
Apr.	0.00							17.5	4.8	6.8	12.2	22.0	54.0	12.4	15.0		55.0	28.08	1.07	27.01
May	0.00		0.175	**0.54**			**0.54**	14.4	2.4	9.1	18.2	19.8	41.0	9.0	17.5		45.1	31.82	0.93	30.89
June	0.00		0.467	**1.43**			**1.43**	15.2	2.9	11.5	23.0	13.3	12.8	5.1	19.4		45.1	32.35	1.04	31.31
July	5.32	**16.32**					**16.32**	15.4	3.0	11.5	26.7	0.0	0.0	0.0	0.0		39.8	24.58	1.00	23.58
Aug.	0.00	**0.00**					**0.00**	18.0	4.9	5.0	26.6	0.0	0.0	0.0	0.0		42.8	27.46	1.08	26.38
Sept.	0.67	**2.07**					**2.07**	13.7	2.1	7.5	24.2	7.3	4.8	13.8	25.0		42.7	33.00	1.00	32.00
Oct.	3.01	**9.24**					**9.24**	10.0	0.8	11.0	16.7	8.5	6.5	16.4	17.1		33.0	28.44	0.99	27.45
Nov.	1.86	**5.70**					**5.70**	10.8	0.9	9.5	12.3	9.0	7.8	13.1	13.6		32.2	26.97	0.72	26.25
Dec.	0.30	**0.93**					**0.93**	14.4	2.4	8.3	9.3	11.3	8.6	13.8	10.2		45.2	38.69	0.72	37.97
Annual Total	11.162	34.25	0.642	1.97	0.00	0.00	36.22									0.00				
							AVERAGE	15.4	3.5	8.5	16.9	10.4	15.6	8.4	11.7	AVERAGE	44.8	29.6	1.0	28.6

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	INFLUENT		EFFLUENT		CONTACT		REAERATION		TURB	CLF	PH					IMHOFF		COD			BOD			COLIF.	NITRATE	NITRITE
	D.O. mg/L	TEMP C	D.O. mg/L	TEMP C	D.O. mg/L	TEMP C	D.O. mg/L	TEMP C	EFFL NTU	BLKT FT.	EFFL S.U. AVE.	INFL S.U. AVE.	CONT S.U. AVE.	REAER S.U. AVE.	DIG S.U. AVE.	SET.S. INFL ML	SET.S. EFFL. ML	2hr INFL. mg/L	2hr EFFL. mg/L	% RED.	5 day INFL. mg/L	5 day EFFL. mg/L	5 day RED. %	EFFL MPN 100mL	EFFL mg/L	EFFL N mg/L
Jan. 1997	4.4	9.2	2.0	9.4	4.9	9.6	0.8	10.2	15.3	1.1	6.7	6.9	6.6	6.5	6.7	4.0	0.40	585	75	87.2	96	17	82.3	13.0	2	1
Feb.	2.9	10.2	3.5	10.4	5.5	10.5	0.5	11.0	18.6	1.8	6.9	7.0	6.8	6.6	6.9	10.0	0.40	609	92	84.9	210	17	91.9	8.0	2	2
Mar.	1.8	12.8	4.7	13.7	5.5	13.6	0.5	13.8	14.6	3.3	7.1	7.1	7.0	6.9	7.2	13.0	0.20	1058	85	92.0	323	15	95.4	8.0	4	4
Apr.	0.4	15.4	2.2	16.3	4.8	16.3	0.5	16.2	10.4	0.8	7.0	7.1	6.9	6.9	6.9	13.0	0.10	752	77	89.8	326	16	95.1	5.0	6	5
May	0.4	19.4	0.9	20.6	3.0	20.4	0.6	20.8	12.5	2.2	6.7	7.2	6.6	6.6	6.9	17.0	0.30	1021	87	91.5	265	16	94.0	13.0	3	12
June	0.5	21.2	1.0	22.2	3.7	22.3	0.5	23.2	21.4	2.6	6.8	7.2	6.7	6.7	7.2	16.0	0.60	989	128	87.1	270	24	91.1	23.0		3
July	0.3	23.5	0.9	24.6	3.7	24.3	1.7	25.2	25.8	2.2	6.8	7.3	6.7	6.5	7.4	21.0	0.80	1037	166	84.0	352	32	90.9	2.0	12	4
Aug.	0.3	23.5	0.9	24.2	4.0	24.7	1.3	25.3	19.6	1.6	6.6	7.3	6.5	6.4	7.1	19.0	0.70	1138	94	91.7	281	22	92.2	2.0	16	5
Sept.	0.2	21.7	1.9	22.6	5.5	22.6	0.7	22.9	11.3	2.3	6.7	7.2	6.6	6.5	7.0	20.0	1.00	1279	101	92.1	288	18	93.8	2.0	13	3
Oct.	2.3	17.6	6.0	18.2	0.1	18.4	1.6	1.1	7.7	1.2	6.9	7.2	6.9	6.9	7.1	16.0	0.30	943	71	92.5	224	14	93.8	2.0	6	3
Nov.	0.6	14.6	2.0	15.3	5.4	15.3	0.2	15.4	7.2	2.5	6.9	7.2	6.8	6.8	6.8	18.0	0.40	1016	71	93.0	265	11	95.8	8.0	8	3
Dec.	1.0	10.6	2.6	11.1	4.9	11.2	0.3	11.3	14.0	3.2	7.0	7.1	7.0	6.9	7.1	15.1	0.52	956	84	91.2	249	24	90.4	2.0	3	2
Annual Total																										
AVERAGE	1.3	16.6	2.4	17.4	4.3	17.4	0.8	16.4	14.9	2.1	6.8	7.2	6.8	6.7	7.0	15.2	0.48	948.6	94.3	89.7	262.4	18.8	92.2	7.3	6.8	3.9

DATE	INFLUENT		EFFLUENT		CONTACT		REAERATION		TURB	CLF	PH					IMHOFF		COD			BOD			COLIF.	NITRATE	NITRITE
	D.O. mg/L	TEMP C	D.O. mg/L	TEMP C	D.O. mg/L	TEMP C	D.O. mg/L	TEMP C	EFFL NTU	BLKT FT.	EFFL S.U. AVE.	INFL S.U. AVE.	CONT S.U. AVE.	REAER S.U. AVE.	DIG S.U. AVE.	SET.S. INFL ML	SET.S. EFFL. ML	2hr INFL. mg/L	2hr EFFL. mg/L	% RED.	5 day INFL. mg/L	5 day EFFL. mg/L	5 day RED. %	EFFL MPN 100mL	EFFL mg/L	EFFL N mg/L
Jan. 1998	1.0	10.5	2.6	10.9	5.5	11.0	0.3	11.3	15.2	3.4	7.0	7.0	7.0	6.8	6.8	8.9	0.22	637	82	87.1	232	22	90.5	2.0	2.0	2.5
Feb.	3.3	10.1	2.7	10.4	5.5	10.4	0.5	10.9	12.1	2.5	6.8	6.9	6.9	6.8	6.8	6.3	0.14	570	142	75.1	131	18	86.3	4.0	1.0	2.3
Mar.	0.9	12.0	2.5	12.2	4.6	12.4	0.3	13.0	15.7	4.1	7.0	7.0	7.1	6.9	7.4	7.7	0.19	643	83	87.1	125	21	83.2	4.0	1.0	2.0
Apr.	1.1	12.5	3.2	12.9	5.6	13.3	0.2	14.0	16.1	4.5	6.9	7.0	7.0	6.9	6.8	9.4	0.31	735	86	88.3	159	17	89.3	4.0	1.0	3.1
May	0.5	15.0	1.4	16.0	5.0	16.0	0.3	16.7	17.4	2.2	7.1	7.3	7.2	7.1	7.7	12.2	0.24	537	83	84.5	192	16	91.7	7.0	3.0	4.0
June	0.4	18.2	0.9	19.5	4.5	19.4	0.3	20.2	14.9	0.7	7.1	7.3	7.2	7.0	7.3	13.9	0.17	524	85	83.8	200	20	90.0	5.0	4.0	2.0
July	0.4	22.1	0.8	23.5	4.6	23.2	0.4	24.1	23.2	1.0	7.4	7.4	7.4	7.3	7.4	17.5	0.18	608	97	84.0	224	31	86.2	5.0	1.7	4.4
Aug.	0.4	23.2	0.8	24.3	4.8	24.2	0.4	25.0	16.7	0.9	7.3	7.4	7.3	7.1	7.5	16.7	0.48	679	115	83.1	247	31	87.4	5.0	3.0	5.5
Sept.	0.3	21.9	0.7	22.8	4.0	22.7	0.6	23.4	9.2	0.7	6.9	7.1	7.0	6.9	7.1	16.3	0.31	642	105	83.6	235	19	91.9	2.0	9.0	7.5
Oct.	0.3	16.8	0.7	17.8	3.6	17.8	0.4	18.3	7.0	0.6	6.9	7.2	7.1	6.9	7.0	16.2	0.12	598	84	86.0	230	13	94.3	2.0	5.0	4.3
Nov.	0.2	13.9	1.3	14.2	4.8	14.7	0.4	14.6	8.5	0.9	7.0	7.4	7.1	7.0	6.9	17.3	0.07	573	83	85.5	236	14	94.1	2.0	4.0	4.0
Dec.	0.1	11.4	1.2	10.9	4.3	11.8	0.5	11.1	11.7	0.9	6.9	7.2	7.2	7.1	7.2	12.6	0.15	530	94	82.3	200	15	92.5	2.0	3.0	6.0
Annual Total																										
AVERAGE	0.7	15.6	1.6	16.3	4.7	16.4	0.4	16.9	14.0	1.9	7.0	7.2	7.1	7.0	7.2	12.9	0.22	606	94.9	84	200.9	19.8	89.8	3.7	3.1	4.0

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	SLUDGE VOLUME INDEX				CONTACT		REAERATION		TOTAL SOLIDS		RAS SOLIDS			DIGESTER SOLIDS			RESPIROMETER						CENTRIFUGE			
	SVI 30 CONT. mL/L	SVI 30 REAER mL/L	SVI 30 AVE mL/L	SVI	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	TOTAL mg/l	MLSS mg/L	MLVSS mg/L	TOTAL mg/l	INF. O.U.R. ml/L/hr	EFFL. O.U.R. ml/L/hr	CONT. O.U.R. ml/L/hr	REAR. O.U.R. ml/L/hr	RAS O.U.R. ml/L/hr	DIG O.U.R. ml/L/hr	CON %	REA %	RAS %	DIG %
Jan. 1997	133	793	580	98	2182	1699	7961	5905	6104	4553	9578	7737	9546	25950	28502	24727			37.0	63.0			3	10	11	30
Feb.	166	812	604	89	3013	2287	8590	6237	6797	4967	12250	9629	11829	31880	22960	26990			26.0	95.0			3	11	14	32
Mar.	133	569	429	78	2425	1688	6885	5194	5451	4067	15652	10968	16128	28428	21068	26858						44.0	3	9	18	29
Apr.	123	388	303	80	1877	1445	4673	3601	3774	2908	11318	8553	12404	26273	17762	26834			28.0	95.0		50.0	11	7	17	33
May	324	720	593	80	4863	3617	8567	6204	7376	5373	11361	8011	11866	27235	18590	26256						63.0	7	11	15	29
June	312	886	702	79	4613	3261	11338	8063	9176	6520	13118	9963	13001	27298	19129	47395							6	15	18	32
July	213	762	585	71	3735	2847	10544	7784	8356	6197	11893	8861	12242	30208	21223	28957							5	14	15	30
Aug.	201	530	424	63	3833	2996	7966	6037	6637	5059	10498	7952	17161	27864	19982	25975							5	10	14	29
Sept.	250	618	500	230	3681	2840	6160	5835	4527	4080	13177	9555	13994	24624	19753	25818			13.0	43.0			5	11	16	30
Oct.	199	657	510	83	3604	2826	8960	6730	7238	5475	13784	9992	13391	27250	20380	25406							5	10	14	27
Nov.	325	711	587	72	5501	4116	9425	6775	8163	5920	11757	8428	12362	28068	19548	28459							6	11	15	31
Dec.	165	702	529	69	3057	2446	9818	7621	7645	5958	43202	15804	14567	30610	22540	31657							4	11	15	31
Annual Total																										
AVERAGE	212	679	529	91	3532	2672	8407	6332	6770	5090	14799	9621	13208	27974	20953	28778	#####	#####	26.0	74.0	#####	52.3	5.3	10.8	15.2	30.3

DATE	SLUDGE VOLUME INDEX				CONTACT		REAERATION		TOTAL SOLIDS		RAS SOLIDS			DIGESTER SOLIDS			RESPIROMETER						CENTRIFUGE			
	SVI 30 CONT. mL/L	SVI 30 REAER mL/L	SVI 30 AVE mL/L	SVI	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	TOTAL mg/l	MLSS mg/L	MLVSS mg/L	TOTAL mg/l	INF. O.U.R. ml/L/hr	EFFL. O.U.R. ml/L/hr	CONT. O.U.R. ml/L/hr	REAR. O.U.R. ml/L/hr	RAS O.U.R. ml/L/hr	DIG O.U.R. ml/L/hr	CON %	REA %	RAS %	DIG %
Jan. 1998	113	812	587	87	2229	1839	8447	6775	6448	5188	14812	11184	10317	18937	13562	24375							3	11	12	27
Feb.	146	891	652	74	2717	2125	11771	8492	8861	6445	12364	8802	12713	29480	20873	27617							3	13	13	30
Mar.	130	896	650	70	1777	1568	10806	7442	6492	4544	12546	8442	13421	21698	14963	27268							3	14	15	28
Apr.	226	918	695	62	4002	2736	14750	9844	11295	7559	15611	9972	15721	28018	18077	25420							4	15	16	29
May	163	894	659	79	2600	2003	11218	8346	8448	6307	10971	8076	11435	23767	17432	26242							3	13	13	26
June	148	824	607	123	1655	1358	6549	4946	4976	3793	7474	5552	7005	24975	17470	21590							2	8	9	24
July	164	918	676	144	1726	1400	6171	4837	4742	3732	7166	5643	7288	12818	9618	11148							3	9	10	18
Aug.	193	902	674	149	2426	1942	5597	3866	4577	3248	6790	5334	7102	11772	13459	20323							3	10	11	28
Sept.	196	841	633	132	2081	1719	6151	4906	4843	3881	7006	5575	6717	17286	12962	18105							4	9	10	27
Oct.	179	749	566	116	2032	1708	6187	5081	4851	3997	6316	5186	6360	13072	6918	16587							3	9	9	20
Nov.	161	437	348	83	2244	1864	4942	4129	4075	3401	6790	5554	6467	19098	15050	23440							3	7	9	31
Dec.	140	697	518	110	1923	1575	6031	4731	4710	3716	7233	5643	7026	22984	16622	23587							3	8	10	24
Annual Total																										
AVERAGE	163	815	605	102	2284	1820	8218	6116	6193	4651	9590	7080	9298	20325	14751	22142	#####	#####	#####	#####	#####	#####	3	11	11	26

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	DIGESTER DECANTING SUPERNATANT TURBIDITY				DIGESTER DECANTING SUPERNATE BOD				DIGESTER DECANTING SUPERNATE COD			
	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4
Jan. 1997	23	12			23				367	498		
Feb.	58	8			6				110	112		
Mar.												
Apr.												
May	17	12			27				221	153		
June												
July	9	16			17				90	395		
Aug.	332	25			55				648	309		
Sept.	4								6			
Oct.												
Nov.												
Dec.												
Annual Total												
AVERAGE	73.8	14.6	#####	#####	25.6	#####	#####	#####	240.4	293.4	#####	#####

DATE	DIGESTER DECANTING SUPERNATE MLSS				DIGESTER DECANTING SUPERNATE MLVSS				DIGESTER DECANTING SUPERNATE TOTAL SOLIDS			
	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4
Jan. 1997	71	29			66	25			435	435		
Feb.	7	5			6	2						
Mar.												
Apr.												
May	527	46			57	33			707	703		
June												
July	28	70			18	64			450	420		
Aug.	509	40			356	31			1220	450		
Sept.	36				32				540			
Oct.												
Nov.												
Dec.												
Annual Total												
AVERAGE	196.3	38.0	#####	#####	89.2	31.0	#####	#####	670.4	502.0	####	####

DATE	DIGESTER DECANTING SUPERNATE TURBIDITY				DIGESTER DECANTING SUPERNATE BOD				DIGESTER DECANTING SUPERNATE COD			
	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4
Jan. 1998												
Feb.												
Mar.												
Apr.												
May												
June												
July												
Aug.												
Sept.												
Oct.												
Nov.												
Dec.												
Annual Total												
AVERAGE	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####

DATE	DIGESTER DECANTING SUPERNATE MLSS				DIGESTER DECANTING SUPERNATE MLVSS				DIGESTER DECANTING SUPERNATE TOTAL SOLIDS			
	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4	S#1	S#2	S#3	S#4
Jan. 1998												
Feb.												
Mar.												
Apr.												
May												
June												
July												
Aug.												
Sept.												
Oct.												
Nov.												
Dec.												
Annual Total												
AVERAGE	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	####	####

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	DIGESTER WASTE TOTAL GALS.	DIGESTER DECANT TOTAL GALS.	DIGESTER DRYING BEDS GALS.	DIGESTER SOLIDS BEDS mg/L	DIGESTER TOTAL SOLIDS LBS.	DIGESTER CHEMICALS LIME USED LBS	DIGESTER CHEMICALS POLYMER USED mL	DIGESTER CHEMICALS POLYMER DRYING BED mL	DRYING BED DISCHARGED #	DRYING BED DISCHARGED #
Jan. 1997	110907	95374			0		101000			
Feb.	101910	89106	20982		0		141000		1,2	3,7
Mar.	152045	114723	19348	30000	**4841**	900	104000		5	6
Apr.	108722	118537			0		116000			
May	156712	135434	23980		0	900	162000		1,2	4,8
<u>June</u>	142516	89380	49797	30290	**12580**	900	157000		3,5	6,7
July	174128	136795	21800	1200	**218**	900	136000		1,2	5,8
Aug.	193740	191295			0		185000			
Sept.	228625	237619			0	1000	197000			
Oct.	180020	164589	22890	35370	**6752**	900	150000		1,3	6,8
Nov.	177396	151508			0		161000			
Dec.	181579	182029	16350	36950	**5038**	1100	231000		2,4	5,7
Annual Total	1908300	1706389	175147	133810	29429	6600	1841000	0		
AVERAGE	159025	142199	25021	26762	(WET)	943	153417	#DIV/0!		

DATE	DIGESTER WASTE TOTAL GALS.	DIGESTER DECANT TOTAL GALS.	DIGESTER DRYING BEDS GALS.	DIGESTER SOLIDS BEDS mg/L	DIGESTER TOTAL SOLIDS LBS.	DIGESTER CHEMICALS LIME USED LBS	DIGESTER CHEMICALS POLYMER USED mL	DIGESTER CHEMICALS POLYMER DRYING BED mL	DRYING BED DISCHARGED #	DRYING BED DISCHARGED #
Jan. 1998	161316	161865			0		135500			
Feb.	156782	160228			0		169000			
Mar.	181757	171619	16300		0	900	169000		1,3	5,8
Apr.	145273	113632	16350	30630	**4177**	1000	166000		1,2	3.0
May	132707	67308	56407		0	1000	90000		1,6,7	7,8
<u>June</u>	164917	101370	54282		0	1000	62000			
July	130291	116356	32700		0	1000	30000		2.0	3,4
Aug.	165408	124532	23544	20640	**4053**	1050	108000			
Sept.	134617	142484			0		91000			
Oct.	130253	111179	32700		0	1100	57000			
Nov.	108453	93195			0		77000			
Dec.	107358	105186	22073		0	1100	83000		3,4	7,8
Annual Total	1719132	1468954	254356	51270	8229	8150	1237500	0		
AVERAGE	143261	122413	31795	25635	(WET)	1019	103125	#DIV/0!		

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	PRIMARY FLOWS PML FLOW MG.	PRIMARY FLOWS GRO/BOF FLOW MG.	PRIMARY FLOWS TOTAL FLOW MG.	PRIMARY FLOWS TOTAL FLOW A.F.	EQUALIZATION HOLDING AVE. GAL.	SECONDARY FLOWS AVE FLOW MGD	SECONDARY FLOWS TOTAL FLOW MG.	SECONDARY FLOWS TOTAL FLOW A.F.	RAINFALL Inches	RAINFALL SEASON Total to Date	TREATED EFFLUENT AVE FLOW MGD	TREATED EFFLUENT TOTAL FLOW MG.	TREATED EFFLUENT TOTAL FLOW A.F.	IRRIGATION ON - SITE Field # 1 MG.	Field # 1 A.F.	Field # 2 MG.	Field # 2 A.F.	Field # 3 MG.	Field # 3 A.F.	Field # 4 MG.	Field # 4 A.F.
Jan. **1999**					193,517				8.10	16.85	0.183	5.662	**17.38**								
Feb.					246,265				9.80	26.65	0.228	6.379	**19.58**								
Mar.					168,909	0.160	4.960	**15.225**	2.95	29.60	0.215	6.670	**20.47**								
Apr.					204,375				3.90	33.50											
May					209,632	0.166	3.317	**10.182**	0.80	34.30	0.180	4.496	**13.80**								
June					183,926	0.165	4.959	**15.222**	0.30	Season 34.60	0.198	5.931	**18.21**								
July					214,240	0.178	5.527	**16.965**	0.00	0.00	0.203	6.292	**19.31**								
Aug.					185,591	0.172	5.322	**16.336**	0.00	0.00	0.159	4.942	**15.17**								
Sept.					177,292	0.139	4.170	**12.800**	0.35	0.35	0.227	6.810	**20.90**								
Oct.					187,073	0.127	3.936	**12.082**	0.51	0.86	0.127	3.951	**12.13**								
Nov.					161,319	0.133	3.981	**12.220**	3.54	4.40	0.129	3.872	**11.89**								
Dec.					153	0.129	3.874	**11.891**	0.32	4.72	0.130	4.044	**12.41**								
Annual Total	0.000	0.000	0.000	0.00			40.046	122.923	30.57			59.049	181.25	0.0	0.00	0.000	0.00	0.000	0.00	0.000	0.00
				AVERAGE	177,691					AVERAGE	0.180										

DATE	PRIMARY FLOWS PML FLOW MG.	PRIMARY FLOWS GRO/BOF FLOW MG.	PRIMARY FLOWS TOTAL FLOW MG.	PRIMARY FLOWS TOTAL FLOW A.F.	EQUALIZATION HOLDING AVE. GAL.	SECONDARY FLOWS AVE FLOW MGD	SECONDARY FLOWS TOTAL FLOW MG.	SECONDARY FLOWS TOTAL FLOW A.F.	RAINFALL Inches	RAINFALL SEASON Total to Date	TREATED EFFLUENT AVE FLOW MGD	TREATED EFFLUENT TOTAL FLOW MG.	TREATED EFFLUENT TOTAL FLOW A.F.	IRRIGATION ON - SITE Field # 1 MG.	Field # 1 A.F.	Field # 2 MG.	Field # 2 A.F.	Field # 3 MG.	Field # 3 A.F.	Field # 4 MG.	Field # 4 A.F.
Jan. **2000**					168,596	0.168	5.199	**15.959**	12.89	17.61	0.172	5.321	**16.33**								
Feb.					245,300	0.273	7.918	**24.305**	15.34	32.95	0.254	7.366	**22.61**								
Mar.					261,769	0.258	7.983	**24.504**	3.96	36.91	0.249	7.712	**23.67**								
Apr.					257,831	0.173	5.181	**15.903**	3.57	40.48	0.249	7.481	**22.96**								
May					280,449	0.166	5.158	**15.833**	2.59	43.07	0.156	4.834	**14.84**								
June					272,202	0.165	4.963	**15.234**	0.96	Season 44.03	0.164	4.913	**15.08**								
July					217,784	0.195	6.039	**18.537**	0.00	0.00	0.205	6.356	**19.51**								
Aug.					210,883	0.167	5.169	**15.866**	0.05	0.05	0.219	6.783	**20.82**								
Sept.					179,073	0.136	4.082	**12.530**	0.60	0.65	0.185	5.551	**17.04**								
Oct.					351,136	0.126	3.917	**12.023**	4.24	4.89	0.127	3.947	**12.12**								
Nov.					0	0.124	3.732	**11.456**	0.93	5.82	0.119	3.557	**10.92**								
Dec.					106,835	0.127	3.949	**12.122**	0.78	6.60	0.123	3.704	**11.37**								
Annual Total	0.000	0.000	0.000	0.00			63.290	194.271	45.91			67.525	207.27	0.0	0.00	0.000	0.00	0.000	0.00	0.000	0.00
				AVERAGE	212,655					AVERAGE	0.185										

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	IRRIGATION and EFFLUENT DISPOSAL: ON - SITE TOTAL MG.	ON - SITE TOTAL A.F.	PML TOTAL MG.	PML TOTAL A.F.	CONSTRUCTION THOU. GAL.	CONSTRUCTION A.F.	TOTAL DISPOSAL A.F.	EFFLUENT IN-STORAGE: RESERVOIR # 1 LEVEL FT.	RESERVOIR # 1 VOLUME A.F.	RESERVOIR # 1 D.O.mg/L AVE.	RESERVOIR # 1 TEMP. C AVE.	RESERVOIR # 2 LEVEL FT.	RESERVOIR # 2 VOLUME A.F.	RESERVOIR # 2 D.O.mg/L AVE.	RESERVOIR # 2 TEMP. C AVE.	RES. # 1 RE-TREAT A.F.	CHLORINE: APPL. # / DAY AVE.	APPL. mg / L	FREE RESID. mg/L	DEM. mg/L
Jan. 1999			0.000					16.5	3.60	13.5	9.4	12.8	11.40	14.4	10.7	0.00	45.4	30.40	0.82	29.60
Feb.			0.000	0.00				16.6	3.60	14.4	10.7	17.1	26.00	12.7	10.7	2.30	66.9	36.20	0.86	35.40
Mar.	2.51	8.00	0.000	0.00			8.00	11.8	1.35	16.5	14.2	20.3	44.00	18.9	14.0	2.25	50.4	37.90	0.90	37.00
Apr.	2.029	6.00	0.000	0.00			6.00	12.7	1.70	14.0	15.1	21.3	50.00	8.4	15.7	0.00	39.9		0.85	
May	3.82	12.00	0.141	0.43			12.43	13.6	2.05	4.6	21.3	21.2	55.50	7.1	20.4	1.80	38.7	28.90	0.88	28.10
June			3.713	11.40			11.40	15.7	3.30	7.8	24.4	19.4	38.00	7.2	23.9	0.30	47.3	35.50	1.04	34.50
July			2.315	7.11			7.11	10.4	0.89	8.5	26.2	16.7	24.30	5.5	26.3	1.65	42.4	29.10	1.27	27.80
Aug.	9.92	30.44	0.297	0.91			31.35	13.1	1.85	10.1	24.1	14	14.90	6.6	24.0	0.00	38.5	27.40	1.02	26.40
Sept.	10.21	31.30	0.297	0.91			32.21	15	2.80	5.4	22.4	11.9	10.30	10.9	22.9	4.00	45.1	40.20	1.13	39.10
Oct.			0.304	0.93				8.7	0.50	14.1	17.6	10.5	8.90	12.7	17.7	0.83	34.3	32.80	1.03	31.80
Nov.	10.21	31.30					31.30	8.2	0.49	11.9	13.1	9.8	8.30	14.8	13.2	0.30	29.6	27.30	1.53	25.80
Dec.	1.31	3.13					3.13	11	1.10	5.8	7.5	11.2	9.50	15.1	8.5	0.40	43.0	40.40	0.91	39.50
Annual Total	40.000	122.17	7.067	21.69	0.00	0.00	142.93									13.83				
							AVERAGE	13	1.94	10.6	17.2	16	25.09	11.2	17.3	AVERAGE	43.4	33.3	1.0	32.3

DATE	IRRIGATION and EFFLUENT DISPOSAL: ON - SITE TOTAL MG.	ON - SITE TOTAL A.F.	PML TOTAL MG.	PML TOTAL A.F.	CONSTRUCTION THOU. GAL.	CONSTRUCTION A.F.	TOTAL DISPOSAL A.F.	EFFLUENT IN-STORAGE: RESERVOIR # 1 LEVEL FT.	RESERVOIR # 1 VOLUME A.F.	RESERVOIR # 1 D.O.mg/L AVE.	RESERVOIR # 1 TEMP. C AVE.	RESERVOIR # 2 LEVEL FT.	RESERVOIR # 2 VOLUME A.F.	RESERVOIR # 2 D.O.mg/L AVE.	RESERVOIR # 2 TEMP. C AVE.	RES. # 1 RE-TREAT A.F.	CHLORINE: APPL. # / DAY AVE.	APPL. mg / L	FREE RESID. mg/L	DEM. mg/L
Jan. 2000	1.029	3.16	0.000				3.16	14.8	2.7	7.3	8.7	12.6	10.8	15.0	8.9	3.90	55.9	44.20	0.86	43.30
Feb.			0.000					19.1	5.7	6.4	9.9	17.1	26.0	18.0	10.2	1.70	76.9	35.20	0.63	34.60
Mar.	1.530	4.70	0.000				4.70	22.6	10.0	15.3	13.8	21.7	53.0	18.8	14.7	6.30	75.0	35.00	0.42	34.50
Apr.	1.530	4.70	0.000				4.70	14.4	2.4	9.1	17.9	23.6	65.0	8.0	18.1	5.80	72.6	51.10	3.55	47.60
May	9.293	28.52	0.000				28.52					24.5	70.0	11.2	22.9	0.00	58.3	44.40	0.87	43.50
June	3.380	10.37	2.981	9.15			19.52	9.2	0.7	6.3	25.9	23.6	64.0	9.9	22.5	0.44	55.6	41.60	0.94	40.70
July	2.320	7.12	2.879	8.84			15.96	15.2	2.9	9.4	26.0	20.8	46.0	9.6	27.3	1.70	55.1	34.20	0.89	33.20
Aug.	8.928	27.40	2.344	7.19			34.60	13.8	2.1	8.1	25.8	18.6	33.0	7.3	26.6	3.50	55.0	40.00	0.74	39.20
Sept.	7.615	23.38	5.847	17.95			41.32	6.3	0.2	9.8	22.7	15.4	18.8	9.4	22.7	2.45	47.7	43.00	1.16	41.90
Oct.	5.700	17.50	1.686	5.18			22.67	1.6	0.1	7.2	21.0	11.3	9.8	15.2	17.5	0.15	41.0	39.20	1.94	37.30
Nov.	2.520	7.74	0.733	2.25			9.99	9.1				11.2		17.6	9.4		28.2	28.00	0.66	27.40
Dec.	2.570	7.89	0.207	0.64			8.52	0.7	0.0			11.1	9.5	19.8	9.5	0.20	29.0	28.00	0.70	27.30
Annual Total	46.414	142.47	16.677	51.19	0.00	0.00	193.66									26.14				
							AVERAGE	12	2.67	8.8	19.1	18	36.90	13.3	17.5	AVERAGE	54.2	38.7	1.1	37.5

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	INFLUENT D.O. mg/L	INFLUENT TEMP C	EFFLUENT D.O. mg/L	EFFLUENT TEMP C	CONTACT D.O. mg/L	CONTACT TEMP C	REAERATION D.O. mg/L	REAERATION TEMP C	TURB EFFL NTU	CLF BLKT FT.	PH EFFL S.U. AVE.	PH INFL S.U. AVE.	PH CONT S.U. AVE.	PH REAER S.U. AVE.	PH DIG S.U. AVE.	IMHOFF SET.S. INFL ML	IMHOFF SET.S. EFFL. ML	COD 2hr INFL. mg/L	COD 2hr EFFL. mg/L	COD % RED.	BOD 5 day INFL. mg/L	BOD 5 day EFFL. mg/L	BOD 5 day RED. %	COLIF. EFFL MPN 100mL	NITRATE EFFL mg/L	NITRITE EFFL N mg/L
Jan. 1999	0.40	12.1	2.2	10.6	5.0	11.5	0.7	10.8	18.1	2.3	7.0	7.1	7.1	7.1	7.1	11.8	0.26	750	184	75.5	195	17	91.3	2.0	3.5	6.2
Feb.	2.60	11.5	2.2	10.5	5.0	11.2	1.0	10.9	17.9	1.2	6.9	7.1	7.1	6.9	6.8	12.1	0.24	572	110	80.8	220	27	87.7	2.0	9.7	4.7
Mar.	0.80	12.4	5.5	11.8	5.0	12.6	0.5	12.1	14.4	1.3	7.2	7.3	7.2	7.1	7.1	12.1	0.24	471	96	79.6	134	19	85.8	2.0	9.4	3.5
Apr.	0.10	13.9	1.1	13.9	4.3	14.4	0.5	14.0	10.6	0.6	7.3	7.3	7.3	7.2	7.0	11.7	0.16	487	78	84.0	73	8	89.0	2.0	1.8	6.3
May	0.00	17.6	1.0	18.5	4.0	18.4	0.4	18.2	18.0	1.7	7.4	7.3	7.4	7.3	7.4	16.3	0.14	8	71	92.0	292	16	94.5	<2	1.3	5.2
June	0.08	19.9	1.0	21.1	4.9	20.6	0.4	21.6	35.6	2.9	7.4	7.4	7.4	7.1	7.4	16.6	0.42	815	84	89.7	370	50	86.5	5.0	2.5	6.6
July	0.20	23.2	0.9	23.9	4.6	23.2	0.1	24.6	21.1	0.7	7.4	7.5	7.4	7.1	7.2	17.4	0.13	704	74	89.5	253	53	79.1	<2	2.6	5.9
Aug.	0.02	22.2	0.8	23.4	4.0	23.2	0.2	24.3	34.0	4.3	7.3	7.4	7.3	7.1	7.4	17.9	0.69	1209	97	92.0	258	43	83.3	<2	4.7	8.1
Sept.	0.05	22.0	1.8	22.3	5.4	22.2	0.4	22.9	19.6	3.5	7.4	7.4	7.3	7.2	7.4	17.7	0.76	1245	79	93.7	242	35	85.5	2.0	4.8	6.4
Oct.	0.10	18.5	4.3	19.1	5.2	19.3	0.3	19.3	8.8	2.9	7.3	7.4	7.2	7.1	7.3	19.4	0.20	1234	76	93.8	211	21	90.0	2.0	5.8	5.7
Nov.	1.30	15.3	1.9	15.6	3.9	16.0	0.2	15.8	10.8	2.2	6.8	7.3	6.9	6.9	7.1	21.8	0.32	889	74	91.7	353	28	92.1	8.0	9.1	4.0
Dec.	2.50	11.9	3.3	11.4	5.5	12.3	0.8	11.9	17.0	3.1	7.1	7.3	7.1	7.0	6.9	18.4	0.37	913	92	89.9	328	48	86.0	2.0	4.9	5.1
Annual Total																										
AVERAGE	0.68	16.7	2.2	16.8	4.7	17.1	0.5	17.2	18.8	2.2	7.2	7.3	7.2	7.1	7.2	16.1	0.33	774.8	92.9	87.7	244.1	30.4	87.6	3.0	5.0	5.6

DATE	INFLUENT D.O. mg/L	INFLUENT TEMP C	EFFLUENT D.O. mg/L	EFFLUENT TEMP C	CONTACT D.O. mg/L	CONTACT TEMP C	REAERATION D.O. mg/L	REAERATION TEMP C	TURB EFFL NTU	CLF BLKT FT.	PH EFFL S.U. AVE.	PH INFL S.U. AVE.	PH CONT S.U. AVE.	PH REAER S.U. AVE.	PH DIG S.U. AVE.	IMHOFF SET.S. INFL ML	IMHOFF SET.S. EFFL. ML	COD 2hr INFL. mg/L	COD 2hr EFFL. mg/L	COD % RED.	BOD 5 day INFL. mg/L	BOD 5 day EFFL. mg/L	BOD 5 day RED. %	COLIF. EFFL MPN 100mL	NITRATE EFFL mg/L	NITRITE EFFL N mg/L
Jan. 2000	2.1	11.1	2.6	11.3	4.7	11.5	0.7	11.5	15.8	2.0	7.0	7.2	7.0	6.9	7.1	13.1	0.37	814	104	87.2	421	60	85.7	2.0	4.4	7.2
Feb.	4.3	11.4	2.5	12.0	5.9	11.5	0.5	12.1	20.9	1.8	7.0	7.2	7.0	6.9	6.8	9.9	0.38	536	110	76.0	271	53	80.0	2.0	3.6	4.2
Mar.	5.4	12.5	1.4	13.7	4.6	13.0	2.5	13.2	13.7	2.8	6.8	7.1	6.8	6.7	6.9	10.1	0.35	662	66	88.0	238	28	88.2	5.0	5.4	2.9
Apr.	0.2	16.1	0.5	17.0	4.0	16.5	1.5	16.8	12.3	2.8	6.6	7.1	6.6	6.6	7.0	13.6	0.38	1032	61	94.1	391	18	95.4	5.0	10.3	2.8
May	0.2	18.3	0.8	19.5	5.0	19.1	0.5	19.6	16.7	3.8	6.9	7.1	6.9	6.9	7.1	15.3	0.33	1123	80	92.0	420	21	94.0	4.0	7.5	2.9
June	0.1	22.5	0.2	23.0	5.0	22.8	0.3	23.6	13.5	1.2	6.8	7.1	6.9	6.6	7.1	14.3	0.21	736	82	88.0	279	23	91.0	2.0	9.6	3.9
July	0.0	23.0	0.1	23.7	4.6	23.6	0.4	24.8	9.9	0.7	6.9	7.2	6.9	6.7	7.3	16.3	1.69	909	81	91.1	420	30	92.9	2.0	9.2	4.4
Aug.	0.0	23.2	0.1	24.4	3.7	24.4	0.7	25.2	8.8	1.3	6.8	7.4	6.8	6.5	7.2	18.0	1.23	1027	70	93.2	493	20	95.9	2.0	12.0	3.4
Sept.	0.1	21.3	0.0	22.5	3.8	22.5	1.0	22.9	6.7	0.5	6.7	7.4	6.7	6.4	6.6	22.1	0.36	800	86	89.3	396	20	94.9	<2	12.6	2.4
Oct.	0.5	18.1	0.3	19.1	4.3	18.9	0.4	19.4	6.4	0.7	6.8	7.3	6.8	6.6	6.8	20.6	0.11	684	64	90.6	356	19	94.7	2.0	8.8	1.7
Nov.	0.0	11.8	1.7	12.8	5.3	12.8	0.5	12.7	8.8	0.3	7.2	7.3	7.3	7.0	7.0	12.9	0.10	456	69	84.9	197	22	88.8	2.0	3.8	2.4
Dec.	0.1	11.7	2.0	12.0	6.2	12.1	0.3	12.0	8.9	2.3	7.4	7.5	7.4	7.3	7.3	19.1	0.11	828	77	90.7	275	24	91.3	7.0	1.5	1.9
Annual Total																										
AVERAGE	1.1	16.8	1.0	17.6	4.8	17.4	0.8	17.8	11.9	1.7	6.9	7.2	6.9	6.8	7.0	15.4	0.47	800.6	79.2	88.8	346.4	28.2	91.1	3.2		3.3

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	SLUDGE VOLUME INDEX				CONTACT		REAERATION		TOTAL SOLIDS		RAS SOLIDS			DIGESTER SOLIDS			RESPIROMETER						CENTRIFUGE			
	SVI 30 CONT. mL/L	SVI 30 REAER mL/L	SVI 30 AVE mL/L	SVI	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	TOTAL mg/l	MLSS mg/L	MLVSS mg/L	TOTAL mg/l	INF. O.U.R. ml/L/hr	EFFL. O.U.R. ml/L/hr	CONT. O.U.R. ml/L/hr	REAR. O.U.R. ml/L/hr	RAS O.U.R. ml/L/hr	DIG O.U.R. ml/L/hr	CON %	REA %	RAS %	DIG %
Jan. 1999	214	801	613	104	2809	2131	7485	5647	5982	4517	9160	6783	9661	18037	18056	24145							3.4	9.2	11.8	29.5
Feb.	128	721	530	86	2123	1636	8293	5892	6309	4524	9222	6521	9469	27800	19330	25964							3.0	9.0	10.0	28.0
Mar.	133	486	373	71	2602	2158	6132	10652	4998	7922	10486	8143	11080	14651	11007	19489							3.0	7.0	12.0	23.0
Apr.	132	517	393	101	1602	1298	4615	3671	3646	2908	6508	5208	6791	24768	17190	25912							3.0	7.0	9.0	32.0
May	203	604	475	157	1762	1427	3765	3040	3121	2521	7246	5806	7256	25108	18573	25296							3.0	7.0	12.0	30.0
June	172	941	694	99	2461	1943	9222	6931	7049	5328	11195	8654	11434	26628	19896	29154							4.0	14.0	16.0	41.0
July	126	908	656	107	1596	1251	8183	5996	6066	4471	10794	8137	11162	18828	13645	20805							3.0	12.0	15.0	31.0
Aug.	265	939	722	99	3153	2445	9553	7127	7496	5622	14490	10923	12261	29879	21983	27456							5.0	14.0	18.0	43.0
Sept.	198	664	515	80	3376	2503	8658	6388	6805	5139	16744	11514	16255	32663	22990	33782							4.0	12.0	21.0	38.0
Oct.	146	510	393	81	2160	1616	6126	4317	4851	3448	16526	10352	22091	35258	22290	33960							3.0	8.0	21.0	41.0
Nov.	278	534	451	76	4483	2929	6797	4394	6054	3923	12429	8239	13074	14938	20156	28715							5.0	8.0	16.0	33.0
Dec.	207	662	516	73	4834	3833	9042	6993	7689	5977	13963	10776	17959	32004	24143	30983							4.0	9.0	17.0	35.0
Annual Total																										
AVERAGE	184	691	528	95	2747	2098	7323	5921	5839	4692	11564	8421	12374	25047	19105	27138	#####	#####	#####	#####	#####	#####	3.6	9.7	14.9	33.7

DATE	SLUDGE VOLUME INDEX				CONTACT		REAERATION		TOTAL SOLIDS		RAS SOLIDS			DIGESTER SOLIDS			RESPIROMETER						CENTRIFUGE			
	SVI 30 CONT. mL/L	SVI 30 REAER mL/L	SVI 30 AVE mL/L	SVI	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	TOTAL mg/l	MLSS mg/L	MLVSS mg/L	TOTAL mg/l	INF. O.U.R. ml/L/hr	EFFL. O.U.R. ml/L/hr	CONT. O.U.R. ml/L/hr	REAR. O.U.R. ml/L/hr	RAS O.U.R. ml/L/hr	DIG O.U.R. ml/L/hr	CON %	REA %	RAS %	DIG %
Jan. 2000	156	564	433	63	2683	2176	8823	6832	6849	5335	13323	10357	14193	34706	27110	38157							3.0	9.0	16.0	35.0
Feb.	146	887	649	59	2952	2322	14863	11207	11034	8351	16455	12629	16708	32161	22763	31987							3.0	16.0	17.0	31.0
Mar.	222	857	653	61	4344	3324	13840	9825	10788	7735	14237	10156	13968	30160	20985	30751							7.0	14.0	15.0	30.0
Apr.	311	668	553	48	6805	4934	12826	8661	10890	7463	18333	12260	17311	27457	18203	30701							7.0	13.0	18.0	30.0
May	329	823	664	54	6482	4623	15179	9815	12383	8146	30244	10708	16918	33937	22861	33258							7.0	16.0	19.0	35.0
June	213	722	558	136	3709	2709	10126	7220	7300	5224	10552	7733	11201	24300	13834	22424							16.0	13.0	13.0	28.0
July	178	624	480	66	2747	2097	8890	6461	6916	5058	8418	7290	9812	19460	13518	19858							5.0	11.0	12.0	28.0
Aug.	263	766	604	84	4026	3030	8899	6647	7332	5484	9184	6825	9156	22377	15962	22070							6.0	12.0	13.0	27.0
Sept.	198	575	454	73	3107	2490	7630	5862	6176	4778	7613	5537	8172	22612	16662	23387							4.0	10.0	11.0	30.0
Oct.	201	647	503	68	3257	2578	8982	6670	7142	5355	9396	6943	9087	25938	19935	25016							5.0	12.0	12.0	33.0
Nov.	122	412	319	78	1526	1265	4533	3684	3566	2906	6085	4837	6342	9692	7615	8189							3.0	7.0	10.0	12.0
Dec.	259	895	690	143	2246	1898	6082	5020	4849	4016	9107	7389	8693	15546	12624	16143							4.0	10.0	14.0	26.0
Annual Total																										
AVERAGE	217	703	547	78	3657	2787	10056	7325	7935	5821	12746	8555	11797	24862	17673	25162	#####	#####	#####	#####	#####	#####	5.8	11.9	14.2	28.8

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	DIGESTER WASTE TOTAL GALS.	DIGESTER DECANT TOTAL GALS.	DIGESTER DRYING BEDS GALS.	DIGESTER SOLIDS BEDS mg/L	DIGESTER TOTAL SOLIDS LBS.	DIGESTER CHEMICALS LIME USED LBS	DIGESTER CHEMICALS POLYMER USED Liter	DIGESTER CHEMICALS POLYMER DRYING BED mL	DRYING BED DISCHARGED #	DRYING BED DISCHARGED #
Jan. 1999	146879	125898			0		141			
Feb.	115269	130528			0		139			
Mar.	123445	111726	27250	7543	1714	1000.0	95		3,4	7,8
Apr.	127532	114996			0		140			
May	169768	154237	24525	39890	8159	1100.0	140		1,2	5,6
June	158598	134345	35698	32220	9593	1100.0	265		Summer	
July	137339	111918			0		66			
Aug.	204380	222633			0		279			
Sept.	197836	173786	28340	8967	2119	1050.0	183		Summer	
Oct.	157779	175267			0		281			
Nov.	130528	106003	19620	32570	5329	1100.0	116		4,5	6,7,8
Dec.	137614	131620			0		245			
Annual Total	1806967	1692957	135433	121190	26915	5350	2090	0		
AVERAGE	150580.6	141079.8	27086.6	24238	(WET)	1070.0	174.2	#DIV/0!		

DATE	DIGESTER WASTE TOTAL GALS.	DIGESTER DECANT TOTAL GALS.	DIGESTER DRYING BEDS GALS.	DIGESTER SOLIDS BEDS mg/L	DIGESTER TOTAL SOLIDS LBS.	DIGESTER CHEMICALS LIME USED LBS	DIGESTER CHEMICALS POLYMER USED Liter	DIGESTER CHEMICALS POLYMER DRYING BED mL	DRYING BED DISCHARGED #	DRYING BED DISCHARGED #
Jan. 2000	125077	135706			0		289			
Feb.	105999	78481			0		145			
Mar.	193749	191840			0		252			
Apr.	177396	139793	32700	41710	11375	1200	135			
May	182847	156691			0		309			
June	157774	120444	32700	30888	8424	1500	88		5,6	7,8
July	180667	143880	40875		0	1150	111		5,6,8	summer
Aug.	171946	145242	31610		0		102			
Sept.	140881	112863			0		36			
Oct.	146603	125623			0		22			
Nov.	70578	50957	30520		0	1200	6		1,2,3,4	5,6,7,8
Dec.	130255	100280			0		61			
Annual Total	1783772	1501800	168405	72598	19799	5050	1556	0		
AVERAGE	148647.7	125150.0	33681.0	36299	(WET)	1263	129.7	#DIV/0!		

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	PRIMARY FLOWS PML FLOW MG.	PRIMARY FLOWS GRO/BOF FLOW MG.	PRIMARY FLOWS TOTAL FLOW MG.	PRIMARY FLOWS TOTAL FLOW A.F.	EQUALIZATION HOLDING AVE. GAL	SECONDARY FLOWS AVE FLOW MGD	SECONDARY FLOWS TOTAL FLOW MG.	SECONDARY FLOWS TOTAL FLOW A.F.	RAINFALL Inches	RAINFALL SEASON Total to Date	TREATED EFFLUENT AVE FLOW MGD	TREATED EFFLUENT TOTAL FLOW MG.	TREATED EFFLUENT TOTAL FLOW A.F.	IRRIGATION ON - SITE Field # 1 MG.	Field # 1 A.F.	Field # 2 MG.	Field # 2 A.F.	Field # 3 MG.	Field # 3 A.F.	Field # 4 MG.	Field # 4 A.F.
Jan. **2001**					192,881	0.150	4.658	**14.298**	7.38	13.98	0.141	4.362	**13.39**								
Feb.																					
Mar.																					
Apr.																					
May																					
June										Season											
July																					
Aug.																					
Sept.																					
Oct.																					
Nov.																					
Dec.																					
Annual Total	0.000	0.000	0.000	0.00			4.658	14.298	7.38			4.362	13.39	0.0	0.00	0.000	0.00	0.000	0.00	0.000	0.00
				AVERAGE	192,881					AVERAGE	0.141										

DATE	PRIMARY FLOWS PML FLOW MG.	PRIMARY FLOWS GRO/BOF FLOW MG.	PRIMARY FLOWS TOTAL FLOW MG.	PRIMARY FLOWS TOTAL FLOW A.F.	EQUALIZATION HOLDING AVE. GAL	SECONDARY FLOWS AVE FLOW MGD	SECONDARY FLOWS TOTAL FLOW MG.	SECONDARY FLOWS TOTAL FLOW A.F.	RAINFALL Inches	RAINFALL SEASON Total to Date	TREATED EFFLUENT AVE FLOW MGD	TREATED EFFLUENT TOTAL FLOW MG.	TREATED EFFLUENT TOTAL FLOW A.F.	IRRIGATION ON - SITE Field # 1 MG.	Field # 1 A.F.	Field # 2 MG.	Field # 2 A.F.	Field # 3 MG.	Field # 3 A.F.	Field # 4 MG.	Field # 4 A.F.
Jan. **####**																					
Feb.																					
Mar.																					
Apr.																					
May																					
June										Season											
July																					
Aug.																					
Sept.																					
Oct.																					
Nov.																					
Dec.																					
Annual Total	0.000	0.000	0.000	0.00			0.000	0.000	0.00			0.000	0.00	0.0	0.00	0.000	0.00	0.000	0.00	0.000	0.00
				AVERAGE	#DIV/0!					AVERAGE	#DIV/0!										

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	IRRIGATION and EFFLUENT DISPOSAL: ON - SITE TOTAL MG.	ON - SITE TOTAL A.F.	PML TOTAL MG.	PML TOTAL A.F.	CONSTRUCTION THOU. GAL.	CONSTRUCTION A.F.	TOTAL DISPOSAL A.F.	EFFLUENT IN-STORAGE: RESERVOIR # 1 LEVEL FT.	RESERVOIR # 1 VOLUME A.F.	RESERVOIR # 1 D.O.mg/L AVE.	RESERVOIR # 1 TEMP. C AVE.	RESERVOIR # 2 LEVEL FT.	RESERVOIR # 2 VOLUME A.F.	RESERVOIR # 2 D.O.mg/L AVE.	RESERVOIR # 2 TEMP. C AVE.	RES. # 1 RE-TREAT A.F.	CHLORINE: APPL. # / DAY AVE.	APPL. mg / L	FREE RESID. mg/L	DEM. mg/L
Jan. 2001	1.417	**4.35**	0.000				**4.35**	6.6	0.19	4.5	5.8	12.2	10.50	17.9	7.3	1.63	28.1	22.80	0.63	22.20
Feb.																				
Mar.																				
Apr.																				
May																				
June																				
July																				
Aug.																				
Sept.																				
Oct.																				
Nov.																				
Dec.																				
Annual Total	1.417	4.35	0.000	0.00	0.00	0.00	4.35									1.63				
							AVERAGE	7	0.19	4.5	5.8	12	10.50	17.9	7.3	AVERAGE	28.1	22.8	0.6	22.2

DATE	IRRIGATION and EFFLUENT DISPOSAL: ON - SITE TOTAL MG.	ON - SITE TOTAL A.F.	PML TOTAL MG.	PML TOTAL A.F.	CONSTRUCTION THOU. GAL.	CONSTRUCTION A.F.	TOTAL DISPOSAL A.F.	EFFLUENT IN-STORAGE: RESERVOIR # 1 LEVEL FT.	RESERVOIR # 1 VOLUME A.F.	RESERVOIR # 1 D.O.mg/L AVE.	RESERVOIR # 1 TEMP. C AVE.	RESERVOIR # 2 LEVEL FT.	RESERVOIR # 2 VOLUME A.F.	RESERVOIR # 2 D.O.mg/L AVE.	RESERVOIR # 2 TEMP. C AVE.	RES. # 1 RE-TREAT A.F.	CHLORINE: APPL. # / DAY AVE.	APPL. mg / L	FREE RESID. mg/L	DEM. mg/L
Jan. ####																				
Feb.																				
Mar.																				
Apr.																				
May																				
June																				
July																				
Aug.																				
Sept.																				
Oct.																				
Nov.																				
Dec.																				
Annual Total	0.000	0.00	0.000	0.00	0.00	0.00	0.00									0.00				
							AVERAGE	#####	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	AVERAGE	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	INFLUENT D.O. mg/L	INFLUENT TEMP C	EFFLUENT D.O. mg/L	EFFLUENT TEMP C	CONTACT D.O. mg/L	CONTACT TEMP C	REAERATION D.O. mg/L	REAERATION TEMP C	TURB EFFL NTU	CLF BLKT FT.	PH EFFL S.U. AVE.	PH INFL S.U. AVE.	PH CONT S.U. AVE.	PH REAER S.U. AVE.	PH DIG S.U. AVE.	IMHOFF SET.S. INFL ML	IMHOFF SET.S. EFFL. ML	COD 2hr INFL. mg/L	COD 2hr EFFL. mg/L	COD % RED.	BOD 5 day INFL. mg/L	BOD 5 day EFFL. mg/L	BOD 5 day RED. %	COLIF. EFFL MPN 100mL	NITRATE EFFL mg/L	NITRITE EFFL N mg/L
Jan. 2001	0.7	9.4	2.8	9.0	6.9	8.9	1.1	9.2	14.2	2.6	7.3	7.3	7.3	7.2	7.3	12.9	0.13	728	89	87.8	344	32	90.7	5.0	2.2	3.600
Feb.																										
Mar.																										
Apr.																										
May																										
June																										
July																										
Aug.																										
Sept.																										
Oct.																										
Nov.																										
Dec.																										
Annual Total																										
AVERAGE	0.7	9.4	2.8	9.0	6.9	8.9	1.1	9.2	14.2	2.6	7.3	7.3	7.3	7.2	7.3	12.9	0.13	728.0	89.0	87.8	344.0	32.0	90.7	5.0		3.600

DATE	INFLUENT D.O.. mg/L	INFLUENT TEMP C	EFFLUENT D.O. mg/L	EFFLUENT TEMP C	CONTACT D.O. mg/L	CONTACT TEMP C	REAERATION D.O. mg/L	REAERATION TEMP C	TURB EFFL NTU	CLF BLKT FT.	PH EFFL S.U. AVE.	PH INFL S.U. AVE.	PH CONT S.U. AVE.	PH REAER S.U. AVE.	PH DIG S.U. AVE.	IMHOFF SET.S. INFL ML	IMHOFF SET.S. EFFL. ML	COD 2hr INFL. mg/L	COD 2hr EFFL. mg/L	COD % RED.	BOD 5 day INFL. mg/L	BOD 5 day EFFL. mg/L	BOD 5 day RED. %	COLIF. EFFL MPN 100mL		NITRITE EFFL N mg/L
Jan. ####																				####			#####			
Feb.																				####			#####			
Mar.																				####			#####			
Apr.																				####			#####			
May																				####			#####			
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Nov.																				####			#####			
Dec.																				####			#####			
Annual Total																										
AVERAGE	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#DIV/0!	#####	######	######	####	####	####	#####	#####	#####	#####		######

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	SLUDGE VOLUME INDEX				CONTACT		REAERATION		TOTAL SOLIDS		RAS SOLIDS			DIGESTER SOLIDS			RESPIROMETER						CENTRIFUGE			
	SVI 30 CONT. mL/L	SVI 30 REAER mL/L	SVI 30 AVE mL/L	SVI	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	TOTAL mg/l	MLSS mg/L	MLVSS mg/L	TOTAL mg/l	INF. O.U.R. ml/L/hr	EFFL. O.U.R. ml/L/hr	CONT. O.U.R. ml/L/hr	REAR. O.U.R. ml/L/hr	RAS O.U.R. ml/L/hr	DIG O.U.R. ml/L/hr	CON %	REA %	RAS %	DIG %
Jan. 2001	183	846	633	135	1980	1557	5999	4870	4707	3805	9736	7625	9260	17727	13398	20685							3.0	9.0	13.0	26.0
Feb.																										
Mar.																										
Apr.																										
May																										
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July																										
Aug.																										
Sept.																										
Oct.																										
Nov.																										
Dec.																										
Annual Total																										
AVERAGE	183	846	633	135	1980	1557	5999	4870	4707	3805	9736	7625	9260	17727	13398	20685	#####	#####	#####	#####	#####	#####	3.0	9.0	13.0	26.0

DATE	SLUDGE VOLUME INDEX				CONTACT		REAERATION		TOTAL SOLIDS		RAS SOLIDS			DIGESTER SOLIDS			RESPIROMETER						CENTRIFUGE			
	SVI 30 CONT. mL/L	SVI 30 REAER mL/L	SVI 30 AVE mL/L	SVI	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	MLSS mg/L	MLVSS mg/L	TOTAL mg/l	MLSS mg/L	MLVSS mg/L	TOTAL mg/l	INF. O.U.R. ml/L/hr	EFFL. O.U.R. ml/L/hr	CONT. O.U.R. ml/L/hr	REAR. O.U.R. ml/L/hr	RAS O.U.R. ml/L/hr	DIG O.U.R. ml/L/hr	CON %	REA %	RAS %	DIG %
Jan. ####																										
Feb.																										
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June																										
July																										
Aug.																										
Sept.																										
Oct.																										
Nov.																										
Dec.																										
Annual Total																										
AVERAGE	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	####	####	####	####

GCSD STP Flow, Precipitation, and Treatment Summary

DATE	DIGESTER WASTE TOTAL GALS.	DIGESTER DECANT TOTAL GALS.	DIGESTER DRYING BEDS GALS.	DIGESTER SOLIDS BEDS mg/L	DIGESTER TOTAL SOLIDS LBS.	DIGESTER CHEMICALS LIME USED LBS	DIGESTER CHEMICALS POLYMER USED Liter	DIGESTER CHEMICALS POLYMER DRYING BED mL	DRYING BED DISCHARGED #	DRYING BED DISCHARGED #
Jan. 2001	157782	147967	32155		0	1100.0	117.0		1,2,3,4	5,6,7,8
Feb.					0					
Mar.					0					
Apr.					0					
May					0					
June					0					
July					0					
Aug.					0					
Sept.					0					
Oct.					0					
Nov.					0					
Dec.					0					
Annual Total	157782	147967	32155	0	0	1100	117	0		
AVERAGE	157782.0	147967.0	32155.0	#DIV/0!	(WET)	1100.0	117.0	#DIV/0!		

DATE	DIGESTER WASTE TOTAL GALS.	DIGESTER DECANT TOTAL GALS.	DIGESTER DRYING BEDS GALS.	DIGESTER SOLIDS BEDS mg/L	DIGESTER TOTAL SOLIDS LBS.	DIGESTER CHEMICALS LIME USED LBS	DIGESTER CHEMICALS POLYMER USED mL	DIGESTER CHEMICALS POLYMER DRYING BED mL	DRYING BED DISCHARGED #	DRYING BED DISCHARGED #
Jan. ####					0					
Feb.					0					
Mar.					0					
Apr.					0					
May					0					
June					0					
July					0					
Aug.					0					
Sept.					0					
Oct.					0					
Nov.					0					
Dec.					0					
Annual Total	0	0	0	0	0	0	0	0		
AVERAGE	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	(WET)	#DIV/0!	#DIV/0!	#DIV/0!		

APPENDIX C
GCSD Sewer Spill History, 1990 to 2001

Groveland Community Services District

Sewer Spill History 1990 to Present

Date	System Section	Location	Type of Problem	Facility Involved	Equipment Involved	Volume Released	Effected Area	Remedial Action	Yr	Sec	PML Loc.
11-28-2000	Groveland / Big Oak Flat	Behind Wayside Park, Hwy 120	Blockage	Gravity Main, 8"	Main Gravity line from Groveland / Big Oak Flat	10,000	Drainage course, First Garrotte Creek. First Garrotte Creek to Pine Mountain Lake. Approximately 6,564 ft. of creek	Pumped sewage out of creek at mid-point, flushed creek with 50,000 gallons of water. Rain runoff flushed creek on 11-29-00	00	G / B	
9-15-2000	Pine Mountain Lake	Butler Way Unit 13 Lot 296	Blockage	Service cleanout	Sewer connection cleanout	unknown	Contained within 20ft. of customer's service cleanout, part-time occupancy, slow & low flow	Self contained by soaking into soil, cleared blockage	00	P	13-296
8-27-2000	Pine Mountain Lake	Tannahill Drive Unit 5 Lot 301	Blockage	Gravity Main,	Manhole Blockage	300	Flow to and down street gutter to dry drainage course, pooled at street culvert.	Root ball blockage in manhole. Manhole pumped. Spill did not extend beyond street culvert	00	P	5-301
7-23-2000	Pine Mountain Lake	Pleasant View Drive Unit 1 Lot 300	Blockage	Gravity Main,	Manhole Blockage	200	Self contained within 10 feet of manhole	Root intrusion into manhole	00	P	1-301
7-1-2000	Pine Mountain Lake	Yorkshire Road Unit 12 Lot 210	Breakage	Force Main, 4" LS # 11	Pipe split-bell	8,000	Flow extended approximately 800 ft down dry drainage course, tributary to Humbug Creek	Contained in pools in drainage course, used vacuum truck to maintain lift station during repairs	00	P	12-210
5-31-2000	Pine Mountain Lake	Pine Mountain Dr. Unit 13 Lot 197	Blockage	Manhole	Manhole Blockage	20	Self contained within 10 feet of manhole. Problem reported as soon as problem began	Self contained within manhole area due to partial blockage.	00	P	13-197
1-8-2000	Pine Mountain Lake	First Garrotte Circle Unit 7 Lot 117	Breakage	Force Main, 4" LS # 10	Pipe split-bell	unknown	Spill site was detected after brush removal. Spill location was 20 ft. above drainage course.	Problem was close to break over point in force main. Surface disinfection applied.	00	P	7-117
1-3-2000	Pine Mountain Lake	Pine Mountain Dr. Unit 1 Lot 428	Blockage	Service cleanout	Sewer connection cleanout	20	Contained within area of customer's service cleanout. Customer called District	Root ball blockage in customer cleanout. Disinfected surface area.	00	P	1-428
10-18-1999	Pine Mountain Lake	Pleasant View Drive Unit 1 Lift Station	Equipment Failure	Lift Station # 9	Float Switch	10	Spill caught early enough to self contain in soil at the lift station facility	Replaced defective float	99	P	1-LS# 9

Groveland Community Services District

Sewer Spill History 1990 to Present

Date	System Section	Location	Type of Problem	Facility Involved	Equipment Involved	Volume Released	Effected Area	Remedial Action	Yr	Sec	PML Loc.
8-27-1999	Pine Mountain Lake	Grizzly Circle Unit 1 Lot 379	Breakage	Force Main, 4" LS # 5	Pipe Seal Leak	800	Major portion of spill pooled within landscape area of residence at 19502 Grizzly Circle	Replaced seal. Disinfected surface area, taped off land-scaping to restrict public access	99	P	1-379
8-12-1999	Groveland Community Services District	District Treated Wastewater Disposal Area	Breakage	Irrigation Field # 3	Sprinkler head	1,000	Dirt berm failed to contain the treated water due to gofer hole breach of berm. Flow entered drainage course	Some of the flow self-contained in pools in drainage course. Flow entered First Garrotte Creek, did not enter Pine Mountain Lake.	99	D	Irrg. # 3
8-15-1999	Groveland Community Services District	District Treated Wastewater Disposal Area	Breakage	Irrigation Field # 3	Sprinkler head	500	Dirt berm failed to contain the treated water due to gofer hole breach of berm. Flow entered drainage course	Same problem as 8-12-99. Operator error failed to isolate the sprinkler head from system, prior to the making of repairs	99	D	Irrg. # 3
7-22-1999	Big Oak Flat	Black Street	Blockage	Service cleanout	Sewer connection cleanout	Greater than 1,000	Flow soaked into ground around cleanout. Single Residence	Surface disinfection	99	B	
6-17-1999	Pine Mountain Lake	First Garrotte Circle Unit 7 Lot 116	Breakage	Force Main, 4" LS # 10	Possible pipe seal problem	1,000	Localized in area. Did not reach drainage course.	Did not find leak, think root was intruding into pipe seal and was removed during pipe excavation.	99	P	7-116
6-2-1999	Groveland Community Services District	District Treated Wastewater Disposal Area	Breakage	Irrigation Fields 3 & 4 Force Main, 8"	Fractured 8" PVC tee	200	Most of the water was contained in the irrigation field area and dirt berm, the water that did escape was through gofer hole in berm	Spill volume was self contained in drainage ditch pools, but over-night rains moved contaminated water to First Garrotte Creek and beyond	99	D	Irrg.
5-25-1999	Groveland Community Services District	District Wastewater Treatment Plant	Breakage	Force Main, 3" Wash-down water storage tank	Buried 3 PVC pipe, Treated Wastewater from Pressure Tank	1,000	A rock bar while exposing a different line, which was above the punctured line, punctured this PVC line.	The flow traveled three directions, one that entered a storm water drain. This water was contained at the drain outfall on District property but within the First Garrotte Creek basin	99	D	STP

Groveland Community Services District

Sewer Spill History 1990 to Present

Date	System Section	Location	Type of Problem	Facility Involved	Equipment Involved	Volume Released	Effected Area	Remedial Action	Yr	Sec	PML Loc.
5-11-1999	Groveland Community Services District	District Wastewater Treatment Plant	Blockage	Drainage Culvert	Rock blocked drainage culvert overflowed	3,600	A drainage culvert used to convey sludge to open air-drying beds became blocked with rocks. The culvert overflowed to First Garrotte Creek basin	Flow entered creek basin but did not enter stream flow. Gravel and sand were used to contain surface flow, culvert was cleared to arrest situation.	99	D	STP
4-5-1999	Groveland Community Services District	District Wastewater Treatment Plant	Human Error	Valve 16"	16" emergency valve opened to drainage course	2.5 million	Emergency relief valve for Treated Wastewater holding Reservoir # 2 was opened in a non-emergency situation	Valve was closed	99	D	STP
10-6-1998	Pine Mountain Lake	Cresthaven & Green Valley Circle Unit 3 Lot 335	Equipment Failure	Lift Station # 12	Backup Float Switch set to high to turn on pumps	200	Self contained within 30 ft. of lift station by soaking into dry ground	Reset float switch and replaced failed PLC unit.	98	P	3-355
7-2-1998	Pine Mountain Lake	Jimmie Bell Street Unit 7 Lot 162	Breakage	Force Main, 4" Lift Station #10	Fracture in PVC pipe	1,000+	Rock in pipe bedding material caused pipe failure. Spill flowed to wet drainage course.	No containment possible, flushed drainage course with 10,800 gallons of potable water.	98	P	7-162
4-10-1998	Groveland Community Services District	Between District Wastewater Treatment Plant and Pine Mountain Lake	Equipment Failure	Force Main, 10" Lift Station # 7	Air Relief Valve failure	20,000	Flow traveled to First Garrotte Creek and into Pine Mountain Lake	Replaced air relief valve	98	D	STP
3-23-1997	Pine Mountain Lake	Pleasant View Drive Unit 1 Lot 300	Equipment Failure	Gravity Main, from Lift Station # 8	Control failure of PLC and backup systems at Lift Station # 5	2,000+	Customer's cleanout service connection is the lowest point between LS# 8 and LS#5, which spills at this point if LS # 5 fails	The failure of LS # 5 and the backup of sewage this causes will spill at this low point	97	P	1-300
2-4-1997	Groveland Community Services District	District Wastewater Treatment Plant	Infiltration Controlled Spill, Treated Effluent	Discharged Treated Effluent through Irrigation	Treated Effluent pumped to PML Golf course between 2-4 and 2-19-1997	14,480 million	Pumped to PML Golf Course Irrigation pond, pond overflowed to drainage course, drainage course to Big Creek. Flow kept out of Pine Mountain Lake	During high sewer collection infiltration period, the effluent impoundments were into freeboard limits. The discharge lowered impoundment levels	97	D	STP

Groveland Community Services District

Sewer Spill History 1990 to Present

Date	System Section	Location	Type of Problem	Facility Involved	Equipment Involved	Volume Released	Effected Area	Remedial Action	Yr	Sec	PML Loc.
1-2-97	Pine Mountain Lake	Big Foot Court Unit 4 Lot 75	Infiltration Breakage	Lift Station # 14	Broken sewer Flushing Branch	3,000	Left Station # 14 overflowed with Pine Mountain Lake and sewage waters during high lake levels due to rains.	High lake levels submerged a broken sewer collection system-flushing branch during an extended heavy rain period.	97	P	4-75
1-1-1997	Pine Mountain Lake	Yorkshire Road Unit 12 Lot 210	Infiltration Breakage	Lift Station # 11	Broken sewer connection cleanout	2,000	Lift Station overflow entered drainage course. Heavy rains & drainage course flow.	A broken sewer connection cleanout became submerged under high rain runoff flows, flows entered sewer collection system and overwhelmed lift station pumping capacity	97	P	12-210
12-20-1996	Groveland	Elder Lane Twin Pines Apartments	Vandalism	Gravity Main	Vandalism of 9 manholes	800 Localized	5 out of 9 vandalized manholes overflowed in their local areas. Overflows did not enter drainage courses.	Newer vandalism proof bolts for the manhole covers were installed.	96	G	
12-20-1996	Groveland	Tenaya School Gym and Highway 120	Blockage	Gravity Lateral	Sewer Lateral from School	100	Gym clothing blocked sewer lateral. Spill confined to 30 ft.	Localized spill	96	G	
12-5-1996	Groveland	Ferretti Road and GCSD	Blockage	Gravity Main	Manhole	800	Drainage course to First Garrotte Creek and Pine Mountain Lake	Gravity main from Twin Pines Apartments crossing First Garrotte Creek became blocked	91	G	
11-27-1996	Pine Mountain Lake	Bass Pond, Clements Road Unit 12 Lot 173	Blockage	Gravity Main	Manhole	400	Overflow traveled 30 feet to Bass Pond, a fishing pond.	Cleared blockage	96	P	12-173
10-15-1996	Groveland / Big Oak Flat	Behind Wayside Park, Hwy 120	Blockage	Gravity Main, 8"	Main Gravity line from Groveland / Big Oak Flat	10,000	Drainage course, First Garrotte Creek. Self contained in dry creek in a 3,500 foot area	Cleared blockage. Flushed Gravity Main to treatment plant	96	G / B	
9-22-1996	Groveland Community Services District	District Treated Wastewater Disposal Area	Breakage	Irrigation Fields 3 & 4 Force Main, 8"	Fractured 8" PVC tee	617,527	Flow of treated wastewater traveled across irrigation field to drainage course and into First Garrotte Creek and Pine Mountain Lake	Reduced nighttime irrigation. The reason for the high discharge volume was nighttime irrigation	96	D	Irrg.

Groveland Community Services District

Sewer Spill History 1990 to Present

Date	System Section	Location	Type of Problem	Facility Involved	Equipment Involved	Volume Released	Effected Area	Remedial Action	Yr	Sec	PML Loc.
5-17-1996	Pine Mountain Lake	Jackson Mill and Gamble Streets Unit 2 Lot 102	Equipment Failure	Lift Station # 10	Power Failure, Power Breaker	1,000	Overflow traveled 10 feet to wet drainage course	Replaced power breaker	96	P	2-102
5-8-1996	Groveland Community Services District	District Treated Wastewater Disposal Area	Breakage	Irrigation Fields 3 & 4 Force Main, 8"	Fractured 8" PVC tee	39,600	Flow of treated wastewater traveled across irrigation field to drainage course and into First Garrotte Creek and Pine Mountain Lake	Repaired PVC tee and inspected all pipe in irrigation system	96	D	Irrg.
1-2-1996	Groveland	Elder Lane Twin Pines Apartments	Vandalism	Gravity Main	Vandalism of 1 manhole	200 Localized	Pooled close to manhole	Blockage caused by plastic bucket in manhole. Secured manhole lids in apartment area	96	G	
9-2-1995	Pine Mountain Lake	Jimmie Bell Unit 7 Lot 161	Breakage	Force Main Lift Station # 10	Fracture in PVC pipe	200	Ground saturation in area	Replaced section of pipe.	95	P	7-161
8-23-1995	Groveland / Big Oak Flat	Behind Wayside Park, Hwy 120	Blockage	Gravity Main, 8"	Main Gravity line from Groveland / Big Oak Flat	1,000	Drainage course, First Garrotte Creek. Self contained in dry creek in a 800 foot area	Cleared blockage. Flushed Gravity Main to treatment plant	95	G / B	
6-13-1995	Pine Mountain Lake	Cresthaven Drive Unit 3 Lot 324	Blockage	Gravity Main	Manhole	17,000	Root intrusion and grease blocked flow in manhole, flow entered wet drainage course and Pine Mountain Lake	Cleared root intrusion and grease from manhole	95	P	3-324
4-27-1995	Pine Mountain Lake	Yorkshire Road Unit 12 Lot 210	Infiltration	Lift Station # 11	Lift Station # 11	2,000	Lift Station overflow entered drainage course. Heavy rains & drainage course flow.	Infiltration flows entering sewer collection system and overwhelming lift station pumping capacity	95	P	12-210
3-23-1995	Pine Mountain Lake	Pine Mountain Drive Unit 1 Lot 362	Equipment Failure	Lift Station # 6	Power Failure in small localized area	1,000	Overflow to wet drainage course and into Pine Mountain Lake.	Power failure in this small area kept lift station from operating, while upstream Lift Stations were operational and pumped into this station	95	P	1-362

Groveland Community Services District

Sewer Spill History 1990 to Present

Date	System Section	Location	Type of Problem	Facility Involved	Equipment Involved	Volume Released	Effected Area	Remedial Action	Yr	Sec	PML Loc.
3-21-1995	Groveland Community Services District	District Wastewater Treatment Plant	Infiltration Controlled Spill, Treated Effluent	Discharged Treated Effluent through Irrigation	Treated Effluent irrigated and pumped to PML Golf course between 3-21 and 4-17-1997	18.411 million total. 8.774 M to irr. 9.637 M to B.C.	Irrigated effluent and pumped to PML Golf Course Irrigation pond. Both flows entered drainage courses. One to Pine Mountain Lake, the other to a drainage course, which enters Big Creek below Pine Mountain Lake.	During high sewer collection infiltration period, the effluent impoundments were into freeboard limits. The discharge lowered impoundment levels in holding reservoirs	95	D	STP
3-10-95	Pine Mountain Lake	Pine Mountain Lake Drive Unit 1 Lot 362	Equipment Failure	Lift Station # 6	Lost Prime to pumps	1,000	Overflow to wet drainage course and into Pine Mountain Lake.	Evacuated air from pumps	95	P	1-362
2-25-95	Groveland	Ferretti Road and GCSD	Blockage	Gravity Main	Manhole	1,000	Drainage course to First Garrotte Creek and Pine Mountain Lake	Gravity main from Twin Pines Apartments crossing First Garrotte Creek became blocked	91	G	
12-29-1994	Pine Mountain Lake	Pine Mountain Lake Drive Unit 1 Lot 473	Blockage	Gravity Main	Manhole	200	Flow to dry drainage course	Cleared root intrusion and grease for manhole	94	P	1-473
12-23-1994	Pine Mountain Lake	Yorkshire Road Unit 12 Lot 210	Equipment Failure	Lift Station # 11	Lost Prime to pumps	2,000	Overflow to wet drainage course.	Evacuated air from pumps and cleared PLC	94	P	12-210
12-20-1994	Groveland Community Services District	District Wastewater Treatment Plant	Equipment Failure	Sewer Treatment Plant	Pump control circuit	44,750	Treated effluent flowed to First Garrotte Creek and Pine Mountain Lake after pump control circuit failed to turnoff influent pumps	Pump Control Circuit shuts off influent pumps should the effluent pumps fail, this failure overflowed the chlorine contact chamber	94	D	STP
12-7-1994	Groveland	Tenaya School and Highway 120	Blockage	Gravity Main	Manhole	1,000	Gym clothing blocked sewer lateral.	Flowed about 236 feet in drainage course and 1058 feet in lined gutter	94	G	
8-26-1994	Pine Mountain Lake	Lower Skyridge Drive Unit 15 Lot 115	Blockage	Gravity Main 8"	Manhole between Lift Stations # 1 and # 2	2,000	Flowed to Pine Mountain Lake	Root intrusion cleared	94	P	15-115

Groveland Community Services District

Sewer Spill History 1990 to Present

Date	System Section	Location	Type of Problem	Facility Involved	Equipment Involved	Volume Released	Effected Area	Remedial Action	Yr	Sec	PML Loc.
7-9-1994	Pine Mountain Lake	Tannahill Drive Unit 5 Lot 24	Breakage	Lift Station # 7	Seal failure on pump discharge, inside lift station	3,000	Flowed to dry First Garrotte Creek and contained in 300 foot section of creek	Repaired seal	94	P	5-24
5-25-1994	Pine Mountain Lake	Pleasant View Drive Unit 1 Lot 278	Equipment Failure	Lift Station # 8	Lost Prime to pumps	9,000	Flow to Pine Mountain Lake	Replaced priming pump	94	P	1-278
3-16-1994	Pine Mountain Lake	Grizzly Circle Unit 1 Lot 391	Breakage	Force Main, 4" LS # 5	Pipe Coupler Failure	800	Major portion of spill pooled within 250 ft. Did not reach any water course.	Replaced pipe section Disinfected surface area	94	P	1-391
2-20-1994	Pine Mountain Lake	Yorkshire Road Unit 12 Lot 196	Blockage	Gravity Main	Manhole	1,000	Flowed to Bass Pond	Cleared Blockage, flushing collection lines in the area	94	P	12-196
2-12-1994	Pine Mountain Lake	Clements Drive Unit 12 Lot 173	Blockage	Gravity Main	Manhole	800	Flowed to Bass Pond	Cleared grease and debris from manhole	94	P	12-173
1-12-1994	Pine Mountain Lake	Tannahill Drive Unit 5 Lot 24	Equipment Failure	Lift Station # 7	Vacuum pump switch and bottom float switch failure	1,000	Flowed to wet First Garrotte Creek and into Pine Mountain Lake	Replaced pump switch and float	94	P	5-24
12-3-1993	Groveland	Ferretti Road and GCSD	Blockage	Gravity Main	Manhole	2,000	Drainage course to First Garrotte Creek and Pine Mountain Lake	Gravity main from Twin Pines Apartments crossing First Garrotte Creek became blocked	91	G	
11-11-1993	Pine Mountain Lake	Pine Mountain Lake Drive Unit 1 Lot 362	Equipment Failure	Lift Station # 6	Backup power problem	2,000	Overflow to wet drainage course and into Pine Mountain Lake.	Fuel cutoff switch failure during an emergency power outage caused this station to shutdown while all upstream lift stations continued to pump sewage to this station.	93	P	1-362
6-29-1993	Pine Mountain Lake	Pleasant View Drive Unit 1 Lift Station	Equipment Failure	Lift Station # 9	Station Flooded	100	Self contained in area. Problem found shortly after it started.	Could not find the problem as to why the station failed to work and subsequently flooded.	93	P	1-LS# 9

Groveland Community Services District

Sewer Spill History 1990 to Present

Date	System Section	Location	Type of Problem	Facility Involved	Equipment Involved	Volume Released	Effected Area	Remedial Action	Yr	Sec	PML Loc.
2-11-1992	Pine Mountain Lake	Pleasant View Drive Unit 1 Lot 300	Equipment Failure	Gravity Main, Manhole	Bottom float switch failure	2,000	Flowed to Pine Mountain Lake	Replaced bottom float switch	92	P	1-300
8-28-1991	Groveland / Big Oak Flat	Behind Wayside Park, Hwy 120	Blockage	Gravity Main, 8"	Main Gravity line from Groveland / Big Oak Flat	10,000	Drainage course, First Garrotte Creek. First Garrotte Creek to Pine Mountain Lake.	Cleared gravity line	91	G / B	
2-5-1991	Groveland	Ferretti Road and GCSD	Blockage	Gravity Main	Manhole	2,000	Drainage course to First Garrotte Creek and Pine Mountain Lake	Gravity main from Twin Pines Apartments crossing First Garrotte Creek became blocked	91	G	
1-5-1991	Pine Mountain Lake	Tannahill Drive Unit 5 Lot 24	Equipment Failure	Lift Station # 7	Motor Control Failure while under emergency generator power	1,000	Flowed to wet First Garrotte Creek and into Pine Mountain Lake	Repaired motor control	91	P	5-24
7-2-1990	Pine Mountain Lake	Yorkshire Road Unit 12 Lot 210	Equipment Failure	Lift Station # 11	Pump Impeller; Phase Monitor; Pressure Transducer failure	1,000	Flowed to drainage course	Repaired and replaced parts	90	P	12-210
6-13-1990	Pine Mountain Lake	Rising Hill Circle Unit 3 Lot na	Blockage	Gravity Main	Manhole	200	Retained in pit below manhole	Cleared blockage	90	P	3-na
4-30-1990	Groveland / Big Oak Flat	Behind Wayside Park, Hwy 120	Blockage	Gravity Main, 8"	Main Gravity line from Groveland / Big Oak Flat	8,000	Drainage course, First Garrotte Creek. First Garrotte Creek to Pine Mountain Lake.	Cleared gravity line	90	G / B	

APPENDIX D
Flow Model Output

Existing GCSD Wastewater Results

TABLE 1

(Existing Gravity Main Lines)

Pipe Tag	Pipe Type	DoverD	(in) Size	(fps) DesignVel	(%) Slope	(cfs) AverageFlow	(cfs) ExCapacity	(cfs) QFull	(gpm) AverageFlow	(ft) Length	(cfs) DesignQ	(cfs) QMaxAllowed	(in) Depth
132	EPI	0.28	6	4.52	0.087	0.20	0.42	1.54	89.7	800	0.20	0.62	1.68
136	EPI	0.36	8	4.79	0.050	0.56	0.44	2.50	249.8	3700	0.56	1.00	2.90
139	EPI	**0.54**	10	2.39	0.006	0.72	**-0.10**	1.56	322.6	1700	0.72	0.63	5.40
141	EPI	0.50	12	**5.36**	0.025	2.13	**-0.03**	5.24	954.1	400	2.13	2.10	6.04
144	EPI	0.32	6	4.56	0.077	0.22	0.33	1.45	100.1	2200	0.25	0.58	1.89
149	EPI	0.28	6	3.87	0.064	0.08	0.35	1.32	35.2	900	0.17	0.53	1.68
164	EPI	0.34	12	**5.16**	0.036	1.24	1.27	6.29	558.1	100	1.25	2.52	4.08
165	EPI	**0.58**	8	4.94	0.031	1.05	**-0.26**	1.98	470.3	100	1.05	0.79	4.67
166	EPI	**0.63**	12	2.26	0.004	1.17	**-0.39**	1.96	526.3	1000	1.17	0.79	7.54
167	EPI	0.46	8	4.33	0.031	0.63	0.11	1.98	284.5	100	0.68	0.79	3.68
168	EPI	**0.78**	10	2.04	0.003	0.82	**-0.49**	1.12	367.6	1500	0.93	0.45	7.82
169	EPI	**0.68**	12	2.79	0.005	1.52	**-0.63**	2.35	682.3	1500	1.56	0.94	8.10
170	EPI	**0.51**	6	1.52	0.005	0.08	**-0.01**	0.37	35.1	100	0.15	0.15	3.05
171	EPI	**0.67**	8	1.73	0.003	0.37	**-0.17**	0.65	165.9	1200	0.43	0.26	5.35
175	EPI	**0.63**	10	2.00	0.004	0.72	**-0.24**	1.21	322.6	2000	0.72	0.48	6.29
176	EPI	**0.70**	8	2.16	0.005	0.56	**-0.24**	0.80	249.8	800	0.56	0.32	5.58
177	EPI	**0.59**	6	1.66	0.005	0.20	**-0.05**	0.37	89.7	1200	0.20	0.15	3.53
178	EPI	**0.67**	6	1.75	0.005	0.22	**-0.10**	0.37	100.1	400	0.25	0.15	4.04
180	EPI	**1.00**	6	2.86	0.005	0.56	**-0.41**	0.37	251.3	500	0.56	0.15	6.00
182	EPI	**1.00**	6	2.25	0.005	0.37	**-0.30**	0.37	165.9	200	0.44	0.15	6.00
31	EPI	0.47	6	4.97	0.059	0.37	0.06	1.27	165.8	1000	0.45	0.51	2.79
43	EPI	**0.83**	12	2.25	0.003	1.52	**-0.88**	1.73	682.4	550	1.57	0.69	9.97
49	EPI	0.49	12	3.05	0.008	1.17	0.04	3.03	526.3	300	1.17	1.21	5.89
52	EPI	**0.57**	10	3.00	0.009	0.82	**-0.20**	1.91	367.7	800	0.96	0.76	5.68
58	EPI	0.15	8	4.07	0.100	0.05	1.32	3.56	23.5	300	0.11	1.42	1.18
64	EPI	0.43	8	4.80	0.041	0.63	0.23	2.29	284.5	1450	0.68	0.91	3.40
70	EPI	**0.79**	8	1.91	0.004	0.56	**-0.30**	0.67	251.3	1500	0.56	0.27	6.29
73	EPI	**0.67**	6	4.05	0.027	0.56	**-0.22**	0.86	251.3	1350	0.56	0.34	4.01
82	EPI	**0.55**	8	**5.27**	0.038	1.05	**-0.18**	2.18	470.3	450	1.05	0.87	4.42
88	EPI	0.29	12	**6.69**	0.074	1.24	2.35	8.99	558.1	400	1.25	3.60	3.44
94	EPI	0.44	8	3.16		0.017	0.34	0.13	7.8	2300	0.47	0.59	3.49

Note: The boxed items indicate pipelines that don't meet the specified requirements

TABLE 2

(Existing Force Main lines)

Pipe Tag	Pipe Type	(in) Size	(fps) DesignVel	(%) Slope	(cfs) DesignQ	(cfs) AvgFlow	(ft) Length
134	PRE	4	1.53	-0.028	0.13	0.13	600
145	PRE	8	3.84	-0.004	1.34	1.33	3800
146	PRE	4	2.23	-0.079	0.19	0.08	650
28	PRE	4	**6.99**	-0.016	0.61	0.61	900
34	PRE	4	3.09	-0.158	0.27	0.19	400
46	PRE	8	2.72	-0.007	0.95	0.95	700
55	PRE	3	2.38	-0.060	0.12	0.02	100
6	PRE	4	2.49	-0.041	0.22	0.18	2900
61	PRE	4	1.75	-0.080	0.15	0.05	450
67	PRE	6	3.58	-0.144	0.70	0.63	450
76	PRE	6	2.25	-0.263	0.44	0.44	175
79	PRE	6	**5.25**	-0.057	1.03	1.03	1700
85	PRE	6	**5.55**	-0.028	1.09	1.08	1200
91	PRE	4	3.54	-0.047	0.31	0.18	2800
97	PRE	12	1.39	-0.052	1.09	1.09	2200

TABLE 3

(Existing Lift Stations)

Tag	LS	Type	(gpm) Size	(cfs) DesignQ	(cfs) AvgFlow	(gpm) WWCap	(cfs) $MaxQ_{in}$	(gpm) $MaxQ_{stored}$	(cfs) $MaxQ_{over}$	(cfs) Q_{MAX}	(gpm) Inflow
100	LS11	PUM	100	0.235	0.18	100	0.18	18.00	0.00	0.23	80.0
106	LS14	PUM	240	0.610	0.37	240	0.42	153.82	0.00	0.61	190.6
108	LS15	PUM	179	0.270	0.11	179	0.11	80.20	0.00	0.27	50.0
111	**LS8**	PUM	438	0.950	1.52	438	1.56	438.00	**0.62**	0.95	702.3
113	**LS5**	PUM	823	1.030	1.99	823	2.09	823.00	**1.08**	1.03	939.7
115	LS4	PUM	175	0.120	0.01	175	0.01	78.76	0.00	0.12	5.0
117	LS3	PUM	155	0.220	0.01	155	0.01	56.14	0.00	0.22	5.0
119	LS2	PUM	224	0.710	0.56	224	0.56	84.65	0.00	0.71	252.1
122	LS1	PUM	156	0.459	0.15	156	0.15	52.91	0.00	0.46	66.0
124	LS6	PUM	709	1.090	1.05	709	1.05	284.36	0.00	1.09	470.3
126	**LS7**	PUM	833	1.090	1.59	833	1.71	833.00	**0.63**	1.09	769.0
127	LS10	PUM	215	0.310	0.07	215	0.07	111.10	0.00	0.31	30.0
135	LS12	PUM	100	0.134	0.04	100	0.04	24.35	0.00	0.13	20.0
137	LS13	PUM	604	1.340	1.28	604	1.28	437.10	0.00	1.34	574.0
147	LS9	PUM	198	0.200	0.04	198	0.04	96.24	0.00	0.20	20.0

GCSD EXISTING SANITARY SEWER SYSTEM HYDRA LAYOUT