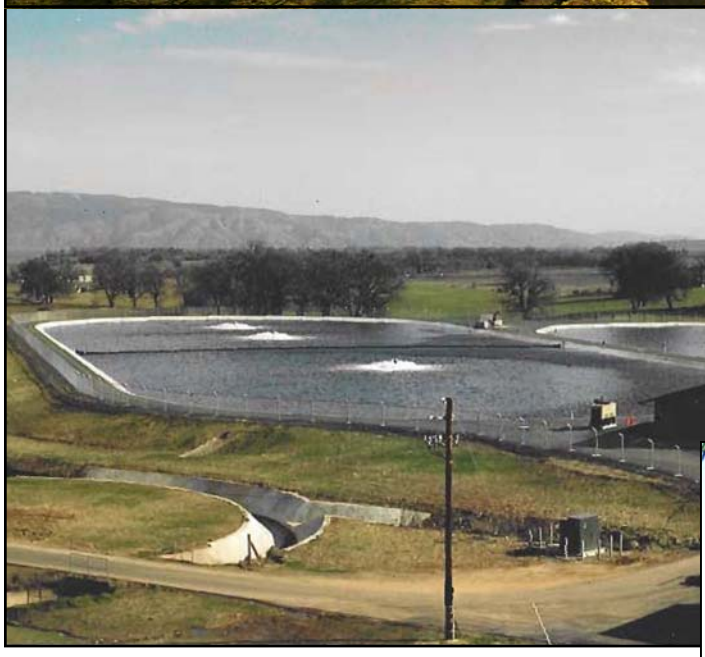
CITY OF LAKEPORT

2008 MASTER SEWER PLAN

JUNE 2008



PACE
CIVIL, INC.
REDDING, CA 96001

CITY OF LAKEPORT

2008 MASTER SEWER PLAN

FOR

CITY OF LAKEPORT

225 Park Street
Lakeport, CA 95453

JUNE 2008

Job No. 523.23

PACE
CIVIL, INC.
REDDING, CALIFORNIA

PACE
CIVIL, INC.

June 30, 2008

523.23

City Council
City of Lakeport
225 Park Street
Lakeport, CA 95453

Dear City Council:

Subject: City of Lakeport 2008 Master Sewer Plan

We are pleased to present our engineering report entitled:

CITY OF LAKEPORT
2008 MASTER SEWER PLAN

This report contains the results of our investigation of Lakeport's sewer system, including the sewage collection system, pumping stations, and wastewater treatment plant facilities. It includes conceptual plans, staging, and cost estimates for the major capital improvements that will be necessary as the City grows. Emphasis has been placed on the planning and staging of improvements necessary to correct existing deficiencies and to allow continued growth in the next 20 years.

A summary of the report, including our recommendations, follows the Table of Contents.

PACE Civil, Inc., is very pleased to have participated in this project. We thank your staff for their able assistance in its preparation. We will be happy to meet with you at your convenience to discuss the Master Sewer Plan in detail.

Sincerely,

Bruce A. Crom
Senior Engineer

BAC/MLW
Enclosures
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SUMMARY AND RECOMMENDATIONS

SUMMARY

Development of this Master Plan consisted of an engineering analysis of the Lakeport wastewater trunk system, lift stations, and treatment plant and what effects, current and future, wastewater flow conditions would have on each of these components. The wastewater collection system was analyzed using the H_2OMAP Sewer by MWHSoft computer program for wastewater flow determination and pipeline sizing. The analysis of the sewer system and treatment plant was accomplished with the cooperation and review of the City's Planners and Public Work's personnel.

Wastewater Collection System: The existing City of Lakeport wastewater collection system is shown on Plate 1. The City collection system consists of about 135,400 feet of collector sewer mains and 13,500 feet of interceptor sewers.

Based on current estimated peak wet weather conditions, it appears that the majority of the existing collection system has, in general, adequate capacity. However, several sewer segments within the existing collection system currently show some signs of moderate to severe surcharging during peak rain events and require further consideration for corrective action in order to increase sewer capacity (i.e., Main Street Sewer, 10th Street Sewer, etc.).

Portions of the existing City sewers are up to 60 years old and some of the collection system is made from clay pipe with cement mortar joints. Although the City has done significant infiltration and inflow (I&I) mitigation (i.e., video inspections, grout sealing, and replacement etc.) over the last 10 to 15 years, flows at the treatment plant can increase by seven times the average dry weather flows (ADWF) during peak rain events. Consequently, there is a significant I&I flow component that increases the wastewater flows at the City's treatment plant from an ADWF of about 0.38-million-gallons per day (MGD) during the summer to peak wet weather flows (PWWF) in excess of 2.8 MGD.

Sewage Lift Stations: There are presently nine public operated sewage lift stations in the City: Martin Street, Clearlake Avenue, Lakeshore Boulevard, Rose Street, C Street, Lakeport Boulevard, Lake County Lift Station No. 12, Lerrecou Lane, and Linda Lane Lift Stations. The Lake County Lift Station No. 12 is operated by the Lake County Sanitary District, but it discharges into the Lakeport collection system. The Lakeshore Boulevard Lift Station is the City's newest lift station and it discharges sewage into the Lake County Sanitary District collection system for treatment at the county treatment facilities.

The Clearlake Avenue Lift Station is a small lift station that is located within the flood plain of Clearlake. The small size of this lift station makes it difficult to access and it appears that some of the concrete manhole walls are showing signs of degradation (i.e., exposed aggregate) The station's wet well sits in the middle of Clearlake Avenue and is difficult to enter by City Utility Operators during routine maintenance. Additionally, the station's pumps and piping are antiquated and in need of replacement.

The Martin Street Lift Station wet well hatch needs rehabilitation due to corrosion. In addition, the hydraulic analysis suggests that the effective capacity (i.e., one sewage pump not operating) of this lift station may be deficient in the future due to estimated peak sewage flows.

Intermittent odor issues at the Linda Lane lift station have been noted by City personnel in the past and anticipated growth near this lift station in the future may exasperate this problem.

Effective monitoring and control of the major lift stations within the Lakeport collection system have been limited by the existing phone based communication alarm system and the lack of remote data acquisition.

Wastewater Treatment Plant: Based on the treatment plant water balance that was calculated for this Master Plan, it appears that the current Lakeport Wastewater Treatment Plant has an existing ADWF capacity of approximately 0.51 MGD. The design PWWF capacity of the plant is estimated at 3.0 MGD. The ADWF capacity is based on the treatment plants ability to store

and dispose of the annual effluent volume generated by Lakeport. Over the last 4 to 5 years, the summer ADWF has been estimated to be about 0.38 MGD. This is estimated to be about 75 percent of the current 100-year annual capacity of the effluent irrigation and storage facilities at the plant. Based on recent historical plant flows and the City's ongoing I&I reduction program, the estimated peak flow at the plant is roughly 2.8 MGD.

FUTURE SEWAGE FLOWS

The number of residential unit equivalents (RUEs) within the Master Plan study area is estimated to approximately 2,600. Based on the City's current general plan and proposed developments submitted to the City's planning department, it is estimated that over the next 20 years there will be a 1.1 percent growth rate equating to approximately 630 RUEs added to the City's wastewater collection system. Of these future RUEs, about 520 RUEs would be added to the City's main sewer area that is currently being served by the Lakeport treatment plant. This would result in an ADWF at the treatment plant of roughly 0.48 MGD at year 2028.

Existing and future I&I allowances were determined from analysis of recent flow-monitoring data and treatment plant wet weather flows. Although every effort has been made to assign reasonable I&I allowance values within the wastewater system, the flow-monitoring data was limited to only two negligible rain events in January 2008. **It is imperative that the City continue its flow-monitoring program in order to confirm that these estimated I&I allowances are valid.**

ANALYSIS AND RECOMMENDED IMPROVEMENTS

After reviewing the existing wastewater system deficiencies under current conditions, the wastewater collection system was analyzed under 2028 conditions. The primary improvement requirements defined by this analysis are as follows:

1. The City should focus its comprehensive I&I reduction program within the I&I target areas that was defined during wet weather monitoring in January 2008. The first stage of the program would involve having City crews continue to investigate and identify I&I sources within these target area. The second stage would involve rehabilitation and repair. The City's I&I staff should continue the flow-monitoring program that was developed as part of this Master Plan study in order to provide reliable data for verification of the estimated flows, as well as provide flow information needed for evaluating the ongoing I&I reduction program.

2. Parallel or replace existing sewers in order to relieve current or impending surcharging and possible blockages and; provide sufficient sewer capacity for the projected 20-year conditions. In some areas where I&I flows are extremely high or the sewers are in poor condition or where there is not enough room to install parallel sewers, it may be necessary to replace existing sections of sewer instead of adding a parallel relief sewer.
3. Renovate existing lift stations that are inefficient and are considered to have operational deficiencies.
4. Modify and improve the City's Wastewater Treatment Plant facilities in order to increase PWWF capacity of the chlorine contact pipeline to 3.4 MGD. Repair the aeration basin dikes and remove sludge to restore capacity. Replace the gas chlorine system with a hypochlorite system to increase safety at the plant and the surrounding areas.

Infiltration and Inflow Control: The proposed Master Plan assumes future I&I reductions will be made in the next 10 to 20 years. The flow projections developed for this Master Plan are based on the City achieving a net decrease in current I&I of about 0.94 MGD over the next

20 years. Phase 1 of this reduction program would be a continuation of the City's I&I reduction efforts focused within the I&I Target Areas shown on Plate 2. It would involve video inspection of sewers, mains, and laterals, as well as manhole inspections and inventory, smoke testing, and analysis of collected data. Emphasis should be placed on those areas nearest to the lake where flooding occurs over the public and private collection system. Once sewer defects are identified within the system, the repair and rehabilitation stage would be implemented. The repair and rehabilitation stage would involve such things as grout sealing, lining, and replacement of leaking sewers and laterals, and manhole repair or replacement. The estimated cost for addressing I&I in the Target Areas is approximately $1,976,000 and would have the potential for reducing about 0.9 MGD of existing I&I from the sewer system.

Sewer System Improvements: Analysis of the existing sewer trunk system indicates that the majority of the system has adequate capacity for the next 20 years, given the City's growth rate of 1.1 percent and provided that the City's I&I mitigation efforts continue. However, the analysis and past observations by City staff show that some sewer segments of the existing sewer along Main Street from 10th Street to C Street are at capacity during peak wet weather conditions. It is recommended that some of these Main Street sewer segments be replaced or paralleled with new sewer segments within the next 5 to 10 years starting with the 8-inch sewer between 6th Street and 10th Street. The analysis also suggests that existing segments of 8-inch sewers along 10th Street and Lakeshore Boulevard (see Plate 2) may also reach capacity during peak wet weather conditions and may experience surcharging. The analysis recommends that these segments be paralleled with 8-inch sewers.

Existing sewers along Martin Street, Russell Street, and Berry Street appear to have moderate surcharging during current peak flows. The City's I&I reduction efforts should reduce flows through these sewers and diminish surcharging. It is recommended that the City perform further wet weather monitoring of these sewers. If it is determined that significant surcharging is occurring in these sewers, paralleling of these pipelines needs to be performed over the next 20 years. Other improvements include the replacement of the Clearlake Avenue Lift Station and improving the lift stations communication data acquisition systems.

Potential As Developed (AD) trunk sewers and lift stations are also shown on Plate 2 for the currently undeveloped Southern Development Area (SDA). The SDA is a speculative development that may involve the construction of over 1,500 single family households. A significant portion of the SDA encompasses converting the City's existing treatment plant into a golf course. These AD sewers are not included in the general sewer improvement category because they would normally be constructed as development occurs.

Wastewater Treatment Plant: The water balance that was created for this Master Plan suggests that the current effluent reservoir and irrigation deposal system at the treatment plant has an effective capacity to treat 0.51 MGD ADWF during a 100-year annual rain event. Based on this, the City's continued I&I reduction efforts, and a 1.1 percent growth rate, it appears the effluent reservoir and disposal facilities at the treatment plant have capacity for at least the next 20 years.

Recommended Improvements at the treatment plant would include the repair of the aeration basin slopes over the next 10 years. This repair is meant to correct erosion of the aeration basin earthen slopes and will require that during alternate years, each aeration basin be taken out of service and dried so that additional slope protection can be installed. Concurrently, it is recommended that while the aeration basins are out of service the City remove the accumulated sludge that has been collecting at the bottom of the ponds. This sludge, estimated at between 12 and 24 inches deep, diminishes the effective volume of these basins. It is suggested that this sludge could be dried on site; and then either applied on City land, or disposed of at an approved landfill.

The existing 16- to 48-inch chlorine contact pipe has a peak contact time of around 30 minutes at 3.0 MGD. Currently, it is estimated that peak flows at the plant are roughly 2.8 MGD however, growth over the next 20 years will probably increase peak flows to 3.3 to 3.4 MGD based on the City continuing to implement an aggressive I&I reduction program. Therefore, in order to re-establish the maximum volume within the chlorine contact pipe, the City should have the pipeline inspected and if it is determined that significant sediment has collected, have the pipeline cleaned. Ultimately, additional capacity will be needed in the chlorine contact pipeline

and it is proposed that a parallel 20-inch pipeline be constructed within the next 10 to 20 years to keep up with future peak flows.

Finally, the California Accidental Release Prevention Program (CALARP) has been implemented by the Lake County Environmental Health Department, requiring that the City prepare and submit a Risk Management Plan for all City facilities that use chlorine gas for disinfection. The CALARP Program was established in California to prevent accidental releases of those substances determined to potentially pose the greatest risk of immediate harm to the public and the environment. Although the City has had an excellent safety record in handling chlorine gas at their treatment plant, it is evident that the use of large quantities of chlorine gas near residential developments is coming under closer scrutiny at the County, State, and Federal level. Given this increased level of County involvement, and the safety of City workers and the public, Lake County Environmental Health Department has requested that the City evaluate its chlorine handling processes at the treatment plant and consider replacing the gas disinfection processes, in the near future, with a safer method of disinfection (e.g., sodium hypochlorite). In order to accommodate this goal, it is recommended that within the next 5 years the City consider switching from chlorine gas to a hypochlorite system at the treatment plant.

Master Plan Key Elements and Costs: The total cost for all sewer system general improvements (i.e., I&I Reduction Programs, upgrading existing collection system and lift stations, and future treatment plant improvements) is approximately $5,006,000 of which about $1,087,000 is needed in the next 5 years. The Master Plan of Improvements needed to correct existing sewer system deficiencies and to provide anticipated future capacity for 20-year development is shown on Plate 2 and Figure 2 at the end of this report. Plate 2 includes the sizes of future AD sewers needed to serve the outlying areas. A summary of the costs and recommended staging of sewer system and treatment plant improvements is shown in Table 14.

Table 14 along with Plate 2 and Figure 2 are in essence, the 2008 Master Sewer Plan. The sewer improvements shown in this Master Plan, and their proposed construction periods, are based on the computer model developed for the trunk sewer system and observed sewer deficiencies. As indicated hereinbefore, the I&I rates used in this model are based on limited flow-monitoring

information. Consequently, it is recommended that the City continue to pursue wet weather I&I monitoring before major expenditures are made on sewer capacity increases. The future improvement design process should include additional wet weather studies to confirm upstream I&I rates. In general, no inadequately sized sewer should be replaced or paralleled with a new relief sewer until it is either demonstrated that overflows or lateral flooding is imminent under very wet weather conditions or the sewer is shown to be poorly constructed and there is a potential for sewer blockage. Since the computer model only flags trunk sewers that are inadequately sized by normal standards with moderate surcharge taken into account, it is quite possible that some of the proposed sewer construction can be postponed by allowing greater surcharges to occur. Such sewers will require more constant monitoring during wet weather periods. Also, it is possible that subsequent flow measurements during very wet weather periods will show that some of the sewers improvements flagged for construction may be unnecessary if future I&I rates are actually lower than these Master Plan estimates. Because of the potential for postponement of some sewer construction and elimination of others shown in the Master Plan, it is likely that the construction costs in the long term may be lower than listed in the expenditure forecast.

The projected improvement costs for the Master Plan are as follows:

Time Period	I&I Reduction Program	General Gravity Sewer System Improvements	Wastewater Treatment Plant Improvements	Total
2008-2013 Near Term	$450,000	$262,000	$405,000	$1,117,000
2013 -2018 Intermediate Term	$564,000	$1,660,000	$200,000	$2,424,000
2018 -2028 to Long Term	$962,000	$333,000	$170,000	$1,465,000
GRAND TOTAL				$5,006,000

These figures are based on June 2008 dollars and do not include any allowance for inflation or financing costs.

The conceptual location and size of the new trunk sewers that will be needed to serve future developments are also shown on Plate 2, although they are not listed in Table 14 as general improvements. The City may want to consider contributing to the cost of oversizing sewers in

new developments, where such sewers are necessary for service to an area larger than just that development. This policy could lead to an orderly expansion of the sewer system in the future.

It is recommended that the City review this Master Plan report carefully, and if in agreement, that it be adopted as the City of Lakeport Master Sewer Plan, with any corrections or supplements as may be applicable.

INTRODUCTION

HISTORY

In September 2006, the City of Lakeport authorized PACE Civil, Inc., to work jointly with the City staff to prepare a Master Sewer Plan. The emphasis of this Master Plan was to review and analyze the existing sewer system and treatment plant and recommend improvements needed to handle potential development over the next 20 years. Plate 1 shows the City's 2008 existing sewer collection system. Plate 2 shows the location of the anticipated developments over the next 20 years (i.e., 2008 to 2028), including a conceptual sewer collection system at 2028 to serve anticipated growth. The findings of this evaluation of the wastewater collection system and the City's wastewater treatment plant are presented herein and make up the 2008 City of Lakeport Master Sewer Plan.

SCOPE OF WORK

The study area for the 2008 Master Sewer Plan is shown on Plate 2. This study reviews the current wastewater system and recommends improvements required over the next 20 years, with wastewater flow projections and main line sewers sized for potential 20 year flows; furthermore, the wastewater treatment facility, located south of Lakeport, was reviewed to determine what improvements are required to treat future wastewater flows generated from anticipated growth.

ABBREVIATIONS

Certain terms and abbreviations have been used in this report for convenience. Definitions are as follows:

ABM	Air blown mortar
ACFT	Acre foot
AD	As Developed
ADWF	Average dry weather flow. This is the average rate of wastewater flow during the summer months.
BOD	Biochemical Oxygen Demand
CALARP	California Accidental Release Prevention Program
CCTV	Close circuit television
CLMSD	City of Lakeport Municipal Sewer District
COL	City of Lakeport
EPA	Environmental Protection Agency
ETo	Evapotransport
GPAD	Gallons per acre per day
GPCD	Gallons per capita per day
GPD	Gallons per day
GPM	Gallons per minute
HP	Horsepower
I&I	Infiltration and inflow
LAFCO	Local Agency Formation Commission
LS	Lift Station
MG	Million gallons
MGD	Millions gallons per day
MPN	Most probable number
PDWF	Peak dry weather flow
PLC	Programmable logic controller
PPD	Pounds per day
PSI	Pounds per square inch
PWWF	Peak wet weather flow. This is the highest wastewater flows anticipated by a 10-year storm event.
RUE	Residential Unit Equivalent
CRWQCB	California Regional Water Quality Control Board
SCADA	Supervisory Control and Data Acquisition
SDA	Southern Development Area (development areas F, 19, and 20 Plate 2)
STEP	Septic Tank Effluent Pumping
SS	Suspended solids
USGS	United States Geologic Survey
WWTP	Wastewater Treatment Plant
WWF	Wet Weather Flow

SEWER SYSTEM REVIEW

The City of Lakeport Municipal Sewer District (CLMSD) owns and operates a wastewater collection and treatment system that serves the City and a minor portion of Lake County. A plan of the City of Lakeport wastewater collection system and treatment plant is shown on Plate 1 and Figure 2. Plates, figures, and tables are located at the end of the report.

WASTEWATER COLLECTION SYSTEM

.In 2008, the City of Lakeport Sewer System consisted of about 135,400 feet of collection sewers and 13,500 feet of 12- to 15-inch main interceptor sewers. In addition, there are over 540 manholes within the sewer collection system. Collection sewers are generally 6 to 10 inches in diameter and are used to collect wastewater from the building laterals. A significant amount of the collection sewers in the Lakeport system are 4-inch diameter (approximately 18,000 feet) pipe. The main branches of the collection system, typically called trunk or interceptor sewers, are 12-inch and larger sewer pipes, convey the wastewater to the treatment facility. The City of Lakeport's sewer piping materials consist of vitrified clay, Orangeburg, asbestos-concrete, plastic, PVC, and other assorted materials. Plate 1 shows the current Lakeport wastewater collection system.

As with any sewage collection system that has been in existence for over 60 years, there is a tendency for leakage into the sewer piping and manholes from groundwater, storm water run-off, and lake water in the case of the Lakeport system. Plate 1 indicates the recorded maximum Clear Lake water elevation (i.e., elevation 1329.7 feet recorded in February 1998) and the location of the City's collection system.

Leakage of unwanted water into the City's collection system is referred to as infiltration and inflow (I&I) and is a problem that the City of Lakeport has had to deal with for many years. I&I is a concern because it decreases the ability of the collection system to transmit sewage, it reduces the volume of the City's treatment plant effluent storage facilities, and it requires that the

City expend a significant amount of money in pumping and treating, what is in essence, large volumes of clean water.

In an effort to try and reduce this I&I load on the system, the City has performed several rehabilitation projects throughout its history:

- A sewer system evaluation survey of the Lakeport sewer system was performed by Gillett-Harris-Duranceau Associates in 1976. This survey included smoke testing of the collections system to determine sources of inflow, comprehensive manhole inspections to identify I&I defects, video inspecting over 15 percent of the City's sewers, and some flow monitoring. From this study, several areas of the City's collection system were identified for rehabilitation work.
- In 1979 the City performed an extensive rehabilitation program made up of sewer reconstruction, sewer video inspection, and grout sealing of sewer joints. These improvements were based largely on the 1976 study discussed above.
- In 1991 to 1992 the City performed an I&I analysis of the entire sewer system. This analysis involved smoke testing of the collections system to determine sources of inflow, manhole inspections, and wet weather flow monitoring. From this comprehensive analysis, several areas within the collection system were identified as having moderate to severe I&I.
- Using the 1991 and 1992 I&I study discussed above, the City preformed a major collection system rehabilitation project in 1993 and 1994. This project involved video inspecting, testing, and grout sealing approximately 38,000 feet of main line sewer, and replacing 8,200 feet of 6-inch to 10-inch main sewer as well as 3,100 feet of 3-and 4-inch lateral sewers within the right-of-way areas. In addition, the City also expanded the C Street pump station with upgrades to the pumps, control equipment, and the control building. This upgrade also included the raising of the pump station wet well hatch 2 feet above the historical maximum lake level of 1329.6 feet.

Implemented in 2003, the City has an ongoing I&I reduction program and staff dedicated to reducing or eliminating I&I within the collection system. The City's I&I efforts have included:

- Aerial mapping of the city including GIS mapping of the collection system.
- Inventory of all sewer utilities (i.e., manholes, sewer sizes, etc).
- GIS utility atlas provided to field crews for constant update.
- Completion of City Sewer Spillage Geodatabase.
- Purchase of flow meters for sewage lift stations, 2004
- Installation of 44 sewer manhole covers, 2005
- Routine internal close circuit television (CCTV) inspection of all gravity sewer main lines and some laterals using City owned CCTV equipment.
- Systematic smoke testing to identify open clean outs, leaking manholes, and damaged sewers in areas prone to high I&I and flooding.
- Identification, documentation, repairs, and enforcement of damaged and illicit connections to the gravity sewer system.
- Scheduling of maintenance, restoration, and replacement of damaged sewers and laterals.
- Physical assessment, photographing, and cataloging of all sewer manholes within the Lakeport collection system.
- Rehabilitation of over 50 deteriorating manholes and lids from 2004 to 2006. Purchase and installation of leak proof manhole covers on a significant number of manholes throughout the system.

In addition, CLMSD is evaluating additional programs, such as creation of a Sewer System Management Plan, Overflow Emergency Response Program, FOG Control Plan, Capital Improvement Plan, and Hydraulic Capacity Estimates. Annual expenditures for I&I reduction efforts within the City of Lakeport, from 2004 to 2007, have averaged approximately $225,000 per year.

SEWAGE LIFT STATIONS

Due to the City's topography, generally sloping from west to east, the majority of the existing service area is served by gravity flow to several lift stations located at or near Clear Lake. Most the City's lift stations collect the raw sewage from the collection system and pump it to both the Larrecou and the Linda Lane Lift Stations, which are the main lift stations that pump raw sewage

to the City's wastewater treatment plant. The lift station locations and zones of service are shown on Figure 1 and their design capacities are summarized in Table 1.

C Street Lift Station: In 1993, the lift station was rehabilitated by installing new submersible pumps, upgrading the electrical controls, and increasing the height of the wet well lids to elevation 1331.7, which is 2 feet above the historical maximum lake level. The lift station consists of an 8-foot diameter wet well that contains two rail-mounted 47-HP submersible pumps that have an effective capacity of 1,100 gallons per minute (GPM).

The C Street controls are housed in a block control building next to the wet well. This building also houses the dedicated diesel generator for emergency use. Level control within the wet well is accomplished by using a sonic transducer and redundant float switches. The City recently installed a magnetic flow meter on the stations force main to better monitor flows coming from the lift station.

This lift station is considered to be one of the City's major pumping faculties serving approximately 711 residential unit equivalents (RUEs) and collecting sewage from Main Street, Park Avenue, and Esplanade Avenue (see Figure 1). Discharge from this lift station is pumped directly to the Larrecou Lift Station via an 8-inch force main.

Lakeshore Boulevard Lift Station: The lift station was constructed in 2005, making it the City's newest lift station. It was constructed to replace the Ashe Street Lift Station, which was outdated and unreliable. The Lakeshore Boulevard Lift Station consists of two 10-HP rail-mounted submersible pumps, contained in a 6-foot diameter wet well. Sewage from this lift station can either be pumped to the City of Lakeport collection system or the Lake County sewage collection system. Since 2002, all flows collected in the old Ashe Street lift station and the new Lakeshore Boulevard lift station have been pumped to the Lake County collection system. The effective capacity of the pumping facility is approximately 520 GPM. This lift station serves approximately 600 RUEs within the City of Lakeport and is considered to be one of the major lift stations within the City system.

The controls are housed in a wood framed control building next to the wet well and include: telephone based telemetry system for transmitting the lift station's alarms and a programmable logic controller. This building also houses the dedicated 40 kW diesel generator and automatic transfer switch for operating the lift station during power outages and other emergencies. Level controls within the wet well are accomplished using a conductive liquid level probe and redundant float switches. Flow is monitored using a 6-inch magnetic flow meter contained in a separate vault.

Clear Lake Lift Station: The lift station consists of a 4-foot diameter wet well and two 1-HP submersible pumps. The wet well is located within Clearlake Avenue, next to the Skylark Shores Motel. The lift station serves the motel and several single family homes and has an effective capacity of about 120 GPM. The close proximity of the lift stations wet well to the shore of Clear Lake and the poor construction of the wet well manhole makes this lift station prone to I&I due to high ground water and localized flooding during high lake levels (i.e., the rim elevation of the wet well is below the maximum lake level elevation).

Electrical controls are contained next to the wet well in a stand-alone electrical panel. The electrical control panel uses electrical relays to operate the lift station. Operation of the pumps is controlled by float switches within the wet well. The lift station pumps sewage to the gravity collection system on Main Street via a 4-inch force main. The alarm system is monitored via phone lines connected to the City's emergency response system.

A field investigation of this facility noted the following:

- Inspection and/or repair of wet well equipment, including the submersible pumps, require that City operators use confined space entry techniques to enter the wet well. Confined space entry procedures are required when there is the potential of injury or death to the person having to enter the wet well to make repairs.
- Access for maintenance and repair of the existing pumps within the wet well is difficult because of cramped space and the lack of a pump rail system for removing pumps from the surface.

- The concrete wet well is in poor condition with exposed aggregate around the wet well walls.
-

Rose Avenue Lift Station: This is a wet well style lift station that serves approximately 90 RUEs along Main Street between Rose Avenue and 16th Street. The lift station consists of a 6-foot diameter wet well that is located within Main Street. Two submersible sewage pumps, each with an effective capacity of 500 GPM, are installed. The pumps are on rails and can be removed from the wet well by operators using a truck mounted wench and boom. Level control within the wet well is performed using an ultra sound level transducer and redundant float switches. The lift station discharges to the gravity sewer system on North Main Street.

The electrical controls are housed within a lockable control panel next to the wet well between the sidewalk and curb. The electrical controls include a programmable logic controller, generator receptacle, and manual transfer switch for emergency operation of the lift station during power outages. Alarms at this lift station are transmitted via telephone to the City's operators.

The City of Lakeport and Lake County have been negotiating to have the Lake County Airport (Lampson Field) sewage pumped directly to the City of Lakeport wastewater treatment plant. In return to serving the airport, it has been agreed that sewage flows from the Rose Street Lift Station would be re-routed to the Lake County Treatment Plant via the Lakeshore Boulevard lift station. Although it is unclear when this "service swap" will take place, it is anticipated that it will occur within the next 10 to 20 years and it is assumed that the estimated sewage flows from the airport will equal flows from the Rose Avenue Lift Station.

Lake County Lift Station: The Lake County Lift Station (Lift Station No. 12) is located along south Main Street. As the name indicates, this lift station it maintained and operated by the Lake County Sanitation District, serving County Areas 9-1 and 9-3. Discharge from this lift station is through a 6-inch force main and enters the Lakeport collection system along Main Street south of Peckham Court. It is anticipated that this lift station's operation and maintenance will be

become the responsibility of the City of Lakeport once the area that the lift station is located in is annexed into the City within the next 3 to 4 years.

The lift station consists of a 6-foot wet well and two rail-mounted 10-HP submersible pumps with an estimated effective capacity of 450 GPM. The lift station currently serves approximately 180 RUEs.

Martin Street Lift Station: This lift station is one of the oldest sewage lift stations in the Lakeport system. It consists of a 6-foot diameter wet well that is located along Martin Street and serves approximately 240 RUE's west of Ester Street. Two rail-mounted submersible sewage pumps, each with capacity of 420 GPM, are installed. Level control within the wet well is performed using float switches. Field observations indicate that the existing wet well steel hatch is corroded and needs rehabilitation.

The electrical controls are housed within a lockable control panel next to the wet well. The lift station controls contain a manual transfer switch for connecting a trailer-mounted generator to operate the lift station during power disruption.

Alarms at this lift station are transmitted via telephone to the City's Fire Department emergency operator. The lift station flows are monitored using a magnetic flow meter within an on-site vault and all flows are pumped directly to the Larrecou Lift Station via an 8-inch force main. The lift station has a gravity overflow system such that if pumps are not in service flows can be diverted to the C Street Lift Station via the Martin Street and Main Street gravity sewer system.

Lakeport Boulevard Lift Station: This is a wet well style lift station that serves approximately 780 RUEs along Lakeport Boulevard and south Main Street. The lift station consists of a 6-foot diameter wet well that is located in a parking lot at the intersection of Main Street and Lakeport Boulevard. Two rail-mounted submersible sewage pumps, each with an effective capacity of 1,000 GPM, are installed. The pumps are on rails and can be removed from the wet well by City operators using the City's truck-mounted wench and boom. Level control within the wet well is performed using float switches.

The electrical controls are housed within a lockable control panel next to the wet well, behind the sidewalk. The controls include a generator receptacle and a manual transfer switch for emergency operation using the City's trailer-mounted generator. The existing controls are relay based.

All alarms generated at this lift station are transmitted as a common alarm via telephone to the City's Fire Department emergency operator who notifies the "on-call" City operator to respond. The lift station operation is not monitored via the City's SCADA and radio telemetry system. Recently, the City installed a magnetic flow meter to this lift station to monitor flows. The pump station pumps directly to the Larrecou Lift Station via a 6-inch force main.

Larrecou Lane Lift Station: The lift station was constructed in 1991, as a part of the treatment plant expansion. The Larrecou Lift Station consists of three 47-HP rail-mounted submersible pumps contained in three separate 6-foot diameter wet wells. There is also a 6-foot screening manhole up stream of the wet wells that traps large diameter debris (i.e., 3-inch and larger) from entering the wet wells and damaging the pumps. The Larrecou Lift Station is considered to be a major lift station serving approximately 2,000 RUEs within the City. Currently, all flows collected in this lift station are pumped to the Linda Lane Lift Station at the treatment plant via the 8-inch force main and 15- to 24-inch Parallel Drive gravity sewer. The effective capacity of the pumping facility is approximately 2,200 GPM (i.e., 3.2 MGD) with two of the three submersible pumps operating.

The controls for this lift station are housed within the adjacent old wastewater treatment plant control building. The state of the art controls contain SCADA and phone based telemetry system for remotely monitoring the lift station's operations and a programmable logic controller. This building also houses the dedicated 40 kW diesel generator and automatic transfer switch for operating the lift station during power outages and other emergencies. Level controls within the wet well are accomplished using an ultrasound sonic-level transducer and redundant float switches.

Linda Lane Lift Station: Is identical to the Larrecou Lift Station and was also constructed during the expansion of the treatment plant in 1991. The Linda Lane Lift Station consists of three 47-HP rail-mounted submersible pumps contained in three separate 6-foot diameter wet wells. There is also a 6-foot screening manhole up stream of the wet wells that traps large diameter debris (i.e., 3-inch and larger) from entering the wet wells and damaging the pumps. The Linda Lane Lift Station is a major lift station pumping all of the City's sewage directly to the headworks at the wastewater treatment plant. The effective capacity of the pumping facility is approximately 2,600 GPM (3.74 MGD) with two of the three submersible pumps operating.

Odor control at this lift station is via a small blower and vent piping that evacuates air from the wet wells and blows it through activated carbon canisters next to the lift station control building. In addition, chlorine can be injected via the treatment plant chlorine system to the screening manhole at the lift station. City staff indicates that localized odor problems due to excess hydrogen sulfide within the wet wells has been a concern in the past.

The controls for this lift station are housed within a control building adjacent to the wet wells. The controls contain SCADA, radio telemetry, and a programmable logic controller. The control building also houses the dedicated 40 kW diesel generator and automatic transfer switch. Recently, the City replaced the sonic flow meter at the lift station with a new magnetic flow meter in order to monitor daily flows.

All of the City operated lift stations are provided with high wet well level alarms and power outage alarms that send a telephone signal to the City's Fire Department. In turn, the City's Fire Department notifies the City's on call operator of the nature of the failure. Furthermore, all lift stations that do not have a dedicated generator are equipped with manual transfer stations, which allow the City's portable generators to be safely connected to lift stations during a power failure.

WASTEWATER TREATMENT PLANT

The City's original treatment plant, located at Larrecou Lane, was constructed in 1939. It was expanded in 1959 and again in 1979. The original plant used a series of clarifiers and a trickling filter to treat the wastewater prior to pumping it to a effluent reservoir for use as irrigation. In 1991 the City constructed a new wastewater facility at Linda Lane to replace the antiquated and inefficient Larrecou Lane treatment plant. The City's current wastewater facility was designed for an average dry weather flow (ADWF) treatment capacity of about 1.0 million gallons per day (MGD) and a PWWF capacity of approximately 3.0 MGD. The treatment plant is considered to be a secondary treatment facility.

Processes: The unit processes of the treatment plant consist of headworks with a mechanical screen, two earthen aeration basins, an effluent pump station, 48-inch diameter chlorine contact pipe, effluent reservoir, irrigation pumping station, and effluent irrigation fields. Most processes at the treatment plant are automatically controlled by a programmable logic controller (PLC) that is located within the treatment plant control building.

Headworks: The headworks is a concrete structure with both manually cleaned and mechanically cleaned barscreens. The mechanically cleaned barscreen consisting of a motor driven stainless steel belt that is activated on a timer that moves the trapped screenings into a trash dumpster for disposal at a local landfill. The manual barscreen is used only if the mechanical barscreen is not functioning, such as in a power outage, and as the name suggests, has to be manually cleaned. The headworks has a high-water alarm that activates when water levels reach 2-feet from the top of the headworks wall.

Aeration Basins: Wastewater flows from the headworks into the two 11.8-million-gallon aeration basins. The aeration basins are about 15-feet deep and are constructed of earth with an air blown mortar (ABM) slope protection at the normal water level (the ABM apron is about 7 feet deep from the top of the dike). The wastewater detention time within each aeration basin at 1 MGD plant flow is approximately 24 days.

The influent from the headworks enters the bottom of the aeration basins where the settleable solids drop out and are spread over the bottom. These solids remain on the bottom where they can be further decomposed by anaerobic processes. It is estimated that every 8 to 10 years the accumulated solids (i.e., sludge and grit) at the bottom of the aeration basins need to be removed in order to restore the basins designed detention time. Removal of solids is accomplished by dredging of the ponds.

The aeration basins are divided into two equally sized cells (i.e., Cell 1 and 2) by a geo-fabric baffle curtain. Each pond is equipped with three 20-HP floating aerators, two aerators in Cell 1 and one aerator in Cell 2. The aerators provide two functions: they transfer oxygen into the basins required by the biological oxidation reactions, and they provide the mixing required for dispersing the oxygen and for contacting the reactants (that is oxygen, wastewater, and microbes). The aerators are controlled by timers within the control building.

Effluent from Cell 1 passes through an opening in the center baffle curtain to Cell 2. Cell 2 has one floating aerator and is quiescent at the discharge end to allow the suspended solids (SS) to settle out prior to discharge to the effluent pumping station.

Over the past several years, operators at the treatment plant have observed that due to wave and wind action, the earth below the 7-foot deep ABM apron has begun to erode causing undermining of the ABM apron along the aeration pond slopes. The worst slope erosion appears to be located around the aeration basin access ramps. Although the City has implemented temporary measures to try and slow this undermining of the ABM (i.e., reinforcing the ABM and placing temporary concrete fill under the ABM), the continued degradation of the slopes due to this erosion could possible cause further damage of the ABM slope protection and may lead to dike failure if left unchecked.

Effluent Pump Station: The effluent pump station consists of a wet well, three 20-HP vertical turbine pumps, and a flowmeter. The effluent pump station has an effective pumping capacity of approximately 3.5 MGD. Flow from each aeration basin enters the pump station from a screened

aeration basin outlet structure where it is pumped to the effluent reservoir via a 16-inch to 48-inch chlorine contact pipe.

Effluent Force Main and Chlorine Contact Pipe: The force main/chlorine contact pipe convey-treated effluent from the effluent pump station to the storage reservoir. This pipe is approximately 1,250 feet long (i.e., 600 feet of 16-inch and 650 feet of 48-inch pipe) and is constructed of 16-inch diameter PVC pipe. The 48-inch chlorine contact pipe is cement–lined, coated, welded steel pipe. The force main and the chlorine contact pipe provide the necessary flow detention for disinfection prior to discharge into the storage reservoir. The force main/chlorine contact pipes are designed to allow a 30 minute chlorine contact time at a peak design wet weather plant flow of 3.0 MGD.

Treatment Plant Chlorine Facilities: The treatment plant chlorine system is made up of two 1-ton chlorine gas cylinders that are stored in the chlorine storage room at the treatment plant control building. The chlorine storage room is ventilated and also contains a chlorine leak detector that activates local alarms at the plant when it detects concentrations of chlorine above one part per million. The 1-ton cylinders are transported to and from the treatment plant via trucks and are loaded and unloaded into the chlorine storage room via dedicated electric hoist.

The chlorine system also contains three chlorinators that are used to inject chlorine solution to different treatment plant processes. Two of the chlorinators have a maximum 400 pounds per day (PPD) capacity and the third chlorinator has a 200 PPD capacity. The No. 1 chlorinator serves to disinfect effluent at the effluent pumping station. The No. 2 chlorinator is used for irrigation chlorination and the No. 3 chlorinator is used for odor control at the Linda Lane Pump Station.

The chlorination system at the treatment plant serves three purposes:

- Used to pre-chlorinate the Linda Land Pump Station for odor control.
- Chlorinate effluent at the irrigation pump station prior to sprinkler irrigation.
- Effluent disinfection into the storage reservoir.

Chlorination of the effluent prior to entering the effluent reservoir is required in order to maintain an average monthly effluent Coliform level of 23 MPN that is mandated by the CRWQCB waste discharge permit (see Appendix A). Operators' report that, based on maintaining a 5 mg/l chlorine residual at the discharge of the chlorine contact pipe, current effluent chlorine dosage rates range from 90 to 120 pounds per day in the summer and 100 to 150 pounds per day during the winter months.

Disinfection of the effluent prior to irrigation is not required but it is recommended in order to protect treatment operators. Pre-chlorination of the Linda Lane Pump Station is only required as needed to control odors at the pump station and headworks.

Recently, the Lake County Environmental Health Department has requested that the City prepare a Risk Management Plan for all City facilities that use chlorine gas for disinfection. This Risk Management Plan is a part of the new regulations for the California Accidental Release Prevention Program (CALARP). The CALARP Program was established in California to prevent accidental releases of those substances determined to potentially pose the greatest risk of immediate harm to the public and the environment. Although the City has had an excellent safety record in handling chlorine gas at their treatment plant, it is evident that the use of large quantities of chlorine gas near residential developments is coming under closer scrutiny at the County, State, and Federal level. Given this increased level of County involvement and the safety of City workers and the public, Lake County Environmental Health Department has requested that the City evaluate its chlorine handling processes at the treatment plant and consider replacing the gas disinfection processes in the near future with a safer method of disinfection (e.g., sodium hypochlorite).

Effluent Reservoir: The plant contains an effluent storage reservoir with a maximum capacity of approximately 650 acre feet (ACFT) (i.e., 212 MG) at the spillway elevation of 1,432 feet. Treated water is stored in the effluent reservoir until such time that the treated effluent can be applied to the City's irrigation facilities, typically during April to October, when rain amounts are minimal. The California Regional Water Quality Control Boards (CRWQCB) Waste

Discharge Permit (see Appendix A) mandates that the City cannot operate its effluent irrigation facilities during and no sooner then 24 hours after a rain event. Furthermore, the CRWQCB has stipulated that the maximum reservoir level must not exceed 1,430 feet (i.e., 2 feet of free board below the spillway elevation), thus limiting the reservoir capacity to 600 ACFT.

In April 2006, City operators determined that the effluent reservoir was exceeding its mandated reservoir level of 1430 feet (i.e., 2 feet from the overflow). This maximum reservoir level was due to a number of factors including:

- Three months in the 2005-2006 rain year matching the 100-year rain event for that period. Rain in 2006 for the months of March and April exceeded the 100-year event by 150%.
- Based on the treatment plants discharge permit (see Appendix A) on average there are typically 63 days when conditions are right for the City to irrigate between January through April. In 2006, the number of available irrigation days for effluent irrigation was reduced by one-third preventing City operations from discharging onto the irrigation fields.
- Severe I&I entering the treatment plant from the collection system (a significant portion of this I&I was later determined to be from high lake levels flooding open sewer clean-outs along private properties near the lake).

In order to prevent the effluent reservoir from overflowing, the City applied approximately 26 MG of chlorinated and treated effluent onto the City's irrigation fields from April 13, 2006 to April 24, 2006. Of the amount that was discharged onto the irrigation fields, approximately 3.0 to 6.0 MG of treated effluent and rainwater was released from the treatment plant site in violation of the CRWQCB discharge permit.

Resulting from this occurrence, the CRWQCB issued a Cease and Desist Order No. R5-2007-0010 (see Appendix B) to the City requiring that the City perform several upgrades to their effluent irrigation system and to submit a Master Sewer Plan.

Effluent Irrigation System: In response to the April 2006 emergency release of treated effluent from the treatment plant effluent reservoir, discussed above, and to add irrigation capacity for future City growth, the CRWQCB required that the City of Lakeport make modifications to the treatment plant effluent irrigation system. The following is the main components of the 2007 Effluent Irrigation System Expansion:

- The irrigation spray fields were increased in size from 242 acres to 332 acres.
- Two new tail-water pump stations were constructed to capture and return runoff from the new spray irrigation fields.
- A third 125-HP "canned" vertical turbine pump was added to the existing irrigation pump station to increase the effective capacity (i.e., two pumps operating) of the station to approximately 2,800 GPM.
- A new magnetic flow meter was installed at the Linda Lane Lift Station to better monitor influent flows.
- A diversion ditch bypass pipe was installed to intercept surface runoff and divert it away from the plants recapture basins, thus increasing the storage capacity of the basins for effluent storage.

Irrigation System Water Balance: As established by the CRWQCB Cease and Desist Order, this Master Plan has developed a water balance in order to evaluate the current and future capacity of the effluent reservoir and effluent deposal system to provide sufficient storage capacity. The water balance is shown in Table 2 and the following discusses the factors in preparing the water balance:

- A 100-year annual rain event, which for the Lakeport area, has been set at 58.25 inches of rain annually based on Station Lakeport 2NW Precipitation Long-Duration-Frequency Table 3 from DWR Bulletin 195, October 1976. The 100-year rainfall was spread (see table below) in proportion to average monthly rainfall data for years 1941-2001 from the Western Regional Climate Center for Lakeport Station 0440701.

Table 3
100-Year Rainfall Event Proportioned By Average Year Rainfall

Month	Average Year	100 Year
January	6.16	12.36
February	4.82	9.67
March	3.62	7.26
April	1.91	3.83
May	0.72	1.44
June	0.28	0.56
July	0.04	0.08
August	0.11	0.22
September	0.34	0.68
October	1.74	3.49
November	4.03	8.09
December	5.26	10.55
Total	**29.03**	**58.25**

- Maintenance of 2 feet of freeboard within the effluent storage reservoir as established by the CRWQCB. This equates to a reservoir capacity of roughly 600 ACFT.
- Irrigation disposal rates based on the treatment plants wastewater discharge permit, which stipulates that no spray irrigation of effluent can occur during period of rain and for at least 24 hours after cessation of rain. Reclaimed water is agronomically applied, based upon the pasture evapotransportation rate minus any precipitation. This would typically mean that irrigation can only occur during the months of May through September. The CRWQCB Waste Discharge Requirements for Lakeport require that no irrigation take place 24 hours before or after a rainfall event. However, historical off-season irrigation rates and daily rainfall events over the past five years from the Scotts Valley weather station (UC Cooperative Extension Service) were analyzed to determine historically there are a number of available irrigation days between October and April that are used for irrigation, albeit at a much reduced rate. The off season days were incorporated into the water balance at a reduced off-season irrigation rate of 0.25 inches per day, as opposed to the typical application rate of 1.1 to 1.4 inches per day during May through September.

- Pasture evapotransportation ratio determined from DWR Bulletin 73-79, November 1979.
- Potential evapotransport (ETo) based on 12 years of data for Station Lakeport Evaporation from Water Surface, DWR Bulletin 73-79, November 1979.
- The amount of sewage entering the plant is a function of the ADWF plus estimated I&I. A historical monthly I&I multiplier was determined based upon plant flow data from 2004 to 2006. Based on the monthly multiplier the 100 year water balance shows that the annual treatment plant flow into the plant is estimated at approximately 297 acre feet per year. This value is approximately, 90 acre feet above the average annual flow into the plant over the past 5 years and approximately 50 acre feet more than what the plant saw in 2005 to 2006 (i.e., 246 acre feet).
- Maintenance of at least 45 to 50 acre feet of water within the reservoir at the end of the irrigation season.
- The newly expanded effluent irrigation field area of 332 acres.

Table 2 is the water balance for this Master Plan and the table estimates that the reservoir and the irrigation system currently has capacity to handle an annual ADWF treatment plant flow of approximately 0.51 MGD during a 100-year annual rain event given the above criteria.

Irrigation Recycle System: Runoff from the irrigation fields is collected in a system of diversion ditches and recycle pumping stations that collect irrigation runoff and transport it to Recycle Reservoir No. 1. Recycle Reservoir No. 1 is an earthen reservoir with a storage capacity of approximately 3.5 ACFT. Recycle Pumping Stations 2, 3, and 4 collect runoff from their individual irrigation areas and pump it back to Reservoir No. 1. Recycle Pumping Station No. 1 contains two vertical turbine pumps (10-HP and a 15-HP) that maintains Reservoir No. 1 levels based on reservoir level switches. Runoff is pumped back to the overland disposal fields.

The existing plant facilities are shown schematically on Figure 2. A summary of the design criteria for the existing facilities is shown in Table 4.

WASTEWATER FLOWS

SERVICE AREA

For this Master Plan's study area, the City's planning department has determined that the City's current LAFCO boundary, and potential areas of service immediately adjacent to the current LAFCO boundary, would be included in the sewer study area. The study area boundary is illustrated on Plate 2.

The 2008 Master Plan outlines the 20-year sewer requirements that will be needed to service the near-term growth, as shown on Plate 2. To determine the 20-year collection system needs of the City, the study area was divided into 33 sub-areas. The RUE wastewater loadings were then estimated for each sub-area based on the City's current General Plan. The sub-area boundaries were established using existing sewer locations, topography, and other pertinent factors such as lot lines, existing streets, and existing drainages.

EXISTING WASTEWATER FLOWS

RUE Determination

A residential unit equivalent is defined as the ADWF generated from a single-family household dwelling. In order to determine ADWF per RUE the Lakeport wintertime household water consumption was calculated from the City's water billing records. It was assumed that the winter water use would be a gauge of the dry weather sewage flow at the treatment plant, based on the assumption that the preponderance of winter water usage (i.e., 80 percent billed) is discharged directly into the sewage collection system. The 2006 average winter time water usage for the City of Lakeport was determined from February 2006 water meter readings. The City's February 2006 water billing records indicate that approximately 0.46 MGD of water was consumed within the main Lakeport water zone (the main zone does not include properties served by the Lakeshore Boulevard Lift Station). Taking 80 percent of this value yields a winter

water rate of roughly 0.37 MGD, which is approximately the same value as the wastewater treatment plant ADWF recorded over the summer of 2004 to 2007 (i.e., 0.38 MGD).

Of the 0.38 MGD treatment plant ADWF approximately 0.13 MGD is associated with the top 40 water users based on their winter water use (see Table 5). The remaining dry weather flow (i.e., 0.25 MGD) at the plant would be considered the dry weather sewage flow generated by the remaining active water service connections, which are assumed to be single RUEs. Based on these calculations it is estimated that the average dry weather flow per RUE is approximately 180 GPD. However, in order to allow for unoccupied "vacation" residences within Lakeport (i.e., RUEs) during the winter months the ADWF/RUE was increased by 10 percent. Thus, for this study the ADWF/RUE is estimated at 200 GPD/RUE and the number of RUEs within the system equates to approximately 2,050.

The 200 GPD per RUE rate compares reasonably well with similar Northern California communities. For example, Weaverville and the City of Yreka use a 200 GPD per household equivalent (HE) rate and the City of Mount Shasta uses 230 GPD per HE. Therefore, for the purposes of this study, a flow factor of 200 GPD per RUE was used for the existing and future development throughout the Lakeport sewer service area.

Inflow and Infiltration

Based on review of the 2004 to 2007 influent flow records from the wastewater treatment plant, the ADWF is estimated at about 0.38 MGD (see Table 6 and Figure 3) and the instantaneous peak dry weather daily flow has been estimated at 0.90 MGD (based on a 2.3 peaking factor see Figure 4). A review of historical wet weather flows at the treatment plant indicated that after 2002 (the year that the Ashe Street Lift Station began pumping to the Lake County treatment plant) peak wet weather flows (PWWF) at the treatment plant have exceeded 2.2 MGD approximately six times and during December 31, 2005, the plant experienced a flow of 3.09 MGD.

Table 6 Historic Flow Data					
Year	2004	2005	2006	2007	Average
ADWF $_{\text{Aug-Oct}}$ (MGD)	0.39	0.41	0.38	0.34	0.38
Max Day Wet Weather (MGD)	2.69	3.09	2.13	1.33	2.31

Comparing the past peak wet weather flow of 3.09 MGD with that of the peak dry weather flow (PDWF) at the treatment plant results in a difference of approximately 2.2 MGD. This difference is the estimated historical peak I&I component within the collection system.

Infiltration refers to groundwater that leaks into cracks and breaks in the sewers and manholes. Inflow refers to storm water that enters the sewer system directly from such sources as illicit roof drain connections, cross connections to storm drains, surface drainage that directly enters cleanouts without lids or leaky manhole covers, etc. Infiltration tends to be prolonged leakage until the groundwater table subsides, and inflow tends to be more noticeable during a storm event when surface water is present (this is very important in Lakeport due to the close proximity of the lake to the City's collection system). Since the two are often very hard to separate, it is common practice to simply refer to the entire leakage problem as I&I.

I&I has a significant impact on sizing of sewers in a collection system and can increase costs significantly. The total I&I rate that occurs at the worst condition is referred to as peak I&I and although this may last for only a short time, such as minutes in a small system or an hour or so in larger systems, the sewer facilities must be sized to handle this peak. Thus, the size of wastewater collection system, interceptor facilities, and lift stations are governed mainly by the combination of peak I&I and peak wastewater flow components, with I&I often being the largest component. The second type of I&I that affects the cost of a sewer system is simply the total amount of I&I usually referred to as the annual I&I. This affects the annual operating costs which include pumping, treating, and disposal of the I&I.

In Lakeport, high lake levels coincide with elevated ground water levels within the Lakeport region. Plant flow data indicates that when the lake level exceeds the elevation of 1,325 feet there is a moderate elevation of sewage flow into the treatment plant. For example, in March and April 2000 the Lakeport treatment plant recorded average daily flows of approximately 0.92 MGD for 14 days during a period when there was no rainfall and the lake level was approximately elevation 1,325 feet (See Figure 5). This average rate is 0.54 MGD above the current ADWF into the plant and would suggest that a significant amount of the excess flow was infiltration from either high ground water levels, or possibly high lake levels, entering the City's collection system.

It is possible that flooding of the City's collection system due to high lake levels can contribute a significant amount of inflow. Plate 1 shows the recorded maximum lake level (1329.6) in relationship to the City's collection system. As can be seen from this Plate, several areas along Park Street, Esplanade Avenue, Lakeshore Avenue, and Clearlake Avenue can be flooded due to high lake levels. Flooding impacts the City's sewers by allowing water to enter open pick holes and joints in manhole lids, open sewer cleanout caps, and house drains illegally connected to the sewer system. Lake flooding and rain in February 1998 caused the treatment plant flows to exceed 2.0 MGD for approximately 23 consecutive days.

Although considerable effort by the City to reduce I&I in the City's main collection system have been performed, a significant component of the I&I is generated from private sewers and house connections that are more difficult to address due to their location within private property. Several studies have suggested that 50 percent of all I&I entering a public collection system is from private property. For example, in March and April 2006 flooding was reported within a private RV park west of the C Street Lift Station adjacent to Clearlake. Lake levels during that period were estimated at about 1,326 feet and combined with several days of rain, resulted in treatment plant flows between 1.0 and 2.0 MGD from March 2006 to the end of April. While investigating high I&I rates from this area it was determined by City Staff that several of the private sewer cleanouts that had been under lake water had open lids allowing lake water to inflow into the City's collection system. From this single incident it was estimated that as much as 300,000 to 500,000 gallons of lake water per day could have entered the City's collection

system. To date, the City has eliminated or repaired all identified sources of I&I within this private sewer system.

I&I Flow Monitoring

In 1991 to 1992, the City performed an extensive I&I analysis and monitoring program (September 1992 Lakeport Sewer Infiltration and Inflow Analysis) that reviewed and identified several areas within the Lakeport collection system that had significant I&I rates. From this analysis the City implemented the 1993 to 1994 collection system rehabilitation program that involved sewer rehabilitation and replacement in those high I&I areas. To update the previous I&I flow monitoring study, PACE and the City of Lakeport partnered to perform a systematic flow measurement program in the winter of 2007 and 2008. The flow monitoring consisted of measuring instantaneous wastewater flows at different monitoring station manholes during wet weather conditions to estimate I&I flow rates. The collection system flows were measured or observed at 18 strategic manholes and lift stations disbursed throughout the Lakeport collection system (see Plate 1 and Table 7) during each of the monitoring events. The monitoring manholes were selected on the basis of upstream service area, historical observed flows, flow isolation, and sewer size.

The field flow-monitoring effort consisted of going through the collection system at night and early morning, when the wastewater component of the flow was minimal, to measure the flow at the designated manholes. In some cases, the measured flow would include the flow(s) measured in upstream monitoring stations, which was deducted from the measured flow to derive the I&I contributions from the lone service area. Because the measurements are taken at different times, and flows do vary over time, this can compound errors; however, the data is meaningful and provides a basis for the master planning effort.

WWF monitoring took place on two occasions in January 2008 (i.e., January 4th to the 5th, 2008 and January 25th to 26th, 2008). Table 7 summarizes the dates, rainfall amounts, lake levels, and wastewater treatment plant flows during those events. Note that peak flows at the treatment plant during the flow monitoring events were estimated at about 2.0 MGD by City staff.

A statistical interpretation of the rain that occurred during the two January 2008 events (rain gauge maintained by the City of Lakeport at the Wastewater Treatment Plant) suggests that the rainfall over a period of 20 days prior to the monitoring (from December 15, 2007 to January 4, 2008 and from January 5, 2008 to January 25, 2008) was a one in a 2-year occurrence. In other words, over a 20-day period prior to the flow monitoring, an observer would probably record that much rainfall once every 2 years. In comparison, the 15-day rainfall that occurred prior to the historical peak flow (3.09 MGD) at the treatment plant on December 31, 2005, was determined to be a one in 50-year event and the lake level during that period was at (1326 Feet). Therefore, the flow monitoring data that was collected during the January 2008 events were obtained during a rain period that had minimal rainfall and relatively low lake levels.

The primary indication of the severity of the I&I conditions is the magnitude of the flows measured at the treatment plant. As indicated hereinbefore, the dry weather peak instantaneous flow at the Lakeport Treatment Plant is estimated at 0.90 MGD, and at night the treatment plant would expect to receive half of the ADWF or 0.19 MGD. During the January 2008 monitoring events, it was reported that the treatment plant peak flow was estimated at around 2 MGD. This peak flow is approximately 35 percent less than the historical treatment plant flow recorded in December 2005 (i.e., 3.09 MGD).

A summary of the flow-monitoring data is presented in Table 7. Column 3 indicates the estimated sewered area, in acres, for each monitoring sub-area during each monitoring event. Columns 7 and 12 show the estimated net wet weather flow per sub-area per monitoring event. The net flow value is the flow measured at the monitoring station less any flow(s) measured upstream of that sub-service area. The measured I&I flow rates for each sub-area, shown in Columns 9 and 14, were calculated by taking the measured flow and dividing it by the sewered area in each monitored area. The extrapolated I&I values are shown in Column 10 and 15 of Table 7 and are based on increasing the measured flows in proportion to the peak treatment plant flows measured at the time of the monitoring (estimated at 2.0 MGD) and the treatment plant peak flow on December 31, 2005 (i.e., 3.09 MGD).

Typically, sewered areas that have I&I rates at or below 1,500 gallons per acre per day (GPAD) are considered to be within industry limits. As can be seen from Column 16 of Table 7 and Plate 1, a number of the monitoring stations had extrapolated values less than 1,500 GPAD, indicating that the sewers in these areas appear to be relatively tight. I&I rates in excess of 3,500 GPAD are considered high and indicate that these sewers have defects that are sources for I&I. Table 7 indicates there are 11 monitored areas that had average extrapolated I&I rates above 3,500 GPAD and out of these, six monitored areas (Stations 3C, 4B, 7C, 9C, 9B, and 13A) had I&I rates in excess of 5,000 GPAD, indicating that these areas are potential sources for severe I&I. These 11 monitoring areas represent about 1.6 MGD of the estimated extrapolated I&I flows or about 50 percent of the historical daily peak I&I flow entering the treatment plant during a 10-year rain event and an elevated lake level (i.e., above 1,329 feet).

GROWTH PROJECTIONS

The current study estimates the number of RUEs being served by the Lakeport treatment plant to be approximately 2,050 (see Table 5) and that there is an additional 550 RUE's being served through the Lakeshore (Ashe) Lift Station to the Lake County treatment plant (i.e., total RUEs within the Lakeport study area is estimated at around 2,600).

20-Year Growth Projections

The State Department of Finance (DOF) has estimated the City's population increased from 4,820 in 2000 to 5,060 people in 2007. This is a population increase of approximately 0.7 percent per year. Although population growth rate could be used to predict future sewage flows, the population growth rate alone tends to neglect other factors that can affect wastewater production. For example, increases or decreases in commercial and industrial water use and the current trend for water saving appliances can impact the production of wastewater in the future.

In order to estimate the number of additional households that will connect to the system in the next 20 years, the growth rates used in this Master Plan were based on the minimum growth

alternative of 1.1 percent defined in the May 14, 2007, City of Lakeport Draft General Plan. The General Plan growth rate was based on 1990 to 2000 Lakeport growth data. It must be noted that, since 1997 the City's growth has slowed to around 0.55 percent. Obviously, one of the biggest contingencies in any planning document, such as a master plan, is growth. If actual growth projections turn out to be greater than the 1.1 percent growth used in this analysis, some of the recommended sewer improvements discussed in this Master Plan will need to be constructed sooner than anticipated. If growth is less than estimated, master plan sewer improvements can be delayed.

Therefore, using a 1.1 percent growth rate over the next 20-year period, the estimated increase in the number of RUEs within the current study area would be roughly 630 (i.e., 3,230 total RUEs) by year 2028. Of these future RUEs about 520 RUEs would be within the City's main sewer area that is currently being served by the Lakeport treatment plant. This would result in an estimated ADWF at the City's treatment plant of roughly 0.48 MGD at year 2028 (see Figure 3).

As discussed, the general plan also proposes that there is interest in developing land that is south of the current City limits (see Area 19 and 20 on Plate 2) near the City's wastewater treatment plant (i.e., the Southern Development Area - SDA). It has been suggested that this southerly area has the potential of adding 1,000 to 1,500 RUEs, mainly as residential developments, to the City's sphere of influence. For this study, it was decided to evaluate the potential impacts of this southerly area as a part of the Master Plan, assuming that the growth in this southern development area would occur beyond the next 20 years and that the sewer system and treatment plant improvements needed to sustain these southerly developments would be financed and constructed by the developers on a as needed basis.

The location and size of each development proposed in the next 20 years was compiled by the City's Community Development Department and is shown in Appendix C (see Housing Units Proposed in the City of Lakeport April 2007) and are also indicated on Plate 2. This list was used in disbursing future RUEs throughout the Lakeport Study Area.

Figure 3 represents estimated future treatment plant dry weather flows based on the 1.1 percent growth rate within the areas served by the treatment plant. As can be seen from this figure and the water balance Table 2, projected treatment plant ADWFs will exceed the current 100-year annual rain event capacity of the plant effluent reservoir and irrigation system (i.e., 0.51 MGD) within the next 25 years (roughly an additional 650 RUE capacity remains) unless additional capacity can be acquired.

FUTURE WASTEWATER AND INFILTRATION AND INFLOW

To obtain meaningful flow projections to use in developing a plan to meet the year 2028 sewer needs, it is important to predict how much growth is expected to occur in the next 20 years and where growth will likely occur in the City of Lakeport. It is also important to estimate the wastewater loadings on the sewer system at ultimate development.

The anticipated 20-year developments were spread throughout the study area with the assistance of the City Planning Department staff. Plate 2 shows the approximate location of the areas where growth is anticipated to occur over the next 20 years, and Table 8 details that growth. Of particular importance is development areas F, 19, and 20 on Plate 2. For this Master Plan these areas will be referred to as the Southern Development Area. The Southern Development Area (SDA) encompasses proposed residential developments that will convert the City's existing treatment plant irrigation areas into a golf course. Although tentative at this point, the SDA has been examined in this Master Plan based strictly on the impact of adding residential units into the Lakeport system. Obviously, if the SDA were to occur in its present configuration, it would modify the City's current treatment plant and irrigation system and these impacts would have to be addressed as a part of the SDA planning and environmental review.

After estimating the expected growth in specific sub-areas and determining the number of RUEs associated with that growth, the existing 2008 and 2028 sewage and I&I flow contributions were estimated for each sub-area. The estimated 20-year flows were used to determine the required sewer size needed to serve each sub-service area.

The sub-area boundaries are shown on Plate 1 and are approximate limits of service. The boundaries can often be shifted slightly to change the sub-area without significantly impacting sewer sizing. However, large changes in service areas should be reviewed to determine if downstream sewers are impacted.

In existing sub-areas with measured I&I values of less than 1,500 GPAD, it was assumed that the I&I rates would gradually increase due to degradation of the collection system over time to 1,500 GPAD under ultimate conditions. I&I flows in sub-areas that had values above 3,500 GPAD in 2008 were reduced in future years based on the assumption that the City will reduce future I&I in those areas. Table 10 shows the reduction rates used for the 20-year model. In existing sub-areas that had values between 1,500 and 3,500 GPAD, it was assumed they would remain the same in the future. All future sewered areas were assigned an I&I allowance of 1,500 GPAD.

All of the above mentioned estimates of RUEs, sewered area, and I&I rate data for each sub-area are summarized in the Service Area Tabulation sheets for all service areas as shown in Table 8. Based on these factors, it was estimated that the ADWF at the plant would increase from its current rate of 0.38 MGD to 0.48 MGD by 2028 if all proposed development occurs within the current City limits (i.e., not including the SDA).

If the SDA is included, the ADWF would increase to approximately 0.8 MGD by 2028. Peak treatment plant flows are much more difficult to predict. Based on aggressively reducing I&I within the identified high I&I areas as shown on Table 10, maintaining current I&I rates in other areas and the predicted increase in RUEs within the City limits over the next 20 years, it is estimated that peak treatment plant flows could reach or exceed 3.4 MGD by year 2028 based on a 50-year 15-day rain event. The addition of the SDA would theoretically increase peak flows to the treatment plant to 5.5 MGD at total build out. The inclusion of the SDA development would require that the treatment plant be significantly expanded to accommodate this added flow and it is proposed that this expansion would be paid for by the SDA development.

DESIGN CRITERIA SUMMARY

Sewer sizing was based upon handling the PWWF, which equals to the average dry weather wastewater flow rate times a peaking factor plus the peak I&I allowance. The typical diurnal curve shown on Figure 4 was developed based on pump station records. This diurnal curve was used in the hydraulic model to simulate the affect of daily flows into the Lakeport collection system.

HYDRAULIC COMPUTER MODELING

H2OMAP Sewer by MWHSoft was used to model the City's collection system. Two computer models were created for this Master Plan: Existing (2008) PWWF model and a 20-year PWWF model (2028). The existing PWWF model was created using the existing Lakeport collection system. City "Record Drawings" of the existing collection system were used to confirm collection system pipe size, slope, length, and material for input into the modeling software. Lift station flow meter and elapsed time meter data were used as a gauge in modeling the performance of the lift stations. Sewage flow measurements taken during the January 2008 I&I flow-monitoring efforts for this Master Plan were then combined with estimated PDWFs to create the 2008 PWWF hydraulic model.

The 2008 PWWF model was then used as the base for the 20-year model. The 2028 model includes estimated growth projections and locations obtained from the City's planning department. Future trunk sewers and lift stations needed to serve future areas were determined and inserted into the model. I&I data was based on the sewer design flow criteria shown on Table 10.

As indicated, the model I&I allowances were estimated by an analysis of the adjusted monitoring station wet weather flows. The model assumes that all sewer pipes have free flow. As the City investigates the areas known to have high I&I, it may discover that some of the sewer flows are impeded or have other problems not reflected by the model.

The 2008 PWWF model was based upon flows generated by a 15-day rainfall event in December 2005, which is expected to occur once every 50 years and a lake level of 1,326 feet. Rain events, greater than this 50-year event, combined with a maximum lake level (i.e., elevation 1329), may cause sewage flows to increase above what is estimated in the 2008 PWWF model.

Once both hydraulic models were created, they were analyzed and collection system limitations were addressed. Where modeled sewer capacities were limited, parallel or larger replacement sewers were calculated in order to resolve these limitations in the model. Table 12 summarizes hydraulic model results and also shows sewer capacities needed to reduce the potential of existing or future sewer surcharge.

ANALYSIS AND RECOMMENDED IMPROVEMENTS

GENERAL

The first step in analysis of the sewer system was to compare the capacity of the existing gravity trunk sewer lines with calculated 2008 and 2028 estimated PWWFs using the hydraulic models. Plate 1 represents the existing sewer collection system.

The next step in the analysis was to determine the approximate location and size of future sewers in areas not presently served by the City in order to model service to those areas. Establishing approximate routes for trunk sewers was determined by examining the City's topographic map data and placing trunk lines along major drainages in the area to service sub-areas. For example, minor drainages were used for sewer routes in Subservice Area 19 near the wastewater treatment plant (see Plate 2). Once the routes were established, the surface grade was estimated along these routes to estimate sewer sizes. Where surface topography or existing development prohibited the use of gravity sewers to serve an area, a lift station and force main was proposed as an alternative.

Future sewer lines marked AD (As Developed) on Plate 2 represent sewers that are not currently scheduled for construction. Most of these sewers would be constructed either as the areas develop or as existing septic systems fail and a sewer system becomes mandatory. These sewers will typically be funded by development projects or by assessment districts, as the areas are sewered. On the other hand, new sewers needed to parallel or replace existing sewers that will be inadequate in the future have been designated as General Improvements and it is anticipated that they be paid for by City capacity charges.

The lines shown AD are nebulous at this point; this is especially true where they are providing service to undeveloped perimeter areas. In these cases, the extent of future development is undetermined at this time and consequently pipe sizes may need to be revised, if conditions change. In order to effectively utilize this Master Plan, it is recommended that the service area tabulations shown in Table 9 of this report be reviewed prior to construction of major trunk

sewers. If the actual development is significantly more or less dense than anticipated, then appropriate adjustments in the proposed sewer size and downstream sewer sizes should be made. The locations of lines shown for new development are approximate and should be considered schematic based upon the available topographic mapping. In flatter areas, their final location will be dependent upon obtaining more definitive topographic information and the actual pattern of future development.

Where existing sewers are not large enough to convey the 20-year flows, a new parallel or replacement sewer is indicated on the Master Sewer Plan. Parallel sewers have been sized based on handling the differential flow between ultimate demand and existing capacity. This assumes the existing sewer will remain in service and that it can be restored to acceptable standards utilizing currently available rehabilitation techniques, if necessary. Prior to paralleling or replacement of any existing sewer, a detailed review including a video inspection should be made of the existing sewer to determine whether it is desirable to keep it in service. Obviously, the capital cost of a total sewer replacement, which would require a larger new sewer and lateral re-connections, is considerably greater than installing a parallel relief sewer.

INFILTRATION AND INFLOW REDUCTION PROGRAM

Sizing of parallel relief sewers and replacement sewers; and future expansions of the treatment plant are often dependent on estimated existing and future I&I rates. As previously mentioned, these estimates represent the largest contingency in the development of this Master Sewer Plan. In view of the large expenditures required to install parallel relief sewers and upgrading of the wastewater treatment plant, it is imperative that the City continue investing in long-term I&I reduction programs. Reducing I&I will result in long-term savings to the City by reducing the volume of sewage treated at the wastewater treatment facility and delay or possibly eliminate the need for parallel or replacement sewers.

Our experience has been that installing relief sewers without correcting major sources of I&I will only relieve existing bottlenecks and result in even higher PWWF downstream. Sewer systems

in poor condition continue to deteriorate and, if not corrected, the volume of I&I will only increase with time.

The average peak I&I rate for all of the sewers within the City of Lakeport is about 2,400 GPAD. However, flow monitoring data indicates that there are eleven flow-monitoring areas that have extrapolated I&I flow rates that are significantly higher than the majority of the service areas (See Plate 1 and Tables 9 and 13). The total net peak sewage flow from the 11 highest flow-monitoring areas resulting from a 50-year rain storm is about 1.59 MGD, which represents about 51 percent of the total estimated City system peak flow of 3.09 MGD. In addition, these areas only comprise about 300 sewered acres or 15 percent of the total existing 2,000 sewered acres within the City limits. Therefore, it appears that 15 percent of the City's sewered area contributes 51 percent of the peak flows entering the collection system.

For this Master Plan, it was assumed that the City will continue to aggressively correct I&I in the future. The design flow criteria in Table 10 estimates, that the City's continued I&I reduction program will focus on the high I&I areas (i.e., areas with I&I greater than 3,500 GPAD) and reduce I&I in these areas by between 10 and 30 percent over the next 20 years. Historically, the City has aggressively identified and implemented major I&I reduction projects. During the spring of 2006 the City identified 10 to 14 open lateral clean outs at a private mobile home park along Park Street that had been flooded by high lake levels and were allowing inflow to enter the City's collection system. Although it is difficult to determine the exact amount of I&I that was eliminated from this repair it is estimated that by plugging one 3-inch clean out a savings of about 0.3 MGD (200 GPM) has been prevented from entering the collection system (based on 12-inches of flood water over the clean out opening).

The City's I&I reduction program has been able to identify and repair numerous I&I sources within the existing collection system. Many of these sources are easy to identify and repair. However, future sources of I&I may be more difficult to define. For example, during the January flow monitoring effort it was determined that an 8-inch sewer connected to the manhole at the intersection of Main and Martin Street (Monitoring Station 4) was discharging approximately 15 GPM into the collection system. Further investigation by City staff concluded

that this existing sewer was no longer in service and it was plugged. By abandoning this sewer approximately 22,000 GPD of I&I was eliminated from the system.

Laterals and House Connection I&I

In order for the City's I&I reduction program to be effective, the City will need to address leakage from laterals and private building sewers. There have been several studies that point to sewer laterals and building connections as contributors of up to half of the I&I entering a collection system.

In a study for the U.S. Environmental Protection Agency (EPA), Conklin (1981) noted that many sewer rehabilitation programs that did not address sewer laterals, had a maximum I&I removal rate of about a 30 percent. Furthermore, the EPA study also concluded that the building connections and private sewer laterals contributed 50 percent of the total I&I into the system. Therefore, with a continued City committment to eradicate I&I from the laterals and private house connections, the best that can be hoped for in any I&I reduction program is about a 30 percent reduction.

Typically, the sewer pipe from the house to the property line is called the "building sewer" or the "private sewer lateral" and the sewer pipe from the property line to the sewer main is called the sewer "lateral." Generally, the lateral is located in the public right-of-way. In the City of Lakeport the property owner is responsible for the maintenance of the private sewer lateral from the house to the private property line.

Currently, the City's newly adopted sewer ordinance has addressed some of the issues attributed to I&I coming from the private sewer laterals. The City's ordinance requires that private laterals be periodically cleaned, inspected, and tested for I&I by the private property owners at predetermined scheduled events, such as when applying for a building or plumbing permit. Furthermore, the City's ordinance also stipulates that approved cleanouts must be installed within the existing private sewer laterals whenever the laterals are replaced or when the lateral is to be tested. Testing of private sewer laterals involve an exfiltration pressure test that measures the amount of pressure loss within the private sewer lateral over a set period of time. The

ordinance stipulates that if the mandatory exfiltration test fails, the private property owner would be required to repair the lateral and retest or possibly be fined a noncompliance fee.

Future I&I Reduction Programs

During the flow monitoring that was performed for this Master Plan several subservice areas have been identified as being high I&I areas. It is in these identified target areas the City should focus near term I&I reduction efforts such as smoke and dye testing of the sewers, internal video inspection of both the main line sewers and laterals (where access is possible) to determine defects and sources of I&I, and continued inspection of manholes during rain events to try and identify I&I sources that are caused by poor manhole construction, flooding, and degradation. Of special interest are those areas nearest the lake where flooding can occur (i.e., subservice areas 13A, 3C, etc.). An extensive effort in addressing private sewer connections should also be implemented in these areas based on the newly created sewer ordinance. The City should routinely evaluate (e.g., dye and smoke test) areas adjacent to the lake on a regular basis (i.e., once every three to four years) in order to evaluate potential new sources of I&I.

As new field data is collected, the City should compare this information with past inspections to determine if sewer facilities have deteriorated or been damaged. This phase would also involve reviewing the field data, summarizing and tabulating where sources of I&I are evident within the system, and formulating the best way to repair these defects. Most of the I&I sources can be easily repaired by City crews as they are identified.

However, other more extensive sources of I&I, may require the City go out for public contract to have this work performed by contractors. Repairing defects, such as major root intrusions, failing sewer pipes, sewer sags, and deteriorating manholes may require specialty contractor skills. Some of these work items may include grouting of sewers and lateral joints, lining, pipe bursting, or replacing main line sewers and manholes, and addressing laterals by installing cleanouts so that specific laterals can be evaluated and, repairing if needed. It might be possible to combine general sewer improvements recommended in this Master Plan with major I&I reduction repairs that are identified in the I&I target areas.

Plate 2 shows the six sub-service areas that contribute the highest I&I into the collection system and constitute the Initial I&I Target Areas. In particular, Subservice Area 9B and 9C north of the Fairgrounds, Subservice Area 4B on the east side of the Fairgrounds, Area 3C along Park Street, 13A along North Main Street, and a small Subservice Area 7C along North Street. From these six areas it is estimated that as much as 0.9 MGD of I&I is generated during significant (i.e., 10-year or greater) rain events. It is in these Initial I&I Target Areas that the City should continue to focus its I&I reduction efforts over the next ten years (i.e. 2008 to 2018). In addition, the City should budget for subsequent I&I reduction efforts in the remaining high I&I areas in the collection system (see 1 Subareas 1B, 7A, 7B, 9A, and 10B), once the Initial I&I Target Area has been systematically investigated and repaired.

Table 14 indicates a preliminary cost estimate for a comprehensive I&I reduction program within the City over the next 20 years and beyond. Assuming that City staff will perform all of the investigative work (i.e., smoke and dye testing, video sewer inspections, manhole inspections, etc.) as a part of there on going I&I reduction program the table provides estimated "order of magnitude" costs for performing the repair portion (Phase 2) of the work with Contractors through public bidding. Table 14 also includes objectives for the amount of I&I reduction to be achieved in each of the monitoring areas. If these I&I reduction objectives can be realized, then it is estimated that approximately 0.5 MGD of I&I could be removed from the Initial Target Area and about 0.4 MGD would be removed in the remaining high I&I service areas (this depends a great deal on how effective the City is in having private property owners repair leaky building sewers).

Phase 2 costs were projected by assuming that approximately 20 percent of all of the sewers, laterals, and manholes in the high I&I areas will need some type of rehabilitation or replacement. Estimated quantities within this table should be considered as an order of magnitude estimate for planning purposes. Costs for performing the Phase 2 work cannot be accurately forecast until such time that the Phase 1 work has been completed and the field data is reviewed. All costs include 25 percent for planning and engineering and 15 percent for contingency.

Finally, any I&I reduction program that is performed should be verified by subsequent flow monitoring. Using the flow monitoring data generated for this and successive Master Plans as a basis, subsequent flow monitoring data in those areas that have been rehabilitated will need to be gathered and compared in order to verify reductions in I&I. It is strongly recommended that the City perform such flow monitoring of the existing system during peak rain events and elevated lake levels.

SEWER IMPROVEMENTS

The recommended sewer improvements are shown on Plate 2. Trunk sewer design flows and the required sewer sizes were determined for the 2008 and 2028 conditions, as described below. As was discussed, the specific improvements recommended below are based on the City's commitment to controlling and reducing I&I in the sewer system. Table 10 establishes I&I reduction goals for the next 20 years. If these goals cannot be achieved, peak sewage flows in the system will be higher than estimated, which will result in future sewer capacity issues and the need for the construction of additional relief sewers and treatment plant capacity.

The PWWF for each reach of trunk sewer was determined using the H_2OMAP Sewer by MWHSoft computer program. The summary of the H_2OMAP program output is shown in Table 12 in the back of this report. The table indicates the analysis year, model pipe number, sewer length, diameter, slope, capacity, model PWWF, surcharge depth, and recommended replacement or parallel sewer. Using an input sewer slope and diameter of the existing trunk sewer, if there is one, together with compiled PWWF, the program computes the existing sewer capacity. Table 12 also indicates a recommended size of a parallel sewer if the existing sewer is inadequate. In addition, a replacement sewer size is also shown on the table in case the existing sewer is to be abandoned.

North Main Street Sewer: The analysis indicates that during present day peak wet weather conditions, several segments of the 8-inch Main Street Sewer between 6th Street to 10th Street (see Points 1 to 2 on Plate 2) can encounter surcharging conditions during PWWF. This

surcharging condition has been observed in the field as City crews have reported several overflows within this segment of sewer over the past 5 to 10 years. In order to relieve this potential surcharge condition, it is recommended that the existing 8-inch sewer be either paralleled with a 10-inch sewer or replaced with a new 12-inch sewer. The hydraulic analysis also suggest that if the Rose Avenue Lift Station is diverted to the north, as is being negotiated between the City and County, future peak sewage flows on the Main Street sewers will be lowered. The analysis indicates that the Rose Avenue lift station diversion to the north would require that an 8-inch parallel sewer would be needed versus the 10-inch sewer suggested above.

In addition, the hydraulic analysis indicates that a significant segment of existing 12-inch sewer along Main Street, from Sixth Street to C Street (see Points 1 to 3 on Plate 2), can also experience moderate surcharging during estimated PWWF. This is probably caused by the shallow slope of several segments of this sewer (i.e., some segments have slopes of 0.1 percent) and the influence of upstream lift stations such as the Rose Avenue and Clearlake Avenue lift stations. In order to relieve estimated peak flows within this sewer, the hydraulic analysis indicates that a parallel 15-inch relief sewer should be constructed. Similarly, the diversion of the Rose Avenue lift station to the north would improve this estimated surcharging condition such that instead of requiring a parallel 15-inch sewer along Main Street from 6th Street to C Street a parallel 12-inch sewer from 6th Street to Armstrong Street would be required.

Lakeshore Boulevard: Currently, the existing 8-inch sewer that connects High Street to Giselman Street, along Lakeshore Boulevard (see Points 4 to 5), appears to have moderate surcharge during PWWF. This surcharge was seen in the hydraulic analysis for 2008 and 2028. It is proposed that within the next 5 to 10 years (2013 to 2018), this segment of sewer be paralleled with a second 8-inch sewer to increase its current capacity.

North High Street Sewer: The analysis indicates that the existing 6-inch High Street sewer between 17th Street and Via Del Lago Street (see Points 6 to 7 on Plate 2) has potential surcharge conditions during current and 20-year PWWF conditions. It is recommended that this 400-foot sewer segment be replaced with an 8-inch sewer within the next 10 years. Furthermore, if the Rose Avenue lift station flow is diverted to the north it is expected that this sewer will be

impacted with more peak sewage in the future. The hydraulic analysis indicates that the additional Rose Avenue lift station flows will necessitate that the existing High Street sewer from 17th Street to Via Del Lago Street be replaced with a 10 inch and that an additional 200 feet of parallel 8-inch sewer be installed between Via Del Lago Street and Lakeshore Boulevard.

Martin Street Sewer: The hydraulic model suggests that the 8-inch Martin Street sewer upstream of the Martin Street Lift Station (see Points 11 to 12 on Plate 2) may be under surcharging conditions during current PWWF's. It is suggested that the I&I Reduction Program will reduce the PWWF on this sewer segment appreciably reducing the potential for surcharging. It is recommended that the City monitor this sewer segment during wet weather conditions to determine if sewer capacity is an issue. A parallel 8-inch sewer may be necessary within the next 5 to 10 years if I&I reductions do not occur or are ineffective.

Compton to Russell Street Sewer: The analysis indicates that during present day peak wet weather conditions, two 6-inch segments of the Compton to Russell Street sewer (see Points 13 to 14 on Plate 2) can encounter surcharging conditions during PWWF. Although it is hoped that I&I reductions in service area 10B may eliminate this potential for surcharging the City should monitor this segment of sewer during wet weather conditions and if needed replace this sewer with an 8-inch over the next 10 to 20 years.

Martin Street Lift Station: Currently, the lift stations wet well hatch is corroded and should be rehabilitated by sand blasting and applying a non-corrosive paint system in order to prevent further degradation of the hatch.

The current Martin Street lift station has an estimated effective pumping capacity (i.e., one pump operation) of about 425 GPM (0.61 MGD). Because this lift station serves several subservice areas with moderate to severe I&I rates (see Plate 1) the Master Plan analysis predicts that during wet weather conditions, flows into the lift station can exceed approximately 500 GPM (0.86 MGD). It is hoped that the proposed I&I reduction program within the high I&I areas (i.e., subservice areas 9B and 9C) can reduce flows into this lift station over the next 20 years. However, if I&I reductions cannot be achieved, flows at this lift station may increase over time

necessitating that the City evaluate replacing the existing pumps with higher capacity pumps. Furthermore, several developments upstream of this lift station (see Plate 2 developments 9, 10, 11, and 12) are planned over the next 20 years and could impact the capacity of this lift station even more. The City should continue monitoring pump operation at this lift station during high flow conditions. If it is determined that both Martin Street Pumps are required to keep up with peak flows, the City should consider replacing them with larger capacity pumps within the next 10 to 20 years, possibly requiring that future developments upstream of this lift station enter a reimbursement agreement with the City for upgrading.

The Martin Street Lift Station is considered to be one of the City's primary lift stations. In order to improve monitoring of this lift station it is recommended that the City look at equipping this lift station with radio telemetry and SCADA capabilities in the future (see SCADA radio telemetry section below).

Clear Lake Lift Station: The Clear Lake Lift Station is old and requires City operators to perform confined space entry when having to repair the pumps and other wet well equipment. As noted in the recent field review of this facility, the lift station has the potential of being flooded due to high lake levels. Furthermore, access into the wet well is also limited due to the small diameter of the wet well. It also appears that there is some deterioration of the concrete wet well walls (i.e., evidence of exposed aggregate within the walls).It is recommended that the City consider renovating this lift station within the next 5 to 10 years to improve access.

Rose Avenue Lift Station: The City of Lakeport and Lake County have been negotiating a service swap such that the City would collect and treat waste water from the County's facilities at the airport in return for taking flows from the Rose Avenue Lift Station and pumping them to the Lake County Treatment Plant to the north via the Lakeshore Boulevard Lift Station. In order to pump sewage from the Rose Avenue Lift Station to the Lake County treatment facilities a new 6- to 8-inch force main would be needed from the lift station to the existing collection system on North High Street (see Point 6 to 15 on Plate 2) approximately 1,600 feet.

Linda Lane Lift Station: Current odor problems at the Linda Lane lift station are probably due to an undersized blower venting the lift station wet wells. It is recommended that the City replace this blower with a larger capacity blower in order to better exhaust the wet wells through the activated carbon odor scrubbers. In addition, the City has the ability to inject chlorine into the Linda Lane wet wells from the treatment plant chlorine system in order to neutralize excessive hydrogen sulfide odors. It is recommended that operators utilize chlorine injection during those periods when odors are excessive.

Lift Station SCADA and Radio Telemetry: In order to improve the monitoring and maintenance of the City's lift stations and to better track sewage flows throughout the collection system it is recommended that improvements to the major lift station controls be implemented over the next five and ten years. Installation of radio telemetry equipment and supervisory control and data acquisition (SCADA) hardware and software at Rose Street, C Street, Martin Street, Lakeshore Boulevard and the Lakeport Boulevard Lift Stations would allow City operators to better monitor these main lift stations within the Lakeport system.

WASTEWATER TREATMENT PLANT IMPROVEMENTS

The existing Wastewater Treatment Plant was originally designed for an ADWF of about 1.0 MGD and a PWWF of 3.0 MGD. As discussed in this report, the current expanded effluent irrigation system has a current 100-year rainfall capacity of about 0.51 MGD. The summer 2003 to 2007 ADWF at the treatment plant was estimated to be about 0.38 MGD, which is 74 percent of the expanded effluent irrigation plant capacity. At a 1.1 percent ADWF growth rate (see Figure 3), it is estimated that the effluent reservoir/irrigation system will be at capacity by 2033.

Since 2002, (the year that the Ashe Street Lift Station started diverting sewage flow from the Lakeport Treatment Plant to the Lake County Sanitary facilities) there has been one instance for which the peak wet weather flow at the treatment plant exceeded 3.0 MGD (i.e., December 31, 2005, flows were estimated at 3.09 MGD). It appears that this incident was an isolated occurrence, and as discussed, the City was able to identify a significant source of some of this excessive flow and reduce it. It is estimated that by capping and plugging the 10 to 14 open clean-outs that were flooded along Park Street in April 2006, as much as 0.3 MGD of potential I&I could have been eliminated from leaking into the collection system due to lake flooding at this location. Although lake levels above elevation 1326 have not occurred since these repairs were made it is estimated that because of these repairs current peak flows at the plant are around 2.8 MGD given the same peak lake and rain conditions that were seen in the winter of 2005 to 2006.

Future peak flows at the treatment plant are much more difficult to predict. It is anticipated that the City's ongoing I&I reduction program and implementation of the City's new sewer ordinance will work to control some of the existing and future I&I flows. However, some of the City's sewers are over 60 years old and it is inevitable that deterioration of existing sewers will occur. Therefore, based on the historical treatment plant peak flows; proposed City growth; the projected I&I reduction program; and existing sewers that will continue to deteriorate; it is estimated that PWWF at the treatment plant will begin to exceed 3.0 MGD regularly during extreme conditions over the next 10 to 20 years. It is anticipated that plant flows will be as high as 3.3 to 3.4 MGD by 2028. Therefore, some of the existing treatment plant processes may need

to be improved over the next 20 years in order to keep up with these anticipated peak flows.

Headworks: Based on the current effective capacity (i.e., two pumps operating at between 3.6 to 3.7 MGD) of the Linda Lane Lift Station, the City's operators have never reported a high water level alarm in the headworks during peak flow conditions (the high water alarm is set at 2 feet from the top of the headworks wall). Therefore, it appears that the existing treatment plant headworks has a current PWWF capacity of at least 3.6 MGD. Operators should continue to monitor the headworks during peak flow conditions in order to determine if there are any headworks capacity issues in the future.

Aeration Basins: As previously discussed, the aeration basin ABM slope protection appears to be failing in many locations due to wind and wave erosion of the earth from under the ABM.

In particular, the access ramps into the ponds have seen the worst damage to the ABM apron (see picture above). The continued degradation of the aeration basin slopes and ABM apron may compromise the existing earthen dikes and the City should implement a staged repair procedure within the next 10 years. It is proposed that in order to properly repair the aeration pond dikes, each aeration basin would be taken out of service temporarily over two summers, between June to September, in order to dry the pond slopes and install additional armament or slope

stabilization material. Pond 1 should be repaired first since it has a greater extent of dike area followed by pond 2. Repair of the slopes may involve replacing some of the severely damaged ABM, reinforcing the existing ABM with additional concrete footings, and installing additional ABM or possibly rock rip rap along the dike slopes, below the existing ABM apron, to protect the slopes from further erosion.

As a part of the ABM/slope repair, it is recommended that the City consider removing accumulated sludge and grit from the bottom of each pond. Although currently the ponds appear to be functioning properly, the addition of sludge over time will eventually reduce aeration basin capacity and have an effect on pond treatment efficiencies. It is estimated, based on recent pond bottom sounding measurements, that there could be as much as 12 to 24 inches of sludge at the bottom of each pond, currently.

The City will be required to perform a comprehensive analysis of the sludge prior to any disposal method. Laboratory analysis of the sludge would involve Title 22, California Code of Regulations, test requirements such as heavy metals, organic, and inorganic constituent testing. Furthermore, after the sludge analysis is performed, a comprehensive engineering report will need to be prepared in order to determine what alternatives are best suited for sludge disposal. Options could include drying the sludge at the treatment plant and land application onto City property or possibly disposing of the sludge at a land fill.

Effluent Pump Station: As discussed the effluent pumping station has an effective capacity of approximately 3.5 MGD and it appears to have sufficient capacity for the next 20 years based on estimated 2028 PWWF.

Chlorine Contact Pipeline: The chlorine contact pipeline was designed to provide a maximum 30 minute contact time for a peak wet weather flow of 3.0 MGD. Although these PWWF events have been isolated, it is expected that within the next twenty years peak flows above 3.0 MGD will start to become a more common occurrence, especially if I&I reduction within the collection system is not achieved. Therefore it is recommended that in order to optimize the current chlorine contact pipeline volume the pipeline be internally inspected and if needed, cleaned of

solids. Inspection and cleaning of this pipeline may involve draining the pipeline temporarily, inspecting the pipeline with either a CCTV robot or divers and cleaning with hydro-flusher equipment and pumps to remove accumulated sediment.

Furthermore, in order to maintain the minimum 30 minutes of detention time in the future, the City will need to consider adding additional volume to the chlorine pipeline to accommodate the estimated 3.3 to 3.4 MGD PWWF that is predicted by 2028. Additional chlorine contact capacity may be needed. The addition of a parallel 20-inch pipeline to the existing 650 foot 16-inch chlorine force main would add necessary volume to the existing contact chamber to achieve the recommended 30 minutes of contact time at 3.4 MGD PWWF.

Chlorination Facilities: Chlorine gas is one of the cheapest sources of chlorine that can be purchased today. Unfortunately, chlorine gas also has its safety issues when it comes to handling and storing the gas. Recently, the Lake County Environmental Health Department has requested that the City prepare a Risk Management Plan for all City facilities that use chlorine gas for disinfection. This Risk Management Plan is a part of the new regulations for the California Accidental Release Prevention Program (CALARP). The CALARP Program was established in California to prevent accidental releases of those substances determined to potentially pose the greatest risk of immediate harm to the public and the environment. Although the City has had an excellent safety record in handling chlorine gas at their treatment plant, it is evident that the use of large quantities of chlorine gas near residential developments is coming under closer scrutiny at the County, State, and Federal level. Given this increased level of County involvement and the safety of City workers and the public, Lake County Environmental Health Department has requested that the City evaluate its chlorine handling processes at the treatment plant and consider replacing the gas disinfection processes in the near future with a safer method of disinfection (e.g., sodium hypochlorite).

Although there are several disinfection alternatives (calcium hypochlorite powder and tablets, sodium hypochlorite solution, etc.), it appears that the City should consider switching from gaseous chlorine to a sodium hypochlorite dosing system within the next five years. A typical hypochlorite system would include installing bulk hypochlorite storage tanks within a

containment building, chemical feed pumps, and appurtenances. It is proposed that the supply of hypochlorite solution would be trucked to the treatment site regularly from sources in Santa Rosa or Sacramento. Labor costs for operating a sodium hypochlorite system would be similar to use of the current gas system, however material costs would probably be twice as much as using gas. Currently, the maximum that the existing effluent chlorinators can deliver is about 400 pounds per day (ppd). At 3.0 MGD this equates to dosage rate of about 16 mg/l. In order to maintain this dosage rate for future 20-year peak flows (i.e., approximately 3.4 MGD), it is estimated that the chlorinators would need to deliver approximately 470 ppd. It is recommended that as a part of switching from chlorine gas to sodium hypochlorite, the new system incorporate effluent chlorinators that can deliver 500 ppd.

Effluent Reservoir and Disposal: The water balance that was created for this Master Plan (see Table 2) suggests that the current effluent reservoir and irrigation deposal system at the treatment plant has an effective capacity to treat a 0.51 MGD ADWF during a 100-year annual rain event. Based on this, and the City's continued I&I reduction efforts and a 1.1 percent growth rate, it appears the effluent reservoir and disposal facilities at the treatment plant have capacity for at least the next 20 years.

In order to investigate sources for future effluent disposal, the City of Lakeport recently received a Water Recycling Facilities Planning grant from the State Water Resources Control Board. This grant will be used to perform a study to investigate the feasibility of providing recycled water, which has been recognized as a valuable source of water in the State of California, from the City's treatment plant to other water users. As a part of this study it is anticipated that other disposal sources will be established, including the prospect of finding users that could utilize the City's treated effluent all year around, without any restrictions due to rainfall (e.g., the Geysers). It is anticipated that this Water Recycling Facilities study will be completed by November 2008.

Recycle Pump Station No. 1: Currently all recycle water run-off is collected in recycle reservoir No. 1 and pumped back to the overland system via Recycle Pump Station No. 1. This operation is controlled by level switches that activate the pumps based on pond level. Currently, pump operation can occur during any part of the day including the peak energy periods of

between 12:00 p.m. and 6:00 p.m. Given that there appears to be significant excess volume within Recycle Reservoir No. 1 during the summer months, the City should pursue the idea with PG&E to convert Pump Station No. 1's operation to a time-of-use operation to save energy costs. By operating the pump station during Partial-Peak (8:30 a.m. to 12:00 p.m. and 6:00 p.m. to 9:30 p.m.) and Off-Peak hours (9:30 p.m. to 8:30 a.m.) during the summer, significant energy costs could be achieved. Conversion of this pump station to time-of-use operation would simply require that station controls be modified to include timer controls and a pond level system that would override the timer operation and turn the pumps on when the pond exceeds a certain level.

SDA Treatment Plant Requirements: The Southern Development Area (SDA) previously discussed would include approximately 1,500 RUEs developed over an area of roughly 900 acres. This size development would equate to roughly 0.3 MGD ADWF and an estimated PWWF of around 2.0 MGD. Furthermore, the SDA developers propose that a large portion of the City's existing treatment plant effluent irrigation area be converted to a golf course, which would use the effluent for irrigation. In order to utilize the City's effluent for application onto a golf course, additional treatment of the effluent would be required, most likely tertiary treatment standards would be compulsory for the purpose of public health protection. Modification of the existing treatment plant to improve effluent quality to accommodate golf course irrigation needs may include the following options:

- Storage Reservoir Effluent Treatment:
    - Flotation Thickening and Filtration
    - Roughing Filter followed by Membrane Filtration
    - Roughing Filter followed by Upflow Clarification and Filtration (similar to existing water treatment plant)
- Replacing the Existing Oxidation Pond System for Unrestricted Reuse:
    - Conventional Activated Sludge with Effluent Coagulant Filtration
    - Activated Sludge with Membrane Filtration

Due to the speculative nature of the SDA at this juncture and the extent of the changes proposed to take place at the existing Lakeport treatment plant to accommodate a golf course, a comprehensive review of a practical treatment plant alternative for addressing the SDA development is beyond the scope of this Master Plan. It is anticipated that future tertiary treatment plant improvements will be evaluated as a part of the water recycling facilities study in order to determine which process will be the most cost effective in treating the existing effluent for recycle use.

ESTIMATES OF COST

BASIS OF COST ESTIMATES

Gravity sewer, force main, and other facility costs have been prepared using information from comparable projects in the area where construction contracts were competitively bid. Gravity sewer construction costs from these previous projects, projected to June 2008 costs, and an Engineering News Record Index (ENR) of 8185 are illustrated on the curves on Figure 6. The figure accounts for varying depths and types of backfill required. Values from these curves and recent projects were used as a guide in preparing the estimate of pipeline costs herein.

Note that these estimates are based, in many instances, on preliminary information. An example of this is the cost of proposed trunk sewers to serve areas that are currently undeveloped. Even in the developed areas, at the report stage, it is often difficult to determine the underground conditions relative to the amount of groundwater, rock excavation, and conflicts with existing utilities that would be encountered. These cost elements cannot be properly evaluated until final design. Consequently, the estimates in this report should be considered as "order-of-magnitude" estimates which may vary considerably from the actual construction cost for a particular project element, but the overall Master Plan costs should be reasonably close and satisfactory for the basis of planning a financial program.

To obtain total project costs, construction contingencies and indirect costs were added to the construction costs. Construction contingencies are assumed to be 15 percent of the construction costs. Indirect costs include engineering, administration, and legal costs and amounts to about 25 percent. The total of the above two categories was taken at 40 percent for the treatment plant improvements and sewer improvements. This figure may vary considerably depending upon the complexity of the work.

All costs indicated in this report are based upon June 2008 dollars. For future or delayed work, an allowance for construction cost increases must be considered. During the last ten years,

general construction costs have increased at an average rate of about 3.2 percent per year. Similarly, the average rate of increase for the last four years has been about 5 percent per year. In projecting future costs, one should consider both short-term and long-term inflationary trends.

Note that costs presented in this report are capital improvement costs only and do not include any operation or maintenance costs of the sewer system. The total capital improvement costs include the estimated costs for correcting those high I&I areas that were identified for this study (see Plates 1 and 2, and Table 13). The projected capital costs do not include the annual cost for an I&I correction program outside these high I&I areas.

The need for sewer improvements has been determined using the best available information regarding the existing design capacity and flow conditions. However, the flow conditions are based on a small set of wet weather flow measurements and the future flow estimates are based on assumed growth rates. Because of the approximate nature of the flows, the improvements identified in this study are preliminary. Prior to expending any funds for improvements, a detailed analysis of each problem area should be undertaken by video inspecting and smoke testing those areas.

Time Periods

Near Term (2008 to 2013): Improvements where existing capacity is clearly less than the calculated theoretical and are thus needed as soon as possible or are needed to improve safety or performance of the existing facilities (probably within the next five years).

Intermediate Term (2013 to 2018): Other improvements that are marginal in capacity, or will be over the theoretical capacity in the next five to ten years, or are needed to improve performance or efficiency.

Long Term (2018 to 2028): The remaining improvements that are theoretically needed to have adequate capacity to meet 20-year development. Scheduling of these sewer facilities will be more definite in future Master Plan updates.

A preliminary cost estimate for the 20-year Wastewater Treatment Plant improvements and the proposed general sewer system improvements are summarized in Table 12.

Table 14 together with the I&I Reduction Program shown on Plate 2 and Table 13, in essence, are the Master Plan of Sewer Improvements. As shown in Table 14, approximately $1,117,000 (June 2008 dollars) worth of sewer general improvements, I&I reduction, and treatment plant improvements will be needed in the Near Term period.

Additional improvements are scheduled for the Intermediate and Long Term time periods. Project costs scheduled in these time periods are based upon the projected growth of 1.1 percent and estimated future I&I rates. Final timing of the individual projects will be dependent upon the actual growth experienced in each subservice area and confirmation of the estimated I&I rates by subsequent flow monitoring.

The cost for increasing the treatment plant's effluent irrigation system was not included within this report pending study results from the City's State Water Resources Control Board recycle study, which will be included in this Master Plan as an addendum when it is completed later in 2008. As a part of this study, it is anticipated that disposal sources will be identified and estimated costs for treating and disposing of the City's effluent will be established.

The I&I Reduction Program within the initial target area (see Table 13) is estimated to cost approximately $1,013,800 over the next 10 years (or $101,000 per year). Subsequent I&I reduction programs outside of the initial target area (see Plate Nos. 1 and 2) would cost an additional $1.0 million dollars, and it is assumed that these subsequent programs would be implemented once the initial target area was completed. Undoubtedly, the high I&I sewered areas identified in this study will continue to degrade without some type of remediation program and it is advised that the reduction programs outlined in this study be implemented as soon as possible in order to delay or prevent this degradation.

FIGURES

N

W E

S

LAKESHORE BLVD
LIFT STATION
(PUMPED TO LAKE COUNTY
TREATMENT PLANT)

ROSE AVE
LIFT STATION

CLEARLAKE
LIFT STATION

C ST LIFT
STATION

MARTIN ST
LIFT STATION

LARRECOU
LIFT STATION

LAKEPORT
LIFT STATION

PRIVATE
LIFT STATION

PRIVATE
LIFT STATION

LAKE COUNTY
SANITATION DISTRICT
LIFT STATION #12

LINDA LANE
LIFT STATION

LAKEPORT
TREATMENT
PLANT

Legend

- Sewer Lift Station
- Sewer Manhole
- Sewer Force Main
- Sewer Main
- PARCELS
- LAKE COUNTY LS #12
- LAKESHORE BLVD
- C STREET
- CLEARLAKE AVE
- LAKEPORT
- LARRECOU
- LINDA LANE
- MARTIN STREET
- ROSE AVE

1 inch = 2,000 feet

PACE
CIVIL, INC.
REDDING, CALIFORNIA

CITY OF LAKEPORT

2008 SEWER MASTER PLAN
LIFT STATION SERVICE AREAS

FIGURE 1

DATE 10/07

JOB# 523.23

2008–2013
MODIFY RECYCLE PUMP STATION FOR TIME-OF-USE OPERATION

2008–2013
REPLACE CHLORINE GAS SYSTEM W/ HYPOCHLORITE SYSTEM

BASIC DESIGN CRITERIA

AVERAGE DRY WEATHER FLOW (ADWF)	1.0 MILLION GALLONS/DAY
PEAK WET WEATHER FLOW (PWWF)	3.0 MILLION GALLONS/DAY
AERATED POND DETENTION TIME	23.7 DAYS AT ADWF
CHLORINE CONTACT TIME	30 MIN AT PWWF

EXISTING IRRIGATION RUNOFF COLLECTION POND
MOTORIZED OPERATOR
15 HP PUMP
RECYCLE PUMP STATION
TO IRRIGATION SYSTEM
NEW EMERGENCY RECYCLE BYPASS
LINDA LANE GENERATOR BUILDING
TRASH RACK IN WET WELL
LINDA LANE PUMP STATION
MAG METER
24" SEWER
2008–2013
INSTALL LARGER BLOWER FOR ODOR CONTROL
SCREENINGS TO LANDFILL
MECHANICALLY CLEANED 5/8"± BARSCREEN
16" FM
HEADWORKS
EMERGENCY 1-1/4" BYPASS BAR SCREEN
STOPGATE, TYP
2013–2018
REPAIR AERATION BASIN 2 & REMOVE SLUDGE
TREATMENT POND #2
20HP AERATOR, TYP
6" BYPASS
SPLITTER WEIRS & STOPGATES
SUMP, TYP
BAFFLE CURTAIN, TYP
TREATMENT POND #1
2013–2018
REPAIR AERATION BASIN 1 & REMOVE SLUDGE
SUBMERGED OUTLET, TYP
FLOAT WELL
CONTROL BLDG SEWER
3/4" EFFLUENT SAMPLE
EFFLUENT PUMP STATION
CONTACT CHAMBER DRAIN
2018–2028
INSTALL 20" PARALLEL CHLORINE CONTACT PIPELINE
48"x 600 FT CHLORINE CONTACT PIPE
OPERATIONS BLDG
6" IRRIGATION RECYCLE
CHLORINATORS
HYDRO TANK
RELOCATED EXISTING IRRIGATION PUMP STATION (PHASE 1 NIC)
NO 2 WATER FOR WASHDOWN
3" BYPASS, ALT SUCTION FOR CS
3" CHLORINATED EFFLUENT
TO EXISTING IRRIGATION FIELDS NO'S 3, 10, 1, 2 & 3
TO EXISTING IRRIGATION FIELDS NO'S 4, 5, 6, 7 & 8
TO EFFLUENT IRRIGATION FIELDS
332 ACRE IRRIGATION AREA
OUTLET STRUCTURE
PRV
EXISTING RESERVOIR OUTLET PIPE
ADJUSTABLE FLOATING INTAKE SCREEN
BOTTOM INTAKE SCREEN
EXISTING EFFLUENT STORAGE RESERVOIR
DAM HEIGHT 1436.75
2008–2013
INSPECT CHLORINE CONTACT PIPE & CLEAN
SPILLWAY CREST WS 1432.0
EXISTING MH 6 16" BV
EXISTING 16" INLET (PHASE 1 NIC)
16" BV (PHASE 1 NIC)
12" GV NORMALLY CLOSED

PROCESS DIAGRAM

HYDRAULIC PROFILE

VERT. 1"=10'
HORZ. NTS

NOTE: WATER SURFACE ELEVATIONS (W.S.) ARE AT PEAK WET WEATHER FLOW OF 3.0 M.G.D. WITH ONE AERATED POND OUT OF SERVICE.

1430
1420
1410
1400
1390
1380
1350
1340
1330
1320

MECHANICALLY CLEANED 5/8" (16 MM) BARSCREEN
DISCHARGE TO DUMPSTER
1394.50
1392.79
W.S.
1392.44
1391.0
INVERT 1390.0
BAFFLED OUTLET
1389.0 W.S.
VERTICAL TURBINE PUMP, TYP.
1392.5
BAFFLE CURTAIN
1385.0
INLET STRUCTURE, TYP.
1372.0 TO 1376.0
METER MANHOLE
1391.0
CHLORINE CONTACT CHAMBER
EFFLUENT STORAGE RESERVOIR
EL. 1436.75
6" VENT
48" MANHOLE
24" MH PRESSURE HATCH
12" SEALED VENT
INV. 1405±
SPILLWAY CREST W.S. 1432.00
MANHOLES
B.V.'S
EXISTING OR BY OTHERS
15" DISCHARGE INTO RESERVOIR
GRADE 1348.0±
12"
METER
24" INF. SEWER
SCREEN
1331.1±
1328.1±
SUBMERSIBLE PUMPS
HEADWORKS
TREATMENT PONDS
EFFLUENT PUMP STATION
LINDA LN PUMP STATION

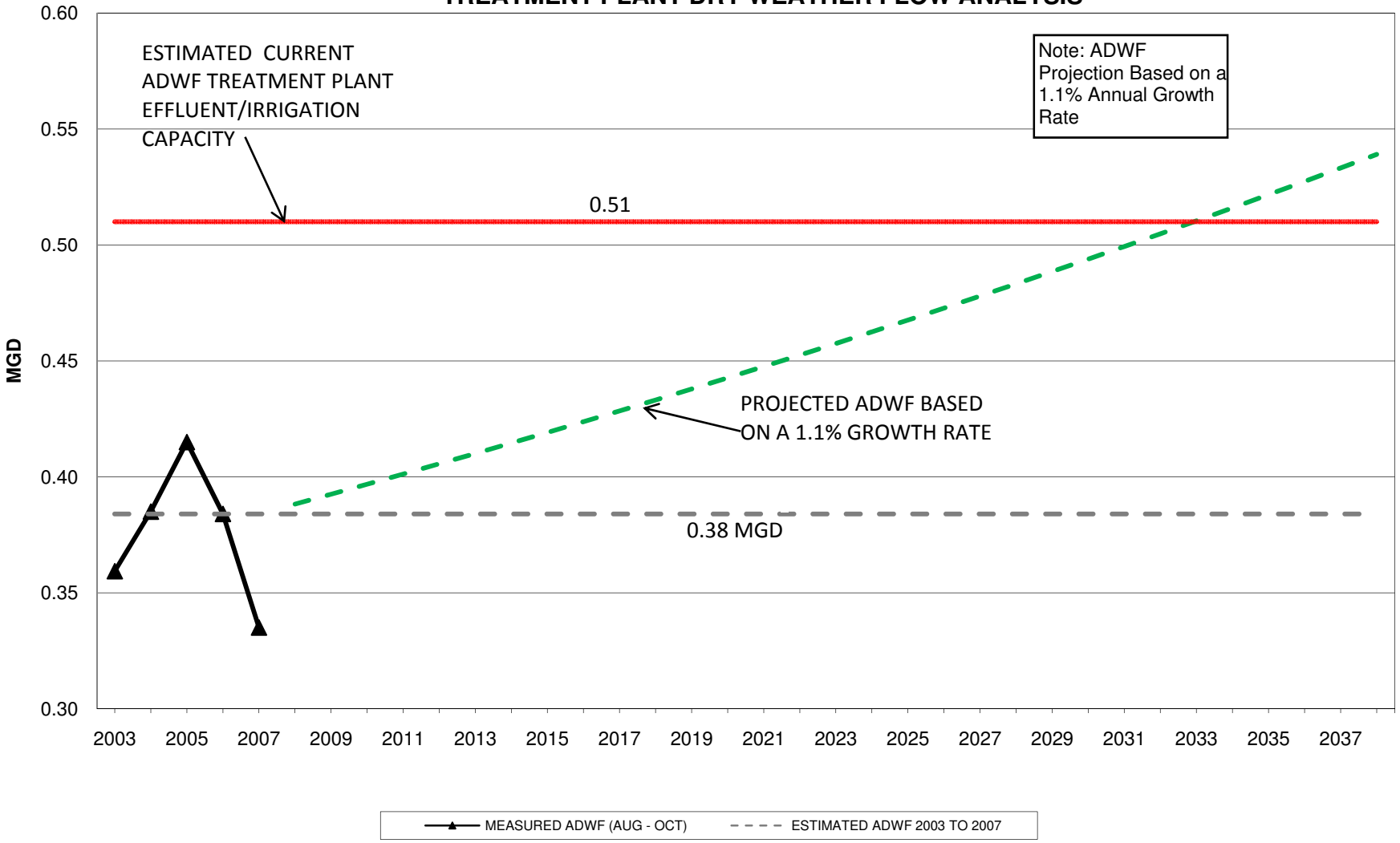
PACE CIVIL, INC.
REDDING, CALIFORNIA

CITY OF LAKEPORT
2008 SEWER MASTER PLAN
TREATMENT PLANT AND DISPOSAL SYSTEM IMPROVEMENTS

FIGURE 2
DATE 06/08
JOB # 523.23

Plot Date: April 08, 2009 - 4:46 pm Login Name: gmaxwell
File Name: M:\Inactive\Land Projects\Land Projects Inactive 2009\052323 LAKEPORT SEWER MP\dwg\Figure 2 Existing Treatment.dwg, Layout: FIG 2

FIGURE 3
CITY OF LAKEPORT
2008 MASTER SEWER PLAN
TREATMENT PLANT DRY WEATHER FLOW ANALYSIS



M:\Inactive\Jobs\Jobs Inactive 2009\0523.23\2008 Master Sewer Plan\Report Spreadsheets\FIG 3 PROJECTED ADWF.xls

4/8/2009

FIGURE 4
CITY OF LAKEPORT
2008 MASTER SEWER PLAN
COLLECTION SYSTEM DIURNAL CURVE

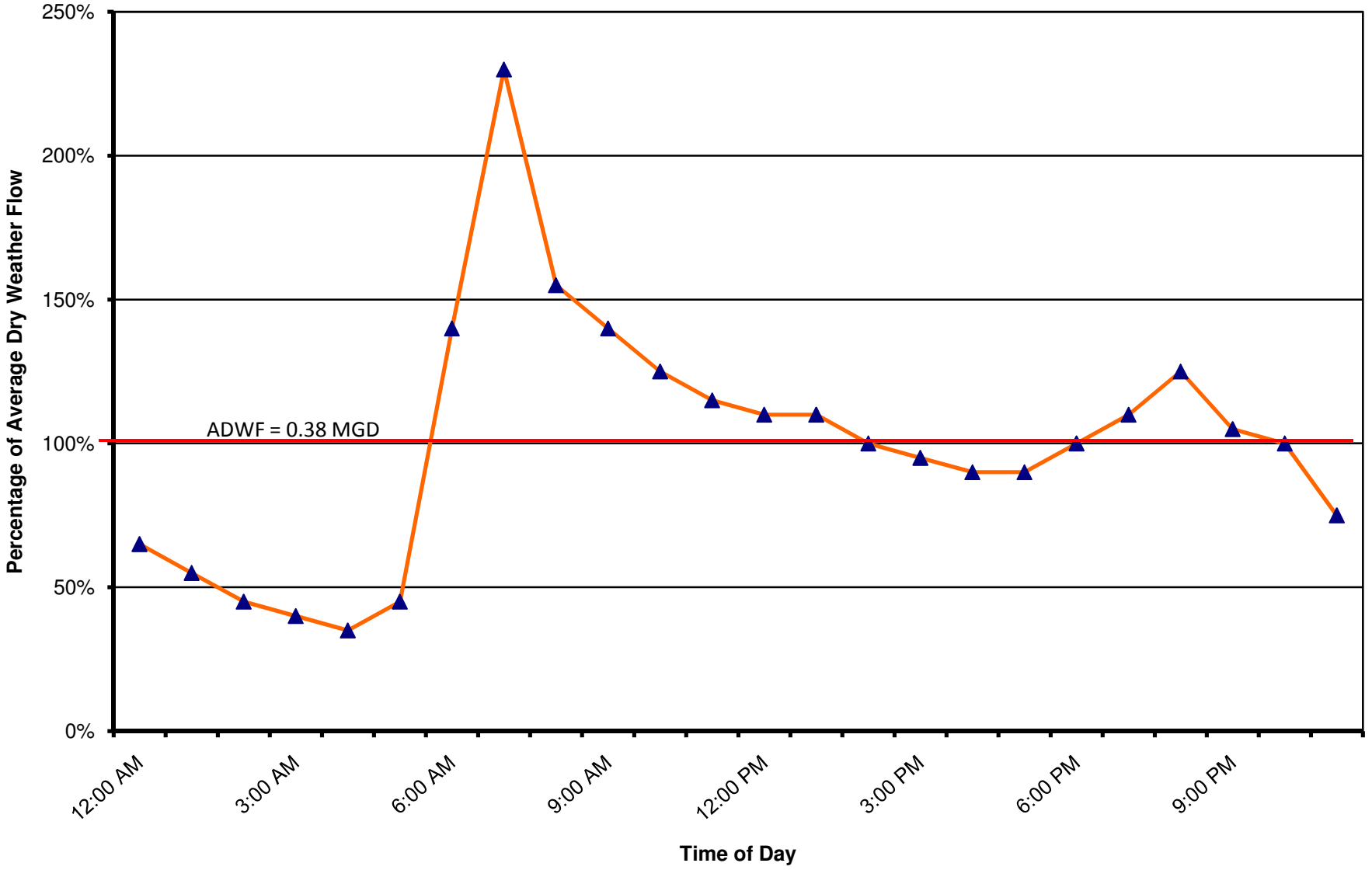


FIGURE 5
CITY OF LAKEPORT
2008 MASTER SEWER PLAN
ESTIMATED PLANT FLOW MARCH-APRIL 2000

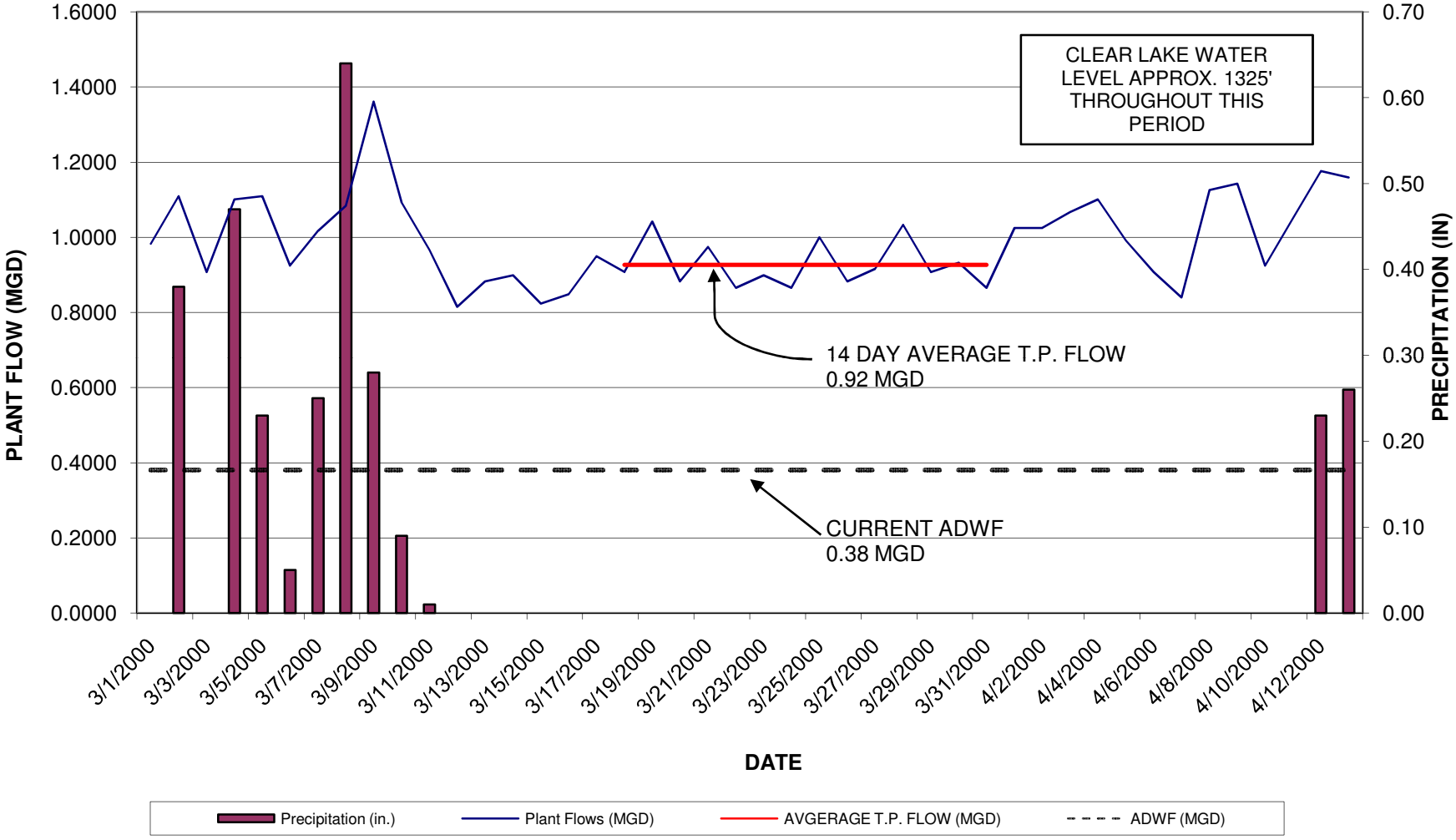
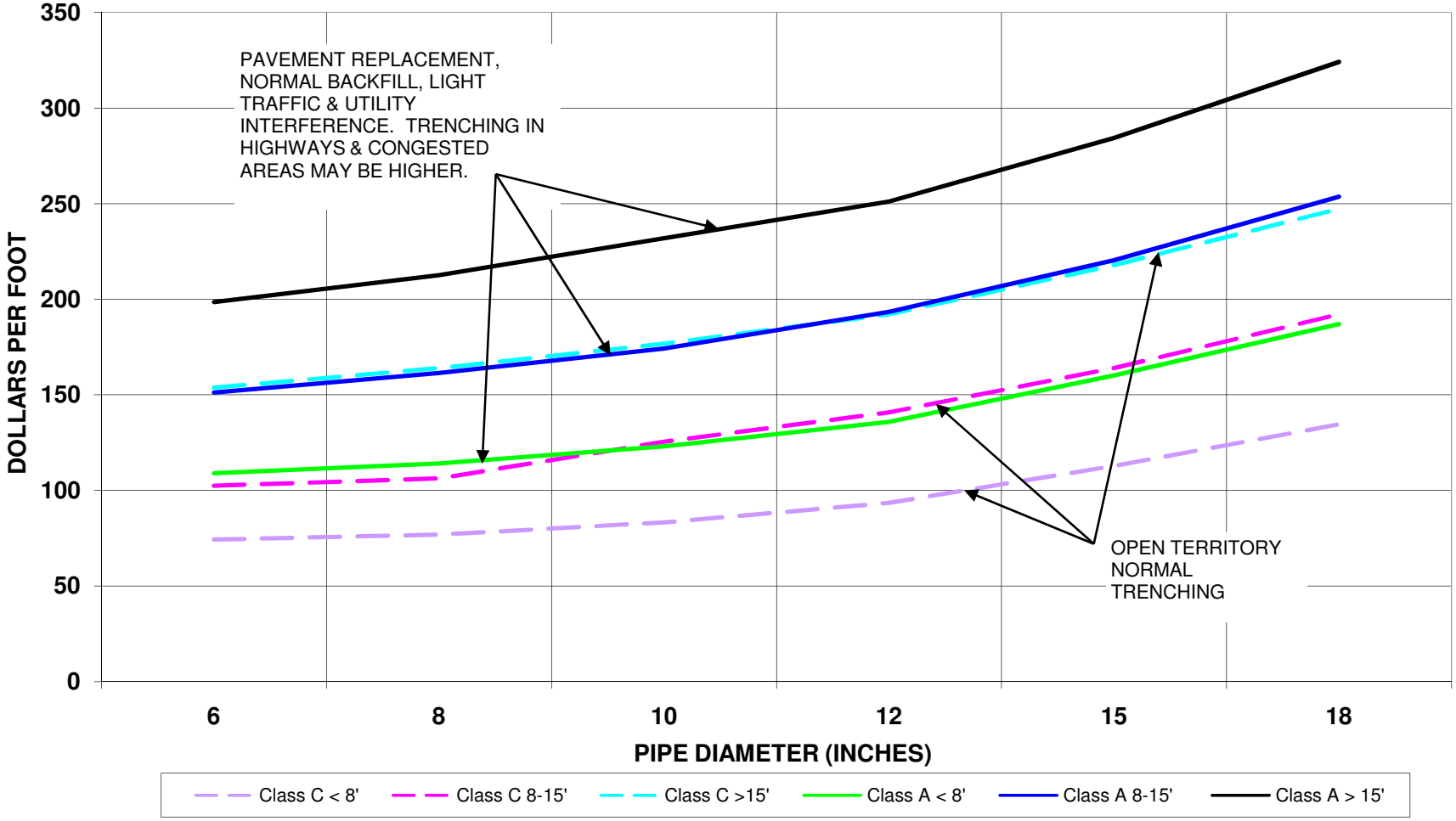


FIGURE 6
CITY OF LAKEPORT
2008 MASTER SEWER PLAN
GRAVITY SEWER CONSTRUCTION COST
JUNE 2008



NOTE: COSTS ARE FOR OPEN TRENCHING & INCLUDE ALLOWANCES FOR MANHOLES & OTHER NORMAL APPURTENANCES. THIS COST FIGURE DOES NOT INCLUDE ENGINEERING OR CONTINGENCIES, BORING AND JACKING, ROCK EXCAVATION, SEVERE GROUND WATER, EASEMENTS, OR OTHER SITE SPECIFIC FACTORS.

TABLES

TABLE 1
CITY OF LAKEPORT
2008 SEWER MASTER PLAN
ESTIMATED LIFT STATION FLOWS AND RECOMMENDED IMPROVEMENTS

LIFT STATION	TYPE	NUMBER OF PUMPS & HORSEPOWER	FLOWMETER (Y/N)	CURRENT EFFECTIVE CAPACITY (MGD)	NUMBER OF RUE'S SERVED		ESTIMATED AVG WET WEATHER FLOWS		RECOMMENDED IMPROVEMENTS
					2008 RUE'S	2028 RUE'S	2008 (MGD)	2028 (MGD)	
Lakeshore Blvd	Wet Well	2 - 10 Hp	Y	0.75	450	480	0.54	0.58	Installation of SCADA and radio telemetry would improve monitoring of this lift station.
Rose Ave	Wet Well	2 - 5 Hp	Y	0.72	90	90	0.19	0.16	Installation of SCADA and radio telemetry would improve monitoring of this lift station.
C St	Wet Well	2 - 47 Hp	Y	1.54	700	740	1.00	1.05	Installation of SCADA and radio telemetry would improve monitoring of this lift station.
Linda Ln	Wet Well	3 - 47 Hp	Y	3.77	2050	2560	2.60	2.75	Install new odor control blower and begin chlorine injection at this lift station to improve odor control.
Larrecou	Wet Well	3 - 47 Hp	N	3.2	2000	2500	2.59	2.75	The addition of a flow meter at this lift station would improve system performance and monitoring.
Clearlake	Wet Well	2 - 1 Hp	N	0.17	10	10	0.03[1]	0.03	Due to limited access into the wet well, potential localized flooding, & manhole degradation, this lift station should be replaced with a new lift station.
Martin St	Wet Well	2 - 6 Hp	Y	0.61	240	360	0.86	0.65	Installation of SCADA and radio telemetry would improve performance and analysis of this lift station. The existing wet well hatch should be rehabilitated. Future peak flows may require that larger pumps be installed.
Lakeport Blvd	Wet Well	2 - 30 Hp	Y	1.46	780	945	0.67	0.79	Installation of SCADA and radio telemetry would improve monitoring of this lift station.
Lake County Lift Station #12	Wet Well	2 - 10 Hp	Y	0.65	180	?	0.42[2]	?	L.S. is maintained by the Lake County Sanitary District. Flow meter should be installed in order to monitor daily flows. City to annex lift station within the next 5 to 10 years.

[1] Estimated PWWF based on historical elapsed time meters readings.
[2] PWWF based on 1,500 GPAD I&I rate.

TABLE 2

CITY OF LAKEPORT

2008 MASTER SEWER PLAN

100 YEAR RAINFALL EVENT, 600 AF RESERVOIR & AVERAGE DRY WEATHER FLOW (ADWF) WATER BALANCE

RESERVOIR & EFFLEUNT IRRIGATION SYSTEM WATER BALANCE

File: Table 2 Water balance 5-
Job #: 523.28/Report Spreadshe
Date: 6/30/2008
By: BAC

MONTH	RAINFALL [1,2] Inch/Month	ET_o RATE [3] Inch/Month	PASTURE				SEWAGE			RAINFALL ON STORAGE Ac-Ft/Month	RESERVOIR & OXIDATION PONDS			IRRIGATION Ac-Ft/Month	RESERVOIR PERCOLATION [9] Ac-Ft/Month	TAILWATER RETURN Ac-Ft/Month	CHANGE IN STORAGE Ac-Ft	TOTAL IN STORAGE Ac-Ft	Evap Pan A Lakeport A80 470100 (mm)	Annual Rainfall [2] (Inches)
			PASTURE COEFFICIENT [4]	PASTURE ET Inch/Month	AGRONOMIC IRRIGATION [5]	MINIMUM IRRIGATION [6]	Q_{MONTH}/ ADWF [7] DESIGN RATIO	TO STORAGE MG/Month	TO STORAGE Ac-Ft/Month		RESERVOIR COEFFICIENT [8]	EVAPORATION Inch/Month	EVAPORATION Ac-Ft/Month							
																		100		
OCT	3.49	2.6	0.76	1.9	0.0	17	1.01	15.81	48.5	9.9	0.881	2.3	1.7	114.1	1.5	7.2	-51.7	48.3	65	1.74
NOV	8.09	0.7	0.73	0.5	0.0	8	1.06	16.06	49.3	22.9	0.801	0.5	0.6	54.0	2.8	3.4	18.3	66.6	17	4.03
DEC	10.55	1.1	0.71	0.8	0.0	0	1.63	25.52	78.3	29.9	0.801	0.9	1.5	0.0	4.3	0.0	102.5	169.1	28	5.26
JAN	12.36	0.6	0.72	0.5	0.0	0	2.26	35.38	108.6	35.0	0.801	0.5	1.0	0.0	5.3	0.0	137.4	306.5	16	6.16
FEB	9.67	1.3	0.74	1.0	0.0	3	2.23	31.53	96.8	27.4	0.801	1.0	2.2	20.8	5.8	1.3	96.7	403.2	33	4.82
MAR	7.26	2.2	0.76	1.6	0.0	0	2.52	39.45	121.1	20.6	0.801	1.7	4.2	0.0	6.5	0.0	131.0	534.2	55	3.62
APR	3.83	3.9	0.78	3.0	0.0	6	2.31	35.00	107.4	10.9	0.744	2.9	7.0	41.5	6.5	2.6	65.9	600.1	99	1.91
MAY	1.44	5.9	0.78	4.6	3.8	18	1.66	25.99	79.8	4.1	0.744	4.4	10.5	103.9	6.5	6.5	-30.5	569.6	149	0.72
JUN	0.56	6.9	0.78	5.3	5.7	20	1.36	20.60	63.2	1.6	0.744	5.1	11.8	158.7	6.3	10.0	-102.0	467.6	174	0.28
JUL	0.08	8.5	0.78	6.6	7.8	28	1.21	18.94	58.1	0.2	0.744	6.3	12.5	216.5	5.3	13.6	-162.3	305.3	215	0.04
AUG	0.22	7.7	0.78	6.0	7.0	28	1.08	16.91	51.9	0.6	0.744	5.7	10.0	192.5	4.5	12.1	-142.3	163.0	196	0.11
SEP	0.68	5.6	0.78	4.3	4.4	24	1.02	15.45	47.4	1.9	0.744	4.1	6.1	121.1	3.8	7.6	-74.0	89.0	141	0.34
TOTAL	58.25	46.8		36.2	28.7	151		296.6	910.4	165.0		35.5	69.0	1023.2	58.8	64.5	-11.0		1188	29.03

CONSTANTS

Storage pond runoff area (acres):	A	34		
Average storage pond water surface (acres):	B	26		
Total oxidation cell area (acres):		2.82		
Irrigation area (acres):	C	332		
Storage pond percolation rate @ 12 ft WL (in/day):	D	0.1	4.6E-07	cm/sec
Design ADWF (MGD):	E	**0.51**	47.1	Ac-Ft/Month
Irrigation Application Efficiency Factor	F	1.2		
Offseason Irrigation Rate (in/day)	G	0.25		
Tailwater recovery percent of applied water		0.063		

NOTES:

1. 100-year rainfall based on Station Lakeport 2NW Precipitation Long-Duration-Frequency Table from DWR Bulletin 195, October 1976.
2. 100-year rainfall of 58.25 inches spread in proportion to average monthly rainfall data for years 1941-2001 from Western Regional Climate Center.
3. Potential ET_o based on 12 years of data for Station Lakeport Evaporation from Water Surface, DWR Bulletin 73-79, November 1979.
4. Pasture evapotranspiration ratio determined from DWR Bulletin 73-79, November 1979.
5. Effluent applied May through September. Application rate = (ET - Precipitation) * 1.2 Irrigation Application Efficiency Factor
6. Effluent applied in October through April based upon minimum irrigation days and historical offseason irrigation rate.
7. Sewage flow based upon 2004-2007 monthly average dry weather flow sent to reservoir, Qmonth/ADWF Design Ratios x Design ADWF.
8. Reservoir and oxidation ponds evaporation pan ratios from "Penman-Monteith Estimates of Reservoir Evaporation"; Marvin E. Jensen, Hon. M.ASCE; Avry Dotan; and Roland Sanford.
9. Reservoir percolation and evaporation rates take into account the surface area inundated. Evaporation includes oxidation pond area.
10. The 4-year ADWF for Aug-Oct 2004-2007 = 0.38 MGD. The ADWF/RUE = 200 GPD. Based upon this spreadsheet, CLMSD has an ADWF capacity of about 0.56 MGD remaining in the treatment plant reservoir/effluent disposal . Thus there is an estimated remaining ADWF capacity of approximatley 0.18 MGD ADWF. This is predicated on an extremely aggressive irrigation
11. Normalized I&I = [296.6 MG/Yr -(0.51 MGD * 365 Days/Yr)] / 0.51 MGD = 222.4 MG/MGD

TABLE 4
CITY OF LAKEPORT
2008 MASTER SEWER PLAN
WASTEWATER TREATMENT FACILITIES DESIGN CRITERIA

Item	Capacity
Household Equivalents	4,000±
Average Dry Weather Flow (ADWF) MGD	1.0
Peak Wet Weather Flow (PWWF) MGD	3.0
Sewage Loading	
Biochemical Oxygen Demand (BOD_5)	
Concentration, mg/L	240
Lbs/Day	2,000
Total Suspended Soils	
Concentration, mg/l	240
Lbs/Day	2,000
FIRST-STAGE TREATMENT	
Number of Aeration Cells	2
Cell Surface Area, Acres	1.42
Cell Volume, MG	5.89
Detention Time at ADWF, Days	11.8
Cell Depth Range, Ft	15-17
BOD_5 Loading, Lbs/Day/Cell	1001
Aeration Capacity Required, Lbs O_2/Lb BOD5 Applied	2
Estimated Minimum Oxygen Supply Potential Assumptions: T=24°C; Elev = 1,400 FT.; 1.5 mg/L Residual 0_2; Beta 0.9; Alpha 0.8; Standard Rate 3.2 Lbs/Hr; Lbs 0_2/Hp Hr	1.64
Theoretical Horsepower Required Hp/Cell	25.4
Aerator Size Used, Hp Nominal	2 @ 20
Estimated BOD_5 Reduction, %	58
SECOND STAGE TREATMENT	
Number of Aeration Cells	2
Cell Surface Area, Acres	1.42
Cell Volume, MG	5.89
Detention Time at ADWF, Days	11.8
Cell Depth Range, Ft	13-15
BOD_5 Loading, Lbs/Day/Cell	420
Aeration Capacity Required, Lbs O_2/Lb BOD_5 Applied	2
Estimated Minimum Oxygen Supply Potential, Lbs O_2/Hp/Hr	1.74
Theoretical Hp/Cell	10.1
Aerator Size Used, Hp Nominal	20
Estimated BOD_5 Reduction, %	33

TABLE 4
CITY OF LAKEPORT
2008 MASTER SEWER PLAN
WASTEWATER TREATMENT FACILITIES DESIGN CRITERIA

Item	Capacity
ESTIMATED EFFLUENT QUALITY FROM AERATED PONDS	
BOD_5 mg/L, Average	34
Total Suspended Solids, mg/L, Average	60
Total Nitrogen, N, mg/L	10 to 30
Total Phosphorus, P, mg/L	5 to 10
STORAGE RESERVOIR	
Capacity, Acre Feet	600
Depth, Ft, Maximum	42
Average Surface Area, Acres	28
BOD5 Loading Rate, Lbs/Day, Average	284
Loading Rate, Lbs/Acre/Day	10.1
CHLORINATION	
Number of Gas Chlorinators	3
Maximum Dosage Per Chlorinator, Lbs/Day	325
Maximum Dosage for Disinfection, mg/L	24
Typical Dosage to Irrigation System, mg/L	5
Chlorinator Feedwater Pumps	3
Chlorinator Feedwater Pump Capacity, GPM	24
IRRIGATION	
Annual Application Rate - Average, Ac-Ft/Yr	3.0
-Maximum, Ac-Ft/Yr	3.5
Irrigation Cycle - Irrigation Days	1
- Rest Days	6
Cycle Application Rate, Inches/Day	
Normal (4.4 Hours to 6.1 Hours)	1.1- 1.4
Maximum (7.4 Hours)	1.7
Sprinkler Application Rate, Inches/Hour	0.22 TO 0.24
Disposal Requirements, Ac-Ft/Yr	
100-Year Rainfall, 0.45 MGD ADWF	1,043
Current Net Irrigation Area, Acres	332
Typical Sprinklered Area	90
Peak Month Application Rate, Ac-Ft	215
Maximum Flow Rate (Two Irrigation Pumps), GPM	2,800
Typical Number Sprinklers in Each Field	100
Flow Per Sprinkler, GPM	28

TABLE 5
CITY OF LAKEPORT
2008 MASTER SEWER PLAN
RUE DETERMINATION

No.	Bill Name	100 CF in February 2006	Average Winter Water Use (CF/Month)[3]	Average Winter Water Use (Gall/Month)[3]	Average [3] (GPD)	Estimated Equivalent RUE's
1	TGJ SUMMITT DEVELOPMENT	1,121	89,680		21,639	108
2	DA VITA, INC.	792	63,360		15,288	76
3	FAIRGROUNDS VILLAGE	453	36,240		8,744	44
4	49TH DIST AG ASSOC	414	33,120		7,992	40
5	K MART #4819	391	31,280		7,548	38
6	MC KINNEY/BRUCE//	236	18,880		4,556	23
7	BRUNO'S (MAIN STORE)	235	18,800		4,536	23
8	COUNTY OF LAKE	206	16,480		3,976	20
9	AQUA VILLA MOBILE HOME PARK	204	16,320		3,938	20
10	PACIFIC REGENCY	184	14,720		3,552	18
11	QUAIL RUN FITNESS CENTER	168	13,440		3,243	16
12	YOZSA/RICHARD//	158	12,640		3,050	15
13	MC KINNEY/BRUCE//	142	11,360		2,741	14
14	ARTON INC	132	10,560		2,548	13
15	REGENCY INN	121	9,680		2,336	12
16	LAKEPORT VILLAGE APTS	113	9,040		2,181	11
17	SAFEWAY #0983	96	7,680		1,853	9
18	SKYLARK MOTEL	96	7,680		1,853	9
19	CURTIS/DAVID B//	93	7,440		1,795	9
20	BUTCHER/DEREK R//	79	6,320		1,525	8
21	FEUEREBACHER/STEVEN L//	76	6,080		1,467	7
22	LUCKY 4 TRAILER PARK	75	6,000		1,448	7
23	KEN HOLMES	72	5,760		1,390	7
24	KATHY FOWLER CHEVROLET PONTIA	67	5,360		1,293	6
25	EDELWEISS GUEST HOME	67	5,360		1,293	6
26	LAKE COUNTY COURTHOUSE	64	5,120		1,235	6
27	ST MARY PARISH	64	5,120		1,235	6
28	AMZONE LLC	64	5,120		1,235	6
29	LAKEVIEW HOUSING, INC.	62	4,960		1,197	6
30	PERKO'S CAFE	58	4,640		1,120	6
31	COUNTY OF LAKE - SHERIFF	56	4,480		1,081	5
32	SUN/RANDOLPH/DR & MRS/	55	4,400		1,062	5
33	VAARS/KATHERINE//	51	4,080		984	5
34	SINGH/PAL//	50	4,000		965	5
35	380 FIRST ST. TRUST ACCOUNT	48	3,840		927	5
36	SIERRA WEST PROP. MGMT	48	3,840		927	5
37	AMZONE LLC	47	3,760		907	5
38	ADVANCE AMERICA CASH ADV	46	3,680		888	4
39	BRIXIE/TINA M//	46	3,680		888	4
40	TUCKER/ROBERT//	43	3,440		830	4
			527,440		**127,266**	**636**

Average Lakeport Winter Water Consumption[1]	0.37	MGD
Average Treatment Plant Flow (Avg Summer 2004 to 2007)[2]	0.38	MGD
Metered Winter Water Use Top 40 users[3]	0.13	MGD
Dry Weather Sewage Component distributed to remaining services	0.25	MGD
Total Connections[4][5][6]	1450	
Top 40 Service Connections	40	
Remaining active service connections = RUE's	1410	
Estimated RUE Dry Weather Flow	180	GPD
Adjusted RUE Dry Weather Flow[8]	**200**	**GPD**
Total estimated RUEs within Lakeport Main Service Area[7]	2,046	RUEs

[1] 80% of average winter (February 2006) metered water use for Lakeport main zone, excluding Lakeshore L.S. service area.
[2] Average Daily Treatment Plant flows for August, September & October 2004 to 2007
[3] 80% of average winter (February 2006) metered water use top 40 users discharged to collection system.
[4] Does not include approximately 600 connections served by the Lake County Sanitary District via the Lakeshore Blvd. Lift Station (Ash L.S.).
[5] Includes approximately 180 connections served by the Lake County Sanitary Dist. Lift Station 12.
[6] Number of Lakeport water connections that were billed for February 2006 water use.
[7] Includes all developed properties currently connected to the City of Lakeport main zone (not including areas served by the Lakeside Boulevard L.S.) and Lake County SD service area 9-1 and 9-3 collection systems.
[8] Adjusted ADWF/RUE based on a 7 percent vacancy rate.

TABLE 7
CITY OF LAKEPORT
2008 MASTER SEWER PLAN
SEWER FLOW MONITORING SUMMARY

(1)				(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
Monitoring Station[2]	City Manhole No.	Service Area Number	Lift Station Name	Inlet Sewer Diameter (in)	Test Direction	Subservice Area (Ac)	Upstream Mon. Station	STREET	Monitored WWF 1/4-1/5 (GPM)	Net WWF per Sub Area 1/4-1/5 (GPM)	Measured I&I Rates 1/4-1/5[6] (gpd)	GPAD	Extrapolated GPAD[5] (PF =3.09/2.0)[1]	Monitored WWF 1/25-1/26 (GPM)	Net WWF per Sub Area 1/25-1/26 (GPM)	Measured I&I Rates 1/25-1/26[7] (gpd)	GPAD	Extrapolated GPAD[5] (PF =3.09/2.0)[1]	Maximum Extrapolated I&I Rates GPAD	ESTIMATED I&I AT TREATMENT PLANT 3500-5000 GPAD MGD	5000-10000 GPAD MGD	>10000 GPAD MGD
MS1	H21-11	1A		8"	EAST	140.0		Lakeport & Main	40	40	57,600	411	638						638			
		1B		8"	WEST	32.9		Lakeport & Main	58	58	83,520	2539	3,935	62	62	89,280	2714	4,206	**4,206**	**0.138**		
MS 1LS		1 LS	Lakeport LS			198.0	County L.S.	Lakeport LS	227.1	221	317,664	1604	2,487						2,487			
MS 2		2 LS	County LS			218.0		County LS	6.5	7	9,360	43	67						67			
MS 3	H19-13	3A		6"	SOUTH	22		Esplanade	6	6	8,640	393	609						609			
		3B		6"	WEST	18.6		Main Street	5	5	7,200	387	600						600			
MS 3LS	H19-14	3 LS	C St LS			374.0	Rose & Clear Lake	C Street LS	286.5	286.5	412,560	1103	1,710						1,710			
MS 3C	H19-04	3C		10"	NORTH	27.6		Next to C Street LS	54	54	77,760	2817	4,367	62	62	89,280	3235	5,014	**5,014**		**0.138**	
MS 4	H19-03	4A		6"	NORTH	29.3		Martin & Main Street	85	5	7,200	246	381						381			
		4B		8"	WEST	28.0		Martin Street	39	39	56,160	2006	3,109	72	72	103,680	3703	5,739	**5,739**		**0.161**	
MS 5	H16-14	5A		8"	NORTH	13.0	6A 6B	Main & 6th	20	-11	-15,840	-1218	-1,889						0			
		5B		8"	WEST	13.7	8A, 8B, 8C	Main & 6th	60	20	28,800	2102	3,258						3,258			
MS 6	H15-10	6A		8"	NORTH	19.2		Main & 10th	3	3	4,320	225	349						349			
		6B		10"	WEST	21.3	7A, 7B, 7C	Main & 10th	28	6	8,640	406	629						629			
MS 7	G15-20	7A		8"	WEST	61.0		10th & North Street	20	20	28,800	472	732	112	112	161,280	2644	4,098	**4,098**	**0.250**		
		7B		6"	NORTH	5.3		10th & North Street	1	1	1,440	272	421	10	10	14,400	2717	4,211	**4,211**	**0.022**		
		7C		6"	SOUTH	2.0		10th & North Street	1	1	1,440	720	1,116	6	6	8,640	4320	6,696	**6,696**		**0.013**	
MS 8	G16-18	8A		6"	NORTH	3.4		Brush & 6th	1	1	1,440	424	656						656			
		8B		6"	SOUTH	22.8		Brush & 6th	14	14	20,160	884	1,371	32	32	46,080	2021	3,133	3,133			
		8C		6"	WEST	32.7		Brush & 6th	25	25	36,000	1101	1,706	45	45	64,800	1982	3,072	3,072			
MS 9A	G19-03	9A		8"	WEST	23.0	10A, 10B	Martin & Polk	68	42	60,480	2630	4,076	76	-25	-36,000	-1565	-2,426	**4,076**	**0.094**		
		9C		6"	NORTH	10.5		Martin & Polk	5	5	7,200	686	1,063	28	28	40,320	3840	5,952	**5,952**		**0.062**	
MS 9B	G19-05	9B		8"	EAST	28.6		Martin St.	23	23	33,120	1158	1,795	148	148	213,120	7452	11,550	**11,550**			**0.330**
MS 9LS		9 LS	Martin LS			141.0		Martin LS	82.6	82.6	118,944	844	1,308						1,308			
MS 10	G18-08	10A		6"	WEST	16.9		Armstrong & Starr	8	8	11,520	682	1,057	11	11	15,840	937	1,453	1,453			
		10B		6"	NORTH	44.5		Armstrong & Starr	18	18	25,920	582	903	90	90	129,600	2912	4,514	**4,514**	**0.201**		
MS 11	G20-07	11		8"	WEST	104.6		West of Corp Yard	38	38	54,720	523	811	49	49	70,560	675	1,046	1,046			
MS 11LS		LS 11	Larrecou LS	8"	WEST	104.6	MS9LS,MS 3LS, MS1LS	Larrecou LS	600	10	14,832	142	220						220			
MS 12LS		LS 12	Private						?				0						0			
MS 13	H14-16	13A		8"	NORTH	33.9		Main and 10th	40	40	57,600	1699	2,634	80	80	115,200	3398	5,267	**5,267**		**0.179**	
		13B		4"	WEST	5.2		Main and 10th	4	4	5,760	1108	1,717						1,717			
MS 13LS	H14-17	LS 13	Rose LS			45.9		Rose LS	47.1	47.1	67,824	1478	2,290						2,290			
MS 14LS	H15-04	LS 14	Clear Lake LS					Clear Lake LS					0						0			
MS 15LS		LS 15	Private					Private LS	?				0						0			
MS16	H12-17	16A		8"	EAST	66.1		Lakeshore & Ashe	33	33	47,520	719	1,114						1,114			
		16B		8"	WEST	110.5	17A, 17B	Lakeshore & Ashe	70	26	37,440	339	525						525			
	G12-13	16B		6"	WEST	110.5		20th & Hartley						65	65	93,600	847	1,313	1,313			
MS 16LS		LS 16	Ashe LS			298.0		Ashe LS	17.3	17.3	24,912	84	130						130			
MS17	H13-01	17A		8"	EAST	14.6		High Street	4	4	5,760	395	612	19	19	27,360	1874	2,905	2,905			
		17B		8"	WEST	82.0		High Street	40	40	57,600	702	1,089	90	90	129,600	1580	2,450	2,450			
	G13-01	17A		6"	NORTH	10.9		Hartley & 19th	0					10	10	14,400	1321	2,048	2,048			
MS 18	H28-01	LS 18	Linda Lane			62.0	MSL11LS	Linda Lane	692.3	92.3	132,912	2144	3,323		0	0	0	0	3,323			
																				0.705	0.554	0.330
																		AVERAGE	2,303			

(1) Estimated peak treatment plant flow during monitoring period (11:00 PM to 6:00 AM) was 2.0 MGD.
(2) See Plate 1 for monitoring station locations
(3) Sum of Rose, Martin, & "C" St. LS's.
(4) Difference between Linda Lane & Larrecou L.S.'s.
(5) Ratio of historical max. plant flow with monitoring period plant flow = 3.09/2.00 MGD = **1.55**
(6) Lake level during 1/4-1/5/08 Rumsey value of 2.1 (1320.1'). 24 Hour rainfall amount 2.8"
(7) Lake level during 1/25-1/26/08 Rumsey value of 3.7 (1321.7'). 24 Hour rainfall amount 1.4"
(8) Flows for Larrecou L.S. based on pumping rate (1,100 gpm) and ETM readings.

TABLE 13
City of Lakeport
2008 MASTER SEWER PLAN
INFILTRATION AND INFLOW REDUCTION PROGRAM

	Approx 2008 I&I				Phase 2 - Sewer Repair and Replacement [3]															Total Project Cost	Ultimate Estimated I&I Reduction	
					Mainline Grout Sealing				Manhole Repair or Replacement						Sewer Repair or Replacement				Lateral Repairs				
																			Lateral [1]				
	Subservice Area	Existing Sewered Area (Ac)	MGD	GPAD	Sewer Size (inches)	Estimated Length (ft)	MH's	Estimated # of Laterals [1][2]	Grout Sealing (ft)[4]	Sealing Costs ($)[5]	MH's Repaired (ea)[6]	MH's Repair Costs ($)[6]	MH's Replaced (ea)[7]	MH's Replaced ($)[7]	Main Size (Inches)	Length (ft)[8]	Unit Cost ($/LF)[9]	Total Cost	Number [10]	Cost @$6,700 ea.		%	(MGD)
INITIAL I&I REDUCTION TARGET AREA (2008 to 2018)	9B	28.6	0.33	11,550	8	300	11	86	60	$300	1	$4,000	1	$6,000	8	60	$163	$9,800	17	$113,900	$319,100	60%	0.198
					6	3,540			708	$3,700					6	708	$158	$111,900					
					4	2,130			426	$2,200					4	426	$158	$67,300					
	7C	2	0.013	6,700	6	250	1	8	50	$300	0	$0	0	$0	6	50	$158	$7,900	2	$13,400	$21,600	75%	0.010
	9C	10.5	0.062	5,950	6	890	5	23	178	$900	0	$0	0	$0	6	178	$158	$28,100	5	$33,500	$79,400	65%	0.040
					4	520			104	$500					4	104	$158	$16,400					
	4B	28	0.161	5,740	8	1,150	13	18	230	$1,200	1	$4,000	1	$6,000	8	230	$163	$37,500	4	$26,800	$144,400	75%	0.121
					6	1,230			246	$1,300					6	246	$158	$38,900					
					4	880			176	$900					4	176	$158	$27,800					
	13A	33.9	0.179	5,270	8	2,260	22	102	452	$2,400	2	$8,000	2	$12,000	8	452	$163	$73,700	20	$134,000	$321,500	50%	0.090
					6	2,370			474	$2,500					6	474	$158	$74,900					
					4	430			86	$400					4	86	$158	$13,600					
	3C	27.6	0.137	5,010	8	2,500	14	53	500	$2,600	1	$4,000	1	$6,000	8	250 [11]	$163	$38,300	6 [12]	$40,200	$127,800	35%	0.048
					6	745			149	$800					6	149	$158	$23,500					
					4	380			76	$400					4	76	$158	$12,000					
SUBSEQUENT I&I REDUCTION TARGET AREA (2018 to 2028)	10B	44.5	0.201	4,510	8	2,185	23	100	437	$2,300	2	$8,000	2	$12,000	8	437	$163	$71,200	20	$134,000	$303,200	50%	0.101
					6	2,320			464	$2,400		$0			6	464	$158	$73,300					
	7B	5.3	0.022	4,210	8	227	3	15	45	$200	0	$0	0	$0	8	45.4	$163	$7,400	3	$20,100	$58,900	60%	0.013
					6	380			76	$400					6	76	$158	$12,000					
					4	575			115	$600					4	115	$158	$18,200					
	1B	32.9	0.139	4,210	8	460	16	40	92	$500	2	$8,000	2	$12,000	8	92	$163	$15,000	8	$53,600	$189,900	65%	0.090
					6	3,090			618	$3,200					6	618	$158	$97,600					
	7A	61	0.25	4,100	8	980	15	65	196	$1,000	2	$8,000	2	$12,000	8	196	$163	$31,900	13	$87,100	$268,200	60%	0.150
					6	2,150			430	$2,200					6	430	$158	$67,900					
					4	1,780			356	$1,900					4	356	$158	$56,200					
	9A	23	0.094	4,080	8	1,350	10	30	270	$1,400	1	$4,000	1	$6,000	8	270	$163	$44,000	6	$40,200	$142,000	55%	0.052
					6	1,360			272	$1,400					6	272	$158	$43,000					
					4	60			12	$100					4	12	$158	$1,900					
SUBTOTAL INITIAL I&I TARGET AREA		130.6	0.882			19,575	66	290	3,915	$20,400	5	$20,000	5	$30,000		3415		$726,100	48	$361,800	$1,013,800		0.506
TOTAL ALL HIGH I&I AREAS		**297.3**	**1.588**			**36,492**	**133**	**540**	**7,298**	**$38,000**	**12**	**$48,000**	**12**	**$72,000**		**6,798**		**$1,121,200**	**98**	**$696,800**	**$1,976,000**		**0.912**

NOTES:

(1) Laterals refer to the sewer pipe serving the property from the sewer main to the property line (i.e., lateral in the public right-of-way).
(2) House connection refers to the sewer pipe on private property from the property line to the structure being served.
(3) All costs include 25% engineering and 15% contingency and are based on prevailing wages and Contractor costs.
(4) Grout sealing of mainline sewers assumes that 20% of the sewers in the high I&I target areas will require sealing.
(5) Grout sealing costs based on 10-foot sewer pipe segments. $52/joint includes 40% Engineering and contingency.
(6) Cost for manhole repairs based on 10% of the existing MHs needing some type of repair. Repair cost $4,000/MH.

MGD = Million Gallons Per Day
GPAD = Gallons Per Acre Per Day

(7) Cost for manhole replacement based on 10% of the existing MHs needing replacement. Replacement cost $6,000/MH.
(8) Replacement and/or repair of sewers is based on 20% of the existing sewers needing some type of replacement or repair (i.e., lining, pipe bursting, etc.).
(9) Replacement sewer costs assume pavement restoration and sewer depth less then 8 feet deep.
(10) Replacement and/or repair of laterals is based on 20% of the existing laterals needing some type of replacement or repair (i.e., lining, pipe bursting, etc.).
(11) Due to previous rehabilitation project completed in 1994, replacement and/or repair of sewers in this area is based on only 10% of the existing sewers needing some type of replacement or repair (i.e., lining, pipe bursting, etc.).
(12) Due to previous rehabilitation project completed in 1994, replacement and/or repair of laterals in this area is based on only 10% of the existing laterals needing some type of replacement or repair (i.e., lining, pipe bursting, etc.).

TABLE 8
CITY OF LAKEPORT
2008 Sewer Master Plan
20 YEAR GROWTH PROJECTION

Development Number[1]	Development Type	Estimated RUEs	Estimated Developed Area (Ac)	
1	Residential[2]	36	4.8	FUTURE GROWTH AREAS SERVED BY THE LAKESHORE LIFT STATION
2	Residential[2]	4	1.2	
3	Residential[2]	4	2.6	
4	Residential[2]	28	4.0	
5	Residential[2]	8	4.0	
6	Residential[2]	35	14.3	
7	Residential[2]	6	1.6	
8	Residential[2]	8	2.4	
9	Residential[2]	32	7.2	
10	Residential[2]	10	2.7	
11	Residential[2]	30	8.9	
12	Residential[2]	60	5.3	
13	Residential[2]	6	1.0	
14	Residential[2]	28	6.7	
15	Residential[2]	96	22.3	
16	Residential[2]	96	7.1	
17	Residential[2]	70	7.9	
18	Residential[2]	8	0.5	
A	Commercial[3]	1	1.6	
B	Commercial[3]	10	3.4	
C	Commercial[3]	19	6.7	
D	Commercial[3]	4	1.0	
E	Commercial[3]	29	10.2	
F	P.O.	99	23.0	SOUTHERN DEVELOPMENT AREA (SDA)
19	Residential[2]	1000	800.0	
20	Residential[2]	340	95.1	
	TOTAL RUEs[4]	2,067	1,046	

[1] See Plate 2 for development locations.

[2] Assumes one RUE per residence.

[3] RUEs based on similar Lakeport developments.

[4] For this Master Plan only 660 RUEs are projected over the next 20 years based on a 1.1% growth rate. The 2,067 RUEs proposed in this table are estimates from the City Planning Department and includes the Southern Development Area which is anticipated to be developed beyond 2028.

TABLE 9

CITY OF LAKEPORT

2008 Sewer Master Plan

SERVICE AREA TABULATION TABLE

Service Area No.	Year	Total RUEs	Existing Sewered Area (AC)	New Sewered Area (AC)	Existing I&I Rate (GPM)	Existing I&I Rate (GPAD)	Future I&I Rate (GPAD)	ADWF (MGD)[5]	I&I Flow (MGD)	PWWF[1] (MGD)
1A	2008	350	140.0		64	640		0.065	0.090	0.238
	2028	521	140.0	15.0		1500	1500	0.104	0.233	0.472
1B	2008	140	32.9		99	4200		0.026	0.138	0.197
	2028	159	32.9	6.7		3000	1500	0.032	0.109	0.182
2	2008	200	70.0		73	1500		0.037	0.105	0.190
	2028	200	70.0			1500		0.040	0.105	0.197
3A	2008	40	22.0		10	610		0.007	0.013	0.030
	2028	40	22.0			1500		0.008	0.033	0.051
3B	2008	15	18.6		8	600		0.003	0.011	0.017
	2028	15	18.6			1500		0.003	0.028	0.035
3C	2008	120	27.3		99	5010		0.022	0.137	0.187
	2028	120	27.3			4500		0.024	0.123	0.178
4A	2008	40	29.3		8	380		0.007	0.011	0.028
	2028	40	29.3			1500		0.008	0.044	0.062
4B	2008	25	28.0		114	5740		0.005	0.161	0.171
	2028	25	27.6			4500		0.005	0.124	0.136
5A	2008	25	13.0		14	1500		0.005	0.020	0.030
	2028	25	13.0			1500		0.005	0.020	0.031
5B	2008	15	13.7		32	3255		0.003	0.045	0.051
	2028	15	13.7			3255		0.003	0.045	0.051
6A	2008	46	19.2		5	350		0.009	0.007	0.026
	2028	46	19.2			1500		0.009	0.029	0.050
6B	2008	30	21.6		10	630		0.006	0.014	0.026
	2028	30	21.6			1500		0.006	0.032	0.046
7A	2008	270	61.0		178	4100		0.050	0.250	0.364
	2028	339	61.0	24.9		3000	1500	0.068	0.220	0.376
7B	2008	15	5.3		16	4200		0.003	0.022	0.029
	2028	15	5.3			3000		0.003	0.016	0.023
7C	2008	15	2.0		10	6700		0.003	0.013	0.020
	2028	15	2.0			4500		0.003	0.009	0.016
8A	2008	25	3.5		2	660		0.005	0.002	0.013
	2028	25	3.5			1500		0.005	0.005	0.017
8B	2008	25	22.8		51	3130		0.005	0.071	0.082
	2028	25	22.8			3130		0.005	0.071	0.083
8C	2008	30	30.7		67	3070		0.006	0.094	0.107
	2028	30	30.7			3070		0.006	0.094	0.108
9A	2008	65	30.4		86	4075		0.012	0.124	0.151
	2028	129	30.4	5.3		3000	1500	0.026	0.099	0.158
9B	2008	75	28.6		235	11550		0.014	0.330	0.362
	2028	75	28.6			7000		0.015	0.200	0.235
9C	2008	20	8.0		34	5950		0.004	0.048	0.056
	2028	20	8.0			4500		0.004	0.036	0.045
10A	2008	60	17.0		17	1450		0.011	0.025	0.050
	2028	60	17.0			1500		0.012	0.026	0.053
10B	2008	10	44.5		143	4510		0.002	0.201	0.205
	2028	82	44.5	15.2		3000	1500	0.016	0.156	0.194
11	2008	265	107.5		78	1050		0.050	0.113	0.225
	2028	405	107.5	33.4		1500	1500	0.081	0.211	0.398
13A	2008	89	33.9		127	5260		0.017	0.178	0.216
	2028	97	33.9	0.5		4500	1500	0.019	0.153	0.198
13B	2008	20	6.5		6	1720		0.004	0.011	0.020
	2028	20	6.5			1500		0.004	0.010	0.019
14	2008	20	2.8		3	1500		0.004	0.004	0.013

TABLE 9
CITY OF LAKEPORT
2008 Sewer Master Plan
SERVICE AREA TABULATION TABLE

Service Area No.	Year	Total RUEs	Existing Sewered Area (AC)	New Sewered Area (AC)	Existing I&I Rate (GPM)	Existing I&I Rate (GPAD)	Future I&I Rate (GPAD)	ADWF (MGD)[5]	I&I Flow (MGD)	PWWF[1] (MGD)
	2028	20	2.8			1500		0.004	0.004	0.013
16A[2]	2008	130	76.4		52	1120		0.024	0.086	0.141
	2028	170	76.4	4.6		1500	1500	0.032	0.122	0.195
16B[2]	2008	155	100.2		103	1310		0.029	0.131	0.197
	2028	185	100.2	8.1		1500	1500	0.035	0.162	0.242
17A[2]	2008	55	15.7		30	2900		0.010	0.046	0.069
	2028	55	15.7			2900		0.010	0.046	0.069
17B[2]	2008	200	82.0		143	2450		0.037	0.201	0.285
	2028	200	82.0			2450		0.037	0.201	0.287
18[3]	2008	0	0.0		0	0		0.000	0.000	0.000
	2028	468	0.0	128.3		0	1500	0.088	0.192	0.394
19[3]	2008	0	0.0		0	0		0.000	0.000	0.000
	2028	1,000	0.0	800.0		0	1500	0.187	1.200	1.630
2008 Main Zone Totals[4][5]		2,050	840					0.38	2.24	3.10
2028 Main Zone Totals[4][5]		2,593	840					0.48	2.24	3.43
2008 Totals		2,590	1,114	0				0.48	2.70	3.80
2028 Totals		4,671	1,114	1,042				0.91	4.16	6.24

[1] Includes a Dry Weather Flow peaking factor of 2.3 based on the diurnal curve data.

[2] These service areas are served by the Lakeshore Blvd L.S. and are pumped to the Lake County Treatment Plant.

[3] Subservice areas within the Southern Development Area.

[4] Main zone served by the Lakeport Treatment Plant.

[5] Assumed 2008 and 2028 ADWF adjusted for a 7% vacancy rate.

TABLE 10
CITY OF LAKEPORT
2008 Sewer Master Plan
SEWER DESIGN FLOW CRITERIA

Domestic Wastewater
Average Dry Weather Flow (ADWF) 200 GPD/RUE

	YEAR	
	2008 (GPAD)	2028 (GPAD)
Typical Infiltration & Inflow Allowance - Existing Sewers	Above 10,000	7,000
	8,000 to 10,000	6,500
	5,000 to 8,000	4,500
	3,500 to 5,000	3,000
	less than 3,500	(1)
Infiltration and Inflow Allowance Sewers Constructed after 2001	--	1,500

Note: I & I rate Reductions used in the Master Sewer Plan analysis for the 2028 rehabilitation areas were based on observed conditions of the sewers and projected repairs and may not reflect the reductions shown on this table. These reductions will require that private sewer connections also be repaired. It is estimated that approximately half of the I&I in the system is from private sewer connections.

(1) I&I flows less than 3,500 GPAD are assumed to be constant. It is assumed that the sewers will not be fully rehabilitated; however, there will be some improvements made to maintain prevent further degradation.

TABLE 11
CITY OF LAKEPORT
2008 SEWER MATER PLAN
HIGHEST INFILTRATION AND INFLOW AREAS

Monitoring Station	Subareas	Sewered Area-Acres	Infiltration & Inflow GPAD	Infiltration & Inflow MGD	
MS 9B	9B	28.6	11,550	0.330	INITIAL I&I TARGET AREA
MS 7	7C	2.0	6,700	0.013	
MS 9A	9C	10.5	5,950	0.062	
MS 4	4B	28	5,740	0.161	
MS 13	13A	33.9	5,270	0.179	
MS 3C	3C	27.3	5,010	0.137	
MS 10	10B	44.5	4,510	0.201	SUBSEQUENT I&I TARGET AREA
MS 7	7B	5.3	4,210	0.022	
MS 1B	1B	32.9	4,210	0.139	
MS 7	7A	61.0	4,100	0.250	
MS 9A	9A	23	4,080	0.094	
TOTAL		297.0		1.588	

TABLE 12
CITY OF LAKEPORT
2008 MASTER SEWER PLAN
HYDRAULIC MODEL SEWER CAPACITY AND FLOW SUMMARY

Model Pipe ID No.	From Model Manhole	To Model Manhole	Sewer Diameter (in)	Existing Or Future	Length (ft)	Sewer Slope (ft/ft)	Pipe Capacity (MGD)	2008		2028						Comments
								Model PWWF (MGD)	PWWF Surcharge (ft)	Model PWWF (MGD)	Estimated PWWF Surcharge (ft)	REPLACEMENT SEWER		PARALLEL SEWER		
												Size (in)	Capacity (MGD)	Size (in)	Capacity (MGD)	
359	G10-04	G10-05	10	E	318.26	0.003	0.774	0.031		0.046						
361	G10-05	G10-09	10	E	155.66	0.005	1.000	0.043		0.062						
363	G10-09	H10-06	10	E	253.88	0.003	0.774	0.056		0.078						
365	H10-06	H11-02	6	E	404.67	0.005	0.256	0.069		0.094						
367	H11-02	H11-03	6	E	258.77	0.012	0.397	0.082		0.110						
369	H11-03	H11-04	8	E	309.04	0.007	0.652	0.108		0.138						
371	H11-04	H11-05	8	E	487.67	0.004	0.493	0.132		0.173						
373	H11-05	H11-07	8	E	233.75	0.004	0.493	0.154		0.198						
375	H11-07	H11-10	8	E	293.23	0.003	0.427	0.167		0.215						
377	H11-10	H12-07	8	E	382.75	0.003	0.427	0.178		0.233						
379	H12-07	H12-10	8	E	283.00	0.004	0.493	0.193		0.251						
381	H12-10	H12-12	8	E	242.29	0.004	0.493	0.207		0.268						
383	G12-02	G11-06	6	E	223.36	0.013	0.413	0.032		0.032						
385	G11-06	G12-01	6	E	215.01	0.065	0.923	0.049		0.050						
387	G12-01	H12-01	6	E	592.56	0.040	0.724	0.067		0.069						
389	H12-01	H12-03	6	E	191.03	0.110	1.201	0.087		0.090						
391	H12-03	H12-04	6	E	267.04	0.017	0.472	0.109		0.112						
393	H12-04	H12-08	8	E	145.39	0.028	1.305	0.129		0.132						
395	H12-08	H12-14	8	E	224.78	0.054	1.812	0.154		0.157						
397	H12-14	H12-15	8	E	368.63	0.007	0.652	1.019	4.0	1.035	4.0	10	1.20	8	0.65	Lakeshore Blvd. Sewer[5]
399	H12-15	H12-16	8	E	77.11	0.004	0.493	1.024	1.0	1.035	1.0	12	1.45	10	0.90	Lakeshore Blvd. Sewer[5]
401	E12-03	E12-06	6	E	374.06	0.066	0.930	0.024		0.024						
403	E12-06	E12-05	6	E	184.21	0.034	0.668	0.041		0.049						
405	E12-05	E12-04	6	E	50.93	0.035	0.677	0.061		0.069						
407	E12-04	F12-01	6	E	389.60	0.025	0.573	0.080		0.088						
409	F12-01	F12-02	6	E	92.15	0.011	0.380	0.100		0.109						
411	F12-02	F12-03	6	E	305.41	0.010	0.362	0.120		0.128						
413	F12-03	F12-04	6	E	439.93	0.012	0.397	0.138		0.147						
415	F12-04	G12-11	6	E	439.47	0.026	0.584	0.156		0.165						
417	G12-11	G12-12	6	E	440.33	0.027	0.595	0.175		0.184						
419	G12-12	G12-13	6	E	531.48	0.008	0.324	0.195		0.204						
421	G12-13	H12-13	6	E	736.17	0.027	0.595	0.217		0.234						
423	H12-13	H12-14	8	E	118.55	0.002	0.349	0.846	5.0	0.858	5.0	12	1.00	10	0.65	Lakeshore Blvd. Sewer[5]
425	G13-02	H13-08	6	E	542.55	0.008	0.324	0.215		0.214						
427	H13-08	H13-02	6	E	391.95	0.002	0.162	0.352	5.0	0.349	5.0	8	0.35	8	0.35	High St. Sewer[5]
429	H13-02	H13-01	8	E	189.26	0.006	0.604	0.507		0.503						High St. Sewer[5]
431	H13-01	H12-13	8	E	301.19	0.004	0.493	0.608	5.0	0.603	5.0	10	0.90	6	0.23	High St. Sewer[5]
433	F15-02	F15-03	6	E	346.79	0.009	0.344	0.110		0.114						
435	F15-03	F15-04	6	E	352.98	0.008	0.324	0.217		0.206						
437	F15-04	F15-05	6	E	341.25	0.009	0.344	0.332		0.304						
439	F15-05	G15-07	6	E	224.88	0.012	0.397	0.441		0.396						
441	G15-07	G15-09	8	E	298.54	0.015	0.955	0.563		0.503						
443	G15-09	G15-10	8	E	20.75	0.045	1.654	0.621		0.559						
445	G15-10	G15-18	8	E	228.33	0.007	0.652	0.648		0.570						
447	G15-18	G15-17	8	E	9.71	0.132	2.833	0.655		0.576						
449	G15-17	G15-19	8	E	246.01	0.005	0.551	0.658	6.0	0.578	3.0	10	1.00	4	0.09	10th St. Sewer[2]
451	G15-19	G15-20	8	E	234.02	0.006	0.604	0.661	6.0	0.580						
453	G15-20	G15-21	8	E	260.80	0.014	0.923	0.717		0.634						
455	G15-21	G15-22	8	E	225.70	0.005	0.551	0.728	6.0	0.653	6.0	10	1.00	6	0.26	10th St. Sewer[2]
457	G15-22	H15-08	8	E	315.13	0.005	0.551	0.740	6.0	0.673	6.0	10	1.00	6	0.26	10th St. Sewer[2]
459	H15-08	H15-09	10	E	258.12	0.003	0.774	0.753		0.695						
461	H15-09	H15-10	10	E	283.68	0.003	0.774	0.769		0.719						
463	H15-10	H16-04	8	E	255.06	0.004	0.493	1.375	6.0	1.369	6.0	12	1.50	10	0.90	Main St. Sewer[4]
465	H16-04	H16-10	8	E	361.75	0.003	0.427	1.380	7.0	1.389	8.0	12	1.30	12	1.30	Main St. Sewer[4]
467	G16-04	G16-10	6	E	208.54	0.113	1.217	0.078		0.078						
469	G16-10	G16-15	6	E	219.01	0.032	0.648	0.150		0.149						
471	G16-15	G16-16	6	E	262.63	0.035	0.677	0.229		0.225						
473	G16-16	G16-17	6	E	159.27	0.017	0.472	0.307		0.282						
475	G16-17	G16-18	6	E	297.17	0.016	0.458	0.385		0.379						
477	G16-18	H16-11	8	E	292.06	0.005	0.551	0.401		0.400						
479	H16-11	H16-12	8	E	260.86	0.010	0.780	0.452		0.450						
481	H16-12	H16-14	8	E	291.77	0.007	0.652	0.505		0.501						
485	H16-10	H16-13	8	E	241.99	0.003	0.427	1.385	6.0	1.402	7.0	15	2.30	12	1.25	Main St. Sewer[4]
487	H16-13	H16-14	8	E	14.85	0.185	3.354	1.388		1.388						
489	H16-14	H17-05	12	E	216.02	0.001	0.727	1.894	7.0	1.880	7.0	18	2.15	15	1.30	Main St. Sewer[4]
491	H17-05	H17-14	12	E	250.50	0.001	0.727	1.901	9.0	1.887	9.0	18	2.15	15	1.30	Main St. Sewer[4]
493	H17-14	H17-18	12	E	266.88	0.002	1.028	1.907	9.0	1.894	9.0	15	1.90	12	1.00	Main St. Sewer[4]
495	H17-18	H17-22	12	E	267.07	0.004	1.454	1.917	6.0	1.904	6.0	15	2.70	8	0.50	Main St. Sewer[4]
497	H17-22	H18-05	12	E	328.24	0.001	0.727	1.920	5.0	1.907	5.0	18	2.15	15	1.30	Main St. Sewer[4]
499	H18-05	H18-12	12	E	364.63	0.002	1.028	1.923	4.0	1.915	4.0	18	3.00	12	1.00	Main St. Sewer[4]
501	H18-12	H19-03	12	E	300.95	0.002	1.028	1.932	2.0	1.925	2.0	18	3.00	12	1.00	Main St. Sewer[4]
503	H19-03	H19-13	12	E	349.09	0.004	1.454	1.933	2.0	1.939	2.0	15	2.65	8	0.50	Main St. Sewer[4]
505	H19-13	H19-14	12	E	264.65	0.005	1.626	1.960		2.010						

TABLE 12
CITY OF LAKEPORT
2008 MASTER SEWER PLAN
HYDRAULIC MODEL SEWER CAPACITY AND FLOW SUMMARY

Model Pipe ID No.	From Model Manhole	To Model Manhole	Sewer Diameter (in)	Existing Or Future	Length (ft)	Sewer Slope (ft/ft)	Pipe Capacity (MGD)	2008		2028						Comments
								Model PWWF (MGD)	PWWF Surcharge (ft)	Model PWWF (MGD)	Estimated PWWF Surcharge (ft)	REPLACEMENT SEWER		PARALLEL SEWER		
												Size (in)	Capacity (MGD)	Size (in)	Capacity (MGD)	
507	H19-14	C St PS	8	E	4.00	0.338	4.534	2.027		2.105						
511	H21-13	H21-07	8	E	245.80	0.003	0.427	0.006		0.009						
513	H21-07	H21-02	8	E	139.88	0.004	0.493	0.013		0.019						
515	H21-02	H20-17	8	E	118.01	0.002	0.349	0.019		0.028						
517	H20-17	H20-14	8	E	267.41	0.005	0.551	0.027		0.039						
519	H20-14	H20-11	8	E	178.65	0.004	0.493	0.034		0.048						
521	H20-11	H20-07	8	E	209.23	0.003	0.427	0.040		0.057						
523	H20-07	H20-02	8	E	200.62	0.004	0.493	0.046		0.067						
525	H20-02	H19-21	8	E	354.11	0.003	0.427	0.053		0.076						
527	H19-21	H19-20	8	E	56.03	0.009	0.740	0.059		0.086						
529	H19-20	H19-14	8	E	141.61	0.004	0.493	0.065		0.097						
531	H13-14	H13-15	8	E	21.47	0.013	0.889	0.088		0.075						
533	H13-15	H14-03	8	E	128.76	0.011	0.818	0.167		0.141						
535	H14-03	H14-07	8	E	286.72	0.003	0.427	0.245		0.210						
537	H14-07	H14-09	8	E	182.23	0.004	0.493	0.332		0.284						
539	H14-09	H14-16	8	E	337.04	0.002	0.349	0.417		0.354						
541	H14-16	Rose PS	8	E	17.65	0.094	2.391	0.438		0.365						
543	F16-08	F16-09	6	E	362.07	0.012	0.397	0.033		0.025						
545	F16-09	F17-01	8	E	240.06	0.023	1.183	0.062		0.065						
547	F17-01	F17-04	8	E	199.91	0.010	0.780	0.093		0.089						
551	F17-05	F17-07	8	E	46.13	0.003	0.427	0.154		0.134						
553	F17-07	F17-08	8	E	236.51	0.013	0.889	0.184		0.157						
555	F17-08	F17-09	8	E	188.48	0.007	0.652	0.215		0.179						
557	F17-10	F17-11	8	E	291.54	0.012	0.854	0.276		0.226						
559	F17-11	F17-12	6	E	217.28	0.006	0.280	0.306	4.0	0.250						Compton St. Sewer[3]
561	F17-09	F17-10	8	E	17.33	0.095	2.404	0.245		0.204						
563	F17-12	F17-14	6	E	154.03	0.007	0.303	0.337	4.0	0.286						Russell St. Sewer[3]
565	F17-14	F17-15	8	E	37.48	0.030	1.351	0.368		0.310						
567	F17-15	F18-03	8	E	287.20	0.004	0.493	0.398		0.333						
569	F18-03	G18-03	8	E	282.00	0.014	0.923	0.429		0.356						
571	G18-03	G18-08	8	E	356.04	0.006	0.604	0.460		0.380						
573	G18-08	G19-01	8	E	346.94	0.004	0.493	0.537	4.0	0.456						Martin St. Sewer[3]
575	G19-01	G19-03	8	E	236.85	0.008	0.697	0.800	5.0	0.666						Martin St. Sewer[3]
577	G19-03	G19-04	8	E	279.42	0.007	0.652	0.862	6.0	0.741	1.0	10	1.20	4	0.10	Martin St. Sewer[3]
579	G19-04	G19-05	8	E	270.21	0.008	0.697	0.919	3.0	0.786						Martin St. Sewer[3]
581	G19-08	G19-07	8	E	17.93	0.118	2.679	0.121		0.144						
583	E20-03	E20-02	8	E	299.27	0.003	0.427	0.022		0.087						
585	E20-02	E20-01	8	E	157.55	0.005	0.551	0.043		0.117						
587	F20-03	F20-05	8	E	314.67	0.010	0.780	0.101		0.193						
589	F20-05	F21-01	8	E	298.31	0.005	0.551	0.119		0.219						
591	F21-01	F21-05	8	E	292.41	0.005	0.551	0.145		0.254						
593	F21-05	F21-06	8	E	201.79	0.005	0.551	0.163		0.281						
595	F21-06	F21-04	8	E	662.22	0.010	0.780	0.215		0.343						
597	G20-08	G20-07	8	E	173.72	0.006	0.604	0.336		0.521						
599	G20-07	G20-06	8	E	257.08	0.005	0.551	0.364		0.557						
601	F20-04	F20-07	8	E	225.53	0.009	0.740	0.033		0.042						
603	F20-07	F20-06	8	E	248.21	0.007	0.652	0.050		0.072						
605	F20-06	G20-09	8	E	405.15	0.016	0.986	0.068		0.098						
607	F21-04	G20-09	8	E	456.82	0.006	0.604	0.233		0.369						
609	G20-09	G20-08	8	E	238.06	0.006	0.604	0.318		0.494						
611	H25-04	H25-02	12	E	438.97	0.011	2.411	0.790		0.789						
613	H25-02	H24-04	12	E	83.12	0.025	3.635	0.812		0.828						
615	H24-04	H24-03	12	E	122.06	0.003	1.259	0.827		0.860						
617	H24-03	H24-02	12	E	354.35	0.001	0.727	0.843		0.968						
619	H24-02	H24-01	12	E	63.36	0.006	1.781	0.859		1.002						
621	H24-01	H23-09	12	E	339.11	0.003	1.259	0.874		1.034						
623	H23-09	H23-07	12	E	335.04	0.002	1.028	0.917		1.094						
625	H23-07	H23-05	12	E	48.58	0.005	1.626	0.996		1.206						
627	H23-05	H23-04	12	E	223.90	0.003	1.259	1.011		1.238						
629	H23-04	H23-02	12	E	124.96	0.001	0.727	1.044		1.287						
631	H23-02	H22-05	12	E	279.02	0.000	0.230	1.060		1.322						
633	H22-05	H22-04	12	E	56.11	0.007	1.924	1.079		1.359						
635	H22-04	H22-03	12	E	305.35	0.002	1.028	1.094		1.391						
637	H22-03	H22-01	12	E	297.39	0.002	1.028	1.112		1.426						
639	H22-01	H21-15	12	E	244.04	0.002	1.028	1.137		1.468						
641	H21-15	H21-11	12	E	312.12	0.004	1.454	1.187		1.535						
643	H21-10	H21-11	6	E	71.30	0.028	0.606	0.359		0.298						
645	H21-09	H21-10	6	E	215.40	0.035	0.677	0.368		0.307						
647	H17-07	H17-16	8	E	252.39	0.001	0.247	0.052		0.045						
649	H17-16	H17-20	8	E	262.82	0.002	0.349	0.104		0.089						
651	H17-20	H17-25	8	E	265.49	0.002	0.349	0.155		0.133						
653	H17-25	H18-07	8	E	327.63	0.002	0.349	0.207		0.178						
655	H18-07	H18-15	8	E	460.14	0.005	0.551	0.333		0.296						
657	H18-15	H19-15	8	E	529.47	0.001	0.247	0.384		0.341						

TABLE 12

CITY OF LAKEPORT

2008 MASTER SEWER PLAN

HYDRAULIC MODEL SEWER CAPACITY AND FLOW SUMMARY

Model Pipe ID No.	From Model Manhole	To Model Manhole	Sewer Diameter (in)	Existing Or Future	Length (ft)	Sewer Slope (ft/ft)	Pipe Capacity (MGD)	2008		2028						Comments
								Model PWWF (MGD)	PWWF Surcharge (ft)	Model PWWF (MGD)	Estimated PWWF Surcharge (ft)	REPLACEMENT SEWER		PARALLEL SEWER		
												Size (in)	Capacity (MGD)	Size (in)	Capacity (MGD)	
659	H15-03	H15-07	8	E	323.72	0.003	0.427	0.569	4.0	0.554	4.0	10	0.77	6	0.20	North Main St.[3][4]
661	H15-07	H15-10	8	E	240.22	0.003	0.427	0.592	4.0	0.554	4.0	10	0.77	8	0.42	North Main St.[3][4]
663	F19-01	F19-02	6	E	130.76	0.025	0.573	0.064		0.050						
665	F19-02	G19-02	6	E	306.14	0.017	0.472	0.149		0.122						
667	G19-02	G19-01	8	E	19.75	0.143	2.949	0.206		0.166						
669	H12-12	H12-17	8	E	93.41	0.025	1.233	0.213		0.287						
671	H12-16	H12-17	8	E	27.35	0.078	2.178	1.027		1.035						
673	E20-01	F20-03	8	E	287.73	0.012	0.854	0.073		0.155						
675	H23-06	H23-07	6	E	301.34	0.016	0.458	0.021		0.038						
679	H19-15	C St PS	8	E	24.36	0.014	0.923	0.387		0.344						
685	H21-11	Lakeport PS	12	E	70.30	0.048	5.037	1.549		1.834						
693	F22-06	F22-07	15	E	75.00	0.006	3.229	3.762		3.762						See foot note [1]
695	F22-07	F22-08	15	E	341.00	0.041	8.441	3.765		3.778						See foot note [1]
697	F22-08	F22-09	15	E	398.00	0.027	6.850	3.766		3.780						See foot note [1]
699	F22-09	G23-01	15	E	400.00	0.018	5.593	3.768		3.781						See foot note [1]
701	G23-01	G23-04	15	E	400.00	0.019	5.746	3.770		3.805						See foot note [1]
703	G23-04	G24-01	15	E	400.00	0.015	5.106	3.772		3.806						See foot note [1]
705	G24-01	G24-02	15	E	400.00	0.009	3.955	3.774		3.829						See foot note [1]
707	G24-02	G24-03	21	E	400.00	0.001	3.233	3.776		3.831						See foot note [1]
709	G24-03	G25-01	21	E	184.50	0.001	3.233	3.777		3.832						See foot note [1]
711	G25-01	G25-02	24	E	400.00	0.001	4.617	3.779		3.834						See foot note [1]
713	G25-02	G25-03	24	E	400.00	0.001	4.617	3.781		3.835						See foot note [1]
715	G25-03	H26-01	24	E	400.00	0.001	4.617	3.782		3.836						See foot note [1]
717	H26-01	H26-02	24	E	400.00	0.001	4.617	3.783		3.838						See foot note [1]
719	H26-02	H26-03	24	E	273.50	0.001	4.617	3.784		3.839						See foot note [1]
721	H26-03	H27-01	24	E	223.00	0.001	4.617	3.785		3.840						See foot note [1]
723	H27-01	92 SIPHON UP	18	E	26.39	0.145	25.812	2.509		2.548						See foot note [1]
725	H27-04	H27-05	24	E	400.00	0.002	6.529	3.789		3.846						See foot note [1]
727	H27-05	H27-06	24	E	400.00	0.001	4.617	3.791		3.847						See foot note [1]
729	H27-06	H28-03	24	E	171.00	0.001	4.617	3.792		3.848						See foot note [1]
731	H28-03	H28-02	24	E	250.00	0.001	4.617	3.793		3.850						See foot note [1]
733	H28-02	H28-01	24	E	271.50	0.001	4.617	3.794		3.851						See foot note [1]
735	H28-01	Linda Ln PS	24	E	54.00	0.001	4.617	3.795		3.852						See foot note [1]
741	G19-05	Martin St PS	8	E	84.30	0.035	1.459	1.614	10.0	1.042						
743	H12-17	Lakeshore PS	10	E	34.99	0.079	3.974	1.244		1.325						
755	G19-07	96	8	E	99.50	0.024	1.208	0.262		0.309						
757	88	76	12	E	5.00	0.100	7.271	0.761		0.764						
761	90	74	20	E	5.00	0.200	40.150	5.358		5.354						
763	F17-04	F17-05	8	E	110.56	0.008	0.697	0.123		0.111						
765	G20-06	102	6	E	134.61	0.013	0.413	0.385		0.586	1.7					
767	92	H27-04 SIPHON DOWN	18	E	31.48	0.119	23.384	2.510		2.549						
769	H27-01	94 SIPHON UP	8	E	26.61	0.144	2.959	1.277		1.294						
771	94	H27-04 SIPHON DOWN	8	E	31.55	0.119	2.690	1.278		1.296						
773	96	Martin St PS	8	E	135.74	0.007	0.652	0.377		0.447						
775	98	G10-04	10	E	427.54	0.021	2.049	0.014		0.018						
777	102	86	12	E	29.49	0.156	9.081	0.385		0.614						

(1) PWWF flows in the Parallel Drive gravity sewer based on Larrecou Lift Station Pumping Capacity.

(2) Minimum sewer size to be 8-inch.

(3) City to observe these sewers during future PWWF conditions to verify if significant surcharging is occurring prior to performing recommended improvements.

(4) Peak flows will be reduced on this sewer segement if the Rose Ave. L.S. is diverted to the north per proposed City and County agreement.

(5) Peak flows will be increased on this sewer segement if the Rose Ave. L.S. is diverted to the north per proposed City and County agreement.

TABLE 13

City of Lakeport

2008 MASTER SEWER PLAN

INFILTRATION AND INFLOW REDUCTION PROGRAM

	Approx 2008 I&I				Phase 2 - Sewer Repair and Replacement [3]																Total Project Cost	Ultimate Estimated I&I Reduction	
					Mainline Grout Sealing		Manhole Repair or Replacement				Sewer Repair or Replacement						Lateral Repairs						
																			Lateral [1]				
	Subservice Area	Existing Sewered Area (Ac)	MGD	GPAD	Sewer Size (inches)	Estimated Length (ft)	MH's	Estimated # of Laterals [1][2]	Grout Sealing (ft)[4]	Sealing Costs ($)[5]	MH's Repaired (ea)[6]	MH's Repair Costs ($)[6]	MH's Replaced (ea)[7]	MH's Replaced ($)[7]	Main Size (Inches)	Length (ft)[8]	Unit Cost ($/LF)[9]	Total Cost	Number [10]	Cost @$6,700 ea.		%	(MGD)
INITIAL I&I REDUCTION TARGET AREA (2008 to 2018)	9B	28.6	0.33	11,550	8	300	11	86	60	$300	1	$4,000	1	$6,000	8	60	$163	$9,800	17	$113,900	$319,100	60%	0.198
					6	3,540			708	$3,700					6	708	$158	$111,900					
					4	2,130			426	$2,200					4	426	$158	$67,300					
	7C	2	0.013	6,700	6	250	1	8	50	$300	0	$0	0	$0	6	50	$158	$7,900	2	$13,400	$21,600	75%	0.010
	9C	10.5	0.062	5,950	6	890	5	23	178	$900	0	$0	0	$0	6	178	$158	$28,100	5	$33,500	$79,400	65%	0.040
					4	520			104	$500					4	104	$158	$16,400					
	4B	28	0.161	5,740	8	1,150	13	18	230	$1,200	1	$4,000	1	$6,000	8	230	$163	$37,500	4	$26,800	$144,400	75%	0.121
					6	1,230			246	$1,300					6	246	$158	$38,900					
					4	880			176	$900					4	176	$158	$27,800					
	13A	33.9	0.179	5,270	8	2,260	22	102	452	$2,400	2	$8,000	2	$12,000	8	452	$163	$73,700	20	$134,000	$321,500	50%	0.090
					6	2,370			474	$2,500					6	474	$158	$74,900					
					4	430			86	$400					4	86	$158	$13,600					
	3C	27.6	0.137	5,010	8	2,500	14	53	500	$2,600	1	$4,000	1	$6,000	8	250 [11]	$163	$38,300	6 [12]	$40,200	$127,800	35%	0.048
					6	745			149	$800					6	149	$158	$23,500					
					4	380			76	$400					4	76	$158	$12,000					
SUBSEQUENT I&I REDUCTION TARGET AREA (2018 to 2028)	10B	44.5	0.201	4,510	8	2,185	23	100	437	$2,300	2	$8,000	2	$12,000	8	437	$163	$71,200	20	$134,000	$303,200	50%	0.101
					6	2,320			464	$2,400		$0			6	464	$158	$73,300					
	7B	5.3	0.022	4,210	8	227	3	15	45	$200	0	$0	0	$0	8	45.4	$163	$7,400	3	$20,100	$58,900	60%	0.013
					6	380			76	$400					6	76	$158	$12,000					
					4	575			115	$600					4	115	$158	$18,200					
	1B	32.9	0.139	4,210	8	460	16	40	92	$500	2	$8,000	2	$12,000	8	92	$163	$15,000	8	$53,600	$189,900	65%	0.090
					6	3,090			618	$3,200					6	618	$158	$97,600					
	7A	61	0.25	4,100	8	980	15	65	196	$1,000	2	$8,000	2	$12,000	8	196	$163	$31,900	13	$87,100	$268,200	60%	0.150
					6	2,150			430	$2,200					6	430	$158	$67,900					
					4	1,780			356	$1,900					4	356	$158	$56,200					
	9A	23	0.094	4,080	8	1,350	10	30	270	$1,400	1	$4,000	1	$6,000	8	270	$163	$44,000	6	$40,200	$142,000	55%	0.052
					6	1,360			272	$1,400					6	272	$158	$43,000					
					4	60			12	$100					4	12	$158	$1,900					
SUBTOTAL INITIAL I&I TARGET AREA		130.6	0.882			19,575	66	290	3,915	$20,400	5	$20,000	5	$30,000		3415		$726,100	48	$361,800	$1,013,800		0.506
TOTAL ALL HIGH I&I AREAS		**297.3**	**1.588**			**36,492**	**133**	**540**	**7,298**	**$38,000**	**12**	**$48,000**	**12**	**$72,000**		**6,798**		**$1,121,200**	**98**	**$696,800**	**$1,976,000**		**0.912**

NOTES:

(1) Laterals refer to the sewer pipe serving the property from the sewer main to the property line (i.e., lateral in the public right-of-way).
(2) House connection refers to the sewer pipe on private property from the property line to the structure being served.
(3) All costs include 25% engineering and 15% contingency and are based on prevailing wages and Contractor costs.
(4) Grout sealing of mainline sewers assumes that 20% of the sewers in the high I&I target areas will require sealing.
(5) Grout sealing costs based on 10-foot sewer pipe segments. $52/joint includes 40% Engineering and contingency.
(6) Cost for manhole repairs based on 10% of the existing MHs needing some type of repair. Repair cost $4,000/MH.

MGD = Million Gallons Per Day
GPAD = Gallons Per Acre Per Day

(7) Cost for manhole replacement based on 10% of the existing MHs needing replacement. Replacement cost $6,000/MH.
(8) Replacement and/or repair of sewers is based on 20% of the existing sewers needing some type of replacement or repair (i.e., lining, pipe bursting, etc.).
(9) Replacement sewer costs assume pavement restoration and sewer depth less then 8 feet deep.
(10) Replacement and/or repair of laterals is based on 20% of the existing laterals needing some type of replacement or repair (i.e., lining, pipe bursting, etc.).
(11) Due to previous rehabilitation project completed in 1994, replacement and/or repair of sewers in this area is based on only 10% of the existing sewers needing some type of replacement or repair (i.e., lining, pipe bursting, etc.).
(12) Due to previous rehabilitation project completed in 1994, replacement and/or repair of laterals in this area is based on only 10% of the existing laterals needing some type of replacement or repair (i.e., lining, pipe bursting, etc.).

TABLE 14
CITY OF LAKEPORT
2008 MASTER SEWER PLAN
PRELIMINARY COST ESTIMATES FOR MAJOR SEWER SYSTEM IMPROVEMENTS

ITEM NO.	PROJECT NAME DESCRIPTION	PROJECT YEAR COST IN JUNE 2008 DOLLARS [1] Near Term 2008 TO 2013	Intermediate 2013 TO 2018	Long Term 2018 TO 2028
1	**Main Street Sewer Replacement**			
	12" Sewer Replacement Pt. 1 to 2	$220,000		
2	**Treatment Plant - Replace Chlorine Gas System**			
	Hypochlorite System See Fig. 2	$300,000		
3	**Treatment Plant - Inspect & Clean Chlorine Contact Pipe**			
	Inspect/restore Chlorine Contact pipe capacity See Fig. 2	$80,000		
4	**Treatment Plant - Modify Recycle Pump Station No. 1**			
	Modify pump station for time-of-use operation See Fig. 2	$25,000		
5	**Lift Station Radio Telemetry and SCADA Improvements**			
	Install Radio Telemetry in 5 lift stations	$30,000		
	Install SCADA		$250,000	
6	**I&I Reduction Program - Initial Target Areas** [5]			
	Subservice Areas 3A & 13C See Plate 1 & 2	$450,000		
	Subservice Areas 4B,7C,9C,& 9B See Plate 1 & 2		$564,000	
7	**Linda Lane Lift Station Odor Control**			
	Install larger blower at lift station See Fig. 2	$12,000		
8	**Lakeshore Blvd and N High Street Parallel Sewer**			
	8" Parallel Sewer Pt. 4 to 5		$180,000	
9	**Clearlake Lift Station Replacement**			
	L.S. Pt. 10 Replacement [2]		$205,000	
10	**Treatment Plant - Repair Aeration Basins & Remove Sludge**			
	Repair Aeration Basin 1 See Fig. 2 [3][4]		$100,000	
	Repair Aeration Basin 2 See Fig. 2 [3][4]		$100,000	
11	**Main Street Parallel Sewer**			
	15" Parallel Sewer Pt. 1 to 3		$715,000	
12	**N High Street Sewer Replacement**			
	8" Replacement Sewer Pt. 6 to 7		$60,000	
13	**Martin Street Parallel Sewer**			
	8" Parallel Sewer Pt. 11 to 12		$250,000	
14	**I&I Reduction Program - Subsequent High I&I Areas** [5]			
	Subservice Areas 1B, 7A, 7B, 9A, & 10B See Plate 1 & 2			$962,000
15	**10th Street Parallel Sewer**			
	8" Parallel Sewer Pt. 8 to 9			$192,000
16	**Treatment Plant - Install 20" Chlorine Contact Pipe**			
	Increase PWWF chlorine contact time See Fig. 2			$170,000
17	**Martin Street Lift Station Capacity Improvements**			
	Increase L.S. Effective Pump Capacity Pt. 11			$60,000
18	**Russell Street Sewer Replacement**			
	8" Replacement Sewer Pt. 13 to 14			$81,000
	TOTAL ESTIMATED PROJECT COSTS (June 2008 Dollars) [1]	$1,117,000	$2,424,000	$1,465,000

				TOTAL
I&I Reduction Costs	$450,000	$564,000	$962,000	$1,976,000
General Fund Costs	$262,000	$1,660,000	$333,000	$2,255,000
Treatment Plant Improvements	$405,000	$200,000	$170,000	$775,000
				$5,006,000

[1] Estimated project costs include 40% allowance for indirect costs and contingencies, but exclude inflation and financing costs.

[2] Replacement cost for Clearlake Ave L.S.

[3] Aeration basin slope repair costs based on installation of rip rap armament placed along the aeration slopes.

[4] Cost for sludge removal does not include disposal landfill trucking and disposal costs.

[5] The I&I reduction area costs are order of magnitude costs based on preliminary sewer repairs and I&I monitoring data. Additional analysis must be completed by the City as a part of the Phase 1 work before definite costs can be determined.

APPENDIX A

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. 98-207

WASTE DISCHARGE REQUIREMENTS
FOR
CITY OF LAKEPORT
MUNICIPAL SEWER DISTRICT
LAKE COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Board) finds that:

1. The City of Lakeport Municipal Sewer District (hereafter Discharger) owns and operates a wastewater collection, treatment and disposal system which serves the City of Lakeport. The property (Assessor's Parcel No(s). 007-003-43 and 46, and 005-035-06, 16 and 18) is owned by the Discharger.

2. Waste Discharge Requirements Order No. 92-196, adopted by the Board on 25 September 1992, prescribed requirements for a discharge from the City of Lakeport Municipal Sewer District No. 1 to a storage reservoir and land application area.

3. Order No. 92-196 is neither adequate nor consistent with current plans and policies of the Board.

4. Currently, the Discharger treats approximately 1.05 million gallons per day (mgd) of municipal sewage in a baffled pond system. The effluent is disinfected prior to discharge to a storage reservoir and then to a land application area on Parallel Drive, southwest of downtown Lakeport, as shown in Attachment A, which is attached hereto and part of the Order by reference. The capacity of the storage reservoir is 650 acre-feet and the land application area consists of approximately 340 irrigated acres.

5. The City of Lakeport's treatment and storage system is in Section 36, T14N, R10W, MDB&M, and the land application area is in Section 1, T13N, R10W, MDB&M, with surface water drainage to Clear Lake, as shown in Attachment B, which is attached hereto and part of the Order by reference.

6. The Board adopted a Water Quality Control Plan, Fourth Edition, for the Sacramento River and San Joaquin River Basins (hereafter Basin Plan), which contains water quality objectives for all waters of the Basin. These requirements implement the Basin Plan.

7. The beneficial uses of Clear Lake are municipal, industrial, and agricultural supply; recreation; aesthetic enjoyment; navigation; ground water recharge; fresh water replenishment; hydropower generation; and preservation and enhancement of fish, wildlife, and other aquatic resources.

8. The beneficial uses of underlying ground water are domestic, industrial, and agricultural supply.

9. The Basin Plan encourages reclamation.

10. The action to update waste discharge requirements for this facility is exempt from the provisions of the California Environmental Quality Act (CEQA), in accordance with Title 14, California Code of Regulations (CCR), Section 15301.

11. This discharge is exempt from the requirements of Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste, as set forth in Title 27, CCR, Division 2,

Subdivision 1, Section 20005, et seq. (hereafter Title 27). The exemption, pursuant to Section 20090(b), is based on the following:

a. The Board is issuing waste discharge requirements, and

b. The discharge complies with the Basin Plan, and

c. The wastewater does not need to be managed according to Title 22, CCR, Division 4.5, Chapter 11, as a hazardous waste.

12. The Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for this discharge and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

13. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED that Order No. 92-196 is rescinded and the City of Lakeport Municipal Sewer District, its agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, shall comply with the following:

A. Discharge Prohibitions:

1. Discharge of wastes to surface waters or surface water drainage courses is prohibited.

2. Bypass or overflow of untreated or partially treated waste is prohibited.

3. Discharge of waste classified as 'hazardous', as defined in Sections 2521(a) of Title 23, CCR, Section 2510, et seq. (hereafter Chapter 15), or 'designated', as defined in Section 13173 of California Water Code, is prohibited.

B. Discharge Specifications:

1. The monthly average dry weather discharge flow shall not exceed 1.05 mgd.

2. The maximum daily discharge shall not exceed 3.8 million gallons.

3. The discharge shall not cause degradation of any water supply.

4. Objectionable odors originating at this facility shall not be perceivable beyond the limits of the wastewater treatment and disposal areas.

5. As a means of discerning compliance with Discharge Specification No. 4, the dissolved oxygen content in the upper zone (1 foot) of wastewater in ponds and the storage reservoir shall not be less than 1.0 mg/l.

6. The treatment facilities shall be designed, constructed, operated and maintained to prevent inundation or washout due to floods with a 100-year return frequency.

7. Treatment plant effluent (Sample Location L-1) and storage reservoir effluent (Sample Location L-2) shall not exceed the following Limits:

Constituent	Units	Monthly Average	Daily Maximum
Settleable Solids	ml/l	0.2	0.5
Coliform[1]	MPN	23	500

[1] Coliform limits are applicable after chlorination.

8. Ponds shall not have a pH less than 6.5 or greater than 8.5.

9. Ponds shall be managed to prevent breeding of mosquitoes. In particular,

   a. An erosion control program should assure that small coves and irregularities are not created around the perimeter of the water surface.

   b. Weeds shall be minimized.

   c. Dead algae, vegetation, and debris shall not accumulate on the water surface.

10. Public contact with wastewater shall be precluded through such means as fences, signs and other acceptable alternatives.

11. Treatment ponds and the storage reservoir shall have sufficient capacity to accommodate allowable wastewater flow, design seasonal precipitation and ancillary inflow and infiltration during the nonirrigation season. Design seasonal precipitation shall be based on total annual precipitation using a return period of 100 years, distributed monthly in accordance with historical rainfall patterns. The effluent storage reservoir freeboard shall never be less than two (2.0) feet (measured vertically at the spillway) except during years equaling or exceeding the precipitation of a 100-year return period. Treatment ponds shall never have a freeboard of less than 2.0 feet (measured vertically).

12. On or about **1 October** of each year, available pond storage capacity shall at least equal the volume necessary to comply with Discharge Specification No. 11.

C. Sludge Disposal:

1. Collected screenings, sludges and other solids removed from liquid wastes shall be disposed of in a manner that is consistent with Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste, as set forth in Title 27, CCR, Division 2, Subdivision 1, Section 20005, et seq. and approved by the Executive Officer.

2. Any proposed change in sludge use or disposal practice from a previously approved practice shall be reported to the Executive Officer and U.S. Environmental Protection Agency (EPA) Regional Administrator at least 90 days in advance of the change.

3. Use and disposal of sewage shall comply with existing Federal and State laws and regulations, including permitting requirements and technical standards included in 40 CFR 503.

If the State Water Resources Control Board and the Regional Water Quality Control Boards are given the authority to implement regulations contained in 40 CFR 503, this Order may be reopened to incorporate appropriate time schedules and technical standards. The Discharger must comply with the standards and time schedules contained in 40 CFR 503 whether or not they have been incorporated into this Order.

4. The Discharger is encouraged to comply with the State Guidance Manual issued by the Department of Health Services titled *Manual of Good Practice for Landspreading of Sewage Sludge.*

D. Wastewater Reclamation Prohibitions:

1. Spray irrigation of orchards and vineyards with undisinfected reclaimed water is prohibited.
2. Grazing of milking animals within the area irrigated with effluent is prohibited.

E. Wastewater Reclamation Specifications:

1. Use of reclaimed water shall be limited to surface irrigation of orchards, vineyards, and fodder, fiber and seed crops.
2. If spray irrigation of orchards and vineyards is initiated, reclaimed water shall be adequately disinfected, oxidized, coagulated, clarified and filtered as required by Title 22, CCR, Division 4, Section 60301, et seq. For adequate disinfection, the 7-day median number of coliform organisms shall not exceed 23 MPN per 100 milliliters.
3. Public contact with reclaimed water shall be precluded through such means as fences, signs and irrigation management practices. Fence and sign requirements will be at the direction of the County Health Officer.
4. Areas irrigated with reclaimed water shall be managed to prevent breeding of mosquitoes. More specifically,
   a. Tail water must be returned and all applied irrigation water must infiltrate completely within a 48-hour period.
   b. Ditches not serving as wildlife habitat should be maintained free of emergent, marginal and floating vegetation.
   c. Low-pressure and unpressurized pipelines and ditches accessible to mosquitoes shall not be used to store reclaimed water.
5. Reclaimed water for irrigation shall be managed to minimize erosion, runoff and movement of aerosols from the disposal area.
6. Direct or windblown spray shall be confined to the designated reclamation area and prevented from contacting drinking water facilities.
7. The Discharger may not spray irrigate effluent during periods of precipitation and for at least 24 hours after cessation of precipitation, or when winds exceed 30 mph.

8. Signs with proper wording of sufficient size shall be placed at areas of access and around the perimeter of all areas used for effluent disposal to alert the public of the use of reclaimed water.

9. A 100 foot setback distance/buffer zone shall be maintained for all additions to the reclamation area from 1 January 1992 forward. The buffer zone is meant to separate the storage and use of the wastewater from domestic wells and property lines.

F. **Wastewater Reclamation Provisions:**

1. For the purposes of this Order, "spray irrigation" means application of reclaimed water to crops by sprinklers and "surface irrigation" means application by flood or furrow irrigation.

2. Reclaimed water controllers, valves, etc., shall be affixed with reclaimed water warning signs as required by the County Health Officer. The wastewater reclamation system shall be secured in a manner that permits operation by authorized personnel only and prevents operations that would cause a violation of this Order.

3. A revised contingency plan, including notification of the Board and health agencies and outlining actions to be taken when effluent quality fails to meet required standards or in the case of an unauthorized release of effluent, shall be submitted within 90 days after adoption of this Order.

4. If the Discharger intends to use reclaimed water on crops other than those specified in an accepted land management plan, it shall first submit a written report demonstrating to the satisfaction of the Executive Officer, that management of reclaimed water and irrigated properties will assure compliance with the terms of this Order.

5. If reclaimed water is used for construction purposes, it shall comply with the most current edition of "Guidelines for Use of Reclaimed Water for Construction Purposes". Other uses of reclaimed water not specifically authorized herein shall be subject to the approval of the Executive Officer and shall comply with Title 22, CCR, Division 4.

G. **Ground Water Limitation:**

1. The discharger, in combination with other sources, shall not cause underlying ground water to be degraded.

H. **Provisions:**

1. The Discharger shall comply with the Monitoring and Reporting Program No. 98-207, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.

2. The Discharger shall comply with the following time schedule to assure compliance with Groundwater Limitation No. 1 of this Order:

Task	Report Due
Submit proposed groundwater assessment work plan	1 July 1999

3. The Discharger shall comply with the following time schedule to resolve capacity issues related to high inflow and infiltration (I/I).

Task	Compliance Date
a. Status Report on I/I Impacts to WWTP due to lake level and high ground water	**Annually, 1 June**
b. I/I assessment report describing I/I correction plan, critical areas, time schedule and costs	**1 June 1999**

4. The Discharger shall comply with the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements", dated 1 March 1991, which are attached hereto and by reference a part of this Order. This attachment and its individual paragraphs are commonly referenced as "Standard Provision(s)."

5. In the event of any change in control or ownership of land or waste discharge facilities described herein, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office.

6. At least 90 days prior to termination or expiration of any lease, contract, or agreement involving disposal or reclamation areas or off-site reuse of effluent, used to justify the capacity authorized herein and assure compliance with this Order, the Discharger shall notify the Board in writing of the situation and of what measures have been taken or are being taken to assure full compliance with this Order.

7. The Discharger must comply with all conditions of this Order, including timely submittal of technical and monitoring reports as directed by the Executive Officer. Violations may result in enforcement action, including Board or court orders requiring corrective action or imposing civil monetary liability, or in revision or rescission of this Order.

8. A copy of this Order shall be kept at the discharge facility for reference by operating personnel. Key operating personnel shall be familiar with its contents.

9. The Board will review this Order periodically and will revise requirements when necessary.

I, GARY M. CARLTON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 23 October 1998.

GARY M. CARLTON, Executive Officer

AMENDED
wac/jsb:lakeport.wdr

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. 98-207

FOR
CITY OF LAKEPORT
MUNICIPAL SEWER DISTRICT
LAKE COUNTY

EFFLUENT MONITORING

Effluent samples shall be collected just prior to discharge to the disposal facility. Effluent samples should be representative of the volume and nature of the discharge. Samples collected from the outlet structure of ponds will be considered adequately composited. Time of collection of a grab sample shall be recorded. Effluent monitoring shall include at least the following:

Constituents	Units	Type of Sample	Sampling Frequency	Sample Location
Flow to Sewage Treatment Facility	mgd	Cumulative	Daily	At Pumps
Flow from Sewage Treatment Facility	mgd	Cumulative	Daily	L-1
Flow to Irrigation Areas	mgd	Cumulative	Daily	L-2
BOD_5 20°C	mg/l	Grab	Weekly	L-1
Suspended Matter	mg/l	Grab	Weekly	L-1
Settleable Matter	ml/l	Grab	Weekly	L-1
Specific Conductivity	µmhos/cm	Grab	Weekly	L-2
pH	pH Units	Grab	Weekly	L-2
Total Coliform Organisms	MPN/100 ml	Grab	Weekly	L-2
Nitrates as N	mg/l	Grab	Monthly	L-2
Total Dissolved Solids	mg/l	Grab	Monthly	L-2
Standard Minerals	mg/l	Grab	Annually	L-2

Sample location L-1 is the effluent end of the pond treatment system
Sample location L-2 is prior to use as irrigation water

STORAGE RESERVOIR MONITORING

The storage reservoir shall be monitored for dissolved oxygen in accordance with the following protocol:

1. When laboratory results for treatment plant effluent is under 30 mg/l $BOD_{5\ Day}$ 20°C, the storage reservoir need not be tested for dissolved oxygen.

2. The Discharger shall initiate monitoring of the storage reservoir dissolved oxygen levels when the results of one laboratory BOD_5 20°C is greater than 30 mg/l. The monitoring shall continue through two consecutive weekly BOD laboratory results under 30 mg/l. The storage reservoir shall be monitored for dissolved oxygen at the one foot depth and at each 5 foot incremental depth to the bottom of the reservoir. The monitoring shall be done at the deepest part of the reservoir only. Dissolved oxygen monitoring shall be conducted weekly.

SLUDGE MONITORING

A composite sample of sludge shall be collected annually in accordance with EPA's *POTW Sludge Sampling and Analysis Guidance Document, August 1989*, and tested for the following metals:

Cadmium	Copper	Lead
Chromium	Zinc	Nickel

Sampling records shall be retained for a minimum of five years. A log shall be kept of sludge quantities generated and of handling and disposal activities. The frequency of entries is discretionary; however, the log should be complete enough to serve as a basis for part of the annual report.

WATER SUPPLY MONITORING

A sampling station shall be established where a representative sample of the municipal water supply can be obtained. Water supply monitoring shall include at least the following:

Constituents	Units	Sampling Frequency
pH	pH unit	Annually
Electrical Conductivity @ 25°C	µmhos/cm	Annually
Total Dissolved Solids	mg/l	Annually
Standard Minerals	mg/l	Annually

GROUND WATER MONITORING

Ground water shall be monitored quarterly for the first year after installation of the monitoring wells and semi-annually thereafter. Monitoring wells shall be tested for the presence of coliform organisms, pH, specific conductivity, Nitrates as NO_3, ground water elevation and flow gradients.

REPORTING

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly the compliance with waste discharge requirements.

Monthly monitoring reports shall be submitted to the Board by the 15th day of the following month.

The results of any monitoring done more frequently than required at the locations specified in the Monitoring and Reporting Program shall be reported to the Board.

The Discharger shall submit a report to the Board by **30 March** of each year. The report shall contain both tabular and graphical summaries of the monitoring data obtained during the previous year. In addition, the Discharger shall discuss the compliance record and the corrective actions taken or planned which may be needed to bring the discharge into full compliance with the waste discharge requirements.

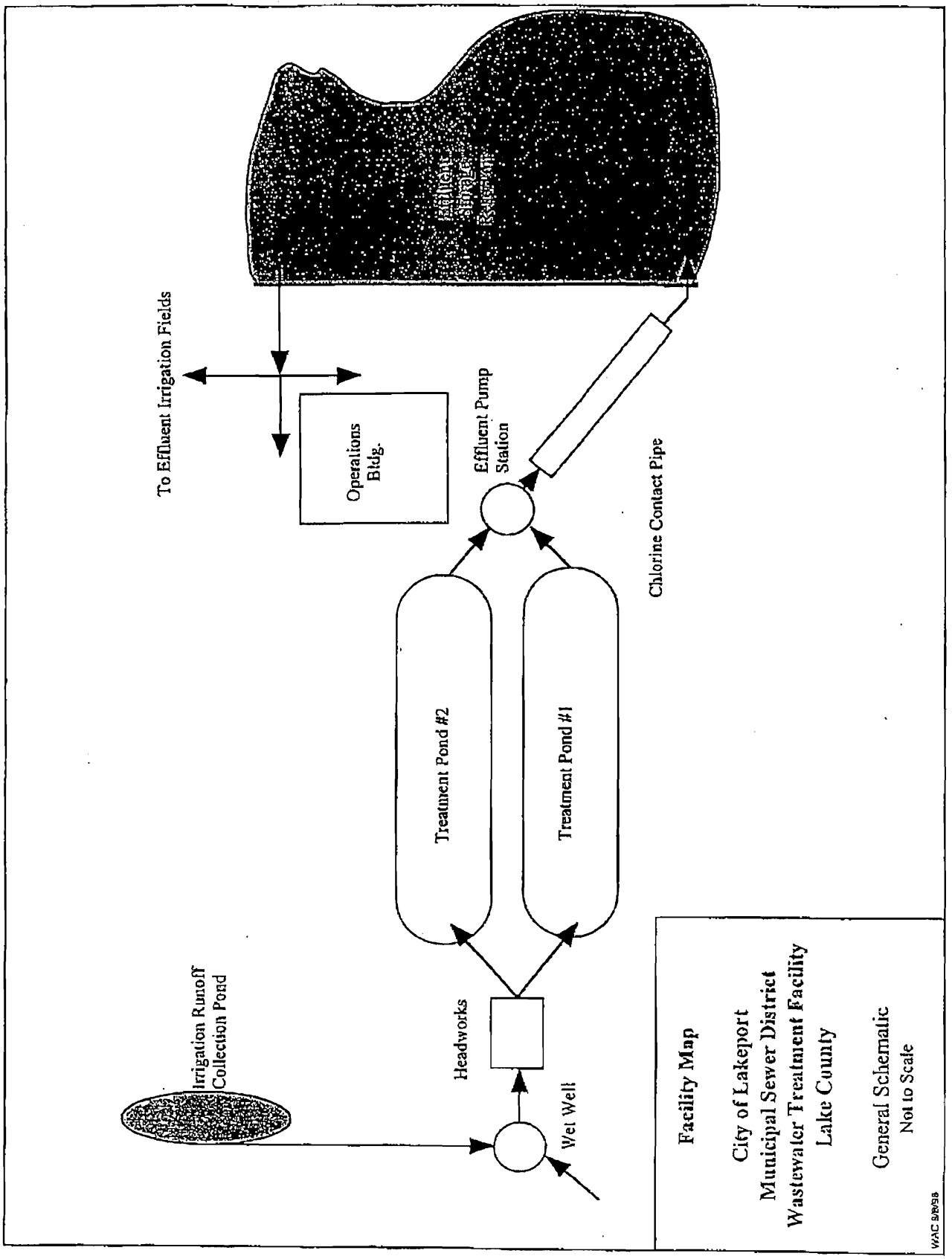
The Discharger shall implement the above monitoring program as of the date of this Order.

Ordered by: _____
GARY M. CARLTON, Executive Officer

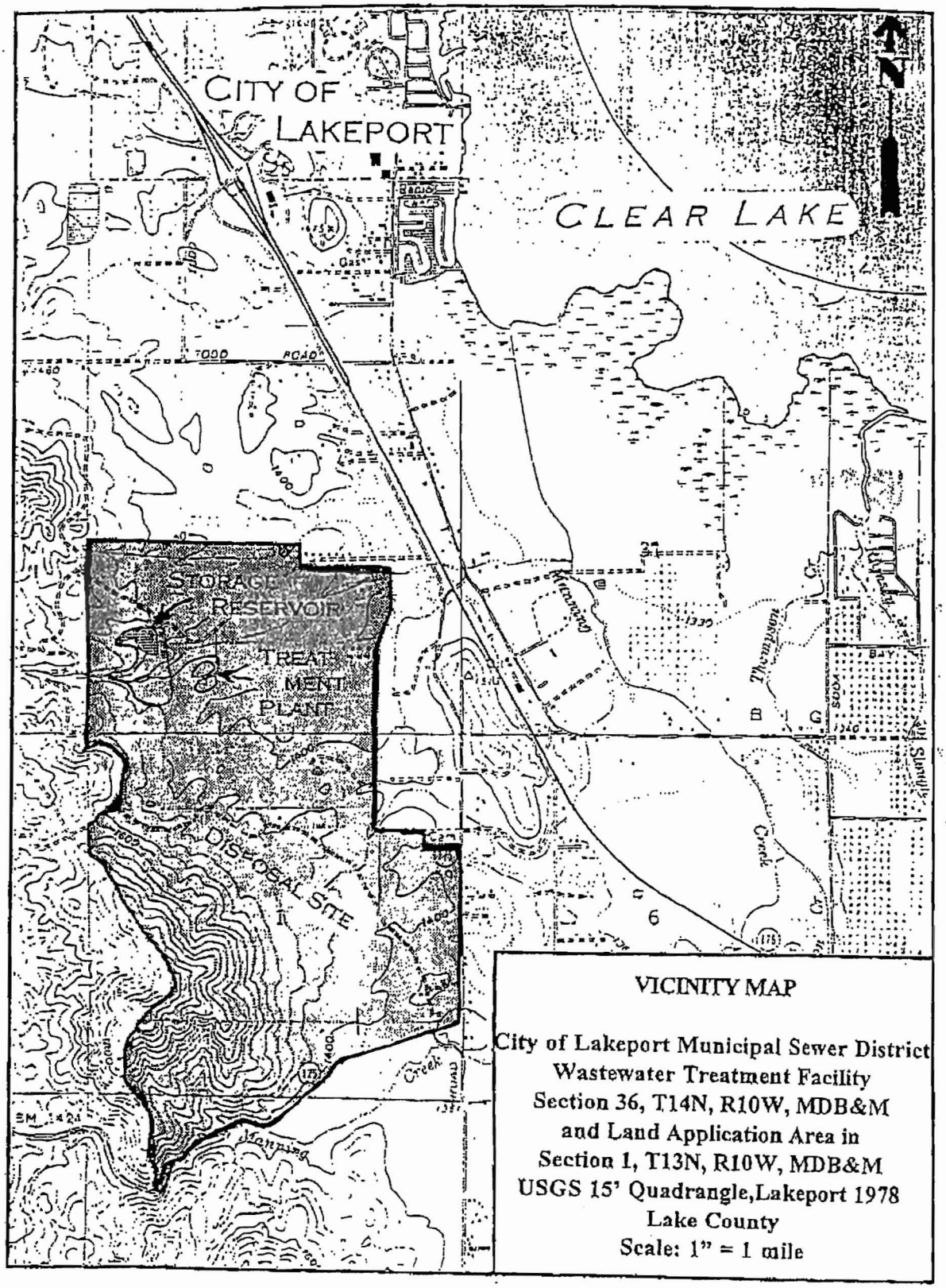
23 October 1998
(Date)

AMENDED
wac/lsb:lakeport.mrp

ATTACHMENT A



ATTACHMENT B



VICINITY MAP

City of Lakeport Municipal Sewer District
Wastewater Treatment Facility
Section 36, T14N, R10W, MDB&M
and Land Application Area in
Section 1, T13N, R10W, MDB&M
USGS 15' Quadrangle,Lakeport 1978
Lake County
Scale: 1" = 1 mile

INFORMATION SHEET

CITY OF LAKEPORT
MUNICIPAL SEWER DISTRICT
LAKE COUNTY

The City of Lakeport is on the northwestern shore of Clear Lake in Lake County. The City currently treats approximately 1.05 mgd of municipal sewage in a baffled pond system. After treatment and disinfection, the effluent is pumped into a storage reservoir and used for land application. The maximum daily discharge shall not exceed 3.8 million gallons. The storage capacity of the storage reservoir is 650 acre-feet and the land application area consists of approximately 340 irrigated acres. The property used for wastewater reclamation is owned by the City of Lakeport. Ground water monitoring will be conducted to assess the impact of the facility on ground water.

The beneficial uses of Clear Lake are municipal, industrial, and agricultural supply; recreation; aesthetic enjoyment; navigation; ground water recharge; fresh water replenishment; hydropower generation; and preservation and enhancement of fish, wildlife, and other aquatic resources.

The beneficial uses of underlying ground water are domestic, industrial, and agricultural supply.

The surface water drainage is to Clear Lake.

APPENDIX B

California Regional Water Quality Control Board
Central Valley Region
Karl E. Longley, ScD, P.E., Chair

Linda S. Adams
Secretary for Environmental Protection

Sacramento Main Office
11020 Sun Center Drive #200, Rancho Cordova, California 95670-6114
Phone (916) 464-3291 • FAX (916) 464-4645
http://www.waterboards.ca.gov/centralvalley

Arnold Schwarzenegger
Governor

File
S23.22

28 March 2007

RECEIVED
APR 04 2007
PACE Civil, Inc.

Mark Brannigan
City of Lakeport Municipal Sewer District
City of Lakeport Corporation Yard
591 Martin Street
Lakeport, CA 95453

CERTIFIED MAIL
7005 1160 0004 0127 2893

NOTICE OF ADOPTION
OF
CEASE AND DESIST ORDER
CITY OF LAKEPORT MUNICIPAL SEWER DISTRICT
WASTEWATER TREATMENT FACILITY
LAKE COUNTY

Cease and Desist Order (CDO) No. R5-2007-0010 for the Wastewater Treatment Facility was adopted by the California Regional Water Quality Control Board, Central Valley Region, at its 15 March 2007 meeting.

Please note that the CDO does not include a connection restriction as in the draft Order. However, the CDO has a flow limitation which states: *"Effective immediately, the average monthly dry weather inflow to the wastewater treatment plant shall not exceed 0.42 million gallons per day, (calculated by averaging the flows from August through October each year) and the annual inflow (measured from October through September) shall not exceed 885 acre-feet (approximately 288 million gallons)."* The City of Lakeport Municipal Sewer District (Discharger) must be aware that it is their responsibility to allocate sewer connections and not exceed the revised flow limit as required by CDO No. R5-2007-0010.

The CDO also contains compliance schedules with specific timetables for submitting reports and conducting studies to the wastewater system. The first scheduled compliance date is **1 April 2007** when irrigation with wastewater shall not be performed within 24 hours before a predicted precipitation event, during precipitation, or within 24 hours after any precipitation event, nor shall it be performed when the ground is saturated or when winds exceed 30 mph. In addition, the first scheduled reporting date is **1 June 2007**, when the City of Lakeport Municipal Sewer District must submit documentation showing that a magnetic flow meter has been installed to accurately measure the influent wastewater flows into the wastewater treatment facility.

In order to conserve paper and reduce mailing costs, a paper copy of the order has been sent only to the Discharger. Interested parties are advised that the full text of this order is available on the Regional Water Board's web site at http://www.waterboards.ca.gov/centralvalley/adopted_orders. Anyone without access to the Internet who needs a paper copy of the order can obtain one by calling Regional Water Board staff.

If you have any questions regarding the CDO, please call Guy Childs at (916) 464-4648.

Wendy Wyels

for MARK R. LIST, Chief, P.G.
Waste Discharge to Land Unit

Enclosures - Adopted Cease and Desist Order No. R5-2007-0010

cc w/o enc: Frances McChesney, Office of Chief Counsel, State Water Board, Sacramento
Gordon Innes, Division of Water Quality, State Water Board, Sacramento
Mark Bradley, Enforcement Unit, State Water Board, Sacramento
Department of Water Resources, Sacramento
Bruce Burton, Department of Health Services, Santa Rosa
Sandy Morey, Department of Fish and Game, Rancho Cordova
Bill Jennings, California Sportfishing Alliance, Stockton
Ray Ruminski Lake County Environmental Health Department, Lakeport
Richard Knoll, Lakeport Community Development Department, Lakeport
Scott Schellinger, Schellinger Homes, Santa Rosa
Mark L. Ranft, Attorney and Counselor at Law, Ukiah
Christopher Carr, Morrison and Forestor LLC, San Francisco
Theresa A. Dunham, Somach, Simmons, and Dunn, Sacramento
Thomas Warnock, Pace Civil, Inc., Redding
Kenneth Walters, Civil Engineer, Santa Rosa
Bill Jennings, California Sportfishing Alliance, Stockton

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2007-0010

CEASE AND DESIST ORDER

FOR
CITY OF LAKEPORT MUNICIPAL SEWER DISTRICT
WASTEWATER TREATMENT FACILITY
LAKE COUNTY

TO CEASE AND DESIST
FROM DISCHARGING CONTRARY TO REQUIREMENTS

The Regional Water Quality Control Board, Central Valley Region, (hereafter referred to as "Regional Water Board") finds that:

1. Waste Discharge Requirements (WDRs) Order No. 98-207, adopted by the Regional Water Board on 23 October 1998, prescribes requirements for the wastewater system owned and operated by the City of Lakeport Municipal Sewer District (hereafter referred to as "Discharger"). Revised Monitoring and Reporting Program No. 98-207 was issued on 22 April 2004.

2. The Discharger's wastewater treatment and storage system is on the southwestern shore of Clear Lake in Section 1 of T13N, R10W, MDB&M. The facility is southwest of downtown Lakeport on the west side of Highway 29. Assessor's Parcel Numbers for the property are APN 007-003-43 and 46, and 005-035-06, 16 and 18.

Wastewater Treatment Facility

3. The WDRs prescribe requirements for the treatment and disposal of a monthly average dry weather flow not exceed 1.05 million gallons per day (mgd) and a maximum daily discharge not to exceed 3.8 million gallons.

4. The Wastewater Treatment Facility (WWTF) is comprised of a domestic wastewater collection system, a treatment facility, a storage reservoir, a tailwater recapture system and disposal fields. The collection system consists of approximately 250,000 linear feet of sewer main and laterals and collects wastewater from approximately 5,150 residents. The treatment system is designed to treat 1.05 mgd of domestic sewage in a baffled pond system. The effluent is disinfected to secondary standards prior to discharge to a 600 acre-foot storage reservoir (at two feet of freeboard) and to a land application area.

5. The Discharger states that the discharge from the storage reservoir is used to irrigate approximately 242 acres of pasture and open areas (land application areas). However, the WDRs state that the land application area consists of 340 acres. The Discharger states that 211 acres are spray irrigated and 31 acres are flood irrigated. The land application area is divided into 31 fields. On a typical irrigation day, between nine and ten fields are irrigated on an alternating schedule over a 12-hour period. A different set of irrigation fields are used each day over a three-day period.

Violations of the Waste Discharge Requirements

Spill Violations

6. Discharge Prohibition No. A.1 of WDRs Order No.98-207 states: *"Discharge of wastes to surface waters or surface water drainage courses is prohibited."*

7. Discharge Prohibition No. A.2 of WDRs Order No. 98-207 states: *"Bypass or overflow of untreated or partially treated effluent is prohibited."*

8. Since adoption of WDRs Order No. 98-207 on 23 October 1998, the Discharger has reported 64 spills from the collection system and 3 spills from the treatment system. Of these spills, 33 entered surface waters. The largest of these spills was partially treated wastewater that occurred over an 11 day period in April 2006 and was estimated between 3.6 and 6.6 million gallons. A description of these spills is presented as Attachment A of this Cease and Desist Order.

9. To prevent unauthorized discharges of wastewater to surface water and surface water drainage courses, it is appropriate to require a Spill Contingency Plan.

Storage Capacity Violations

10. Discharge Specification No. B.11 of the WDRs Order No. 98-207 states: *"Treatment ponds and the storage reservoir shall have sufficient capacity to accommodate allowable wastewater flow, design seasonal precipitation and ancillary inflow and infiltration during the nonirrigating season. Design seasonal precipitation shall be based on total annual precipitation using a return period of 100 years, distributed monthly in accordance with historical rainfall patterns. The effluent storage reservoir freeboard shall never be less than two (2.0) feet (measured vertically at the spillway) except during years equaling or exceeding the precipitation of a 100-year return period. Treatment ponds shall never have a freeboard of less than 2.0 feet (measured vertically)."*

11. Monthly self-monitoring reports show that the freeboard in the storage reservoir was less than two feet in April and May 2006.

12. The Discharger's 18 September 2006 water balance, prepared by a California Registered Engineer, shows that there is adequate storage capacity for an average dry weather flow (ADWF) of 0.57 mgd. However, at the currently permitted ADWF of 1.05 mgd, there is inadequate storage capacity. The water balance is based on 100-year annual precipitation data, 600 acre-feet of storage with two feet of freeboard, a beginning storage volume in October of each year of 100 acre-feet or less, and applying wastewater to 260 acres of disposal area (however, the actual sprayfield area is 242 acres).

    Staff and the Discharger discussed how to measure the ADWF, and agreed that it is to be an average of the inflows for the months of August, September, and October each year. The ADWF for the years 2003 through 2006 ranges from 0.37 to 0.41 mgd.

Staff's California Registered Engineer worked with the Discharger to revise the water balance to reflect actual conditions and better model inflow/infiltration rates. Staff's revised water balance shows that there is adequate storage capacity for 0.35 mgd ADWF. Therefore, the Discharger does not have sufficient capacity for its current flows, in violation of the WDRs.

However, the Discharger has the ability to rapidly make two changes to increase its capacity: lower the volume remaining in the storage reservoir to 50 acre feet each October, and increase the sprayfield by 90 acres. When staff's revised water balance was changed to reflect these improvements, it shows that the Discharger has adequate storage capacity for an ADWF of 0.42 mgd.

13. The Discharger's 2006 General Plan and related documents found on 12 March 2007 at http://www.cityoflakeport.com/docs/Project-contacts-August-2006mxd-726200635900PM.pdf shows that it has approved projects to build 334 homes, and that it has pending applications for an additional 203 homes. If all of these projects are built, then the ADWF will increase from 0.4 mgd to 0.54 mgd, which is significantly over the calculated capacity.

14. Influent flows are currently measured using pump run times from the Linda Lane Pump Station. It is unknown when this was last calibrated and therefore to ensure that influent flows are accurately measured, it is appropriate to require that a proper flow meter be installed and all flow meters be calibrated.

Land Application Area Violations

15. Wastewater Reclamation Specification No. E.7 of the WDRs Order No. 98-207 states: *"The Discharger may not spray irrigate effluent during periods of precipitation and for at least 24 hours after cessation of precipitation or when winds exceed 30 mph."*

16. Monthly self-monitoring reports show that the Discharger has violated Wastewater Reclamation Specification No. E.7. During April 2006, rainfall occurred a total of four days and the Discharger applied wastewater to the land application areas via spray irrigation on these days. This discharge during precipitation events resulted in the discharge of wastewater to Clear Lake.

Groundwater Violations

17. Groundwater Limitations No. G.1 of the WDRs Order No. 98-207 states: *"The Discharger, in combination with other sources, shall not cause underlying groundwater to be degraded."*

18. The provisions of the WDRs and Revised Monitoring and Reporting Program (MRP) No. 98-207 require that the City of Lakeport install groundwater monitoring wells, sample the installed groundwater monitoring wells, and evaluate groundwater conditions related to the discharge of waste at the facility.

19. Five groundwater monitoring wells were installed at the WWTF and land application area in September 2004. Quarterly groundwater monitoring and sampling reports were submitted between November 2004 and December 2006. Review of the groundwater monitoring data shows that the discharge appears to have degraded groundwater when comparing the upgradient background well to the downgradient wells. Concentrations of Total Dissolved Solids (TDS), boron, iron, manganese, magnesium, potassium, sodium, and chloride in the downgradient wells are higher than those in the upgradient background well. The discharge of waste from the City of Lakeport's WWTF has violated the Groundwater Limitations of WDRs Order No. 98-207. Therefore, it is appropriate to require the Discharger to complete a Background Groundwater Quality Study Analysis and to evaluate Best Practicable Treatment Control Measures to reduce degradation to below water quality objectives.

Previous Enforcement

20. Since issuance of the current WDRs in October 1998, Regional Water Board records indicate that four Notices of Violations (NOVs) have been issued for multiple wastewater spills. These NOVs are summarized as follows:

    a. An NOV was issued on 15 January 2004 for a 66,000 gallon raw sewage spill that occurred on 27 October 2003 and for five other spills ranging from 25 to 100 gallons that occurred in November and December 2003. The NOV required the submittal of a *Sanitary Sewer System Operation, Maintenance, Overflow Prevention, and Response Plan* (SSS Plan). The SSS plan was received by Regional Water Board staff on 4 June 2004.

    b. An NOV was issued on 8 February 2006 for a raw sewage spill estimated at approximately 500 gallons that occurred on 31 December 2005 and the Discharger's inability to report the spill as required by the Standard Provisions and Reporting Requirements of the Waste Discharge Requirements. The spill was caused by (i) excessive amounts of rain accompanied with inflow and infiltration (I/I), (ii) fats, oils, and greases in the main sewer line, (iii) privately operated sewer pumps from nearby motels that are connected to the sewer main, (iv) and an undersized section of the sewer main. Because the Discharger did not report the spill as required by the Standard Provisions and Reporting Requirements, the NOV required the submittal of a technical report describing how they will change internal procedures such that all spills will be reported as required by the Standard Provisions. The NOV also required the submittal of a report showing the repairs that had been completed to reduce the I/I in the spill area, a copy of the ordinance submitted to City of Lakeport regarding the reduction of fats, oils, and grease from nearby restaurants connected to the main sewer line, results of the investigation regarding the operation of the privately operated sewer pumps during periods of heavy rains, and a timeline for the replacement of the undersized section of sewer main. The Discharger has submitted the required information.

c. An NOV was issued on 3 August 2006 for a discharge of wastewater into Clear Lake from the recapture reservoir. The discharge occurred between 13 and 24 April 2006 and was estimated to be between 3,600,000 and 6,600,000 gallons of partially treated wastewater. The Discharger based the estimate spilled on approximately 15 to 25 percent of the total amount of wastewater (24 million gallons) that was discharged to the spray field during this period. The primary causes of the spill were the inflow from the Willow Point area due to the high lake levels and the uncapped sewer cleanouts, the heavy rains that occurred during this period, the lack of storage capacity, and the inability to allow the land application area to dry prior to irrigation. The NOV required the Discharger to submit a water balance prepared by a California Registered Engineer evaluating the wastewater treatment system's capacity and ability of the ponds to maintain two feet of freeboard on a month-by-month basis. The technical report and water balance prepared by a California Registered Engineer were received on 18 September 2006.

d. On 9 January 2007, an NOV was issued for two raw sewage spills that occurred on 26 October and 9 November 2006. The October spill was estimated to be between 100 and 200 gallons, and was from an overflowing manhole. The spill entered a flowing storm drain and eventually Clear Lake and was caused by a grease blockage in the sewer pipe. The Discharger states that the sewer pipe was cleaned of grease deposits and video surveyed. The Discharger indicates that this section of sewer pipe will be inspected by the 3rd quarter 2007. The November spill, estimated at 90 gallons, occurred from an overflowing manhole located near the Clear Lake High School. The spill did not enter a surface water drainage course. The spill was caused by a blockage in the sewer line from a large mass of wet paper products possibly from vandalism. A video inspection conducted by the Discharger on 9 November 2006 indicated that there were no defects within the manhole or sewer mains.

Response to April 2006 Spill and Notice of Violation

21. On 10 August 2006, the Discharger requested a meeting with Regional Water Board staff to discuss the 3 August 2006 NOV and any additional enforcement action under consideration. The meeting with staff was held on 5 September 2006, and a subsequent meeting was held with the Executive Officer on 6 October 2006. The following information was presented at each meeting and in follow-up correspondence.

The Discharger states that the main cause of the April 2006 spill was the continuous rainfall that occurred beginning in December 2005 and the inability to apply wastewater to the land application area. Once the Discharger began irrigating in April, storm water run-on into the tailwater diversion ditch from the surrounding areas contributed to the increased volumes to the storage reservoir. In addition, the Discharger submitted the following information:

- In response to increased flows at Lift Station C, the City of Lakeport staff inspected the Willow Point RV Park on 1 March 2006 and found approximately 20 uncapped

private sewer cleanouts. The RV Park is immediately adjacent to Clear Lake.

- Extensive flooding occurred along the shores of Clear Lake and in the Willow Point RV Park from 6 March through 27 April 2006. This flooding allowed approximately 65 acre-feet of excess water to enter the collection system through the uncapped sewer cleanouts.

- The majority of the open sewer cleanouts were brought to grade and capped with watertight covers on 24 March 2006 after utilizing the services of the City of Lakeport Building Department, the California Housing and Community Development, and Lake County Environmental Health Department. Wastewater flows at the nearby Lift Station No. 6 have since been reduced. However, follow-up site investigations on 18 and 22 August 2006 indicate that the Recreation Vehicle (RV) Dump Station cleanout remains open and is subject to future flooding. The inspection also found that large amounts of rock and gravel were placed onsite to prevent future flooding of the area.

- The City of Lakeport will monitor the repairs made to the sewer cleanouts through inspections and take flow measurements both upstream and downstream of the Willow Point RV Park.

- The owner of the Willow Point RV Park has received citations from the Lake County Environmental Health Department and the California Department of Housing and Community Development for the two sewer spills. One of the sewer spills was discovered within five feet of the lake level on 1 March 2006.

The impact to beneficial uses from the millions of gallons of wastewater spilled into Clear Lake was negligible because (a) the wastewater was re-disinfected prior to discharge and (b) the heavy rains diluted any constituents of concern. In addition, the Discharger took action to prevent some wastewater from entering Clear Lake. Approximately 597,000 gallons of partially treated wastewater was transported by sewage pumper trucks to the Southeast Regional Wastewater Treatment Facility during a seven-day period from 13 through 21 April 2006 at a cost of approximately $96,000.

Inflow/Infiltration Assessment

22. Provision H.3.a of the WDRs requires that, in order to resolve capacity issues related to high inflow and infiltration (I/I), the Discharger was to submit an I/I assessment report by 1 June 1999. The report was not submitted until November 2000.

23. In a 10 May 2000 inspection report, Regional Water Board staff informed the Discharger that the wastewater treatment and disposal facilities appeared well-operated and maintained. However, the report also stated that the collection system had significant inflow/infiltration (I/I) problems (documented in Attachment A to this Order). To address these problems, the Discharger was reminded that the WDRs required submittal of an I/I assessment report, and that it should detail the City's plan and schedule for implementing a program to define the nature and extent of I/I in the collection system, establish cost

effective measures for reduction of I/I sources, and perform ongoing I/I prevention and control. The report was received in November 2000, and included the following:

Task	Target Completion Date	Status
Determine the strategy to mitigate the I/I problem	16 October 2001	Completed
Finalize the analysis of the new sewer rates and coordinate the rate increase with the Lake County Sanitation District rate increase.	10 January 2001	Completed
Implement the rate increase with Proposition 218 requirements.	31 March 2001	Completed
Hire additional staff for I/I issues, and obtain necessary monitoring equipment and provide training.	15 June 2001	Hired two additional staff in March and April 2004.
Conduct initial smoke testing, provide initial update for mapping the sewer collection system, conduct base flow monitoring, sewer testing and miscellaneous repair activities.	15 October 2001	Smoke testing began in June 2004 (as of June 2005 approximately 65 percent of the lines inspected). Geographical Information System (GIS) mapping of sewer manholes (2004/2005).
Issue repair notices and work orders for defective collection system facilities.	30 November 2001	Ongoing
Initiate wet weather flow monitoring	1 December 2001	Magnetic flow meters arrived in June 2004 and have been installed at four lift stations (Lakeshore Blvd., Rose Ave., Martin Street, and C Street). A fifth magnetic flow meter is planned to be installed at the Linda Lane lift station.
Conduct ongoing flow monitoring, mapping, and repair activities to the sewer collection system.	Ongoing	Ongoing

24. The Discharger states that a concerted effort has been made towards an I/I Reduction Program with the following actions having been taken: (a) aerial mapping of the city in 1991, 2002, 2006, (b) GIS mapping of utilities from 1999 to present, (c) inventory of sewer utilities from 2001 to present, (d) creation of the I/I Department in 2003, (e) providing a GIS utility atlas to field crews in 2004, (f) completion of the sewer spillage database in 2005, (g) physical inspection of all sewer manholes from 2001 to present, (h) video inspection of sewers from 2001 to present, (i) purchase of magnetic flow meters for sewage lift stations

in 2004, (j) restoration of 10 sewer manholes in 2004, 21 manholes in 2005, and 20 manholes in 2006, and (k) the installation of 44 sewer manhole covers in 2005.

25. The Discharger's 18 September 2006 technical report states that historically, the wastewater collection system has experienced substantial inflow and infiltration; however, the I/I Reduction Program was created in 2003 to identify the problem areas and repair the collection system. The Discharger states that an average of $225,000 per year has been spent on the I/I Reduction Program.

26. In addition, the Discharger indicates that it has recently contracted with a consultant to prepare a Sewer Master Plan. The Plan will address both collection system and treatment system improvements. The estimated cost to complete the plan is $50,000 and the scheduled completion date is 13 August 2007. In summary, the Master Plan will contain the following: (a) development of a service area and system map, (b) an inflow/infiltration flow monitoring program, (c) development of a hydraulic model, (d) an evaluation of, and recommended improvements to the wastewater treatment, storage and disposal system to accommodate the next 20 years of growth, (e) cost estimates associated with those recommended improvements, and (f) development of a sewer master plan map.

27. To ensure that a mechanism is in place to provide adequate funding needed for the treatment, storage and disposal capacity necessary to consistently comply with the permit conditions, it is appropriate for the Discharger to submit a Revenue Plan for existing and future expansion of the City of Lakeport's WWTF.

28. To ensure that adequate staffing is available to perform operation and maintenance of the wastewater treatment and disposal system to comply with the WDRs, it is appropriate that the Discharger submit a Staffing Analysis Report.

29. On 2 May 2006, the State Water Board adopted Statewide General Waste Discharge Requirements For Sanitary Sewer Systems General Order No. 2006-0003-DWQ (General Order). The General Order requires all public agencies that own or operate sanitary sewer systems greater than one mile in length to comply with the Order. The Discharger's collection system exceeds one mile in length, therefore the General Order is applicable. The Discharger applied for coverage under the General Order on 29 October 2006.

Regulatory Considerations

30. As a result of the events and activities described in this Order, the Regional Water Board finds that the Discharger has caused or permitted waste to be discharged in such a manner that it has created, and continues to threaten to create, a condition of pollution or nuisance. The Regional Water Board also finds that the Discharger is discharging waste in violation of WDRs No. 98-207 as described in the above Findings.

31. The Regional Water Board's Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Basin Plan) designates beneficial uses, includes water quality objectives to protect the beneficial uses, and includes implementation plans to implement the water quality objectives.

32. Surface water drainage from the facility is to Clear Lake. The beneficial uses of Clear Lake, as stated in the Basin Plan, are municipal and domestic supply; agricultural supply; industrial service supply; water contact recreation; noncontact water recreation; warm freshwater habitat, cold freshwater habitat; spawning, reproduction, and/or early development; and wildlife habitat.

33. The beneficial uses of underlying groundwater are municipal and domestic water supply, agricultural supply, industrial service supply, and industrial process supply.

34. Section 13301 of the California Water Code states in part: "When a regional board finds that a discharge of waste is taking place or threatening to take place in violation of requirements or discharge prohibitions prescribed by the regional board or the state board, the board may issue an order to cease and desist and direct that those persons not complying with the requirements or discharge prohibitions (a) comply forthwith, (b) comply in accordance with a time schedule set by the board, or (c) in the event of a threatened violation, take appropriate remedial or preventive action. In the event of an existing or threatened violation of waste discharge requirements in the operation of a community sewer system, cease and desist orders may restrict or prohibit the volume, type, or concentration of waste that might be added to such system by discharges who did not discharge into the system prior to the issuance of the cease and desist order. Cease and desist orders may be issued directly by a board, after notice and hearing, or in accordance with the procedure set forth in Section 13302."

35. Section 13267(b) of the California Water Code states: " In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge, waste outside of its region that could affect the quality of waters within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the regional board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports. In requiring those reports, the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports."

36. The Discharger owns and operates the facility subject to this Order. Monitoring reports and other technical reports required by this Order are necessary to assure compliance with WDRs Order No. 98-207 and revised MRP No. 98-207 to assure protection of public health and safety.

37. The issuance of this Order is an enforcement action by a regulatory agency and is exempt from the provisions of the California Environmental Quality Act, pursuant to Section 15321(a)(2), Title 14, California Code of Regulations.

38. On 15 March 2007, in Rancho Cordova, California, after due notice to the Discharger and all other affected persons, the Regional Water Board conducted a public hearing at which evidence was received to consider a Cease and Desist Order and Connection Restriction.

39. Any person affected by this action of the Regional Water Board may petition the State Water Resources Control Board to review the action in accordance with Section 2050 through 2068, Title 23, California Code of Regulations. The petition must be received by the State Water Resources Control Board, Office of Chief Counsel, P.O. Box 100,

Sacramento, CA, 95812-0100, within 30 days of the date on which the Regional Water Board action took place. Copies of the law and regulations applicable to filing petitions are available at www.waterboards.ca.gov/water_laws/index.html and also provided upon request.

IT IS HEREBY ORDERED that, pursuant to Sections 13301 and 13267 of the California Water Code, the City of Lakeport Municipal Sewer District, its agents, successors, and assigns, shall implement certain measures, and identify and implement facility improvements, in accordance with the scope and schedule set forth below to ensure long-term compliance with WDRs Order No. 98-207 or any revisions to those WDRs.

Each document submitted under this Order shall bear the following certification signed by the Discharger:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my knowledge and on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

1. The Discharger shall **immediately** comply with all aspects of WDRs Order No. 98-207, and in addition shall comply with all items described in this Order. Where the CDO imposes more stringent conditions than those provided in the WDRs, the Discharger shall comply with the more stringent conditions required by this Order.

2. Effective immediately, the average monthly dry weather inflow to the wastewater treatment plant shall not exceed 0.42 mgd (calculated by averaging the flows from August through October each year), and the annual inflow (measured from October through September) shall not exceed 885 acre-feet (approximately 288 million gallons).

3. Effective **1 November 2007**, the facility shall have sufficient treatment, storage, and disposal capacity to accommodate allowable wastewater flow, design seasonal precipitation, and ancillary inflow and infiltration. Design seasonal precipitation shall be based on total annual precipitation using a return period of 100 years, distributed monthly in accordance with historical rainfall patterns. The freeboard in the treatment ponds and storage reservoir shall never be less than two feet as measured from the water surface to the lowest point of overflow. By **1 October** of each year, the storage reservoir capacity shall at least equal the volume necessary to comply with the above.

4. Effective **1 April 2007**, irrigation with wastewater shall not be performed within 24 hours before a predicted precipitation event, during precipitation, or within 24 hours after any precipitation event, nor shall it be performed when ground is saturated or when winds exceed 30 mph.

5. By **1 June 2007**, the Discharger shall install a magnetic flow meter to accurately measure the influent wastewater flows into the wastewater treatment facility. By this date, the Discharger shall submit documentation certifying installation of the flow meter.

6. By **1 September 2007**, the Discharger shall submit a *Flow Meter Calibration Report* that demonstrates that all flow meters used for determining compliance with the WDRs and this Order have been independently calibrated by a third party. The report shall also (a) provide standard procedures for plant personnel to use when taking and recording flow measurements and (b) provide a schedule for on-going meter calibration, and (c) shall provide two months of data showing influent flows for the Linda Lane pump station calculated by both pump run times and by the magnetic flow meter, and shall discuss the differences and the impact on the water balance.

7. By **1 October of each year**, the volume of wastewater in the effluent storage reservoir shall not exceed 50 acre-feet.

Short Term Storage and Disposal Capacity Improvements

8. By **1 July 2007**, the Discharger shall submit and immediately implement a *Spill Contingency Plan* containing the interim measures necessary for preventing unauthorized discharges to surface water and surface water drainage courses from the WWTF. The Spill Contingency Plan shall remain in effect until all improvements to the WWTF are completed. The Spill Contingency Plan must, at a minimum, consider additional water conservation measures to reduce wastewater flows, provisions for transporting wastewater offsite for disposal, and provisions for increasing the capacity of the storage reservoir. The cost and funding mechanism for each contingency measure must be identified. The Spill Contingency Plan must identify the selected alternatives, and for each alternative, specify all necessary materials, staffing, and equipment required for implementation.

9. By **1 August 2007**, the Discharger shall submit a *Staffing Analysis Report* for the wastewater treatment, storage and disposal system. The analysis shall include a review of current staffing levels, allocation of staff tasks, an analysis of whether current staff allocation is adequate, and if necessary, describe the shortfalls and make recommendations for future staffing needs. If the analysis indicates additional staff are necessary, then the report shall also include a *Staffing Contingency Plan* describing the steps the Discharger shall take in the short term and long term to assure that it has enough staff to perform the necessary operation and maintenance activities associated with the wastewater storage and disposal system. If the analysis indicates additional staff are necessary, then the *Staffing Contingency Plan* shall also contain a proposed timeline for acquiring the necessary staff.

10. By **1 November 2007**, the Discharger shall submit a report demonstrating that it has completed the 90-acre expansion of the spray irrigation disposal fields. The report shall clearly show that tailwater generated on these fields will be captured and returned to the storage reservoir.

Groundwater Evaluation

11. By **1 November 2007**, the Discharger shall submit a *Background Groundwater Quality Study and Degradation Assessment Report.* For each groundwater monitoring parameter/constituent identified in revised MRP No. 98-207, the report shall present a summary of all monitoring data and calculation of the concentration in background monitoring well(s). Determination of background quality shall be made using the methods described in Title 27, Section 20415(e)(10), and shall be based on data from at least eight consecutive quarterly (or more frequent) groundwater monitoring events. For each monitoring parameter/constituent, the report shall compare the measured concentration in each compliance monitoring well with the proposed background concentration.

12. By **1 November 2007**, the Discharger shall submit a *BPTC Evaluation Workplan* that sets forth the scope and schedule for a systematic and comprehensive technical evaluation of the waste constituent(s) to determine which best practicable treatment and control (BPTC) practices are necessary to implement to ensure that groundwater degradation is minimized. The workplan shall contain an evaluation of each component of the wastewater treatment facility and shall propose a comprehensive evaluation of appropriate treatment and control measures for each waste constituent causing degradation.

13. By **1 November 2008**, the Discharger shall submit a *BPTC Evaluation Report* containing the results of the study described in Ordered Item No. 12. The report shall recommend improvements to the WWTF that will result in compliance with the Groundwater Limitations of WDRs Order No. 98-207.

Sewer System Master Plan

14. By **1 July 2008**, the Discharger shall submit a *Sewer System Master Plan* that describes the facility improvements needed to:

    a. Increase overall storage and disposal capacity as necessary to comply with a 100-year total annual precipitation event;
    b. Provide enough wastewater storage and disposal capacity for current flows, as well as growth projected over the next 15 years;
    c. Prevent sanitary sewer overflows;
    d. Comply with pond freeboard requirements in the WDRs; and
    e. Address I/I (shall include items listed in Finding No. 26).

    The *Sewer System Master Plan* shall include a water balance for both the current inflow and projected flows through at least the year 2022, and shall clearly show the times of the year when wastewater must be stored versus when it may be applied to land. The water balance shall evaluate the wastewater storage reservoir's ability to provide sufficient capacity to maintain two feet of freeboard on a month-by-month basis. The water balance shall be based on all flows entering the wastewater system, 100-year annual precipitation returns, and compliance with the two-foot freeboard requirement in treatment ponds and storage reservoir, and shall model I/I flows using the method described in the July 2004 State Water Board training manual titled *"Training Handbook for Disposal of Non-Designated Waste to Land Systems"* or other appropriate method if approved by the Executive Officer. All assumptions and calculations used in preparing the water balance

must be clearly identified. The water balance shall include consideration of at least the following:

a. Wastewater flows from all sources such as subsurface inflows, storm water run-on, and any inflow and infiltration from the collection system;
b. Local precipitation data (indicate what weather station was used to obtain the data, and indicate what the total annual precipitation is for average and 100 year annual storm events, and show how that value was distributed throughout the year, by months, based on historical rainfall patterns);

c. Infiltration and inflow;

d. Local evaporation data;

e. Measured evaporation data from any enhanced evaporation system;

f. Projected percolation rates for the effluent storage reservoir; and

g. Irrigation disposal rates that comply with the requirements of the WDRs.

The *Sewer System Master Plan* shall include a proposed timeline for all improvements.

Revenue Plan

15. By **1 September 2008**, the Discharger shall submit a *Revenue Plan* for all work and improvements described in the Sewer System Master Plan. The Revenue Plan shall include the following:

    a. A detailed description of the scope and schedule of all planning, design, and construction, including improvements to existing facilities and construction of new facilities as needed to accommodate projected future influent flows over the next 15 years. A phased expansion plan may be proposed; and

    b. A preliminary capital cost estimate and a financing plan describing how the improvement project(s) will be funded.

Report of Waste Discharge

16. By **1 April 2009**, the Discharger shall submit a *Report of Waste Discharge* (RWD) to allow the WDRs to be revised to reflect the proposed upgrades in the Sewer System Master Plan. The RWD consists of the Form 200 *(Application for Report of Waste Discharge)* and a technical report that addresses all items listed in Attachment B to this Order, "*Additional Information Requirements for a Report of Waste Discharge.*" The Report of Waste Discharge shall clearly reference the groundwater monitoring data collected for the sprayfields and shall demonstrate that the proposed improvements are compliant with State Water Resources Control Board Resolution No. 68-16 (the Antidegradation Policy).

Progress Reports

17. **Beginning with the second quarter 2007**, the Discharger shall submit a *Quarterly Compliance Status Report*. These reports shall describe all work completed during the calendar quarter to comply with this Cease and Desist Order; any new, modified, or renovated component of the collection, treatment, storage, and disposal system and number of new connections authorized during that quarter. The reports shall specifically address work completed to identify and reduce I/I. These reports shall be submitted by the **1st day of the second month after the quarter** (e.g., the first quarterly report is due by 1 May of each year).

In addition to the above, the Discharger shall comply with all applicable provisions of the California Water Code that are not specifically referred to in this Order. As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all technical reports shall be prepared by, or under the supervision of, a California Registered Engineer or Professional Geologist and signed/stamped by the registered professional.

If, in the opinion of the Executive Officer, the Discharger fails to comply with the provisions of this Order, the Executive Officer may refer this matter to the Attorney General for judicial enforcement or may issue a complaint for administrative civil liability.

Failure to comply with this Order or with the WDRs may result in the assessment of Administrative Civil Liability of $1,000 to $10,000 per day of violation, depending on the violation, pursuant to the California Water Code, including sections 13268, 13350 and 13385. The Regional Water Board reserves its right to take any enforcement actions authorized by law.

I, PAMELA C. CREEDON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 15 March 2007.

- Original Signed by -

PAMELA C. CREEDON, Executive Officer

Attachment A - Summary of Spills from October 1998 through 2006
Attachment B - Additional Information Requirements for a Report of Waste Discharge

GJC/MRL/WSW: 15 March 2007

ATTACHMENT A

CEASE AND DESIST ORDER NO. R5-2007-0010

FOR

CITY OF LAKEPORT MUNICIPAL SEWER DISTRICT
WASTEWATER TREATMENT FACILITY
LAKE COUNTY

The following table summaries the wastewater spills that have occurred (as documented in the Regional Water Board case file) since adoption of the Waste Discharge Requirements in October 1998 through the issuance of this Cease and Desist Order.

Date of Spill	Volume Discharged (Gallons)	Discharge to Surface Water Drainage Course?	Type of Waste	Location of Spill	Cause of Spill[1]
29 Oct 1998	>325,900	Yes	Partially Treated Effluent	2400 Linda Lane & Parallel Drive	Recapture pond gate partially open because pond was full and overflowing due to storm water flow into the pond
23 Nov 1998	400	Yes	Partially Treated Effluent	Disposal Site	Overflow from recapture pond caused during installation of plastic pipe in earthen berm
29 Dec 1998	100	Yes	Raw Sewage	420 2nd Street	Blockage in sewer lateral
30 Dec 1998	75	No	Raw Sewage	375 High Street	Plugged sewer lateral
16 Jan 1999	30	No	Raw Sewage	975 Armstrong and Russell Street	Blockage in sewer lateral
28 Jan 1999	50	No	Raw Sewage	635 11th and Main Streets	Blockage in sewer lateral
31 Jan 1999	20	No	Raw Sewage	40th and South Main Street	Plugged sewer service lateral
17 Feb 1999	50	Yes	Raw Sewage	475 Third Street and Tunis Ave.	Blockage in main sewer line
4 Mar 1999	30	Yes	Raw Sewage	825 Forbes	Roots in sewer lateral
13 Mar 1999	25	No	Raw Sewage	450 Hillcrest and Forest	Plugged sewer lateral
19 Apr 1999	30	Yes	Raw Sewage	480 Third Street and Tunis Ave.	Blockage in sewer lateral
23 June 1999	1,500	Yes	Raw Sewage	1940 Lakeshore Drive and Giselman	Blockage in main sewer line
18 Nov 1999	20	No	Raw Sewage	2235 Healton Circle	Plugged sewer lateral

Date of Spill	Volume Discharged (Gallons)	Discharge to Surface Water Drainage Course?	Type of Waste	Location of Spill	Cause of Spill[1]
19 March 2000	75 to100	No	Raw Sewage	Tunis Street between 2nd and 3rd Streets	Plugged sewer main
24 March 2000	25	No	Raw Sewage	480 3rd Street	Plugged sewer main
13 April 2000	50	No	Raw Sewage	475 3rd Street	Plugged sewer main
21 April 2000	50	No	Raw Sewage	210 11th Street	Plugged sewer lateral
16 May 2000	200	No	Raw Sewage	16th and 17th Streets	Debris blockage in sewer manhole
30 May 2000	30	No	Raw Sewage	Pecham Street	Blockage in sewer main
5 June 2000	25	Yes	Raw Sewage	1824 Via Del Cabana	Plugged sewer lateral
8 Sept 2000	50	No	Raw Sewage	155 South Forbes	Plugged sewer line cleanout
15 Nov 2000	100	Yes	Raw Sewage	Via Delago & Via Del Cabana	Blockage in sewer main
15 Nov 2000	150	Yes	Raw Sewage	1880 High Street	Blockage in sewer main
25 Dec 2000	50	No	Raw Sewage	224 2nd Street	Blockage in sewer main
9 Jan 2001	25	Yes	Raw Sewage	Peckham & South Main	Blockage in sewer main
9 Feb 2001	25	No	Raw Sewage	Parallel & Craig	Blockage in sewer main
23 Feb 2001	25	Yes	Raw Sewage	426 2nd Street	Plugged sewer main
23 Feb 2001	30	Yes	Raw Sewage	2019 South Main	Plugged sewer main
23 July 2001	30	Yes	Raw Sewage	Via Delago & Del Cabana	Blockage in sewer main
8 Oct 2001	10	No	Raw Sewage	425 3rd and Tunis Street	Plugged sewer main
9 Oct 2001	25	Yes	Raw Sewage	975 North Brush Street	Plugged sewer lateral
26 Nov 2001	25	Yes	Raw Sewage	1130 Mellor Street	Root blockage in sewer lateral
28 Feb 2002	40	Yes	Raw Sewage	475 Tunis Street	Blockage in sewer main

Date of Spill	Volume Discharged (Gallons)	Discharge to Surface Water Drainage Course?	Type of Waste	Location of Spill	Cause of Spill[1]
11 Mar 2002	25	No	Raw Sewage	480 3rd Street	Blockage in sewer main
30 April 2002	25	No	Raw Sewage	475 Tunis Street	Plugged sewer main
12 May 2002	20	No	Raw Sewage	1264 Craig Ave	Plugged sewer lateral
12 May 2002	10	No	Raw Sewage	1155 North Forbes	Plugged sewer lateral
25 June 2002	100	Yes	Raw Sewage	1425 North Main Street	Power failure to the pumps and controls
7 July 2002	50	No	Raw Sewage	1264 Craig Street	Plugged sewer lateral
17 July 2002	25	No	Raw Sewage	1155 North Forbes Street	Plugged sewer lateral
13 Sept 2002	15	No	Raw Sewage	2235 Healton Circle	Plugged sewer main
4 Oct 2002	20	Yes	Raw Sewage	100 North Main Street	Plugged sewer main
29 Oct 2002	50	No	Raw Sewage	992 19th Street	Blockage in sewer main
1 Nov 2002	50	No	Raw Sewage	1021 24th Street	Blockage in sewer main
8 Nov 2002	5	No	Raw Sewage	360 Third Street	Blockage in sewer lateral
13 Nov 2002	25	No	Raw Sewage	210 11th Street	Plugged sewer cleanout
18 Dec 2002	10	No	Raw Sewage	15th and High Street	Blockage in sewer main
10 Jan 2003	20	No	Raw Sewage	785 6th Street	Roots in sewer lateral
27 Jan 2003	300	Yes	Raw Sewage	755 11th Street	Blockage in sewer main
29 Jan 2003	25	Yes	Raw Sewage	Clearlake Ave & Main Street	Leaking valve cover
20 Feb 2003	500	Yes	Raw Sewage	6th Street	Grease blockage in sewer main
24 Feb 2003	50	Yes	Raw Sewage	High and 20th Streets	Grease blockage in sewer main
18 Oct 2003	15	Yes	Raw Sewage	195 South Main Street	Plugged sewer line
18 Oct 2003	15	Yes	Raw Sewage	235 South High Street	Plugged sewer line

Date of Spill	Volume Discharged (Gallons)	Discharge to Surface Water Drainage Course?	Type of Waste	Location of Spill	Cause of Spill[1]
27 Oct 2003	66,000	Yes	Raw Sewage	2485 Parallel Drive	Power failure and standby generator running out of fuel
18 Nov 2003	1,400	Yes	Raw Sewage	320 16th Street	Grease blockage in sewer line
24 Nov 2003	25	No	Raw Sewage	470 2nd Street	Plugged sewer main
30 Nov 2003	30	No.	Raw Sewage	867 14th Street	Plugged sewer lateral
15 Dec 2003	100	Yes	Raw Sewage	180 6th Street	Partially blocked sewer main
18 Dec 2003	100	Yes	Raw Sewage	180 6th Street	Partially blocked sewer main
29 Dec 2003	100	Yes	Raw Sewage	1005 North Main	Heavy rains and I/I problems
13 Mar 2004	15	No	Raw Sewage	975 Armstrong Ave.	Blockage in sewer lateral
19 July 2004	20	No	Raw Sewage	1155 North Forbes Street	Blockage in sewer lateral
31 Dec 2005	500	Yes	Raw Sewage	1100 North Main	I/I problems, grease blockage, undersized section of sewer pipe
13 – 24 April 2006	3,600,000 to 6,623,250	Yes	Partially Treated Effluent	Land Application Area	Excessive rains, I/I and storage capacity problems, flooding of sewer cleanouts at Willow Point RV Park
26 Oct 2006	200	Yes	Raw Sewage	Villa Del Lago and Via Del Cabana	Grease blockage in sewer line
9 Nov 2006	90	No	Raw Sewage	Lakeport Unified School District	Backup in manhole due to vandalism

[1]Based on Discharger's spill reports.

GJC/MRL/WSW: 15 March 2007

ATTACHMENT B

ADDITIONAL INFORMATION REQUIREMENTS
FOR A REPORT OF WASTE DISCHARGE

CEASE AND DESIST ORDER NO. R5-2007-0010
FOR
CITY OF LAKEPORT MUNICIPAL SEWER DISTRICT
WASTEWATER TREATMENT FACILITY

Provide a technical report prepared by a California Registered Civil Engineer that presents the following information:

1. A narrative description of all wastewater conveyance, treatment, and disposal systems currently existing at the facility.

2. A narrative description of all planned physical improvements, their purpose, and anticipated completion dates. If phased build out is planned provide scope and completion dates for each phase.

3. A process flow diagram, scaled treatment plant site plan, and scaled map(s) showing all existing and proposed effluent disposal areas (including conveyance and tailwater control systems.

4. For each pond and other waste containment structure, provide the following information. Discuss both existing and proposed ponds:
   a. Identification (name) and function of the pond;
   b. Surface area, depth, and volumetric capacity at two feet of freeboard;
   c. Height (relative to surrounding grade), crest width, interior slope, and exterior slope of each berm or levee;
   d. Materials used to construct each berm or levee;
   e. Description of engineered liner, if any;
   f. Estimated steady state percolation rate for each unlined pond;
   g. Depth to shallow groundwater below the planned base of the ponds;
   h. Overfilling/overflow prevention features; and
   i. Operation and maintenance procedures.

5. For each reclamation site, provide:
   a. Complete ownership information.
   b. A scaled map showing the topography, property boundary, streets, residences, surface waters, etc. A USGS topo map may be sufficient as a base map.

c. A scaled map showing the limits of the reclamation areas, reclaimed water conveyance systems, other irrigation water conveyance systems, on-site drainage, tailwater systems, and runoff controls (existing and proposed).

d. Net irrigation area.

e. Method(s) of irrigation, including typical frequency and depths of application for each month when irrigation will occur.

f. Typical cropping practices (crops grown, rotation cycles, use of fertilizers and pesticides, etc.).

g. Typical storm water management practices.

6. A description of the sources and types of wastewater flowing into the wastewater treatment system, design flow rates, and the design capacity of the system (existing and proposed). Include projected infiltration/inflow rates and peaking factors used in design calculations.

7. A description of emergency wastewater storage facilities or other means of preventing system bypass or failure during reasonably foreseeable overload conditions (e.g., power failure, sewer blockage, and illicit sewer discharges). Consider both potential problems at the plant and within the community sewer system.

8. A description of the community sewer system: materials, age, infiltration/inflow estimate, and lift station details (type, location, capacity, backup systems, and alarm features).

9. Chemical characterization of influent wastewater quality, including biochemical oxygen demand, total suspended solids, total dissolved solids, and nitrogenous compounds. Include a discussion of seasonal variations, if any, and supporting analytical data.

10. A description of all known or anticipated industrial dischargers whose individual BOD, total dissolved solids and/or hydraulic loads will be greater than 2% of the plant's total daily influent loading, including the following:

    a. Name;

    b. Industry;

    c. Nature of waste stream;

    d. Average daily flow (gpd and percentage of total plant loading);

    e. Peak daily flow;

    f. Average daily BOD loading (lb/day and percentage of total plant loading);

    g. Peak daily BOD loading;

    h. Salinity (e.g., total dissolved solids, electrical conductivity, major ions);

    i. Nitrogen (all forms);

    j. Nature of seasonal or diurnal variations in influent flow or quality, if any; and

k. Pre-treatment or self-monitoring programs, if any.

11. A description of the following for the both existing system and each phase of the proposed expansion:
    a. Average dry weather flow;
    b. Peak wet weather flow; and
    c. Effluent quality at the point of discharge to the disposal system (BOD, total suspended solids, settleable matter, nitrogenous compounds, electrical conductivity, pH, and total coliform organisms).

12. Narrative description of expected solids generation rates and handling/storage procedures:
    a. Debris;
    b. Grit and screenings; and
    c. Biosolids.

13. Narrative description of proposed solids disposal practices for debris, grit, screenings, and biosolids:
    a. Method of disposal;
    b. Frequency of disposal;
    c. Disposal site/area name(s) and location(s); and
    d. For biosolids (if beneficial re-use is proposed for reclamation sites):
        - Land application rates (dry tons per unit area per application, number of applications per year);
        - Soil incorporation practices;
        - Vegetation grown;
        - Runoff controls, if any; and
        - Public access controls.

14. A description of the types of soil underlying any planned ponds and effluent disposal areas (include a copy of the geotechnical report).

15. Projected monthly water balance for each phase of buildout demonstrating adequate containment capacity for the 100-year return period total annual precipitation, including consideration of at least the following.
    a. A minimum of two feet of freeboard in each pond at all times;
    b. Historical local evaporation data (monthly average values);
    c. Local precipitation data with the 100-year return period annual total distributed monthly in accordance with mean monthly precipitation patterns;

d. Proposed wastewater loading rates distributed monthly in accordance with expected seasonal variations;

e. Projected long-term percolation rates (including consideration of percolation from unlined ponds and the effects of solids plugging on all ponds); and

f. Projected irrigation usage rates (if recycling is proposed).

16. Proposed flow limits and basis for the limit for the current facility and each phase of the planned expansion. Consider dry weather flows vs. peak flows and seasonal variations associated with major industrial dischargers. Include the technical basis for the proposed flow limit (e.g., design treatment capacity; hydraulic capacity of a main lift station, headworks, or other system element; and demonstrated effluent disposal capacity).

17. A narrative description of plant operation and maintenance procedures to be employed, including those associated with effluent storage and disposal.

18. A description of any policies or facility design features that reduce the potential for groundwater degradation (best practicable treatment and control or BPTC measures). Such features might include industrial discharger effluent quality limits, prohibitions on discharge of certain types of waste, advanced treatment, disinfection, concrete treatment structures, and pond lining systems.

19. Provide a technical report prepared by a Professional Geologist or Certified Hydrogeologist that provides an assessment of the following:

    a. Baseline groundwater quality at each new disposal or reclamation site.

    b. Groundwater degradation, if any, that has resulted from the existing operation; and

    c. The potential for the proposed effluent disposal expansion to degrade groundwater quality (at the plant and at reclamation/disposal sites).

    This assessment must be made based on site-specific data and must provide technically-based answers to the following questions based on historical data and supplemental data to be collected for the purpose of this study:

    - What is the groundwater elevation and gradient at the existing facility? At least one new well will be required to better define background groundwater quality outside the influence of any mounding around the ponds and at least one more well will required downgradient of the existing ponds.
    - What is background shallow groundwater quality for typical municipal waste constituents? Compare to established water quality objectives for protection of the beneficial uses of groundwater.[1]

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[1] Include analyses for the following: BOD, total coliform organisms, total dissolved solids, ammonia (as N), total Kjeldahl nitrogen, nitrate (as N), nitrite (as N), and a complete anion/cation scan with ion balance. Total coliform organisms shall be determined using the 15- or 25- tube method.

- What is the groundwater quality data downgradient of the existing WWTP and application areas.
- For each monitored constituent, has the existing facility degraded groundwater quality? If so:
  - What constituents exceed the applicable water quality objective?
  - What constituents exceed background concentrations?
  - Based on site hydrogeology, is the degradation contained within a defined area (or one that could be defined by additional investigation)?
  - What Best Practicable Treatment and Control (BPTC) methods will be utilized to minimize the degradation?
- What are subsurface conditions at the proposed new disposal sites?[2]
- What is the character of groundwater quality at the proposed new disposal sites? [2]
- Based on site hydrogeology, the nature of the waste, and the proposed disposal method, what level of degradation is expected to result from the expansion (if any)?
- If the proposed expansion will cause degradation, how will the degradation be confined or controlled?
- At a minimum, the report shall include the following:
  - Rationale for field investigation approach.
  - Description and documentation of all proposed investigational methods and activities.
  - Description of the site hydrogeology including stratigraphy, hydraulic conductivity of the soils, capillary rise, groundwater elevation and gradient, transmissivity, and influence of all recharge and pumping sources (i.e., a site conceptual model)
  - A detailed map showing locations of all water wells including springs and isolated wetlands within one mile of the WWTP and land application areas.
  - Description of fate and transport mechanisms for all monitored constituents.
  - Description of data reduction/analysis techniques and results.
  - Presentation of historical and supplemental site-specific soil and groundwater data.
  - Comparison of groundwater quality data to background groundwater quality and water quality objectives for each constituent.
  - An analysis of all data and conclusions regarding each of the above questions.

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[2] This must be based on subsurface investigation at the proposed disposal site including soil borings and/or cone penetrometer tests and groundwater analyses. Groundwater samples may be obtained using a one-time sampling method such as Hydropunch®.

SMALL COMMUNITY WASTEWATER GRANT
INITIAL SCOPE OF WORK FORM
FOR THE REGIONAL WATER QUALITY CONTROL BOARD
COMPETITIVE PROJECT LISTS

Project Title: City of Lakeport Municipal Sewer District (CLMSD) Capacity Expansion Project

Type of Grant Assistance Needed (check all that apply): Planning ☒ Design ☒ Construction ☒

Estimated Total Project Cost: $2,000,000 **Estimated Construction Cost:** $1,700,000

Applicant: City of Lakeport Municipal Sewer District

Mailing Address: 591 Martin St., Lakeport CA. 95453

Telephone Number: 707-263-3578 **Fax Number:** 707-263-1514

Contact Name: Mr. Mark Brannigan

Contact Title: Utilities Superintendent **E-mail Address:** mbrannigan@cityoflakeport.com

Project Description: Design and construction of the following improvements to the existing wastewater treatment plant;

1. Expansion of spray irrigation fields by approximately 90 acres to include two recapture pump stations, additional irrigation pump, additional monitoring wells, piping and controls.
2. Installation of magnetic flow meter at the Linda Lane Lift Station to accurately record flow.
3. Construction of a diversion ditch bypass to divert natural runoff around the tail water Recapture Pump Station No. 1 and thereby extend the irrigation season.

Is the project necessary to rectify an existing or potential, health hazard or pollution problem?
Existing ☒ Potential ☐ Health Hazard ☒ Pollution Problem ☒

Describe the existing or potential problem: The existing reclaimed water storage reservoir and spray irrigation disposal area do not have enough capacity to meet present or future demands given a 100-year rainfall event. In April 2006, the CLMSD was forced into discharging reclaimed water to the spray irrigation area when the ground was saturated and runoff could not be recaptured. Approximately 3 to 6 MG of reclaimed water is estimated to have left the site and enter waterways that eventually flowed into Clear Lake.

List all enforcement actions such as, Orders, Moratoriums, Prohibitions, or Declarations, that exist regarding the wastewater system and/or facilities: (Please include type and title of the document, the governing agency that adopted it, and the date of the adoption):
A Notice of Violation was issued by the Central Valley Regional Water Quality Control Board on August 3, 2006. Following that, a Cease and Desist Order # R5-2007-0010 was adopted by CVRWQCB on March 15, 2007. The CVRWQCB water balance indicates that the City of Lakeport Municipal Sewer District does not have sufficient capacity for its current flows, and is in violation its WDRs. To increase capacity the Cease and Desist Order requires that CLMSD install 90 acre of additional spray irrigation, and submit a report by 1 November 2007.

Current Status of Project – Please be Specific (Ex: pre-planning, mid-planning, planning complete, pre-design, mid-design, design complete):
Pre-design has been completed and the CLMSD has signed an engineering agreement with PACE Civil, Inc. to provide engineering services through design and construction including contract administration and construction observation. The CVRWQCB Cease and Desist Order requires construction of the spray irrigation area and magnetic flow meter be completed and operational by November 1, 2007, respectively. The projects are on a fast track design and construction schedule.

Water Body Effluent Discharges to: Normally, no reclaimed water is to leave the boundaries of the facilities. If reclaimed water inadvertently leaves the site it eventually makes it to Clear Lake.

Description of Existing Wastewater Facility: Over the past three years the average dry weather flow (ADWF) has averaged 0.4 million gallons per day (MGD). All of the sewage is pumped by the Linda Lane Pump Station to extended aeration/oxidation pond system, and then pumped again through a disinfection contact pipe to a 650 acre foot storage/treatment reservoir. Reclaimed water from the storage reservoir is used for pasture irrigation on 242 acres used for disposal and recapture. The facility service area receives primarily domestic sewage from an estimated 5,000 residents. There are approximately 1,863 residential unit equivalents (RUE) contributing to the CLMSD.

Age and Condition of Facility: The existing facilities were substantially expanded in 1992 including construction of the oxidations ponds and disinfection facilities, and expansion of the spray irrigation fields and storage reservoir from 300 acre-feet to the current 650 acre-feet. The existing facilities are generally in good condition.

Will this project benefit a community currently lacking an adequate sewer system? Yes. The City of Lakeport sewer system has a serious inflow and infiltration problem that needs to be addressed. The City is currently under a Cease and Desist Order that requires expansion of the spray irrigation area and a meter installed at the Linda Lane Lift Station; among other improvements.

Will this project benefit a community whose treatment plant capacity is currently at 90% or greater? Yes. Cease and Disist Order No. R5-2007-0010 states that "...the Discharger does not have sufficient capacity for its current flows, in violation of the WDRs." *(Page 3, first paragraph)* and that CLMSD complete a variety of projects in a short time to create capacity, which was not budgeted for.

Estimated Median Household Income (MHI) of Community: $32,226

Source of MHI Data: 2000 Census

Estimated Population Served: 5,000

Estimated % of Permanent Residents (residing more than 6 months per year): 4,150

Source of Population Data: 2000 Census lists a 17% vacancy factor.

Special Environmental Concerns: Expansion of the spray irrigation field was already covered under the original CEQA documentation. The proposed diversion ditch bypass is less than one mile in length; therefore it will be declared statutorily exempt under CEQA.

Previous Small Community Wastewater Grants Received (Include grant award date and funding amount received for each grant): None.

Anticipated Project Milestones:

Task	Anticipated Completion Date	Date Completed
a. Hire Consultant	March 20, 2007	_____
b. Submit Facilities Plan (Includes: Feasibility Report, Environmental (CEQA) Documents, Draft Revenue Program, Operations Evaluation)	N/A	_____
c. Submit Final Plans & Specifications (P&S)	May 1, 2007	_____
d. Start Construction	July 1, 2007	_____

_____ _____

Signature of Authorized Representative Date

Attachments:
Cease and Desist Order No. R5-2007-0010
Notice of Violation Dated 3 August 2006

PLATES

1"=800'

LEGEND

- CURRENT SPHERE OF INFLUENCE BOUNDARY
- CITY LIMIT BOUNDARY
- TREATMENT PLANT LAND BOUNDARY
- L.S. — LIFT STATION
- MANHOLE
- MODELED MANHOLE
- MS 1A — FLOWPOKE MONITORING STATION NUMBER
- 8 — SEWER DIAMETER (INCHES)
- FM — FORCE MAIN
- PVC SEWER MAIN
- ACP SEWER MAIN
- LINED VCP SEWER MAIN
- VCP1 SEWER MAIN
- OBP SEWER MAIN
- SDR 35 SEWER MAIN
- UPL SEWER MAIN
- UNKNOWN SEWER MAIN
- CREEK
- 16A — SUBSERVICE AREAS W/ NUMBER
- EFFLUENT IRRIGATION FIELDS
- TREATMENT PONDS
- AREA BELOW ELEVATION OF 1329.6' (HIGHEST LAKE LEVEL RECORDED ON FEBRUARY 24, 1998)
- 5,200 — AREAS OF I & I GREATER THAN 5,000 GPD/AC
- 4,200 — AREAS OF I & I BETWEEN 3,500 AND 5,000 GPD/AC
- 3,200 — AREAS OF I & I BETWEEN 1,500 AND 3,500 GPD/AC

CRYSTAL LAKE
HARTLEY
HOWARD
LAKESHORE
RAINBOW
WITHINGTON
HILL
CEMETERY
SCOTTS CREEK
SCHOOLS
LAKEPORT SPHERE OF INFLUENCE, TYP
SCOTTS VALLEY
BOGGS
16A
16B
MS 16
LAKESHORE L.S.
2,900
17A
MS 17
17B
2,500
ALTERNATIVE FM NOT CURRENTLY IN USE
13A
5,300
MS 13A
ROSE AVENUE L.S.
13B
MS 13B
14
MS 14
CLEARLAKE L.S.
7A
4,100
7B
4,300
MS 7
6A
MS 6
6B
7C
6,700
MCMAHON
TRAILPARK
8A
8C
MS 8B&C
5B
MS 8A
5A
MS 5
3,100
8B
3,300
BERRY
10B
4,500
4A
CITY HALL PARK
9C
11,600
9B
MS 10
6,000
MS 9B
MS 4
3C
5,000
MARTIN
10A
MS 9A & 9C
MARTIN STREET L.S.
4B
MS 3B
MS 3C
C STREET L.S.
MS 3LS
9A
4,100
FAIRGROUNDS
3A
MS 3A
5,700
3B
CLEAR LAKE
CRAIG
LARECOU L.S.
11
MS 11
FORBES CREEK
WESTSIDE PARK
KONOCTI
MS 1B
LAKEPORT BLVD L.S.
MS 1A
1B
4,200
PRIVATE L.S.
LAKEPORT CITY LIMITS, TYP.
18
CAMPBELL
1A
MAIN
PECKHAM
PRIVATE L.S.
SANDY
TODD
LAKE COUNTY SANITATION DISTRICT L.S.
LAKE COUNTY SERVICE AREAS 9-1 AND 9-3
2
LAKEPORT TREATMENT PLANT LAND BOUNDARY, TYP.
LAKEPORT WASTE WATER TREATMENT PLANT
LINDA LANE L.S.
EFFLUENT STORAGE RESERVOIR
EFFLUENT IRRIGATION FIELDS, TYP
19

DATE		
03/08	PACE CIVIL, INC. REDDING, CALIFORNIA	CITY OF LAKEPORT 2008 MASTER SEWER PLAN EXISTING SEWER SYSTEM

PLATE 1

CEMETERY
SCOTTS CREEK
SCHOOLS
SCOTTS VALLEY
MCMAHON
BOGGS
LANCE
LAKESHORE
AUDEN
HAWLEY
MOORE
CLEAR LAKE
ARMSTRONG
BERRY
MARTIN
BEVINS
CRAIG
FORBES CREEK
WESTSIDE PARK
CAMPBELL
MAIN
TODD
SANDY
PECKHAM
CLEAR LAKE

PARALLEL W/8" (2013–2018)
REPLACE W/ 8" (2013–2018) SEE NOTE 3
ROSE AVE LIFT STATION DIVERTED TO NORTH (2018–2028) SEE NOTE 4
EVALUATE LIFT STATION FOR RENOVATION (2013–2018)
PARALLEL W/ 8" (2018–2028)
PARALLEL W/ 10" OR REPLACE W/ 12" (2008–2013) SEE NOTE 1
PARALLEL W/ 15" (2013–2018) SEE NOTE 2
INCREASE EFFECTIVE PUMP CAPACITY AD (2018–2028)
OBSERVE SEWER SEGMENT DURING PEAK CONDITIONS & REPLACE W/ 8" IF NECESSARY (2018–2028)
OBSERVE SEWER SEGMENT DURING PEAK CONDITIONS & PARALLEL W/ 8" IF NECESSARY (2013–2018)
POSSIBLE FUTURE EFFLUENT IRRIGATION SITE, TYP
LAKEPORT CITY LIMITS, TYP
SEE FIGURE 2 FOR TREATMENT PLANT IMPROVEMENTS
LAKEPORT TREATMENT PLANT LAND BOUNDARY, TYP
LAKEPORT SPHERE OF INFLUENCE, TYP
EFFLUENT IRRIGATION FIELDS, TYP
EFFLUENT STORAGE RESERVOIR
AERATION BASINS 1 & 2
LAKEPORT WASTE WATER TREATMENT PLANT (SEE FIGURE 2)

LAKESHORE L.S.
ROSE AVENUE L.S.
CLEARLAKE L.S.
MARTIN STREET L.S.
C STREET L.S.
LARECOU L.S.
LAKEPORT BLVD L.S.
PRIVATE L.S.
LAKE COUNTY SANITATION DISTRICT LIFT STATION #12
LINDA LANE L.S.
CITY HALL
PARK
FAIRGROUNDS

1" = 800'

CLEAR LAKE

LEGEND

- CURRENT SPHERE OF INFLUENCE BOUNDARY
- CITY LIMIT BOUNDARY
- TREATMENT PLANT LAND BOUNDARY
- L.S. — EXISTING LIFT STATION
- 361 — MODELED MANHOLE WITH PIPE ID NUMBER
- 8 — EXISTING SEWER MAIN
- FM — EXISTING FORCE MAIN
- CREEK
- 16A — SUBSERVICE AREAS
- IRRIGATION FIELDS
- TREATMENT PONDS
- 8 — PROPOSED 20–YEAR GROWTH AREA AND ASSUMED SEWER SYSTEM CONNECTION POINT
- 19 — PROPOSED SOUTHERN DEVELOPMENT AREA (SDA)
- INITIAL I & I REDUCTION AREA (2008–2018)
- POSSIBLE FUTURE EFFLUENT IRRIGATION SITES
- 8" AD — SEWER MAIN (TO BE CONSTRUCTED AS DEVELOPMENT OCCURS)
- 1 — 2 / 10" (2008–2013) — SEWER MAIN WITH IDENTIFICATION POINTS (TO BE CONSTRUCTED 2008 TO 2013 AS GENERAL CITY IMPROVEMENT)
- FUTURE PUMP FACILITY IMPROVEMENT, TYP.

NOTES:

1.) IF ROSE AVE LIFT STATION IS DIVERTED TO THE LAKE COUNTY TREATMENT PLANT TO THE NORTH A PARALLEL 8" SEWER OR REPLACEMENT 10" COULD BE USED.

2.) IF ROSE AVE LIFT STATION IS DIVERTED TO THE LAKE COUNTY TREATMENT PLANT TO THE NORTH A PARALLEL 12" SEWER CAN BE USED BETWEEN 6TH ST & ARMSTRONG ST.

3.) IF ROSE AVE LIFT STATION IS DIVERTED TO THE NORTH REPLACE THE EXISTING SEWER W/ A 10" FROM 17TH ST TO LAKESHORE BLVD.

4.) NEGOTIATIONS ARE ONGOING BETWEEN THE CITY OF LAKEPORT & LAKE COUNTY TO DIVERT ROSE AVE LIFT STATION TO THE NORTH.

DATE			PLATE
02/08	PACE CIVIL, INC. REDDING, CALIFORNIA	CITY OF LAKEPORT 2008 MASTER SEWER PLAN SEWER SYSTEM 20–YEAR IMPROVEMENTS	2