Harris & Associates

CONTRA COSTA COUNTY

SANITARY DISTRICT No. 6

System Evaluation and Recommended Improvements Report

January 22, 2014

Jason Chen, PE
Contra Costa County Public Works
Design/Construction Division
255 Glacier Drive
Martinez, CA 94553

Subject: **CONTRA COSTA COUNTY SANITARY DISTRICT 6**
System Evaluation and Recommended Improvements Report

Dear Jason:

Harris & Associates is pleased to provide this System Evaluation and Recommended Improvements Report for Sanitary District 6. The report represents our efforts under Task Order No 1. It presents background information and analysis of issues which would improve the current performance of the facility as well as address its future use and possible annexation.

Chapters 1 through 4 describe the waste water system operations and analyze recent emergency work and ongoing operation and maintenance activities.

Chapter 5 evaluates existing deficiencies and improvements needed to improve the system including the pump stations, controls and other site work.

Chapters 6 and 7 look at the annual replacement costs and the current budget.

Chapter 8 and 9 review permitting requirements, deficiencies and possible changes SD-6 may require.

Finally our conclusions and recommendations are summarized in Chapter 10.

We look forward to discussing these recommendations with you and proceeding with the next Task Order to look at annexation opportunities.

Sincerely,
Harris & Associates

Vern Phillips, PE
Project Director
RCE 33435

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EXECUTIVE SUMMARY

The wastewater system mechanical equipment in Contra Costa County Sanitary District 6 (SD-6), in the Stonehurst Subdivision, has deficiencies in many areas. Various facilities have been inoperative, unreliable, or without redundancy and at times for extended periods. While the supervision, operation and maintenance of the system has been very capable, the equipment needs are great.

Some of the critical equipment, specifically most of the recirculation pumps, Filter No. 1, and the alarm system at the lift station, is still inoperative. This creates a severe risk of a sewage spill, which could lead to significant fines and expensive mandated actions.

If a decision is made to annex SD-6 into the Central Contra Costa Sanitary District (CCCSD) and only the minimal expenditures are made to keep the existing wastewater system in operation for about five years while the annexation process takes place, the true annual cost of the wastewater system is estimated to be approximately $4,497 per year. See Table 11. This includes a budget for repayment of previous deficits and costs for possible future emergencies.

At times, debris has been reaching the lift station and has been clogging the screens of the pumps. This probably indicates that some of the homeowner septic tanks in the system do not have effluent screens in place.

It is recommended that the following be done:

a. A rate increase be instituted to cover current deficits and future O&M and replacement costs and that the new rate schedule include an annual escalator for inflation.

b. Proceed promptly to estimate the cost and evaluate the advantages / disadvantages of annexation to CCCSD.

c. A notice should be sent to the homeowners reminding them that it is important that the septic tanks effluent screens be in place and arrange to have them inspected for compliance.

d. Proceed to make the improvements needed immediately as listed in Table 8

e. Explore abandoning the ultra-violet light (UV) disinfection system and recirculating gravel filters with the Regional Water Quality Control Board (Regional Board).

f. Explore reducing the required amount of monitoring with the Regional Board.

g. If SD-6 does not annex into CCCSD, provide storm drainage improvements to prevent stormwater from flooding out on to recirculating gravel Filter No. 1 and possibly destroying it by clogging it with soil.

h. If SD-6 does not annex into CCCSD, evaluate the need to provide a French drain to prevent groundwater from entering the recirculating gravel filters.

i. If SD-6 does annex into CCCSD, the cost for the annual sewer assessment fee would need to be increase to approximately $4,497 per year.

1. INTRODUCTION

Contra Costa County SD-6, located in the Stonehurst Subdivision, serves 47 parcels. It is the only wastewater facility under County jurisdiction.

In recent years there have been several emergencies that have incurred significant costs. The income (taxes and assessments) to SD-6 have not been adequate to cover the costs and there have been significant budget deficits in the past few years.

From the time SD-6 was established in 1991, it has been envisioned that the wastewater treatment and disposal facilities would be abandoned when the Central Contra Costa Sanitary District (CCCSD) sewer system was extended to the vicinity of the site. This is mentioned in the permit. The CCCSD sewer system has now reached the intersection of Alhambra Valley Road and Quail Court, which is approximately one mile from the Stonehurst Subdivision. It may therefore now be time for SD-6 to annex to CCCSD.

To evaluate the recent emergencies and budget deficits and to address the issue of annexation of SD-6 to CCCSD, the Contra Costa County Public Works Department issued a request for qualifications (RFQ) for On-Call Sanitary Engineering Consulting Services on February 25, 2013. Statements of Qualifications were received on March 13, 2013, and interviews were held on May 16, 2013. Harris & Associates of Concord, CA was selected for the project.

The Harris & Associates team Included:

Vern Phillips, PE. Project Director and QA/QC Manager.
Bonneau Dickson, PE. Project Manager.
Dan Cortinovis, PE. Wastewater Treatment O&M Specialist.
Paul Louis. Wastewater Collection Systems O&M Specialist.
John Mercurio, PE. Wastewater Funding And Permitting Specialist.
Dennis Klingelhofer, PE. Financial Engineer.

Task Order 1 included the following tasks

a. Determine the deficiencies in the system.
b. Estimate the cost of operation & maintenance.
c. Estimate the annual replacement cost.
d. Review the budget.
e. Describe possible changes in the permit requirements.
f. Evaluate the risks of continued operation of the existing system.
g. Prepare a report.

Task Order 1 became effective as of July 9, 2013.

A site visit took place on July 12, 2013. In attendance were Vern Phillips, Bonneau Dickson, Dan Cortinovis, and Paul Louis of the Harris & Associates team and Paul Stovall of HS Operating Services (HS), the contract operators of the system.

As a part of preparing this report, invoices from HS and Ernie's Plumbing & Sewer Service (Ernie's) and others were provided by the County and were analyzed to evaluate the "incidental" services that have been performed.

The contract with HS for operation of the wastewater facilities includes a flat monthly fee for "O&M services" and a provision for "incidental" services on an hourly basis as needed. Some of the incidental services are for addressing emergencies.

The tables, appendices and system map are located at the end of the text of the report.

2. SYSTEM DESCRIPTION

SD-6 collects, treats, and disposes of wastewater from the Stonehurst subdivision. The subdivision is located in Alhambra Valley, two miles south of the City of Martinez. Most parcels are developed and the subdivision was recently incorporated into the City of Martinez.

Each house has its own septic tank, which provides primary treatment. Septic tank effluent then flows by gravity or is pumped from each house to the lift station near the entrance to the subdivision or directly to the wastewater treatment plant. The lift station pumps to the treatment plant.

At the wastewater treatment plant, the septic tank effluent receives biological secondary treatment in two re-circulating gravel filters. On average, the flow is pumped five times through these filters. The wastewater is then pumped through a UV disinfection system, and then pumped by the high pressure effluent pump station to leach fields that are located on top of the hill that is west of the main part of the subdivision.

A system map is presented in Appendix C of this report and photos of components are presented at the end of this report.

The collection system was built in 1991 and is 22 years old at this writing. It is permitted under the Regional Board Order No R2-1991-0096 Waste Discharge Requirements. All sanitary sewer overflows (SSOs) must be reported and system operation, maintenance and management activities must be documented.

It was originally envisioned to provide reclaimed water quality effluent for irrigation purposes but that was never implemented and to our knowledge there are no plans to use reclaimed water in the subdivision. As such, disinfection of the effluent by UV methods would not be needed and discussion of this as a cost savings follows in the report.

In this report, the low pressure pump station near 5319 Stonehurst Drive at the entrance to the subdivision will be referred to as the "lift station". The high pressure pump station at the end of the treatment facilities will be referred to as the "effluent pump station".

3. EVALUATION OF RECENT EMERGENCIES

HS provides routine operation and maintenance (O&M) services for the wastewater system for a fixed monthly fee. The tasks that are included in the routine services are listed in the Service

Plan Outline contract, which is presented in Appendix A. Incidental services are paid at an hourly rate, which currently is $91.30 per hour. Some of the incidental services are emergencies; some are not. When an emergency or non-routine issue arises, HS is called. HS evaluates the situation and if necessary arranges for incidental services from others. In recent years, many of the incidental emergency services have been provided by Ernie's Plumbing and Sewer Service (Ernie's). Ernie's provides plumbing services and also has pumps and tanker trucks that can remove wastewater if the pumps in the system have failed. Ernie's has a good record of responding promptly to emergencies.

Instrumentation and control work often has been done by Telstar. Other contractors or services are occasionally used as required.

Although other contractors may do much or all of the incidental work, HS has to provide access to the facilities and oversee the incidental work and thus has expenses beyond their basic contract for routine O&M services.

a. Incidental Services

To evaluate costs and problems incurred affecting system operations, invoices for work performed recently were reviewed. Invoices from HS for the period from January 2010 through July 2013 were provided by the County staff. Information about incidental services listed on the invoices is summarized in Table 1. Incidental services were required from HS in 25 of the 37 months for which monthly reports were available.

Table 2 presents similar information on invoices from Ernie's plumbing from 2010 through 2013.

Various significant emergencies and incidental services can be identified by examining the closely grouped and large expenses in Tables 1 and 2.

- From September 24, 2010 through October 10, 2010, there was a spill at the dosing tank at the leach field. Stormwater was getting into the filters during this period and the amount of water being pumped to the leach fields was high. Usually flow from the dosing tank is discharged alternately to Leach Fields A and B but it was discovered that only Leach Field B was in operation. The overflow from the dosing tank eroded a gully along part of the access road but did not escape from the leach field area.

- Much of Leach Field A is located adjacent to trees. During the repair work in late 2010 it was noted that roots from the trees had completely filled some of the leach lines. Root "logs" were removed from some of the leach lines and were delivered to the County staff. Based on this experience, a program of having Ernie's remove the roots from the leach lines on a regular quarterly basis was instituted.

- On or around 4/2/2012, Ernie's replaced the two 0.5 HP pumps at the lift station. This required a confined space entry. This type of confined space entry requires that there be a crew of at least three persons and that specialty equipment be available. Ernie's also hauled wastewater from the lift station to the treatment plant while the new pumps were being installed. The cost for Ernie's part of this operation was $14,950.

- Starting around 12/10/2012, problems were encountered with the high pressure effluent pumps at the wastewater treatment plant. Wastewater was hauled from the treatment

plant to the CCCSD plant for several days. It was not possible to haul the treatment plant effluent up to the leach field for disposal because full tanker trucks cannot drive up the steep access road. One effluent pump was rebuilt and the other was replaced. In addition, the discharge manifold was rebuilt and isolation valves were installed on it.

- Starting around 12/14/2012, an emergency was experienced with the lift station. The control panel was replaced. It was found that both pumps were over amperage due to clogging of their inlet screens with debris.

- A cracked pipe was repaired and brass check valves were installed. A confined space entry was necessary to clear the pumps and repair the cracked pipe. The cost for Ernie's part of this operation was $7,280. There were additional charges for incidental work by HS.

- Starting around 2/13/2013, there was a piping failure at an air relief valve (ARV) near 102 Stonehurst Court. Ernie's hauled some wastewater and repaired the piping.

The total amounts of incidental services was $46,283 by HS and $80,741 by Ernie's

In Tables 3 and 4, the incidental work by HS and by Ernie's is broken down by categories. For HS, the incidental work is divided by type of service (routine maintenance versus emergency callouts), location, and by which pumps were affected, if any. In Table 4, incidental expenses from Ernie's are divided only into the latter two categories. The objective of Tables 3 and 4 is to reveal where the large expenditures for incidental expenses have been made.

In Table 3, it can be seen that only a very minor portion of the services were for routine maintenance. This is because routine maintenance is done by HS under the O&M services portion of their contract.

- Most of HS's incidental expenses were at the lift station, the treatment plant, and the leach fields. There were very few expenses for the collection system and no expenses attributed to the force main.

- The largest portion of HS’s incidental expenses on pumps was for the lift station pumps and the effluent pumps. Much of the expenses for the lift station pumps was caused by the need for confined space entry by Ernie's.

In Table 4, it can be seen that Ernie's incidental expenses are concentrated at the lift station and the treatment plant. The second grouping of expenses show that major portions of the incidental expenses were attributed to the lift station pumps and the effluent pumps. Ernie's did not work on the recirculation pumps or the UV pumps.

In Table 5, six incidental expenses from Telstar for electrical and control work are tabulated. The total incidental expense by Telstar was $4,636 for the period from February, 2010 through April, 2013. For the 39 months that these invoices cover, the average cost was $119 per month. The first five of the Telstar invoices are for work on the effluent pumps or the controls for these pumps. Telstar notes that the control and alarm systems utilize antiquated relay logic and recommends that a more modern PLC (programmable logic controller) be provided.

The most recent Telstar invoice was for work at the lift station on 4/13/13. It was noted that #2 pump had failed and that #1 pump was marginal. Both these pumps were recently replaced. There have also been incidental expenses from some additional vendors, such as Cascade Integration.

This categorization of the incidental expenses will be of interest when annexation to CCCSD is considered in a later phase of the work. If the subdivision can be connected to CCCSD with a gravity line, the pump stations and the treatment plant can be abandoned and the significant costs that have been incurred to maintain and operate these facilities will be avoided. In addition, the small cost of maintaining the collection system should reassure CCCSD that it is reasonable to retain the small diameter sewers.

b. Evaluation of Recent Emergencies

The recent emergencies added significant, unexpected costs and are summarized as follows:

1. The spill at the leach fields in September and October, 2010 probably was a onetime event and is unlikely to recur.

2. There have been occasional breaks in the piping, usually at air release valves. These breaks probably are unavoidable due to the unstable soil conditions at the site.

3. There have been recurring problems at the lift station. Some of these problems have been caused by debris clogging the pump screens. Presence of debris in the wet wells probably means that some of the septic tanks do not have effluent screens in place.

4. There have been recurring problems with the effluent pumps and their controls.

5. There have been recurring problems with the control and alarm systems, which are antiquated. Problems with the control and alarm systems have resulted in numerous callouts which result in additional incidental expenses.

Three major emergencies that involved the lift station and the effluent pump station are summarized in Table 6. The emergency expenses by HS and by Ernie's were taken from Tables 1 and 2 respectively.

Many of these emergency expenses were incurred because a spare pump was not available, because the lift station pumps could not be removed without a confined space entry, or because certain other relatively minor piping modifications have not been made.

Other emergency expenses were unavoidable. For example, if a pump had failed, a new pump had to be purchased and installed. An estimate is made in the last column of Table 6 of the portion of the emergency costs that were unavoidable. In general, this was done by omitting the costs of extended hauling of wastewater, the estimated cost of confined space entry, etc. from Tables 1 and 2.

The total costs of the three emergencies in Table 6 are $63,213. The unavoidable emergency costs are estimated to be approximately $28,400. The emergency cost that could have been avoided is the difference between these two values, i.e.:

$63,212 - $28,400 = $35,000 approximately.

The cost of the 5 HP effluent pumps is about $3,500. The cost of having them installed is about $2,000 so an installed effluent pump costs about $5,500. The other ten pumps in the wastewater system are fractional horsepower pumps and cost only about $600 each. For the most part, installation of a replacement pump can be done by HS, assuming that modifications are made at the lift station to allow the pumps to be removed without entering the wet well. HS can remove and install a small pump for about $400 as an incidental expense, thus the cost of removing and re-installing a small pump is about $1,000. The total cost of replacing all the pumps is approximately:

10 Small Pumps * $1,000 Each + 2 Effluent Pumps * $5,500 Each = $21,000.

The amount that has been spent on avoidable emergency services in these three incidents is considerably more than what it would have cost to replace all the pumps. This is in fact a conservative estimate because it covers only three major emergencies. There would have been further savings on some of the minor emergencies.

4. EVALUATION OF THE COSTS OF OPERATIONS AND MAINTENANCE

The routine O&M tasks that HS provides for fixed monthly fee are listed in the Service Plan Outline (Appendix A). These services include weekly, monthly, quarterly, semiannual, annual, and biannual O&M tasks, record keeping and reporting. The fee for the O&M services during our analysis was $3,179 per month. On October 1, 2013, this increased to $3,243.45.

The average cost of the HS incidental services over the last few years was $46,283 per year. The average HS incidental cost during the 37 months for which records were available was:

$46,283/37 Months = $1,251/Month.

The total cost of the incidental services by Ernie's was $80,741. The average Ernie's incidental cost during these 35 months was:

$80,741/35 Months = $2,307/Month.

HS's incidental expenses for late November, 2010 mention several meetings with Ernie's at the leach field, but no incidental expenses were found for this period on the Ernie's invoices. In addition, there is a gap in the incidental expenses for quarterly hydroflushing of Leach Field A from 10/9/12 to 5/13/13. To account for this, incidental expenses for Ernie's has been rounded up to $2,500/Month.

The incidental expenses by Telstar span a period of 39 months. The average monthly cost was:

$4,636/39 Months = $119/Month.

The monthly payment for O&M services and these average incidental expenses are summarized in Table 7. A small additional expense of $200 per month has been added to the incidental expenses to account for other vendors. The total annual cost for O&M services and incidental expenses is estimated in Table 6 to be $86,964.

The annual taxes and assessments (income) for SD-6 is $1,950 per parcel. There are 47 parcels so the total income is:

47 parcels * $1,950/parcel = $91,650.

The annual O&M and incidental expenses equal nearly the entire income for the District, leaving little or nothing for numerous other SD-6 expenses.

5. EXISTING DEFICIENCIES AND IMPROVEMENTS NEEDED

Improvements to the existing facilities that are needed immediately or that may be needed in the relatively near future are listed in Table 8 and are discussed below.

Improvements Needed Immediately

a. Lift Station Alarm System

There is an alarm system with a telephone dialer at the lift station but it has been inoperative for years. Much better systems are now available. A spill at the lift station could quickly reach the creek which is only a short distance away. Such an event would need to be reported and likely trigger a serious response from the Regional Board.

A new alarm system should be installed. The cost of a new alarm system might be on the order of $7,500.

b. Lift Station Spare Pump

The lift station pumps were recently replaced and are currently in satisfactory condition. Nevertheless, because of the risk of a spill at the lift station and the low cost of these pumps, a spare pump should be purchased and kept on hand.

The cost of a spare pump is only about $600. Installation costs an additional $400.

c. Lift Station Piping

The pumps at the collection system pump station are not easily removed from the wet well. This requires a confined space entry to service them. Ernie's charged $14,950 on 4/2/12 and $7,282 on 12/15/12 for removing and re-installing pumps at the lift station. Major parts of these costs were for the confined space entries.

The pumps should be connected to the discharge piping with hoses so they can be removed from the wet well without entering the wet well.

Similarly, the check valves should be relocated from the wet well to the valve vault so that servicing them also would not require entry into the wet well. It is recommended that the piping modifications include a valved connection that can be used by a portable emergency pump if this becomes necessary.

The cost of removing, modifying, and reinstalling the pumps are estimated to increase this cost to approximately $17,000.

d. Recirculation Pumps

The original treatment plant design calls for three recirculation pumps for each filter, a total of six recirculation pumps. Four of the six recirculation pumps are inoperable. The two operable pumps are used with Filter #2. As noted below, Filter #1 is out of operation.

All inoperable pumps should be replaced with new pumps. It is recommended that replacements also be purchased for the two operable pumps since they have been in service for a long time.

These pumps cost only about $600 each. Installation of pumps is an incidental expense in HS's contract. Paul Stovall estimated that it takes about three hours to remove and install a small pump. Adding a little for incidental parts and supplies, the total cost of replacing a small pump is approximately $1,000. For six pumps the cost is approximately $6,000.

e. Effluent Pumps

The 5 horsepower (HP) effluent pumps are the largest pumps in the system. They are high head turbine pumps and have failed several times in the past. The existing effluent pumps have been in service since March, 2013 and December, 2012, and are currently in satisfactory condition.

Failure of these pumps can cause a spill. In the past, to avoid a spill wastewater has been trucked away for extended periods at considerable expense. Ernie's was paid $11,615 for trucking wastewater away in December, 2012 alone. This expense would have been avoided in part or in whole if a spare effluent pump had been on hand.

The effluent pumps cost about $3,500 each. The cost of installation is estimated to add another $2,000 per installed pump.

Due to the risk of a spill if the effluent pumps fail and the high cost of hauling wastewater when these pumps are not available for service, a spare pump should be purchased.

f. Pressure Gauge

The pressure gauge is inoperable. Knowledge about the operating pressure in the force main is useful for operational purposes. If the pressure is not in the range of 195 to 200 PSI, the operator knows that something unusual is happening in the system. We recommend a new pressure gauge should be installed.

The installed cost of a new pressure gauge is estimated to be $1,500.

g. Control System

The control system relies on electrical relays. The control equipment is old and frequently malfunctions. There is a considerable risk of failure that might cause a spill. The best course of action probably is to replace the control system with a computer based system, i.e. with a PLC. Such a system would allow much greater flexibility in operations and data gathering, would be more reliable, and would mesh well with improvements in the alarm system.

A new control system that addressed all of the issues is estimated to cost $25,000.

h. Alarm System

The existing dialer alarm system is unreliable and has often resulted in false alarms that have resulted in incidental expenses. This system is probably beyond its useful life.

The local alarm light does not work. It probably would be ineffective even if it did work because it depends upon a passerby seeing the light and placing a phone call. There is no sign giving the passerby the number to call.

Improvements in the alarm system should be incorporated in improvements to the control system. A PLC controller can include a telephone dialer.

The cost of the improvements to the alarm system might cost approximately $5,000 if they are incorporated with the improvements to the control system.

i. Door Of The UV Building

The door to the building is broken at the lower hinge. The door should be replaced to secure the building. The cost of replacing the door is estimated to be $500.

j. UV System, Pump Replacement

The UV system is operated but is in poor condition and probably does not provide much disinfection. The total coliform effluent limit is always exceeded

The transmissivity meter of the UV system has been inoperative for about eight years. The UV bulbs have not been replaced for many years. HS spends approximately an hour each week cleaning the bulbs in the UV system. One of the UV pumps needs work. The installed cost of a new small UV pump would be approximately $1,000.

As discussed elsewhere, it may be possible to abandon the UV system. If so, this expense can be avoided.

Improvements Needed In The Near Future

k. UV System, Complete Rehabilitation

If the Regional Board does not agree that UV treatment is not needed the UV System will require complete rehabilitation in the future. This cost is approximated to be $6,000.

l. Drainage Improvements at the Filters

Filter #1 (the one closest to the hill, farthest from the stream) is out of operation due to control problems. As discussed below, the controls probably should be replaced with a small programmable logic controller (PLC).

Surface runoff floods Filter #1 in wet weather. The surface runoff deposits sediment on the filter, which clogs the filter.

Groundwater also enters Filter #1 or both filters during wet weather. During very wet periods, Filter #1 has been observed to be full of water even when the recirculation pumps are turned off and the recirculation tank is full. Under these conditions, water drains from the filter directly to the UV pump wet well and there should be no water in the filter. The filter is kept full because groundwater is entering it.

In the past, leakage into the filters has resulted in high flows to the leach fields. These high flows could potentially cause a spill.

These problems are not completely understood. There is a headwall with an inlet to a 10-inch drainage pipe just uphill to the east of Filter #1. Brush and sediment accumulate at the inlet of the drainage pipe from the hillside above, which causes stormwater to overflow the headwall and enter Filter #1.

It might be possible to avoid the surface runoff problem by maintaining the inlet to the 10" culvert above the treatment plant to keep it clear of debris and sediment; however the hydraulic capacity of the drainage pipe may be inadequate. The drainage pipe is not shown on the construction drawings and the location of the outlet end of the pipe is unknown. The drainage pipe may have been added to the project during construction.

If a larger drainage pipe is needed and it will only be temporary for a few years, the height of the existing headwall might be raised with sandbags and a pipe might be surface laid through the treatment plant site to the creek.

It is assumed that a drainage pipe will be about 300-feet long and will cost about $150 per linear foot for a total cost of $45,000.

m. French Drain

Further investigation is needed of the groundwater problem. Because groundwater moves slowly, it should not overload the pumps; however Paul Stovall reported that Filter #1 remained full of water during wet weather even when no flow was being pumped to it. Under these circumstances, it should drain to the UV wet well.

If the flow of groundwater is keeping Filter #1 full during wet weather, a French drain (a graveled filled trench with a perforated pipe at the bottom) will be needed. The French drain would be about 150-feet long and probably would cost about $200 per linear foot for a total cost of approximately $30,000.

n. Fence

The fence on the east (hill) side of the treatment facility is falling over. If it leans enough, it would allow children or animals to enter the treatment plant site, where they might fall into one of the wet wells. Paul Stovall reported that the leaning of the fence has recently accelerated. This part of the fence is shown on the construction drawings as being 86-feet long.

The cost of replacing this fence is estimated to be approximately $40 per linear foot for a total of $4,000.

o. Pump Station Vaults

The effluent pump station vault is made of wood that is slowly collapsing. A collapse could cover some of the equipment in the vault, making it inaccessible.

There are plywood covers on several vaults. As a minimum, these should be fitted with padlocks.

These improvements are estimated to cost around $6,000.

p. Flow Meter

The flow meter failed years ago and was removed and never replaced. The operating staff has been calculating the flows by other means. The discharge permit requires that the flow be metered, thus the lack of a functioning flow meter may technically be a violation of the permit.

Accurate flow metering and recording is useful for operational purposes and might be very helpful in evaluating groundwater infiltration into the filters. We recommend a new magnetic flow meter should be installed.

The installed cost of a new magnetic flow meter is estimated to be $5,000.

q. Dose Counter At The Dosing tank

The dose counter at the dosing tank has not worked for years. It provides valuable information about the performance of the leach fields and should be replaced or repaired.

The cost of replacing or repairing the dose counter might be on the order of $2,000.

r. Rehabilitate Leach Field A

Ernie's is now clearing the distribution lines in Leach Field A quarterly with miniature hydroflushing equipment to minimize the impact of roots in these lines. The hydroflushing equipment cannot get through two of the 20 lines, which indicates that they are blocked or collapsed. The lines should be rehabilitated when 20 percent of them cannot be cleared.

The rehabilitation would involve digging the distribution lines up and clearing or replacing them. This work might cost approximately $5,000.

There are no known root problems in Leach Field B, probably because it is in an open field with no nearby trees.

s. Piping To Leach Fields C And D

The construction plans call for piping and valving to allow Leach Fields C and D to be used, but some of this piping has been capped off or is otherwise inoperable.

Restoration of the piping to provide the full original functionality of the leach field system might cost around $3,000. At present, only Leach Fields A and B are used and they appear to be capable of disposing of the total flow that reaches them. If the leach field disposal system will only be used for a few years until there is annexation to CCCSD, restoration of the piping that serves Leach Fields C and D probably is unnecessary.

t. Monitoring Wells

The discharge permit requires that groundwater samples be collected from monitoring wells.

In the original construction, five monitoring wells were installed to depths of about 28-feet. Attempts have been made to obtain samples from these wells as required by the discharge permit but only on rare occasions has there been enough groundwater in the wells to permit a sample to be taken.

Although the Regional Board has not raised this issue in the past, it might do so in the future and might force SD-6 to construct new deeper monitoring wells.

Monitoring wells often cost about $7,500 each. The cost of five wells would be on the order of $37,500.

u. Odor Control Carbon Filters

The construction drawings call for activated carbon air filters to be installed in the air release valve enclosures and at the effluent pump manhole. The activated carbon has a limited useful life. In so far as known, the activated carbon has never been replaced. It probably has no effect at all on any odors that are being generated.

Paul Stovall reported that occasionally there have been odors at the Regional Parks trail, but these problems apparently have been infrequent and minor. If odors become a problem, the activated carbon should be replaced.

The cost of replacing the activated carbon probably is low. An allowance of $500 has been entered in Table 8. If a more severe odor problem arises, there is a risk that much more expensive countermeasures might be required.

6. ANNUAL REPLACEMENT COST

Nothing lasts forever. To keep any kind of facility going in perpetuity, funds must be made available to replace facilities as they wear out and reach the end of their economic lives. Replacement is different than maintenance. Maintenance keeps the facility running but eventually it must be replaced.

In Table 9, the various components of the wastewater system are listed, along with their useful lives, their remaining lives, and their estimated replacement costs. Dividing the current replacement cost by the remaining useful life in years gives the amount that should be placed into reserve each year so that the asset can be replaced when it fails. In Table 9, the required annual replacement reserve amount is $133,801. On a per parcel basis, the required annual replacement reserve is:

$133,801/47 Parcels = $2,847/Parcel.

No reserve funds have ever been accumulated for SD-6 asset replacement costs.

It should be noted that the projected replacement costs do not include the costs developed elsewhere in this report to cover existing deficiencies and improvements that are currently needed.

The replacement costs shown in Table 9 should be adequate to cover the "soft" costs (engineering, administration, etc.) since most of the items will be one-for-one replacements that require little or no design work.

7. BUDGET REVIEW

The current annual sewer use fee (taxes and assessments) per parcel is $1,950 per year. The fee has not increased since 2006. The annual income for the 47 parcels thus is:

$1,950/Parcel/Year * 47 Parcels = $91,650/Year.

The current fee has been entered as the first line item in Table 11.

The deficits that the wastewater budget has incurred over the past three years were presented in a slide presentation that was made by Jason Chen of the County Public Works staff to the HOA on July 18, 2013. Expenditures at the end of FY 2012-13 amounted to $162,885. This caused a deficit of $70,999.

The average deficit over the past three fiscal years was $39,552 per year. This is $807 for each of the 47 parcels in SD-6. See Table 10. In the second line of Table 11, it has been assumed that these deficits will be repaid over the next three years.

It is assumed that the annual deficits can be reduced by the amount of avoidable emergency costs shown in Table 6, i.e. $34,813 ($63,213 Total Emergency Costs - $28,400 Estimated Unavoidable Emergency Costs). Dividing this value by the approximately three years over which records were available and by the 47 parcels in the subdivision, yields a reduction of:

$34,813 in 3 Years/ (3 Years * 47 Parcels) = $247 Reduction in Annual Deficit.

This reduces the deficit line item from $807 to $560 per year in future years.

The wastewater system needs significant capital expenditures for immediate improvements. See Table 8. In Table 11, it is assumed that all of the needed improvements in Table 8 will be made over a 3 year period if the system is to be maintained in perpetuity and that the immediately needed improvements will be made over a 3 year period if annexation will proceed.

It should be kept in mind that deferring the immediately needed improvements incurs risks of facility failure, imposition of regulatory requirements, and/or significant fines.
The true cost of the wastewater system includes the cost of replacing the components of the system as they wear out. Reserves ought to be set aside for the replacements that will inevitably be needed eventually. To date, no reserves have been set up for SD-6. If annexation does not happen, the cost of replacements is $1.5 million. The cost of replacements was developed in Table 9, and in Chapter 5 above, and has been inserted in Table 11.

If the wastewater system will be abandoned within five years, only the replacement costs in Table 9 that have a remaining life of five years or less need to be funded. There are only four items in Table 9 with remaining lives of five years or less. The total annual replacement cost for these is $8,667, or $184 per parcel per year. This value has been inserted in the right hand column of Table 11 for the replacement line item.

The last line item in Table 11 is for some additional services that will be provided to SD-6 by County staff. Many of the County services are included in the annual fee, but dealing with the current facility deficiencies will require some additional services. It is estimated that these additional services will add approximately $300 per year per parcel if the system is maintained in perpetuity and $500 per year per parcel if annexation proceeds. These values have been inserted in Table 11.

Table 11 shows that if the wastewater system is to be maintained in perpetuity under the current practices, the true total annual cost of the wastewater system per parcel is estimated to be $7,982. If the system will only be maintained for approximately five years until annexation can occur, then the true total annual cost of the wastewater system per parcel is estimated to be $4,497.

It should be noted that there will also be some extra-ordinary, one-time costs to SD-6 in the future. The cost for an annexation study and time for County staff oversight of it, are not included in the annual costs above.

8. POSSIBLE PERMIT CHANGES

It may be possible to negotiate changes in the discharge permit that would reduce the cost of operating and maintaining the wastewater system. These changes include:

a. Reduced monitoring requirements.

b. Abandonment of the UV disinfection system.

c. Abandonment of the recirculating gravity filters.

These possible changes are discussed below.

a. Reduced Monitoring Requirements

In the original concept, a portion of the treated effluent was to be used to irrigate landscaping around the tennis courts at the entrance to the subdivision. Later this was found to be economically infeasible and it was never implemented. The monitoring program that was implemented included a high level of samples and analyses because the reuse of treated effluent on landscape irrigation was likely to have people come in contact with the treated wastewater.

With the wastewater being discharged to the remote leach fields, there is very little chance of people coming in contact with the treated wastewater thus a much lower level of monitoring is appropriate.

b. Abandonment Of The UV Disinfection System

It appears that the UV disinfection system was included in the original project design because it was intended that some of the treated effluent be used for landscape irrigation. As the project evolved, all of the treated effluent goes to the leach fields.

We are unaware of any instance in which disinfection has been required prior to subsurface disposal of wastewater. Such requirements may exist at some unusual facilities but they are unknown to us. It should be noted that septic systems are used by about one third of the population of the United States and design guides for septic systems do not include disinfection systems.

Disposal of the wastewater underground prevents contact with humans and thus prevents disease transmission. Disinfection is therefore not required.

If the UV system can be abandoned, the piping at the treatment plant could be modified to allow the wastewater to flow directly from the recirculation tanks to the effluent pump station wet well. The UV pumps and equipment could be removed and might have some salvage value.

If the filters can be abandoned, the piping that leads to the recirculation tanks should be modified to go directly to the effluent pump station wet well.

The County and its representatives have communicated in writing and orally with the Regional Board about reducing the monitoring requirements and abandoning the UV system since at least 1999, but there has never been a substantive response from the Regional Board. The material presented to the Regional Board even included a marked up copy of the discharge permit showing the changes that were requested.

The County's consultant was successful in achieving a reduction in fees of about $4,000 in 2008 by pointing out to Regional Board staff that that the fee level was reflective of a plant on a much higher level of complexity than the one currently operating. At that time, there was encouraging

evidence that progress was being made in convincing Regional Board staff to allow removal of the UV disinfection and reduction of the monitoring requirements. However, it appears that discontinuance of the County's consultant effort also ended the effort to modify the Regional Board's requirements. Since the savings benefit would be significant, this effort should be renewed.

c. Abandonment Of The Recirculating Gravel Filters

Treatment of septic tank effluent prior to subsurface disposal is rarely mandated, except where there are issues of nitrates in the groundwater or where the wastewater will percolate too quickly or the groundwater table is too near the subsurface disposal area. The filters at SD-6 do not significantly reduce the nitrogen in the wastewater. The filters were provided because the wastewater needs to have very low suspended solids for the UV disinfection system to be effective. If there are solids in the water that is passing through the UV disinfection system, the solids shelter pathogens from the UV radiation. The soil at the leach field site does not percolate too quickly and the groundwater table is far below the leach fields.

If the UV system is not required, there appears to be need for the filters either. If the filters can be abandoned, the piping that leads to the recirculation tanks should be modified to go directly to the effluent pump station wet well.

The County and its representatives have communicated in writing and orally with the Regional Board about reducing the monitoring requirements and abandoning the UV system since at least 1999, but there has never been a substantive response from the Regional Board. The material presented to the Regional Board even included a marked up copy of the discharge permit showing the changes that were requested.

9. EVALUATION OF RISKS OF CONTINUED OPERATIONS.

One alternative course of action would be to address the deficiencies and improvements needed that have been discussed above, however even if this is done and the existing wastewater system is operating well, there are several risks that are present. These are discussed below.

a. Regulatory Risks

The Regional Water Quality Control Board (Regional Board) has paid little attention to the SD-6 facility, probably at least in part because the system is small and it has worked well. The Waste Discharge Requirements (discharge permit) that was issued in 1991 has never been formally revised. This permit, which is Order No. 91-096, is presented in Appendix B.

This situation could change. If the Regional Board becomes more aggressive, actions that they might take could include:

i. Require that SD-6 annex to CCCSD.

ii. Require that SD-6 strictly meet all requirements of the discharge permit.

iii. Require that SD-6 have all equipment be fully operational.

iv. Require that deeper monitoring wells be installed.

v. Impose fines for failing to meet the permit requirements strictly.

The discharge permit includes a provision on Page 9 that says, "If at any time sanitary sewer services become available in the Alhambra Valley, the sewage flow from Stonehurst shall be directed to the sanitary sewer line." The recent extension of the CCCSD sewer system to the intersection of Alhambra Valley Road and Quail Court seems to require that SD-6 connect to the CCCSD sewer system. If the Regional Board takes action on this requirement, then annexation would be mandatory and much of the cost of improving the existing system would be wasted.

The Regional Board could demand that all equipment in the wastewater system be operational. This would require that numerous inoperable or marginal pumps be replaced, that the controls of Filter 1 be repaired or replaced so it could be put back in service, that the UV system be made fully functional, etc. (See the list of deficiencies and improvements needed). Considerable expenditures would be needed.

The permit requires that groundwater samples be taken but the existing monitoring wells rarely provide samples of the groundwater. The Regional Board might require that new, deeper monitoring wells be constructed. This requirement was recently enforced by a different Regional Board on a subdivision in the south part of Sacramento County.

The Regional Board could impose fines for failing to meet the permit requirements strictly. A fine of $40,000 was proposed a few years ago for a minor spill from a small treatment system at a marina in the Sacramento River delta.

When the Regional Board assesses fines, they consider whether the discharger has derived "economic benefit" from some of the factors that led to a spill. The fine often includes recovery of the economic benefit. For example, if a discharger derived economic benefit by deferring maintenance of pumps, and a pump failure led to a spill, the Regional Board fine would include the costs that were not spent on maintenance.

The risk that the Regional Board might become more aggressive will increase greatly if there is a sewer system overflow (SSO or "spill").

b. Economic Risks

Economic risks include:

i. Silting up of Filter #1 due to stormwater overflow on to the site.

ii. Leach field failure.

iii. Extraordinary emergency expenses such as the $40,000+ during December, 2012.

iv. Replacement of the monitoring wells.

v. Treatment required of odor problems.

vi. Fines imposed by the Regional Board.

vii. An accident at the wastewater facilities.

viii. A change of regulations requiring a greater degree of treatment.

ix. Significant damage to the wastewater facilities by a natural disaster such as an earthquake, a landslide, or a wildfire.

x. Significant damage to the wastewater facilities by vandalism.

As noted above, some costly items might become necessary as the result of regulatory action. Others might be made necessary because of failure of the existing facilities.

10. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

a. The current annual sewer use fee of $1,950 is not covering the true cost of running the wastewater system. The annual sewer fee needs to be increased. To maintain the system in perpetuity, the annual cost per parcel is estimated to be $7,982.

b. If a decision is made to annex SD-6 into the CCCSD collection system, then only minimal expenditures should be made to keep the existing wastewater system in operation for about five years while the annexation process takes place. In this scenario, the total annual cost per parcel is estimated to be approximately $4,497 per year.

c. The debris that is reaching the lift station may indicate that the effluent screens are not in place on some of the septic tanks.

d. Much of the mechanical equipment in the system (mostly pumps) has at times been inoperative, unreliable, or without redundancy and at times for extended periods. Some of the equipment, especially the recirculation pumps, is still inoperative. This creates a severe risk of a significant sewage spill which could lead to significant fines and mandated actions.

e. The cost of the conveyance system to connect to CCCSD and abandon the treatment facilities in the Stonehurst subdivision should be investigated. Costs for such a system might be on the same order of magnitude as the required annual sewer use fees for sustaining the existing treatment and disposal facilities, but this has not yet been evaluated.

Recommendations

The recommendations include the following.

a. The annual sewer fee needs to be increased as noted in Conclusions a. or b. above.

b. A notice should be sent to the homeowners reminding them that it is important that the septic tanks effluent screens be in place and arrange to have them inspected for compliance.

c. Proceed to make the improvements needed immediately as listed in Table 8.

d. Explore abandoning the UV system and recirculating gravel filters with the Regional Board.

e. Explore reducing the required amount of monitoring with the Regional Board.

f. Proceed promptly to estimate the cost of annexation to CCCSD so the cost of annexation can be compared to the cost of retaining the existing system.

g. If SD-6 is not annexed into CCCSD, provide storm drainage improvements to prevent stormwater from flooding out on to recirculating Filter No. 2 and possibly destroying it by clogging it with soil.

h. If SD-6 is not annexed into CCCSD, evaluate the need to provide a French drain to prevent groundwater from entering the recirculating gravel filters.

TABLES

TABLE 1. INVOICES FROM HS OPERATING SERVICES FOR INCIDENTAL SERVICES

CHRONOLOGICAL LISTING

Date	$	Description	Location					Pumps				Miscellaneous					
			LS	CS	TP	FM	LF	LS	RE	UV	EP	AD	CO	ER	RM	ST	TE
2/1/10	46	Weed abatement. Roundup.			X										X		
4/1/10	812	Recirculation pump and effluent pump B installation.			X				X		X		X				
4/1/10	33	LimeAway. For UV lamps.			X										X		
5/1/10	457	"B" effluent pump, recirculation pump and float level switch installation.			X						X						
5/15/10	166	Respond to alarm call-out. Not included on May invoice.			X						X		X				
6/23/10	166	Met with Cascade Integration.			X						X	X					
6/23/10	250	Cascade Integration troubleshooting effluent pump. $250 to Cascade.			X						X						
7/14/10	415	Respond to trouble call at 5325 Stonehurst Drive. Provide support for Ernie's Plumbing site visit and investigate possible sources of leak.		X										X			
7/20/10	208	Pull effluent pump and deliver to San Jose. Bruce Barton Pump Co.			X						X						
10/1/10	2063	Baker tank rental.												X			
10/1/10	6557	See attached log. (Not found).												X			
10/1/10	19	Miscellaneous parts for plant.			?												
10/1/10	7263	SSO 671323 9/24/10 Thru 10/10/10 at the leach fields.					X										
10/1/10	382	SSO 671323 9/24/10 Thru 10/10/10 at the leach fields materials.					X				?						
10/18/10	0	Met with staff at County Office.					X					X					
11/24/10	125	Met with Ernie's Plumbing. Inspected field A. Repaired riser pipes.					X							X			
11/28/10	125	Check drain field A. Collected root log samples.					X										
11/29/10	166	Met with Ernie's and delivered root log samples to County.					?							X			
12/19/10	166	Alarm call-out. High recirculation tank level. Rain flooding filters.			X				X				X			X	
1/1/11	125	Installation of recirculation pumps.			X				X								
1/1/11	1026	Two recirculation pumps.			X				X								
1/1/11	90	Miscellaneous parts.			X				X								
2/4/11	125	Met with Ernie's Plumbing. Drain field.					X							X	X		
2/17/11	125	Emergency call-out. High recirculation tank level. Storm runoff reaching filters.			X				X							X	
3/4/11	0	Support Ernie's Plumbing quarterly drain field maintenance.					X							X	X		
3/19/11	125	Emergency call-out. High recirculation tank level. 2" rain in gauge.			X				X				X			X	
3/24/11	125	Emergency call-out. High recirculation tank level. 2.1" rain in gauge.			X				X				X			X	
3/26/11	83	Storm related plant check. 0.9" rain. RE Pumps 1 and 2 running.			X											X	
3/27/11	83	Storm related plant check. No. 1 filter still flooded. No. 2 no standing water.			X											X	
3/30/11	125	Inspect storm drain system, plant check, and issue report of findings.			X											X	
4/30/11	166	Repair storm damage to #1 and #2 filters. Re-burying distribution pipes.			X											X	
6/1/11	?	Monthly invoice missing.										X					
7/1/11	?	Monthly invoice missing.										X					
8/1/11	?	Monthly invoice missing.										X					
10/1/11	?	Monthly invoice missing.										X					
11/1/11	?	Monthly invoice missing.										X					
11/16/11	91	Preparation and delivery of recirculation valve replacement.			X												
11/17/11	320	Install new recirculation valve. Mickey Mouse valve.			X												
2/1/12	?	Monthly invoice missing.						X				X					
2/23/12	137	Alarm call-out. High effluent tank. 5:00 a.m.			X						X		X				
2/26/12	91	Alarm condition plant check. Float or alarm problem.			X								X				
3/2/12	183	Replace high level effluent tank switch. Higher high level float.			X												
3/9/12	0	Monitor quarterly drain field maintenance.					X							X	X		
3/9/12	411	Support Telstar recall on auto-dialer repair. Dialer problem.			X												X
3/15/12	411	Telstar recall on auto-dialer repair			X												X
3/28/12	539	Emergency response for lift station SSO.	X					X					X				
3/29/12	365	Lift station troubleshooting with Ernie's.	X					X						X			
3/30/12	274	Lift station monitoring and manual pumping.	X					X						X			
3/31/12	137	Lift station monitoring and manual pumping.	X					X						X			
4/1/12	137	Assist Ernie's with transfering 3000 gallons from lift station to plant.	X					X						X			
4/2/12	548	Support installation of two pumps at lift station. Confined space entry.	X					X						?			

TABLE 1. INVOICES FROM HS OPERATING SERVICES FOR INCIDENTAL SERVICES

CHRONOLOGICAL LISTING

Date	$	Description	Location					Pumps				Miscellaneous					
			LS	CS	TP	FM	LF	LS	RE	UV	EP	AD	CO	ER	RM	ST	TE
4/13/12	228	Alarm call-out. High recirculation tank level. Storm event.			X				X				X			X	
4/18/12	137	Alarm reset and plant check. Storm event.			X								X			X	
5/1/12	320	Respond to SSO at 101 Stonehurst Court. ARV on lateral.		X									X	X			
5/18/12	91	Met with Ernie Plumbing re lift station. Carlos.	X					X						X			
5/22/12	183	Met with Ernie Plumbing re lift station.	X					X						X			
5/23/12	183	Research and report on pump station issues.	X									X					
6/1/12	411	Check valve installation at lift station. New check valves.	X											X			
6/5/12	137	Emergency call-out, 5319 Stonehurst Drive. Groundwater, not sewage.		X									X				
6/8/12	0	Monitor and report on drain field maint. Routine quarterly service.					X								X		
7/19/12	274	Alarm call-out. High recirculation tank level. Dialer problem.			X				X				X				
10/4/12	411	Dialer call-out. High effluent tank level.			X						X		X	X			
10/5/12	639	Set-up emergency pump around due to pump failure.			X						X			X			
10/6/12	457	Contingency pumping and flow control.			X						X			X			
10/7/12	457	Contingency pumping and flow control.			X						X			X			
10/8/12	730	Install new effluent pump. Held water at the pump station.			X						X			X			
10/8/12	3553	Effluent pump and associated parts.			X						X						
10/8/12	150	Electrician installed new effluent pump and PCA 5 HP capacitor pack.			X						X						X?
10/9/12	365	Clean-up and restore normal operations.			X						X						
10/22/12	137	Dialer call-out. High recirculation tank level #1.			X				X				X				
11/10/12	228	Alarm call-out. High recirculation tank level. False alarm.			X				X				X				
12/10/12	730	Emergency, effluent tank overflow. Found effluent pumps not working.			X						X			X			
12/11/12	91	Support Ernie's for effluent tank emergency. Bad wire.			X						X			X			
12/12/12	365	Return to normal ops and cleanup.			X						X						
12/13/12	560	Electrician time and materials. 1/5/13 and 1/13/13. Subcontractor. Not an HS expense.	X					X						X			
12/14/12	274	Emergency ops at pump station.	X					X						X			
12/15/12	228	Emergency ops at pump station. Plastic check valves.	X					X						X			
12/16/12	457	Emergency call-out, high effluent tank and emergency pump sta. ops.			X						X		X	X			
12/17/12	548	Contingency ops at plant, pumping and hauling. Manual operation.			X						X		X	X			
12/18/12	548	Contingency ops at plant, pumping and hauling. Manual operation.			X						X		X	X			
12/19/12	822	Contingency ops at plant, pumping and hauling. Manual operation.			X						X		X	X			
12/20/12	0	Met with County personnel (no charge).			X							X					
12/21/12	365	Support Ernie's work, return to normal ops. New capacitors.			X									X			
12/23/12	183	High filter level, excessive rain run-off.			X				X							X	
12/25/12	228	Call-out, UV system alarm. False alarm. Float failure.			X					X			X				
12/28/12	228	UV tank float change out and system check.			X					X			X				
1/5/13	365	Assist electrician. Troubleshoot alarm dialer.	?														
1/13/13	365	Assist electrician with alarm dialer repair and reqire connections.	?														
1/13/13	560	Electrician time and materials. 1/5/13 and 1/13/13. Subcontractor. Not an HS expense.															
2/15/13	411	Callout 102 Stonehurst Court.		X									X				
2/16/13	183	Follow-up to investigate callout and possible SSO.		X									X				
2/21/13	228	Support Ernie's Plumbing with ARV installation. Near previous one.		X										X			
2/22/13	228	Support Ernie's Plumbing with ARV installation. On PS FM.		X										X			
3/22/13	183	Respond to call out at lift station.	X										X				
4/3/13	365	Assist Ernie's Plumbing with hauling	X					X						X			
4/4/13	365	Emergency operations at lift station.	X					X									
4/5/13	183	Emergency operations at lift station. Hour meter not working.	X					X									
4/10/13	183	Assist Telstar at lift station. B Pump has bad motor.	X					X									X
4/11/13	365	Assist Ernie's Plumbing with hauling. One pump failed, the other failing.	X					X						X			
4/12/13	320	Assist Ernie's Plumbing with hauling.	X					X						X			
4/13/13	137	Check pump station.	X					X									
4/14/13	274	Assist Ernie's Plumbing with hauling to treatment plant.	X					X									
4/15/13	274	Assist Ernie's Plumbing with hauling to treatment plant.	X					X						X			
4/16/13	274	Assist Ernie's Plumbing with hauling to treatment plant.	X					X						X			
4/17/13	274	Support Orenco work at lift station. Wiring problems.	X					X						X			
4/18/13	137	Operation check for station. High run time.	X					X									
5/7/13	228	Support pump replacement at lift station.	X					X						X			
5/9/13	411	Support pump replacement at lift station. Set-up for leach field maintenance.	X				X	X						X			
5/13/13	0	Support & monitor leach field maintenance.					X							X	X		
Total	**46,283**																

TABLE 1. INVOICES FROM HS OPERATING SERVICES FOR INCIDENTAL SERVICES

CHRONOLOGICAL LISTING

Date	$	Description	Location					Pumps				Miscellaneous					
			LS	CS	TP	FM	LF	LS	RE	UV	EP	AD	CO	ER	RM	ST	TE
	109 incidental service entries over 37 months, average cost per month =		$ 1,250.89														
	Note: The date shown is the date the service was performed, if this was stated. If not, then the date of the invoice was used.																
	Where the day of the month was not given, it was assumed that the service was performed on the first of the month.																
SD6 CODING FOR HS OPERATING SERVICES INCIDENTAL SERVICES.																	
	Column Headings																
	Location																
	LS = Lift Station																
	CS = Collection system																
	TP = Wastewater Treatment Plant																
	FM = Force Main																
	LF = Leach Field																
	Pumps																
	LS = Lift Station																
	RE = Recirculation Pumps																
	UV = UV Pumps																
	EP = Effluent Pumps																
	Miscellaneous																
	AD = Administrative (Mostly interaction with the County).																
	CO = Callout																
	ER = Ernie's Plumbing																
	RM = Routine Maintenance																
	ST = Storm Related																
	TE = Telstar																

TABLE 2. INVOICES FROM ERNIE'S PLUMBING & SEWER SERVICE
CHRONOLOGICAL LISTING

Date	$	Description	Location					Pumps				Miscellaneous					
			LS	CS	TP	FM	LF	LS	RE	UV	EP	AD	CO	ER	RM	ST	TE
7/9/10	120	Correct 2" collection system water line leak. Repair of a union?		X									X	X			
9/30/10	1,190	Pumped two loads from septic tank (splitter box?) at leach field site. Got all solids and debris from bottom. Probably routine maintenance.												X	X		
10/21/10	1,190	Pumped two loads from tank at leach field area. (The spill incident.)											X	X			
2/17/11	2,165	Hydrojetted storm drain. Installed new bubbler line.												X	X		
2/25/11	400	Hydroflushing Leach Field A					X							X	X		
3/4/11	400	Hydroflushing Leach Field A					X							X	X		
7/29/11	400	Hydroflushing Leach Field A					X							X	X		
10/3/11	400	Hydroflushing Leach Field A					X							X	X		
12/12/11	400	Hydroflushing Leach Field A					X							X	X		
3/9/12	400	Hydroflushing Leach Field A					X							X	X		
4/2/12	14,950	Install two 1/2 HP pumps at the lift station. Confined space entry. Hauling.	X					X						X			
5/3/12	2,972	Emergency pumping and replacement of fitting under ARV		X									X	X			
6/1/12	3,000	Installed 2 new PVC swing check valves.	X											X			
6/8/12	400	Hydroflushing Leach Field A												X	X		
10/9/12	400	Hydroflushing Leach Field A												X	X		
12/10/12	1,935	Pumped three loads from effluent tank at treatment plant.			X						X		X	X			
12/11/12	1,935	Pumped three loads at treatment plant			X						X		X	X			
12/11/12	4,538	Trouble shooting and replacing high pressure effluent pumps.			X						X		X	X			
12/13/12	1,290	Pumped two loads from PS across from 5319 Stonehurst Dr. $645/truckload.	X					X					X	X			
12/14/12	1,290	Pumped two loads from PS.	X					X					X	X			
12/15/12	7,282	Lift Station (LS). Both pumps over amperage. Inlet screen and pump screens clogged with debris. (No septic tank screens). Broken discharge pipe. Hauled one load. Confined space entry.	X					X					X	X			
12/17/12	1,935	Pumped three loads from pump tank at treatment plant.			X						X		X	X			
12/18/12	2,580	Pumped four loads from effluent tank at treatment plant.			X						X		X	X			
12/19/12	3,225	Pumped five loads from effluent tank at treatment plant.			X						X		X	X			
12/19/12	1,615	Ordered and installed the replacement control panel for the lift station			X						X		X	X			
12/20/12	14,965	Installed discharge manifold. Ordered pump rebuild kit and new 5 HP pump. Installed 5HP pump. Electrical repairs.			X						X		X	X			
2/13/13	5,880	Valve leaking at 102 Stonehurst Ct. Believed to be from an unused irrigation system.											X	X			
3/1/13	77	Finance charge.												X			
4/3/13	1,507	Removed, cleaned, and reinstalled pump. Clogged by wipes and debris. (Septic tank screens not in place.)	X					X						X			
4/3/13	1,500	Hydrojetting sand from drains at baseball field. (Tennis courts?)												X			
5/13/13	400	Hydroflushing Leach Field A												X	X		
Total	80,741																
	30 incidental service entries over 35 months, average cost per month =		$		2,306.89												

SD6 CODING FOR INCIDENTAL SERVICES.

Column Headings

Location

LS = Lift Station
CS = Collection system
TP = Wastewater Treatment Plant
FM = Force Main
LF = Leach Field

Pumps

LS = Lift Station
RE = Recirculation Pumps
UV = UV Pumps
EP = Effluent Pumps

Miscellaneous

AD = Administrative (Mostly interaction with the County).
CO = Callout
ER = Ernie's Plumbing
RM = Routine Maintenance
ST = Storm Related
TE = Telstar

TABLE 3. INVOICES FROM HS OPERATING SERVICES FOR INCIDENTAL SERVICES BY CATEGORIES

	Cost	Percent Of Total HS Incidental Expenses
TYPE OF SERVICE		
Routine Maintenance	$203	0.4
Emergency Callout	$7,639	16.5
LOCATION		
Lift Station	$7,901	17.1
Collection System	$1,921	4.2
Treatment Plant	$19,097	41.3
Force Main	$0	0.0
Leach Fields	$8,594	18.6
PUMPS		
Lift Station Pumps	$7,125	15.4
Recirculation Pumps	$3,642	7.9
UV Pumps	$457	1.0
Effluent Pumps	$12,517	27.0

TABLE 4. INVOICES FROM ERNIE'S FOR INCIDENTAL SERVICES BY CATEGORIES

Item	Cost	Percent Of Total Ernie's Incidental Expenses
LOCATION		
Lift Station	$29,319	36.3
Collection System	$3,092	3.8
Treatment Plant	$32,729	40.5
Force Main	$0	0.0
Leach Field Rodding	$3,600	4.5
Leach Field Special	$2,380	3.0
PUMPS		
Lift Station Pumps	$26,319	32.6
Recirculation Pumps	$0	0.0
UV Pumps	$0	0.0
Effluent Pumps	$32,729	40.5

TABLE 5. INVOICES FROM TELSTAR

CHRONOLOGICAL LISTING

Date	$	Description	Location					Pumps				Miscellaneous					
			LS	CS	TP	FM	LF	LS	RE	UV	EP	AD	CO	ER	RM	ST	TE
2/9/10	695	Troubleshooting effluent pumps.			X						X						X
10/14/11	2004	Amps wrong on both effluent pumps. Replaced all floats Replaced effluent pump #2. Suggest change to 3 phase power.			X						X						X
10/21/11	Included	Recommend replacement of relay logic with PLC controls.			X						X						X
3/9/12	681	Troubleshooting effluent pump alarm system.			X						X						X
3/15/12	681	Troubleshooting effluent pump alarm system.			X						X						X
4/10/13	575	Trouble shooting pumps. #2 failed. #1 Marginal. Controls OK.	X					X									X
Total	4636																

6 service entries over 39 months, average cost per month = $ 118.86

SD6 CODING FOR INCIDENTAL SERVICES.

Column Headings

Location

LS = Pump Station
CS = Collection system
TP = Wastewater Treatment Plant
FM = Force Main
LF = Leach Field

Pumps

LS = Pump Station
RE = Recirculation Pumps
UV = UV Pumps
EP = Effluent Pumps

Miscellaneous

AD = Administrative (Mostly interaction with the County).
CO = Callout
ER = Ernie's Plumbing
RM = Routine Maintenance
ST = Storm Related
TE = Telstar

TABLE 6. PUMP RELATED EMERGENCY COSTS

Dates	Event	HS Costs, $	Ernie's Costs, $	Total Emergency Costs, $	Estimated Unavoidable Emergency Costs, $
		Note 1	Note 1		Note 2
3/28-4/2/2012	Replace lift station pumps. Confined space entry. Hauling wastewater.	685	14,950	15,635	5,900
12/10-20/2012	Replace one effluent pump and rebuild the other one. Piping modifications. Much hauling of wastewater.	4,486	32,728	37,214	16,700
12/13-15/2012	Clear debris from lift station pumps. Confined space entry. Hauling wastewater.	502	9,862	10,364	5,800
Totals		**5,673**	**57,540**	**63,213**	**28,400**

Avoidable Emergency Costs = Total Emergency Costs - Unavoidable Emergency Costs = $63,213 - $28,400 = $34,813

Notes:

1. HS and Ernie's emergency costs are taken from Tables 1 and 2 for the dates of the events.

2. Unavoidable emergency costs are those portions of the total emergency costs that could not have been avoided even if a spare pump and the recommended piping improvements had been in place.

TABLE 7. O&M AND AVERAGE INCIDENTAL EXPENSES

Vendor	Monthly Average Cost	Annual Average Cost
Monthly O&M Services		
HS	**$3,178**	**$38,136**
Average Incidental Expenses		
HS	$1,251	$15,012
Ernie's Plumbing	$2,500	$30,000
Telstar Electrical And Control	$119	$1,428
Miscellaneous	$200	$2,400
Total Incidental Expenses	**$4,070**	**$48,840**
Total O&M And Average Incidental Expenses	**$7,248**	**$86,976**

TABLE 8. IMPROVEMENTS NEEDED

	Improvement	Description	Estimated Cost, $
	Improvements Needed Immediately		
a.	Lift Station Alarm System	Replace the inoperable alarm system.	7,500
b.	Lift Station Spare Pump.	Purchase a spare pump.	1,000
c.	Lift Station Piping.	Install hoses to allow pumps to be withdrawn without entering the wet well. Relocate valves to valve vault. Install bypass connection.	17,000
d.	Recirculation Pumps.	Purchase and install 6 new recirculation pumps.	6,000
e.	Effluent Pumps.	Purchase a spare effluent pump.	5,500
f.	Pressure Gauge.	Replace the inoperable pressure gauge.	1,500
g.	Control System	Replace the existing relay control system with a PLC control system.	25,000
h.	Alarm System.	Improve the alarm system and connect it to the PLC control system.	5,000
i.	Door of the UV Building.	Replace the broken door and hardware so the building can be secured.	500
j.	UV System, Pump Replacement	Replace the existing UV pump	1,000
	Total Improvements Needed Immediately		**70,000**
	Improvements That Probably Can Be Deferred For Five Years Or More		
k.	UV System, Complete Rehabilitation	Rehabilitate the transmissivity meter etc. and replace the bulbs.	6,000
l.	Drainage Improvements at the Filters.	Install a surface mounted drainage line from the existing headwall and raise the headwall with sandbags.	45,000
m.	French Drain	Construct a French drain to keep groundwater out of Filter #1.	30,000
n.	Fence	Replace the east fence.	4,000
o.	Pump Station Vaults	Repair the collapsing wooden vaults, especially at the effluent pumps. Secure the vault covers.	6,000
p.	Flow Meter.	Replace the missing flow meter.	5,000
q.	Dose counter at the Splitter Box.	Repair or replace the dose counter at the splitter box.	2,000
r.	Rehabilitate Leach Field A.	Excavate and repair or replace the distribution lines that cannot be hydroflushed.	5,000
s.	Piping to Leach Fields C and D.	Repair the piping and valving to allow Leach Fields C and D to be used if necessary.	3,000
t.	Monitoring Wells.	Install 5 new monitoring wells to a greater depth to allow groundwater to be sampled.	37,500
u.	Odor Control Carbon Filters	Replace the activated carbon in the various odor control facilities.	500
	Total Improvements That Probably Can Be Deferred For Five Years Or More		**144,000**
	Total Improvements Needed		**214,000**

TABLE 9. ANNUAL REPLACEMENT COST

	Component Description	Useful Life, Years	Remaining Life, Years	Estimated Replacement Cost, $	Replace-ment Cost Per Year, $
A	Sewer System				
1	2" Gravity Sewer Sch 40 PVC	50	28	$300,000	$10,714
2	3" Lift Station Force Main Sch 40 PVC	50	28	$100,000	$3,571
3	3" Effluent Force Main To Leach Fields Sch 40 and 80 PVC	50	28	$150,000	$5,357
4	Air Release Valve Stations	20	10	$15,000	$1,500
				$565,000	**$21,143**
B	Wastewater Lift Station				
1	Structure	30	20	$10,000	$500
2	Pumps 2 HP	3	3	$2,000	$667
3	Pipe and Valving	15	15	$10,000	$667
4	Controls	20	10	$20,000	$2,000
5	Alarms	20	10	$5,000	$500
6	Electrical	20	10	$10,000	$1,000
				$57,000	**$5,333**
C	Treatment facilities				
1	Hydro Splitter	15	10	$3,000	$300
2	Recirculation Tanks	30	20	$45,000	$2,250
3	Recirculation Pumps	3	3	$3,000	$1,000
4	Recirculation Pumps Controls And Electrical	5	5	$20,000	$4,000
5	Gravel Bed Filters	30	8	$200,000	$25,000
6	Gravel Bed Filters Older	30	8	$200,000	$25,000
7	UV Pump Basins	50	20	$8,000	$400
8	UV Disinfection Equipment	10	10	$30,000	$3,000
9	3000 gallon pump tank	50	20	$10,000	$500
10	Effluent pumps	5	5	$15,000	$3,000
11	Effluent Pump Controls and Electrical	10	8	$15,000	$1,875
12	Piping and Valving	15	8	$10,000	$1,250
13	Control House	32	10	$10,000	$1,000
				$569,000	**$68,575**
D	Leachfield Facilities				
1	Dosing Chamber	20	8	$10,000	$1,250
2	Drain Fields (Four) With 5000 Liner Feet Of Disposal trench	20	8	$300,000	$37,500
	Replacement area equals approx. 6.1 acres			**$310,000**	**$38,750**
	Total Replacement Cost			**$1,501,000**	**$133,801**
	Annual Replacement Cost Per Parcel For 47 Parcels				**$2,847**

TABLE 10. RECENT ANNUAL WASTEWATER BUDGET DEFICITS

Year	Cost
FY 10-11	$32,235
FY 11-12	$15,422
FY 12-13	$70,999
Total	$118,656
Average/year	$39,552
Average/Property	$807

Source: Slide presentation by Jason Chen to the Home Owners Association, July 18, 2013, updated to reflect FY 12-13 actual.

TABLE 11. TOTAL ANNUAL COST OF THE WASTEWATER SYSTEM PER PARCEL

	Cost Category	In Perpetuity, Current Practices Cost $	Until Annexed (5 Years +\-) Cost $
1	Current annual sewer use fee (taxes and assessment).	1,950	1,950
2	Recovery of average previous deficits over three years. (Table 10).	807	807
3	Continuing annual deficits at a reduced rate due to improvements that avoid emergency costs. See Chapter 7 text.	560	560
4	Improvements needed. (Table 8). Costs are spread over three years.	1,518	496
5	Annual cost for replacements. (Table 9).	2,847	184
6	Additional Contra Costa County Public Works support services.	300	500
	Total annual cost of the wastewater system per parcel.	**7,982**	**4,497**

Note. Each septic tank is pumped every three years at a cost of about $600, thus the annual cost is $200 per year.

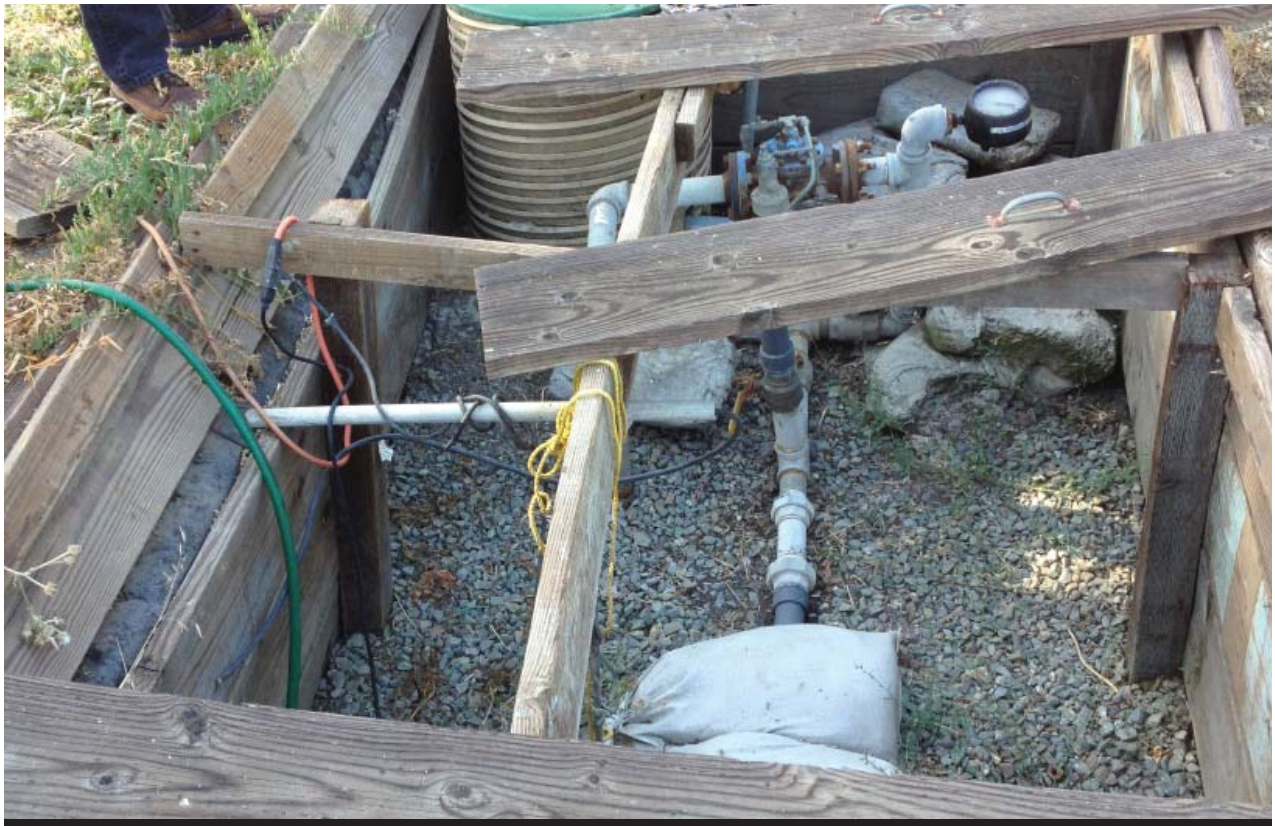
WASTEWATER SYSTEM PHOTOS

Wastewater treatment area

Recirculating gravel filter bed

Recirculation tank

Recirculation pump



Effluent pump station vault

Valve and piping in effluent station vault

Control panel and alarm system

Deficient storm drain pipe above filter #1

APPENDIX A.

Service Plan Outline. (HS Operating Services Contract with the County).

SERVICE PLAN

For good and valuable consideration received from Contra Costa County, through its Public Works Department, on behalf of Sanitation District (SD) 6 (Stonehurst), Contractor agrees to provide operation and maintenance services for SD-6. The facility at which the Contractor will be performing services is remote from available County employee resources and the County's economic interests are served by using Contractor for the services described herein.

A. The Contractor will:

Conduct routine scheduled work to be performed throughout the term of this Contract as outlined below. The proper reference file materials and/or Operations & Maintenance Manual, all of which Contractor possesses, will be referenced by Contractor for specific job duties. Record keeping in the operations log book and equipment record files are part of doing the scheduled work. All samples collected are to be transported under correct chain-of-custody protocols to a certified laboratory testing. Contractor will submit results of analytical tests to County Representative and Regional Water Quality Control Board (RWQCB) on a monthly basis.

Weekly

1. At Treatment Plant, inside shack
   a. Record hour meter readings from control panels inside shack on clipboard log.
      i. Recirculation tank 1, pumps 1,2 & 3
      ii. Recirculation tank 2, pumps 1,2 & 3
      iii. UV pumps 1 & 2
      iv. Final effluent pumps 1 & 2
      v. UV lamp control panel hour meter and lamp intensity meter reading
      vi. Record final effluent flow readings.
   b. Calculate pump run time hours since rounds last made and verify all pumps have been running normally.
   c. Check control panel operating status.
   d. Inspect UV lamp tank for normal operation
   e. Check alarm auto dialer for ready/normal status
   f. Review scheduled duties list & perform if necessary.
   g. Log yourself in on plant log book to include: date, time, name and activities that will be done that day.

2. At Treatment Plant, outside equipment
   a. Check Recirculation tanks 1 & 2 for proper operation.
      i. Verify influent flow is split evenly between tanks 1 & 2
      ii. Check "Mickey Mouse" diverter valves for normal operation
      iii. Check recirculation pump basins for level, pump operation and insure screens unplugged.
   b. Inspect filters for abnormal sounds, wet spots, etc.
   c. Inspect UV pump basins
      i. Check level for normal; and
      ii. Verify "Mickey Mouse" valves operating normally in basin
   d. Check final effluent pump tank level, probe basin for solids build-up.

Initials: PRS

Contractor

County Dept.

APPENDIX A. SERVICE PLAN OUTLINE (CONTRACT FOR O&M SERVICES)

i. Level normal
ii. Water quality

e. Check Final effluent (FE) pump basin for pump operation
f. Check FE discharge equipment valve
   i. Record FE discharge line pressure on clip board log.
   ii. Inspect equipment for normal
g. Do order patrol around yard. Correct any problems.

3. At Pumping Station
   a. Record hour meter readings for pumps 1 & 2 and check control panel status. Verify pump run time is normal.
   b. Check alarm auto dialer for armed and ready
   c. Pull manhole cover and visually check level and inside equipment for normal operation
   d. Do odor patrol and verify none present.

4. At dosing tank for leach fields
   a. Lift covers and inspect for normal level.
   b. Check water quality
   c. Check counter for siphons and record reading.

5. Log Book Entries
   a. Before leaving district, log all work done, any abnormal observations, and time you left
   b. Turn off light for UV shack before locking up
   c. All gates mush be locked when leaving, both at plant and dose field road

6. Flush recirculating gravel filters distribution piping to remove solids.

7. Pull UV lamp racks and clean lamp and intensity probe sleeves with lime away. Wash down surfaces inside/outside of UV lamp tank with brush.

8. Collect weekly influent and effluent grab samples and immediately take to lab for analysis.

9. Rotate UV pumps as part of lamp cleaning procedure.

10. Test alarms and auto dial up equipment on the following:
    a. Both Recirculation tanks, final effluent pump tank, and UV pumps
    b. UV lamp system
    c. Pumping station's wet well

Monthly

1. Dose UV pump basins.

2. Inventory operating supplies for routine duties and notify County representative if supplies are needed.

3. Prepare/submit monthly report of required data to the County representative and RWQCB

4. Verify UV lamp tank flow control valve setting

Initials: PRS _____ Contractor

_____ County Dept.

5. Pull recirculation tank pumps and screens to clean off biological growth. Wipe down floats and pump basin side walls. Frequencies of doing this task can be adjusted based on the time it takes for screen build up to restrict free flow of water into the pump basin.

Quarterly

1. Collect groundwater samples from 5 groundwater monitoring wells located in leach fields.
2. Inspect 5-10 leach field inspection ports for standing water. Check ground for surface dampness during the port inspections.
3. Collect quarterly samples of influent and effluent at treatment plant and take to lab.
4. Perform surface water monitoring at 4 creek locations.

Every 6 Months

1. Verify final effluent flow meter accuracy by volumetric pump test.

Yearly

1. Test collection systems air relief valve operation and clean internal screen if necessary. Replace carbon cartridges in vented covers for relief valve vaults.
2. Wash down tank and pump basin manhole walls and covers with hose & brush.
    a. Recirculation pump basins
    b. UV pump basins
    c. Recirculation tank access hatches
    d. Final effluent tank-level float access riser and pump basin
3. Drain and flush final effluent line between plant and drain fields.
4. Check calibration of UV lamp intensity meter
5. Pull the pumps and inspect. Scrub down pump basin and pump out debris
6. Replace UV lamps and O-rings
7. Take spare parts on hand inventory and have County Representative order needed items.

Every 2 Years

1. Check condition of "Mickey Mouse" diverter valve balls.

Plant Maintenance

1. Keep filtration beds free of weeds and debris. Conduct periodic weeding of grounds.
2. Maintain plant and grounds in clean and sanitary condition. Dispose of any on-site trash or debris.
3. Recognize when pumps need repair and make minor repairs and adjustments of plant equipment
4. Conduct other duties as required to ensure the smooth running operation of the Sanitation District

Sewer Maintenance

Initials: PRS

Contractor

County Dept.

1. Respond to sewer calls and complaints. Contact appropriate sewer contractor. Obtain confirmation of arrival time. Do final check after repair is completed.

2. As Contractor receives notices of digging from Underground Service Alert of Northern California and Nevada (USA), Contractor will review and mark project areas in accordance with the USA North Color Code Procedures.

Emergencies

1. Report all emergencies to County within 24 hours of the occurrence.

B. Payment Provisions

County will pay Contractor for services at the rates set forth below. These rates shall remain in effect for the duration of this contract.

1. For the period of October 1, 2011-September 30, 2012 a monthly rate of $3,117.50 for the operation and maintenance services set forth in Section A of this Service Plan. The rate for any incidental work will be $91.30 per hour.

2. For the period of October 1, 2012-September 30, 2013 a monthly rate of $3,179 for the operation and maintenance services set forth in Section A of this Service Plan. The rate for any incidental work will be $91.30 per hour.

3. For the period of October 1, 2013-September 30, 2014 a monthly rate of $3,243.45 for the operation and maintenance services set forth in Section A of this Service Plan. The rate for any incidental work will be $91.30 per hour.

4. Contractor shall not make any expenditure in excess of routine repair or maintenance without approval by County Staff prior to purchasing. All items reimbursed by the County will be considered County property.

5. The Rate for reimbursables will be paid according to the chart below.

Mileage	Included in the rate per hour and not separately reimbursed
Parking Toll	At cost with original receipt
Parts	At cost with original receipt
Chemicals for Facility	At cost with original receipt
Travel/Hotel/Food	Non-Reimbursable items
Postage/Express Mail	Included in the rate per hour and not separately reimbursed
Photo Copy	Included in the rate per hour and not separately reimbursed
Subcontractor	At cost with original receipt/invoice

6. Invoices shall be submitted on a monthly basis, within 30 days of the previous month. Invoices shall be sent to Contra Costa County Public Works, 255 Glacier Drive, Martinez, CA 94553, Attn: Special Districts, by the end of each calendar month.

Initials: PRS _____
Contractor County Dept.

APPENDIX B.

Waste Discharge Requirements for the Stonehurst Subdivision (Order No. 91-096).

California Regional Water Quality Control Boa
San Francisco Bay Region

ORDER NO. 91-096

WASTE DISCHARGE REQUIREMENTS FOR:

SECURITY OWNERS CORPORATION
STONEHURST SUBDIVISION
MARTINEZ, CONTRA COSTA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter called the Board) finds that:

1. Security Owners Corporation (hereinafter called the Discharger) proposes to construct a 47 home, 235 acre subdivision called Stonehurst in the Alhambra Valley, located about two miles south of Martinez in Contra Costa County. The site is shown on Attachment A, which is hereby made a part of this order. Security Owners Corporation has applied, by application dated March 26, 1991, for Waste Discharge Requirements for treatment, disposal, and subsurface reclamation of wastewater generated by the community.

2. The Stonehurst development occupies a small valley consisting of both gently and steeply sloping hills drained by an unnamed, intermittent stream which is tributary to Arroyo del Hambre. Arroyo del Hambre runs along Alhambra Valley Road in the vicinity of the site, and is tributary to the Carquinez Straight at the Martinez Regional Shoreline.

3. Sanitary sewers are not currently available in the Alhambra Valley area. The nearest sewer line belongs to the Central Contra Costa Sanitary District, and is located nearly two miles away from the proposed development.

4. Septic systems and leachfields for each individual home were approved by the Contra Costa County Health Department in May, 1989. In July, 1990, Security Owners Corporation proposed that wastewater from the residential community be treated by individual septic tanks, and a centrally located recirculating sand filter and ultra-violet disinfection system. The wastewater is proposed to be discharged during the winter months to a leachfield, and during the summer, reclaimed for subsurface irrigation of community landscaping.

5. The community system as proposed is unique and unusual for the San Francisco Bay Region, and experimental in nature. The system is permitted by this Order only due to the fact that (1) individual septic systems were already approved for the site, and the proposed system is expected to provide better treatment than individual treatment systems therefore resulting in fewer water quality impacts; (2) frequent monitoring of treatment system performance and disposal areas will be required for compliance evaluation; (3) in the event that sanitary sewers are constructed in the vicinity of the site, wastewater flows from the subdivision will be directed to the local sanitary district; and, (4) the Discharger has proposed to establish a long term contract with a public entity as set forth in Findings 8 and 9 herein.

APPENDIX B. WASTE DISCHARGE REQUIREMENTS ORDER NO. 91-096 (THE DISCHARGE PERMIT)

6. The Board's Resolution No. 78-14, Policy of Discrete Sewerage Facilities, states, in part that the "Regional Board will apply the following principles to all wastewater discharges:

   1. The system must be designed, constructed, and installed so as to be capable of preventing pollution or contamination of waters of the State, or creating nuisance for the life of the development.

   2. The system must be operated, maintained, and monitored so as to continually prevent pollution or contamination of the waters of the State and the creation of nuisance.

   3. The responsibility for both of the above must be clearly and legally assumed by a public entity with the financial and legal capability to assure that the system provides protection to the quality of the waters of the State for the life of the development. "

7. The policy described above is reiterated as part of the "Policy on Discrete Sewerage Facilities" included with the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan). The Basin Plan further states that a public entity assume legal authority and responsibility for new community wastewater treatment and disposal systems.

8. The Discharger proposes to establish a long term legal contract with a public entity for management, operation, maintenance, and repair of the wastewater collection, treatment, disposal, and irrigation system at the Stonehurst development. The contracted public entity will assume legal authority and responsibility for the system, and any water quality related impacts, with the exception of septic tanks and wastewater collection pipes located on each homeowner's property, which will be owned and maintained by the individual homeowner. The contract will include a structure for ensuring that sufficient funds are available for maintenance of the system in compliance with this Order.

9. This contract between the Discharger and a public entity must be submitted to, reviewed, and approved by the Executive Officer prior to any discharge of wastewater, as provided in E.1 and E.2 herein. When a satisfactory contract has been established, this order will be amended to include the contracted public entity as a Discharger.

10. Generally, it is preferred that a public entity responsible for a community system actually assume ownership of the on-site operations. Ownership clearly defines the party responsible for protection of water quality, and leaves little or no question as to the degree of commitment and culpability. To assume anything less than ownership raises concerns about the public entity's commitment to carry responsibility over the duration of what is considered to be a long term project. In addition, the funding mechanism which enables the public entity's involvement becomes more complicated, and possibly more susceptible to problems which could affect the operation of the system. The contractual arrangement proposed by the Discharger for the Stonehurst development specifically excludes ownership by a public entity, and as such is not the Board's preferred approach to a community system. Issuance of this Order should not be interpreted as setting a precedent to allow such arrangements for other projects.

11. Each home in Stonehurst is to be served by a conventional septic tank, which will provide sedimentation and skimming of the influent. The effluent from each tank will be conveyed to the central treatment plant in a small diameter (two or three inch) sewer system, either by gravity or under pressure supplied by pumps. The total flow from the homes is projected to be 14,100 gallons per day.

12. The central treatment plant consists of a recirculating sand filter, which will provide biological treatment, followed by bacterial removal using ultraviolet light. The sand filter consists of two feet of fine gravel with a coarse gravel underdrain contained within a synthetic liner. Effluent from a recirculation tank is intermittently distributed evenly over the media, which contains a thin film of bacteria. The effluent then travels back to the tank, and is recirculated through the media three to five times before discharge to the ultra-violet disinfection system. The effluent from the sand filter is expected to have a concentration of 15 mg/l for both biochemical oxygen demand and total suspended solids.

13. The ultra-violet disinfection system will consist of a stainless steel housing unit that contains light bulbs. The factors which determine the degree of bacterial kill are the clarity of the liquid, the flow rate of wastewater, and the intensity of light. The clarity of the wastewater will depend upon the degree of treatment provided by the sand filter, and the flow rate will be controlled to approximately 15 gallons per minute by an equalization chamber located just upstream of the disinfection unit. The unit will automatically shut off when the light intensity drops below a specific set point. When operating under optimal conditions, the ultraviolet disinfection unit is expected to achieve a total coliform count of less than 23 MPN/100 ml.

14. Effluent disposal is to be by one of two means. During dry weather months, effluent is to be routed to a subsurface distribution system for the irrigation of community landscaping, mostly consisting of trees and shrubs located at the entrance to Stonehurst, on the north side of Arroyo del Hambre. During wet months when the landscaping does not require watering, the effluent will be discharged to a leach field located at the top of the ridge on the western edge of the property.

15. Characterization of shallow subsurface soils and geology in the vicinity of the leachfields has been based on logging of 42 test pits dug to depths ranging from two to eight feet in the spring of 1989. Descriptions for the test pits are included with a report titled "Stonehurst Waste Disposal System" prepared by Steve Wert Soil Consulting, dated December 1989, which is hereby incorporated as a part of this Order. The soil conditions vary from one test pit to another; however, they can generally be described as follows: shallow soils (silty clay and silty clay loam) underlain by a soft sandstone which is highly weathered and fractured. Groundwater was not encountered in any of the test pits (dry weather conditions). Five of the test pits were utilized as absorption trenches for hydraulic testing.

16. The slopes of the leachfields to be utilized initially for disposal range from about 10 to 20 percent. The slopes of the proposed reserve leachfield areas (to be utilized in the event that the initial leachfields fail) are in the range of 20 to 25 percent. The maximum slope for

leachfields as specified in the Regional Board's "Minimum Guidelines for the Control of Individual Waste Treatment and Disposal Systems" is 20 percent.

17. Groundwater presence beneath the site has not been characterized in detail; however, studies within the limits of residential development indicate groundwater occurs at a fairly uniform depth below the moderately sloping ground surface throughout most of the basin. Information derived from geotechnical borings made within the residential area of the site indicate that shallow groundwater is present at depths ranging from 13 to 35 feet. The depth to groundwater probably fluctuates from year to year, and with the seasons. No detailed studies have been conducted to characterize groundwater in the ridgetop areas of the site where groundwater is expected to be at slightly greater depths than in the lower valley area of the site.

18. There are approximately twelve groundwater wells of various depths and construction located within one mile of the leachfield. A number of these wells are utilized for domestic water supply, as the homes which they serve are beyond the municipal water supply system.

19. A Report of Waste Discharge dated July 25, 1990 (hereby incorporated as part of this Order), was submitted by Nolte and Associates for the proposed wastewater treatment and disposal system, and the subsurface irrigation project.

20. The Water Quality Control Plan for the San Francisco Bay Basin identifies existing and potential beneficial uses of, and water quality objectives for, the surface and ground waters in the San Francisco Bay Basin. The existing or potential beneficial uses of Arroyo del Hambre and its tributaries are:

    a. Fresh water replenishment and groundwater recharge,
    b. Municipal, agricultural, and industrial water supply,
    c. Contact and non-contact recreation,
    d. Warm water habitat and wildlife habitat.

21. The existing or potential beneficial uses of groundwater in the Alhambra Valley include:

    a. Municipal and Domestic Supply
    b. Agricultural Supply
    c. Industrial Supply.

22. The County of Contra Costa approved a negative declaration for the Stonehurst Development and its wastewater treatment and disposal system (individual septic systems and leachfields for each home), in accordance with the California Environmental Quality Act (Public Resources Code 21000 et seq.).

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

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

IT IS HEREBY ORDERED that the Discharger, pursuant to provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, shall comply with the following:

A. DISCHARGE PROHIBITIONS

1. There shall be no bypass or overflow of untreated or partially treated wastewater from the wastewater collection, treatment, or disposal facilities to waters of the State.

2. Effluent shall be maintained below the surface of the ground at all times, whether disposed of to leaching trenches, or applied to project landscaping via subsurface irrigation. Effluent shall not be allowed to leach, seep or flow into surface waters of the State.

3. The collection, treatment, or discharge of waste shall not create pollution, contamination or a nuisance as defined by Section 13050 of the California Water Code.

4. The discharge of waste in excess of 14,100 gallons per day as a monthly average is prohibited.

5. Effluent shall only be used for subsurface irrigation in areas approved by the Executive Officer.

6. The discharge of effluent to the disposal leachfields or the subsurface irrigation area shall not adversely impact the existing or potential beneficial uses of the surface or ground water in the vicinity of the site. The pollution or contamination of surface or ground water is prohibited.

7. The wastewater system shall not cause the following conditions to exist in surface waters in the vicinity of the development:

    1. Floating, suspended, or deposited macroscopic particulate matter or foam.

    2. Bottom deposits or aquatic growth.

    3. Alteration of temperature, turbidity, or apparent color beyond natural background levels.

    4. Toxic or other deleterious substances to be present in concentrations or quantities which may cause deleterious effects on aquatic biota, wildlife or waterfowl, or which render any of these unfit for human consumption either at levels created in the receiving waters or as a result of biological concentrations.

B. EFFLUENT SPECIFICATIONS

1. Effluent discharged to either the leaching or subsurface irrigation systems shall meet the following limits of quality:

	Constituent	Units	30-day Average	Daily Maximum
a.	Biochemical Oxygen Demand (5-day, 20° C)	mg/l	15	30
b.	Total Suspended Solids	mg/l	15	25
c.	Settleable Matter	ml/l-hr	0.1	0.2

2. The moving median value for the Most Probable Number (MPN) of total coliform bacteria in any seven consecutive effluent samples shall not exceed 23 MPN per 100 milliliters (23 MPN/100 ml). Any single sample shall not exceed 240 MPN/100 ml.

3. The pH of the discharge shall not exceed 9.0 nor be less than 6.0.

C. TREATMENT FACILITY, LEACHFIELD, AND SUBSURFACE IRRIGATION SPECIFICATIONS

1. All wastewater treatment and disposal facilities, and subsurface irrigation systems shall be adequately protected from erosion, washout, and flooding from a rainfall event having a predicted frequency of once in 100 years.

2. The leachfields shall not be located within 100 feet of any groundwater well, stream, or water body, or within four times the vertical height of any cut fill or embankment, or within 50 feet of any drainageway.

3. Treated wastewater shall not be applied to the subsurface irrigation areas, (1) during periods of rainfall, (2) when soils are saturated, and, (3) when rainfall is expected to occur within 24 hours.

4. Application of treated wastewater shall not cause saturated conditions within 100 feet of any water body or wetland.

5. The leachfield and subsurface irrigation areas shall be managed to prevent ponding from occurring at any time, other than as a result of rainfall or stormwater runoff.

6. The slope of the leachfields shall not exceed 20%. A variance from this slope requirement may be considered upon demonstration, to the satisfaction of the Executive Officer, that use of the soil absorption system will not cause surfacing of effluent in the absorption field, create water quality problems, jeopardize contiguous properties, and affect soil stability. This demonstration must be made by a State registered civil engineer with soils and geological background, or a geologist.

7. The Discharger shall design and implement a surface and ground water quality monitoring program for the leachfields and the irrigation area. The program shall be designed to detect the presence of waste constituents in surface water and groundwater outside of the disposal areas. This program shall consist of a sufficient number of wells, installed at appropriate locations and depths to yield groundwater samples that represent background water quality, and the quality of groundwater downgradient of the effluent application areas.

8. The groundwater monitoring program shall include consistent and appropriate sampling and analytical procedures that accurately measure indicator parameters and waste constituents to provide a reliable indication of groundwater quality. Initial sampling of monitoring wells installed for the program shall take place at least 90 days prior to discharge of effluent to the leachfields or irrigation system. Background water quality shall be evaluated based on a series of samples taken at appropriate intervals prior to discharge of waste. The program shall provide for annual evaluation of water quality data to determine whether the waste discharge has impacted, or is threatening to impact, the beneficial uses of surface and/or ground water. This evaluation must include a meaningful way of comparing background to downgradient water quality.

9. The Discharger shall, on a regular basis, evaluate the impacts of effluent discharge (to the leachfields and subsurface irrigation system) on surface and ground water quality. If existing or potential beneficial uses are impacted as a result of the discharge of effluent to the leachfields, or the irrigation area, then the Discharger shall establish and implement a corrective action program. Corrective action alternatives evaluated shall include ceasing discharge of treated wastewater to the leachfields and irrigation area.

D. CROSS CONNECTION SPECIFICATIONS

There shall be no interconnection between the raw influent, treated effluent, and potable water systems. To accomplish this the Discharger shall comply with the following:

1. All piping, valves, and outlets used for non-potable water shall be clearly identified as being either raw sewage or reclaimed water.

2. All valves or other kinds of water controllers used for non-potable water should be affixed with warning signs identifying the flow as either raw sewage or reclaimed water. Such fixtures shall also be of a type or secured in such a manner that only permits operation by personnel authorized by the discharger.

3. Installation or use of hose bibs on the subsurface irrigation system used with reclaimed water is prohibited.

4. There shall be at least a ten foot horizontal and a one foot vertical separation between all pressurized pipelines transporting raw sewage or reclaimed water, and those transporting domestic water, with the domestic water line to be above those for raw sewage or reclaimed water.

5. Supplementing reclaimed water with water used for domestic supply shall not be allowed except through an air gap or reduced pressure principle device.

6. The Discharger shall maintain as-built plans of the use area showing all buildings, street, domestic water pipelines, and pipelines for the collection of sewage and its conveyance to subsurface reclamation or disposal areas. Plans shall be updated as development proceeds and as modifications are made.

E. SYSTEM START-UP SPECIFICATIONS

1. No discharge or reclamation of wastewater shall take place until the Discharger's contract with a public entity (establishing legal authority and responsibility as described in Findings 8 and 9, and Specification E.2.a) has been approved by the Executive Officer.

2. The Discharger shall submit the following reports at least 60 days prior to the anticipated date of start-up of the system:

   a. A proposed contract with a public entity which describes in detail a long term agreement to manage, operate, maintain, repair, and monitor the wastewater collection, treatment, disposal and re-use systems at the Stonehurst development. This contract shall specify the responsibilities of the public entity, and establish a structure for guaranteeing sufficient funding for operating and maintaining the wastewater system in a manner such that compliance with this Order is maintained. Estimated operation, maintenance, and monitoring costs for the entire project, including the funding mechanism, shall be included as part of this submittal. The funding mechanism shall also provide for emergency response procedures and implementation of contingency plans in the event of system failure.

   b. An operations, maintenance, and management plan for the wastewater collection, treatment, disposal, and irrigation systems. This report shall provide a detailed description of activities necessary for maintaining the wastewater system in compliance with this Order, including responsibilities for monitoring of the treatment and disposal system, and surface and ground water quality. This report shall include procedures to be implemented in the event of failure or breakdown of the collection or distribution system, the treatment system, the leachfields, and/or the irrigation system, and a monitoring plan for detection of leakage from the pressure sewer system.

   c. A report describing in detail the irrigation program. This report shall include, at a minimum, a description of the soils in the area, plants and trees to be irrigated, estimated evaporation and transpiration, and a water balance. A detailed map showing the irrigation project and surrounding area, including Arroyo del Hambre and the unnamed tributary, shall be included. This report shall describe in detail management practices which will be used to effectively utilize wastewater flow without problems such as surfacing

of wastewater, and over watering. Discharge of effluent to the subsurface irrigation system shall not proceed until the Executive Officer has approved the irrigation area and management plan.

d. A proposed plan for pilot testing of the sand filter and the ultra-violet disinfection system. This report shall include a monitoring plan for the pilot testing, with an appropriate sampling frequency intended to demonstrate that the treatment plant can achieve the effluent limitations specified in this permit. The pilot testing shall proceed for a minimum of one month, and results shall be submitted within two weeks of completion.

e. A plan for implementation of a program providing for education of home owners and occupants on elimination, or minimization of, the discharge of household hazardous wastes to the wastewater collection system.

3. The Discharger shall submit, for Executive Officer approval, at least 120 days prior to system start-up, a proposed surface and ground water quality monitoring program, and implementation time schedule, for the effluent leachfields and the irrigation area. This monitoring program shall be designed to establish background concentrations of relevant waste constituents, and shall provide for compliance with Specifications C.7 and C.8 of this Order. Upon approval of the proposed program, a Self-Monitoring Program which includes specifications for surface and groundwater monitoring, shall be issued by the Executive Officer.

F. PROVISIONS

1. If at any time sanitary sewer services become available in the Alhambra Valley, the sewage flow from Stonehurst shall be directed to the sanitary sewer line. Redirection of the sewage flows from the on-site treatment system to the sewer shall take place at the earliest possible time after construction of the sewer has been completed. A report shall be filed with the Regional Board which details the closure of the on-site wastewater treatment and disposal system.

2. If the waste discharge has impacted existing or potential beneficial uses of surface and/or ground water, the Discharger shall establish a corrective action program to remediate the problem. A proposed corrective action program shall be submitted to the Board, along with an implementation time schedule.

3. The sand filter influent wet well shall be equipped with a high water level alarm in order to prevent the occurrence of a sewage spill resulting from mechanical breakdown or power failure. The power supply for the alarm shall be independent of the normal power supply for the wastewater system.

4. All equipment, including pumps, piping, valves, etc, which may at any time contain wastewater shall either be isolated from public access by adequately secured fencing, or adequately and clearly identified with warning signs informing the public that the water contained therein is wastewater and is not safe for drinking or contact.

5. Inspection, supervision and employee training should be provided for persons operating and maintaining the irrigation system to assure proper use of the reclaimed water. Records of inspection and training should be maintained by the Discharger.

6. The Discharger shall comply with all sections of this Order immediately upon adoption.

7. The Discharger shall comply with the Self-Monitoring Program for this Order as issued, and amended by the Executive Officer.

8. The Discharger shall maintain in good working order and shall operate, as efficiently as possible, all equipment installed, or as modified to achieve compliance with this Order.

9. The wastewater treatment facilities shall be supervised and operated by persons possessing certificates of appropriate grade pursuant to Chapter 4, Subchapter 14, Title 23, of the California Code of Regulations.

10. The Discharger shall permit the Board or its authorized representatives, in accordance with Section 13267(c) of the California Water Code:

    a. Entry upon the premises where wastewater treatments, disposal or reclamation is located, or where records are kept pursuant to the conditions of this Order,

    b. Access to and copy of, at reasonable times, any records that must be kept under the conditions of this Order,

    c. Inspection of, at reasonable times, of any facility, equipment (including monitoring and control equipment), practices, or operations regulated or as required under this Order, or

    d. To photograph, sample, or monitor, at reasonable times, for the purpose of assuring compliance with this Order.

11. In the event of any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger, the Discharger shall notify, by letter, the succeeding owner or operator of the existence of this Order. A copy of this letter shall be forwarded to this Board.

12. The Discharger shall file with the Board a Report of Waste Discharge at least 180 days before making any material change in the character, location, or volume of discharge or reuse, except for emergency conditions in which case this Board shall be notified.

13. After notice and opportunity for a hearing, this Order may be terminated or modified for cause, including, but not limited to:

    a. Violation of any term or condition of this Order;

    b. Obtaining this Order by misrepresentation or failure to disclose all relevant facts;

c. A change in any condition that requires either a temporary or permanent change in the authorized treatment, discharge, or reuse;

d. Endangerment to the public health or environment that can only be regulated to acceptable levels by Order modification or termination.

14. This Order is subject to Board review and updating as necessary to comply with changing State and Federal laws, regulations, policies, or guidelines; changes in this Regional Board's Basin Plan; or changes in the discharge characteristics. This Order will be reviewed periodically to determine the need for updating.

I, Steven R. Ritchie, 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, San Francisco Bay Region on June 19, 1991.

Steven R. Ritchie
Executive Officer

Attachments:

Standard Provisions and Reporting Requirements, December 1986
Location Map

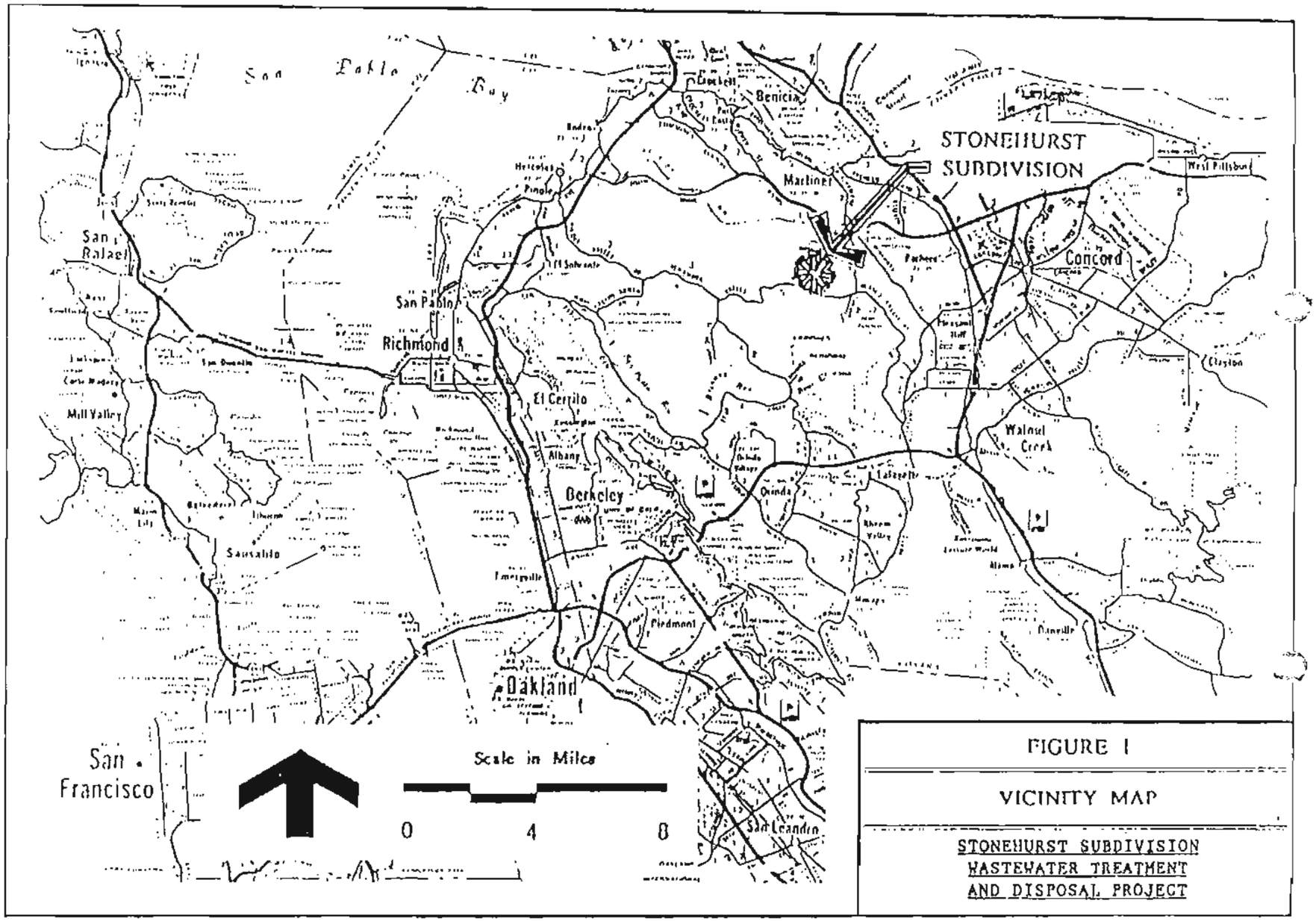


FIGURE 1

VICINITY MAP

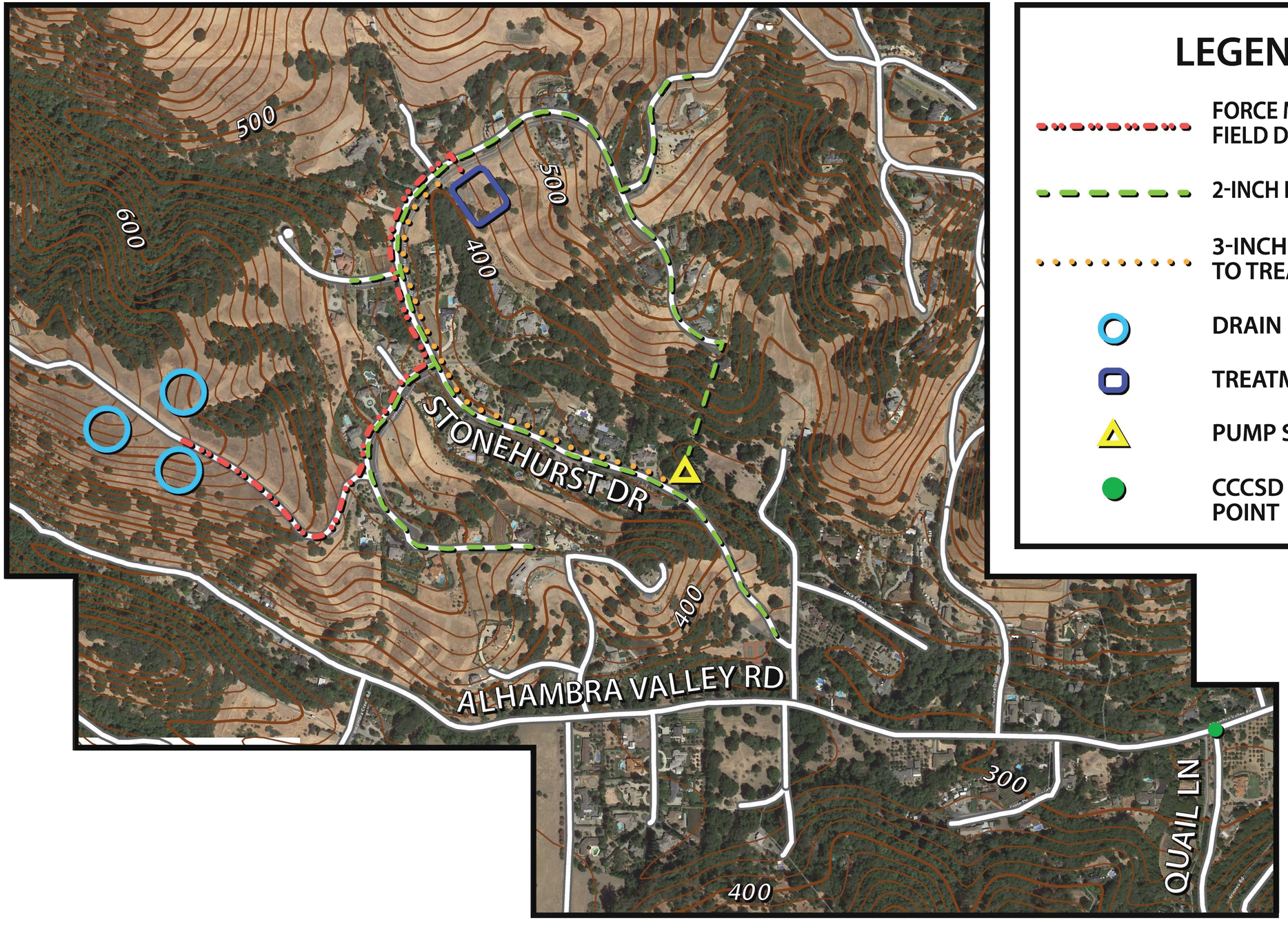
STONEHURST SUBDIVISION
WASTEWATER TREATMENT
AND DISPOSAL PROJECT

map from Nolte & Associates Report of Waste Discharge, August 1990

APPENDIX C.

Map of Stonehurst Wastewater System

STONEHURST SUBDIVISION – SD-6



LEGEND

- FORCE MAIN TO DRAIN FIELD DOSING TANK
- 2-INCH EFFLUENT PIPE
- 3-INCH FORCE MAIN TO TREATMENT AREA
- DRAIN FIELD
- TREATMENT AREA
- PUMP STATION
- CCCSD CONNECTION POINT