TO: BOARD OF DIRECTORS

FROM: DON SPAGNOLO
GENERAL MANAGER

DATE: NOVEMBER 2, 2010

AGENDA ITEM
E-3

NOVEMBER 10, 2010

DRAFT SOUTHLAND WASTEWATER TREATMENT FACILITY IMPROVEMENTS PHASE 1 CONCEPT DESIGN REPORT

ITEM

Consider Draft Southland WWTF Improvements Phase 1 Concept Design Report [RECEIVE REPORT AND PROVIDE DIRECTION TO STAFF].

BACKGROUND

The Board selected AECOM to provide final engineering design services for Phase 1 of the Southland Wastewater Treatment Facility (WWTF) Improvement Project. The project is based on the January 2009 Southland WWTF Master Plan and August 2010 Southland WWTF Master Plan Amendment #1. The project as currently envisioned involves maintaining the current capacity of 0.9 MGD and includes a influent lift station, influent screening system, grit removal system, Biolac® cell in Pond 1, a clarifier, gravity belt thickener, two concrete lined sludge drying beds, controls & blower building, and a non-potable plant water system.

AECOM has completed the Draft Southland WWTF Upgrade Phase 1 Concept Design Report which provides the basis for the detailed technical engineering design that will occur as the drawings and specifications for construction of the project are developed. The proposed Draft Concept Report will be reviewed by the peer review team and the Southland WWTF Upgrade Project Committee. Once the Concept Report is finalized, AECOM can proceed with the design of the plant upgrade and preparation of the construction documents.

FISCAL IMPACT

The FY 10-11 Budget includes $2,000,000 in Town Sewer Capacity Fund (Fund #710) for the Southland WWTF Upgrade Phase 1 design services, environmental review services and construction. Additional funding will be budgeted in FY 11-12 and possibly FY 12-13. The Phase 1 construction cost, including contingency, is $8.9 million based on the cost estimate in the Draft Concept Report.

RECOMMENDATION

Staff recommends that the Board receive AECOM's presentation of the concept design report, ask questions as appropriate and provide direction to staff.

ATTACHMENT

- November 2010 Southland WWTF Improvements Phase 1 Concept Design Report

T:\BOARD MATTERS\BOARD MEETINGS\BOARD LETTER\2010\101110 SOUTHLAND WWTF UPGRADE CONCEPT DESIGN REPORT.DOC

DRAFT CONCEPT DESIGN REPORT

November 2010

Nipomo Community Services District

Southland Wastewater Treatment Facility Improvements Phase 1 Concept Design Report (DRAFT)

Nipomo Community Services District

Southland Wastewater Treatment Facility Improvements Phase 1 Concept Design Report (DRAFT)

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Section 1 Introduction

1.1 Purpose of this Report

The purpose of this Report is to present the conceptual design for the Nipomo Community Services District (District) Southland Wastewater Treatment Facility (WWTF) Improvements. Phase I of the proposed upgrade, addressed in this project, will improve effluent quality. Subsequent phases will increase treatment capacity. This concept design report contains a detailed description of the improvements proposed for each unit process. The recommendations in the Final WWTF Master Plan (AECOM, January 2009) and subsequent WWTF Master Plan Amendment #1 (AECOM, August 2010) provided the basis for design. Technical Memorandum #2 – Sludge Thickening Systems (AECOM, Draft October 6, 2010) provided the basis for the sludge thickening system design.

1.2 Background

The District owns and operates the WWTF, which is located west of Highway 101 in the southern portion of San Luis Obispo County, California. Sheet 1, at the end of this report, shows a vicinity map and a location map of the project site.

The WWTF treats a combination of domestic, commercial, and some light industrial wastewater from the unincorporated community of Nipomo, California. The WWTF operates under Waste Discharge Requirements Order No. 95-75 (see Appendix A) which specifies a permitted capacity of 900,000 gallons per day (gpd) based on the maximum monthly flow (MMF). Currently, wastewater is treated by two grinders and four aerated ponds and discharged to onsite infiltration basins.

On February 7, 2006, the District received a Notice of Violation (NOV) from the Regional Water Quality Control Board (RWQCB) for several effluent quality violations reported during 2005. The NOV required the District to investigate the dependability of analytical results, investigate WWTF improvements, and submit a report of actions needed to correct wastewater treatment deficiencies and discharge violations. The District retained AECOM to respond to the NOV's requirements.

AECOM and District staff identified the need for a new treatment process as a result of the NOV and concerns with onsite effluent disposal. These issues are detailed in the WWTF Master Plan (MP). The MP outlined the strategy for future capital improvements at the WWTF. The MP was first issued in January 2009 and revised in Amendment No.1 dated June 2010.

1.3 Related Work

- Waterline Intertie Project – Provide supplemental water to Nipomo Mesa Management Area. This project is a key component in the District's salt management strategy to improve effluent quality

- Frontage Road Sewer Upgrade Project – This project will improve the capacity in community's largest trunk sewer (influent line to the Southland WWTF)

1.4 Project Description

This project includes design and construction of a new WWTF to replace the existing one. The new WWTF will utilize an extended aeration activated sludge technology (EAAS), such as Parkson Biolac ® Wave Oxidation System, to treat the wastewater to a secondary level. Other improvements include a new influent lift station, a new headworks consisting of screening and grit removal, secondary clarification, new blower and controls building, return activated sludge (RAS) and waste activated sludge (WAS) pumping, WAS thickening and sludge drying beds. A new process water system will also be provided to supply non-potable water for operational use and landscaping within the WWTF site. Section 4 in this report provides a detailed description of the improvements proposed for each of the unit treatment processes.

Section 2
Wastewater Flows and Characteristics

2.1 Wastewater Flows

Wastewater flow projections presented herein were developed in WWTF MP Amendment No. 1. Previous flow projections developed in the January 2009 MP relied on extrapolations from 2004 through 2007 flow monitoring data. Recently collected data from 2006 through 2008 indicated a baseline Maximum Monthly Flow approximately 20 percent lower that the previously reported value. The projected future[1] average annual wastewater flow is estimated to be 1.67 MGD per the MP.

AECOM's revised flow projections required revisions to the construction phasing of the WWTP improvements. The following table summarizes the existing flow rates and proposed capacities per phase:

Flow Condition	Present	Phase I	Phase II	Phase III
Average Annual Flow (AAF)	0.57	0.84	1.20	1.67
Maximum Monthly Flow (MMF)	0.61	0.90	1.28	1.79
Peak Daily Flow (PDF)	0.71	1.03	1.48	2.05
Peak Hourly Flow (PHF)	1.65	2.43	3.46	4.83
Planning/Design Threshold ("Trigger") (MMF basis)	--	0.70	1.00	1.40

This concept design report focuses on the detailed design of Phase I. Planning triggers for subsequent phases are provided in the MP Amendment, based on reaching 80% of the design capacity as shown above. We recommend the District begin planning for construction of Phase II when the wastewater flows reach a MMF of approximately 0.70 MGD.

2.2 Wastewater Characteristics

Influent wastewater five-day biochemical oxygen demand (BOD_5) used for the design of the new WWTF was obtained from historical records between September 2007 and August 2009. Wastewater samples were collected weekly for that period of time. The 90^{th} percentile BOD_5 (a parameter used for design) for the sampling period was 300 mg/l. The samples were also analyzed for total suspended solids. As discussed in

[1] Based on buildout as defined by the Land Use and Circulation elements of the SLO County General Plan for South County – Inland (revised June 23, 2006).

the MP Amendment, the results were inconsistent. Therefore, design TSS concentrations are conservatively assumed to be equal to BOD_5 concentrations.

Supplemental influent monitoring began in May, 2009. Data for May 2009 through December 2009 was examined for the design.

Based on results of the analyses, the following are the primary raw wastewater characteristics used for design:

Parameter	Value
90^{th} percentile BOD_5, mg/L	300
Average BOD_5, mg/L	250
90^{th} percentile TSS, mg/L	300
Average TSS, mg/L	250
90^{th} percentile Total Nitrogen, mg/L	60
Average Total Nitrogen, mg/L	35
Average Total Phosphorus, mg/L	5.7
Average Total Alkalinity, mg/L	35

Notes:

1. Total Nitrogen consists of ammonium, nitrite, nitrate, and organic forms of nitrogen.

2. Reported values for total nitrogen and total alkalinity are based on supplemental influent monitoring performed once per week between May and December 2009. Reported values for total phosphorus are based on supplemental influent monitoring performed once per week between August and December 2009.

It is assumed the raw wastewater alkalinity is sufficient for nitrification/denitrification without chemical addition. However, this may be required in the future depending on plant performance and changes in influent conditions.

Section 3
Site Conditions, Utilities, and Easements

3.1 Site Location and Topography

The unincorporated Nipomo community is located approximately 25 miles south of San Luis Obispo on California Highway 101. The Southland WWTF is located in Nipomo, just southeast of the intersection of South Frontage Rd and Southland Street. The property runs along the west side of Highway 101, and is generally oriented northwest-southeast. The site is bounded by agricultural fields to the southeast and southwest, Southland Street to the northwest, and Highway 101 to the east. The site is covered by low, gently rolling sand dunes and the majority has been graded for the existing facilities. Elevations range from approximately 290 to 312 feet above mean sea level.

3.2 Potable Water Supply

Potable water is provided to the WWTF via a 6-inch water line which runs along the entrance road. The water is available at hose bibs at various locations around the site, including at the influent lift station and near each aerated pond. The system also supplies water to a fire hydrant, located at the northeast end of the site, approximately 130 feet from the entrance gate, and to an emergency eyewash station, near the existing blower building. An irrigation drip system was installed to water the bushes along the easterly edge of the site. However, according to District staff, the irrigation system is no longer operable.

3.3 Power

Plant power is provided by PG&E electrical service. Overhead power lines coming from Southland Street to the northwest provide power for the existing service. The service consists of a 600 Amp, 480 Volt, 3 phase service and is described further in Section 5. The PG&E service panel and meter are located adjacent to the influent lift station near the site entrance.

3.4 Easements

The State of California has an easement through the District's WWTF property for the State Water Project. The easement grants the State a permanent exclusive pipeline easement of 1.966 acres, just southeast of the existing sludge drying beds. The easement contains restrictions for wastewater pipelines that cross the easement, as follows: *"All existing and future wastewater pipelines that cross this easement shall be maintained by the Grantor (District) in good condition and shall be sleeved with a 20' section of plastic or steel pipe centered directly over the State's water pipeline. Further, such crossings shall maintain a minimum vertical separation of not less than eighteen (18) inches, shall cross perpendicular to State's pipeline and may be subject to additional reasonable and necessary restrictions as required by State, with consideration of Grantor's input, to ensure protection of State's facilities".*

These conditions will be integrated into the design, and apply to design of the new treated effluent pipeline running from the clarifiers to the infiltration basins.

Section 4
Wastewater Treatment Upgrades

4.1 Basis of Design

The project will increase the level of treatment at the WWTF, while maintaining the existing discharge capacity (0.9 MGD on a MMF basis). The design is based on meeting Phase 1 flows and loads, while facilitating the new phases of construction required to meet future flows and loadings. The following describes the basis of design for the WWTF components, and detailed project design parameters are summarized in Sheet 3.

WWTF Component	Basis of Design
Influent Lift Station	Construct lift station to ultimately meet future PHF with one pump offline. Install pumps to meet Phase 1 PHF with one pump offline.
Mechanical Screen	Meet future PHF with one screen out of service. Remove materials greater than ¼-inch in size.
Grit Removal System	Remove grit at 50% of future PHF without decrease in efficiency at lower flows. Plan to remove grit for future PHF without decrease in efficiency at lower flows.
Aeration Basin	Provide volume and aeration to treat Phase 1 PDF and loads. Together with clarifiers, provide treatment to meet BOD_5 = 20 mg/L, TSS = 20 mg/L, TN = 10 mg/L. Plan to meet future PDF and effluent quality criteria with one basin out of service.
Secondary Clarifier	Provide volume to treat Phase 1 PDF. Together with aeration basins, provide treatment to meet BOD_5 = 20 mg/L, TSS = 20 mg/L, TN = 10 mg/L. Plan to meet future PDF and effluent quality criteria with one clarifier out of service.
RAS/WAS Pump Station	Capacity for 1.5 times Phase 1 ADF with one pump out of service.
Gravity Belt Thickener	Provide sufficient thickening capacity to handle a maximum Phase 1 WAS volume of 182,000 gal/week working 5 days a week, and 8 hours per day.
Sludge Drying Beds	Provide sufficient area for Phase 1 projected waste sludge to dry to 20% solids with minimum one cell available to accept wet sludge.

4.2 Treatment Process Description

The proposed treatment process will produce undisinfected secondary effluent. Total nitrogen will also be reduced as part of the treatment process.

The proposed treatment approach will include screening, grit removal, primary clarification, extended aeration, and secondary clarification. Biosolids thickening and drying will also be provided. Several extended aeration processes were explored in the January 2009 MP and the District selected an aeration process that utilizes floating aeration chains and is retrofitted into the existing ponds, such as the Parkson Biolac®.

Preliminary construction drawings for the proposed improvements are included at the end of this report. Each of the unit processes have been labeled with a system number for clarity and easy referencing. The following table lists the system number assigned to each of the individual treatment processes:

System	Description
10	Influent Lift Station
20	Headworks – Screening
30	Headworks – Grit Removal
40	Aeration Basin
50	Secondary Clarifiers, RAS/WAS Pump Station
60	Sludge Thickening System
70	Non-Potable Water Pump Station
80	Emergency Holding Basin
90	Sludge Drying Beds

4.3 Site Layout

The layout of the new facilities utilizes some of the existing aeration lagoons for the extended aeration basins and emergency holding basin. New berms will be constructed to divide the existing aeration lagoons since extended aeration uses smaller detention times than aerated lagoons. The new ponds will be lined using a HDPE liner to protect groundwater.

Sheet 7 shows the proposed site plan for the new WWTF. Only the improvements shown in Sheet 7 will be constructed as part of this project. Subsequent phases are labeled as "Future" and will be constructed when planning thresholds from Section 2.1 are met.

4.4 Hydraulic Profile

Hydraulic calculations for the proposed WWTF have been prepared assuming a future PHF of 4.83 MGD. The hydraulic calculations assume that the existing effluent disposal pond water surface elevation of 295.00 will remain the same.

According to the hydraulic calculations (see Appendix B), the headloss estimated from the discharge of the influent lift station pumps to the surface water elevation at the effluent ponds is approximately 14 feet. The District proposed trunk line will enter the facility at an elevation of approximately 293 ft. The total dynamic head of the influent lift station is estimated to be 35 ft.

Sheet 6 is a schematic drawing of the hydraulic profile.

4.5 Process Flow Diagram

Sheet 4 contains the proposed process flow diagram for the upgraded WWTF. The process flow diagram includes tag numbers for all the major equipment, pumps, blowers, valves and gates. Schedules of the new valves, gates, pumps and blowers are included in Sheet 5.

4.6 Influent Lift Station

The influent lift station will receive incoming raw wastewater flows through a new 24" gravity sewer line to be constructed as part of the Frontage Road Sewer Upgrade Project. Raw wastewater will enter the lift station's wet well approximately 11 feet below ground at an elevation of 293.48 ft. The influent lift station will consist of two submersible screw centrifugal pumps, each capable of handling a PHF of 1,800 gpm at 35 feet of Total Dynamic Head (TDH). An additional influent lift pump will be added in the future to handle the future design PHF flow of 3,400 gpm. Adequate wetwell size will be provided in this project for the future pump. Pre-rotation basins will be installed in the wetwell to match influent flows, reducing pump run times, and further enhancing solids removal and continual cleaning of the wet well. The lift station pumps are sized to handle the PHF with the largest pump out of service for redundancy. In addition, the influent lift pumps will be connected to an emergency generator to provide power during outages in the grid.

The influent lift station wet well will be enclosed and constructed to just above ground level. Access to the wet well will be provided through a hatch and a ladder system. Hatches will also be provided above each of the submersible pumps for their removal for maintenance purposes. A traveling bridge with an electrical hoist will be located above ground to facilitate the lifting and removal of the submersible pumps.

The interior of the influent lift station will be lined using a protective coating to prevent deterioration from hydrogen sulfide. An auxiliary ventilation system will also be provided to provide circulation within the wet well and prevent accumulation of hydrogen sulfide.

The following table lists the design parameters used in the design of the Influent Lift Station:

Design Parameter	Value
Number of Pumps	2
Type	Screw Centrifugal
Tags	10-ILP-01, 10-ILP-02
Capacity (each)	1,800 gpm @ 35 ft TDH
Motor Size	20 HP
Roof Vent Capacity	600 scfm
Hoist Capacity	3 Tons

Sheets 8 and 9 at the end of this report show a plan view and a section of the conceptual design of the influent lift station.

4.7 Headworks

The influent lift station will convey raw wastewater through a 14" pipeline to the headworks. The purpose of the headworks is to provide removal of large solids and settleable solids that could damage downstream equipment or affect the performance of downstream processes. The headworks will consist of fine screening followed by grit removal.

4.7.1 Screening

Screening of incoming wastewater will be provided directly after the influent pump station. Raw wastewater conveyed into the headworks structure will be split in two separate channels each with one shaftless spiral screen mounted in parallel. A center bypass channel with a manual coarse screen will be provided for emergency situations. Slide control gates will be provided in each of the screen's influent channels. Stop plates will be provided in the emergency bypass channel.

The proposed screening system uses shaftless spiral technology to perform screening, solids conveying and dewatering in one step. The spiral screw conveys screenings through a dewatering zone located in the screen's shaft. The spiral is surrounded by a stainless steel tube that encloses screenings, minimizes odors and provides clean, hygienic operation.

The screening system's shaftless core handles a greater volume of solids than alternative shafted screw designs. Fibrous and bulky solids have a clear, barrier-free path to the dewatering zone. The shaftless design also eliminates the need for maintenance-intensive bottom support bearings and intermediate hanger bearings. A common spiral shaftless conveyor will be provided to collect screenings from both screens and deposit them onto a bin located at ground level for easy removal.

The following table shows the design parameters followed in the design of the screening system.

Design Parameter	Value
Number of Screens	2
Type	Shaftless Spiral Screen
Tags	10-SSS-01, 10-SSS-02
Opening Size	¼"
Motor Size	1.5 HP
Process Water Demand	7 gpm @ 60 psi
Channel Width	24"
Channel Depth	48"
Max. Headloss	12"

Sheets 10 and 11 at the end of this report shows the plan and sections of the headworks structure and sections of the screening.

4.7.2 Grit Removal

Following screening, wastewater will flow into a vortex grit removal tank. The grit tank will consist of a circular concrete tank with a tangential entry. The flow will travel through 270 degrees before exiting the outlet channel which is ultimately parallel to the inlet channel. The grit will first be separated from light organic solids in the upper section of the chamber and then collected in the lower storage hopper.

A top mounted drive, drive tube and impeller will create a radial flow around the grit chamber that will encourage the grit to sink by gravity around the outer edge of the upper section. The system will be able to remove grit at the hydraulic peak flow rate with no decrease in efficiency at flows less than design capacity.

Solids collected in the lower section of the grit tank will be periodically removed through a self-priming grit pump. The 4-inch diameter grit suction pipe will be an integral part of the grit removal system running from the storage hopper up through the drive tube and drive head to terminate in the top mounted grit pump. Also a 1.5 inch diameter grit fluidizing pipe will run parallel with the suction pipe from the storage hopper to terminate with a solenoid valve above the drive head.

Settled grit will be pumped through a cyclone to separate the organic material from the heavy inorganic grit particles. Reject water from the cyclone will gravity-flow back to the influent lift station wet well. The heavy inorganic grit particles will drop into the grit classifier hopper where a shaftless screw conveyor will convey grit into a storage bin. The following table shows the design parameters of the grit removal system:

Design Parameter	Value
Number of Grit Tanks	1
Type	Vortex
Tag No.	30-G-01
Center Drive Motor	0.5 HP
Inlet Channel Width, inches	15"
Outlet Channel Width	30"
Max. Headloss	1"
Grit Pump	
Tag No.	30-GRP-01
Type	Self-Priming
Capacity	250 gpm @ 13 ft TDH
Motor Size	2 HP
Grit Classifier	
Tag No.	30-GCL-01
Motor Size	1.5 HP

Sheets 12 and 13 at the end of this report show the plan and section of the grit removal tank and auxiliary equipment.

4.8 Aeration Basin

Pre-treated wastewater (screened and de-gritted) will gravity-flow into the aeration basin flow splitter box. At build-out, the flow splitter box will separate the flow into three aeration basins using equal length weirs. However, this initial phase only requires a single aeration basin and the flow splitter box will only have one of the weirs. The other two will be knock-out walls that will be removed in subsequent phases.

At the flow splitter box, wastewater will mix with Recycled Activated Sludge (RAS) from the bottom of the secondary clarifiers. The mix of pre-treated wastewater and RAS will become mixed liquor (ML). ML is primarily a suspended culture of organisms responsible for reducing the bulk of the soluble wastewater BOD. The organisms feed on the soluble organic material in the pre-treated wastewater transforming it into cell mass.

The aeration basin will be constructed inside one of the existing aeration lagoons by constructing an earth embankment. The basin will be lined using HDPE. Air will be injected via diffuser tubes near the bottom of the aeration basin to support the ML's organisms. By the same aeration process, ammonia nitrogen will also be oxidized into nitrite and ultimately nitrate. The treatment process selected for this application is an extended aeration process retrofitted into the existing ponds using floating aeration chains and diffusers, such as the Parkson Biolac® System. In the Biolac® process floating aeration chains, also known as Bioflex®, carry suspended aeration assemblies which integrate fine bubble diffusers. The aeration chains movement creates aerobic and anoxic zones, encouraging nitrification and denitrification in a single basin.

A maintenance boat will be required for servicing the aerators. Parkson manufactures a pontoon platform designed for the Biolac® system. However, some facilities choose to utilize a less costly utility boat.

Two positive displacement (PD) blowers will be provided in this initial phase. The PD blowers will be located inside a blower/electrical building south of the aeration ponds. The PD blowers will be controlled by VFDs which will speed up or slow down the blowers based on the DO in the basins. A flow meter will be provided to monitor the amount of air supplied.

The following table shows the main design parameters of the aeration basin:

Design Parameter	Value
Number of Basins	1
Aerobic Volume	1.46 MG
Depth (at water surface)	11'
Length at grade	170'
Width at grade	161'
Hydraulic Retention Time (HRT)	1.63 days
Solids Retention Time (SRT)	25 days
Food-to-microorganism (F/M) Ratio	0.05 lbs of BOD/lbs of MLSS
Mixed Liquor Suspended Solids (MLSS)	3,100 mg/l
Aeration System	
Air Requirements	1,459 scfm
Number of Chains	7
Number of Diffusers (total)	420
Number of Blowers	2
Type	Positive Displacement
Capacity (each)	1500 scfm

4.9 Secondary Clarifiers

After the aeration basin, mixed liquor will flow into the secondary clarifier splitter box. Ultimately, for future flows the secondary clarifier splitter box will equally the flow into three secondary clarifiers. However, this initial phase only requires a single clarifier. A second clarifier is also included in this initial phase for redundancy, to be bid as an additive item. Based on bid results, and construction of one or two secondary clarifiers, the flow splitter box will consist of one or two weirs with knock-out wall(s) to be removed in subsequent phases.

The secondary clarifiers will be circular. Solids will enter the secondary clarifiers through a center column into an energy dissipating well. After entering the clarifiers, ML suspended solids will settle to the bottom of the clarifiers leaving a clear supernatant on top. The clarified effluent will overflow through a peripheral weir. The settled solids will be collected at a bottom center well and conveyed to the RAS pumping station. A spiral scraper mechanism will be used to convey the settled solids to the center well.

Floating scum will accumulate at the surface of the secondary clarifiers. Scum will be pushed by a rotating baffle at the surface of the clarifiers into a scum box located in the periphery. At each pass, water will be sprayed onto the scum box and scum solids will flow to the scum pumping station wet well. Once a certain level has been reached, a scum pump will switch on conveying the scum to the sludge drying beds. The scum pumping station will be located centrally from each clarifier. Treated effluent weirs usually experience algae growth that can adversely impact effluent quality. A spray water system mounted on the arm of the rotating mechanism will keep the weirs clean of algae growth and reduce the maintenance requirements.

The following table lists the main design parameters for the secondary clarifiers:

Design Parameter	Value
Number of Clarifiers	2 *
Type	Circular
Diameter, ft	55
Side Water Depth (SWD), ft	15
Hydraulic Overflow Rate, gal/ft^2/d	
@ ADF	240
@ PHF	694
Solids Loading (@ 150% Recycle), lbs/ft^2/d	
@ADF	0.95
@PHF	1.67
* One secondary clarifier is to be bid as an additive item.	

Sheets 16 and 17 show the plan and section of the proposed secondary clarifier.

The following table lists the design parameters for the scum pumping station:

Design Parameter	Value
Number of Scum Pumps	1
Type	Submersible
Capacity	20 GPM
Motor Size	2 HP

4.10 RAS/WAS Pumping

Settled sludge collected at the center well will flow into a RAS/WAS pumping station wet well located next to each clarifier. Each clarifier will have a dedicated RAS/WAS pumping station wet well with two submersible pumps, one duty and one standby. Variable frequency drives (VFDs) on the pumps and flow meters on each discharge line will control the RAS flow to maintain consistent RAS pumping between clarifiers. The RAS pumps will continuously recirculate sludge back to the aeration basin splitter box.

WAS will be purged from the system periodically as solids begin to build up in the aeration basin. Based on the Mixed Liquor Suspended Solids (MLSS) in the aeration basin, and the desired sludge age, the operators will determine the purge volume. Under normal operation, WAS will be conveyed into a Gravity Belt Thickener (GBT). An Emergency Holding Basin is also provided to receive WAS during times when the GBT is out of service. The operator will manually start the GBT and it will automatically stop once the desired volume of WAS has been reached. A WAS feed pump will draw sludge from the discharge pipe of the RAS pumps. The WAS thickening process is further described in Section 4.12.

The following table lists the main design parameters for the RAS/WAS pumping station:

Design Parameter	Value
RAS Pumps (per clarifier)	
Number	2
Type	Submersible
Capacity (each)	940 gpm
Motor Size	10 HP

Sheets 18 and 19 show the plan and section of the proposed RAS/WAS and Scum pumping stations.

4.11 Effluent Disposal & Reuse

A non-potable water system will be installed to provide water for washdown and various operations around the site. The water may also be used for landscape irrigation around the site. Hypochlorite will be injected to provide disinfection and reduce algal growth. Development of an onsite irrigation system or improvements to the existing irrigation system is not part of the current project.

Treated effluent from the secondary clarifier will flow into the process water (non-potable water) pumping station. Two vertical turbine pumps will pump a portion of the treated effluent into a hydropneumatic tank for reuse within the WWTF. The remaining effluent will overflow through a constant elevation weir.

Non-potable water uses within the WWTF include hose bibs for washing operations, spray water in the screens, and fluidizing water for grit and sludge removal. Landscaping demands within the WWTF may also be met with process water. Sodium hypochlorite will be added to the process water to prevent growth within the distribution system and to provide disinfection.

The process water pumping station needs to be sized for the future WWTF flows. The following table provides a list of estimated process water demands at buildout:

Location	Flow (gpm)
Influent Lift Station	
Hose Bib	10
Headworks-screening	
Shaftless Screens Spray (2 Total)	20
Hose Bib	10
Headworks –Grit Tanks	
Grit Pumps	50
Hose Bib	10
Aeration Basins	
Hose Bibs (6 Total)	60
Secondary Clarifiers	
Hose Bibs (3 total)	30
Weir Cleaning System	30
Scum Well	15
Sludge Aeration Basins	
Hose Bibs (3 Total)	30
Sludge Drying Beds	
Hose Bibs (4 Total)	40
Landscaping	30
Total	335

Process water demands listed in the previous table will not occur simultaneously. It is assumed that as much as 50 percent of the total process water demands may occur simultaneously. An average process water demand at build out of 100,000 gallons per day is assumed for design purposes.

The following table summarizes the design parameters for the process water pumping station and auxiliary equipment:

Design Parameter	Value
Process Water Pumps	
Number	2
Type	Vertical Turbine Pumps
Capacity (each), gpm	200 gpm @ 60 psi
Motor Size, HP	10
Hydropneumatic Tank	
Number	1
Size	5,000 gal
Pressure Settings	
Min	40
Max	60
Sodium Hypochlorite Storage and Pumping	
Dose	10 mg/l
Daily Process Water Flow	100,000 gallons
Sodium Hypochlorite Consumption (daily)	8.34 gallons
Storage	300 gallons
Dosing Pumps	
Number	2
Type	Diaphragm
Capacity	1.4 l/h

Sheets 20, 21 and 22 shows plan and sections of the process water pumping station, hydropneumatic tank and sodium hypochlorite storage area. The sodium hypochlorite tank and dosing pumps will be stored in a CMU or precast concrete building (concrete precast and reinforced masonry will be evaluated during design). Sheet 23 shows a schematic layout of the non-potable water system within the WWTF.

4.12 Sludge Thickening

As mentioned earlier, WAS will be purged from the system periodically (as needed), thickened and conveyed to paved sludge drying beds for solar drying. WAS will be purged from the RAS pipeline. A progressing cavity WAS feed pump will draw sludge from this pipeline and discharge it into a Gravity Belt Thickener (GBT). The operators will control the volume of WAS purged daily. The GBT will be started manually and will shut down after the desired volume has been purged.

An Emergency Holding Basin (EHB) will receive WAS during times when the GBT is out of service. The EHB will be a lined earthen basin with capacity to hold approximately1 MG. Sludge pumped into the SHL will be pumped back into the GBT once is back into service.

Prior to entering the GBT, WAS will be conditioned. Liquid polymer will be injected upstream of the GBT and mixed with the sludge using an adjustable orifice plate. The conditioned sludge will pass through the gravity belt thickener where it will be thickened to a concentration of at least 7% solids. Thickened Sludge (TS) will pour onto the hopper of the TS pump. The TS pump will convey the TS to one of the paved sludge drying beds for drying. The following table lists the main design parameters used in the design of the sludge thickening system.

Design Parameter	**Value**
WAS Feed Pump	
Number	1
Type	Progressing Cavity
Capacity	120 gpm
Motor HP	10
Polymer System	
Metering Pump	
Number	1
Type	Progressing Cavity
Capacity	3.0 gph
Motor HP	10
Polymer Type	Liquid
Gravity Belt Thickener	
Number	1
Capacity	100 gpm
Belt Width	0.5 m

Design Parameter	Value
TS Pump	
Number	1
Type	Progressing Cavity
Capacity	20 gpm
Motor HP	10

Sludge drying beds will be concrete-lined basins where sludge will be allowed to dry through evaporation. Dried sludge will be removed using mechanical equipment such as front end loaders and hauled away for final disposal. Two sludge drying beds will be constructed. Each of the sludge drying beds will have six cells separated by vertical concrete walls.

The following table lists the main design parameters used in the design of the sludge drying beds:

Design Parameter	Value
Sludge drying beds	
Number	2
Cells (in each sludge drying bed)	6
Area (each cell)	5,480 ft^2
Sludge Depth	15"

Section 5
Electrical and Instrumentation

5.1 Existing Electrical Service

The existing service consists of a 400 Amp, 480V, 3 phase service from a PG&E pole mounted transformer. Electrical equipment consists of a Main Switchboard and Motor Control Center mounted outdoors in a weatherproof enclosure. A portable generator rated at 300KW, 480V, 3 Phase provides standby power. Refer to sheet 28 for the existing electrical equipment.

The existing electrical service and the new electrical service will both be operational at the same time. The existing service will be demolished after the new process equipment is operational and the electrical controls and power tests have been accepted, and the existing plant is ready for demolition.

5.2 Proposed Electrical Service

The proposed electrical service will be 800 Amp feeding an 800 Amp, 277/480V, 3 phase, 4 wire main switchboard. The main switchboard will be mounted indoors in a new electrical room.

The new main switchboard will consist of an underground pull section, utility meter compartment with remote meter, main circuit breaker and a standby power circuit breaker. The main circuit breaker and the standby power circuit breaker will be interlocked so that only one can be closed at a time. The standby power circuit breaker will be connected to the portable generator power panel and can provide standby power when the PG&E power fails. The connection of the standby power generator to power the plant will be a manual operation of the main circuit breaker and standby power circuit breaker. An alarm will be activated to alert operators if grid power is lost.

The main switchboard will power Motor Control MCC-A which will be rated at 800 Amp, 480V, 3 Phase, 3 wire and will include a 480-120/240V transformer and a 120/240v, 1 Phase, 3 Wire power panel for low voltage loads, 480V circuit breakers, and combination motor starters. Refer to sheet 29.

Motor Control center MCC-B will be powered from MCC-A and will rated at 600 Amp, 480V, 3 Phase, 3 Wire and will consist of 480V circuit breakers, and combination motor starters. Refer to sheet 29.

Refer to sheet 30 for the electrical equipment elevations and load calculations.

The electrical room will be air conditioned to keep the variable frequency drives (VFDs) from overheating.

5.3 Local Controls

The process motor loads will have local disconnects and local start/stop stations. Weatherproof convenience receptacles with ground fault interrupters, will be located around the site to provide maintenance personnel with 120 volt power.

The existing blower building convenience receptacles and building lighting will remain and the building will be converted to storage. The existing 480V-120/240, 1 phase transformer, that power existing panel "LT-A" will be intercepted and will be powered from the new motor control center MCC-A.

5.4 Site lighting

The site lighting will consist of 12 foot high poles with metal halide lights with motion sensor and local override switch. The lighting will be kept to a minimum at the south side of the site so that the neighbors will not be disturbed by light intrusion.

5.5 Building Lighting

The electrical room and the blower room lighting will consist of fluorescent strip lights with dual local switching. The exterior of the building will have wall mounted metal halide fixtures controlled by a photocell.

5.6 Standby Generator

The District currently uses a portable generator rated at 300 KW for emergency use during power outages. The existing generator will be sufficient to power the new WWTF Phase 1 improvements. A 480/277 V, 3 phase, 400 KW generator will be required for the planned Phase 3 (future) plant. We suggest that the District budget for installation of a 480/277V, 3 phase, 400 KW generator during Phase 2 improvements.

5.7 System Redundancy

The following describes some measures to improve WWTF redundancy:

- Provision for portable standby generator.
- Redundant process equipment (pumps, screens, etc.)

There are no provisions for redundancy in process controllers. When a specific process becomes non-operable due to a controller (PLC) failure, the following will occur:

- WWTF will shutdown allowing sewage to fill the wet well and backup the collection system
- Alarm will be generated and sent to operator(s)

Critical processes will be able to operate in manual mode, which might require operator's on-site presence.

Controls Narrative

5.8.1 Influent Lift Station

The influent lift station will consists of two pumps, a level sensor and a roof-mounted fan. The controls at the influent lift station will consist of the following:

- Wet Well Level Sensor: a submersible transducer level sensor in the wet well will monitor the incoming raw wastewater levels at all times. The raw wastewater level signal will be registered in the

SCADA system and will be used to control the influent lift pumps. Alarms will be provided at a high level set point, low level, pump fail, etc.

- Influent Lift Pump: the Influent lift pumps will be constant speed. Operator will manage water level set points using SCADA, which will automatically turn the pumps on an off based on water level. Prerotation basins will assist in matching influent and effluent flows. During low flow periods, when incoming flows are below the minimum flow of the pump, the pump will switch off and allow the levels to rise before it turns on again.

  The influent lift pumps will be water cooled. A thermal sensor and a moisture sensor will be provided for motor protection. The signals from these sensors will be registered in the SCADA system and will trigger an alarm in the event that the set point is exceeded.

- Roof-fan: the roof fan will blow air into the wet well preventing the accumulation of gases such as hydrogen sulfide. The fan will be on constantly. An alarm will be triggered if the fan stops.

5.8.2 Headworks – Screening

The screening portion of the headworks will consist of two screens mounted in parallel. One of the screens will be capable of handling the peak hour flow. The second one is provided for redundancy.

The proposed screens consists of a perforated plate submerged in the wastewater with a shaftless screw conveyor that will keep the perforations clean and discharge the screenings into a second conveyor.

The operation of the shaftless conveyor will either be manual or automatic. Under automatic operation the screen will be controlled by either time or headloss. Two ultrasonic level sensors will be installed in each channel, one upstream and one downstream. When the headloss through the screen exceeds a set point, the shaftless screw will turn on removing solids from the perforations and reducing the headloss to a normal value. If a certain amount of time passes by and the set headloss is yet not exceeded, the shaftless screw will turn on for a set period of time and will turn off after that.

The screenings will be conveyed into a second shaftless conveyor that will be controlled by the screen controls. When the screw conveyor in any of the screens is on, the second conveyor will be on and vice versa. High torque alarms and switches will be provided in all the conveyors to alert operators in the event of jamming.

5.8.3 Headworks – Grit Removal

The proposed grit removal equipment includes a center drive, a grit pump, and a grit classifier. The following controls will be provided for the grit removal system:

- Center Drive: The grit tank center drive will operate continuously providing the rotation required for the grit removal. An On/Off signal will be connected to the SCADA system and an alarm will be triggered if the motor stops.

- Grit Pump: the grit pump will be operated by a timer. The timer will allow the operator to set an operation time (On) during a cycle time also set by the operator. Before the grit pump is turned on, water under pressure will be injected to fluidize the grit. A solenoid valve will open and allow the pressure water to flow for a set time before the pump turns on. After the fluidizing period, the self-priming pump will turn on pumping grit through a cyclone into the grit classifier. The grit classifier will operate for a set period of time in a cycle independently from the grit pump.

5.8.4 Aeration Basin

The aeration basin will consist of diffusers and monitoring equipment. The following is a description of the aeration basin operations:

- Dissolved Oxygen (DO): a DO probe will be provided to control the air flow into the basin. The DO probe will be installed near the effluent weir and will continuously record the DO levels in the basin. The DO signal will be registered in the SCADA system and will trigger an alarm if the DO concentration falls below a set point for a set period of time.
- Mixed Liquor Suspended Solids Analyzer: the MLSS concentration in the aeration basin will be continuously monitored. The MLSS probe will be located near the effluent weir. The MLSS signal will be registered in the SCADA system.
- Blowers: Two positive displacement blowers will be installed, one duty, one standby. The PD blowers will supply air to the aeration basin as needed. The signal from the DO probe will speed or slow the blowers to maintain a set DO point. The blowers will be VFD controlled.

5.8.5 Secondary Clarifier

The secondary clarifier will consist of a center drive that rotates a scraper mechanism to collect the sludge. The center drive will operate continuously. An On/Off signal will be registered in the SCADA system and will trigger an alarm if the center drive stops. A torque sensor will be provided for protection of the center drive motor.

A surface mounted scum box will collect the scum from the surface of the secondary clarifier. The rotating arm will push the scum onto the box and will turn on a sprayer that will wash the scum into the scum wet well. The wet well will contain a submersible pump which will be controlled by SCADA using water level set points. When the scum level in the wet well reaches a preset level, a transducer will signal to SCADA and SCADA will direct the pump to turn on and pump levels down to a low level point. Scum will be pumped to the sludge drying beds.

A weir cleaning mechanism will be mounted on the radial arm. The weir cleaning mechanism will either use pressure water or brushes to clean the walls of the weir and prevent algae growth. The weir cleaning mechanism will either operate on a timer for periods of time during the day if pressurized water is used or continuously if brushes are used.

5.8.6 RAS/WAS Pump Station

The RAS/WAS pumps stations will consist of two RAS pumps in a wet well adjacent to each clarifier. One of the two RAS pumps will operate continuously while the other is provided for redundancy. The RAS pumps will be VFD controlled to maintain a constant level in the wet wells.

A RAS flow meter will be installed on each discharge line per clarifier and flows will be measured continuously and registered in the SCADA system. The total RAS flow rate will be set by the operator as a percentage of the average influent flow during the previous 24 hours. During normal operation, SCADA will split the total RAS flow between online clarifiers to maintain even RAS pumping from each. Operators will also have the ability to pump different amounts from the clarifiers if needed.

Once a day (or as needed) operators will calculate the volume of sludge that needs to be purged from the system. The volume will be entered into the SCADA system and the WAS pump will turn on, pumping sludge to the sludge thickening system until the set volume has been reached. A flow meter will measure the WAS flow and the signal will be registered in the SCADA.

5.8.7 Process Water Pump Station

The process water pump station will provide non-potable water for miscellaneous uses throughout the facility. The process water pump station will consist of two vertical turbine pumps, a hydropneumatic tank and a sodium hypochlorite dosing system.

The vertical turbine pumps will be mounted on a concrete structure with a fixed weir that maintains sufficient depth for the pump column. The pumps will be controlled by pressure and level in the hydropneumatic tank.

The hydropneumatic tank will maintain pressure in the system. The water level in the hydropneumatic tank will fluctuate between a maximum and a minimum level. Once the minimum level is reached, one of the turbine pumps will be switched on and the hydropneumatic tank will be filled to the maximum level set point. A pressure switch will monitor the air pressure in the hydropneumatic tank. Once the pressure drops below the low pressure set point, air will be compressed and injected in the tank until the pressure rises to a maximum pressure set point.

A chemical dosing system will inject sodium hypochlorite in the process water upstream to prevent growth in the system and to provide some disinfection of the water. The sodium hypochlorite system will consists of a storage tank and two dosing pumps, one duty, one standby. The dosing will be manually adjusted to maintain a chlorine residual in the system. The dosing pumps will be controlled by the hydropneumatic tank. When one of the turbine pumps turns on, the dosing pump will also turn on.

5.8.8 Sludge Thickening System

WAS will be pumped into the aerated sludge digesters. Surface floating aerators will maintain the sludge partially mixed and will keep an aerobic layer on top of the digesters to prevent nuisance conditions. A dissolved oxygen sensor will be mounted in each of the digesters and will turn the aerators on or off based on the DO concentration.

During the sludge transfer, operators will switch the aerator controls to manual. All the aerators will be turned off manually and sludge will be allowed to settle. Supernatant will be decanted using a floating decanter connected to a portable pump. Once decanted, aerators will be manually switched on and sludge will be mixed again. Using the same portable pump, sludge will be transferred from the digesters into one of the sludge drying beds.

5.8.9 Sludge Drying Beds

Two paved sludge drying beds, each of them consisting of six cells will receive transferred sludge from the sludge thickening system. A manual plug valve will control the cell(s) that will be receiving sludge. Once the depth in a cell reaches approximately 15", the operator will manually turn the valves to switch from one cell to the next. Sludge will then be allowed to dry until its consistency is such that allows removal using front loading equipment.

The operation of the sludge drying beds will be manual.

5.9 SCADA System

The WWTF will be tied to NCSD with a Supervisory Control and Data Acquisition (SCADA) System, which needs to be modified to accommodate the WWTF.

A single PC workstation will be housed in the Electrical Building Control Room for operator's control.

Treatment process will be controlled by several programmable logic controllers (PLC), tied into a Control Network, which will interface to the SCADA server(s). Control Network will use Ethernet-based control protocol over fiber optic cables. WWTF will be tied to NCSD Operations Center via fiber optic cable.

PLCs, which are part of the packaged equipment (Aeration System, etc.), will be tied to the SCADA System for monitoring (view only) and logging.

SCADA system will allow operators to monitor and control the treatment process, log the alarms, store historical data, and generate reports. Operators will be able to remotely access the plant control system from a laptop PC via telephone dial-up or Internet connection.

SCADA System will have an automatic dial-up feature to notify an after-hours on-duty operator of the alarm conditions via the phone, cellular phone, or pager.

Process parameters to be monitored by SCADA system include, but not limited to, the following:

- Equipment status (Ready, Run, Fail).
- Pump speed (for variable speed pumps).
- Valve status (open/closed or percent opening for modulating valves).
- Process parameters (level, flow, pressure, temperature, etc.)
- Alarms (high or high-high level, low or low-low level, hazardous gas concentration, etc.)

The following is a partial list of proposed hardware/software vendors for the control system:

- PLCs - Allen-Bradley (including the PLCs for packaged equipment)
- Magnetic flow meters - ABB, or equal
- Pressure transmitters - Rosemount
- Ultrasonic level transmitters -- Milltronics

Section 6
Structural Design

6.1 General Design Codes

The structural design of the proposed treatment facilities will reference applicable and current building codes and project-specific soils data as outlined in the following discussion.

- ACI 350.06, Code Requirements for Environmental Engineering Structures.
- ACI 318, Building Code Requirements for Structural Concrete.
- CBC 2007, California Building Code.
- ASCE 7-05, Minimum Design Loads for Buildings and Other Structures.
- PCA, Circular Concrete Tanks.
- AISC, Manual of Steel Construction.
- ACI 530-05, Building Code Requirements for Masonry Structures.

6.2 Geotechnical/Foundation Criteria

The project Geotechnical Report dated July 21, 2010, by Fugro West, Inc. was reviewed.

The site soils consist of primarily dune sands, both loose or dense. The foundation preparation will include as a minimum an overexcavation of 5 feet below the bottom of footings, backfilling with competent materials, and compaction to at least 90 percent relative density.

The foundations for the proposed facility will be designed as a "flat slab" type support system to uniformly distribute bearing pressures and reduce the possibility of differential settlement.

6.3 Seismic Design Criteria

The design of all facilities will include loadings generated by near source potentially active earthquake faults. Earthquake lateral and vertical forces will be developed per recommendations contained in ASCE 7 and ACI 350.3. Design equations will include an Importance Factor of 1.5.

Section 7
Opinions of Probable Costs

7.1 Capital Construction Cost

AECOM developed an opinion of probable construction cost. The following table summarizes the cost opinion divided by major project components. The total probable construction cost opinion is approximately $8.9 million, including a 25% project contingency and escalated to the anticipated midpoint of construction. A detailed summary is included in Appendix D.

Project Component	Cost
Influent Pump Station and Flowmeter Improvements	$513,700
Spiral Screening System	$355,200
Grit Removal System	$276,300
Extended Aeration System	$1,279,600
Secondary Clarifiers	$1,782,100
Sludge Thickening System	$410,400
Holding Pond	$80,700
Sludge Drying Beds	$578,800
Controls & Blower Building	$253,200
Non-Potable Plant & Irrigation Water Systems	$228,300
Site Piping	$657,100
Instrumentation and Controls	$310,100
Electrical	$402,100
Subtotal	**$7,128,000**
Contingency (25% of subtotal)	*$1,782,000*
TOTAL (rounded to 1000)	*$8,910,000*

Notes:
1. ENR CCI (April 2010) = 8677
2. Costs are escalated by 2% per year to midpoint of construction (estimated 1/10/2012).
3. Construction costs do not include design fees, construction management fees, permitting fees, or other "non-construction" project related costs.
4. The opinion of probable construction cost prepared by AECOM represents our judgment and is supplied for general guidance to the District. Since AECOM has no control over the cost of labor and materials, or over competitive bidding or market conditions, AECOM does not guarantee the accuracy of such opinions as compared to contractor bids or actual costs.

7.2 Operating & Maintenance Costs

7.2.1 Power Consumption

The power consumption for major WWTF components was estimated for the Phase 1 WWTF upgrades, as summarized in the table. A miscellaneous power consumption of 20 horsepower (HP) was added to cover minor uses, such as lighting, screening system, grit removal system, and intermediate pumping for non-potable water and irrigation systems, etc.

Plant Component	Phase 1 Power Usage (HP)
Influent pumping	20
Extended Aeration	50
RAS pumping	20
Sludge Thickening System & Pumps	25
Miscellaneous	20
Total	135

A total power consumption of 135 HP was estimated. To conservatively estimate power costs, AECOM calculated annual power needs assuming this consumption is average for 24 hours per day, 365 days per year. Power consumption is estimated to be 882,200 killowatt-hours per year (kwh/yr). Based on $0.13 per kwh, the annual electricity cost for Phase 1 is estimated to be approximately $115,000.

7.2.2 Chemical Costs

The annual chemical costs were estimated. Two chemicals will be regularly required for operations at the WWTF: sodium hypochlorite for the process water system and a polymer for the sludge thickening system.

The process water usage at the WWTF will require sodium hypochlorite for disinfection and to reduce algal growth in the system. Process water flow is estimated at 100,000 gpd. With a sodium hypochlorite dosing of 10 mg/L, the daily consumption is estimated to be 8.34 gallons. A 300 gallon storage tank is recommended, providing just over 1 month of storage (36 days).

Assuming a 10% increase in consumption for incidentals and $1.50 per gallon for the sodium hypochlorite delivery to the site, the annual sodium hypochlorite is estimated at $5,050.

The annual polymer cost for the gravity belt thickener was estimated. The annual polymer cost is estimated to be approximately $3500, using the following assumptions:

- Sludge yield = 0.75 pounds of dry sludge per pound of BOD_5 removed
- BOD_5 influent = 300 mg/L; BOD_5 effluent = 20 mg/L; MMF = 0.90 MGD
- Polymer required = 4 pounds per ton of dry sludge
- Polymer cost = $3.00 per pound

The total annual chemical costs for Phase 1 are estimated to be approximately $8,550.

APPENDIX A

WASTE DISCHARGE ORDER MONITORING & REPORTING PROGRAM

Cal/EPA

Certified P 381 741 818

Pete Wilson
Governor

Central Coast Regional Water Quality Control Board

81 Higuera Street
Suite 200
San Luis Obispo, CA
93401-5427
(805) 549-3147
FAX (805) 543-0397

October 29, 1997

Mr. Doug Jones, General Manager
Nipomo Community Services District
261 Dana Street, Suite 101
Nipomo, CA 93444

Dear Mr. Jones:

WASTE DISCHARGE REQUIREMENTS FOR NIPOMO COMMUNITY SERVICES DISTRICT, SOUTHLAND WASTEWATER WORKS, SAN LUIS OBISPO COUNTY, ORDER NO. 97-75

Enclosed is a copy of Order No. 97-75, Nipomo Community Services District, Southland Wastewater Works, San Luis Obispo County, which was adopted by this Board on October 24, 1997.

Sincerely,

CALIFORNIA REGIONAL WATER QUALITY
CONTROL BOARD, CENTRAL COAST REGION

BY ____________________
Roger W. Briggs
Executive Officer

Enclosure

p:\cm\final.ltr

cc: Garing Taylor & Assoc.
141 East Elm Street
Arroyo Grande, Ca 93420

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NIPOMO COMMUNITY SERVICES DISTRICT

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Our mission is to preserve and enhance the quality of California's water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations.

WDID No. 400104001

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION
81 Higuera Street Suite #200
San Luis Obispo, California 93401

ORDER NO. 97-75

WASTE DISCHARGE REQUIREMENTS FOR NIPOMO COMMUNITY SERVICES DISTRICT, SOUTHLAND WASTEWATER WORKS, SAN LUIS OBISPO COUNTY

The California Regional Water Quality Control Board, Central Coast Region (Board), finds;

1. Nipomo Community Services District (Discharger) owns and operates a municipal wastewater treatment facility which serves the town of Nipomo.

2. The Discharger filed a Report of Waste Discharge, in accordance with Section 13260 of the California Water Code, for authorization to increase discharges to the wastewater facility on January 24, 1996, and supplemented the Report of Waste Discharge with additional information on July 31, and September 30, 1996, and July 9, 1997. The discharge is currently regulated by Waste Discharge Requirements Order No. 84-56 adopted by the Board on July 13, 1984.

3. The treatment facility consists of influent grinding and aerated lagoons. Treated wastewater is discharged to 5.3 acres of percolation beds. Current design capacity is 360,000 gallons per day (1360 m^3/day), and design capacity of the expanded facilities is 900,000 gallons per day (3406 m^3/day), for which 14.5 acres total percolation basin area will be needed.

4. The percolation beds are located on level topography consisting of sandy soils. Perched ground water occurs at approximately 30 to 40 feet below ground surface, however the quality and direction of flow of this perched water is not clearly determined. A deeper ground water supply occurs at approximately 180 to 200 feet below ground surface and flows toward the southwest. Ground water constituent concentrations in the vicinity of the discharge are reportedly:

Total Dissolved Solids	260 mg/l
Sodium	36 mg/l
Chloride	36 mg/l
Nitrate (as N)	11 mg/l
Sulfate	22 mg/l
Boron	<0.1 mg/l

5. Nipomo Creek, tributary to the Santa Maria River, is located approximately 1/4 mile northeast of the discharge facilities and flows in a southeasterly direction. The wastewater facilities are not within the 100-year flood plain of Nipomo Creek.

6. The Water Quality Control Plan, Central Coast Basin (Basin Plan) was adopted by the Board on September 8, 1994. The Basin Plan incorporates statewide plans and policies by reference and contains a strategy for protecting beneficial uses of State waters.

7. Present and anticipated beneficial uses of ground water in the vicinity of the discharge include: Domestic, Municipal, Agricultural and Industrial Supply.

8. Water quality objectives specified in the Basin Plan for ground water in the vicinity of the discharge include:

Total Dissolved Solids	710 mg/l
Sodium	90 mg/l
Chloride	95 mg/l
Nitrate (as N)	5.7 mg/l
Sulfate	22 mg/l
Boron	0.15 mg/l

9. Nipomo Community Services District certified a final Environmental Impact Report for the existing wastewater facilities in accordance with provisions of the California Environmental Quality Act (Public Resources Code, Section 21000, et. seq.) and the California Code of Regulations on July 14, 1983. The Environmental Impact Report identified potential impacts to water quality from the discharge of nitrates and dissolved solids to ground water. Mitigations include changes in the design and operation of the facility and implementation of a sewer use ordinance. Nipomo Community Services District certified an Initial Study and Negative Declaration for proposed expansion of the wastewater facilities on October 2, 1996, which found no significant potential for impact to surface or ground water quality from the expanded discharge.

10. Discharge of Waste is a privilege, not a right, and authorization to discharge is conditional upon the discharge complying with provisions of Division 7 of the California Water Code and any more stringent effluent limitations necessary to implement water quality control plans, to protect beneficial uses, and to prevent nuisance. Compliance with this Order should assume this and mitigate any potential adverse changes in water quality due to discharge.

11. On **August 5, 1997,** the Board notified the Discharger and interested agencies and persons of its intent to revise waste discharge requirements for the discharge and has provided them with a copy of the proposed Order and an opportunity to submit written views and comments.

12. After considering all comments pertaining to this discharge during a public hearing on October 24, 1997, this Order was found consistent with the above findings.

IT IS HEREBY ORDERED, pursuant to authority in Section 13263 of the California Water Code, Nipomo Community Services District, its agents, successors, and assigns, may discharge treated wastewater from the Wastewater Treatment Facility, providing compliance is maintained with the following:

(Note: Other prohibitions and conditions, definitions, and the method of determining compliance are contained in the attached "Standard Provisions and Reporting Requirements for Waste Discharge Requirements" dated January 1984.)

Throughout these requirements footnote ([A]) is listed to indicate those requirements specified from the Basin Plan. Requirements not referenced are based on Staff's professional judgment.

A. PROHIBITIONS

1. Discharge to areas other than the disposal areas shown on Attachment A is prohibited.

2. Discharge of any wastes including overflow, bypass, seepage, overspray and runoff from transport, treatment, or disposal systems to adjacent drainageways or adjacent properties is prohibited.

B. DISCHARGE LIMITATIONS

1. Effluent flow averaged over each month shall not exceed 360,000 gpd. After completion of the facility expansion, monthly flow shall not exceed 900,000 gpd. Incremental flow increases (600,000 gpd Phase I and 900,000 gpd Phase II) shall be allowed with written approval of the Executive Officer, after the Discharger demonstrates that expansion of the facilities is completed.

2. Effluent discharged to the disposal facilities shall not exceed the following parameters:

Parameter	Units	Month. Mean	Daily Maximum
BOD_5	mg/l	60	100
Suspended Solids	mg/l	60	100
Settleable Solids	ml/l	0.2	0.5
pH^A	Within the range 6.5 to 8.4		
Dissolved Oxygen	mg/l	Minimum 1.0	

3. Wastewater treatment and disposal facilities shall be managed to exclude the public and posted to warn the public of the presence of wastewater.

4. Freeboard in all ponds shall exceed two feet at all times, unless the ponds are specifically designed for a different freeboard.

C. GROUND WATER LIMITATIONS

1. The treatment or discharge shall not cause nitrate concentrations in the ground water downgradient of the disposal facilities to exceed 10.0 mg/l (as N).

2. The discharge shall not cause a significant increase of mineral constituent concentrations in underlying ground waters, as determined by comparison of representative samples of groundwater collected from wells located upgradient and downgradient of the disposal area.

3. The discharge shall not cause concentrations of chemicals and radionuclides in groundwater to exceed limits set forth in Title 22, Chapter 15, Articles 4, 4.5, 5 and 5.5 of the California Code of Regulations.[A]

D. PROVISIONS

1. The requirements prescribed by this Order supersede requirements prescribed by Order No. 84-56 adopted by the Board on July 13, 1984. Order No. 84-56 "Waste Discharge Requirements for Nipomo Community Services District and Local Sewering Entity of San Luis Obispo County Service Area No. 1" is hereby rescinded.

2. Discharger shall comply with "Monitoring and Reporting Program No. 97-75", as specified by the Executive Officer.

3. Discharger shall comply with the attached "Standard Provisions and Reporting Requirements for Waste Discharge Requirements" dated January, 1984.

4. Discharger shall implement salts best management practices within the sewer service area to minimize salts contributions to the sewer system and subsequent discharge to the disposal facilities.

5. Discharger shall submit results and conclusions of the ground water investigation described in Monitoring and Reporting Program by October 24, 1998. If the investigation indicates the discharge may be impacting ground water in the vicinity, proposed mitigation measures (additional treatment and a time schedule) shall be submitted with the summary report. Incremental flow increases shall be authorized (as described in Discharge Limitation B.1.)

based on findings of the ground water investigation and ongoing monitoring.

6. Pursuant to Title 23, Division 3, Chapter 9, of the California Code of Regulations, the Discharger must submit a written report to the Executive Officer not later than April 24, 2001, addressing:

a. Whether there will be changes in the continuity, character, location, or volume of the discharge; and,

b. Whether, in the Discharger's opinion, there is any portion of the Order that is incorrect, obsolete, or otherwise in need of revision.

I, ROGER W. BRIGGS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Coast Region, on October 24, 1997.

for Executive Officer

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

MONITORING AND REPORTING PROGRAM NO. 97-75

FOR

NIPOMO COMMUNITY SERVICES DISTRICT,
SOUTHLAND WASTEWATER WORKS,
SAN LUIS OBISPO COUNTY

Influent Monitoring

Representative samples of the treatment plant influent shall be collected and analyzed as follows:

Parameter	Units	Type of Sample	Sampling and Analyzing Frequency
Maximum Flow	MGD	Metered	Daily
Average Flow	MGD	Calculated	Monthly

Effluent Monitoring

Representative samples of the treatment plant effluent shall be collected and analyzed as follows:

Parameter	Units	Type of Sample	Sampling and Analyzing Frequency
Settleable Solids	ml/l	Grab	Daily
Biochemical Oxygen Demand	mg/l	6-hr. Composite	Weekly
Suspended Solids	mg/l	6-hr. Composite	Weekly
Dissolved Oxygen	mg/l	Grab	Weekly
pH	pH Units	Grab	Weekly
Total Dissolved Solids	mg/l	6-hr. Composite	Semi-annually (Jan/July)
Sodium	mg/l	6-hr. Composite	Semi-annually (Jan/July)
Chloride	mg/l	6-hr. Composite	Semi-annually (Jan/July)
Total Nitrogen (as N)	mg/l	6-hr. Composite	Semi-annually (Jan/July)

Ground Water Monitoring

Discharger shall install new monitoring wells upgradient and downgradient of the disposal area which facilitate representative sampling from the first available ground water. Discharger shall be responsible for determining direction of ground water flow and level to determine the appropriate location and depth of upgradient and downgradient monitoring wells. The monitoring wells shall meet or exceed well standards contained in the Department of Water Resources Bulletins 74-81 and 74-90. Discharger shall also comply with the monitoring well reporting provisions of Section 13750 through 13755 of the California Water Code.

Discharger shall investigate ground water upgradient and downgradient of the discharge in order to identify impacts caused by the discharge. Ground water sampling should include (but not be limited to) the constituents listed below in the ongoing ground water monitoring program. Impacts and mitigation measure shall be summarized in a report to the Executive Officer as specified in Provision D.5 of Order No. 97-75.

The ongoing ground water monitoring program shall include representative upgradient and downgradient samples collected from the first available ground water and analyzed as follows:

Parameter	Units	Type of Sample	Sampling and Analyzing Frequency
Static Water Level	Feet (below ground surface and elevation)		Semi-annually (Jan/July)
Total Dissolved Solids	mg/l	Grab	Semi-annually (Jan/July)
Sodium	mg/l	Grab	Semi-annually (Jan/July)
Chloride	mg/l	Grab	Semi-annually (Jan/July)
Total Nitrogen (as N) *	mg/l	Grab	Semi-annually (Jan/July)
Sulfate	mg/l	Grab	Semi-annually (Jan/July)
Boron	mg/l	Grab	Semi-annually (Jan/July)

*Each component nitrogen form shall be quantified as N.

Reporting

Monthly monitoring reports shall be submitted to the Regional Board by the 30th day of the month following sampling. In reporting the monitoring data, the Discharger shall arrange the data in tabular form so the date, constituents, and concentrations are readily discernible. The data shall be summarized to demonstrate compliance with waste discharge requirements. Any noncompliance with requirements must be identified and addressed according to Standard Provision C.5.

ORDERED BY ____________
Executive Officer

October 24, 1997
Date

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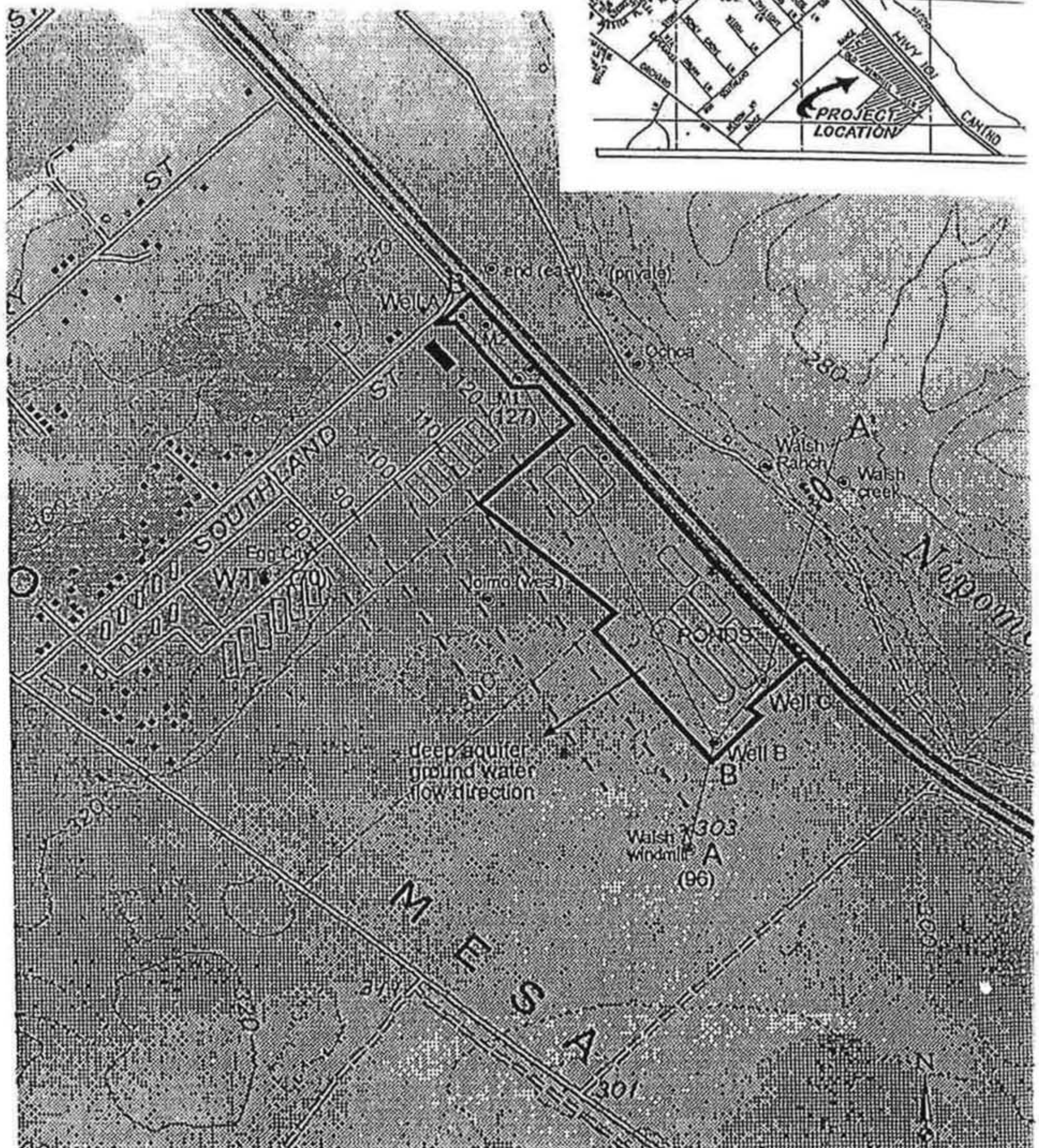
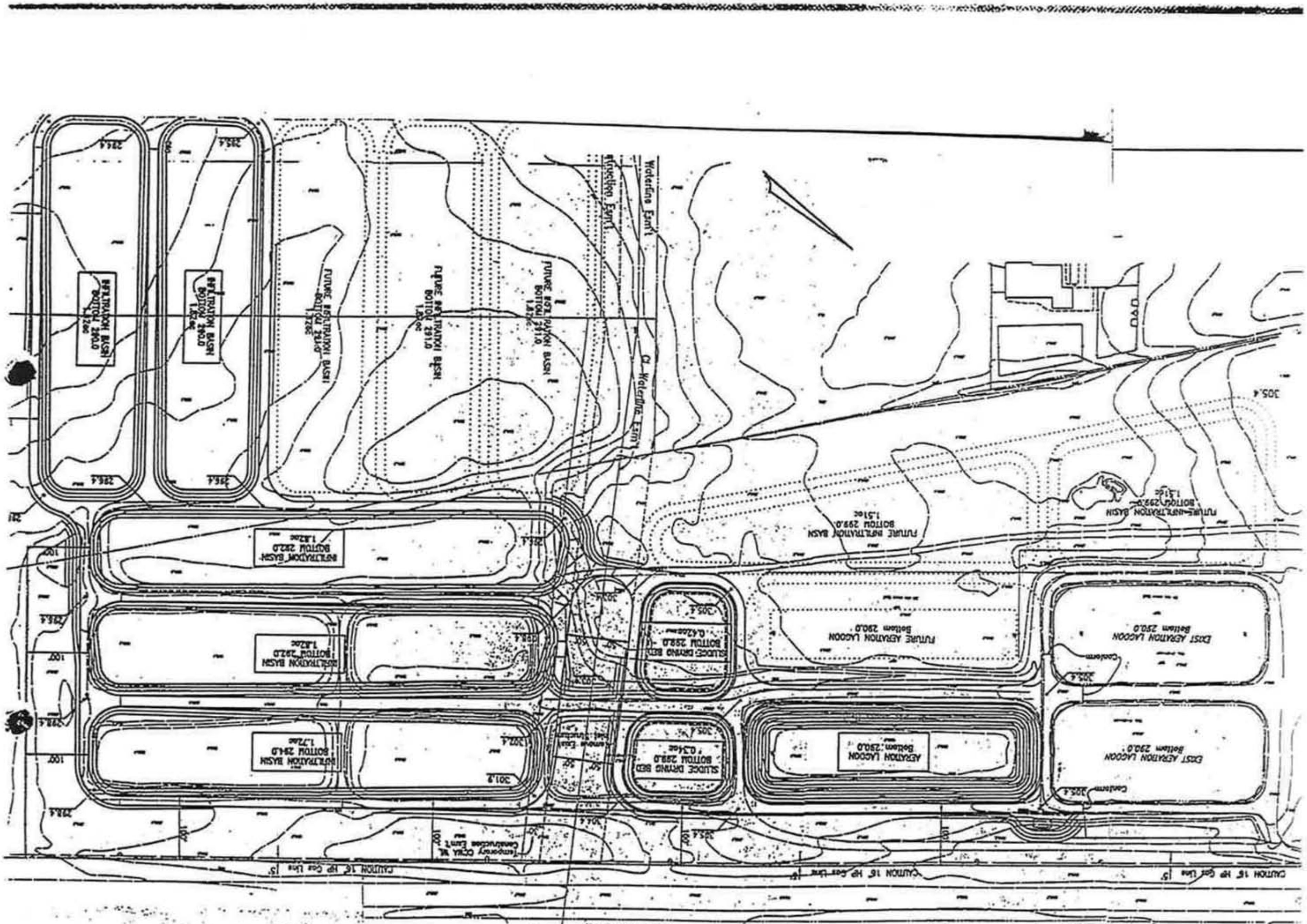
Nipomo CSD
Southland Wastewater Works

LOCATION MAP





ATTACHMENT B

Nipomo CSD - Southland Wastewater Works

APPENDIX B

HYDRAULIC PROFILE CALCULATIONS

PROJECT HYDRAULIC PROFILE
NIPOMO COMMMUNITY SERVICES DISTRICT SOUTHLAND WWTF IMPROVEMENTS - PHASE 1
Updated: 10/13/2010

I. Effluent Box to Infiltration Basin #8

			FLOW CONDITION AAF	PDF	PHF	Notes
						color coding: y = input; green = subtotal; blue = total
W. S. in Infiltration Basin #8			**295.00**	**295.00**	**295.00**	assumes 2-ft freeboard
PLANT FLOW, MGD			0.84	1.33	2.43	
NO. OF PIPES			1.00	1.00	1.00	
Q PER PIPE, CFS			1.30	2.06	3.76	
PIPE DIA., IN			24.00	24.00	24.00	based on buildout PHF
PIPE LENGTH, FT			14.00	14.00	14.00	
PIPE AREA, FT^2			3.14	3.14	3.14	
PIPE VEL., FT/S			0.41	0.65	1.20	
FRICTION COEFF. C			130.00	130.00	130.00	
PIPE FRIC. HL, FT			0.00	0.00	0.00	
NO. OF PIPES			1.00	1.00	1.00	
Q PER PIPE, CFS			1.30	2.06	3.76	
PIPE DIA., IN			24.00	24.00	24.00	
PIPE LENGTH, FT			2066.00	2066.00	2066.00	
PIPE AREA, FT^2			3.14	3.14	3.14	
PIPE VEL., FT/S			0.41	0.65	1.20	
FRICTION COEFF. C			130.00	130.00	130.00	
PIPE FRIC. HL, FT			0.07	0.16	0.48	
TOTAL PIPE FRIC. HL, FT			0.07	0.16	0.48	

	K	QUANTITY	TOTAL	TOTAL	TOTAL
BUTTERFLY VALVE	0.80	0	0.00	0.00	0.00
SLUICE GATE	0.80	0	0.00	0.00	0.00
MAN HOLE	1.50	0	0.00	0.00	0.00
90 ELBOW	0.30	3	0.90	0.90	0.90
45 ELBOW	0.40	6	2.40	2.40	2.40
T THRU	0.60	0	0.00	0.00	0.00
T AROUND	1.80	0	0.00	0.00	0.00
REDUCER	0.25	1	0.25	0.25	0.25
INLET	0.50	1	0.50	0.50	0.50
OUTLET	1.00	1	1.00	1.00	1.00
SWING CHECK VALVE	2.50	0	0.00	0.00	0.00

			FLOW CONDITION			Notes
			AAF	**PDF**	**PHF**	
GATE VALVE (FULLY OPEN)	0.20	1	0.20	0.20	0.20	
COUPLING	0.30	4	1.20	1.20	1.20	
45 WYE, THRU SIDE OUTLET	0.80	0	0.00	0.00	0.00	
45 WYE, STRAIGHT RUN	0.30	0	0.00	0.00	0.00	
SUM OF Ks			6.45	6.45	6.45	
MINOR HL, FT			0.02	0.04	0.14	
HEAD, FT (SUM OF PIPE FRICTION & MINOR HEADLOSS)			0.08	0.20	0.62	
W.S. AT EFFLUENT BOX (downstream)			**295.08**	**295.20**	**295.62**	
WEIR ELEVATION			297.50	297.50	297.50	
	calc distance below top of weir (ft)		2.42	2.30	1.88	If text is red, use submerged weir eq'n
WEIR LENGTH, FT			3.00	3.00	3.00	
FLOW SPLIT RATIO IN THE BOX			1.00	1.00	1.00	
APPROX FLOW OVER WEIR, CFS			1.30	2.06	3.76	
HEAD ABOVE WEIR, FT			0.26	0.35	0.52	
W.S. AT DISTRIBUTION BOX #5 (upstream)			297.76	297.85	298.02	
H downstream, FT			-2.42	-2.30	-1.88	
H upstream, FT (GUESS, iterative)						If submerged flow, guess value until
FLOW OVER WEIR, CFS			Free Flow	Free Flow	Free Flow	# here = design flow
W.S. AT EFFLUENT BOX (upstream)			**297.76**	**297.85**	**298.02**	

2. SECONDARY CLARIFIER EFFLUENT LAUNDER TO EFFLUENT BOX

W. S. AT EFFLUENT BOX			**297.76**	**297.85**	**298.02**
PLANT FLOW, MGD			0.84	1.33	2.43
NO. OF PIPES			1.00	1.00	1.00
Q PER PIPE, CFS			1.30	2.06	3.76
PIPE DIA., IN			16.00	16.00	16.00
PIPE LENGTH, FT			20.00	20.00	20.00
PIPE AREA, FT^2			1.40	1.40	1.40
PIPE VEL., FT/S			0.93	1.47	2.69
FRICTION COEFF. C			130.00	130.00	130.00
PIPE FRIC. HL, FT			0.00	0.01	0.03
NO. OF PIPES			1.00	1.00	1.00
Q PER PIPE, CFS			1.30	2.06	3.76
PIPE DIA., IN			24.00	24.00	24.00
PIPE LENGTH, FT			80.00	80.00	80.00

			FLOW CONDITION			Notes
			AAF	PDF	PHF	
PIPE AREA, FT^2			3.14	3.14	3.14	
PIPE VEL., FT/S			0.41	0.65	1.20	
FRICTION COEFF. C			130.00	130.00	130.00	
PIPE FRIC. HL, FT			0.00	0.01	0.02	
TOTAL PIPE FRIC. HL, FT			0.01	0.02	0.05	

	K	QUANTITY	TOTAL	TOTAL	
PLUG VALVE	0.80	0	0.00	0.00	0.00
SLUICE GATE	0.80	0	0.00	0.00	0.00
MAN HOLE	1.50	0	0.00	0.00	0.00
90 ELBOW	0.30	1	0.30	0.30	0.30
45 ELBOW	0.40	0	0.00	0.00	0.00
T THRU	0.60	0	0.00	0.00	0.00
T AROUND	1.80	0	0.00	0.00	0.00
REDUCER	0.25	0	0.00	0.00	0.00
INLET	0.50	1	0.50	0.50	0.50
OUTLET	1.00	1	1.00	1.00	1.00
SWING CHECK VALVE	2.50	0	0.00	0.00	0.00
GATE VALVE (FULLY OPEN)	0.20	0	0.00	0.00	0.00
COUPLING	0.30	2	0.60	0.60	0.60
45 WYE, THRU SIDE OUTLET	0.80	0	0.00	0.00	0.00
45 WYE, STRAIGHT RUN	0.30	0	0.00	0.00	0.00
SUM OF Ks			2.40	2.40	2.40
MINOR HL, FT			0.03	0.08	0.27
HEAD, FT (SUM OF PIPE FRICTION & MINOR HEADLOSS)			0.04	0.10	0.32
W.S. IN SECONDARY CLARIFIER EFFLUENT LAUNDER			**297.80**	**297.95**	**298.34**

3. DISTIBUTION BOX #2 TO SECONDARY CLARIFIER EFFLUENT LAUNDER

W. S. IN SECONDARY CLARIFIER EFFLUENT LAUNDER		**297.80**	**297.95**	**298.34**
	Launder diameter, ft	45.00		
	notch width, in	6.00		

Free Discharging Weir Computation

Weir Crest Elevation, FT	**299.00**	**299.00**	**299.00**

	FLOW CONDITION AAF	PDF	PHF	Notes
No. of Notches, N	283	283	283	
Flow, Q, MGD	1.68	2.65	4.86	2X Q used to account for recirculation
Head on Weir, H, FT	0.11	0.13	0.16	
EGL, FT	**299.11**	**299.13**	**299.16**	
HGL, FT	**299.11**	**299.13**	**299.16**	
W.S. IN SECONDARY CLARIFIER, FT	**299.11**	**299.13**	**299.16**	

Submerged Weir Computation

	AAF	PDF	PHF
Downstream WSE, FT	**297.80**	**297.95**	**298.34**
Weir Crest Elevation, FT	**299.00**	**299.00**	**299.00**
No. of Notches, N	283	283	283
Flow, Q, MGD	NA	NA	NA
Downstream head, Hd, FT	-1.20	-1.05	-0.66
K	NA	NA	NA
M	NA	NA	NA
Increment, FT	0.50	0.50	0.50
Upstream Head, Hu1, FT	NA	NA	NA
F(H1)	NA	NA	NA
F'(H1)	NA	NA	NA
Upstream Head, Hu2, FT	NA	NA	NA
EGL, FT	**NA**	**NA**	**NA**
HGL, FT	**NA**	**NA**	**NA**
W.S. IN SECONDARY CLARIFIER, FT	**299.11**	**299.13**	**299.16**

Clarifier influent piping:

PLANT FLOW, MGD			1.68	2.65	4.86	2X Q used to account for recirculation
NO. OF PIPES			1.00	1.00	1.00	
Q PER PIPE, CFS			2.60	4.11	7.53	
PIPE DIA., IN			18.00	18.00	18.00	
PIPE LENGTH, FT			45.00	45.00	45.00	
PIPE AREA, FT^2			1.77	1.77	1.77	
PIPE VEL., FT/S			1.47	2.33	4.26	
FRICTION COEFF. C			130.00	130.00	130.00	
PIPE FRIC. HL, FT			0.02	0.05	0.15	
	K	**QUANTITY**	**TOTAL**	**TOTAL**		

			AAF	PDF	PHF	Notes
			FLOW CONDITION			
PLUG VALVE	0.80	0	0.00	0.00	0.00	
SLUICE GATE	0.80	0	0.00	0.00	0.00	
MAN HOLE	1.50	0	0.00	0.00	0.00	
90 ELBOW	0.30	1	0.30	0.30	0.30	
45 ELBOW	0.40	1	0.40	0.40	0.40	
T THRU	0.60	0	0.00	0.00	0.00	
T AROUND	1.80	0	0.00	0.00	0.00	
REDUCER	0.25	0	0.00	0.00	0.00	
INLET	0.50	1	0.50	0.50	0.50	
OUTLET	1.00	1	1.00	1.00	1.00	
SWING CHECK VALVE	2.50	0	0.00	0.00	0.00	
GATE VALVE (FULLY OPEN)	0.20	2	0.40	0.40	0.40	
COUPLING	0.30	2	0.60	0.60	0.60	
45 WYE, THRU SIDE OUTLET	0.80	0	0.00	0.00	0.00	
45 WYE, STRAIGHT RUN	0.30	0	0.00	0.00	0.00	
SUM OF Ks			3.20	3.20	3.20	
MINOR HL, FT			0.11	0.27	0.90	
HEAD, FT (SUM OF PIPE FRICTION & MINOR HEADLOSS)			0.13	0.32	1.05	
W.S IN DISTRIBUTION BOX #2 (downstream)			**299.24**	**299.45**	**300.21**	
WEIR ELEVATION			300.50	300.50	300.50	
	calc distance below top of weir (ft)		1.26	1.05	0.29	If text is red, use submerged weir eq'n
WEIR LENGTH, FT			3.00	3.00	3.00	
FLOW SPLIT RATIO IN THE BOX			1.00	1.00	1.00	
APPROX FLOW OVER WEIR, CFS			2.60	4.11	7.53	
HEAD ABOVE WEIR, FT			0.41	0.55	0.83	
W.S. AT DISTRIBUTION BOX #2 (upstream)			300.91	301.05	301.33	
H downstream, FT			-1.26	-1.05	-0.29	
H upstream, FT (GUESS, iterative)						if submerged flow, guess value until
FLOW OVER WEIR, CFS			Free Flow	Free Flow	Free Flow	# here = design flow
W.S. AT DISTRIBUTION BOX #2 (upstream)			**300.91**	**301.05**	**301.33**	

4. AERATION BASIN TO DISTIBUTION BOX #2

W. S. IN DISTIBUTION BOX #2 (upstream)			**300.91**	**301.05**	**301.33**	
PLANT FLOW, MGD			1.68	2.65	4.86	2X Q used to account for recirculation

			FLOW CONDITION AAF	PDF	PHF	Notes
NO. OF PIPES			1.00	1.00	1.00	
Q PER PIPE, CFS			2.60	4.11	7.53	
PIPE DIA., IN			21.00	21.00	21.00	
PIPE LENGTH, FT			500.00	500.00	500.00	
PIPE AREA, FT^2			2.41	2.41	2.41	
PIPE VEL., FT/S			1.08	1.71	3.13	
FRICTION COEFF. C			130.00	130.00	130.00	
PIPE FRIC. HL, FT			0.11	0.26	0.79	
	K	**QUANTITY**	**TOTAL**	**TOTAL**	**TOTAL**	
PLUG VALVE	0.80	0	0.00	0.00	0.00	
SLUICE GATE	0.80	0	0.00	0.00	0.00	
MAN HOLE	1.50	0	0.00	0.00	0.00	
90 ELBOW	0.30	2	0.60	0.60	0.60	
45 ELBOW	0.40	0	0.00	0.00	0.00	
T THRU	0.60	0	0.00	0.00	0.00	
T AROUND	1.80	0	0.00	0.00	0.00	
REDUCER	0.25	0	0.00	0.00	0.00	
INLET	0.50	1	0.50	0.50	0.50	
OUTLET	1.00	1	1.00	1.00	1.00	
SWING CHECK VALVE	2.50	0	0.00	0.00	0.00	
GATE VALVE (FULLY OPEN)	0.20	0	0.00	0.00	0.00	
COUPLING	0.30	2	0.60	0.60	0.60	
45 WYE, THRU SIDE OUTLET	0.80	0	0.00	0.00	0.00	
45 WYE, STRAIGHT RUN	0.30	0	0.00	0.00	0.00	
SUM OF Ks			2.70	2.70	2.70	
MINOR HL, FT			0.05	0.12	0.41	
HEAD, FT (SUM OF PIPE FRICTION & MINOR HEADLOSS)			0.16	0.38	1.20	
W.S in AERATION BASIN EFFLUENT BOX (downstream)			**301.07**	**301.43**	**302.53**	
WEIR ELEVATION			303.00	303.00	303.00	
	calc distance below top of weir (ft)		1.93	1.57	0.47	If text is red, use submerged weir eq'n
WEIR LENGTH, FT			4.00	4.00	4.00	
FLOW SPLIT RATIO IN THE BOX			1.00	1.00	1.00	
APPROX FLOW OVER WEIR, CFS			2.60	4.11	7.53	
HEAD ABOVE WEIR, FT			0.34	0.46	0.68	
W.S. AT AERATION BASIN WEIR (upstream)			303.34	303.46	303.68	
H downstream, FT			-1.93	-1.57	-0.47	

			AAF	PDF	PHF	Notes
				FLOW CONDITION		
H upstream, FT (GUESS, iterative)						if submerged flow, guess value until
FLOW OVER WEIR, CFS			Free Flow	Free Flow	Free Flow	# here = design flow
W.S. IN AERATION BASIN			**303.34**	**303.46**	**303.68**	

5. DISTIBUTION BOX #1 TO AERATION BASIN

W. S. IN AERATION BASIN			**303.34**	**303.46**	**303.68**	
PLANT FLOW, MGD			1.68	2.65	4.86	2X Q used to account for recirculation
NO. OF PIPES			1.00	1.00	1.00	
Q PER PIPE, CFS			2.60	4.11	7.53	
PIPE DIA., IN			21.00	21.00	21.00	
PIPE LENGTH, FT			280.00	280.00	280.00	
PIPE AREA, FT^2			2.41	2.41	2.41	
PIPE VEL., FT/S			1.08	1.71	3.13	
FRICTION COEFF. C			130.00	130.00	130.00	
PIPE FRIC. HL, FT			0.06	0.14	0.44	

	K	QUANTITY	TOTAL	TOTAL	
PLUG VALVE	0.80	0	0.00	0.00	0.00
SLUICE GATE	0.80	0	0.00	0.00	0.00
MAN HOLE	1.50	0	0.00	0.00	0.00
90 ELBOW	0.30	2	0.60	0.60	0.60
45 ELBOW	0.40	0	0.00	0.00	0.00
T THRU	0.60	0	0.00	0.00	0.00
T AROUND	1.80	0	0.00	0.00	0.00
REDUCER	0.25	0	0.00	0.00	0.00
INLET	0.50	1	0.50	0.50	0.50
OUTLET	1.00	1	1.00	1.00	1.00
SWING CHECK VALVE	2.50	0	0.00	0.00	0.00
GATE VALVE (FULLY OPEN)	0.20	1	0.20	0.20	0.20
COUPLING	0.30	2	0.60	0.60	0.60
45 WYE, THRU SIDE OUTLET	0.80	0	0.00	0.00	0.00
45 WYE, STRAIGHT RUN	0.30	0	0.00	0.00	0.00
SUM OF Ks			2.90	2.90	2.90
MINOR HL, FT			0.05	0.13	0.44
HEAD, FT (SUM OF PIPE FRICTION & MINOR HEADLOSS)			0.11	0.28	0.88

			FLOW CONDITION			Notes
			AAF	PDF	PHF	
W.S in DISTRIBUTION BOX #1 (downstream)			**303.45**	**303.73**	**304.57**	
WEIR ELEVATION			304.60	304.60	304.60	
	calc distance below top of weir (ft)		1.15	0.87	0.03	If text is red, use submerged weir eq'n
WEIR LENGTH, FT			3.00	3.00	3.00	
FLOW SPLIT RATIO IN THE BOX			1.00	1.00	1.00	
APPROX FLOW OVER WEIR, CFS			2.60	4.11	7.53	
HEAD ABOVE WEIR, FT			0.41	0.55	0.83	
W.S. AT AERATION BASIN WEIR (upstream)			305.01	305.15	305.43	
H downstream, FT			-1.15	-0.87	-0.03	
H upstream, FT (GUESS, iterative)						If submerged flow, guess value until
FLOW OVER WEIR, CFS			Free Flow	Free Flow	Free Flow	# here = design flow
W.S. in DISTRIBUTION BOX #1 (upstream)			**305.01**	**305.15**	**305.43**	

6. GRIT CHAMBER TO DISTRIBUTION BOX #1

W.S. in DISTRIBUTION BOX #1 (upstream)			**305.01**	**305.15**	**305.43**
PLANT FLOW, MGD			0.84	1.33	2.43
NO. OF PIPES			1.00	1.00	1.00
Q PER PIPE, CFS			1.30	2.06	3.76
PIPE DIA., IN			18.00	18.00	18.00
PIPE LENGTH, FT			40.00	40.00	40.00
PIPE AREA, FT^2			1.77	1.77	1.77
PIPE VEL., FT/S			0.74	1.16	2.13
FRICTION COEFF. C			130.00	130.00	130.00
PIPE FRIC. HL, FT			0.01	0.01	0.04

	K	QUANTITY	TOTAL	TOTAL	
PLUG VALVE	0.80	0	0.00	0.00	0.00
SLUICE GATE	0.80	0	0.00	0.00	0.00
MAN HOLE	1.50	0	0.00	0.00	0.00
90 ELBOW	0.30	0	0.00	0.00	0.00
45 ELBOW	0.40	0	0.00	0.00	0.00
T THRU	0.60	0	0.00	0.00	0.00
T AROUND	1.80	0	0.00	0.00	0.00
REDUCER	0.25	0	0.00	0.00	0.00
INLET	0.50	1	0.50	0.50	0.50
OUTLET	1.00	1	1.00	1.00	1.00

			FLOW CONDITION AAF	PDF	PHF	Notes
SWING CHECK VALVE	2.50	0	0.00	0.00	0.00	
GATE VALVE (FULLY OPEN)	0.20	1	0.20	0.20	0.20	
COUPLING	0.30	1	0.30	0.30	0.30	
45 WYE, THRU SIDE OUTLET	0.80	0	0.00	0.00	0.00	
45 WYE, STRAIGHT RUN	0.30	0	0.00	0.00	0.00	
SUM OF Ks			2.00	2.00	2.00	
MINOR HL, FT			0.02	0.04	0.14	
HEAD, FT (SUM OF PIPE FRICTION & MINOR HEADLOSS)			0.02	0.05	0.18	
W.S at GRIT CHAMBER (downstream)			**305.03**	**305.21**	**305.61**	
WEIR ELEVATION			306.00	306.00	306.00	
	calc distance below top of weir (ft)		0.97	0.79	0.39	If text is red, use submerged weir eq'n
WEIR LENGTH, FT			2.50	2.50	2.50	
FLOW SPLIT RATIO IN THE BOX			1.00	1.00	1.00	assume 1 grit chamber online
APPROX FLOW OVER WEIR, CFS			1.30	2.06	3.76	
HEAD ABOVE WEIR, FT			0.29	0.39	0.59	
W.S. in GRIT CHAMBER (upstream)			306.29	306.39	306.59	
H downstream, FT			-0.97	-0.79	-0.39	
H upstream, FT (GUESS, iterative)						if submerged flow, guess value until
FLOW OVER WEIR, CFS			Free Flow	Free Flow	Free Flow	# here = design flow
W.S. in GRIT CHAMBER (upstream)			**306.29**	**306.39**	**306.59**	

7. SCREENS TO GRIT CHAMBERS

	AAF	PDF	PHF
W. S. in GRIT CHAMBER (upstream)	**306.29**	**306.39**	**306.59**
neglect minor channel losses.			
neglect friction losses			
W.S. DOWNSTREAM OF MECHANICAL SCREEN:	**306.29**	**306.39**	**306.59**
maximum estimated loss through screen, IN	14	14	14
W.S. UPSTREAM OF MECHANICAL SCREEN:	**307.46**	**307.56**	**307.76**

BUILDOUT HYDRAULIC PROFILE
NIPOMO COMMMUNITY SERVICES DISTRICT SOUTHLAND WWTF
Updated: 10/13/2010

			FLOW CONDITION			
			AAF	PDF	PHF	Notes
I. Effluent Box to Infiltration Basin #8						color coding: y = input; green = subtotal; blue = total
W. S. in Infiltration Basin #8			**295.00**	**295.00**	**295.00**	assumes 2-ft freeboard

PLANT FLOW, MGD			1.67	2.64	4.83
NO. OF PIPES			1.00	1.00	1.00
Q PER PIPE, CFS			2.59	4.09	7.48
PIPE DIA., IN			24.00	24.00	24.00
PIPE LENGTH, FT			14.00	14.00	14.00
PIPE AREA, FT^2			3.14	3.14	3.14
PIPE VEL., FT/S			0.82	1.30	2.38
FRICTION COEFF. C			130.00	130.00	130.00
PIPE FRIC. HL, FT			0.00	0.00	0.01
NO. OF PIPES			1.00	1.00	1.00
Q PER PIPE, CFS			2.59	4.09	7.48
PIPE DIA., IN			24.00	24.00	24.00
PIPE LENGTH, FT			2066.00	2066.00	2066.00
PIPE AREA, FT^2			3.14	3.14	3.14
PIPE VEL., FT/S			0.82	1.30	2.38
FRICTION COEFF. C			130.00	130.00	130.00
PIPE FRIC. HL, FT			0.24	0.56	1.70
TOTAL PIPE FRIC. HL, FT			0.24	0.56	1.71

	K	QUANTITY	TOTAL	TOTAL	TOTAL
BUTTERFLY VALVE	0.80	0	0.00	0.00	0.00
SLUICE GATE	0.80	0	0.00	0.00	0.00
MAN HOLE	1.50	0	0.00	0.00	0.00
90 ELBOW	0.30	3	0.90	0.90	0.90
45 ELBOW	0.40	6	2.40	2.40	2.40
T THRU	0.60	0	0.00	0.00	0.00
T AROUND	1.80	0	0.00	0.00	0.00
REDUCER	0.25	1	0.25	0.25	0.25
INLET	0.50	1	0.50	0.50	0.50

			AAF	PDF	PHF	Notes
			FLOW CONDITION			
OUTLET	1.00	1	1.00	1.00	1.00	
SWING CHECK VALVE	2.50	0	0.00	0.00	0.00	
GATE VALVE (FULLY OPEN)	0.20	1	0.20	0.20	0.20	
COUPLING	0.30	4	1.20	1.20	1.20	
45 WYE, THRU SIDE OUTLET	0.80	0	0.00	0.00	0.00	
45 WYE, STRAIGHT RUN	0.30	0	0.00	0.00	0.00	
SUM OF Ks			6.45	6.45	6.45	
MINOR HL, FT			0.07	0.17	0.57	
HEAD, FT (SUM OF PIPE FRICTION & MINOR HEADLOSS)			0.31	0.73	2.28	
W.S. AT EFFLUENT BOX (downstream)			**295.31**	**295.73**	**297.28**	
WEIR ELEVATION			297.50	297.50	297.50	
	calc distance below top of weir (ft)		2.19	1.77	0.22	If text is red, use submerged weir eq'n
WEIR LENGTH, FT			3.00	3.00	3.00	
FLOW SPLIT RATIO IN THE BOX			1.00	1.00	1.00	
APPROX FLOW OVER WEIR, CFS			2.59	4.09	7.48	
HEAD ABOVE WEIR, FT			0.41	0.55	0.82	
W.S. AT DISTRIBUTION BOX #5 (upstream)			297.91	298.05	298.32	
H downstream, FT			-2.19	-1.77	-0.22	
H upstream, FT (GUESS, iterative)						if submerged flow, guess value until
FLOW OVER WEIR, CFS			Free Flow	Free Flow	Free Flow	# here = design flow
W.S. AT EFFLUENT BOX (upstream)			**297.91**	**298.05**	**298.32**	

2. SECONDARY CLARIFIER EFFLUENT LAUNDER TO EFFLUENT BOX

W. S. AT EFFLUENT BOX			**297.91**	**298.05**	**298.32**	
PLANT FLOW, MGD			1.67	2.64	4.83	
NO. OF PIPES			2.00	2.00	2.00	
Q PER PIPE, CFS			1.29	2.04	3.74	
PIPE DIA., IN			16.00	16.00	16.00	
PIPE LENGTH, FT			20.00	20.00	20.00	
PIPE AREA, FT^2			1.40	1.40	1.40	
PIPE VEL., FT/S			0.93	1.46	2.68	
FRICTION COEFF. C			130.00	130.00	130.00	
PIPE FRIC. HL, FT			0.00	0.01	0.03	
NO. OF PIPES			2.00	2.00	2.00	assume 2 clarifiers online
Q PER PIPE, CFS			1.29	2.04	3.74	

			FLOW CONDITION AAF	PDF	PHF	Notes
PIPE DIA., IN			24.00	24.00	24.00	
PIPE LENGTH, FT			80.00	80.00	80.00	
PIPE AREA, FT^2			3.14	3.14	3.14	
PIPE VEL., FT/S			0.41	0.65	1.19	
FRICTION COEFF. C			130.00	130.00	130.00	
PIPE FRIC. HL, FT			0.00	0.01	0.02	
TOTAL PIPE FRIC. HL, FT			0.01	0.02	0.05	

	K	QUANTITY	TOTAL	TOTAL	TOTAL
PLUG VALVE	0.80	0	0.00	0.00	0.00
SLUICE GATE	0.80	0	0.00	0.00	0.00
MAN HOLE	1.50	0	0.00	0.00	0.00
90 ELBOW	0.30	1	0.30	0.30	0.30
45 ELBOW	0.40	0	0.00	0.00	0.00
T THRU	0.60	0	0.00	0.00	0.00
T AROUND	1.80	0	0.00	0.00	0.00
REDUCER	0.25	0	0.00	0.00	0.00
INLET	0.50	1	0.50	0.50	0.50
OUTLET	1.00	1	1.00	1.00	1.00
SWING CHECK VALVE	2.50	0	0.00	0.00	0.00
GATE VALVE (FULLY OPEN)	0.20	0	0.00	0.00	0.00
COUPLING	0.30	2	0.60	0.60	0.60
45 WYE, THRU SIDE OUTLET	0.80	0	0.00	0.00	0.00
45 WYE, STRAIGHT RUN	0.30	0	0.00	0.00	0.00
SUM OF Ks			2.40	2.40	2.40
MINOR HL, FT			0.03	0.08	0.27
HEAD, FT (SUM OF PIPE FRICTION & MINOR HEADLOSS)			0.04	0.10	0.32
W.S. IN SECONDARY CLARIFIER EFFLUENT LAUNDER			**297.95**	**298.15**	**298.64**

3. DISTIBUTION BOX #2 TO SECONDARY CLARIFIER EFFLUENT LAUNDER

W. S. IN SECONDARY CLARIFIER EFFLUENT LAUNDER		**297.95**	**298.15**	**298.64**
	Launder diameter, ft	45.00		
	notch width, in	6.00		

Free Discharging Weir Computation

		FLOW CONDITION		
	AAF	PDF	PHF	Notes
Weir Crest Elevation, FT	**299.00**	**299.00**	**299.00**	
No. of Notches, N	283	283	283	
Flow, Q, MGD	1.67	2.64	4.83	2Q for recirc, 2 clarifiers online = 2Q/2
Head on Weir, H, FT	0.11	0.13	0.16	
EGL, FT	**299.11**	**299.13**	**299.16**	
HGL, FT	**299.11**	**299.13**	**299.16**	
W.S. IN SECONDARY CLARIFIER, FT	**299.11**	**299.13**	**299.16**	

Submerged Weir Computation

	AAF	PDF	PHF
Downstream WSE, FT	**297.95**	**298.15**	**298.64**
Weir Crest Elevation, FT	**299.00**	**299.00**	**299.00**
No. of Notches, N	283	283	283
Flow, Q, MGD	NA	NA	NA
Downstream head, Hd, FT	-1.05	-0.85	-0.36
K	NA	NA	NA
M	NA	NA	NA
Increment, FT	0.50	0.50	0.50
Upstream Head, Hu1, FT	NA	NA	NA
F(H1)	NA	NA	NA
F'(H1)	NA	NA	NA
Upstream Head, Hu2, FT	NA	NA	NA
EGL, FT	**NA**	**NA**	**NA**
HGL, FT	**NA**	**NA**	**NA**
W.S. IN SECONDARY CLARIFIER, FT	**299.11**	**299.13**	**299.16**

Clarifier influent piping:

	AAF	PDF	PHF	Notes
PLANT FLOW, MGD	3.34	5.28	9.65	2X Q used to account for recirculation
NO. OF PIPES	2.00	2.00	2.00	assume 2 clarifiers online
Q PER PIPE, CFS	2.59	4.09	7.48	
PIPE DIA., IN	18.00	18.00	18.00	
PIPE LENGTH, FT	45.00	45.00	45.00	
PIPE AREA, FT^2	1.77	1.77	1.77	
PIPE VEL., FT/S	1.46	2.31	4.23	
FRICTION COEFF. C	130.00	130.00	130.00	
PIPE FRIC. HL, FT	0.02	0.05	0.15	

	K	QUANTITY	FLOW CONDITION AAF TOTAL	PDF TOTAL	PHF TOTAL	Notes
PLUG VALVE	0.80	0	0.00	0.00	0.00	
SLUICE GATE	0.80	0	0.00	0.00	0.00	
MAN HOLE	1.50	0	0.00	0.00	0.00	
90 ELBOW	0.30	1	0.30	0.30	0.30	
45 ELBOW	0.40	1	0.40	0.40	0.40	
T THRU	0.60	0	0.00	0.00	0.00	
T AROUND	1.80	0	0.00	0.00	0.00	
REDUCER	0.25	0	0.00	0.00	0.00	
INLET	0.50	1	0.50	0.50	0.50	
OUTLET	1.00	1	1.00	1.00	1.00	
SWING CHECK VALVE	2.50	0	0.00	0.00	0.00	
GATE VALVE (FULLY OPEN)	0.20	2	0.40	0.40	0.40	
COUPLING	0.30	2	0.60	0.60	0.60	
45 WYE, THRU SIDE OUTLET	0.80	0	0.00	0.00	0.00	
45 WYE, STRAIGHT RUN	0.30	0	0.00	0.00	0.00	
SUM OF Ks			3.20	3.20	3.20	
MINOR HL, FT			0.11	0.27	0.89	
HEAD, FT (SUM OF PIPE FRICTION & MINOR HEADLOSS)			0.13	0.31	1.04	
W.S IN DISTRIBUTION BOX #2 (downstream)			**299.23**	**299.44**	**300.20**	
WEIR ELEVATION			300.50	300.50	300.50	
	calc distance below top of weir (ft)		1.27	1.06	0.30	If text is red, use submerged weir eq'n
WEIR LENGTH, FT			3.00	3.00	3.00	
FLOW SPLIT RATIO IN THE BOX			0.50	0.50	0.50	
APPROX FLOW OVER WEIR, CFS			2.59	4.09	7.48	
HEAD ABOVE WEIR, FT			0.41	0.55	0.82	
W.S. AT DISTRIBUTION BOX #2 (upstream)			300.91	301.05	301.32	
H downstream, FT			-1.27	-1.06	-0.30	
H upstream, FT (GUESS, iterative)						If submerged flow, guess value until
FLOW OVER WEIR, CFS			Free Flow	Free Flow	Free Flow	# here = design flow
W.S. AT DISTRIBUTION BOX #2 (upstream)			**300.91**	**301.05**	**301.32**	

4. AERATION BASIN TO DISTIBUTION BOX #2

W. S. IN DISTIBUTION BOX #2 (upstream)			**300.91**	**301.05**	**301.32**	
PLANT FLOW, MGD			3.34	5.28	9.65	2X Q used to account for recirculation

			AAF	PDF	PHF	Notes
			FLOW CONDITION			
NO. OF PIPES			2.00	2.00	2.00	Assume 2 basins online
Q PER PIPE, CFS			2.59	4.09	7.48	
PIPE DIA., IN			21.00	21.00	21.00	
PIPE LENGTH, FT			500.00	500.00	500.00	
PIPE AREA, FT^2			2.41	2.41	2.41	
PIPE VEL., FT/S			1.08	1.70	3.11	
FRICTION COEFF. C			130.00	130.00	130.00	
PIPE FRIC. HL, FT			0.11	0.26	0.78	

	K	QUANTITY	TOTAL	TOTAL	TOTAL	
PLUG VALVE	0.80	0	0.00	0.00	0.00	
SLUICE GATE	0.80	0	0.00	0.00	0.00	
MAN HOLE	1.50	0	0.00	0.00	0.00	
90 ELBOW	0.30	2	0.60	0.60	0.60	
45 ELBOW	0.40	0	0.00	0.00	0.00	
T THRU	0.60	0	0.00	0.00	0.00	
T AROUND	1.80	0	0.00	0.00	0.00	
REDUCER	0.25	0	0.00	0.00	0.00	
INLET	0.50	1	0.50	0.50	0.50	
OUTLET	1.00	1	1.00	1.00	1.00	
SWING CHECK VALVE	2.50	0	0.00	0.00	0.00	
GATE VALVE (FULLY OPEN)	0.20	0	0.00	0.00	0.00	
COUPLING	0.30	2	0.60	0.60	0.60	
45 WYE, THRU SIDE OUTLET	0.80	0	0.00	0.00	0.00	
45 WYE, STRAIGHT RUN	0.30	0	0.00	0.00	0.00	
SUM OF Ks			2.70	2.70	2.70	
MINOR HL, FT			0.05	0.12	0.41	
HEAD, FT (SUM OF PIPE FRICTION & MINOR HEADLOSS)			0.16	0.38	1.19	
W.S in AERATION BASIN EFFLUENT BOX (downstream)			**301.06**	**301.43**	**302.51**	
WEIR ELEVATION			303.00	303.00	303.00	
	calc distance below top of weir (ft)		1.94	1.57	0.49	If text is red, use submerged weir eq'n
WEIR LENGTH, FT			4.00	4.00	4.00	
FLOW SPLIT RATIO IN THE BOX			1.00	1.00	1.00	
APPROX FLOW OVER WEIR, CFS			2.59	4.09	7.48	
HEAD ABOVE WEIR, FT			0.34	0.46	0.68	
W.S. AT AERATION BASIN WEIR (upstream)			303.34	303.46	303.68	
H downstream, FT			-1.94	-1.57	-0.49	

			FLOW CONDITION			
			AAF	PDF	PHF	Notes
H upstream, FT (GUESS, iterative)						if submerged flow, guess value until
FLOW OVER WEIR, CFS			Free Flow	Free Flow	Free Flow	# here = design flow
W.S. IN AERATION BASIN			**303.34**	**303.46**	**303.68**	maintain min 2-ft freeboard

5. DISTIBUTION BOX #1 TO AERATION BASIN

	AAF	PDF	PHF	Notes
W. S. IN AERATION BASIN	**303.34**	**303.46**	**303.68**	
PLANT FLOW, MGD	3.34	5.28	9.65	2X Q used to account for recirculation
NO. OF PIPES	2.00	2.00	2.00	assume 2 basins online
Q PER PIPE, CFS	2.59	4.09	7.48	
PIPE DIA., IN	21.00	21.00	21.00	
PIPE LENGTH, FT	280.00	280.00	280.00	
PIPE AREA, FT^2	2.41	2.41	2.41	
PIPE VEL., FT/S	1.08	1.70	3.11	
FRICTION COEFF. C	130.00	130.00	130.00	
PIPE FRIC. HL, FT	0.06	0.14	0.44	

	K	QUANTITY	TOTAL	TOTAL	TOTAL
PLUG VALVE	0.80	0	0.00	0.00	0.00
SLUICE GATE	0.80	0	0.00	0.00	0.00
MAN HOLE	1.50	0	0.00	0.00	0.00
90 ELBOW	0.30	2	0.60	0.60	0.60
45 ELBOW	0.40	0	0.00	0.00	0.00
T THRU	0.60	0	0.00	0.00	0.00
T AROUND	1.80	0	0.00	0.00	0.00
REDUCER	0.25	0	0.00	0.00	0.00
INLET	0.50	1	0.50	0.50	0.50
OUTLET	1.00	1	1.00	1.00	1.00
SWING CHECK VALVE	2.50	0	0.00	0.00	0.00
GATE VALVE (FULLY OPEN)	0.20	1	0.20	0.20	0.20
COUPLING	0.30	2	0.60	0.60	0.60
45 WYE, THRU SIDE OUTLET	0.80	0	0.00	0.00	0.00
45 WYE, STRAIGHT RUN	0.30	0	0.00	0.00	0.00
SUM OF Ks			2.90	2.90	2.90
MINOR HL, FT			0.05	0.13	0.44
HEAD, FT (SUM OF PIPE FRICTION & MINOR HEADLOSS)			0.11	0.27	0.87

		FLOW CONDITION			
		AAF	PDF	PHF	Notes
W.S in DISTRIBUTION BOX #1 (downstream)		**303.45**	**303.73**	**304.55**	
WEIR ELEVATION		304.60	304.60	304.60	
	calc distance below top of weir (ft)	1.15	0.87	0.05	If text is red, use submerged weir eq'n
WEIR LENGTH, FT		3.00	3.00	3.00	
FLOW SPLIT RATIO IN THE BOX		0.50	0.50	0.50	assume 2 basins online
APPROX FLOW OVER WEIR, CFS		1.29	2.04	3.74	
HEAD ABOVE WEIR, FT		0.26	0.35	0.52	
W.S. AT AERATION BASIN WEIR (upstream)		304.86	304.95	305.12	
H downstream, FT		-1.15	-0.87	-0.05	
H upstream, FT (GUESS, iterative)					if submerged flow, guess value until
FLOW OVER WEIR, CFS		Free Flow	Free Flow	Free Flow	# here = design flow
W.S. in DISTRIBUTION BOX #1 (upstream)		**304.86**	**304.95**	**305.12**	

6. GRIT CHAMBER TO DISTRIBUTION BOX #1

W.S. in DISTRIBUTION BOX #1 (upstream)		**304.86**	**304.95**	**305.12**
PLANT FLOW, MGD		1.67	2.64	4.83
NO. OF PIPES		1.00	1.00	1.00
Q PER PIPE, CFS		2.59	4.09	7.48
PIPE DIA., IN		18.00	18.00	18.00
PIPE LENGTH, FT		40.00	40.00	40.00
PIPE AREA, FT^2		1.77	1.77	1.77
PIPE VEL., FT/S		1.46	2.31	4.23
FRICTION COEFF. C		130.00	130.00	130.00
PIPE FRIC. HL, FT		0.02	0.04	0.13

	K	QUANTITY	TOTAL	TOTAL	TOTAL
PLUG VALVE	0.80	0	0.00	0.00	0.00
SLUICE GATE	0.80	0	0.00	0.00	0.00
MAN HOLE	1.50	0	0.00	0.00	0.00
90 ELBOW	0.30	0	0.00	0.00	0.00
45 ELBOW	0.40	0	0.00	0.00	0.00
T THRU	0.60	0	0.00	0.00	0.00
T AROUND	1.80	0	0.00	0.00	0.00
REDUCER	0.25	0	0.00	0.00	0.00
INLET	0.50	1	0.50	0.50	0.50
OUTLET	1.00	1	1.00	1.00	1.00

			FLOW CONDITION AAF	PDF	PHF	Notes
SWING CHECK VALVE	2.50	0	0.00	0.00	0.00	
GATE VALVE (FULLY OPEN)	0.20	1	0.20	0.20	0.20	
COUPLING	0.30	1	0.30	0.30	0.30	
45 WYE, THRU SIDE OUTLET	0.80	0	0.00	0.00	0.00	
45 WYE, STRAIGHT RUN	0.30	0	0.00	0.00	0.00	
SUM OF Ks			2.00	2.00	2.00	
MINOR HL, FT			0.07	0.17	0.56	
HEAD, FT (SUM OF PIPE FRICTION & MINOR HEADLOSS)			0.09	0.21	0.69	
W.S at GRIT CHAMBER (downstream)			**304.94**	**305.16**	**305.81**	
WEIR ELEVATION			306.00	306.00	306.00	
	calc distance below top of weir (ft)		1.06	0.84	0.19	If text is red, use submerged weir eq'n
WEIR LENGTH, FT			2.50	2.50	2.50	
FLOW SPLIT RATIO IN THE BOX			0.50	0.50	0.50	assume 2 grit chamber online
APPROX FLOW OVER WEIR, CFS			1.29	2.04	3.74	
HEAD ABOVE WEIR, FT			0.29	0.39	0.59	
W.S. in GRIT CHAMBER (upstream)			306.29	306.39	306.59	
H downstream, FT			-1.06	-0.84	-0.19	
H upstream, FT (GUESS, iterative)						f submerged flow, guess value until
FLOW OVER WEIR, CFS			Free Flow	Free Flow	Free Flow	# here = design flow
W.S. in GRIT CHAMBER (upstream)			**306.29**	**306.39**	**306.59**	

7. SCREENS TO GRIT CHAMBERS

	AAF	PDF	PHF
W. S. in GRIT CHAMBER (upstream)	**306.29**	**306.39**	**306.59**
neglect minor channel losses.			
neglect friction losses from channel			
W.S. DOWNSTREAM OF MECHANICAL SCREEN:	**306.29**	**306.39**	**306.59**
maximum estimated loss through screen, IN	14	14	14
W.S. UPSTREAM OF MECHANICAL SCREEN:	**307.46**	**307.56**	**307.75**

APPENDIX C
PROCESS CALCULATIONS

THE BIOLAC SYSTEM OXYGEN REQUIREMENTS

Phase I Southland WWTP, Nipomo, CA

Basin Data FOR BASIN ONE

BASIN CAPACITY * NUMBER OF BASINS = TOTAL BASIN CAPACITY
187850 * 1 = 187850

TOTAL BASIN CAPACITY * 7.48 = MILLION GALLON BASIN CAPACITY (MGBC)
187850 * 7.48/1000000 = 1.41

Oxygen Requirements for the Biolac Aeration System

ACTUAL OXYGEN REQUIREMENTS (AOR)

M G D * BOD (mg./l.) * 8.34 LBS./(mg./l.) = TOTAL LBS. BOD/DAY
0.895 253 * 8.34 = 1888

1.5 LBS. O2/LB. OF BOD REMOVED

38 HOURS RETENTION TIME

99 % REMOVAL OF BOD

LBS. BOD REMOVED/DAY * LBS.O2/LB. BOD REMOVED= AOR FOR BOD REMOVAL
1870 * 1.5 = 2804

M G D * TKN(mg./l.) * 8.34 = TOTAL LBS. TKN / DAY
0.895 34 * 8.34 = 254

4.6 LBS.O2/LB. OF TKN REMOVED (STANDARD)

99 % REMOVAL OF TKN

LBS. TKN REMOVED/DAY * LBS. O2/LB. TKN REMOVED = AOR FOR TKN REMOVAL
251 * 4.6 = 1156

COMBINED AOR = 3960 /24 HRS. = 165 LBS. O2/HR. AOR

THE ACTUAL OXYGEN REQUIREMENT MUST BE CONVERTED TO A STANDARD OXYGEN REQUIREMENT. THIS CONVERSION TAKES INTO CONSIDERATION SUCH FACTORS AS, TEMPERATURE, ELEVATION, DIFFUSER DEPTH, ALPHA FACTOR, BETA FACTOR, AND DISSOLVED OXYGEN LEVEL DESIRED.

TEMPERATURE=(T)	20
SATURATION=(CSM)	9.092
SITE BAROMETRIC PRESSURE=(BP)	14.52801

DIFFUSER WATER DEPTH=(DWD)	10
EQUIVILENT DEPTH FACTOR=(F)	0.25
ALPHA=(A)	0.7
BETA=(B)	0.95
THETA=(O)	1.024
DISSOLVED OXYGEN LEVEL=(C-L)	2

C-ST = CSM * (BP+(.433*DWD* F)) / 14.7 = 9.6556042

C-S20= 9.092 *((14.7+(.433*DWD* F)) / 14.7 = 9.7615299

C-SW = BETA * C-ST = 9.172824

LBS.O2/HR. AOR 165

SOR = -- = 321

ALPHA*(C-SW - C-L / C-S20) * (THETA^T - 20)

SOR = **321**

AERATION SYSTEM DESIGN

AIR RATE PER FT OF DIFFUSER AS DETERMINED = **1.11** **SCFM**

SOR = 321

DIFFUSER 02 TRANSFER RATE = **0.204588**

SCFM REQ =(SOR/FT OF DIFF O2 TRANS RATE*AIR FLOW RATE/FT DIFF)

SCFM = **1738** FOR DESIGN OXYGEN REQ

SCFM = **1738** INCLUDING RAS AIRLIFT PUMP

DELTA P=(((swd - 1)/34)*14.7)+1.5 = **5.82**

AIR LIFT AIR FLOW= **0** AIR LIFT BHP= **0**

BHP.= (SCFM*0.3775)((ATM.P+DEL.P/ATM.P)^.283-1)

BHP. = **66** FOR DESIGN OXYGEN REQ

BHP. = **66** INCLUDING CLARIFIER AIRLIFT

MIN SCFM FOR MIXING BASED ON SIDE SLOPE = 4 /1000 FT3

MIN SCFM = BASIN VOLUME 1000 FT3 * 4.0 **751** SCFM

MIN BHP FOR MIXING = **28**

TOTAL FT OF DIFFUSERS SUGGESTED AT TARGET FLOW RATE = 1568

TOTAL FT OF DIFFUSERS BASED ON ACTUAL FINAL LAYOUT = 1568

TUBES PER BIOFUSER ASSEM = 4 TOTAL BIOFUSERS = 98

SERIES BIOFUSER SELECTED = 2000 FT/DIFF ASSEMBLY= 4

NUMBER OF BIOFLEX CHAINS ON PROJECT = 7

NUMBER OF BIOFUSER ASSEMBLIES PER BIOFLEX CHAIN = 14

NOTE AIR FLOW TARGET = 50 fps VELOCITY

AIR FLOW PER CHAIN (SCFM) = 248

FEED DIAMETER = 6 VELOCITY AT CONDITION = 18

CHAIN SPACING = 16.29 BIOFUSER ASSEM SPACING = 7.14

BIOLAC SYSTEM
AERATION SIZING PROCEDURE
WAVE OXIDATION MODIFICATION

DATE: 10/26/2010
PROJECT LOCATION: Phase I Southland WWTP, Nipomo, CA
CONSULTING ENGR: Eileen Shields - AECOM

Basin Data (at mid-depth) FOR BASIN ONE

BASIN CAPACITY * NUMBER OF BASINS = TOTAL BASIN CAPACITY
187850 * 1 = 187850

TOTAL BASIN CAPACITY * 7.48 = MILLION GALLON BASIN CAPACITY (MGBC)
187850 * 7.48/1000000 = 1.41

Oxygen Requirements for the Biolac Aeration System

M G D * BOD (mg./l.) * 8.34 LBS./(mg./l.) = TOTAL LBS. BOD/DAY
0.895 253 * 8.34 = 1888

1.5 LBS. O2/LB. OF BOD REMOVED

38 HOURS RETENTION TIME

99 % REMOVAL OF BOD

LBS. BOD REMOVED/DAY * LBS.O2/LB. BOD REMOVED= AOR FOR BOD REMOVAL
1870 * 1.5 = 2804

M G D * TKN(mg./l.) * 8.34 = TOTAL LBS. TKN / DAY
0.895 34 * 8.34 = 254

4.6 LBS.O2/LB. OF TKN REMOVED (STANDARD)

99 % REMOVAL OF TKN

LBS. TKN REMOVED/DAY * LBS. O2/LB. TKN REMOVED = AOR FOR TKN REMOVAL
251 * 4.6 = 1156

COMBINED AOR = 3960 /24 HRS. = 165 LBS. O2/HR. AOR

ADJUSTED AOR FOR CONDITIONS AS LISTED

PERCENT TKN NITRIFIED	99	TOTAL LBS/DAY	251
PERCENT NITRATE REMOVED	89	TOTAL LBS/DAY	224
LBS OXYGEN/LB NITRATE	2.9	TOTAL LBS/DAY	648

ADJUSTED COMBINED AOR = TOTAL LBS O2 - LBS O2 RECOVERED FROM NITRATE

ADJUSTED AOR = 3312 LBS/DAY = 138 LBS O2/HR AOR

THE ACTUAL OXYGEN REQUIREMENT MUST BE CONVERTED TO A STANDARD OXYGEN REQUIREMENT. THIS CONVERSION TAKES INTO CONSIDERATION SUCH FACTORS AS, TEMPERATURE, ELEVATION, DIFFUSER DEPTH, ALPHA FACTOR, BETA FACTOR, AND DISSOLVED OXYGEN LEVEL DESIRED.

TEMPERATURE=(T)	20
SATURATION=(CSM)	9.092
SITE BAROMETRIC PRESSURE=(BP)	14.52801
DIFFUSER WATER DEPTH=(DWD)	10
EQUIVILENT DEPTH FACTOR=(F)	0.25
ALPHA=(A)	0.7
BETA=(B)	0.95
THETA=(O)	1.024
DISSOLVED OXYGEN LEVEL=(C-L)	0.5

C-ST =	CSM * (BP+(.433*DWD* F)) / 14.7	=	9.655604
C-S20=	9.092 *((14.7+(.433*DWD* F)) / 14.7	=	9.76153
C-SW =	BETA * C-ST	=	9.172824

SOR = LBS.O2/HR. AOR 138 / ALPHA*(C-SW - C-L / C-S20) * (THETA^T - 20) = 222

SOR = 222

AERATION SYSTEM DESIGN

AIR RATE PER FT OF DIFFUSER AS DETERMINED = **1.40** SCFM

SOR = 222

DEFINE 02 TRANSFER RATE/FT OF DIFFUSER :

DIFFUSER 02 TRANSFER RATE = **0.247645**

SCFM REQ =(SOR/FT OF DIFF O2 TRANS RATE*AIR FLOW RATE/FT DIFF)

SCFM = **1256**

DELTA P = (swd - 1 /34)14.7+1.5 = **5.82**

BHP.= (SCFM*0.3775)((ATM.P+DEL.P/ATM.P)^.283-1)

BHP. = **47**

MIN SCFM FOR MIXING BASED ON SIDE SLOPE = 4 /1000 FT3
MIN SCFM = BASIN VOLUME 1000 FT3 * 4 **751** SCFM
MIN BHP FOR MIXING = **28**

TOTAL FT OF DIFFUSERS SUGGESTED AT TARGET FLOW RATE = 1568
TUBES PER BIOFUSER ASSEM = 4 TOTAL BIOFUSERS = 98

NUMBER OF BIOFLEX CHAINS INSTALLED ON PROJECT = 7
NUMBER OF BIOFUSER ASSEMBLIES PER BIOFLEX CHAIN = 14
AIR FLOW PER OPERATING CHAIN (SCFM) = 314
FEED DIAMETER = 6 AIR VELOCITY DURING WOX OPERATION = 23

APPENDIX D

OPINION OF PROBABLE CONSTRUCTION COST

Nipomo Community Services District
SOUTHLAND WASTEWATER TREATMENT FACILITY
IMPROVEMENTS PROJECT
PHASE 1 (0.9 MGD CAPACITY)
OPINION OF PROBABLE CAPITAL COST

Item	Description	Quantity	Unit	Unit Price	Amount
A. Influent Pump Station and Flowmeter Improvements					
1	Flow Metering Manhole	1	LS	$40,000	$40,000
2	Screw centrifugal pumps	2	EA	$58,500	$117,000
3	Valves and piping	1	LS	$120,000	$120,000
4	Wetwell	1	LS	$200,000	$200,000
5	Demolish/salvage existing facility	1	LS	$20,000	$20,000
	Lift Station & Flowmeter Sub Total				$497,000
B. Spiral Screening System					
1	Spiral Screen (HeliSieve® HLS500)	2	EA	$135,000	$270,000
2	2 Concrete channels, w/common wall	30	YD^3	$800	$24,000
3	Miscellaneous piping	1	LS	$20,000	$20,000
4	Bypass Channel	1	LS	$8,000	$8,000
5	Sitework	1	LS	$15,000	$15,000
6	Screenings Conveyer & Bin	1	EA	$6,600	$6,600
	Screens Sub Total				$343,600
C. Grit Removal System					
1	JetAir + Classifier + assoc. equipment	1	LS	$215,700	$215,700
2	Concrete	30	YD^3	$800	$24,000
3	Miscellaneous piping (10% of equipment)	1	LS	$21,600	$21,600
4	Sitework	1	LS	$6,000	$6,000
	Grit Removal Sub Total				$267,300
D. Extended Aeration System (Biolac®)					
1	Extended Aeration System (Biolac®), (1.5MGAL cell)	1	LS	$648,000	$648,000
2	Regrade 1 pond (Cut slopes to 2:1)	2,710	YD^3	$10	$27,100
3	Earthwork for 1 pond (install 22-ft wide berm)	3,050	YD^3	$20	$61,000
4	HDPE Liner (40 mil, 1 cell)	31,500	FT^2	$0.50	$15,800
5	Blowers & VFDs (60 HP, PD)	2	EA	$45,000	$90,000
6	Distribution Boxes	2	EA	$112,000	$224,000
7	New air piping (for Aeration Basins 1 and 2)	350	LF	$170	$59,500
8	Miscellaneous piping and appurtenances (10% of subtotal)		LS		$112,540
	Extended Aeration Sub Total				$1,237,940
E. Secondary Clarifiers					
1	Secondary Clarifier (Diameter = 55 ft)	1	LS	$479,000	$479,000
2	Backup equipment for clarifier	1	LS	$50,000	$50,000
3	Excavation for clarifier	14,080	YD^3	$15	$211,200
4	Fill for clarifier	12,300	YD^3	$15	$184,500
5	RAS/WAS Pump Station		LS		$350,500
6	Distribution Boxes	2	EA	$112,000	$224,000
7	Miscellaneous piping (15% of subtotal)		LS		$224,880
	Secondary Clarifiers Sub Total				$1,724,080
F. Sludge Thickening System					
1	Gravity Belt Thickening System	1	LS	$192,400	$192,400
2	Concrete pad	8	CY	$800	$6,400
3	Shade structure	1	LS	$3,000	$6,000
4	Site work	1	LS	$15,000	$15,600
5	Site piping (10% of equipment)	1	LS	$19,240	$176,600
	Sludge Thickening System Sub Total				$397,000

Nipomo Community Services District
SOUTHLAND WASTEWATER TREATMENT FACILITY
IMPROVEMENTS PROJECT
PHASE 1 (0.9 MGD CAPACITY)
OPINION OF PROBABLE CAPITAL COST

Item	Description	Quantity	Unit	Unit Price	Amount
G. Holding Pond					
1	Earthwork (install one 15-ft berms, 2:1 side slope)	2,600	YD^3	$20	$52,000
2	HDPE Liner (40 mil)	31,300	SF	$0.50	$15,700
3	Sump and Piping (20% of earthwork)		LS		$10,400
	Holding Pond Sub Total				$78,100
H. New Drying Beds					
1	Earthwork & grading (2 beds, approx 150' x 235')	13,000	YD^3	$20	$260,000
2	Concrete liner		LS		$200,000
3	Piping		LS		$100,000
	New Drying Beds Sub Total				$560,000
I. Controls & Blower Building					
1	Controls and Blower Building (35' x 30')	1050	SF	$200	$210,000
2	Site work		LS		$15,000
3	Allowance for doors & louvers, etc		LS		$20,000
	Controls and Blower Building Sub Total				$245,000
J. Non-potable plant & irrigation water systems					
1	Hydrotank (5,000 gal) and slab				$50,000
2	Vertical Turbine Booster Pumps				$37,500
3	Buiding (assume 12' x 16')	192	SF	$200	$38,400
4	Hypochlorite Feed System				$30,000
5	Piping & appurtenances				$50,000
6	Filter for Irrigation Water				$15,000
	NPW Systems Sub Total				$220,900
K. Site Piping					
1	Lift Station to Headworks (assume 14")	300	LF	$115	$34,500
2	Headworks to Aeration Basins (assume 18")	390	LF	$150	$58,500
3	Aeration Basins to Clarifiers (assume 18")	260	LF	$150	$39,000
4	RAS (assume 12")	570	LF	$110	$62,700
5	WAS (assume 8")	500	LF	$90	$45,000
6	Clarifiers to Infiltration Basins (assume 24")	2200	LF	$180	$396,000
	Site Piping Sub Total				$635,700
L. Instrumentation and Controls					
1	SCADA, Instrumentation, and Controls				$300,000
	IC Sub Total				$300,000
M. Electrical					
1	Site electrical (not incl. emergency generator)				$389,000
	Electrical Sub Total				$389,000
	PHASE 1 PROJECT SUBTOTAL				$6,896,000
	Contingency 25% of Subtotal				$1,724,000
	Project Total				$8,620,000

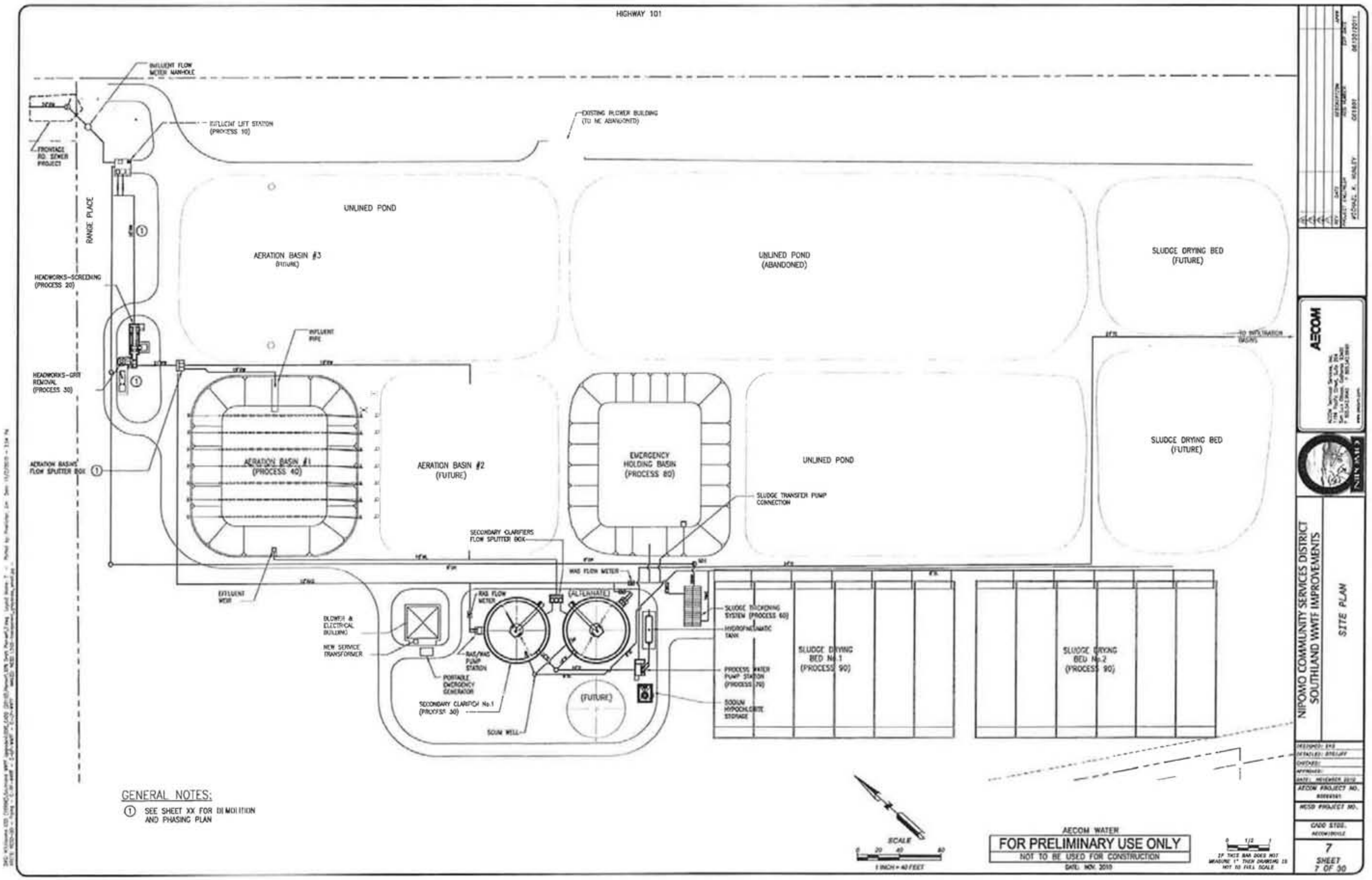
Nipomo Community Services District
SOUTHLAND WASTEWATER TREATMENT FACILITY
IMPROVEMENTS PROJECT
PHASE 1 (0.9 MGD CAPACITY)
OPINION OF PROBABLE CAPITAL COST

Item	Description	Quantity	Unit	Unit Price	Amount

Summary and Escalation Calculation

escalation factor	0.02
midpoint of construction	1/10/2012
cost estimating date	5/10/2010
years to midpoint of construction	1.6712329

Project Component	May 2010 Cost	Escalated Cost
A. Influent Pump Station and Flowmeter Improvements	$497,000	$513,700
B. Spiral Screening System	$343,600	$355,200
C. Grit Removal System	$267,300	$276,300
D. Extended Aeration System (Biolac®)	$1,237,940	$1,279,600
E. Secondary Clarifiers	$1,724,080	$1,782,100
F. Sludge Thickening System	$397,000	$410,400
G. Holding Pond	$78,100	$80,700
H. New Drying Beds	$560,000	$578,800
I. Controls & Blower Building	$245,000	$253,200
J. Non-Potable Plant & Irrigation Water Systems	$220,900	$228,300
K. Site Piping	$635,700	$657,100
L. Instrumentation and Controls	$300,000	$310,100
M. Electrical	$389,000	$402,100
Subtotal	**$6,896,000**	**$7,128,000**
Contingency (25% of subtotal)	$1,724,000	$1,782,000
Total Construction Cost Opinion	**$8,620,000**	**$8,910,000**


HIGHWAY 101
INFLUENT FLOW METER MANHOLE
INFLUENT LIFT STATION (PROCESS 10)
EXISTING BLOWER BUILDING (TO BE ABANDONED)
FRONTAGE RD. SEWER PROJECT
RANGE PLACE
UNLINED POND
AERATION BASIN #3 (FUTURE)
UNLINED POND (ABANDONED)
SLUDGE DRYING BED (FUTURE)
HEADWORKS-SCREENING (PROCESS 20)
INFLUENT PIPE
HEADWORKS-GRIT REMOVAL (PROCESS 30)
AERATION BASIN #1 (PROCESS 40)
AERATION BASIN #2 (FUTURE)
EMERGENCY HOLDING BASIN (PROCESS 80)
UNLINED POND
SLUDGE DRYING BED (FUTURE)
AERATION BASINS FLOW SPLITTER BOX
SLUDGE TRANSFER PUMP CONNECTION
SECONDARY CLARIFIERS FLOW SPLITTER BOX
WAS FLOW METER
EFFLUENT WEIR
RAS FLOW METER
(ALTERNATE)
SLUDGE THICKENING SYSTEM (PROCESS 60)
HYDROPNEUMATIC TANK
BLOWER & ELECTRICAL BUILDING
NEW SERVICE TRANSFORMER
RAS/WAS PUMP STATION
PORTABLE EMERGENCY GENERATOR
SECONDARY CLARIFIER No.1 (PROCESS 50)
SCUM WELL
(FUTURE)
PROCESS WATER PUMP STATION (PROCESS 70)
SODIUM HYPOCHLORITE STORAGE
SLUDGE DRYING BED No.1 (PROCESS 90)
SLUDGE DRYING BED No.2 (PROCESS 90)
GENERAL NOTES:
① SEE SHEET XX FOR DEMOLITION AND PHASING PLAN
SCALE
0 20 40 80
1 INCH = 40 FEET
AECOM WATER
FOR PRELIMINARY USE ONLY
NOT TO BE USED FOR CONSTRUCTION
DATE: NOV. 2010
AECOM
NIPOMO COMMUNITY SERVICES DISTRICT
SOUTHLAND WWTF IMPROVEMENTS
SITE PLAN
DESIGNED: EXS
DETAILED: STEFF
CHECKED:
APPROVED:
DATE: NOVEMBER 2010
AECOM PROJECT NO.
NCSD PROJECT NO.
CADD SIZE
7
SHEET 7 OF 30