City of Morro Bay

Wastewater Treatment Plant Study

May 24, 2007

Prepared by:

Cannon Associates
364 Pacific Street
San Luis Obispo, CA 93420

Table of Contents

Executive Summary

This Update to the 1999 *CDBG Reclamation Feasibility Study Phase II* (Phase II Study) examines the potential fatal flaws in developing a stand alone wastewater treatment plant for the City of Morro Bay (MB WWTP). Potential benefits of the MB WWTP include creek enhancement via effluent discharge to Chorro Creek. Additional flow through Chorro Creek of approximately 1.4 cfs is necessary before the existing ground water wells in the Chorro Valley may be utilized to supplement the City's potable water system.

This Update presents flow rate information to determine the available flow rate of effluent into Chorro Creek. The City identified two potential points for diversion of wastewater from the existing joint WWTP to the new MB WWTP. Diversion Point 1 captures approximately 49% of the average current flow of the City's wastewater; Diversion Point 2 captures approximately 92% of the average current flow. Flow rate calculations determined that, with Diversion Point 1, average flow of approximately 0.7 cfs would be available for discharge to Chorro Creek. With Diversion Point 2, average flow of approximately 1.4 cfs would be available for discharge to Chorro Creek.

This Update examined the impact of the Culligan facility discharge on the Total Dissolved Solids (TDS) concentration in the collection system. The Culligan facility causes a measurable impact to the TDS concentration, so a bypass line may be considered to continue sending Culligan discharge to the existing joint WWTP. Even with this bypass line, additional treatment may be required at the MB WWTP to meet TDS permit limitations.

This Update determined that, with development of a MB WWTP, Morro Bay's average flow to the existing joint WWTP would be reduced to 0.53 MGD (Diversion Point 1) or 0.07 MGD (Diversion Point 2). With this reduction in flow from Diversion Point 2, it is possible that the existing joint WWTP would have sufficient capacity to handle the remaining flow volume, without the need for capacity upgrades; however, because of the age of the existing WWTP, certain upgrades or repairs may be required for reliability purposes.

This Update reviewed the design presented in the Phase II Study for applicability to current treatment goals and permitting requirements. This Update recommends the following modifications: use of centrifuge for sludge dewatering rather than belt press, use of an oxidation ditch for nutrient removal, and advanced membrane treatment for TDS removal. Membrane treatment will require a return line to the existing joint WWTP for discharge of the resulting brine.

This Update reviewed options for solids handling at the MB WWTP. Due to land cost considerations, off-site disposal is recommended.

This Update identified new pipelines which will need to be constructed to implement the proposed design. The likely route for a majority of these lines is along Atascadero Road, Main Street, and Quintana Road. While there are currently many existing underground utilities in these streets, it was assumed that an acceptable route could be found within this corridor.

This Update identified relevant regulations which would apply to the MB WWTP, and reviewed permitting limitations, assuming permit requirements would be similar to those recently-issued for the CMC WWTP. The RWQCB did not specify location requirements for the discharge pipeline relative to the existing wells. No specific restrictions were identified regarding proximity of a WWTP to a state waterline; however, a WWTP within a FEMA flood zone must be sited such that there is no danger of inundation from a 100-year flood. Timeline for RWQCB permitting of a new WWTP will likely range from six months to several years, depending on level of agency review and public comment.

This Update presents a review of the Phase II Study cost estimate for construction and operation of the MB WWTP. Updated construction costs range from approximately $13.6M to approximately $26.6M, depending on the diversion point, WWTP site, and design modifications selected. Annual operating costs are approximately $2M for either site or diversion point. Considering contingencies, miscellaneous additional fees, and a net present value of operating costs over a 20-year life, total costs range from $49.4M to $76.5M. Note that these cost estimates do not include land acquisition costs.

This Update presents a review of the available grant and loan opportunities which may be available to close the funding gaps for construction of the MB WWTP. Funding opportunities may be available to offset the entire upfront cost of construction; however, there is no guarantee that funding will be granted.

Morro Bay has several opportunities to address their wastewater treatment needs, including upgrade of the existing facility, development of their own facility, or possibly a hybrid solution incorporating advantage of both options. Should Morro Bay decide to pursue development of a separate WWTP, the following design considerations and modifications are recommended:

- Diversion Point 2
- Study Area 1
- Oxidation Ditch
- Centrifugal Dewatering
- Reverse Osmosis for 100% of Effluent with a brine return line to the ocean discharge line at the existing plant

Such a design would require capital costs of approximately $26.6M with annual operating costs of $2.3M, and a total Net Present Value (NPV) 20-year cost of $76.5M, not including land acquisition and right-of-way costs. Prior to pursuing this option further, Part II of this Update should be completed to review environmental impacts and additional permitting considerations.

1. Introduction

This Feasibility Study (Update) was prepared to examine the potential challenges in development of a stand-alone Waste Water Treatment Plant for the City of Morro Bay (MB WWTP). Development of a stand-alone MB WWTP has been previously reviewed in two reports prepared by Boyle Engineering Corporation: *CDBG Waster Water Reclamation Feasibility Study Phase I* and *CDBG Reclamation Feasibility Study Phase II* (Phase II Study).

Both of these previous studies explored opportunities for beneficial reuse of wastewater effluent should a MB WWTP be constructed. The Phase II Study expanded on the review performed in Phase I and included a market study; a conceptual design; an environmental assessment; a cost estimate; and preliminary research into project financing and grant opportunities.

The previous studies identified that there may be potential benefits of a stand-alone MB WWTP. The Phase II Study explored the potential beneficial reuse of treated effluent for either agricultural irrigation or creek enhancement via discharge to Chorro Creek. The Phase II Study concluded that both are viable options, but Chorro Creek enhancement was the preferred option.

There are two potential advantages of using treated effluent for creek enhancement. The first is enhancement of the creek itself, providing improved quality of habitat for resident species. The second potential advantage is increased use of the nearby groundwater wells which supplement the City's potable water supply. Regulatory requirements restrict pumping of these wells unless there is sufficient flow in Chorro Creek. Supplementing current Chorro Creek flow with treated effluent may allow increased usage of existing groundwater pumps for additional potable water supply.

Prompted by the need to upgrade the existing jointly-owned WWTP to meet NPDES requirements, the City of Morro Bay commissioned this Update to revisit the current feasibility of developing a stand-alone facility with beneficial reuse of the effluent for creek enhancement.

This Update reviews the information presented in the Phase II Study, under current conditions. The goal of this Update is first to determine current requirements regarding WWTP effluent quality, then to determine if meeting such requirements would be technically and economically feasible. This Update includes an updated cost estimate, as well as a review of current grants and financing sources available for WWTP and creek enhancement projects.

The focus of the Update is on review of the information and design presented in the Phase II Study. For instance, this Update does not create a design to meet current treatment requirements, but determines if the design reviewed in the Phase II Study would meet those requirements, and what modifications might be needed to meet the requirements. For complete understanding, the Phase II Study should be reviewed as a companion to this Update.

2. Background

The Phase II Study reviewed a WWTP and associated sewer system modifications with the following components and characteristics:

- A diversion point would be established in the sewer system at either Lift Station #2 or along Main Street, north of Radcliffe Street, for purposes of directing flow to the MB WWTP.
- Either a "stand alone" plant, which would operate separately from the existing jointly-owned WWTP, or a "satellite" plant, which would treat wastewater at a separate location but utilize the existing joint WWTP for some secondary processes like solids handling.
- Two locations were considered for the MB WWTP, both at the eastern end of Morro Bay. One was a site near Seashell Communities; the other was a site near the Chorro well field. Each treatment location had an associated discharge location into San Bernardo Creek, a tributary to Chorro Creek.
- Potential reuse options, including Chorro Creek enhancement, supplemental agricultural irrigation, or golf course irrigation. The Phase II Study determined that creek enhancement was the most viable reuse opportunity for the City.
- The WWTP system itself included primary clarification, biological oxidation nutrient removal, secondary clarification, filtration, and disinfection prior to discharge. A stand alone facility would also include on-site biosolids treatment. The Phase II Study also considered a satellite design which included a biosolids return pipeline to the existing joint WWTP.
- The Phase II Study identified that membrane treatment may be required, but did not consider this option in detail.

For this Update, the City wished to focus and expand on specific recommendations or options identified in the Phase II Study. This Update focuses on the following design elements from the Phase II Study:

- The City has identified two alternate potential diversion points for this Update: Diversion Point 1 is located near the intersection of Radcliffe and Main, just downstream of the Culligan plant. Diversion Point 2 is located near the intersection of Main and Atascadero and captures the majority of flow from Morro Bay. See Exhibits 1 and 2.
- This Update focuses solely on a "stand alone" plant.
- The same two potential plant sites are considered in this Update as the Phase II Study. The study areas for plant siting are shown on Exhibits 1 and 2.
- This Update focuses solely on potential reuse via creek enhancement.
- This Update examines whether the previously-studied WWTP design is adequate to meet current regulatory requirements, or whether additional components will be necessary, including membrane treatment.

3. Flow Analysis

This section presents the anticipated influent flow to the MB WWTP for each proposed diversion point and resulting effluent flow available for Chorro Creek enhancement. In addition, this section examines the hydraulic impact to the existing plant of diverting flow to the MB WWTP.

More accurate flow rate data has become available since preparation of the Phase II Study, so values from the Morro Bay Sewer Collection System Master Plan Update (SMP), prepared by the Wallace Group in 2006, were used for this Update.

Volume of Influent to Stand-Alone Plant

The SMP identifies 12 distinct drainage basins within the City. As shown on Exhibit 3, Diversion Point 1 captures flow from basins A03, A04, a portion of basin A02, and the three "B" basins. Diversion Point 2 captures flow from all basins except TP. Estimated influent flow rates to the MB WWTP for each diversion point are shown in Table 3-1.

Table 3-1: Influent Flow Rates to MB WWTP

	Current*		Future**	
Basin	Average Flow (GPM)	Peak Hour Dry Weather Flow (GPM)	Average Flow (GPM)	Peak Hour Dry Weather Flow (GPM)
A01a	26	52	26	52
A01b	13	39	14	42
A01c	45	135	46	138
A02	66	198	82	246
A03	74	222	79	237
A04	24	72	28	84
A05	32	96	92	276
A06	47	141	48	144
A07	53	159	54	162
B01	46	115	54	135
B02	49	123	52	130
B03	56	196	62	217
TP	48	72	51	77
Total	579 (0.83 MGD)	1620 (2.33 MGD)	688 (0.99 MGD)	1940 (2.8 MGD)
Diversion Point 1 (GPM)	282	827	316	926
Diversion Point 1 (MGD)	0.41	1.19	0.46	1.33
Percent of Total	*49%*	*51%*	*46%*	*48%*
Diversion Point 2 (GPM)	531	1548	637	1863
Diversion Point 2 (MGD)	0.76	2.23	0.92	2.68
Percent of Total	*92%*	*85%*	*93%*	*96%*

* Current flow rates from Table 5-1 in SMP

** Future flow rates from Table 5-2 in SMP

Volume of Effluent to Chorro Creek

This project is being considered as a means of providing creek enhancement to Chorro Creek via effluent discharge. The Phase II Study identifies that a target flow rate in Chorro Creek of 1.4 cfs is desirable, and effluent from the WWTP will be used to supplement natural Chorro Creek flow toward achieving this flow rate.

In wastewater treatment, a majority of the solids from the influent are removed during processing, so the volume of effluent is estimated as the volume of influent minus removed solids. A typical rule of thumb for solid waste removal during treatment is 0.5 gallons of solid waste product for every 100 gallons of influent. Table 3-2 shows the estimated volumetric effluent rates to Chorro Creek determined by using this rule of thumb. If advanced membrane treatment is required, there may be an additional 10% of this flow lost to brine disposal.

Table 3-2: Effluent Flow Rates to Chorro Creek

Diversion Point	Vol. Influent (MGD)		Vol. Effluent (MGD/cfs)*	
	Average	PDWF	Average	PDWF
1, current	0.41	1.19	0.40/0.62	1.18/1.83
1, future	0.46	1.33	0.45/0.70	1.33/2.1
2, current	0.76	2.23	0.76/1.18	2.22/3.4
2, future	0.92	2.68	0.91/1.4	2.67/4.1

* Assumes approximately 0.5% volume of influent lost to solids waste removal, evaporation, etc.

Note that the average effluent flow rate for Diversion Point 1 for both current and future flow is less than half the desired flow rate for effluent to Chorro Creek of 1.4 cfs. Diversion Point 2 approaches this target under current flows and achieves it under future flow rate scenarios.

Volume of Influent to Joint Facility

While the majority of the City's wastewater would be directed to the MB WWTP, the remainder would continue to flow to the existing jointly-owned WWTP. Based on the SMP, Morro Bay's current average flow to the existing joint WWTP from the City is approximately 0.84 MGD, with peak flows of up to 2.33 MGD. With construction of a stand-alone plant, the flows to the joint WWTP would be reduced as shown below in Table 5-3.

Table 5-3: Volume of Influent to Joint Facility from Morro Bay

Diversion Point	Existing System – MB Flow to Joint WWTP (MGD)		Proposed System - Flow to MB WWTP (MGD)		Proposed System – MB Flow to Joint WWTP (MGD)	
	Average	PDWF	Average	PDWF	Average	PDWF
1, current	0.84	2.33	0.41	1.19	0.43	1.14
1, future	0.99	2.80	0.46	1.33	0.53	1.47
2, current	0.84	2.33	0.76	2.23	0.08	0.10
2, future	0.99	2.80	0.92	2.68	0.07	0.12

With these revised volumes, the new average flow rate to the existing joint WWTP is estimated as shown in Table 5-4:

Table 5-4: Total Proposed Flow at Joint Facility

Diversion Point	Cayucos Flow to Joint WWTP*				MB Flow to Joint WWTP				Total Flow to Joint WWTP	
	Average (MGD)	*% of Total*	PDWF (MGD)	*% of Total*	Average (MGD)	*% of Total*	PDWF (MGD)	*% of Total*	Average (MGD)	PDWF (MGD)
1, current	0.29	*40*	0.36	*17*	0.43	*60*	1.14	*76*	0.72	1.50
1, future	0.32	*38*	0.40	*14*	0.53	*62*	1.47	*79*	0.85	1.37
2, current	0.29	*78*	0.36	*32*	0.08	*22*	0.10	*22*	0.37	0.76
2, future	0.32	*82*	0.40	*27*	0.07	*18*	0.12	*23*	0.39	0.52

* Source: 2007 FMP Table 3-12

4. Regulatory Requirements

This section examines the potential regulatory requirements imposed by the RWQCB for discharge into Chorro Creek. Relevant regulations and impacts for operation of the MB WWTP are detailed below.

Reference is made to the discharge permit issued by the RWQCB to the WWTP operated by the California Men's Colony (CMC). The CMC WWTP is a 1.2 MGD facility, and the discharge requirements are likely similar to those that could be anticipated for the MB WWTP. A copy of the relevant sections of the CMC WWTP permit is included in Appendix A, for reference.

Relevant Regulations

California Toxics Rule/State Implementation Plan

The California Toxics Rule/State Implementation Plan (SIP) establishes limitations for certain priority pollutants (as identified in the SIP) discharged to inland surface waters, such as Chorro Creek. The SIP requires that any of these pollutants with a reasonable chance of being in wastewater be treated. Further, the SIP does not allow for a dilution credit for bodies of water such as Chorro Creek whose primary source of flow is effluent. This requirement means that effluent discharge from the WWTP must be at or below levels considered safe for the creek at the discharge location and downstream.

Some of the priority pollutants that may be present in wastewater include volatile and semi-volatile substances like acrolein, phenols, chloroethanes; inorganic substances like arsenic, cyanide, cadmium, copper, lead, mercury, zinc; and pesticides like PCBs.

Based on discussion with the RWQCB, one of the most relevant type of pollutants of concern for the MB WWTP at this time is THMs, which are by-products of chlorine disinfection. THM restrictions due to the SIP would likely require that the MB WWTP employ some alternative form of disinfection, such as UV or ozone treatment, or use of chlorine dioxide. The CMC facility uses a post-disinfection dechlorination procedure prior to discharge.

Chorro Creek Total Maximum Daily Load Limits (TMDLs)

Chorro Creek is considered an impaired water body for nutrients and dissolved oxygen by the EPA (established per Section 303(d) of the Clean Water Act). The creek has become eutrophic due to excessive nutrient loading and amount of sunlight due to the limited number of surrounding trees.

The Basin Plan prepared by the RWQCB establishes TMDLs to allocate nutrient loading to all sources in the Chorro Creek watershed and to limit point sources to minimize additional problems. These TMDLs include maximum limits on nitrogen, nitrates, phosphorus and sediment, and limits to minimize impact on dissolved oxygen and temperature.

Of these TMDLs, the most challenging to meet is considered to be the nitrogen limitation. The CMC permit shows a maximum discharge concentration for nitrogen at 10 mg/L. This limit is the same level as the drinking water standard. New sources of discharge to the creek should anticipate a maximum allowable limit of nitrogen of 10 mg/L or less. However, the TMDL standards were established based on a review of all existing pollutant sources. New sources may be subject to even stricter requirements.

Additionally, TMDL limits are subject to review by the EPA. Ongoing studies may indicate that eutrophication is triggered at even lower concentrations of nitrogen than 10 mg/L, so this standard may be tightened even further in the future.

Environmental regulations typically require that the most stringent standard be met if the local standard differs from a state or federal standard. Due to the nature of the multi-agency review process, this TMDL standard may be subject to continual review and revision, potentially requiring permitted dischargers to be continually improving their discharge quality as well.

Morro Bay Total Maximum Daily Load Limits

As Chorro Creek feeds ultimately to Morro Bay, discharges to the creek are subject to discharge requirements for the Bay as well. Morro Bay is also a 303(d) listed water body by the EPA, and is considered impaired for nutrients, dissolved oxygen, and pathogens. As Morro Bay is a commercial shellfish growing site, pathogen discharges must meet the shellfish standard. The RWQCB Basin Plan establishes limits for pathogens via Resolution 2003-0060.

The pathogen limit established in the CMC permit is median coliform concentration of MPN 2.2/100 mL or less. Again, standards for new individual sources would be subject to agency review.

Mandatory Penalty Law

Water Code Section 13385, the Mandatory Penalty Law, requires imposition of a $3,000 fine for each effluent violation, per incident, per pollutant. While this law does not impose additional requirements, it does significantly increase liability for operators of WWTPs.

The nature of biological wastewater treatment is that it is a variable process. No matter how many checks and controls are in place, it is likely that occasional violations may occur. According to the RWQCB, other local treatment plants include line items within their annual budgets for payment of mandatory penalties.

Permit Scheduling

The City would need to apply for Waste Discharge Permit from the RWQCB. Timing requirements for obtaining a new wastewater facility discharge permit could range anywhere from six months to several years. The primary factor which could cause

significant delay would be if the permit is contested during public review, or if there is an appeal during review by a higher level agency (SWRCB or EPA).

Other Potential Regulatory Requirements

Other regulatory requirements may be imposed by other environmental oversight agencies. For discharge into Chorro Creek, these agencies could include CDFG, ACOE, NMFS, USFWS, and others. One thing to consider is that, in addition to imposing water quality restrictions, habitat protection agencies may require minimum flow rates to be maintained as well. This requirement could pose challenges in the future, should TMDL restrictions continue to tighten.

Further discussion of additional environmental permitting requirements is beyond the scope of this Update.

Site Specific Issues

Two potential sites for the MB WWTP are under consideration. The first study area contains a state water line adjacent to the proposed WWTP site. As long as locally-mandated separation between the WWTP and the water line are maintained, there do not seem to be additional regulatory restrictions regarding siting the plant near the water line.

The second potential area is within the 100-year flood plain of Chorro Creek. FEMA maps shown in Appendix B show the extent of the flood plain in the vicinity of Study Area 2. A WWTP within a flood plain must be designed such that there is no danger of flooding the facility in a 100-year flood. Satisfying this requirement will require extensive grading and perhaps additional safety measures as well, such as flood walls. FEMA permitting considerations may increase the time schedule for construction of the facility. Additionally, the grading requirements to achieve this elevation may result in an aesthetic problem, if the WWTP becomes more visible from Highway 1.

The first site is considered more desirable due to flood control considerations. Land for this site does not currently belong to the City, so land acquisition costs need to be considered.

5. Design Review

This section reviews the design presented in the Phase II Study and discusses potential modifications which may be required to achieve the anticipated effluent requirements.

The Phase II Study examined a WWTP which utilizes primary treatment for removal of solids; a bioreactor basin to reduce BOD_5, N and P; a secondary clarifier for further solids removal; a sand filter for final solid waste removal; and UV disinfection prior to creek discharge. Refer to Sections 6 and 7 of the Phase II Study for a detailed description of the proposed design.

Potential Design Modifications

Table 5-1 shows the anticipated permit requirements for different effluent characteristics. This table compares the anticipated requirements reviewed for the Phase II Study to those imposed on the CMC WWTP in their recent permit renewal.

Table 5-1: Anticipated Permit Requirements

Water Quality Constituent	Units	Creek Discharge Requirement (1999) Monthly Average	CMC Permit Limitation (2006) Monthly Average
BOD_5	mg/L	10	10
TSS	mg/L	10	10
Settleable Solids	mL/L	0.1	0.1
Turbidity	NTU	10	10
Grease and Oil	mg/L	5	5
Sulfate (max daily)	mg/L	125	125
Dissolved Oxygen	mg/L	≥ 2.0	> 2.0
MPN (per 100 ml)		≤2.2	≤2.2
TDS	mg/L	Water Supply plus 450	500
Chlorodibromotomethane	µg/L	*	0.56
Chronic Toxicity (max daily)	TUc	*	1
Dichlorobromomethane	µg/L	*	0.56
Sodium	mg/L	Water Supply plus 100	50
Chloride	mg/L	Water Supply plus 105	50
Nitrogen (max daily)	mg/L	Un-ionized Ammonia (N), 0.032	Total N, as nitrogen, 10 Un-ionized Ammonia, 0.025
pH		*	6.5-8.3 at all times
Residual Chlorine		ND	ND

* Requirement not specified in Phase II Study permit review
ND : Non detectable

While many of the permit limitations have remained the same, there are several revisions which will require design modifications from the Phase II Study design. Potential design modification requirements are discussed below:

- There is no mechanism in the Phase II Study treatment train for removal of TDS, so the TDS restriction of 500 mg/L may require advanced filtration such as membrane treatment to achieve this limit. As shown in Table 5-2, current TDS-level in the system generally exceeds 500 mg/L everywhere downstream of the Culligan facility. (See Exhibit 4 for locations of Sampling Points.) Even upstream of Culligan or in areas not influenced by its effluent, this TDS level is exceeded in several instances.

Table 5-2: Current System TDS Water Quality

City of Morro Bay Location	TDS (mg/L) 11/15/2006	TDS (mg/L) 12/13/2006	TDS (mg/L) 3/6/2007
Water Source at time of sampling:	Well	State	State
Kings Tank (potable water)	660	260	330
MH8-15 (Upstream Culligan)	900	490	620
MH8-21A (Downstream Culligan)	2500	7300	10000
MH14-1 (Downstream LS #2)	960	580	710
MH5-24A (Main Street)	-	560	550
MH8-47 (Atascadero Rd.)	980	2900	730
Cayucos Line: 1st Upstream Plant	910	1000	870
Headworks	960	1700	710

One potential design modification may be to install a bypass line at the Culligan facility, so that its effluent continues to go to the existing joint WWTP. See Exhibits 1 and 2. Since the existing joint WWTP discharges to the ocean, TDS restrictions are not imposed. However, one factor to consider in this modification is whether the system at the existing treatment plant can handle this concentration of dissolved solids from Culligan.

Even with a bypass line to divert the Culligan effluent from the MB WWTP, it is likely that advanced treatment, such as membrane filtration, will be required to remove TDS levels to below the discharge requirement. It is possible that only a portion of the effluent would require membrane treatment, to be blended with the remainder of the effluent prior to discharge, allowing for a smaller membrane plant. Further analysis of blending is beyond the scope of this Update.

Other constituent limitations may be challenging to meet as well. Table 5-3 shows the permitted limits for the CMC facility for a number of constituents, compared to the reported effluent discharge quality from the existing joint WWTP. Note that there are several constituent limitations which are exceeded under the current process, including copper, phthalate esters, and ammonia. Other constituents limitations may be problematic as well; the existing joint

WWTP does not monitor for all of the listed constituents, so complete data is not available. The MB WWTP would need to employ alternate means to addresses these constituents, such as membrane treatment.

Membrane treatment, such as reverse osmosis (RO), should alleviate concerns regarding a majority of the potential discharge contaminants, including TDS and other constituents which have SIP or TMDL restrictions. Since it is likely that some degree of advanced membrane treatment will be required, anticipated costs for a membrane plant are included in the cost estimate below. The cost estimate assumes that all of the flow will receive membrane treatment prior to discharge.

Table 5-3: CMC Surface Water Limitations vs Existing Joint WWTP Effluent Discharge Quality

Constituent	Units	Maximum Per CMC Permit	Existing Joint WWTP	
			2005 Annual Report	2006 Annual Report
Boron	mg/L	0.2	-	
Cadmium	mg/L	0.003*	0.0028	<0.01
Chloride	mg/L	50	-	-
Cobalt	mg/L	0.05	-	-
Copper	µg/L	8.5*	15	20
Fluoride	mg/L	1	-	-
Iron	mg/L	5	-	-
Lead	mg/L	0.03	0.0021	0.0022
Lithium	mg/L	2.5	-	-
Manganese	mg/L	0.2	-	-
Methylene Blue Activated Substances	mg/L	0.2	-	-
Molybdenum	mg/L	0.01	-	-
PCBs	µg/L	0.3	0.2	<0.2
Phthalate Esters	µg/L	0.002	10	<20
Selenium	mg/L	0.01	0.003	0.0019
Silver	mg/L	0.05	<10	<10
Sodium	mg/L	50	-	-
Sulfate	mg/L	50	-	-
Total Dissolved Solids	mg/L	500	-	-
Un-ionized Ammonia (as N)	mg/L	0.025	33	35
Vanadium	mg/L	0.1	-	-
Zinc	mg/L	0.2*	0.056	0.061

- : no data available
* Limits may be lower depending on water quality of Chorro Creek

- As discussed above in Section 4, the nitrogen limitation may be challenging to meet. As shown in Table 5-3, nitrogen levels from the existing plant were above 30 mg/L for the past two years, suggesting that the treatment methods employed

at the existing facility may not achieve a 10 mg/L limit. The proposed MB WWTP design incorporates additional measures for nutrient removal.

The CMC plant will employ an oxidation ditch to reduce nitrogen levels prior to the wastewater entering the clarifier units. An oxidation ditch/nutrient removal process is recommended for the MB WWTP facility as well, and is included in the cost estimate.

Additional Technical Considerations

Solids Handling

The Phase II report identifies two primary methods of handling biosolids: on-site at the separate facility or returning the bio solids via pipeline to the existing facility for handling. A possible third alternative may be to ship the biosolids off-site to a third party handler. The City has determined that return of biosolids to the existing facility is not a viable option; therefore, this Update does not pursue that option further. Estimated costs for the remaining options are discussed below.

The Phase II Study design included a belt press for solids dewatering. The recommended improvements in the FMP prepared by Carollo include centrifugal dewatering instead. This modification is incorporated into the cost estimate below, although life-cycle studies have indicated that overall costs for the two technologies are similar.

The FMP estimates the volume of dry sludge produced at the existing joint WWTP to be approximately 1200 lbs per million gallons (MG) of influent. Assuming a similar rate production at the MB WWTP, the volume of dry sludge (solids) generated can be estimated as shown in Table 5-4. Even with centrifugal dewatering, the solids will retain a fair amount of water that will result in increased hauling and disposal costs. Using the same assumptions as the FMP for efficacy of centrifugal dewatering, estimated quantities of dry and wet sludge are shown in Table 5-4, below. Quantities in Table 5-4 are shown in pounds per day (lb/d) for dry sludge and tons per year (TPY) for wet sludge.

Table 5-4: Biosolids Generation at MB WWTP

Diversion Point	Average Influent Flow (MGD)	Mass Dry Sludge (lb/d)	Mass Wet Sludge (TPY)	PDWF (MGD)	Mass Dry Sludge (lb/d)	Mass Wet Sludge (TPY)
1, current	0.41	490	1200	1.19	1400	3500
1, future	0.46	550	1300	1.33	1600	3900
2, current	0.76	920	2200	2.23	2700	6500
2, future	0.92	1100	2700	2.68	3200	7800

Given current land acquisition costs, the most economical choice for handling solids will likely be off site hauling. Costs for off site hauling are included in the cost estimate below.

Brine Handling

Should a membrane system be necessary to meet discharge requirements, a means of handling the reject or brine from the membrane plant will be necessary as well. The two likely alternative means of handling brine include on-site dehydration and disposal as solid waste, or transport to either the existing joint WWTP or the City's desalination (desal) plant for disposal via an existing ocean discharge.

Transport to the City's existing desalination plant at the power plant may not be an option. The NPDES permit for the desal plant is specific to brine from the desal facility, so waste from an alternate facility may not be permitted. Further, the permit states that "Discharge of filter backwash or chemical additives, except as described in this Order, are prohibited." Depending on interpretation, discharge at the desal plant may require a permit amendment.

For purposes of this Update, the assumption was made to construct a brine return line to the existing joint WWTP for discharge at the existing joint WWTP outfall structure. Costs for a brine return line from the MB WWTP location to the existing joint WWTP are included in the cost estimate below.

Pipeline Location

There are several new pipelines that would need to be constructed to make the potential MB WWTP viable. These include:

- New gravity sewer main extending from Highway 41/Main to the new lift station at Radcliffe;
- New gravity sewer main from Culligan facility to Highway 41/Main;
- New brine return line to the existing plant;
- New force main from the new lift station to the new WWTP;
- New effluent force main or gravity line from the MB WWTP to the discharge point at San Bernardo Creek.

The likely route for a majority of these lines is along Atascadero Road, Main Street, and Quintana Road. While there are currently many existing underground utilities in these streets, it was assumed that an acceptable route could be found within this corridor.

6. Cost Estimate & Staffing Requirements

This section presents an update of the costs outlined in the Phase II Study, with some design modifications considered, as discussed above.

Cost Estimate

This Update uses the ENR index to correct costs from 1999 values to current values. The ENR Construction Cost Index used in the Phase II Study was 6852 (December, 1998). The Carollo FMP Update uses a value of 7770 (June, 2006). For consistency with the FMP Update and ease of comparison of cost estimates, this Update shows estimated costs adjusted to the same index used in the FMP Update. A summary of these costs is shown in Table 6-1a.

Some construction costs have exceeded the ENR indexed rate of increase. Also shown are revised construction costs which reflect a more accurate estimate of present value costs than the ENR Update. These revised costs are based on various sources including recent bid prices for similar projects and the more recent cost estimates prepared in the FMP and SMP. A summary of the revised costs is shown in Table 6-1b.

This cost estimate also includes approximate costs for the design modifications recommended above. Detailed cost calculations are dependent on a higher level of design for these modifications than falls within the scope of this Update.

Costs are dependent on amount of wastewater being treated (flow rate) and distance from source to treatment location. These costs vary between Diversion Points 1 and 2 and Site Alternatives 1 and 2. Four cost estimate tables are presented, to address each combination. Tables 6-1a and 6-1b show a summary of the cost breakdown shown in the detailed cost tables included in Appendix C.

Note that these summaries do not include land acquisition or easement costs for whichever site may be selected for construction.

Table 6-1a: Cost Estimate Summary (ENR Index)

	Option 1: WWTP Study Area 1 Diversion Point 1	Option 2: WWTP Study Area 1 Diversion Point 2	Option 3: WWTP Study Area 2 Diversion Point 1	Option 4: WWTP Study Area 2 Diversion Point 2
Capital Costs	13,600,000	16,500,000	13,600,000	16,500,000
Contingency (20%)	2,700,000	3,300,000	2,700,000	3,300,000
Engineering/Admin/Legal/ Permitting (35%)	4,800,000	5,800,000	4,700,000	5,800,000
Annual O&M	1,900,000	2,300,000	1,900,000	2,300,000
O&M 20-Year NPV	28,500,000	35,200,000	28,400,000	35,200,000
Total	**49,500,000**	**60,800,000**	**49,400,000**	**60,700,000**

Table 6-1b: Cost Estimate Summary (Revised Costs)

	Option 1: WWTP Study Area 1 Diversion Point 1	Option 2: WWTP Study Area 1 Diversion Point 2	Option 3: WWTP Study Area 2 Diversion Point 1	Option 4: WWTP Study Area 2 Diversion Point 2
Revised Capital Costs	22,400,000	26,600,000	23,700,000	26,600,000
Contingency (20%)	4,500,000	5,300,000	4,700,000	5,300,000
Engineering/Admin/Legal/ Permitting (35%)	7,800,000	9,300,000	8,300,000	9,300,000
Revised Annual O&M	1,900,000	2,300,000	1,900,000	2,300,000
Revised O&M 20-Year NPV	28,500,000	35,200,000	28,400,000	35,200,000
Total Revised Costs	**63,100,000**	**76,500,000**	**65,200,000**	**76,400,000**

Staffing Requirements

The amount of staff required at a WWTP is not dictated by regulations. However, regulations do specify that an operator must be certified to at least the same class level as the plant class. Supervisors and shift supervisors may generally be certified to one level below the plant class.

Given the level of treatment required prior to discharge, this plant would likely be classified as a tertiary-process plant. Given the flow rate of less than 20 MGD, the plant would likely be classified as a Class III or IV plant. This means that the operator must be certified to at least that level, and all supervisors and shift supervisors must be at least Class II or III. If membrane treatment is employed, additional training or higher-level certification will most likely be required.

A Staffing Plan was prepared for the existing joint WWTP, discussing the need for full- and part-time/off-shift staff to maintain safe and efficient operations. The Staffing Plan recommended a staff of seven, with shifts scheduled to maintain plant effluent quality throughout the week, including staff available on weekends. This staffing level is maintained in the FMP.

As the existing plant and the proposed MB WWTP are similar in size, it may be anticipated that staffing requirements will be similar as well. While the lesser flow rate at the MB WWTP might justify some staff reduction, it is anticipated that the additional monitoring and compliance requirements likely to be imposed under the permit will require additional staff. For purposes of this Update, it is assumed that these factors will balance. Salary costs for staffing are included in the annual O&M costs for the WWTP, discussed above.

7. Financing and Grants

Summary and Analysis of Phase II Information

This section presents an overview of potential funding sources for the MB WWTP. Funding opportunities were explored from a variety of different sources, including the State Water Resources Control Board, the California Infrastructure and Economic Development Bank, the US Environmental Protection Agency, and the Department of Parks and Resources, among others.

Table 7-1 summarizes the funding opportunities which were reviewed. The table identifies those sources for which the MB WWTP may be eligible to receive assistance. It also identifies why the project is ineligible for other sources.

Many of these sources arose from bond measures that passed to provide funding for a specific period of time or with a limited budget. As a result, some of these funding sources may not be available at the time of project implementation. The criteria outlined in this table are specific to what was available in February of 2007; if any of these funding sources are to be utilized in the future, it may be necessary to do further research to confirm that the information presented is still valid.

For more information about the specific details of any of these funding sources, the program director or representative may be contacted. The contact information for each funding sources is included in the last column of the table.

Remaining Financing Gaps

The upfront construction costs for developing a standalone MB WWTP range from $13.6M to $26.6M. Grants or financing opportunities are available to cover these upfront costs, but there is no guarantee that such grants or financing will be offered.

8. Summary of Findings and Recommendations

The goal of this Update was to identify potential "fatal flaws" that Morro Bay might face when developing a stand alone WWTP. The list below summarizes the likely challenges which may prevent construction of such a plant.

- *Permitting Restrictions.* There is no guarantee that the RWQCB will grant a permit for a new discharge source to Chorro Creek, or how long it will take to acquire such a permit if so. Assuming RWQCB will grant a permit, meeting the effluent limitations will likely present a technical challenge or expense (discussed further below).

  Further, the RWQCB is not the only reviewing agency involved. The EPA is currently reviewing TMDL standards, and industry sentiment is that those restrictions are likely to become increasingly strict as agency review continues. Whatever limitation that is set at the time of initial permitting is likely to continue to be reviewed and revised during the life of the facility.

  Additional environmental agencies will review the project as well, including the Army Corps of Engineers, state and federal wildlife protection agencies, and local Environmental Health. Each agency will have its own permit review process and conditions of compliance.

  The permitting process may be arduous, expensive, and time consuming. Additionally, new source compliance, monitoring and reporting requirements will likely be more rigorous than those required at the existing joint WWTP.

- *Technical Considerations.* Meeting anticipated effluent restrictions will likely require meeting tertiary standards or better. Nitrogen requirements are anticipated to be at least the same as drinking water. A membrane filtration plant will likely be required to address TDS concentration as well as other priority constituents. While none of these are necessarily technical fatal flaws, they do increase the economic liability of the project.

- *Economic Liability.* Construction costs for the MB WWTP range from $13.6M to $26.6M, with annual operating costs between $1.9M and $2.3M, and a total estimated cost (including NPV for a 20-year O&M estimate) of between $49.4M and $76.5M, not including land costs.

  Additionally, the Mandatory Penalty Law poses potential additional liability should permit violations occur. The cost estimate presented in this Update does not include land or right-of-way acquisition costs. Grants and financing may be available to offset these costs.

Given these potential fatal flaws, alternate means of supplementing the City's potable water source may be more viable. However, should the City decide to pursue a stand-alone WWTP, the following recommendations should be considered:

- Utilize Diversion Point #2, to obtain a sufficient effluent volume of creek discharge to be able to utilize the existing Chorro Valley Wells.

- Utilize Study Area 1, to avoid the grading and potential permitting requirements that will likely be required to avoid 100-year flooding issues at Study Area 2.

- Incorporate an oxidation ditch, microfiltration, reverse osmosis, and UV disinfection into the plant design, to satisfy effluent discharge quality permitting requirements.

- Incorporate a brine return line from the RO plant to the ocean outfall at the existing joint WWTP for handling brine waste.

Such a facility will likely incur capital costs of approximately $26.6M with annual O&M costs of $2.3M, an additional $14.6M for contingency, legal, administrative, permitting, and engineering costs, and a total NPV 20-year cost of $76.5M.

Prior to proceeding with development of a MB WWTP, Part 2 of this Update should be completed, including a detailed review of potential environmental impacts and additional permitting considerations.

Exhibits and Tables

Appendix A: Study Area Aerial Photos and FEMA Maps

Appendix B: CMC WWTP Permit

Appendix C: Detailed Cost Estimate Breakdowns

Table 7-1: Funding Sources

Applicable to the Morro Bay Wastewater Treatment Plant project:

	Program Name	Department	Loan/ Grant	Purpose	Eligibility Requirements	Eligible Uses
FS-1	***Integrated Regional Water Management Grant Program***	State Water Resources Control Board	Grant	To encourage integrated regional strategies for management of water resources and to provide funding, through competitive grants, for projects that protect communities from drought, protect and improve water quality, and improve local water security by reducing dependence on imported water.	Any city, county, district, joint powers authority, state agency or department, or other political subdivision of the State, and nonprofit organizations as defined in the IRWM Guidelines.	Planning grants fund the development of an Integrated Regional Water Management Plan. Implementation grants will fund projects that meet one or more of the objectives: protecting communities from drought, protecting and improving water quality, and/or improving local water security by reducing dependence on imported water based on an IRWM Plan.
FS-2	***Clean Beaches Initiative***	State Water Resources Control Board	Grant	To provide grants for projects that restore and protect the water quality and the environment of coastal waters, estuaries, bays, and near shore waters.	Local agencies, non-profit organizations, and public agencies.	The implementation of projects that protect and restore California's coastal water quality.
FS-3	***Infrastructure State Revolving Fund Program***	California Infrastructure and Economic Development Bank	Loan	To provide low-cost financing for a wide variety of infrastructure projects including drainage, water supply and flood control, sewage collection and treatment, solid waste collection and disposal, water treatment and distribution, etc.	Public agencies.	Sewage Collection and Treatment, and disposal of sludge material.
FS-4	***Small Community Wastewater Grant Program***	State Water Resources Control Board	Grant	To provide grant assistance for the construction of publicly owned wastewater treatment and collection facilities.	Funding only available to public agencies. Must meet financial hardship criteria required by SWRCB. Maximum population of 20,000 people. Median Household Income (MHI) < $37,994.	Treatment facilities, systems, mitigation measures, special and integral equipment, land and change orders
FS-5	***State Revolving Fund Program***	State Water Resources Control Board	Loan	To provide low-interest funding for construction of publicly owned wastewater treatment facilities, local sewers, sewer interceptors, water reclamation facilities, storm water treatment, etc.	Local public agencies.	Publicly-owned wastewater treatment facilities, local sewers, sewer interceptors, and water reclamation facilities
FS-6	***Wetlands Program Development Grants***	US Environmental Protection Agency	Grant	To provide eligible applicants an opportunity to conduct projects that promote the coordination and acceleration of research, investigations, experiments, and studies related to the causes, effects, extent, prevention, reduction, and elimination of water pollution.	States, Tribes, local governments (S/T/LGs), interstate associations, intertribal consortia, and national non-profit, non-governmental organizations are eligible to apply.	Projects that promote the coordination and acceleration of research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution.
FS-7	***Habitat Conservation Fund Program***	Department of Parks and Recreation	Grant	To provide grants to local entities to protect fish, wildlife, and native plant resources, to acquire or develop wildlife corridors and trails, etc.	Cities, counties and districts are eligible to apply.	Enhancement and restoration of wetlands, aquatic habitat for spawning and rearing of anadromous salmonids and trout resources, and riparian habitat
FS-8	***Enterprise Fund - State Community Development Block Grant (CDBG)***	Division of Financial Assistance	Grant	To create or preserve jobs for low-income and very low-income persons.	Counties with fewer than 200,000 residents in unincorporated areas and cities with fewer than 50,000 residents that are not participants in the US Department of Housing and Urban development (HUD) Community Development Block Grant (CBDG) entitlement program.	Funds may be lent to businesses for working capital, land acquisition, equipment purchase, inventory purchase, debt restructuring, and other direct assistance. Local grants may support businesses by providing water and sewer services, access roads, and other public facilities.
FS-9	***Water Recycling Facilities Planning Grant Program***	State Water Resources Control Board	Grant	To provide grants up to $75,000 to study the feasibility of water recycling and to prepare a facilities plan documenting the analyses and conclusions of the investigation.	Public agencies.	Study must be for the use of treated municipal wastewater to offset freshwater supply
FS-10	***Water Recycling State Revolving Fund***	State Water Resources Control Board	Loan	To provide funding for water recycling projects.	Funding only available to municipal wastewater reclamation.	Water recycling treatment, storage, and distribution, emergency backup water supplies

Table 7-1: Funding Sources

Applicable to the Morro Bay Wastewater Treatment Plant project (con't.):

	Program Name	Ineligible Uses (if applicable)	Funding Limits	Terms/Dates	Deadline	Contact Information
FS-1	***Integrated Regional Water Management Grant Program***	Single projects that are not part of an integrated water management plan.	$500,000 for Planning Grants; $50 million for Implementation Grants.	The required minimum funding match for a Planning Grant will be 25% of the total proposal costs. The required minimum funding match for an Implementation Grant will be 10% of the total proposal costs.	No applications are being accepted as of March, 2007. Applications may be accepted at a later date.	Scott Couch scouch@waterboards.ca.gov 916-341-5658
FS-2	***Clean Beaches Initiative***	Land acquisition.	Maximum grant amount is $5,000,000; minimum grant amount is $125,000.	Match requirement is 20% for projects $1,000,000 to $5,000,000 (inclusive) and 15% for projects less than $1,000,000.	Applications were due on January 31, 2007. May be accepting more applications at a later date.	Laura Peters 916-341-5854
FS-3	***Infrastructure State Revolving Fund Program***	Privately owned infrastructure, refinancing existing debt.	Tier 1 loans will be available in amounts ranging from $250,000 to $10 million per applicant; Tier 2 loans will be available in amounts from $250,000 to $2.5 million per applicant.	Fixed interest rate basis, at approximately 67% of Thompson's Municipal Market Data Index for an "A" rated tax-exempt security with a weighted average life similar to the I-Bank loan. Twenty basis points (.20%) will be added to the interest rate for loans that are subject to the Alternative Minimum Tax. Project must meet tax-exempt financing criteria.	Applications accepted on a continuous basis.	Diane Cummings 916-324-4805 dcummings@ibank.ca.gov
FS-4	***Small Community Wastewater Grant Program***	Decorative items, construction or improvements on private property	Grant will be up to 90% of project cost.	Project must be placed on the Statewide Competitive Project List (CPL).	Applications will be accepted until March 23, 2007.	Angela Schroeter (805) 542-4644 ASchroeter@waterboards.ca.gov
FS-5	***State Revolving Fund Program***	Land acquisition, O&M, change orders, decorative items, construction of improvements on private property	$200-$300 million available annually; $25 per municipality per year.	20-year term with an interest rate equal to one-half the most recent State General Obligation Bond Rate, typically 2.5% to 3.5%.	Continuous application process.	Christopher Stevens, Chief Project Development Section 3 916-341-5698 cstevens@waterboards.ca.gov
FS-6	***Wetlands Program Development Grants***	Non profit organizations.	The grants will range from $25,000 to $250,000, depending on the amount requested, the project topic area, and the overall size and need for the project.	Non-federal matching funds of at least 25% of the total project cost are required.	February of each year.	Cheryl McGovern 415-972-3415 mcgovern.cheryl@epa.gov
FS-7	***Habitat Conservation Fund Program***	N/A	The HCF program has up to $2 million available statewide each year.	The HCF program requires a dollar for dollar match from a non-state source. Project must be started within three years of the date the grant funds are appropriated in the state budget.	October 1st of each year.	Bonnie Morse West (916) 651-7740 bwest@parks.ca.gov
FS-8	***Enterprise Fund - State Community Development Block Grant (CDBG)***	Construction or improvements on private property	Grants up to $500,000.	Applications are evaluated and scored on a variety of factors, which may include need, capacity, prior CDBG grant performance, and poverty in the applicant community.	Applications for annual competitive funding rounds are invited by a Notice of Funding Availability (NOFA). The NOFA is typically released each summer.	Program Administration 916-552-9398
FS-9	***Water Recycling Facilities Planning Grant Program***	Pollution control studies.	50% of eligible costs up to $75,000.	Continuous until funding is exhausted.	Currently accepting applications.	Bob Pontureri rpontureri@waterboards.ca.gov (916) 341-5828
FS-10	***Water Recycling State Revolving Fund***	Land, Operation and Maintenance, change orders, decorative items	$25 million per agency per year.	Interest rate is 1/2 of the general obligation bond; repayment term of 20 years.	Currently accepting applications.	Claudia Villacorta 916-341-5735

Table 7-1: Funding Sources

Not applicable to the Morro Bay Wastewater Treatment Plant project:

	Program Name	Department	Loan/ Grant	Purpose	Eligibility Requirements	Eligible Uses
FS-11	***Water and Waste Disposal***	USDA Rural Devalopment	Loan/ Grant	Provide financing for wastewater, solid waste, and storm drainage systems in both new and existing projcts	Public bodies, tribes, nonprofits, Cities and Towns and census designated places with populations less than 10,000. ***The Morro Bay Wastewater Treatment Plant project is not eligible for this funding because Morro Bay has a population greater than 10,000 people.***	--
FS-12	***Water and Waste Disposal Colonias Grant***	USDA Rural Devalopment	Grant	Provide funding to help especially needy communities near the US-Mexico border. Will pay for all or part of the costs to provide waste disposal and storm drain facilities.	Eligible applicants are designated "Colonias" within 150 miles of the US-Mexico border. Cities, towns, public bodies, and census designated places with populations less than 10,000 are eligible for this funding. ***The Morro Bay Wastewater Treatment Plant project is not eligible for this funding because it more than 150 miles away from the US-Mexico border and it has a population greater than 10,000 people.***	--
FS-13	***Water Recycling Construction Program***	State Water Resources Control Board	Loan/ Grant	Grants are provided for facilities planning studies to determine the feasibility of using recycled water to offset the use of fresh/potable water from state and/or local supplies, or construction of those projects.	Municipal wastewater recycling and reclamation of groundwater unusable due to human activities. Private and public agencies may apply for grants. ***The Morro Bay Wastewater Treatment Plant project is not eligible for this funding because it does not offset fresh or potable water supplies.***	--
FS-14	***Ocean Protection Council***	State of California Ocean Protection Act	Grant	Provide funding for the protection of beaches, bays, and coastal waters, main objective is to improve coastal water quality.	***The Morro Bay Wastewater Treatment Plant project is not eligible for this funding because, according to the director of the program, wastewater treatment plans are not the focus of this funding.***	--

LEGEND

- DISCHARGE LINE
- BRINE RETURN LINE
- NEW GRAVITY SEWER MAIN
- FORCE MAIN
- CULLIGAN BYPASS LINE
- LIFT STATION
- POTENTIAL WASTEWATER TREATMENT RECLAMATION PLANT SITE

SAN BERNARDO CREEK

CHORRO CREEK

CREEK DISCHARGE ALT. #1

LIFT STATION #3

WASTEWATER TREATMENT PLANT STUDY AREA #1

CHORRO CREEK

FORCE MAIN ALT. #1

CULLIGAN

PROPOSED LIFT STATION

DIVERSION POINT 1

DIVERSION POINT 2

LIFT STATION #2

EXISTING JOINT WWTP

OUTFALL LINE

N

0 2000 4000

1 INCH = 2000 FEET

Cannon ASSOCIATES

Bakersfield, CA 661.328.6280 | San Luis Obispo, CA 805.544.7407 | Santa Maria, CA 805.928.7363

www.CannonAssociates.us

EXHIBIT 1
MORRO BAY SEWER SYSTEM IMPROVEMENT AREAS STUDY AREA #1
CITY OF MORRO BAY, CALIFORNIA

DRAWN BY	DATE	CA JOB NO.
AJS	05/02/07	061007
CHECKED BY	SCALE	SHEET
LPK	1" =2000'	1 OF 2

F:\proj\2006\061007\Civil\Design\Construction Drawings\EXHIBITS\CE61070EX0001-2.dwg 5-02-07 03:29:41 PM anthonys

LEGEND

- DISCHARGE LINE
- BRINE RETURN LINE
- NEW GRAVITY SEWER MAIN
- FORCE MAIN
- CULLIGAN BYPASS LINE
- LIFT STATION
- POTENTIAL WASTEWATER TREATMENT RECLAMATION PLANT SITE

SAN BERNARDO CREEK

CHORRO CREEK

CREEK DISCHARGE

WASTEWATER TREATMENT PLANT STUDY AREA #2

BRINE RETURN PIPELINE

LIFT STATION #3

CHORRO CREEK

FORCE MAIN

CULLIGAN

PROPOSED LIFT STATION

DIVERSION POINT 1

DIVERSION POINT 2

LIFT STATION #2

EXISTING JOINT WWTP

OUTFALL LINE

0 2000 4000

1 INCH = 2000 FEET

F:\pro\2006\061007\Civil\Design\Construction Drawings\EXHIBITS\CE61070EX0001-2.dwg 5-02-07 03:29:49 PM anthonys

Cannon ASSOCIATES

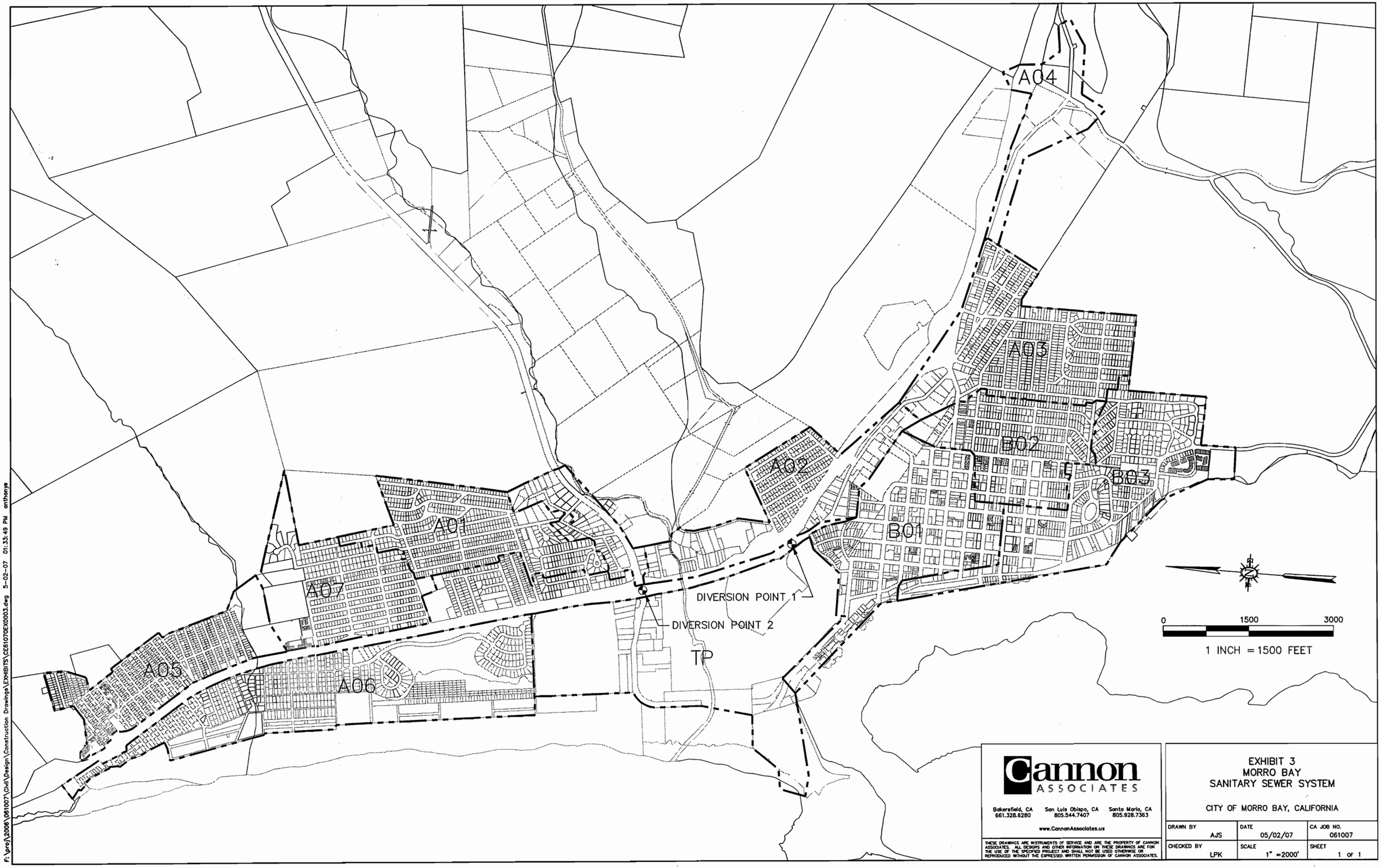
Bakersfield, CA 661.328.6260 | San Luis Obispo, CA 805.544.7407 | Santa Maria, CA 805.928.7363

www.CannonAssociates.us

EXHIBIT 2
MORRO BAY SEWER SYSTEM IMPROVEMENT AREAS STUDY AREA #2

CITY OF MORRO BAY, CALIFORNIA

DRAWN BY	DATE	CA JOB NO.
AJS	05/02/07	061007
CHECKED BY	SCALE	SHEET
LPK	1" =2000'	2 OF 2



F:\pro\2006\061007\Civil\Design\Construction Drawings\EXHIBITS\CE61070EX0003.dwg 5-02-07 01:33:49 PM anthonya

Cannon ASSOCIATES

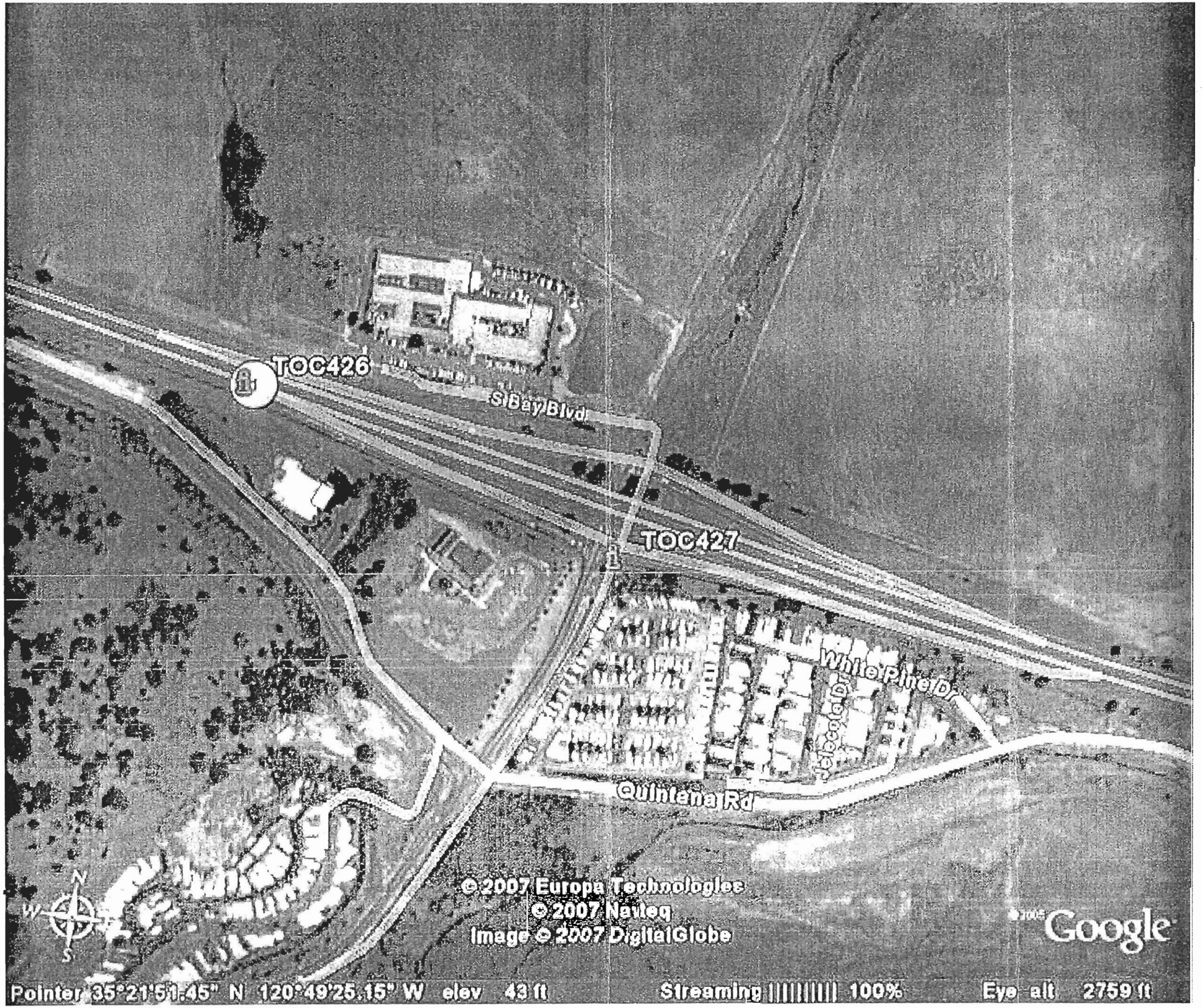
Bakersfield, CA 661.328.6280 | San Luis Obispo, CA 805.544.7407 | Santa Maria, CA 805.928.7363

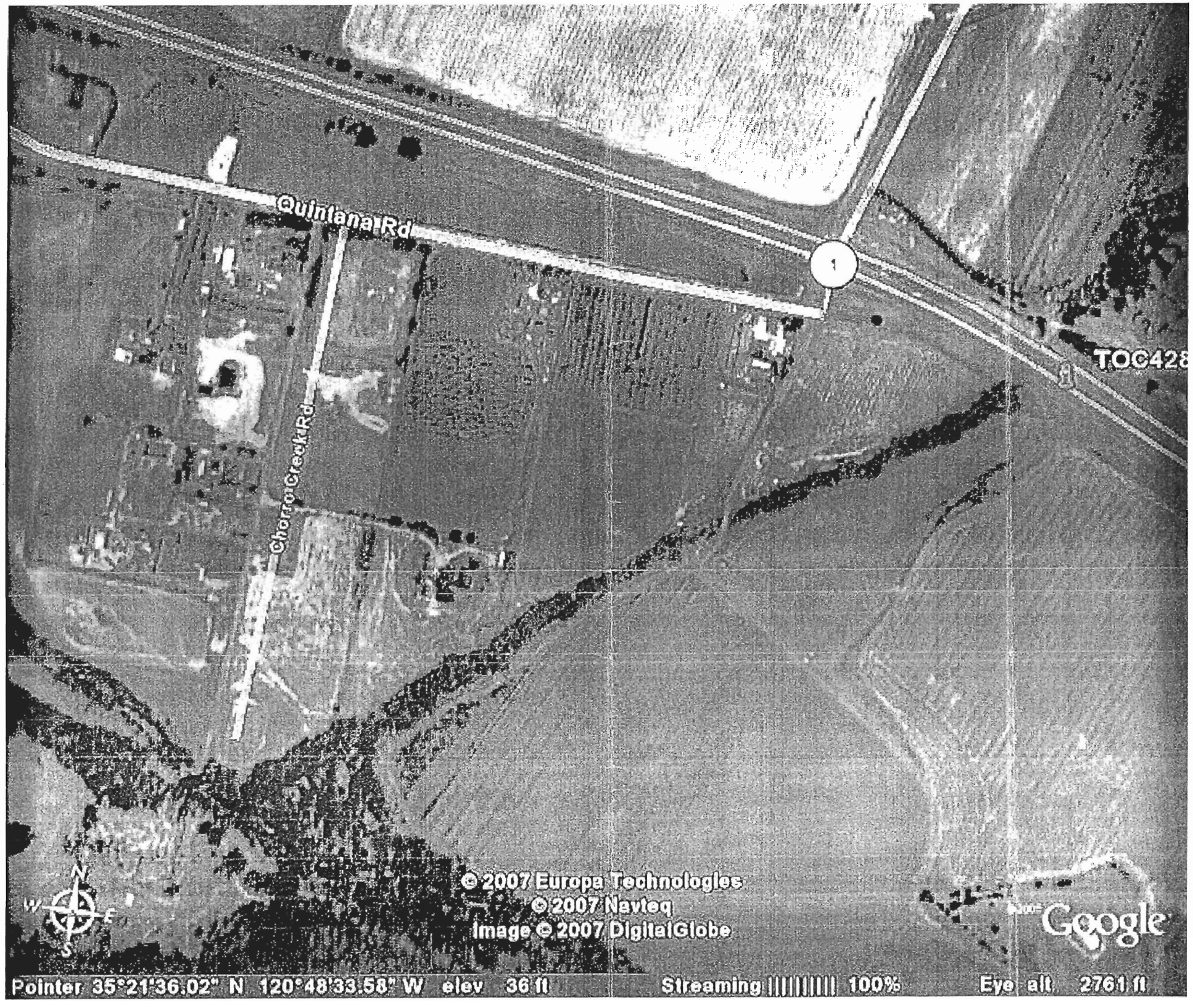
www.CannonAssociates.us

EXHIBIT 3
MORRO BAY
SANITARY SEWER SYSTEM

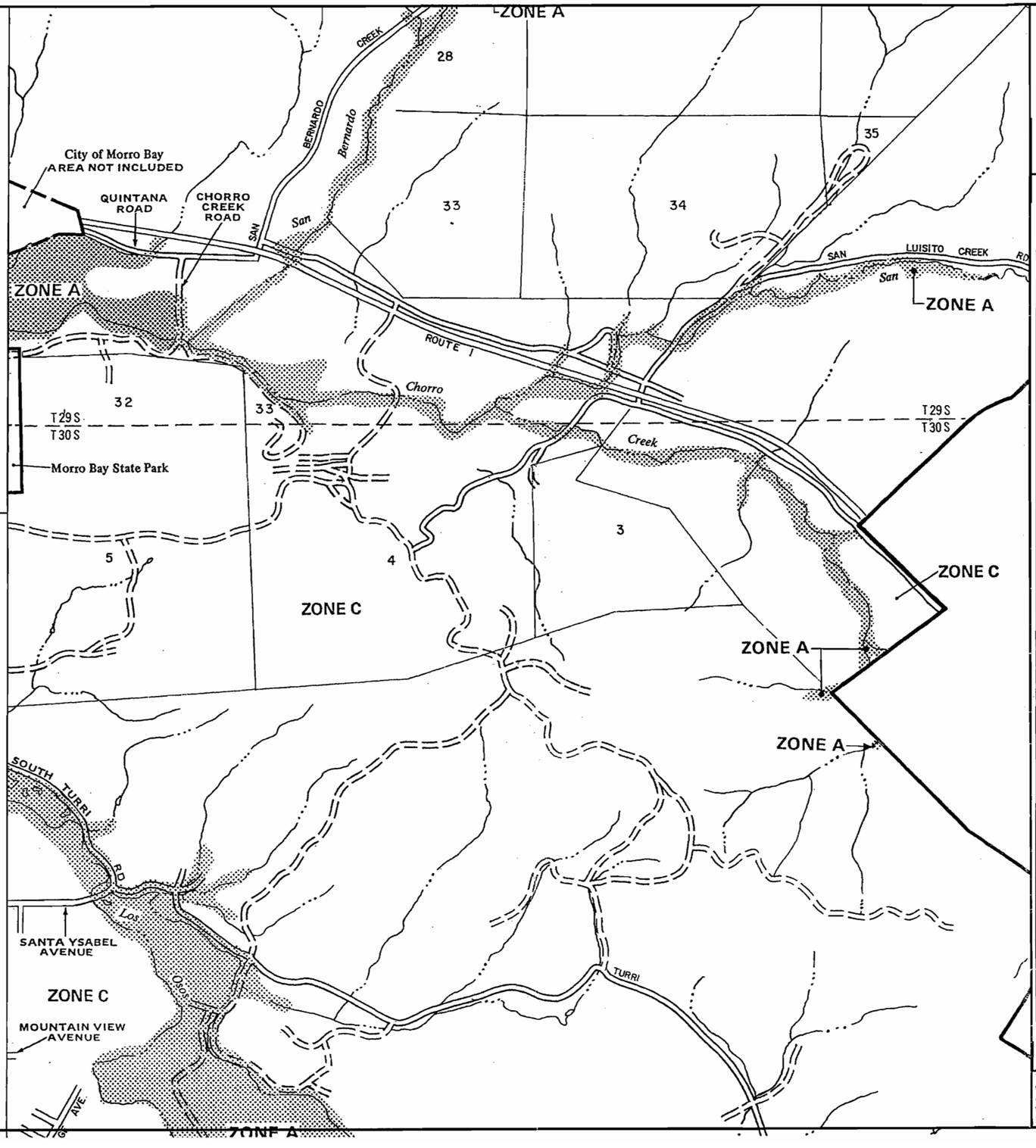
CITY OF MORRO BAY, CALIFORNIA

DRAWN BY	DATE	CA JOB NO.
AJS	05/02/07	061007
CHECKED BY	SCALE	SHEET
LPK	1" =2000'	1 OF 1


TOC426
S Bay Blvd
TOC427
White Pine Dr
Quintana Rd
© 2007 Europa Technologies
© 2007 Navteq
Image © 2007 DigitalGlobe
Google
Pointer 35°21'51.45" N 120°49'25.15" W elev 43 ft
Streaming 100%
Eye alt 2759 ft


Quintana Rd
Cherry Creek Rd
TOC428
© 2007 Europa Technologies
© 2007 Navteq
Image © 2007 DigitalGlobe
Google
Pointer 35°21'36.02" N 120°48'33.58" W elev 36 ft
Streaming 100%
Eye alt 2761 ft

0454



APPROXIMATE SCALE
2000 0 2000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

SAN LUIS OBISPO COUNTY, CALIFORNIA
(UNINCORPORATED AREAS)

PANEL 475 OF 975
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
060304 0475 C

MAP REVISED:
JULY 18, 1985

Federal Emergency Management Agency

SAN LUIS

JOINS PANEL 0454

ZONE B

ZONE A10
(EL 10)

ZONE B

5

City of Morro Bay
AREA NOT INCLUDED

ZONE C

2

1

SHORELINE

ZONE B

ZONE A10
(EL 10)

ZONE B

ZONE B

8

MORRO BAY

LIMIT OF
DETAILED STUDY

ZONE A

ZONE C

ZONE B

11

12

SHORELINE

BAY BOULEVARD

FIRST ST

SECOND ST

THIRD ST

SANTA YSABEL

BAYWOOD WAY

STREET

STREET

STREET

SANTA MARIA AV

ORRO
BAY
TATE
ARK

BAYWOOD PARK

ZONE B

EL MORRO AV

FOURTH STREET

FIFTH STREET

SEVENTH STREET

STREET

STREET

STREET

E B

ZONE A10
(EL 10)

PISMO AVENUE

ZONE C

APPROXIMATE SCALE

1000 0 1000 FE

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

SAN LUIS OBISPO COUNTY, CALIFORNIA

(UNINCORPORATED AREAS)

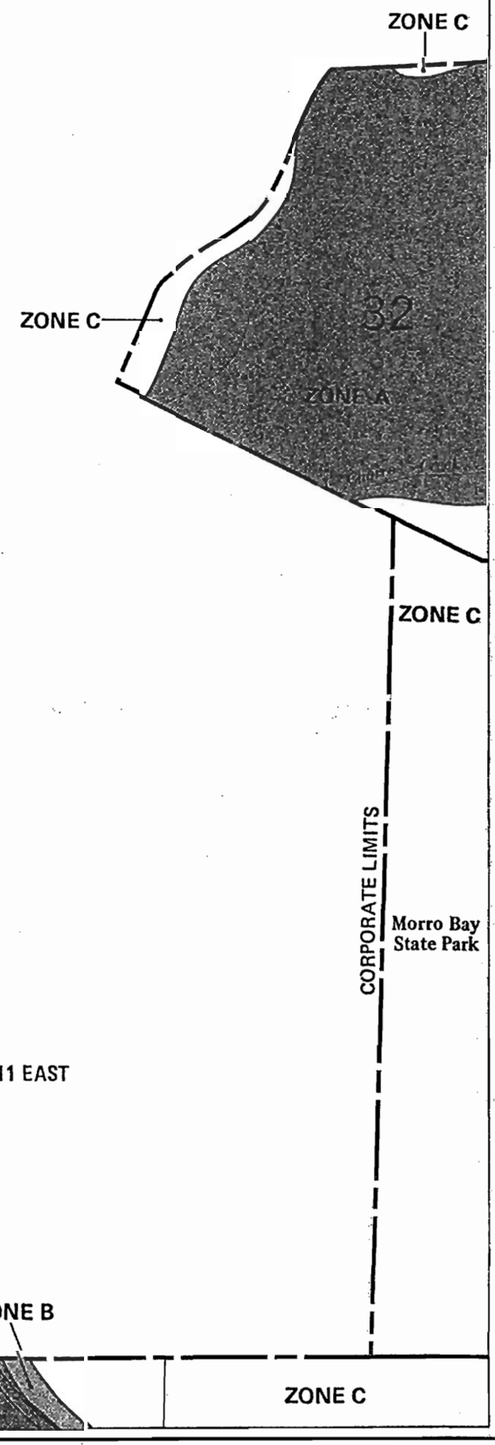
PANEL 465 OF 975

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
060304 0465 C

MAP REVISED:
JULY 18, 1985

Federal Emergency Management Agency



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 29 SOUTH, RANGE 10 EAST AND TOWNSHIP 29 SOUTH, RANGE 11 EAST AND SAN BERNADO LAND GRANT

APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

SAN LUIS OBISPO COUNTY, CALIFORNIA

(UNINCORPORATED AREAS)

PANEL 454 OF 975

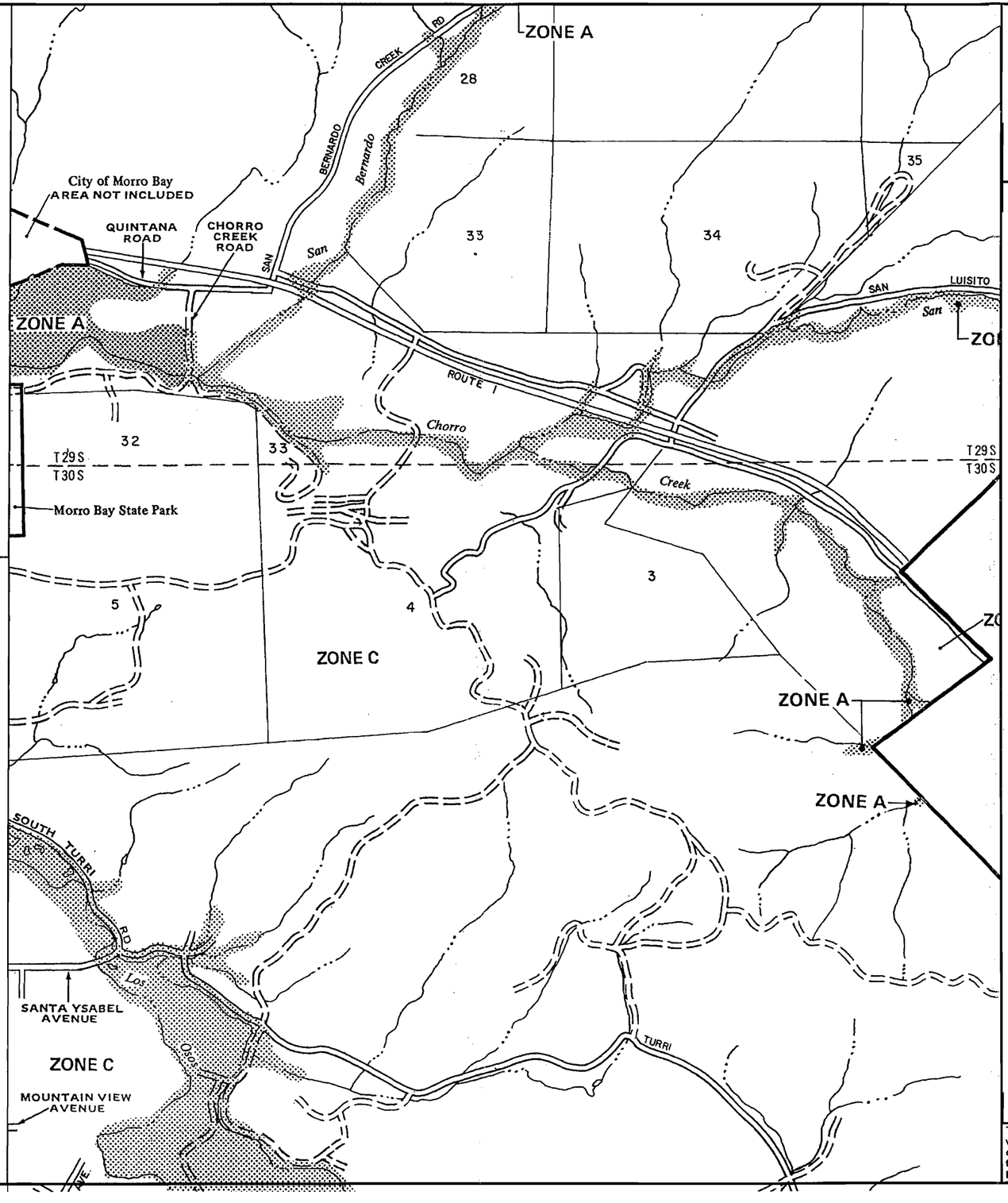
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
060304 0454 C

MAP REVISED:
JULY 18, 1985

Federal Emergency Management Agency

NEL 0454



APPROXIMATE SCALE

2000 0 2000 FEET

KEY TO MAP

SPECIAL FLOOD HAZARD AREA

ZONE A

ZONE B

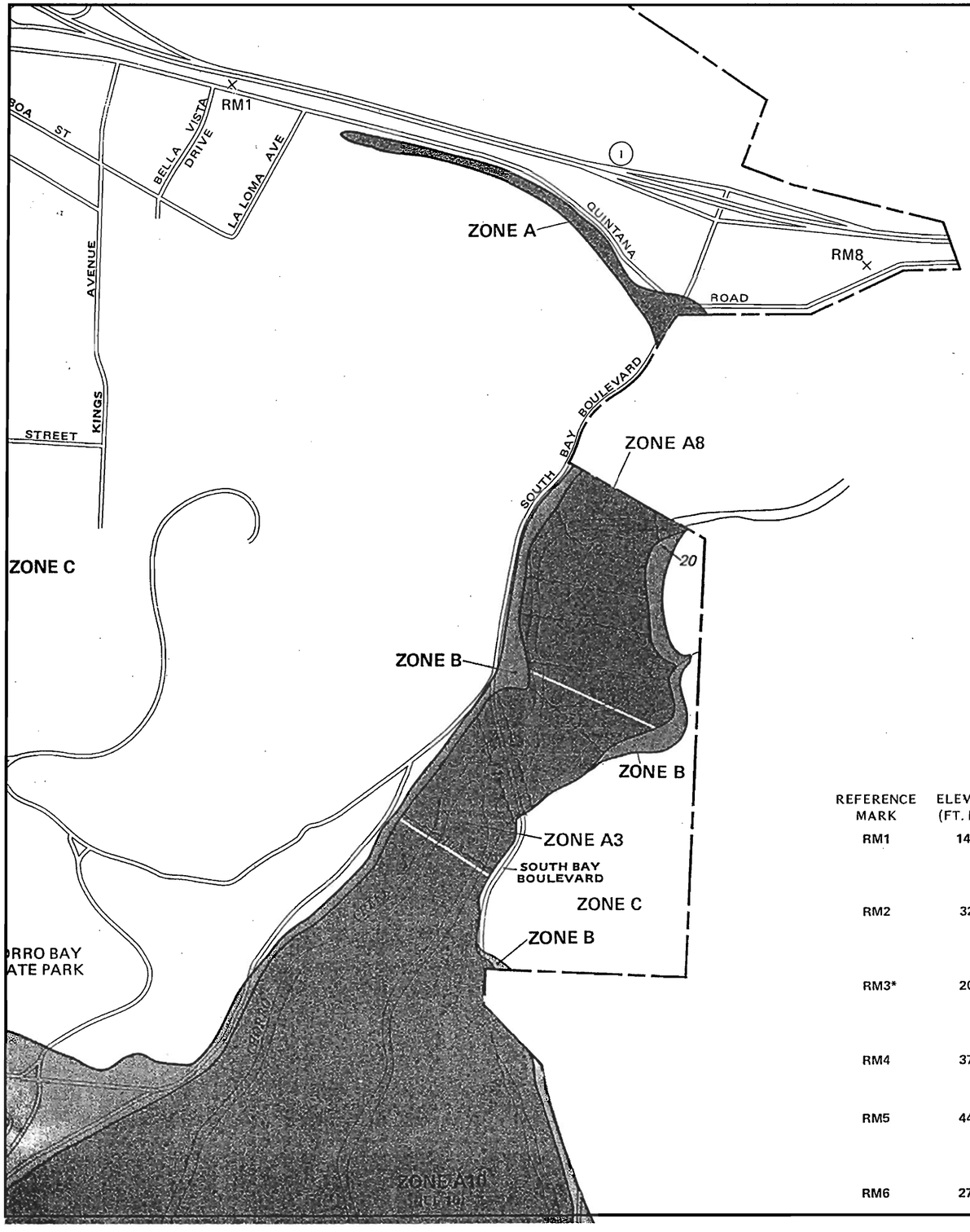
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7×
Zone D Boundary	
River Mile	•M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER



APPROXIMATE SCALE IN FEET

800 0 800

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION
RM1	149.36	Bronze disk set in concrete post, 120 feet east of the center of Bella Vista Drive, 67 feet west of telephone pole 381, 25 feet north of centerline of highway. Stamped J 693 1943. Established by U.S. Coast and Geodetic Survey.
RM2	32.11	Bronze disk set in concrete culvert headwall, 180 feet north of the center of San Jacinto Street, 15 feet east of centerline of the highway, in north end of the east culvert headwall. Established by California State Department of Transportation.
RM3*	20.42	Bronze disk set in concrete walk of bridge, 420 feet north of the center of Torro Creek, at bridge over Torro Creek, 15 feet east of centerline of the highway, in the south end of west walk. Stamped M 693 1943. Established by U.S. Coast and Geodetic Survey.
RM4	37.26	Brass cap set in concrete culvert headwall, 150 feet south of Island Street, 15 feet east of centerline of Main Street, in south end of the east culvert headwall. Established by the City of Morro Bay.
RM5	44.43	Brass cap set in concrete culvert headwall, 25 feet south of Yerba Buena Street, 25 feet west of centerline of Main Street, northeast end of southeast culvert headwall. Established by the City of Morro Bay.
RM6	27.20	Bronze disk set in concrete curb of bridge, at bridge over Morro Creek, 280 feet north of the centerline of Preston Lane (at Main

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
MORRO BAY, CALIFORNIA
SAN LUIS OBISPO COUNTY

ONLY PANEL PRINTED

COMMUNITY-PANEL NUMBER
060307 0005 C

MAP REVISED:
NOVEMBER 1, 1985

Federal Emergency Management Agency

California Regional Water Quality Control Board

Central Coast Region

895 Aerovista Place, Suite 101, San Luis Obispo, CA 93401
Phone 805-549-3147 • Fax 805-788-3547
http://www.waterboards.ca.gov/centralcoast/

ORDER NO. R3-2006-0032
NPDES NO. CA0047856

The following Discharger is authorized to discharge in accordance with the conditions set forth in this Order.

Discharger	California Department of Corrections and Rehabilitation
Indirect Dischargers	California Army National Guard, Camp San Luis Obispo Cuesta College San Luis Obispo County Education Center San Luis Obispo County El Chorro Regional Park and Dairy Creek Golf Course San Luis Obispo County Operational Facility
Name of Facility	California Men's Colony Wastewater Treatment Plant (WWTP)
Facility Address	Hwy 1, North of San Luis Obispo, behind Cuesta College San Luis Obispo, California 93409 San Luis Obispo County

The Discharger is authorized to discharge from the following discharge points as set forth below.

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Treated domestic wastewater	35 ° 19 ' 30 " N	120 ° 46 ' 55 " W	Chorro Creek

This Order was adopted by the Central Coast Water Board on:	July 7, 2006
This Order shall become effective on:	August 26, 2006
This Order shall expire on:	August 26, 2011
The U.S. Environmental Protection Agency (U.S. EPA) and the Central Coast Water Board have classified this discharge as a major discharge.	
The Discharger shall file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, not later than 180 days in advance of the Order expiration date as application for issuance of new waste discharge requirements.	

IT IS HEREBY ORDERED, that Order No. 01-001 is rescinded upon the effective date of this Order except for enforcement purposes, and, in order to meet the provisions contained in Division 7 of the California Water Code (CWC) and regulations adopted hereunder, and the provisions of the federal Clean Water Act (CWA), and regulations and guidelines adopted hereunder, the Discharger shall comply with the requirements in this Order.

I, Roger W. Briggs, Executive Officer, do hereby certify the following is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Coast Region, on July 7, 2006.

Roger W. Briggs, Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
REGION 3, CENTRAL COAST REGION

ORDER NO. R3-2006-0032
NPDES NO. CA0047856

TABLE OF CONTENTS

I. FACILITY INFORMATION

The following Discharger is authorized to discharge in accordance with the conditions set forth in this Order.

Discharger	California Department of Corrections and Rehabilitation
Indirect Dischargers	California Army National Guard, Camp San Luis Obispo Cuesta College San Luis Obispo County Education Center San Luis Obispo County El Chorro Regional Park and Dairy Creek Golf Course San Luis Obispo County Operational Facility
Name of Facility	California Men's Colony WWTP
Facility Address	Hwy 1, North of San Luis Obispo, behind Cuesta College
	San Luis Obispo, California 93409
	San Luis Obispo County
Facility Contact, Title, Phone Number	John Marshall, Warden, 805-547-7901
Mailing Address	P.O. Box 8101, San Luis Obispo, CA 93409
Type of Facility	POTW
Facility Design Flow	Dry weather monthly average of 1.2 million gallons per day (MGD), Peak hour seasonal wet weather flow of 5.2 MGD.

II. FINDINGS

The California Regional Water Quality Control Board, Central Coast Water Board, finds:

A. **Background.** The California Department of Corrections and Rehabilitation (the Discharger) is currently discharging under Order No. 01-001 and National Pollutant Discharge Elimination System (NPDES) Permit No. CA0047856. The Discharger submitted a Report of Waste Discharge, dated September 30, 2005, and applied to renew its NPDES permit to discharge up to 1.2 million gallons per day (MGD) of treated wastewater from the California Men's Colony Wastewater Treatment Plant (WWTP).

B. **Facility Description.** The Discharger owns and operates a trunk sewer line and a domestic WWTP located on the grounds of Camp San Luis Obispo, a National Guard training site. In addition to conveying and treating domestic wastewater from the East and West Facilities of the California Men's Colony, a correctional institution, the trunk sewer and WWTP provide wastewater conveyance and treatment for the California Army National Guard (Camp San Luis Obispo), Cuesta College, and several County facilities (including the Education Center, the El Chorro Regional Park and Dairy Creek Golf Course, and the Operational Facility). The California Army National Guard, Cuesta College, San Luis Obispo County Education Center, San Luis Obispo County El Chorro Regional Park and Dairy Creek Golf Course, and San Luis Obispo County Operational Facility own and maintain discrete wastewater collection and transport systems that discharge to the Department of Corrections' trunk sewer system. It is incumbent upon these local sewering entities (as building permit authorities) to protect the environment to the greatest degree possible and ensure their local collection systems, as well as the receiving sewering system, are protected and utilized

properly. This responsibility includes preventing overflows and may include restricting or prohibiting the volume, type or concentration of wastes added to the system.

Wastewater treatment facilities include an influent pump station, aerated grit removal, two oxidation ditches, secondary clarification, tertiary filtration, and chlorination/dechlorination capability. The treatment facility has the following design capacity:

Average Dry Weather Flow:	1.2 MGD
Peak Dry Weather Flow:	2.4 MGD
Peak Wet Weather Flow:	5.2 MGD

A diagram of the treatment process is depicted in Attachment C, included as part of this permit.

Treated wastewater is used by the County of San Luis Obispo to irrigate the Dairy Creek Golf Course and discharged to Chorro Creek at a minimum continuous flow rate of 0.75 cubic feet per second (cfs). Outfall No. 001 to Chorro Creek is located within the Chorro Subarea (310.22) of the Estero Bay Hydrologic Unit. The discharge and reclamation locations are shown in Attachment B. Alternative locations and methods of disposal or recycling, including land disposal alternatives, were considered during planning under the Clean Water Grants Program. Wastewater solids are dewatered by centrifuge and hauled from the site for disposal.

C. **Legal Authorities.** This Order is issued pursuant to CWA Section 402 and implementing regulations adopted by the U.S. EPA and CWC Chapter 5.5, Division 7. It shall serve as an NPDES permit for point source discharges from this facility to surface waters. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to CWC Article 4, Chapter 4 for discharges that are not subject to regulation under CWA Section 402.

D. **Background and Rationale for Requirements.** The Central Coast Water Board developed the requirements in this Order based on information submitted as part of the Report of Waste Discharge, through monitoring and reporting programs, through data analysis and studies performed to develop Total Maximum Daily Loads for Nutrients and Dissolved Oxygen in Chorro Creek, and through special studies. Attachments A through H, which contain background information and rationale for Order requirements, are hereby incorporated into this Order and, thus, constitute part of the Findings for this Order.

E. **California Environmental Quality Act (CEQA).** This action to adopt an NPDES permit is exempt from the provisions of CEQA (Public Resources Code Section 21100, et seq.) in accordance with CWC Section 13389.

F. **Technology-Based Effluent Limitations.** NPDES regulations at 40 CFR 122.44 (a) require that permits include applicable technology-based limitations and standards. This Order includes technology-based effluent limitations based on standards for the tertiary treatment of wastewater established at 40 CFR Part 133 and/or based on best professional judgment pursuant to CWA Section 402 (a) (1) (B). The Central Coast Water Board has considered the factors listed at 40 CFR 125.3 (c) and (d) for establishing technology-based limitations

using best professional judgment. Discussion of the development of the technology-based effluent limitations of this Order is included in the Fact Sheet (Attachment F).

G. **Water Quality-Based Effluent Limitations.** NPDES regulations at 40 CFR 122.44 (d) require permits to include water quality-based effluent limitations (WQBELs) to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of receiving waters. Where numeric water quality objectives have not been established, in accordance with 40 CFR 122.44 (d), WQBELs may be established using calculated numeric water quality criteria; using U.S. EPA water quality criteria established under CWA Section 304 (a); or using an indicator parameter for the pollutant of concern.

H. **Water Quality Control Plans.** The Central Coast Water Board adopted a *Water Quality Control Plan for the Central Coast Region* (hereinafter, the Basin Plan) that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the Basin Plan. Beneficial uses for specific surface waters in the Central Coast Region are presented in Table 2-1 of the Basin Plan. The identified uses of Chorro Creek are listed below.

Outfall	Receiving Water Name	Beneficial Uses
001	Chorro Creek	MUN - Municipal and domestic water supply AGR – Agricultural Supply GWR – Groundwater Recharge REC1 – Water Contact Recreation REC2 – Non-Contact Water Recreation WILD – Wildlife Habitat COLD – Cold fresh Water Habitat WARM – Warm Fresh Water Habitat MIGR – Migration of Aquatic Organisms SPWN – Spawning, Reproduction, and/or Early Development BIOL – Preservation of Biological Habitats of Special Significance RARE – Rare, Threatened, or Endangered Species FRESH – Fresh Water Replenishment COMM – Commercial and Sport Fishing

Groundwater throughout the Central Coast Region is suitable for agricultural water supply, municipal and domestic water supply, and industrial use.

The State Water Board adopted a *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* (the Thermal Plan) on May 18, 1972, and amended this plan on September 18, 1975. The Thermal Plan contains temperature objectives for inland surface waters.

Requirements of this Order specifically implement the applicable Water Quality Control Plans described above. Requirements of this Order will also implement the Chorro Creek Nutrient and Dissolved Oxygen TMDL, as currently proposed.

I. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** On December 22, 1992, and May 18, 2000, the U.S. EPA adopted the NTR and CTR, respectively. These rules include numeric water quality criteria for priority toxic pollutants and are applicable to this discharge.

J. **State Implementation Policy.** On March 2, 2000, the State Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP establishes procedures to implement water quality criteria of the NTR and CTR as well as water quality objectives contained in the Basin Plan. The SIP requires dischargers to submit sufficient data to determine the need for WQBELs, and it establishes procedures for determining that need and for calculating WQBELs, when necessary. With respect to the priority pollutant criteria promulgated for California by the U.S. EPA through the NTR, the SIP became effective on April 28, 2000; and with respect to the priority pollutant criteria promulgated for California by the U.S. EPA through the CTR, the SIP became effective on May 18, 2000.

K. **Compliance Schedules and Interim Requirements.** Section 2.1 of the SIP provides that, based on a discharger's request and demonstration that it is infeasible for an existing discharger to achieve immediate compliance with an effluent limitation derived from a CTR criterion, compliance schedules may be allowed in an NPDES Order. Unless an exception has been granted under Section 5.3 of the SIP, a compliance schedule may not exceed five years from the date that the Order is issued or reissued, nor may it extend beyond May 18, 2010, to establish and comply with CTR criteria-based effluent limitations. Where a compliance schedule for a final effluent limitation exceeds one year, the Order must include interim numeric limitations for that constituent or parameter. Where allowed by the Basin Plan, compliance schedules and interim effluent limitations or discharge specifications may also be granted to allow time to implement a new or revised water quality objective. This Order includes interim effluent limitations and a schedule for compliance with final limitations for chlorodibromomethane, dichlorobromomethane, and copper. Compliance schedules for chlorodibromomethane, dichlorobromomethane, and copper do allow time for the wastewater treatment facility upgrade to be completed and properly operating. However, the RPA that was conducted for this Order may not be representative of the upgraded facility discharge; therefore, the Discharger will evaluate compliance with the CTR constituent limits based upon the upgraded treatment facility.

L. **Anti-Degradation Policy.** NPDES regulations at 40 CFR 131.12 establish an anti-degradation policy and require State water quality standards to include an anti-degradation policy consistent with that federal policy. The State Board established California's anti-degradation policy in State Board Resolution 68-16, requiring that existing quality of receiving waters be maintained unless degradation is justified based on specific findings. As discussed in the Fact Sheet (Attachment F), the permitted discharge is consistent with the anti-degradation provisions of 40 CFR 131.12 and State Board Resolution 68-16.

M. **Anti-Backsliding Requirements.** CWA Sections 402 (o) (2) and 303 (d) (4) and NPDES regulations at 40 CFR 122.44 (l) prohibit backsliding in NPDES permits; i.e., effluent limitations in a reissued permit must be as stringent as those in the previous permit, with

some exceptions where limitations may be relaxed. Order No. R3-2006-0032 complies with all anti-backsliding requirements, as effluent limitations in this Order are at least as stringent as effluent limitations in Waste Discharge Requirements Order No. 01- 001.

N. **Monitoring and Reporting.** NPDES regulations at 40 CFR 122.48 require that all NPDES permits specify requirements for recording and reporting monitoring results. CWC Sections 13267 and 13383 authorize the Regional Boards to require technical and monitoring reports. The attached Monitoring and Reporting Program (Attachment E) establishes monitoring and reporting requirements to implement federal and State requirements.

O. **Standard and Special Provisions.** Standard NPDES provisions, established at 40 CFR 122.41 and 122.42 and applicable to all discharges, must be included in every NPDES permit and are included in Attachment D. The Central Coast Water Board Standard Provisions are included in this Order as Attachment D-1. Special provisions applicable to the Discharger are included in this Order, with rationale for these special provisions provided in the attached Fact Sheet (Attachment F).

P. **Mandatory Penalties.** Section 13385(h) et seq. of the California Water Code require the Central Coast Water Board to impose mandatory penalties for certain effluent limit violations. Section 13385(h) et seq. applies to effluent discharged to Chorro Creek from this Discharger.

Q. **Privilege to Discharge.** A permit and the privilege to discharge waste into the waters of the State are conditional upon the discharge complying with provisions of Division 7 of the California Water Code and of the Clean Water Act (as amended or as supplemented by implementing guidelines and regulations) and with any more stringent effluent limitations necessary to implement water quality control plans, to protect beneficial uses, and to prevent nuisance. This Order shall serve as a NPDES Permit pursuant to Section 402 of the Clean Water Act. Compliance with this Order should ensure conditions are met and mitigate any potential changes in water quality due to the project.

R. **Clean Water Act Section 303(d).** Section 303(d) of the Clean Water Act requires states to identify and prepare a list of water bodies that do not meet water quality standards and establish a Total Maximum Daily Load (TMDL) for the listed water bodies. A TMDL is the loading capacity of a pollutant that a water body can assimilate while protecting beneficial uses. TMDLs can be expressed in terms of either mass per time, concentration, or other appropriate measure [40 CFR §130.2(i)].

S. **Impairment**. Chorro Creek was identified as impaired by nutrients and included on the 1998 Clean Water Act Section 303(d) list of impaired water bodies. Chorro Creek is identified as impaired due to low dissolved oxygen on the draft 2006 Clean Water Act Section 303(d) list of impaired water bodies. Due to the 303(d) listings, the Water Board is required to adopt a TMDL and associated Implementation Plan (40 CFR 130.6(c)(1), 130.7, Water Code section 13242).

T. **TMDL Project Report**. The Final Project Report for the Chorro Creek Nutrients and Dissolved Oxygen TMDLs contains a Problem Statement, Numeric Targets, Source

Analysis, Total Maximum Load, Linkage Analysis, Load Allocations, Margin of Safety, an Implementation Plan, and a Monitoring Plan. The Final Project Report addresses the nutrient and dissolved oxygen listings through allocations of nitrate-N, total dissolved solids, sodium, temperature, and stream shading. Provisions of this Order are consistent with proposed wasteload allocations in the Final Project Report.

U. **Requirements Necessary to Comply with Federal Law.** This Order contains restrictions on individual pollutants that are no more stringent than required by the CWA. Individual pollutant restrictions consist of technology-based restrictions and water quality-based effluent limitations. The technology-based effluent limitations consist of restrictions on BOD, 5-day and TSS. These restrictions are specified in federal regulations as discussed in Fact Sheet, Section IV.B. and the technology-based pollutant restrictions are no more stringent than required by the CWA. Water quality-based effluent limitations have been scientifically derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that toxic pollutant water quality-based effluent limitations were derived from the California Toxics Rule, the California Toxics Rule is the applicable standard pursuant to 40 C.F.R. 131.38. The scientific procedures for calculating the individual water quality-based effluent limitations are based on the CTR-SIP, which was approved by USEPA on May 1, 2001. All beneficial uses and water quality objectives contained in the Basin Plan were approved under state law and submitted to and approved by USEPA prior to May 30, 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to May 30, 2000, but not approved by USEPA before that date, are nonetheless "applicable water quality standards for purposes of the [Clean Water] Act" pursuant to 40 C.F.R. 131.21(c)(1). Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement the technology-based requirements of the CWA and the applicable water quality standards for purposes of the CWA.

V. **California Water Code (CWC) Section 13241.** This Order contains groundwater limitations, which are not required by the CWA. In accordance with Section 13241 of the CWC, the Central Coast Water Board has established water quality objectives for groundwater in the Basin Plan. The groundwater limitations listed in Section V.B. of this Order are consistent with the Basin Plan and are for the protection of past, present and potential groundwater beneficial uses. In establishing these limitations, the Central Coast Water Board has considered the factors listed in Section 13241 of the CWC. The California Department of Corrections and Rehabilitation and other interested parties have not submitted any information regarding economic considerations or the other factors se forth in Section 13241. The groundwater limitations in the permit are consistent with other similar permits throughout the Central Coast region. Other dischargers have successfully implemented similar requirements. Beneficial uses and environmental characteristics of the area are discussed in attachment F. The requirements are reasonably necessary to protect beneficial uses identified in the Basin Plan, and there are no economic information related to costs of compliance sufficient, in the Board's determination, to justify failing to protect beneficial uses. Coordinated control of water

quality throughout the region will not eliminate the need for this Discharger to prevent adverse water quality impacts from its discharge.

W. **Notification of Interested Parties.** The Central Coast Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe WDRs for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet (Attachment F) of this Order.

X. **Consideration of Public Comment.** The Central Coast Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Details of the public hearing are provided in the Fact Sheet (Attachment F) of this Order.

III. DISCHARGE PROHIBITIONS

A. The discharge of any waste not specifically regulated by this Order, excluding storm water regulated by General Permit No. CAS000001 (Waste Discharge Requirements for Discharges of Storm Water Associated with Industrial Activities) is prohibited.

B. Discharge of treated wastewater at a location other than Discharge Point 001 (35°, 19', 30" N Latitude and 120°, 46', 55" W Longitude), as described by this Order, is prohibited, unless the discharge is regulated by General Permit No. CAS000001 or another discharge permit.

C. The overflow or bypass of wastewater from the Discharger's collection, treatment, or disposal facilities and the subsequent discharge of untreated wastewater, except as provided for in Attachment D, Standard Provision I. G (Bypass), is prohibited.

D. Creation of a condition of pollution, contamination, or nuisance, as defined by CWC Section 13050, is prohibited.

E. The discharge shall not cause or contribute to adverse impacts to beneficial uses of water or to threatened or endangered species and their habitat.

IV. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

A. Effluent Limitations – Discharge Point 001

1. Final Effluent Limitations – Discharge Point 001

a. The discharge of treated wastewater shall maintain compliance with the following effluent limitations at Discharge Point 001, with compliance measured at Monitoring Location M-001, as described in the attached Monitoring and Reporting Program (Attachment E).

Parameter	Units	Effluent Limitation		
		Average Monthly	Average Weekly	Maximum Daily
Acute Toxicity	% survival	-	-	see below [a]
BOD, 5-day [b]	mg/L	10	30	50
	lbs/day	100	300	500
	kg/day	45	136	227
Chlorine Residual	mg/L	-	-	ND [c]
Chlorodibromomethane [d]	µg/L	0.4	-	0.81
Chronic Toxicity	TUc	-	-	1
Copper [e]	µg/L	8.5	-	17
Dichlorobromomethane [d]	µg/L	0.56	-	1.1
Dissolved Oxygen	mg/L	> 2.0 mg/L at all times		
Flow	MGD	1.2[f]	-	-
Oil and Grease	mg/L	5	-	10
	lbs/day	50	-	100
	kg/day	23	-	45
pH	stnd units	6.5 – 8.3 at all times		
Settleable Solids	mL/L	0.1	-	0.3
Sulfate	mg/L	-	-	125
	lbs/day	-	-	1,251
	kg/day	-	-	568
Total Suspended Solids	mg/L	10	30	50
	lbs/day	100	300	500
	kg/day	45	136	227
Total Nitrogen (as N)	mg/L	-	-	10
	lbs/day	-	-	100
	kg/day	-	-	45
Turbidity	NTU	10	-	20

[a] Survival of test organisms exposed to 100 percent effluent shall not be significantly reduced when compared, using a t-test, to the survival of control organisms.

[b] 5-day biochemical oxygen demand at 20° C

[c] ND = less than 0.1 mg/L. Compliance determination for total chlorine residual shall be based on 99% compliance. To determine 99% compliance with the effluent limitation specified above for total chlorine residual, the following conditions shall be satisfied: (1) the total time during which the total chlorine residual values are above 0.1 mg/L (instantaneous maximum value) shall not exceed 7 hours and 26 minutes in any calendar month; (2) no individual excursion from 0.1 mg/L shall exceed 30 minutes; and (3) no individual excursion shall exceed 2 mg/L.

[d] Final effluent limitations for the trihalomethanes shall become effective on May 19, 2010, pending results of the Trihalomethane Study required by Section VI. C. 5 of this Order. If the Trihalomethane Study shows levels of trihalomethanes in effluent above applicable water quality criteria from the CTR, compliance with these final effluent limitations shall be achieved according to the compliance schedule established by Section VI. C. 6 of this Order.

[e] Final effluent limitations for copper will become effective on May 19, 2010, in accordance with the compliance schedule established by Section VI. C. 6 of this Order.

[f] Average monthly dry weather flow.

b. The average monthly percent removal of Biochemical Oxygen Demand (BOD), 5-day and Total Suspended Solids (TSS) by the wastewater treatment facility shall not be less than 85 percent.

c. The median concentration of total coliform bacteria measured in treated effluent at Discharge Point 001 shall not exceed a most probable number (MPN) of 2.2 organisms per 100 milliliters (mL), as determined from the last seven days for which analyses have been completed. The number of total coliform bacteria shall not exceed a MPN of 23 per 100 mL in more than one sample in any 30-day period. No sample shall exceed an MPN of 240 total coliform bacteria per 100 mL.

d. Discharges of treated wastewater through Discharge Point 001 shall be essentially free of substances that:

i. Float or become floatable upon discharge,

ii. May form sediments that degrade benthic communities or other aquatic life,

iii. Accumulate to toxic levels in surface waters, sediments, or biota,

iv. Significantly decrease the natural light to benthic communities and other aquatic life, or

v. Result in aesthetically undesirable discoloration of the water surface.

2. Interim Effluent Limitations – Discharge Point 001

The discharge of treated wastewater at Discharge Point 001 shall comply with the following interim effluent limitations for chlorodibromomethane, dichlorobromomethane, and copper until final effluent limitations become effective on May 18, 2010.

Pollutant	Units	Average Monthly Effluent Limitation
Chlorodibromomethane	µg/L	3.5
Dichlorobromomethane	µg/L	13
Copper	µg/L	12

Violations of interim effluent limitations are subject to the enforcement provisions of the California Water Code and Clean Water Act.

B. Reclamation Specifications

1. Treated effluent shall meet all applicable requirements for "disinfected tertiary recycled water" established by the Department of Health Services at Title 22 of the California Code of Regulations Chapter 3 (Water Recycling Criteria).

2. Wastewater shall be disinfected by either:

   a. A chlorine disinfection process that provides a CT (the product of total chlorine residual and modal contact time measured at the same point) value of not less than 450 milligram-minutes per liter at all times with a modal contact time of at least 90 minutes, based on the peak dry weather design flow, **or**

   b. A disinfection process that, when combined with the filtration process, has been demonstrated to inactivate and/or remove 99.999 percent of the plaque-forming units of F-specific bacteriophage MS2, or polio virus, or a virus that is at least as resistant to disinfection as the polio virus.

3. Wastewater to be reclaimed/recycled shall be filtered to meet the criteria of a **or** b, immediately below.

   a. Wastewater shall be coagulated and passed through natural undisturbed soils or a bed of filter media:

      i. At a rate that does not exceed 5 gallons per minute (gpm) per square foot of surface area in mono, dual, or mixed media gravity, upflow, or pressure filtration systems, or does not exceed 2 gpm per square foot of surface area in traveling bridge automatic backwash filters; **and**

      ii. Turbidity of the filtered wastewater shall not exceed any of the following:

         - An average of 2 NTU within a 24-hour period;
         - 5 NTU more than 5 percent of the time within a 24-hour period; **and**
         - 10 NTU at any time.

   b. Wastewater to be reclaimed/recycled shall be passed through a microfiltration, ultrafiltration, nanofiltration, or reverse osmosis membrane so that turbidity of the filtered wastewater does not exceed any of the following.

      i. 0.2 NTU more than 5 percent of the time within a 24-hour period; **and**

      ii. 0.5 NTU at any time.

4. When treated effluent is being reclaimed/recycled for irrigation, it shall be sampled and analyzed daily for total coliform bacteria.

5. When treated effluent is being reclaimed/recycled for irrigation, it shall be continuously monitored for turbidity following filtration. Compliance with performance criteria of IV. C. 3. a or b, above, shall be determined using the levels of recorded turbidity taken at intervals of no more than 1.2 hours over a 24-hour period. If the continuous turbidity meter and/or recorder fail, grab sampling at a minimum frequency of 1.2 hours may be substituted for a period of up to 24 hours.

6. No irrigation use with treated effluent shall take place within 50 feet of any domestic water supply well.

7. No impoundment of treated effluent shall occur within 100 feet of any domestic water supply well.

8. Reclaimed water shall be confined to areas of authorized use without discharge to surface waters or drainageways.

9. Personnel involved in producing, transporting, or using reclaimed water shall be informed of possible health hazards that may result from contact and use of reclaimed water.

10. Spray irrigation of reclaimed water shall be accomplished at a time and in a manner to minimize ponding and contact with the public.

11. Delivery of reclaimed water shall be discontinued when these Reclamation Specifications cannot be met.

12. All reclamation reservoirs and other areas with public access shall be posted, in English and Spanish, to warn the public that reclaimed wastewater is being stored or used.

13. Reclaimed water systems shall be properly labeled and regularly inspected to ensure proper operation, absence of leaks, and absence of illegal connections.

V. RECEIVING WATER LIMITATIONS

A. Surface Water Limitations

Receiving water limitations are based on water quality objectives contained in the Basin Plan and are a required part of this Order.

1. The discharge shall not cause a violation of the following receiving water limitations in Chorro Creek.

Constituent	Units	Maximum
Boron	mg/L	0.2
Cadmium	mg/L	0.003[a]
Chloride	mg/L	50
Cobalt	mg/L	0.05
Copper	mg/L	0.03[b]
Fluoride	mg/L	1.0
Iron	mg/L	5.0
Lead	mg/L	0.03
Lithium	mg/L	2.5
Manganese	mg/L	0.2
Methylene Blue Activated Substances	mg/L	0.2
Molydbenum	mg/L	0.01
PCBs	µg/L	0.3

Constituent	Units	Maximum
Phthalate Esters	µg/L	0.002
Selenium	mg/L	0.01
Silver	mg/L	0.05
Sodium	mg/L	50
Sulfate	mg/L	50
Total Dissolved Solids	mg/L	500
Unionized ammonia (as N)	mg/L	0.025
Vanadium	mg/L	0.1
Zinc	mg/L	0.2[c]

[a] Cadmium shall not exceed 0.003 mg/L, when hardness in receiving waters is greater than 100 mg/L as $CaCO_3$, nor shall cadmium exceed 0.0004 mg/L when hardness in receiving waters is equal to or less than 100 mg/L as $CaCO_3$.

[b] Copper shall not exceed 0.03 mg/L, when hardness in receiving waters is greater than 100 mg/L as $CaCO_3$, nor shall copper exceed 0.01 mg/L when hardness in receiving waters is equal to or less than 100 mg/L as $CaCO_3$.

[c] Zinc shall not exceed 0.2 mg/L, when hardness in receiving waters is greater than 100 mg/L as $CaCO_3$, nor shall zinc exceed 0.004 mg/L when hardness in receiving waters is equal to or less than 100 mg/L as $CaCO_3$.

2. Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses. Coloration attributable to materials of waste origin shall not be greater than 15 units or 10 percent above natural background color, whichever is greater.

3. Waters shall not contain taste or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin that cause nuisance, or that adversely affect beneficial uses.

4. Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.

5. Waters shall not contain suspended material in concentrations that causes nuisance or adversely affects beneficial uses.

6. Waters shall not contain settleable material in concentrations that result in deposition of material that causes nuisance or adversely affects beneficial uses.

7. Waters shall not contain oils, greases, waxes, or other similar materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.

8. Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

9. The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

10. Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increase in turbidity attributable to controllable water quality factors shall not exceed the following limits.

    a. Five NTU, where natural turbidity is less than 25 NTU

    b. Twenty percent, where natural turbidity is between 25 and 50 NTU

    c. Ten NTU, where natural turbidity is between 50 and 100 NTU

    d. Ten percent, where natural turbidity is greater than 100 NTU

11. The pH value shall not be depressed below 7.0 nor raised above 8.3, nor shall changes in ambient pH levels exceed 0.5 pH units.

12. Dissolved oxygen concentrations in receiving waters shall not be reduced below 7 mg/L at any time. Median values should not fall below 85 percent saturation as a result of controllable water quality conditions.

13. Natural temperature of receiving waters shall not be altered unless it can be demonstrated to the satisfaction of the Central Coast Water Board that such alteration in temperature does not adversely affect beneficial uses. In no circumstances shall temperature be increased by more than 5° F above the natural receiving water temperature.

14. All waters shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in, human, plant, animal, or aquatic life. Survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality conditions, shall not be less than that for the same water body in areas unaffected by the waste discharge.

15. No individual pesticide or combination of pesticides shall reach concentrations that adversely affect the beneficial uses of the receiving water. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life. For waters where existing concentrations are presently nondetectable or where beneficial uses would be impaired by concentrations in excess of nondetectable levels, total identifiable chlorinated hydrocarbon pesticides shall not be present at concentrations detectable within the accuracy of analytical methods as prescribed in *Standard Methods for the Examination of Water and Wastewate*r, latest edition, or other equivalent methods approved by the Executive Officer.

16. Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life; or result in the accumulation of radionuclides in the food web to an extent, which presents a hazard to human, plant, animal, or aquatic life. In no circumstance shall receiving waters contain concentrations of radionuclides in excess of the maximum contaminant levels (MCLs) for radioactivity

presented in Table 4 of the most current version of Title 22 California Code of Regulations, Division 4, Chapter 15, Article 5.

17. Receiving waters shall not contain concentrations of fecal coliform bacteria (based on a minimum of not less than 5 samples for any 30-day period) that exceed a log mean of 200 MPN/100 mL, nor shall more than 10 percent of total samples during any 30-day period exceed 400 MPN/100 mL.

18. Receiving waters shall not contain concentrations of chemical constituents in excess of the primary maximum contaminant levels (MCLs) specified for drinking water in Table 64431-A (Primary MCLs for Inorganic Chemicals) and Table 64444-A (Primary MCLs for Organic Chemicals) of the most current version of Title 22 California Code of Regulations, Division 4, Chapter 15.

B. Groundwater Limitations

Discharges from and activities at the wastewater treatment facility shall not cause exceedance/deviation from the following water quality objectives for groundwater established by the Basin Plan.

1. Groundwaters shall not contain taste or odor producing substances in concentrations that adversely affect beneficial uses.

2. Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life; or result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life. In no circumstances shall ground waters contain concentrations of radionuclides in excess of the maximum contaminant levels (MCLs) for radioactivity presented in Table 4 of the most current version of Title 22 California Code of Regulations, Division 4, Chapter 15, Article 5.

3. The median concentration of total coliform organisms over any seven day period shall be less than a log mean of 2.2 MPN/100 mL.

4. Groundwaters shall not contain concentrations of chemical constituents in excess of the primary maximum contaminant levels (MCLs) specified for drinking water in Table 64431-A (Primary MCLs for Inorganic Chemicals) and Table 64444-A (Primary MCLs for Organic Chemicals) of the most current version of Title 22 California Code of Regulations, Division 4, Chapter 15.

5. Groundwaters shall not contain concentrations of chemical constituents in amounts that adversely affect the agricultural beneficial use. (Interpretation of adverse effect shall be derived from guidelines of the University of California Agricultural Extension Service presented in Section III, Table 3-3 of the Basin Plan.)

6. Groundwaters used for irrigation and livestock watering shall not exceed concentrations of chemical constituents in excess of those levels specified for irrigation and livestock watering in Section III, Table 3-4 of the Basin Plan.

7. Groundwaters shall not contain constituents greater than the following concentrations established in Table 3-8 of the Basin Plan for groundwaters within the Chorro Subarea of the Estero Bay groundwater unit.

TDS	Chloride	Sulfate	Boron	Sodium	Nitrogen
1000 mg/L	250 mg/L Cl	100 mg/L SO_4	0.2 mg/L B	50 mg/L Na	5.0 mg/L N

VI. PROVISIONS

A. Standard Provisions

Federal Standard Provisions. The Discharger shall comply with all Standard Provisions included as Attachment D of this Order.

Central Coast Water Board Standard Provisions. The Discharger shall comply with all Central Coast Water Board Standard Provisions included as Attachment D-1 of this Order.

B. Monitoring and Reporting Program Requirements

The Discharger shall comply with the Monitoring and Reporting Program, and future revisions thereto, in Attachment E of this Order. All monitoring shall be conducted according to 40 CFR Part 136, *Guidelines Establishing Test Procedures for Analysis of Pollutants*.

C. Special Provisions

1. Reopener Provision.

This permit may be reopened and modified in accordance with NPDES regulations at 40 CFR 122 and 124, as necessary, to include additional conditions or limitations based on newly available information or to comply with TMDLs for Nutrients and Dissolved Oxygen in Chorro Creek or due to compliance evaluations, or to implement any U.S. EPA approved, new, State water quality objective.

2. Noncompliance reporting

The Discharger shall comply with Section V.E of Standard Provisions (Attachment D), following procedures described in a February 17, 1981, tri-agency memo from the Department of Health Services and any amendments thereto, and shall notify the following:

Department of Health Services
Jill Baltan (510) 412-4633

Office of Emergency Services	(800) 852-7550
Department of Fish and Game	(707) 944-5523
Mike Hill	(805) 489-7355
County Board of Supervisors	(805) 781-5450
County Ag Commission	(805) 781-1035
Williams Shellfish	(805) 782-0502
Tomales Bay Oyster Company	
Drew Aldeen	(415) 250-9905
Neal Naloney	(805) 234-7102
Morro Bay Estuary	(805) 772-3834
Y. Hayashi & Sons	(805) 489-2595

3. Toxicity Reduction Evaluation Workplan.

The Discharger shall maintain a Toxicity Reduction Evaluation (TRE) Workplan, which describes steps that the Discharger intends to follow in the event that either the acute or chronic toxicity effluent limitation of this Order is exceeded in the discharge. The workplan shall be prepared in accordance with current technical guidance and reference material, including EPA/600/2-88-070 (for industrial discharges) or EPA/600/2-88/062 (for municipal discharges), and shall include, at a minimum:

a. Actions that will be taken to investigate/identify the causes/sources of toxicity,

b. Actions that will be evaluated to mitigate the impact of the discharge, to correct the non-compliance, and/or to prevent the recurrence of toxicity (this list of action steps may be expanded, if a TRE is undertaken), and

c. A schedule under which these actions will be implemented.

When monitoring measures acute or chronic toxicity in the effluent above the limitations established by this Order, the Discharger shall resample immediately, if the discharge is continuing, and retest for toxicity. Results of an initial failed test and results of subsequent monitoring shall be reported to the Executive Officer (EO) as soon as possible following receipt of monitoring results. The EO will determine whether to initiate enforcement action, whether to require the Discharger to implement a Toxicity Reduction Evaluation, or to implement other measures. The Discharger shall conduct a TRE giving due consideration to guidance provided by the U.S. EPA's Toxicity Reduction Evaluation Procedures, Phases 1, 2, and 3 (EPA document nos. EPA 600/3-88/034, 600/3-88/035, and 600/3-88/036, respectively). A TRE, if necessary, shall be conducted in accordance with the following schedule.

Action Step	When Required
Take all reasonable measures necessary to immediately reduce toxicity, where the source is known.	Within 24 hours of identification of noncompliance.
Initiate the TRE in accordance to the Workplan.	Within 7 days of notification by the EO

Action Step	When Required
Conduct the TRE following the procedures in the Workplan.	One year period or as specified in the plan
Submit the results of the TRE, including summary of findings, required corrective action, and all results and data.	Within 60 days of completion of the TRE
Implement corrective actions to meet Permit limits and conditions.	To be determined by the EO

4. Discharges of Storm Water

For the control of storm water discharged from the site of the wastewater treatment facility, if applicable, the Discharger shall seek authorization to discharge under and meet the requirements of the State Water Resources Control Board's Water Quality Order 97-03-DWQ, NPDES General Permit No. CAS000001, *Waste Discharge Requirements for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities*.

5. Biosolids Handling and Disposal

Language in this section was provided by the U.S. EPA Region IX Biosolids Coordinator as standard language for use in NPDES permits. "Biosolids" refers to non-hazardous sewage sludge as defined in 40 CFR 503.9. Sewage sludge that is hazardous as defined in 40 CFR 261 must be disposed in accordance with the Resource Conservation and Recovery Act (RCRA). Sludge with PCB levels greater than 50 mg/kg must be disposed of in accordance with 40 CFR 761.

a. Management of all solids and sludge must comply with all requirements of CFR Parts 257, 258, 501, and 503, including all monitoring, record-keeping, and reporting requirements. Since the State of California, hence the Regional and State Boards, has not been delegated the authority by the U.S. EPA to implement the biosolids program, enforcement of biosolids requirements of CFR Part 503 will occur under U.S. EPA's jurisdiction at this time.

b. All biosolids generated by the Discharger shall be used or disposed of in compliance with the applicable portions of:

i. 40 CFR 503: for biosolids, which are land applied (placed on the land for the purpose of providing nutrients or conditioning the soil for crops or vegetation), placed in surface disposal sites (placed on the land at dedicated land disposal sites or monofills for the purpose of disposal), stored, or incinerated;

ii. 40 CFR 258: for biosolids disposed in municipal solid waste landfills; and,

iii. 40 CFR 257: for all biosolids use and disposal practices not covered under 40 CFR 258 or 503.

40 CFR 503 Subpart B (land application) applies to biosolids applied for the purpose of enhancing plant growth or for land reclamation. 40 CFR 503 Subpart C (surface disposal) applies to biosolids placed on the land for the purpose of disposal.

The Discharger is responsible for ensuring that all biosolids produced at its facility are used or disposed of in compliance with these regulations, whether the Discharger uses or disposes of the biosolids itself or transfers them to another party for further treatment, use, or disposal. The Discharger is responsible for informing subsequent preparers, appliers, and disposers of the requirements that they must meet under 40 CFR 257, 258, and 503.

c. Duty to mitigate: The Discharger shall take all reasonable steps to prevent or minimize any biosolids use or disposal in violation of applicable regulations and/or which has a likelihood of adversely affecting human health or the environment.

d. No biosolids shall be allowed to enter wetlands or other waters of the United States.

e. Biosolids treatment, storage, use, or disposal shall not contaminate groundwater.

f. Biosolids treatment, storage, use, or disposal shall not create a nuisance such as objectionable odors or flies.

g. The Discharger shall assure that haulers transporting biosolids off site for treatment, storage, use, or disposal take all necessary measures to keep the biosolids contained.

h. If biosolids are stored for over two years from the time they are generated, the Discharger must ensure compliance with all the requirements for surface disposal under 40 CFR 503 Subpart C, or must submit a written notification to U.S. EPA with the information in Section 503.20(b), demonstrating the need for longer temporary storage.

i. Any biosolids treatment, disposal, or storage site shall have facilities adequate to divert surface runoff from adjacent areas, to protect the site boundaries from erosion, and to prevent any conditions that would cause drainage from the materials at the site to escape from the site. Adequate protection is defined as protection from at least a 100-year storm and from the highest tidal stage that may occur.

j. The discharge of biosolids shall not cause waste material to be in a position where it is, or can be, conveyed from the treatment and storage sites and deposited in the waters of the State.

k. The Discharger shall design its pretreatment program local discharge limitations to achieve the metals concentration limits in 40 CFR 503.13 Table 3.

l. Inspection and Entry: The U.S. EPA, Central Coast Water Board, or an authorized representative thereof, upon the presentation of credentials, shall be allowed by the Discharger, directly or through contractual arrangements with their biosolids management contractors, to:

i. Enter upon all premises where biosolids produced by the Discharger are treated, stored, used, or disposed, either by the Discharger or by another party to whom the Discharger transfers the biosolids for treatment, storage, use, or disposal;

ii. Have access to and copy any records that must be kept under the conditions of this permit or of 40 CFR 503, by the Discharger or by another party to whom the Discharger transfers the biosolids for further treatment, storage, use, or disposal, and;

iii. Inspect any facilities, equipment (including monitoring and control equipment), practices, or operations used in the biosolids treatment, storage, use, or disposal by the Discharger or by another party to whom the Discharger transfers the biosolids for treatment, storage, use, or disposal.

m. Monitoring shall be conducted in accordance with the Monitoring and Reporting Program (MRP) of this Order (see Attachment E, MRP Section VI.B, *Biosolids Monitoring, Reporting, and Notification*):

n. All the requirements of 40 CFR 503 and 23 CCR, Division 3, Chapter 15, and 27 CCR, Division 2 are enforceable by the U.S. EPA and this Central Coast Water Board whether or not the requirements are stated in an NPDES permit or any other permit issued to the Discharger.

6. Trihalomethane Study

Within four months following adoption of this Order, the Discharger shall initiate quarterly effluent sampling and analysis for the common trihalomethanes - bromoform, dichlorobromomethane, chlorodibromomethane, and chloroform.

The Discharger shall collect grab samples of effluent for quarterly monitoring and otherwise adhere to U.S. EPA approved methods for sampling and analysis from *Guidelines Establishing Test Procedures for the Analysis of Pollutants* (40 CFR 136).

Following quarterly monitoring for the trihalomethanes over one year (i.e., four monitoring events), and immediately following receipt of analytical data for the 4th quarter of monitoring, the Discharger shall submit to the Regional Board a summary

of analytical data for trihalomethanes. The summary report shall include the most stringent applicable water quality criterion for each pollutant from the CTR and the Minimum Level (ML) of detection from the SIP

Trihalomethanes	Minimum Level (µg/L)	Most Stringent Water Quality Criterion (µg/L)
Bromoform	0.5	4.3
Chlorodibromomethane	0.5	0.401
Dichlorobromomethane	0.5	0.56
Chloroform	0.5	-

The summary report shall also include, for each monitoring event: date sampled, date analyzed, analytical method, method detection limit (MDL) for each constituent, and reporting limit (RL) for each constituent as reported by the analytical lab.

If all results of quarterly trihalomethane monitoring are below the applicable water quality criteria, above, final effluent limitations for the trihalomethanes, as stated in Section IV. A. 1. a of this Order, will not become effective. If results show an exceedance for any single trihalomethane, final effluent limitations for the trihalomethanes, as stated in Section IV. A. 1. a of this Order, shall become effective on May 19, 2010, in accordance with the compliance schedule described in Section VI. C. 6, below.

7. Compliance Schedules

If results of the Trihalomethane Study, required by Section VI. C. 5 of this Order, show an exceedance of an applicable water quality criterion for bromoform, chlorodibromomethane, or dichlorobromomethane, the Discharger shall adhere to the following schedule for compliance with final effluent limitations for the trihalomethanes established by Section IV. A. 1. a of this Order.

Schedule for Compliance with Final Effluent Limitations for Chlorodibromomethane and Dichlorobromomethane

Interim Requirement	Completion Date
1. Complete the Trihalomethane Study required by Section VI. C. 5 of this Order.	**November 7, 2007**
2. Evaluate modification of chlorination practices, alternative methods of disinfection, and THM reduction/removal alternatives to allow compliance with final effluent limitations for trihalomethanes.	**January 19, 2008**
3. Send request for environmental and consulting engineering proposals.	**February 19, 2008**
4. Initiate design of facility improvements.	**May 19, 2008**
5. Complete CEQA process and obtain any necessary permits.	**December 19, 2008**
6. Complete design of facility improvements.	**May 19, 2009**
7. Issue Notice to Proceed to contractor.	**June 19, 2009**
8. Submit construction progress reports.	**Quarterly (submitted with self monitoring reports)**

Interim Requirement	Completion Date
9. Complete construction and commence debugging and startup.	**April 19, 2010**
10. Final trihalomethanes effluent limitations become effective.	**May 19, 2010**

The Discharger shall adhere to the following schedule for compliance with final effluent limitations for copper.

Schedule for Compliance with Final Effluent Limitations for Copper

Interim Requirement	Completion Date
1. Identify potential sources by collection system evaluation, sampling and analysis, and by audits of dischargers to the collection system. Evaluate wastewater treatment operational practices to identify potential sources.	**July 7, 2007**
2. Complete Source Control Plan and/or a Pollutant Minimization Plan.	**January 7, 2008**
3. Implement source control and/or pollutant minimization measures and evaluate treatment upgrades necessary to achieve compliance with final limitations.	**July 7, 2008**
4. Submit letter report to the Central Coast Water Board, which summarizes the effectiveness of source control and/or pollutant minimization measures. Describe final action plan, if necessary, to be implemented in Step 5, below.	**July 7, 2009**
5. Implement selected WWTP operational measures and/or treatment upgrades.	**February 19, 2010**
6. Final effluent limitations become effective.	**May 19, 2010**

The Discharger must notify the Central Coast Water Board, in writing, no later than 14 days following each interim completion date, of its compliance or noncompliance with the interim requirements.

8. Salt Management Study

The Discharger shall complete a Salt Management Study with the goal of controlling levels of salts in discharges from the wastewater treatment facility to Chorro Creek and attainment of applicable water quality objectives for salts in Chorro Creek, as presented in Table 3-7 of the Basin Plan and in Section V. A. 25 of this Order.

The Salt Management Study shall be submitted to the Central Coast Water Board with its Report of Waste Discharge, **not later than 180 days prior to the expiration date of this Order**, and shall include, but not be limited to, the following components.

a. Characterization of Source Water Supply(s) and Wastewater Quality

The Discharger shall fully characterize source water supplies and wastewater quality in terms of salt concentrations.

b. Evaluation of Alternative Control Strategies

The Discharger shall evaluate means of controlling source water quality as well as residential, commercial, and industrial control strategies.

c. Development of a Salt Management Plan

The Discharger shall develop a Salt Management Plan to ensure that discharges from the wastewater treatment facility do not interfere with attainment of applicable, concentration-based water quality objectives for salts in Chorro Creek. The Plan shall include a schedule of not more than five years for full implementation.

VII. COMPLIANCE DETERMINATION

For purposes of reporting and administrative enforcement, compliance with effluent limitations or discharge specifications shall be determined as follows:

A. For purposes of reporting and administrative enforcement by the Water Boards, dischargers shall be deemed out of compliance with an effluent limitation, if the concentration of the priority pollutant in the monitoring sample is greater than the effluent limitation and greater than or equal to the Reporting Level.

B. When determining compliance with an average monthly effluent limitation or discharge specification or a four-day average effluent limitation, and more than one sample result is available for the averaging period, the arithmetic mean of the data set shall be computed unless the data set contains one or more reported determinations of "Detected, but Not Quantified" (DNQ) or "Not Detected" (ND). In such cases, the median shall be computed in place of the arithmetic mean in accordance with the following procedure.

1. The data set shall be ranked from low to high, reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

2. The media value of the data set shall be determined. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of the points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

C. If only one sample is collected during the time period associated with the effluent limitations (e.g., 30-day average or four-day average), the single measurement shall be used to determine compliance with the effluent limitation for the entire time period.

D. All analytical data shall be reported uncensored with detection limits and quantitation limits identified. For any effluent limitation, compliance shall be determined using appropriate

statistical methods to evaluate multiple samples. Sufficient sampling and analyses shall be conducted to determine compliance.

E. Minimum Levels (MLs) represent the lowest quantifiable concentrations of a pollutant in water quality samples based on proper application of method-specific analytical procedures and the absence of matrix interferences. MLs also represent the lowest standard concentrations in the calibration curves for specific analytical techniques after the application of method specific factors. For reporting and compliance determinations for toxic pollutants the discharger shall use analytical methods identified in the corresponding ML is below the applicable effluent limitation. If the effluent limitation is below all the MLs identified for the pollutant, the discharger shall select the lowest ML (and corresponding analytical method).

F. When determining compliance based on a single sample, and a single effluent limitation applies to a group of chemicals (e.g. PCBs), concentrations of individual members of the group may be considered to be zero if the analytical response for individual chemicals falls below the MDL for that parameter.

G. As defined by the U.S. EPA at 40 CFR 122.2, average monthly discharge limitation means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

H. Dischargers shall be deemed out of compliance with an effluent limitation or discharge specification if the concentration of the constituent in the monitoring sample is greater than the effluent limitation or discharge specification and greater than or equal to the Minimum Level (ML).

Appendix C: Detailed Cost Estimate Breakdowns

Summary Comparison

Component	Option 1: WWTP Study Area 1 System Diversion Point 1	Option 2: WWTP Study Area 1 System Diversion Point 2	Option 3: WWTP Study Area 2 System Diversion Point 1	Option 4: WWTP Study Area 2 System Diversion Point 2
System Improvements				
New Gravity Lines	638,015	638,015	198,014	198,014
New/Upgraded Lift Stations & Force Mains	1,745,143	1,745,143	2,110,476	2,110,476
System Improvements Subtotal	2,383,158	2,383,158	2,308,489	2,308,489
O&M 20-year NPV	750,188	1,512,246	714,226	1,439,752
WWTP				
Headworks	582,523	582,523	582,523	582,523
Biological Treatment	1,561,484	1,561,484	1,561,484	1,561,484
Secondary Clarifier	1,081,019	1,081,019	1,081,019	1,081,019
Microfiltration	1,063,556	1,063,556	1,063,556	1,063,556
Disinfection	875,089	875,089	875,089	875,089
Electrical & instrumentation	373,532	373,532	373,532	373,532
Site improvements	1,238,675	1,238,675	1,238,675	1,238,675
WWTP Subtotal	6,775,878	6,775,878	6,775,878	6,775,878
O&M 20-year NPV, including staffing	17,185,476	17,185,476	17,185,476	17,185,476
Solids Handling				
Centrifuge Dewatering **	1,170,000	1,170,000	1,170,000	1,170,000
Off-site Hauling (20 year NPV)	891,799	1,783,599	891,799	1,783,599
O&M 20-year NPV	5,474,593	6,366,392	5,474,593	6,366,392
Membrane Plant				
Construction and Installation (Equipment)	2,100,000	5,000,000	2,100,000	5,000,000
Brine Handling System Pipeline	941,925	941,925	975,332	975,332
Brine Handling Pump Station	226,795	226,795	226,795	226,795
Membrane Plant Subtotal	3,268,720	6,168,720	3,302,127	6,202,127
O&M 20-year NPV	4,164,768	8,395,435	4,166,633	8,399,194
Total Capital Costs	13,597,757	16,497,757	13,556,495	16,456,495
Contingency (20%)	2,719,551	3,299,551	2,711,299	3,291,299
Engineering/Admin/Legal/Permitting (35%)	4,759,215	5,774,215	4,744,773	5,759,773
Annual O&M	1,910,501	2,318,203	1,908,139	2,313,441
Total O&M 20-year NPV	28,466,825	35,243,148	28,432,727	35,174,413
Total	49,543,347	60,814,670	49,445,294	60,681,980
Revised Capital Costs	22,359,942	26,609,942	23,721,092	26,586,342
Contingency (20%)	4,471,988	5,321,988	4,744,218	5,317,268
Engineering/Admin/Legal/Permitting (35%)	7,825,980	9,313,480	8,302,382	9,305,220
Revised Annual O&M	1,910,501	2,318,203	1,908,139	2,313,441
Revised O&M 20-year NPV	28,466,825	35,243,148	28,432,727	35,174,413
Total Revised Costs	**63,124,735**	**76,488,558**	**65,200,420**	**76,383,244**

** Phase II Study examined belt filter press. Current technology standard includes centrigual separation of solids from wastewater. Cost estimate shown is for centrifuge.
NPV caluclations based on an assumption of 6% interest rate and 3% inflation rate

Table C-1: Cost Estimate DP1 SA1

Component	Length/Quantity	Diameter	Unit Cost	Estimated Cost (1999)*	Estimated Cost (2006)**		
System Improvements							
Tributary area A02 system modifications - divert gravity line on Radcliff to Radcliff LS	-	-	$5,000	$5,000	$5,670		$5,670
Tributary area A03 system modifications - divert flow to area B03 at Pacific and Kern	-	-	$5,000	$5,000	$5,670		$5,670
New Gravity Main	2335		$63	$147,105	$166,813	$200	$467,000 ***
Modifications to LS#2							
New wet well and pumps	-	-	$250,000	$250,000	$283,494		$500,000
Force main from LS #2 to Radcliff LS	3000	10	$70	$210,000	$238,135	$150	$450,000 ***
Highway crossing	200	10	$70	$14,000	$15,876	$150	$30,000 ***
New Lift Station - Alt. #1							
Radcliffe Lift Station	-	-	$200,000	$200,000	$226,795		$500,000
Force Main from Radcliff LS to WWTP Site 1	11728	8	$70	$820,960	$930,949	$150	$1,759,200 ***
Highway crossing	200	8	$70	$14,000	$15,876	$150	$30,000 ***
Annual O&M (electrical only)					$39,609		$39,609
O&M 20-year NPV					$571,691		$571,691
System Improvements Capital Cost Subtotal					***$1,889,277***		***$3,747,540***
System Improvements Subtotal					**$2,500,576**		**$4,319,231**
WWTP Site 1							
Creek discharge pipe	6437	8	$63	$405,531	$459,862	$125	$804,625 ***
Creek discharge pump station - 20 Hp	-	-	$30,000	$30,000	$34,019		$35,000
Annual O&M (electrical only)					$12,367		$12,367
O&M 20-year NPV					$178,497		$178,497
WWTP Site 1 Capital Costs Subtotal					***$493,881***		***$839,625***
WWTP Site 1 Subtotal					**$684,746**		**$1,018,122**
WWTP							
Headworks			$513,700		$582,523		$1,320,000
Biological Treatment			$1,377,000		$1,561,484		$2,866,000 *****
Secondary clarifier			$953,300		$1,081,019		$3,072,600
Microfiltration system			$937,900		$1,063,556		$1,063,556
Ultraviolet disinfection system			$771,700		$875,089		$875,089
Belt filter press dewatering	*See Solids Handling, below*						
Control buildling			$250,000		$283,494		$2,000,000
Chemical feed building			$200,000		$226,795		$226,795
Electrical & instrumentation			$329,400		$373,532		$150,000
Paving and grading			$247,050		$280,149		$500,000
Yard piping			$329,400		$373,532		$373,532
Painting and coating			*$65,880*		$74,706		$74,706
Annual O&M Costs			$550,000		$623,687		$623,687
Annual staffing costs			$500,000		$566,988		$566,988
O&M 20-year NPV + Staffing					$17,185,476		$17,185,476
WWTP Capital Costs Subtotal					***$6,775,878***		***$12,522,277***
WWTP Subtotal			$6,525,330		**$23,961,354**		**$29,707,754**
Solids Handling							
Centrifuge					$1,170,000		$1,170,000 ****
Off site hauling (ton per year basis)	1343		$46		$61,787		$61,787 ****
Off site hauling 20-year NPV					$891,799		$891,799
Annual O&M			$280,000		$317,513		$317,513
O&M 20-year NPV					$5,474,593		$5,474,593
Solids Handling Capital Costs Subtotal					***$1,170,000***		***$1,170,000***
Solids Subtotal					**$7,536,392**		**$7,536,392**
Membrane Plant							
Construction (equipment includes microfilter and RO plant)					$2,100,000		$2,100,000
Brine Handling Pipeline	13844	6	$60	$830,640	$941,925	$125	$1,730,500 ***
Brine Handling Lift Station	-	-	*$200,000*	$200,000	$226,795		$250,000
Annual O&M Costs (Membrane Plant + Brine Handling Lift Station)					$288,551		$288,551
O&M 20-year NPV					$4,164,768		$4,164,768
Membrane Plant Capital Costs Subtotal					***$3,268,720***		***$4,080,500***
Membrane Plant Subtotal					**$7,433,489**		**$8,245,268**
Total Capital Costs					***$13,597,757***		***$22,359,942***
Contingency (20%)					$2,719,551		$4,471,988
Engineering/Admin/Legal/Permitting (35%)					$4,759,215		$7,825,980
Total Annual O&M Costs					$1,910,501		$1,910,501
Total O&M 20-year NPV					$26,466,825		$26,466,825
Total					**$49,543,347**		**$63,124,735**

* 1999 Costs use ENR Cost Index of 6852 (December 1998)
** 2006 Costs use ENR Cost Index of 7770 (June 2006)
*** Corrected Costs Reflect Pipeline Costs in the SMP
**** Costs Reflect FMP Costs
***** Phase II Study examined use of biological treatment. Current technology standard includes an oxidation ditch. Cost estimate shown is for oxidation ditch.

Operating Costs Calculations

Lift Station Basis Assumptions

Motor Efficiency (Est.)	0.9	
Pump Efficiency (Est.)	0.7	
specific gravity	1	
hours of operation (per year)	8760	(assumtion, using average flow rate)
$/kwh	0.167	from PG&E rate data tables

Radcliffe Lift Station			
Elevation Change (feet)	120		
Peak Flow (DP1 - GPM)	926		
Friction Loss (assume 8" wrought iron pipe) per 100 feet of pipe	1.42	117.28	166.5376
Average Flow (DP1 - GPM)	316		
H (elevation change + friction loss)	286.5376		
kwh (per year)	237178.8177		
operating costs	39608.86256		

20 year total on annual costs:

assume 6% interest rate, 3% inflation rate

14.4334 multiplier

Discharge Pump Station			
Elevation change (feet)	8		
Engine bhp	20		
Friction loss assume 8" wrought iron pipe) per 100 feet of pipe	1.42	64.37	91.4054
equivalent to	14.92	kw	
H (elevation change + friction loss)	99.4054		
at full capacity, a 20 hp engine can move:			
flow =	557.7162	GPM	
	56.65964	percent of the time	
assuming average flow, the engine will operate approximately			
kwh (per year)	74053.7		
operating costs	$ 12,367		

per disucssion with operators/vendors, costs range from $2.1M - 5M

Membrane Plant O&M		
General O&M (per 1000 gallons)	0.7	
Flow (MGD)*	0.46	
Total General O&M	116262.72	
Electrical Usage (per 1000 gallons)	6	kwh
Eletrical Costs	166421.7792	
Total Annual O&M	282684.4992	

Brine Handling Pump			
Elevation Change (feet)	120		
Flow (GPM)*	31.6		
Friction Loss (assume 8" wrought	1.42	138.44	196.5848
H (elevation change + friction loss)	316.5848		
kwh (per year)	35127.36		
operating costs	5866.269		

*assume 10% of flow thrcugh Membrane Plant ends up as brine

Table C-2: Cost Estimate DP2 SA1

Component	Length/Quantity	Diameter	Unit Cost	Estimated Cost (1999)**	Estimated Cost (2006)**			
System Improvements								
Tributary area A02 system modifications - divert gravity line on Radcliff to Radcliff LS	-	-	$5,000	$5,000	$5,670		$5,670	
Tributary area A03 system modifications - divert flow to area B03 at Pacific and Kern	-	-	$5,000	$5,000	$5,670		$5,670	
New Gravity Main	2335		$63	$147,105	$166,813	$200	$467,000	***
Modifications to LS#2								
New wet well and pumps	-	-	$250,000	$250,000	$283,494		$500,000	
Force main from LS #2 to Radcliff LS	3000	10	$70	$210,000	$238,135	$150	$450,000	***
Highway crossing	200	10	$70	$14,000	$15,876	$150	$30,000	***
New Lift Station - Alt. #1								
Radcliffe Lift Station	-	-	$200,000	$200,000	$226,795		$500,000	
Force Main from Radcliff LS to WWTP Site 1	11728	8	$70	$820,960	$930,949	$150	$1,759,200	***
Highway crossing	200	8	$70	$14,000	$15,876	$150	$30,000	***
Annual O&M *(electrical only)*					$79,844		$79,844	
O&M 20-year NPV					$1,152,427		$1,152,427	
System Improvements Capital Cost					***$1,889,277***		***$3,747,540***	
System Improvements Subtotal					**$3,041,704**		**$4,899,967**	
WWTP Site 1								
Creek discharge pipe	6437	8	$63	$405,531	$459,862	$125	$804,625	***
Creek discharge pump station - 25 Hp	-	-	$30,000	$30,000	$34,019		$35,000	
Annual O&M *(electrical only)*					$24,930		$24,930	
O&M 20-year NPV					$359,819		$359,819	
WWTP Site 1 Capital Costs Subtotal					***$493,881***		***$839,625***	
WWTP Site 1 Subtotal					**$853,701**		**$1,199,444**	
WWTP								
Headworks			$513,700		$582,523		$1,320,000	
Biological Treatment			$1,377,000		$1,561,484		$2,866,000	*****
Secondary clarifier			$953,300		$1,081,019		$3,072,600	
Microfiltration system			$937,900		$1,063,556		$1,063,556	
Ultraviolet disinfection system			$771,700		$875,089		$875,089	
Belt filter press dewatering	*See Solids Handling, below*							
Control buildling			$250,000		$283,494		$2,000,000	
Chemical feed building			$200,000		$226,795		$226,795	
Electrical & instrumentation			$329,400		$373,532		$1,500,000	
Paving and grading			$247,050		$280,149		$500,000	
Yard piping			$329,400		$373,532		$373,532	
Painting and coating			$65,880		$74,706		$74,706	
Annual O&M Costs			$550,000		$623,687		$623,687	
Annual staffing costs			$500,000		$566,988		$566,988	
O&M 20-year NPV+ Staffing					$17,185,476		$17,185,476	
WWTP Capital Costs Subtotal					***$6,775,878***		***$13,872,277***	
WWTP Subtotal			$6,525,330		**$23,961,354**		**$31,057,754**	
Solids Handling								
Cetrifuge					$1,170,000		$1,170,000	****
Off site hauling (ton per year basis)	2686		$46		$123,574		$123,574	****
Off site hauling 20-year NPV					$1,783,599		$1,783,599	
Annual O&M			$280,000		$317,513		$317,513	
O&M 20-year NPV					$6,366,392		$6,366,392	
Solids Handling Capital Costs Subtotal					***$1,170,000***		***$1,170,000***	
Solids Subtotal					**$9,319,991**		**$9,319,991**	
Membrane Plant								
Construction (equipment includes microfilter and RO plant)					$5,000,000		$5,000,000	
Brine Handling Pipeline	13844	6	$60	$830,640	$941,925	$125	$1,730,500	***
Brine Handling Lift Station	-	-	$200,000	$200,000	$226,795		$650,000	
Annual O&M Costs (Membrane Plant + Brine Handling Lift Station)					$581,667		$581,667	
O&M 20-year NPV					$8,395,435		$8,395,435	
Membrane Plant Capital Costs Subtotal					***$6,168,720***		***$6,980,500***	
Membrane Plant Subtotal					**$14,564,155**		**$15,375,935**	
Capital Costs Total					***$16,497,757***		***$26,609,942***	
Contingency (20%)					$3,299,551		$5,321,988	
Engineering/Admin/Legal/Permitting (35%)					$5,774,215		$9,313,480	
Total Annual O&M Costs					$2,318,203		$2,318,203	
Total O&M 20-year NPV					$35,243,148		$35,243,148	
Total					**$60,814,670**		**$76,488,558**	

* 1999 Costs use ENR Cost Index of 6852 (December 1998)
** 2006 Costs use ENR Cost Index of 7770 (June 2006)
*** Corrected Costs Reflect Pipeline Costs in the SMP
**** Costs Reflect FMP Costs
***** Phase II Study examined use of biological treatment. Current technology standard includes an oxidation ditch. Cost estimate shown is for oxidation ditch.

Operating Costs Calculations

Lift Station Basis Assumptions

Motor Efficiency (Est.)	0.9		
Pump Efficiency (Est.)	0.7		
specific gravity	1		
hours of operation (per year)	8760	(assumtion, using average flow rate)	
$/kwh	0.167	from PG&E rate data tables	

Radcliffe Lift Station			
Elevation Change (feet)	120		
Peak Flow (DP2 - GPM)	1863		
Average Flow (DP2 - GPM)	637		
Friction Loss (assume 8" wrought iron pipe) per 100 feet of pipe	1.42	117.28	166.5376
H (elevation change + friction loss)	286.5376		
kwh (per year)	478110.4648		
operating costs	79844.44762		

20 year total on annual costs:

assume 6% interest rate, 3% inflation rate

14.4334 multiplier

Discharge Pump Station			
Elevation change (feet)	8		
Engine bhp	25		
equivalent to	18.65	kw	
Friction loss assume 8" wrought iron pipe) per 100 feet of pipe	1.42	64.37	91.4054
H (elevation change + friction loss)	99.4054		
at full capacity, a 20 hp engine can move:			
flow =	697.1452	GPM	
assuming average flow, the engine will operate approximately			
	91.37264	percent of the time	
kwh (per year)	149279.1		
operating costs	$ 24,930		

per disucssion with operators/vendors, costs range from $2.1M - 5M

Membrane Plant O&M		
General O&M (per 1000 gallons)	0.7	
Flow (MGD)*	0.92	
Total General O&M	234365.04	
Electrical Usage (per 1000 gallons)	6	kwh
Eletrical Costs	335476.8144	
Total Annual O&M	569841.8544	

Brine Handling Pump			
Elevation Change (feet)	120		
Flow (GPM)*	63.7		
Friction Loss (assume 8" wrought	1.42	138.44	196.5848
H (elevation change + friction loss)	316.5848		
kwh (per year)	70810.53		
operating costs	11825.36		

*assume 10% of flow through Membrane Plant ends up as brine

Table C-3: Cost Estimate DP1 SA2

Component	Length/Quantity	Diameter	Unit Cost	Estimated Cost (1999)**	Estimated Cost (2006)**			
System Improvements								
Tributary area A02 system modifications - divert gravity line on Radcliff to Radcliff LS	-	-	$5,000	$5,000	$5,670		$5,670	
Tributary area A03 system modifications - divert flow to area B03 at Pacific and Kern	-	-	$5,000	$5,000	$5,670		$5,670	
New Gravity Main	2335		$63	$147,105	$166,813	$200	$467,000	***
Modifications to LS#2								
New wet well and pumps	-	-	$250,000	$250,000	$283,494		$500,000	
Force main from LS #2 to Radcliff LS	3000	10	$70	$210,000	$238,135	$150	$450,000	***
Highway crossing	200	10	$70	$14,000	$15,876	$150	$30,000	***
New Lift Station - Alt. #2								
Radcliffe Lift Station	-	-	$200,000	$200,000	$226,795		$500,000	
Force Main from Radcliff LS to WWTP Site 2	16759	8	$70	$1,173,130	$1,330,301	$150	$2,513,850	***
Highway crossing	200	8	$70	$14,000	$15,876	$150	$30,000	***
Annual O&M *(electrical only)*					$49,484		$49,484	
O&M 20-year NPV					$714,226		$714,226	
System Improvements Capital Cost Subtotal					***$2,288,629***		***$4,502,190***	
System Improvements Subtotal					**$3,002,855**		**$5,216,416**	
WWTP Site 2								
Creek discharge pipe	278	8	$63	$17,514	$19,860	$125	$34,750	***
WWTP Site 1 Subtotal					***$19,860***		***$34,750***	
WWTP								
Headworks			$513,700		$582,523		$1,320,000	
Biological Treatment			$1,377,000		$1,561,484		$2,866,000	*****
Secondary clarifier			$953,300		$1,081,019		$3,072,600	
Microfiltration system			$937,900		$1,063,556		$1,063,556	
Ultraviolet disinfection system			$771,700		$875,089		$875,089	
Belt filter press dewatering	*See Solids Handling, below*							
Control building			$250,000		$283,494		$2,000,000	
Chemical feed building			$200,000		$226,795		$226,795	
Electrical & instrumentation			$329,400		$373,532		$1,500,000	
Paving and grading			$247,050		$280,149		$500,000	
Yard piping			$329,400		$373,532		$373,532	
Painting and coating			$65,880		$74,706		$74,706	
Annual O&M Costs			$550,000		$623,687		$623,687	
Annual staffing costs			$500,000		$566,988		$566,988	
O&M 20-year NPV + Staffing					$17,185,476		$17,185,476	
WWTP Capital Costs Subtotal					***$6,775,878***		***$13,872,277***	
WWTP Subtotal			$7,025,330		**$23,961,354**		**$31,057,754**	
Solids Handling								
Centrifuge					$1,170,000		$1,170,000	****
Off site hauling (ton per year basis)	1343		$46		$61,787		$61,787	****
Off site hauling 20-year NPV					$891,799		$891,799	
Annual O&M			$280,000		$317,513		$317,513	
O&M 20-year NPV					$5,474,593		$5,474,593	
Solids Handling Capital Cost Subtotal					***$1,170,000***		***$1,170,000***	
Solids Subtotal					**$7,536,392**		**$7,536,392**	
Membrane Plant								
Construction (equipment includes microfilter and RO plant)					$2,100,000		$2,100,000	
Brine Handling Pipeline	14335	6	$60	$860,100	$975,332	$125	$1,791,875	***
Brine Handling Lift Station	-	-	$200,000	$200,000	$226,795		$250,000	
Annual O&M Costs (Membrane Plant + Brine Handling Lift Station)					$288,680		$288,680	
O&M 20-year NPV					$4,166,633		$4,166,633	
Membrane Plant Capital Cost Subtotal					***$3,302,127***		***$4,141,875***	
Membrane Plant Subtotal					**$7,468,760**		**$8,308,508**	
Total Capital Costs					***$13,556,495***		***$23,721,092***	
Contingency (20%)					$2,711,299		$4,744,218	
Engineering/Admin/Legal/Permitting (35%)					$4,744,773		$8,302,382	
Total Annual O&M Costs					$1,908,139		$1,908,139	
Total O&M 20-year NPV					$28,432,727		$28,432,727	
Total					**$49,445,294**		**$65,200,420**	

Operating Costs Calculations

20 year total on annual costs:

assume 6% interest rate, 3% inflation rate

Lift Station Basis Assumptions

Motor Efficiency (Est.)	0.9		
Pump Efficiency (Est.)	0.7		
specific gravity	1		
hours of operation (per year)	8760	(assumtion, using average flow rate)	
$/kwh	0.167	from PG&E rate data tables	

Radcliffe Lift Station			
Elevation Change (feet)	120		
Peak Flow (DP1 - GPM)	926		
Average Flow (DP1 - GPM)	316		
Friction Loss (assume 8" wrought iron pipe) per 100 feet of pipe	1.42	167.59	237.9778
H (elevation change + friction loss)	357.9778		
kwh (per year)	296312.7749		
operating costs	49484.23341		

14.4334 multiplier

per disucssion with operators/vendors, costs range from $2.1M - 5M

Membrane Plant O&M		
General O&M (per 1000 gallons)	0.7	
Flow (MGD)*	0.46	
Total General O&M	116262.72	
Electrical Usage (per 1000 gallons)	6	kwh
Eletrical Costs	166421.7792	
Total Annual O&M	282684.4992	

Brine Handling Pump			
Elevation Change (feet)	120		
Flow (GPM)*	31.6		
Friction Loss (assume 8" wrought	1.42	143.35	203.557
H (elevation change + friction loss)	323.557		
kwh (per year)	35900.98		
operating costs	5995.463		

*assume 10% of flow through Membrane Plant ends up as brine

* 1999 Costs use ENR Cost Index of 6852 (December 1998)
** 2006 Costs use ENR Cost Index of 7770 (June 2006)
*** Corrected Costs Reflect Pipeline Costs in the SMP
**** Costs Reflect FMP Costs
***** Phase II Study examined use of biological treatment. Current technology standard includes an oxidation ditch. Cost estimate shown is for oxidation ditch.

Table C-4: Cost Estimate DP2 SA2

Component	Length/Quantity	Diameter	Unit Cost	Estimated Cost (1999)**	Estimated Cost (2006)**			
System Improvements								
Tributary area A02 system modifications - divert gravity line on Radcliff to Radcliff LS	-	-	$5,000	$5,000	$5,670		$5,670	
Tributary area A03 system modifications - divert flow to area B03 at Pacific and Kern	-	-	$5,000	$5,000	$5,670		$5,670	
New Gravity Main	2335		$63	$147,105	$166,813	$200	$467,000	***
Modifications to LS#2								
New wet well and pumps	-	-	$250,000	$250,000	$283,494		$500,000	
Force main from LS #2 to Radcliff LS	3000	10	$70	$210,000	$238,135	$150	$450,000	***
Highway crossing	200	10	$70	$14,000	$15,876	$150	$30,000	***
New Lift Station - Alt. #2								
Radcliffe Lift Station	-	-	$200,000	$200,000	$226,795		$500,000	
Force Main from Radcliff LS to WWTP Site 2	16759	8	$70	$1,173,130	$1,330,301	$150	$2,513,850	***
Highway crossing	200	8	$70	$14,000	$15,876	$150	$30,000	***
Annual O&M *(electrical only)*					$99,751		$99,751	
O&M 20-year NPV					$1,439,752		$1,439,752	
System Improvements Capital Cost Subtotal					***$2,288,629***		***$4,502,190***	
System Improvements Subtotal					**$3,728,381**		**$5,941,942**	
WWTP Site 2								
Creek discharge pipe	278	8	$63	$17,514	$19,860	$125	$34,750	***
WWTP Site 2 Subtotal					***$19,860***		***$34,750***	
WWTP								
Headworks			$513,700		$582,523		$1,320,000	
Biological Treatment			$1,377,000		$1,561,484		$2,866,000	*****
Secondary clarifier			$953,300		$1,081,019		$3,072,600	
Microfiltration system			$937,900		$1,063,556		$1,063,556	
Ultraviolet disinfection system			$771,700		$875,089		$875,089	
Belt filter press dewatering	*See Solids Handling, below*							
Control buildling			$250,000		$283,494		$2,000,000	
Chemical feed building			$200,000		$226,795		$226,795	
Electrical & instrumentation			$329,400		$373,532		$1,500,000	
Paving and grading			$247,050		$280,149		$500,000	
Yard piping			$329,400		$373,532		$373,532	
Painting and coating			$65,880		$74,706		$74,706	
Annual O&M Costs			$550,000		$623,687		$623,687	
Annual staffing costs			$500,000		$566,988		$566,988	
O&M 20-year NPV + Staffing					$17,185,476		$17,185,476	
WWTP Capital Cost Subtotal					***$6,775,878***		***$13,872,277***	
WWTP Subtotal			$7,025,330		**$23,961,354**		**$31,057,754**	
Solids Handling								
Centrifuge					$1,170,000		$1,170,000	****
Off site hauling (ton per year basis)	2686		$46		$123,574		$123,574	****
Off-site hauling 20-year NPV					$1,783,599		$1,783,599	
Annual O&M			$280,000		$317,513		$317,513	
O&M 20-year NPV					$6,366,392		$6,366,392	
Solids Handling Capital Cost Soubtotal					***$1,170,000***		***$1,170,000***	
Solids Subtotal					**$9,319,991**		**$9,319,991**	
Membrane Plant								
Construction (equipment includes microfilter and RO plant)					$5,000,000		$5,000,000	
Brine Handling Pipeline	14335	6	$60	$860,100	$975,332	$125	$1,791,875	***
Brine Handling Lift Station	-	-	$200,000	$200,000	$226,795		$250,000	
Annual O&M Costs (Membrane Plant + Brine Handling Lift Station)					$581,928		$581,928	
O&M 20-year NPV					$8,399,194		$8,399,194	
Membrane Plant Capital Cost Subtotal					***$6,202,127***		***$7,041,875***	
Membrane Plant Subtotal					**$14,601,321**		**$15,441,069**	
Total Capital Costs					***$16,456,495***		***$26,586,342***	
Contingency (20%)					$3,291,299		$5,317,268	
Engineering/Admin/Legal/Permitting (35%)					$5,759,773		$9,305,220	
Total Annual O&M Costs					$2,313,441		$2,313,441	
Total O&M 20-year NPV					$35,174,413		$35,174,413	
Total					**$60,681,980**		**$76,383,244**	

Operating Costs Calculations

20 year total on annual costs:

assume 6% interest rate, 3% inflation rate

Lift Station Basis Assumptions

14.4334 multiplier

Motor Efficiency (Est.)	0.9	
Pump Efficiency (Est.)	0.7	
specific gravity	1	
hours of operation (per year)	8760	(assumtion, using average flow rate)
$/kwh	0.167	from PG&E rate data tables

Radcliffe Lift Station			
Elevation Change (feet)	120		
Peak Flow (DP2 - GPM)	1863		
Average Flow (DP2 - GPM)	637		
Friction Loss (assume 8" wrought iron pipe) per 100 feet of pipe	1.42	167.59	237.9778
H (elevation change + friction loss)	357.9778		
kwh (per year)	597314.0431		
operating costs	99751.44519		

per disucssion with operators/vendors, costs range from $2.1M - 5M

Membrane Plant O&M		
General O&M (per 1000 gallons)	0.7	
Flow (MGD)*	0.92	
Total General O&M	234365.04	
Electrical Usage (per 1000 gallons)	6	kwh
Eletrical Costs	335476.8144	
Total Annual O&M	569841.8544	

Brine Handling Pump			
Elevation Change (feet)	120		
Flow (GPM)*	63.7		
Friction Loss (assume 8" wrought iron pipe) per 100 feet of pipe	1.42	143.35	203.557
H (elevation change + friction loss)	323.557		
kwh (per year)	72370.01		
operating costs	12085.79		

*assume 10% of flow through Membrane Plant ends up as brine

* 1999 Costs use ENR Cost Index of 6852 (December 1998)
** 2006 Costs use ENR Cost Index of 7770 (June 2006)
*** Revised Costs Reflect Pipeline Costs in the SMP
**** Costs Reflect FMP Costs
***** Phase II Study examined use of biological treatment. Current technology standard includes an oxidation ditch. Cost estimate shown is for oxidation ditch.