Feasibility Study on the Reuse of Ojai Valley Sanitary District Effluent- Final Facilities Planning Report

Provided to:

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EXECUTIVE SUMMARY

This study provides a preliminary feasibility analysis for the re-use of effluent currently discharged from Ojai Valley Sanitary District into the Ventura River. The discharge averages approximately 2 million gallons per day, and enters the river approximately 5 miles upstream of the Pacific Ocean. The first part of the analysis is focused on environmental issues primarily related to impacts of reduced discharge flow on the receiving environment, and possible impacts to water quality as a function of reduced flows. Key environmental receptors that were considered included the tidewater goby and the southern steelhead, as well as possible impacts to the river's riparian community including vegetation and associated species, including least Bell's vireo. Preliminary ecological impact assessments were made based a hydrological study that modeled alterations to hydrological characteristics (e.g., river flow, width, depth) during dry weather periods under different levels of effluent re-use.

The analysis focused on dry weather periods, since this is generally the time during which flows in the river are lowest, water demands are highest, and reduction of the discharge would most likely have the greatest impact. Two re-use scenarios were compared against the alternative of no change to the existing level of discharge: 1) re-use of approximately half of the discharge; and 2) re-use of all of the discharge.

Modeled alterations to river characteristics were interpreted with respect to their potential to affect the key environmental receptors. This analysis was qualitative because optimum flow requirements have not been established for each of the receptors in the lower River. In addition, for southern steelhead, detailed information on their presence and use of the lower River during summer dry flows is lacking. Finally, detailed information on the contribution of surfacing groundwater to the lower River was also lacking. Therefore, the modeled water budget was necessarily simplistic, but does provide a basis for comparisons between different levels of re-use.

The potential level of effect was estimated based on the extent to which the modeled alterations to streamflow characteristics (e.g., flow, wetted width, depth) in the lower River deviated from 1) the historical flow levels likely present in the absence of the discharge; and 2) the modeled characteristics associated with the existing level of discharge (i.e., no effluent re-use). Using this approach as a boundary analysis, flows consistently outside of the lower bounds that occurred historically would be considered outside of natural variation and, therefore, likely to result in significant adverse effects. Conversely, streamflow metrics associated with intermediate re-use flows that were within the range of natural variability were evaluated against metrics associated with the current discharge level (i.e., no re-use), and the extent to which they deviated was used as a qualitative measure of impact and potential for mitigation. In other words, a relatively small deviation in streamflow metrics would likely have a similarly small overall impact, and a relatively high potential for mitigation.

During dry seasons in extremely dry years (as might occur one year in twenty), surface flows in the lower Ventura River would likely be comprised entirely of the discharge. Under these conditions, the hydrological analysis suggested that recycling all of the discharge would essentially eliminate surface flows in the lower River. Associated potentially significant impacts could include loss of riparian areas and habitat for a number of species, as well as elimination of aquatic habitat in the side channel immediately downstream of the current discharge point. Consequently, re-use of all of the OVSD effluent is not a recommended option.

Analysis of re-use of approximately half the current level of discharge suggested that, even in extremely dry years, alterations to wetted area, flow and depth would be moderate compared with the "no re-use" scenario and, therefore, potentially mitigable. This suggests that, based on the existing level of data, an intermediate level of re-use could indeed be feasible from an environmental perspective. However, additional studies will be necessary to refine this analysis.

The second part of the analysis considered engineering and market issues related to different levels of effluent re-use. Ultimately, from an economic perspective, the cost and difficulty of providing the infrastructure necessary to supply recycled water to potential users has to be balanced against the demand for such water, and the willingness of potential users to pay for it. The engineering and market analysis identified a cost-effective combination of localized users that minimized the additional infrastructure necessary to supply the recycled water. The primary users identified were Aera Energy and local growers, with Aera accounting for the bulk of the demand. These users, which are currently supplied with a combination of raw and potable water, could utilize approximately half of the current effluent discharge. Indeed, the City estimated that these users could be supplied recycled water at a cost of approximately $529/per acre-foot, including capital expenditures, environmental review and permit compliance costs. Collectively, the environmental, engineering and market analyses suggested that the re-use of at least a portion of the effluent is sufficiently feasible to justify further consideration, although full CEQA documentation and review will be necessary prior to implementation.

This preliminary feasibility analysis also revealed several uncertainties that could affect the conclusions, as well as the ultimate scope of the project, should a decision be made to move forward. These include seasonal contributions of groundwater to surface flows in the lower river, potential effects of local groundwater pumping on surface flows to the lower river, the potential impact of existing water rights to surface water in the lower river, and the potential interactions between surface flows in the lower River and estuary characteristics and function. In addition, more detailed information on the spatial and temporal utilization of the lower River and associated habitat by key environmental receptors (e.g., southern steelhead) will be needed to refine the impacts analysis and estimated flow requirements.

There is no fixed schedule for undertaking this project; however, further development of this project will require a number of steps to be undertaken. The first is submittal of this report to the State Water Resources Control Board, as it provides the necessary documentation that the recycled water can be provided to an identified market at a rate that falls within State guidelines, and suggests that anticipated impacts associated with an intermediate level of re-use are likely to be mitigable.

To qualify for additional funding to pursue studies related to the potential implementation of the water re-use project, the City will also need to obtain an agreement with OVSD with respect to facility operations and supply, as well as assurances from potential users of recycled water. Thus, the City would need to execute a Memorandum of Understanding (MOU) with OVSD with regards to the use and operation of facilities associated with reuse of the effluent. The City may also need to develop a MOU with the Casitas Municipal Water District (Casitas) since the reuse of OVSD's effluent would be within Casitas's service area.

With respect to market assurances, until a full environmental impact analysis can be completed, the exact number of potential recycled water customers is unknown. However, since the largest potential customer is Aera Energy, with a current demand close to the amount of effluent available for reuse, an extraterritorial water service agreement between the City and Aera Energy to purchase the recycled water should provide sufficient market assurance for the City to move forward with the proposed project.

From the regulatory compliance and environmental review perspective, it is recommended that the City convene a pre-application type meeting with the appropriate agencies early in the planning process to outline the proposed project and provide the agencies with the opportunity to express their points of view. This early coordination ensures that the proposed project is planned with sufficient knowledge of the agencies requirements. For the environmental review process under CEQA, the initial steps would be to establish a defined project description and to conduct an Initial Study to determine the appropriate level of CEQA documentation. Although this scoping step has not yet occurred, the City should expect an EIR for this project.

On the engineering side, the first step would be preparation of a Pre-Design Report presenting the recommended design criteria and a preliminary design. Once approved, Final Plans and Specifications would be prepared at increasing levels of detail to allow thorough review of the engineering details at increasing levels of complexity. Once these are approved, a bid process would then be undertaken for construction services.

1 INTRODUCTION

The Ojai Valley Sanitary District (OVSD) currently discharges an average of 2 mgd of tertiary treated municipal effluent into the Ventura River approximately 5 miles upstream of the Pacific Ocean. Recently, Aera Energy LLC (AERA) expressed an interest in using reclaimed water instead of the potable or raw water that they currently use for injection into oil-bearing formations as part of their oil-recovery process. In general, the reuse of treated effluent is generally regarded as beneficial, particularly in areas such as southern California that are faced with limited water supplies. In fact, such re-use is explicitly encouraged in Title 22, that states that recycled water should be used preferentially for applications that do not require potable water quality, provided that existing water rights are not compromised.

Conversely, it is recognized that reducing or removing a discharge could have adverse environmental impacts, especially during dry periods when the effluent may contribute a significant portion of the overall flow. These impacts would most likely be associated with the aquatic and riparian zones, and could be the result of reduced flows, wetted area and water quality. Alternatively, there may be a benefit to reducing discharge flows if some constituents in the effluent (e.g., nutrients) are present at concentrations that may be of concern. In a broader sense, there may also be a concern that increased use of reclaimed water for industrial and landscape applications may make more potable water available, leading to increased localized increases in population growth.

Consequently, the City of San Buenaventura (Ventura) is considering the feasibility of re-using all, or a portion, of this discharge to satisfy needs of local users that are currently being supplied with raw or potable water, but do not require drinking water quality in order to meet their needs. As part of the investigation into the potential for re-using OVSD's effluent, the City authorized a study in which environmental issues, as well as water markets and engineering constraints were evaluated in a preliminary step towards identifying whether effluent re-use was potentially viable from a cost-effective basis, and could be undertaken without impairing beneficial uses associated with the receiving environment.

The feasibility analysis considered two options with respect to recycling the effluent. The first option involves diverting approximately half of the average flow (i.e., 1 mgd), which would be used to supply Aera Energy and local agricultural users. Currently, these users are supplied with potable or raw water, but their needs could be met with water of lower quality. The second option considered diverting all of the average flow (i.e., 2 mgd) towards reuse. The two options were also compared to a zero re-use strategy; in other words, continuing the current practice.

The options were first considered on the basis of potential environmental impacts from the perspective that if the impacts associated with removing the discharge from the river were significant, there would be no justification for going forward with the project, regardless of potential cost-benefits. The environmental analysis not only considered potential environmental components that might be at risk, but also included an evaluation of local groundwater and surface water hydrology to develop a more detailed perspective of the extent to which changes in discharge levels might impact flow and water quality. This analysis considered the river and associated riparian areas downstream of the treatment plant, including the estuary.

On the engineering side, a preliminary analysis of the market for recycled water was undertaken, as well as an evaluation of potential infrastructural requirements and constraints. These included the availability of existing delivery systems, the need for new delivery systems, and any requirements for relatively major modifications to the existing system, such as addition of storage capacity and pump stations. Preliminary cost estimates associated with different build-out configurations were also developed, and the necessary regulatory steps and agency jurisdictions that would be involved should the project move forward were also identified. Finally, regulatory agencies anticipated to have an interest in the project were contacted to identify their concerns, and ensure that they were addressed to the extent possible in the feasibility study.

2 HYDROLOGICAL CONSIDERATIONS

2.1 Physical Setting and Basin Water Budget

This study focused on characterizing and evaluating potential project impacts on what is referred to as the Lower Ventura River Basin and Estuary, which extends from Foster Park downstream to the Pacific Ocean. This approximately 5-mile reach of the Ventura River receives, on average, between 14- and 16-inches of rain a year (California DWR, 2003). The river corridor in this reach is characterized by an alluvial channel and floodplain lying within a valley filled with unconsolidated to semiconsolidated sediments of Recent to Pleistocene age (Fugro, 1996; Entrix, 2001a). These materials are generally interstratified and include sand, gravel, cobbles, boulders, silt, and clay (Fugro, 1996). The valley walls and bottom consist of relatively impermeable Tertiary aged sandstone, claystone, siltstone, and shale bedrock (Fugro, 1996; Entrix, 2001b). The thickness of the valley fill deposits in the Lower Basin are reported to range from 60- to 100-feet (DWR, 2003), but may be thinner as they are reported to range from 45- to 60-feet thick at Foster Park, which is located immediately upstream of Lower Ventura River Basin boundary (Fugro, 1996). Based on a summary of well log information from the Lower Basin provided by the County, the depth of the Recent and Pleistocene alluvium is generally less than 150-feet below ground surface (bgs), with the base of the fresh water averaging between 80- and 120-feet bgs (personal communication, Dave Panaro, Ventura County, Watershed Protection District, May 2007).

In general, the groundwater in the Ventura River basins occurs under unconfined conditions (Fugro, 1996), and flows parallel to the River alignment towards the Pacific Ocean. There is a strong interaction between surface water and groundwater conditions within the lower basin, as the dominant source of recharge to the alluvial aquifer system is direct infiltration of surface water (Fugro, 1996). The total groundwater storage capacity of the Lower Ventura River Basin is estimated at 264,000 acre-feet (DWR, 2003). Available information also indicates that surface water only occurs when and where groundwater levels rise above the bed of the river channel (Fugro, 1996). Areas in the Lower Basin where bedrock narrows or shallows are likely zones of groundwater upwelling that sustains surface water flows. This phenomenon was observed during a field reconnaissance of the Lower Ventura River Basin in early February 2007. At this time, a stream flow measurement was completed approximately 1.5-miles downstream of the OVSD Treatment Plant in what was assumed to be a bedrock narrows. The estimated flow rate from this measurement was 14.9-cfs, approximately 4.2-cfs higher than the sum of the flow measured leaving Foster Park (7.6-cfs) and Treatment Plant release (3.1-cfs). This increase in surface water flow was anticipated, and is assumed to be derived from an increased (upwelling) groundwater contribution due to a decrease in depth to bedrock and narrowing of bedrock valley walls. A portion of the increase in flow may also be associated with seep/spring contributions observed emanating from banks along upstream portions of the River, as well as underflow from Canada Larga. Regardless, the strong surface water-groundwater relationship has significant implications to existing and future river corridor conditions as overproduction of groundwater in the Lower Basin, or any other change in the local water budget, could artificially lower the water table and reduce the spatial extent and duration of surface water flows. Although the historic impacts on Lower Basin River flow are unknown, the California DWR (2003) report that between 1948 and 1956, groundwater levels in one well fluctuated about 25-feet and experienced flowing (artesian) conditions in 1950 and 1954.

Sources of recharge to the Lower Ventura River Basin aquifers include: infiltration of precipitation; subsurface inflow through the alluvial sediments from the Upper Ventura River Basin at Foster Park; tributary inflow, underflow and infiltration; and irrigation return flows of less than 100 af/yr (Fugro, 1996; DWR 2003). The California DWR reports (2003) underflow at 1100 acre-feet per year [af/yr] entering the upstream end of the Lower Ventura River Basin, while Fugro (1996) reports dry year-type underflow at 3426 af/yr and wet year-type underflow at 9882 af/yr. Fugro (2003) also reports that groundwater contributes 33-percent to the total surface flow at Foster Park during wet year-types and 50-percent during dry year-types.

There are a number of existing and historic surface water and groundwater withdrawals from the Lower Ventura Basin, but the actual quantities of diversions and groundwater extractions are not known to the extent necessary to prepare an accurate water budget for the Lower Ventura River Basin. The California DWR (2003) reports that current (circa 2000) groundwater extractions are estimated to be less than 400 acre-feet per year (af/yr). Based on data provided by the County of Ventura, existing extractions are likely much less, as they report only 2 or 3 wells actually remain that can pump from the Lower River Basin with a cumulative capacity of around 100 af/yr (personal communication, Dave Panaro, Ventura County, Watershed Protection District, May 2007). Historic high safe yield from the Lower Ventura River Basin was estimated at approximately 3000 af/yr, and there were no more than 15 wells pumping at the same time (Ibid). Entrix (1997) reported a total of 10 wells in the Lower Ventura River Basin between Main Street and Foster Park, but the type and operability of them appeared uncertain.

Review of the California State Water Resources Control Board electronic Water Rights Information Management System (eWRIMS) indicates that there are currently two (2) water rights for surface water diversion from the Ventura River in the Lower Ventura River Basin, including:

- A 0.65 cfs direct diversion for irrigation from March 1 to November 1 (Owner-James J. Finch) located a short distance downstream of the OVSD Treatment Plant, near the confluence with Canada Larga; and

- A 2.2 cfs direct diversion for year-round irrigation (Owner- John Welty) located on the west bank about 1-mile upstream of the Pacific Ocean.

The extent to which these water rights are being utilized was not determined from this study. However, the potential project-induced impacts on the ability for a water rights owner to satisfy their right is evaluated below (Section 2.3).

2.2 Surface Water Hydrology

The long-term record at the USGS stream gaging station near Foster Park (#11118500) characterizes surface water flows entering the lower Ventura River from the upper portions of the watershed. Typical of South Coast river systems, flows in the Ventura River generally follow a wet winter/dry summer cycle. During the period 1960-2005, the four wettest months (January to April) account for 87% of the total streamflow at the gage. Regional hydrologic conditions are also characterized by extreme inter-annual variations. Monthly-averaged streamflows at the USGS gage illustrate both seasonal and extreme inter-annual variations of surface water flow on the Ventura River (Figure 2.1), and are heavily influenced by extremely wet years. Over the 1960-2005 analysis period, the monthly-average discharge at the 75th percentile[1] exceeds the discharge at the 25th percentile by more than an order of magnitude during most months. As such, the mean monthly discharge value is a poor measure of central tendency to assess potential impacts on hydrologic conditions. Instead, monthly-average discharges at the 25th, 50th (median), and 75th percentiles was evaluated to consider hydrologic conditions for dry, normal, and wet years respectively.

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[1] A monthly-average discharge at the 75th percentile is equal to or greater than 75 percent of the discharge values for that month during the period of record.

Hydrologic conditions downstream of the USGS gage are affected by additional inflows and outflows that affect surface water flows. Inflows include tributary flows (e.g. Cañada Larga and Cañada del Diablo), and direct precipitation to the valley floor. Outflows from the river include evaporation/evapotranspiration and irrigation diversions. Surface water flows are highly interconnected with the groundwater system; however, this relationship varies both spatially and temporally. During the summer low flow period, surface stream flow in the Lower Ventura River Basin is controlled by the complex interaction of upstream inflow/underflow, discharge from springs, groundwater levels, the effects of surface water diversions, water storage, upstream water supply releases, treated wastewater discharge, and groundwater extractions. Due to a lack of data quantifying the surface water – groundwater interactions in the lower Ventura River, the following feasibility assessments make the conservative assumption that surface water flow in the project area is the sum of the flow at the USGS gaging station and the treated effluent discharged from the OVSD plant.

During the period 1980-2005, the OVSD treatment plant discharged an average of 2.2 million gallons of effluent per day (MGD) to the lower Ventura River. In terms of flow, this is equivalent to a discharge of 3.4 cfs. During the dry season, effluent discharges were more typically around 2-MGD (3.1 cfs), while during the wet season higher discharges were observed due to infiltration from rainfall events. Based on the simplified assumption that total river flow in the project area is the sum of flow at the USGS gage and the discharge of treated effluent (i.e., no allowance made for surfacing groundwater), the relative contributions of treated effluent to river flows is shown in Figure 2.2. Under conditions represented by the median (50th percentile) flows, treatment plant releases account for 83-percent of the total river flow in the driest month (September) and 11-percent of the total flow during the wettest month (March). During a wet year, represented by the 75th percentile flows, treatment plant releases account for 46-percent of the flow in October and 2-percent of the total flow in February. During a dry year, represented by the 25th percentile flows, treatment plant releases account for more than 99-percent of the total river flow during the driest three months of the year (August to November) and 27-percent of the total river flow during the wettest month (March).

2.3 Project Influence on Flow Duration

The proposed reuse of treated effluent from the OVSD plant is expected to reduce surface water flows in the lower Ventura River. Potential impacts were evaluated from expected flow duration curves (Figure 2.3) based on daily discharge data for the period WY 1980 – WY 2005, and assuming the following scenarios: (1) existing conditions (total flow equals the sum of flow measured at the USGS gage and the treated effluent discharged from the OVSD), (2) existing flows reduced by the proposed 1000 acre-ft/year (equivalent to 1.4 cfs), and (3) complete reuse of treated effluent (total flow equals the flow measured at the USGS gage). This analysis was also based on the simplified assumption that flows in the lower River were the sum of the discharge and surface flows at the Foster Park gage.

Under existing conditions (i.e., no re-use), and again based on the historical 1980 – 2005 flow record), flows in the river below the OVSD Treatment Plant are maintained above 6 cfs for 60-percent of the time (based on daily averages), and flows of at least 10 cfs are maintained for 40-percent of the time (Figure 2.3). Even during the lowest flows (typically associated with dry seasons) that occur for approximately 20 percent of the time, the discharge of treated effluent maintains a flow of approximately 3 cfs. Under the scenario proposing a reuse of 1000 acre-ft/year, some flow is still maintained during the driest periods, but flows are reduced by nearly 50-percent from existing conditions. With complete reuse, flows are eliminated about 20-percent of the time, mostly during the summer months, and about 30 percent of the mean daily flows are less than 1 cfs.

Potential impacts on flows reaching the Ventura River estuary should also be considered. In addition to providing ecological functions, dry season flows that are maintained (or augmented) by effluent releases also fulfill existing water rights. There are two existing diversions of surface water for irrigation in the project area: (1) a maximum diversion of 0.65 cfs just downstream of the OVSD treatment plant, and (2) a maximum diversion of 2.2 cfs near the mouth of the Ventura River. Potential impacts of reduced effluent discharges were re-assessed to consider the scenario that both irrigators were diverting the maximum flow allowed by their water right. Assuming that existing flows reaching the mouth of the Ventura River estuary are equal to the sum of flows measured upstream at the USGS gage and the effluent discharged by the OVSD plant minus the 2.85 cfs diverted downstream for irrigation, minimum flows of slightly less than 1 cfs would be observed during the driest conditions of the historic period (Figure 2.4). Accounting for the proposed 1000 acre-ft/year reduction in effluent discharge, produces a flow-duration curve that suggests that no flow would reach the mouth of the estuary approximately 25-percent of the time when water rights are being implemented in full. The volume and duration of flow to the estuary would be further reduced under complete reuse of OVSD treated effluent.

2.4 Project Influence on Aquatic Habitats

Under existing conditions, dry season flows in the lower Ventura River maintain a continuous zone of shallow, aquatic habitats in the reach downstream from the OVSD treatment plant to the estuary mouth. Potential effects of reduced discharges to the river on the extent and character of aquatic habitats were evaluated with the HEC-RAS modeling system. HEC-RAS was used to simulate water surface profiles for steady, gradually varied flow based on the solution of the one-dimensional energy equation. A 1600-foot reach downstream of the OVSD treatment plant to the confluence with Cañada Larga was selected as a representative reach for use in the study. Topographic data derived from a February 2005 LIDAR survey (provided by the County of Ventura) were input to the model in a series of cross-sections spaced 50-feet apart in the downstream direction. The model was used to evaluate the effects of reduced discharges to aquatic habitats during the dry season when impacts would be greatest.

Effects were evaluated for moderately dry and extremely dry year-type conditions (25th and approximately 5th percentile years, respectively). At this level of analysis, it was not possible to model all possible flow scenarios. Therefore, conservative assumptions were made regarding the contributions of surfacing groundwater and surface flow to the total flow present in the river upstream of the discharge point. For moderately dry conditions, the modeled assumption was a total base flow of 1.5 cfs entering the reach from upstream – a conservative estimate derived from groundwater conditions described at Foster Park by Fugro (1996), and an accretionary flow estimate back-calculated from the February 2007 flow measurement completed downstream of the OVSD treatment plant. Simulations were run for flows of 4.6 cfs (sum of base flow and OVSD discharging 2-MGD), 3.2 cfs (flow reduced by proposed 1000 acre-ft/year), and 1.5 cfs (complete reuse of OVSD effluent). For extremely dry conditions, the modeled assumption was that no flow is conveyed at the surface upstream of the OVSD treatment plant (i.e., flow in the model reach is only maintained by OVSD effluent). Simulations were run for flows of 3.1 cfs (OVSD discharging 2-MGD) and 1.7 cfs (flow reduced by proposed 1000 acre-ft/year). Hydrologic conditions under the complete reuse (0.0 cfs) scenario during an extremely dry water year-type could be predicted without the use of the numerical model.

Model simulations for both moderately dry and extremely dry conditions are characterized by relatively wide, shallow, and slow moving flows (Table 2.1). The results presented in Table 2.1 are averages of the hydraulic characteristics at the input cross-section locations. Some geomorphic variation associated with the presence and development of gravel bars within the active channel area influenced the hydraulic characteristics at individual locations. Broadly, two general morphologies were observed in the study reach: (1) a well-developed low-flow channel confined to one side of the active channel by a large gravel bar extending into the active channel from the opposite bank, and (2) a less developed low-flow channel where flow tends to spread out across a relatively flat active channel area and fill multiple smaller-scale depressions within the cross section. Both morphologies were equally represented in the reach and were separated longitudinally by transitional zones that exhibited progressively greater degrees of gravel bar development. As such, average values provide a reasonable characterization of conditions within the study reach.

Table 2.1. Resulting hydraulic characteristics of the study reach generated from HEC-RAS simulations of low-flow conditions.

Simulation by Water Year-Type	Flow (cfs)	Top Width (ft)	Max Depth (ft)	Mean Depth (ft)	Flow Area (ft^2)	Velocity (ft/s)
Moderately Dry	4.6	45.03	0.43	0.17	7.20	0.74
	3.2	41.12	0.39	0.15	5.65	0.66
	1.5	28.45	0.31	0.12	3.17	0.58
Extremely Dry	3.1	40.68	0.39	0.15	5.50	0.66
	1.7	31.01	0.33	0.12	3.54	0.59
	0.0	0.00	0.00	0.00	0.00	0.00

Simulations of water surface profiles under reduced flow scenarios provide estimates of expected impacts to hydraulic characteristics (Table 2.2) that can be used to evaluate potential effects on aquatic habitat distributions. The moderately dry simulation assumed that existing conditions were represented by a flow of 4.6 cfs. Reducing the flow by the proposed 1000 acre-ft/yr (1.4 cfs) decreased the average channel width for the reach by 9-percent, and the average channel depth for the reach by 14-percent. Reducing the flow by 3.1 cfs (simulating conditions under the complete reuse of OVSD effluent) decreased average channel width for the reach by 37-percent and average depth for the reach by 31-percent. Evaluation of the effects of reducing discharges by 1.4 cfs (1000 acre-feet/year) during extremely dry conditions revealed a 24-percent decrease in channel width and 18-percent decrease in average depth. These results suggest that the proposed 1000 acre-ft/yr reduction in effluent discharged to the river would have a notable impact on the hydraulic characteristics of the river during the driest conditions. The entire simulated channel reach would remain dry assuming complete reuse of the Plant effluent during an extremely dry year-type.

Table 2.2. Effects of reduced effluent discharges on hydraulic characteristics measured as a percent of the value under existing conditions.

Simulation: Impact	Flow	Top Width	Maximum Depth	Mean Depth	Flow Area	Velocity
Moderately Dry: - 1000 acre-ft/yr	-30%	-9%	-9%	-14%	-21%	-10%
Moderately Dry: complete reuse	-67%	-37%	-27%	-31%	-56%	-21%
Extremely Dry: - 1000 acre-ft/yr	-44%	-24%	-15%	-18%	-36%	-11%
Extremely Dry: complete reuse	-100%	-100%	-100%	-100%	-100%	-100%

2.5 Other Potential Water Project Impacts on Instream Flow

The City of San Buenaventura maintains a surface water and groundwater collection facility at Foster Park, marking the extreme upstream end of the Lower Ventura River Basin. This facility includes a near valley-spanning underground dam constructed between 1906 and 1908 at the confluence of Coyote Creek and the Ventura River. The underground dam acts to further raise groundwater levels in this bedrock narrows, enhancing groundwater well extractions and surface water flows that are captured in a surface water diversion structure. On average, the City diverts 6400 af/yr at the Foster Park facility, with an estimated 2500 af/yr coming from surface water and 3900 af/yr coming from groundwater (Entrix, 2001a).

The City is currently evaluating options to enhance groundwater production from the Foster Park facility, which may have the effect of reducing the amount of groundwater that currently escapes around the collection structures and contributes underflow to the Lower Ventura River Basin. Fugro's 1996 work indicated that average annual production could be increased from 6400 af/yr to 7000 af/yr, mostly through improved groundwater capture, resulting in a decrease of 600 af/yr (average annual flow rate of 0.82 cfs) of underflow to the Lower Basin. Fugro's modeling analysis indicated that by extending the underground dam and improving well performance, an additional 300 af/yr of groundwater production could be attained during dry water year-types and an additional 10,000 af/yr during wet water year-types. The impacts on the downstream Lower Ventura River Basin were not provided in Fugro's 1996 study report. It's assumed that the maximum production from the Foster Park facility is capped by the City of San Buenaventura's water right of 24.5 cfs direct diversion, which equates to 17,737 af/yr.

2.6 Influence on Estuary Conditions and Dynamics

There appears to be little detailed or quantitative information regarding the historic conditions and inlet dynamics of the Ventura River estuary. Qualitative and anecdotal information obtained during this study regarding the conditions and processes controlling the estuary form and function also appear to be contradictory. What appears to be consistent is that when the inlet is open (i.e., sand-cobble bar allows tidal exchange), tidal waters may extend up to the Highway 101 bridge. During high flow events, the barrier beach is eroded and allows draining of and tidal exchange with the estuary. The frequency and duration of barrier beach closure during the summer period or extended drought periods is not well documented. However, based on observations and review of available information and photographs, it appears that the Ventura River estuary barrier beach contains a much higher percentage of large grained (gravel to cobble-size) material than other California coastal estuary beaches which are dominated by sand.

It is hypothesized that the high percentage of coarse-grained material forms a more erosion-resistant core in the Ventura River barrier beach. This makes it more difficult for a) small flood flows, b) high wave energy, and c) estuary filling, overtopping, and downcutting to erode and open and/or maintain an open inlet and partially drained estuary. This more resistant barrier beach and the breaching processes are quite different than those that exist on a system such as the Santa Clara River estuary, where once the estuary fills and overtops during the summer, there is enough power to erode and mobilize the sand barrier beach, typically down to at least the mean tide level, if not the mean lower low water elevation. Much greater forces are required to mobilize the coarse grained material that accumulates at the mouth of the Ventura

River. Entrix reports (2001a) that most of the sediment load (98%) in the Ventura River is transported as suspended sediment, and that bedload comprises the remaining 2%. However, the bed particle sizes in the Ventura River are dominated by cobble-size material, with smaller sizes in the gravel-range and larger sizes being boulders. This same cobble-dominated substrate is observed within barrier beach face of the Ventura River. The forces required to mobilize and transport small cobble-sized material are approximately 3-orders of magnitude higher than the forces needed to mobilize sand, suggesting the Ventura River mouth is more resistant to change than a sand-dominated barrier beach.

2.7 Water Quality

Similar to our ability to develop an accurate water budget for the Lower Ventura River Basin, there is an insufficient amount of surface water and groundwater quality data to make accurate predications on what water quality impacts will occur as a result of this project. However, it is known that general water quality parameters, nutrient loads, substrate conditions and the aquatic vegetation responses to these conditions are highly variable within the Basin, both seasonally and in terms of long-term drought and wet cycles. Water quality issues/questions that remain unaddressed from this feasibility study include:

- How does the water quality of the treatment plant effluent compare with other surface water and groundwater sources feeding the Lower Ventura River Basin and estuary?
- What is the quality of underlying groundwater and how does it affect surface water quality?
- Have contaminants from local industry (e.g., oil) affected groundwater and surface water conditions?
- What are the relative natural contributions of TDS from various geologic formations and/or tributary watersheds, and how do they compare with other sources?
- Is seawater intrusion a serious threat to the Lower Basin water quality?
- How will changes or expansion of future upstream water operations and dam removal impact water/sediment supply and, in turn, water quality in the Lower Basin?
- What is the potential for future water development and regulation in the Lower Basin in response to urban and/or industrial growth.

These questions may need to be addressed in greater detail if there is further interest in implementing some level of effluent re-use.

2.8 References

California Department of Water Resources (DWR), 2003, Ventura River Valley groundwater basin, lower Ventura River subbasin. California's Groundwater Bulletin 118, last update February 27, 2004.

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Fugro West, Inc., 1996, Hydrogeologic study for the Ventura Avenue Treatment Plant/Foster Park Master Plan, Ventura County, California. Prepared for the City of San Buenaventura on behalf of Kennedy/Jenks Consultants, December, 24p.

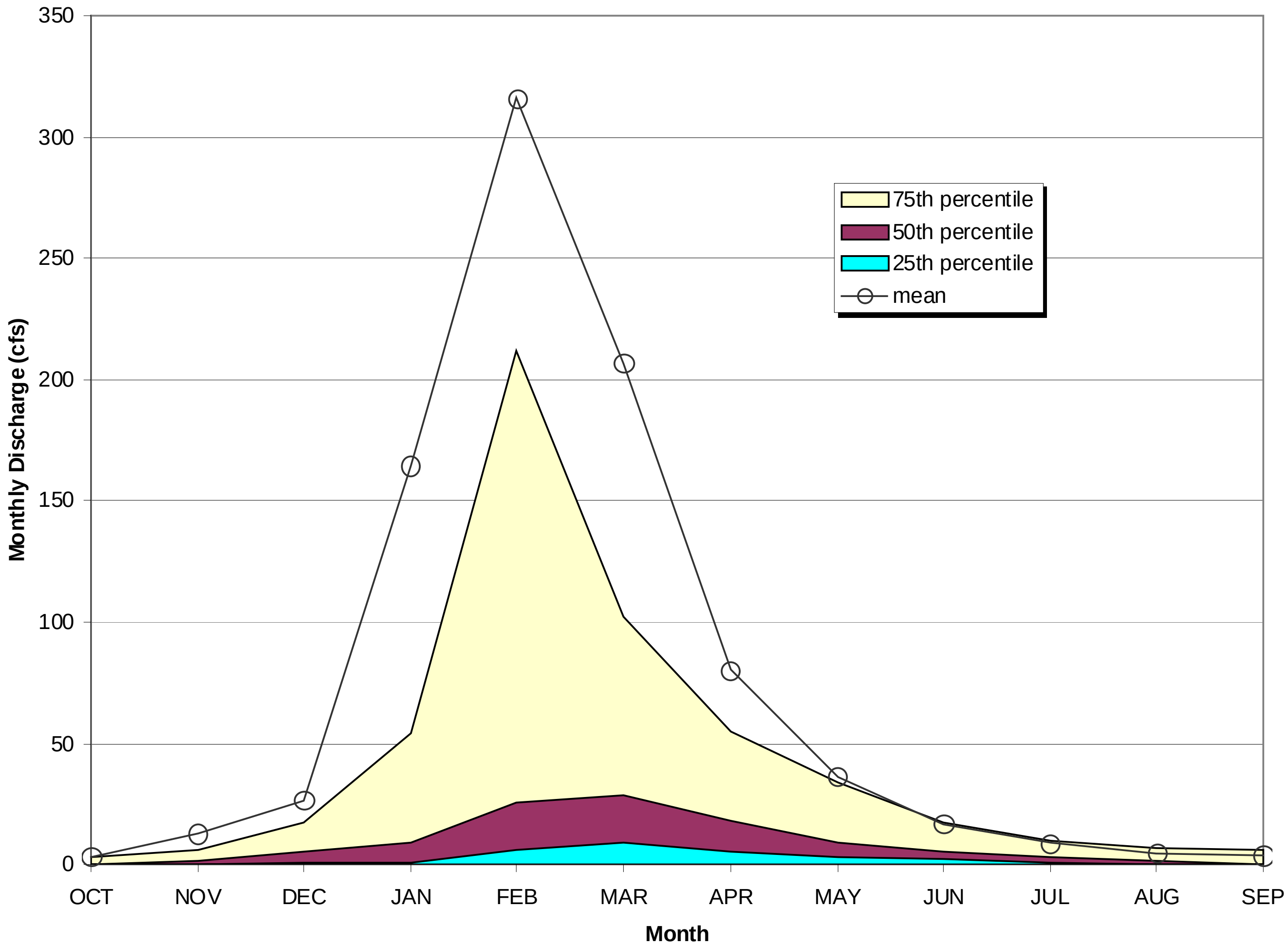

Figure 2.1. Seasonal and inter-annual distributions of monthly flows at the USGS stream gage near Foster Park. Note the extreme range between the 25th and 75th percentile flows for each month and that the mean values are extremely skewed by large magnitude flows.

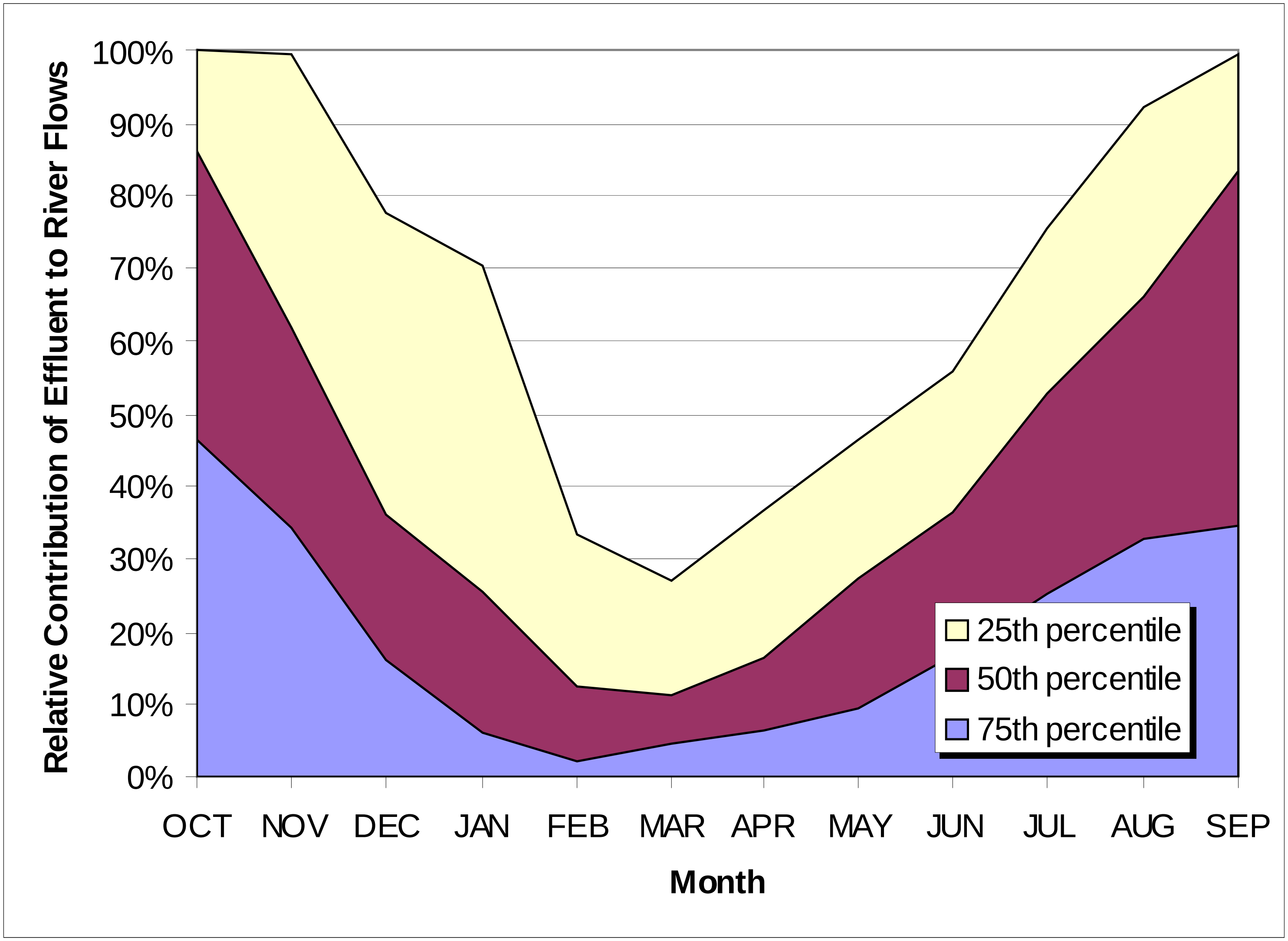

Figure 2.2. Monthly contributions of OVSD effluent to total flow in the lower Ventura River.

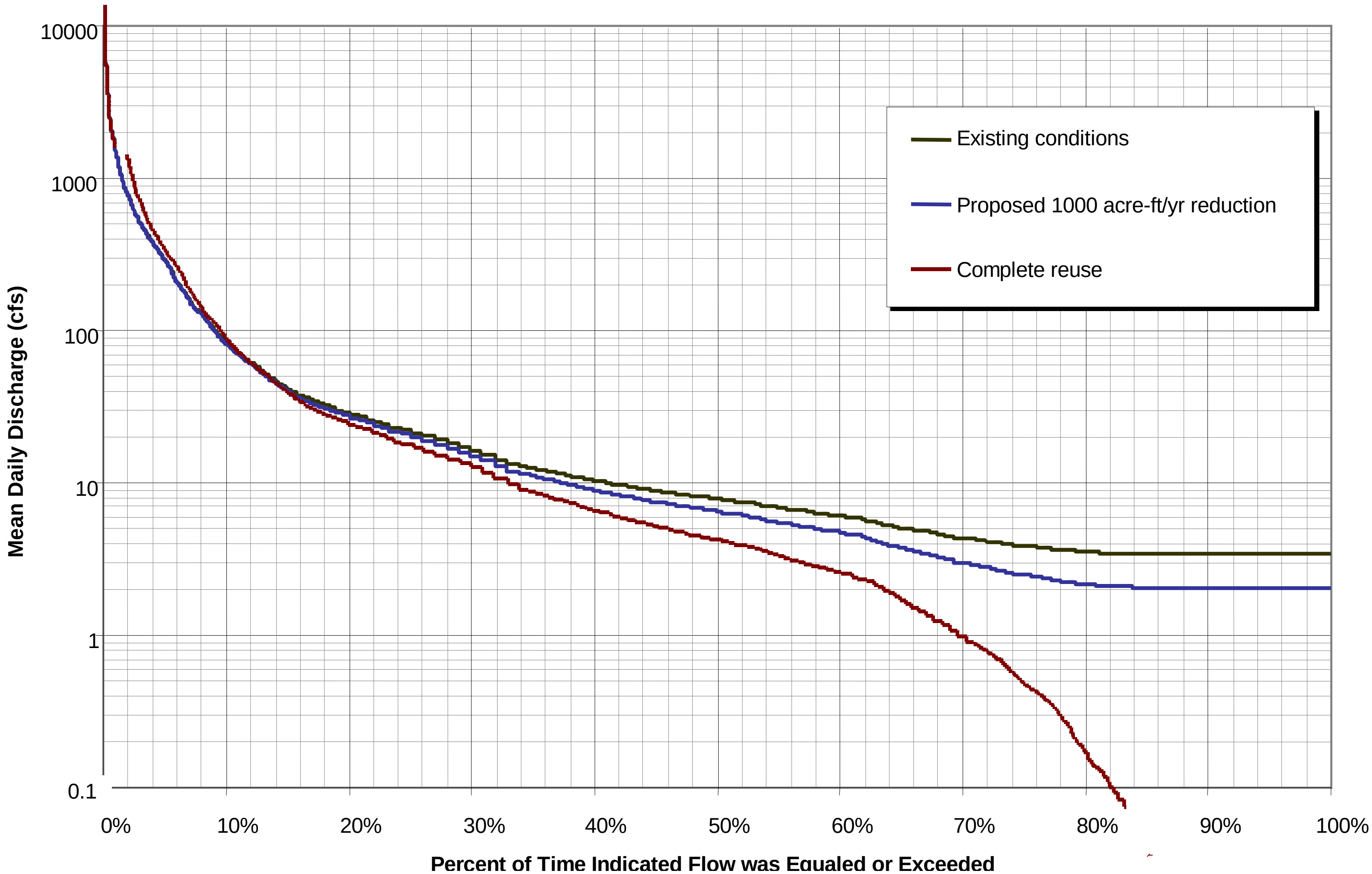

Figure 2.3. Flow Duration below OVSD treatment plant between 1980 and 2005, comparing no reuse, 50% reuse, and complete reuse.

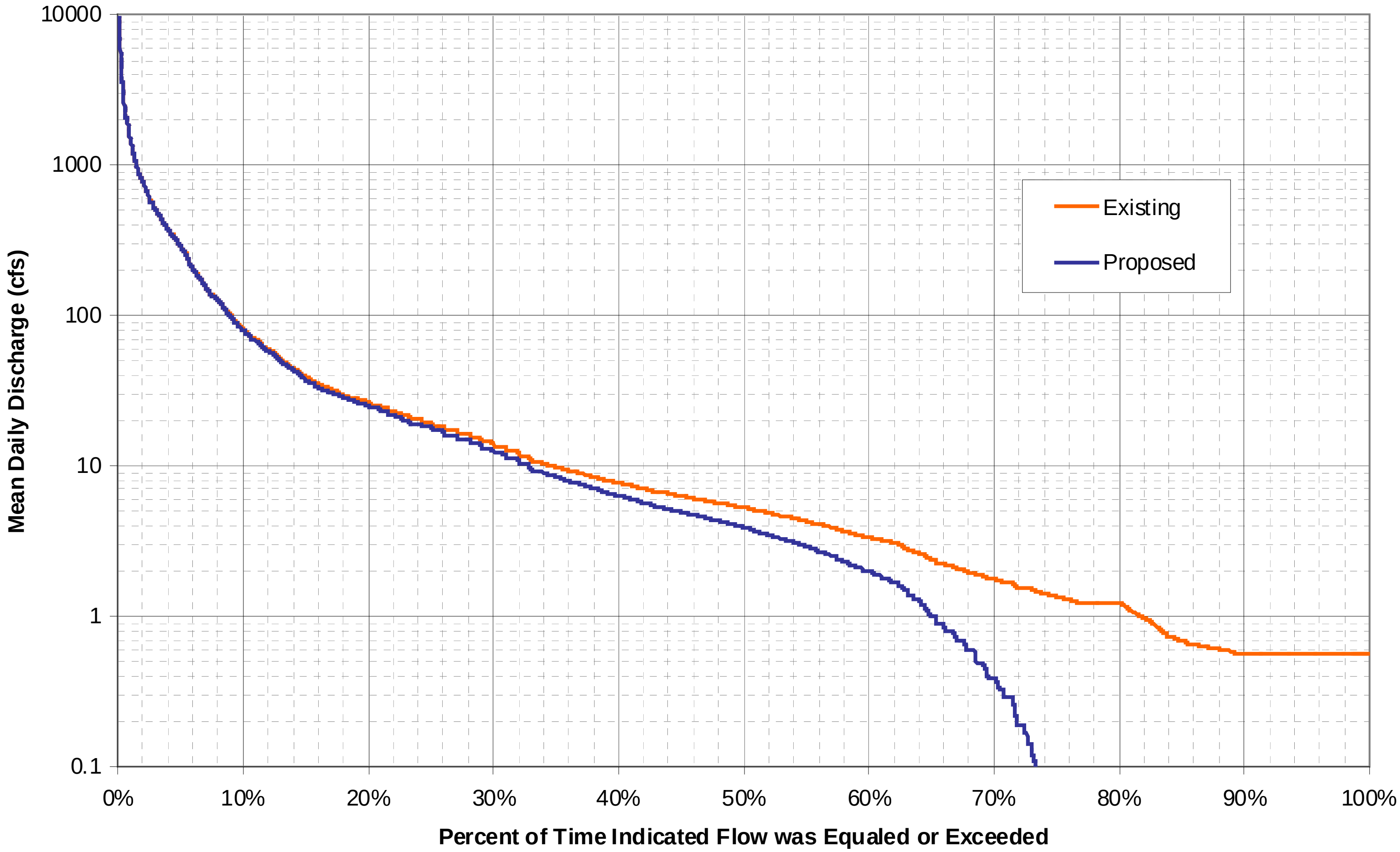

Figure 2.4. Flow Duration at Estuary (sum of OVSD effluent and streamflow at USGS gage site (1980 - 2005) minus existing water rights) comparing median water year and 50% reuse.

3 ENVIRONMENTAL CONSIDERATIONS

This section presents the native and naturalized plants and animals associated with the study area. It also examines applicable local, state and federal regulations that present opportunities and constraints to project implementation. Much of the information compiled and discussed here is from a variety of existing field investigations augmented by several site visits carried out from January to March of 2007.

3.1 Existing Data and Field Investigations

Several natural resources studies have been carried out in the Ventura River including recent comprehensive surveys for a variety of special status species and vegetation mapping efforts for the mainstem that encompass the project area. The following are some of the resources available that were reviewed for the preparation of this feasibility study.

- Casitas Municipal Water District and City of San Buenaventura. 1978. Environmental Impact Report: Ventura River Conjunctive Use Agreement. Report prepared by EDAW, Inc.

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- Entrix. 2007. Ventura River multiple species habitat conservation plan (Draft). Prepared for: Casitas Municipal Water District, City of San Buenaventura, Golden State Water Company, Meiners Oaks County Water District, Ojai Valley Sanitary District, Ventura County Parks Department Ventura County Watershed Protection District, and Ventura River County Water District.

- Ferren Jr, W. R., M. H. Capelli, A. Parikh, D L. Magney, K. Clark, J. R. Haller.. 1990. Botanical resources at Emma Wood State Beach and the Venture River Estuary, California: inventory and management, report to the State of California.

- URS. 2000. Preliminary Assessment: Occurrence of listed wildlife species in t he Ventura River habitat conservation plan study area. Prepared for: Casitas Municipal Water District, County of Ventura (Flood Control District, Transportation, and Solid Waste), Ojai Valley Sanitary District, Southern California Water Company, Ojai Basin GMA, City of Ojai, and Ventura River County Water District.

- Wetlands Research Associates, Inc., Philip Williams and Assoc., Ltd, Hyden Assoc., L. Hunt & P. Lehman.. 1992. Ventura River estuary enhancement; existing conditions. Prepared for the City of San Buenaventura, California Department of Parks and Recreation, and the California State Coastal Conservancy.

3.2 Natural Setting

The Ventura River is part of a coastal watershed that drains an approximate area of 230 square miles. The upper (or northern) half of this watershed is predominantly on Forest Service land (SWRCB 2004), while the lower portion passes through numerous private and public jurisdictions. Throughout, much of the topography is rugged, comprised of varying gradients that tend to be subtler on the southern half. The feasibility study area consists of the Ventura River stretch from the Ojai Valley Sanitation District Plant (OVSD Plant) to the mouth. Therein, a variety of aquatic and upland biotic communities occur. Some of these communities are dependent on perennial riverine and tidal water sources, while others are supported by intermittent water and periodic flooding events.

3.3 Vegetation

The presence of intermittent and perennial water in the study area produces a variety of conditions and associated vegetation types. Perennial and intermittent riverine communities occur in active channels. Watercress (*Rorippa nasturtium-aquaticum*), water primrose (*Ludwigia hexapetala*), and duckweed (*Lemna* sp.) form mats on wetted channels of the Ventura River.

Palustrine environments are common in the northern and central portion of the study area and can be classified into three types: forested, scrub, and emergent. Forested palustrine communities are most developed in the northern portion of the study area, near the OVSD Plant where hydrophytic trees such as sycamore (*Platanus racemosa*), arroyo willow (*Salix lasiolepis*) and red willow (*Salix laevigata*) dominate in places. Mulefat (*Baccharis salicifolia*), mugwort (*Artemisia douglasii*), northern willow-herb (*Epilobium ciliatum*) may be associated with forested palustrine communities, but may also comprise distinct palustrine scrub communities where trees are not present. Emergent palustrine communities are often dominated by marsh plants such as broad-leaved cattail (*Typha latifolia*), rushes (*Juncus* spp.) and California bulrush (*Scirpus californicus*).

Estuarine environments include intertidal and subtidal conditions that support marshes comprised of saltbush (*Atriplex* spp.), coast goosefoot (*Chenopodium macrospermum*), narrow leaf cattail (*Typha angustifolia*), California bulrush, alkali heath (*Frankenia salina*), fleshy jaumea (*Jaumea carnosa*), pickleweed (*Salicornia virginica*) and saltgrass (*Distichlis spicata*).

Vegetated uplands on and adjacent to the Ventura River study area include grasslands, partially-stabilized dunes, sagebrush, and chaparral. In accordance with *A Manual of California Vegetation* (Sawyer and Keeler-Wolf 1995), these vegetation types correspond to the following series: California Annual Grassland Series, Sand Verbena-Beach Bursage Series, Mixed Sage Series, and Sumac Series.

The California Annual Grassland Series is comprised of annual grasses and herbs, many non-native and invasive, such as bromes (*Bromus* spp.), short-pod mustard (*Hirschfeldia incana*), black mustard (*Brassica nigra*), oats (*Avena* spp.) and red-stemmed filaree (*Erodium cicutarium*). Other native and ornamental species may also be present in this community, which is often found in disturbed places and in areas of past agricultural use. The Sand Verbena-Beach Bursage Series is comprised of small perennial plants, grasses, and shrubs adapted to dune environments such as those found at the river mouth. The dominant species include dune bursage (*Ambrosia chamissonis*), pink sand verbena (*Abronia maritima*), and the invasive Hottentot fig (*Carpobrotus edulis*).

The Mixed Sage Series occurs on slopes adjacent to the study area, and in alluvial fans and other areas scoured periodic flooding events. Plants such as California sagebrush (*Artemisia californica*), white sage (*Salvia apiana*), and coyote brush (*Baccharis pilularis*) commonly occur in this series. The Sumac Series is dominated by laurel sumac (*Malosma laurina*) in the study area, but also includes toyon (*Heteromeles arbutifolia*) and black sage (*Salvia mellifera*).

Invasive exotic plants are common throughout the river. Ngaio tree (*Myoporum laetum*), for example, is prolific near the mouth of the Ventura River especially near the 101 Freeway. Giant Reed (*Arundo donax*), is a common invasive that forms often large monotypic stands often classified as distinct vegetation type (Giant Reed Series).

3.4 Wildlife

The diverse mix of vegetation within the study area supports an equally diverse mix of terrestrial and freshwater birds, mammals, amphibians and reptiles. At the northern limits of the study area, riverine, palustrine, and upland communities provide many habitat opportunities. A number of foraging ducks, including mallard (*Anas platyrhynchos*) and northern pintail (*Anas acuta*) along with greater yellowlegs (*Tringa flavipes*), common snipe (*Gallinago gallinago*), and spotted sandpiper (*Actitis macularia*) were observed in pooled portions of the river near the OVSD Plant. Calling Pacific treefrogs (*Pseudacris regilla*) were heard near the facility. Both resident and migratory birds were observed in nearby vegetation, including Townsend's warbler (*Dendroica townsendii*), yellow-rumped warbler (*Dendroica coronata*), northern flicker (*Colaptes auratus*), and ruby-crowned kinglet (*Regulus calendula*). Flocks of gulls including ring-billed (*Larus delawarensis*) and mew gull (*Larus canus*), European starling (*Sturnus vulgaris*), rock pigeon (*Columba livia*), Brewer's blackbird (*Euphagus cyanocephalus*) and tricolored blackbird (*Agelaius tricolor*) were found at or adjacent to the OVSD Plant.

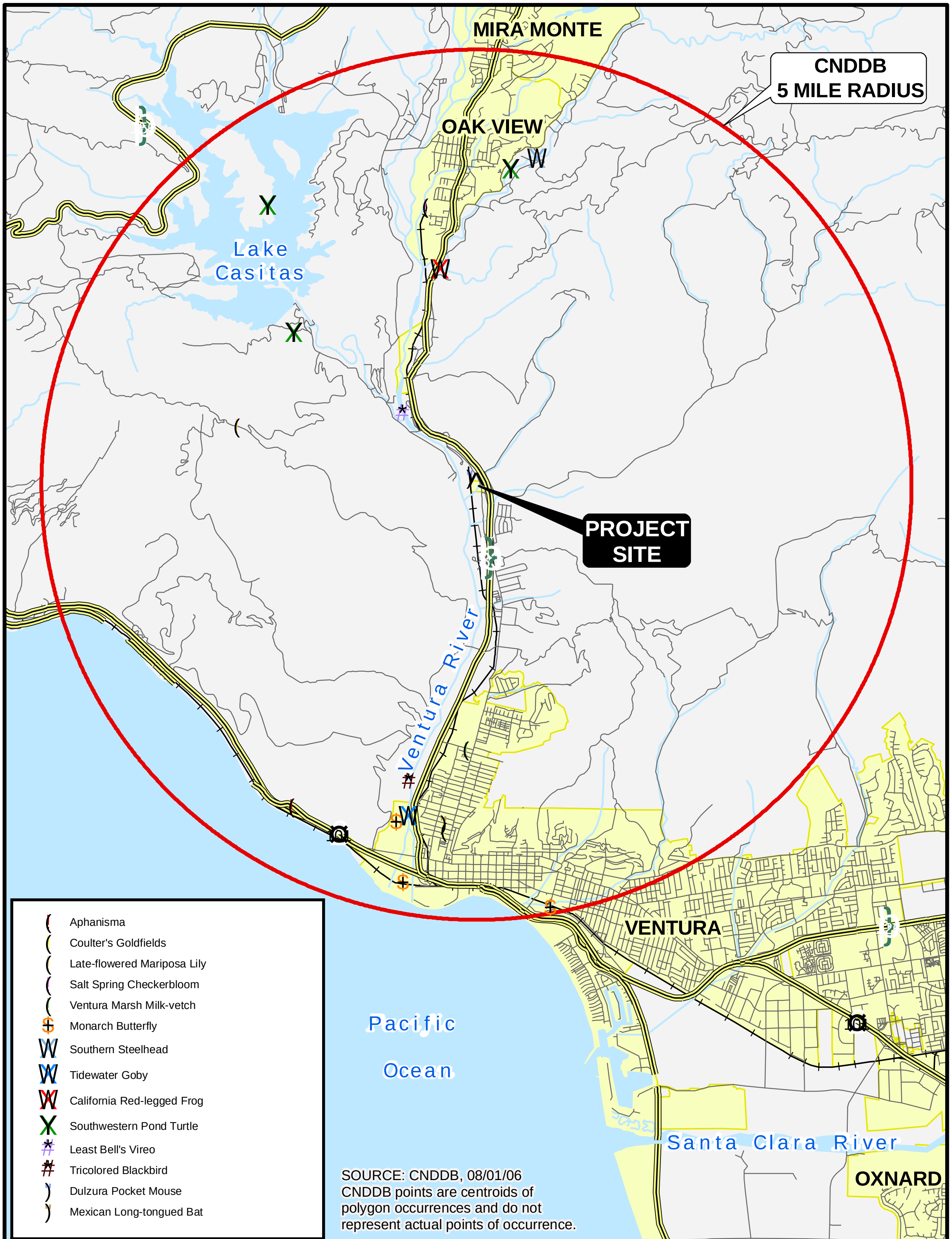
Wildlife species composition changes near the central portion of the study area where the river width increases and a greater variety of habitat conditions occur. Freshwater marsh habitats support birds such as common yellowthroat (*Geothlypis trichas*), song sparrow (*Melospiza melodia*), and red-winged blackbird (*Agelaius phoenicius*). Birds such as black-crowned night heron (*Nycticorax nycticorax*), green heron (*Butorides virescens*) and song sparrow were observed in riparian woodlands on this portion of the study area. Scrub-dominated habitats on slopes and areas beyond the active channel provided habitat for spotted towhee (*Pipilo maculatus*) and California towhee (*Pipilo crissalis*). Upland habitats also provide habitat for a number of mammals observed or detected by sign during field site visits including bobcat (*Felis rufus*), coyote (*Canis latrans*) and mule deer (*Odocoileus hemionus*).

The southern portion of the study area supports a slightly different assemblage of bird species more commonly observed in estuarine and marine environments, including brown pelican (*Pelecanus occidentalis*), great egret (*Ardea alba*), western gull (*Larus occidentalis*), and great blue heron (*Ardea herodias*). Mammals observed here included raccoon (*Procyon lotor*) and opossum (*Didelphis virginiana*).

3.5 Sensitive Biological Resources

The California Natural Diversity Database (CNDDB) program maintains an inventory of the status and locations of rare plants and animals in California. The primary purpose of this program is to provide agencies, resource managers, and other interested parties location and other information on rare species. The CNDDB is used here to determine rare, sensitive, and protected species potentially affected by the proposed project.

Several animals designated by the State of California as Species of Concern were detected. Such species included monarch butterfly (*Danaus plexippus*), white-faced ibis (*Plegadis chihi*), tricolored blackbird (*Agelaius tricolor*), double-crested cormorant (*Phalacrocorax auritus*), and prairie falcon (*Falco mexicanus*). Brown pelican, a species observed at the river mouth, is federally listed as endangered under the Federal Endangered Species Act. White-tailed kite (*Elanus leucurus*) was observed approximately midway between the OVSD Plant and the river mouth. Potential habitat for several other species listed in the California Natural Diversity Database (CNDDB), but not detected during the site visit, was also assessed (Figure 3.1). The results of this review are presented in Table 3.1 and supporting Sections 3.5.1 Sensitive Plants, 3.5.2 Sensitive Wildlife, and 3.5.3 Sensitive Natural Habitats.



CNDDB

FOOTHILL ASSOCIATES
ENVIRONMENTAL CONSULTING • PLANNING • LANDSCAPE ARCHITECTURE

N

0 1 2
SCALE IN MILES

Drawn By: EME
Date: 01/04/07

FIGURE 3

OJAI VALLEY SANITARY DISTRICT

cnddb.mxd
© 2007

Table 3.1. Listed and Special-Status Species Potentially Occurring on the Site or in the Vicinity

Special-Status Species	Federal	State CDFG	CNPS	Habitat Requirements	Potential for Occurence
Plants					
Coulter's Goldfields *Lasthenia glabrata coulteri*	None	None	1B	Occurs in saline places such as salt marshes, playas, vernal pools, and coastal areas (Hickman 1993).	Unlikely; although suitable habitat is present at the mouth of the Ventura River there are no recent records of occurrence in study area.
Davidson's Saltscale *Atriplex serenana davidsonii*	None	None	1B	Occur on bluffs in southwestern California and Baja California (Hickman 1993).	Unlikely; marginally suitable habitat present within study area.
Miles' Milkvetch *Astragalus didymocarpus milesianus*	None	None	1B	Occur in southern California grassy areas near the coast below 60m (Hickman 1993).	Unlikely; marginally suitable habitat present within study area.
Ojai Fritillary *Fritillaria ojaiensis*	None	None	1B	Prefer rocky slopes in river basins in San Luis Obispo, Santa Barbara, and Ventura counties.	May Occur; marginally suitable habitat is present within the study area.
Salt Spring Checkerbloom *Sidalcea neomexicana*	None	None	1B	Generally can be found in alkaline springs and marshes. Usually prefers wetlands, but occasionally occurs in non wetlands (Hickman 1993).	May Occur; suitable habitat present within study area.
Sanford's Arrowhead *Sagittaria sanfordii*	None	None	1B	Strictly associated with freshwater marsh hydrology—natural, modified or man-made.	Unlikely; suitable habitat present, but only one occurrence in Ventura County has been documented and this occurrence is presumed

Special-Status Species	Federal	State CDFG	CNPS	Habitat Requirements	Potential for Occurence
					extirpated.
Ventura Marsh Milk-Vetch *Astragalus pycnostachyus var. lanosissimus*	None	None	1B	Occurs almost always under natural conditions in wetlands. Mostly coastal salt marshes and coastal seeps (Hickman 1993).	Unlikely; "The single remaining population is on privately owned land and has been fenced to protect it from accidental incursion by vehicles or individuals. Weed removal, snail abatement, and other protective measures are being conducted by volunteers and Department of Fish and Game staff. Experimental populations are protected by their location on state park lands, and their location at sites that are infrequently used by the public." (CPC 2007)
Wildlife					
Invertebrates					
Monarch Butterfly *Danaus plexippus*	None	(Wintering sites are protected)	--	Groups that winter along the Southern California coast roost most commonly, in groves of eucalyptus where nectar and sources of water are nearby.	Present; observed during site visit; suitable wintering grounds present.
Amphibians/Reptiles					
California Red-Legged Frog *Rana aurora draytonii*	FT	CSC	--	Prefer deep pools of water such as ponds, marshes, springs,	Unikely; there are no recent records of this species in the HCP study area

Special-Status Species	Federal	State CDFG	CNPS	Habitat Requirements	Potential for Occurence
				reservoirs and streams with abundant overhanging vegetation.	downstream of Matilija Dam.
Coast (San Diego) Horned Lizard *Phrynosoma coronatum blainvillii*	None	CSC	--	Coastal sage scrub, annual grassland, chaparral, oak woodland, riparian woodland, and coniferous forests (CDFG).	May Occur; suitable habitat is present adjacent to the study area. As a result, it is possible that they could occur within the study area.
Southwestern Pond Turtle *Actinemys marmorata pallida*	None	CSC	--	Slow moving permanent or intermittent streams, small ponds, small lakes, reservoirs, and wetlands.	May Occur; suitable habitat was observed during the field site visit, and CNDDB records within 5 miles of the study area exist.
Two-Striped Garter Snake *Thamnophis hammondii*	None	CSC	--	Inhabits perennial and intermittent streams with rocky bed bordered by dense vegetation or sandy riverbeds with surrounding vegetation (CDFG).	May Occur; suitable habitat is present within the study area.
Fish					
Arroyo Chub *Gila orcuttii*	None	CSC	--	Found in slow moving sections of streams with mud or sand substrates (CDFG).	Likely; suitable habitat is present within the project vicinity.
Southern Steelhead *Oncorhynchus mykiss*	FE	CSC	--	Occur in major streams in southern California that originate in the coastal mountains.	Likely; suitable habitat is present within the project vicinity.
Tidewater Goby	FE	CSC	--	Shallow lagoons and	Likely; known to occur in

Special-Status Species	Federal	State CDFG	CNPS	Habitat Requirements	Potential for Occurence
Eucyclogobius newberryi				lower stream reaches in slow moving water that is brackish to fresh.	the estuary.
Birds					
California Condor *Gymnogyps californianus*	FE	CE,CFP	--	Prefer mountains, gorges, and hillsides that create updrafts that provide favorable soaring conditions.	May Occur; suitable foraging habitat is located in the mountain adjacent to the study area.
Least Bell's Vireo *Vireo bellii pusillus*	FE	CE (nesting)	--	Occurs in cottonwood-willow forest, oak woodland, shrubby thickets, and dry washes with willow thickets.	May Occur; suitable habitat is located within the study area. Breeding pairs have been recorded in the downstream portion of the study area.
Southwestern Willow Flycatcher *Empidonax traillii extimus*	FE	CE	--	Occurs in low brushy vegetation in wet areas such as riparian willow thickets.	Unlikely to breed in the study area. May occur in migration.
Western Snowy Plover *Charadrius alexandrinus nivosus*	FT	CSC (Nesting) (Coastal Population)	--	Occurs on sandy beaches and some shallow lakes.	Unlikely to breed; however, known to use habitat located at the mouth of the Ventura River at other times of the year.
California Brown Pelican *Pelecanus occidentalis californicus*	FE	CE, CFP (nesting Colony and Communal Roosts)	--	Forages in shallow waters of oceans, bays and lagoons. Colonies nest on small protected islands. Roosts in large groups on sandbars and piling.	Present; observed at the mouth of the Ventura River during the site visit.
California Least Tern	FE	CE, CFP	--	Nests on sand dunes and	May Occur; no nesting

Special-Status Species	Federal	State CDFG	CNPS	Habitat Requirements	Potential for Occurence
Sterna antillarum browni				sandbars close to water among beach wrack.	habitat present. Somewhat suitable foraging habitat present within the study area.
Prairie Falcon *Falco mexicanus*	None	CSC	--	Inhabit hills, canyons, and mountains of grasslands and shrub-steppes. Open arid areas. Requires cliffs for nesting.	Present; observed during site visit.
White-tailed Kite *Elanus leucurus*	None	CFP (nesting)	--	Occurs in open fields and marshes, where scattered bushes and posts provide perches. Nest in trees.	Present: observed approximately midway between the OVSD Plant and the river mouth.
Double-crested Cormorant *Phalacrocorax auritus*	None	CSC (Rookery site)	--	Occurs on clear open waters ranging from ponds, to rivers, to open ocean. Roosts in trees and on posts, rocks, and sandbars near water.	Present; observed during site visit.
White-faced Ibis *Plegadis chihi*	None	CSC	--	Nests in colonies in low trees or reeds. Forages for aquatic prey in muddy pools and marshes.	Present; observed during site visit.
Tricolored Blackbird *Agelaius tricolor*	None	CSC	--	Requires open water, protective nesting substrate and foraging area with insect prey within a few kilometers of the colony.	Present; observed during site visit.
Yellow-breasted Chat					

Special-Status Species	Federal	State CDFG	CNPS	Habitat Requirements	Potential for Occurence
Mammals					
American Badger *Taxidea taxus*	None	CSC	--	Any area with sufficient food and friable soil. Typically grasslands, savannas, and mountain meadows near timberline.	May Occur; marginally suitable habitat occurs within the study area. Occurrences more likely in open areas, rather than dense riparian vegetation.
Dulzura (California) Pocket Mouse *Chaetodipus californicus femoralis*	None	CSC	--	Prefers chaparral. Can occur in desert grasslands.	Unlikely; unsuitable habitat occurs within study area.
Mexican Long-tongued Bat *Choeronycteris mexicana*	None	CSC	--	They inhabit deep canyons where they use caves and mine tunnels as day roosts. They have also been found in buildings.	Unlikely; marginal foraging habitat is within the study area. Study area is located on the edge of known range for this species.

Federal:
FE = federal endangered
FC = candidate
FT = federal threatened
PT = proposed threatened
FSC = federal species of concern
FPD = proposed for delisting
FD = delisted
California State:
CFP = California fully protected
CE = California state endangered
CT = California state threatened
CR = California state rare
CSC = California Species of Special Concern
CNPS* List Categories:
1A = plants presumed extinct in California
1B = plants rare, threatened, or endangered in California and elsewhere
2 = plants rare, threatened, or endangered in California, but common elsewhere
3 = plants about which we need more information
4 = plants of limited distribution
Other Special-Status Listing:
SLC = species of local or regional concern or conservation significance

3.5.1 Sensitive Plants

Coulter's Goldfields

Coulter's goldfields (*Lasthenia glabrata coulteri*) are associated with low-lying alkali habitats along the coast and in inland valleys (Ornduff 1966). The majority of the populations are associated with coastal salt marsh. Coulter's goldfields usually flower from February through June (Skinner and Pavlik 1994). Because of the species' reliance on periodic inundation, population size varies considerably from year to year, and it may be difficult to recognize it in dry years or after recent disturbance. There is one CNDDB (2007) record of this species within the study area. The occurrence was in 1895, and was "mapped in the vicinity of the mouth of the Ventura River." A record from a location near Port Hueneme states that this species was found in "disturbed salt marsh/mud flats with *Polypogon monspeliensis*, *Salicornia*, *Suaeda*, and *Spergularia*." This is vegetation that is not characteristic of the study area. This species is unlikely to occur within the study area based upon the lack of reported occurrences and the presence of only marginally suitable habitat.

Davidson's Saltscale

Davidson's saltscale (*Atriplex serenana davidsonii*). This is an annual herb that is native to southern California and Baja California. In California, it typically occurs in coastal sage scrub communities in the south coast floristic province. This species has not been detected within 5 miles of the study area, and is unlikely to occur based upon lack of detection and the presence of marginally suitable habitat (CNDDB 2007).

Miles' Milkvetch

Miles' milkvetch (*Astragalus didymocarpus milesianus*) is a species of astragalus that occurs in grasslands within the south coast floristic province (Hickman 1993). There is no record of this species occurring within Ventura County (CNDDB 2007). Miles' milkvetch is unlikely to occur due to the limited presence of suitable habitat within the study area, and the lack of records for occurrences in Ventura County.

Ojai Fritillary

Ojai Fritillary (*Fritillaria ojaiensis*) is a rare fritillary that occurs on rocky slopes and in river basins from 900 to 1800 feet. Its range includes the outer south Coast Ranges and the western transverse ranges (Hickman 1993). All eleven CNDDB (2007) records for occurrences of Ojai Fritillary within the Ventura County suggest that this species is most likely to occur at elevations greater than those within the study area. There is a low likelihood that Ojai Fritillary would occur within the study area.

Salt Spring Checkerbloom

Salt spring checkerbloom (*Sidalcea neomexicana*) is an uncommon checkerbloom that occurs in alkaline springs and marshes. It typically occurs below 4500 feet. In California, its range extends along the Pacific Coast beginning at Point Conception to Mexico. A portion of its range reaches inland into Los Angeles, Riverside, San Bernardino and San Diego Counties (Hickman 1993). In Ventura County, its range is restricted to coastal communities. There is one record of this species occurring within 5 miles of the project location. The specimen was found in 1962 at the Southern Pacific Railroad between Santa Ana Boulevard and San Antonio Creek Bridge in Oak View. Salt spring checkerbloom may occur due to the presence of suitable habitat within the study area.

Standford's Arrowhead

Standford's arrowhead (*Sagittaria sanfordii*) is an uncommon arrowhead that occurs in ponds and ditches below 900 feet. In California, it occurs in the north and south coast regions. In the south coast region, it is restricted to Ventura County. The vegetation in this floristic province is characterized as coastal sage scrub and chaparral communities. Standford's arrowhead is unlikely to occur within the study area (Hickman 1993), because suitable habitat is present adjacent to, but not within, the study area. One occurrence in Ventura County has been documented at Mirror Lake, Mira Monte, Ojai Valley, in 1983, but this occurrence is presumed extirpated (CNDDB 2007).

Ventura Marsh Milkvetch

Ventura marsh milkvetch (*Astragalus pycnostachyus var. lanosissimus*) is an astragalus species that occurs in coastal marshes or seeps below 90 feet, within the south coast floristic province (Hickman 1993). "The single remaining population is on privately owned land and has been fenced to protect it from accidental incursion by vehicles or individuals. Volunteers and Department of Fish and Game staff are conducting weed removal, snail abatement, and other protective measures. Experimental populations are protected by their location on state park lands and their location at sites that are infrequently used by the public" (CPC 2007). Additionally, the CNDDB (2007) reports that in 1987, the vicinity of Pierpont Beach and San Buenaventura State Beach was searched, but no plants were found. Only marginally suitable habitat remains at these sites." As a result, it is unlikely that this species will occur within the study area.

3.5.2 Sensitive Wildlife

Monarch Butterfly

The monarch butterfly (*Danaus plexippus*) is a "special animal" in the state of California, and their wintering sites are protected (CDFG 2006). Generally, monarch roosts are located in wind-protected tree groves, with nectar and water sources nearby (CNDDB 2007). There is suitable wintering habitat for monarch butterflies within the study area. Eucalyptus groves in areas adjacent to the Ventura River are ideal for roosting and the mule fat and coyote brush along the riparian corridor provide the butterflies with ample sources of nectar (Heath 2004). There are 3 records of monarch butterflies within 5 miles of the project location. Monarch butterflies were also observed within the study area during the site visit.

California Red-legged Frog

The California red-legged frog (*Rana aurora draytonii*) is the largest native frog in the Western United States. It is federally listed as threatened, and is a California Species of Concern. The California red-legged frog is a relatively large frog, has a light jaw stripe ending in front of the shoulder, and possesses two unique and well defined dorsal-lateral folds on its back, which begin just behind it eyes and extend towards its posterior. They occur in locations close to permanent sources of deep water such as ponds, marshes, springs, reservoirs and streams with dense, shrubby or emergent riparian vegetation (CNDDB 2007). Juveniles, frog eggs, and adults have also been seen in ephemeral creeks, ponds and drainages that lack riparian vegetation, although they require 11-20 weeks of permanent water for larval development (CNDDB 2007). This species spends most of the year underground, where individuals seek refuge from desiccating weather by constructing and residing in small burrows. These frogs often breed in ponds and drainages between the months of November and March. Disappearing from seventy percent of its historical range, the California red-legged frog has suffered large declines due to harvesting, habitat loss, non-native species introductions, and urban encroachment.

Suitable habitat for the California red-legged frog occurs in selected locations within the study area where there are perennial flows and pools. California red-legged frogs are present on upper Matilija Creek near Lake Matilija, but appear to be absent from the mainstem of the Ventura River downstream of Matilija Dam. The California red-legged frog occurs along San Antonio Creek from its confluence with the Ventura River to Camp Comfort. Suitable habitat is present in the lower watershed (Entrix 2007). Marginal habitat exists in the study area, and several studies have not confirmed the presence of this species. As such, this species is unlikely to occur within the study area.

Coast Horned Lizard

The coast horned lizard (*Phrynosoma coronatum*) is designated as a California Species of Special Concern. It occurs in a variety of habitats, including coastal sage scrub, grassland, coniferous forest, and broadleaf woodland (Stebbins 2003). It occurs along sandy washes where scattered shrubs provide cover. It also requires open areas for basking, and patches of fine loose soil. Native harvester and other native ants compose the majority of its diet. The coast horned lizard occurs throughout most of California west of desert and Cascade-Sierran highlands. It occurs from sea level to 8000 feet (Stebbins 2003). There is suitable habitat for the coast horned lizard within 5 miles the study area. As a result, it may occur in the study area.

Southwestern Pond Turtle

Historically, the southwestern pond turtle (*Actinemys marmorata pallida*) occurred in most drainages west of the Sierra Nevada from south of San Francisco Bay to Baja California, Mexico. They can occur from sea level to 4690 feet. Ponds, lagoons, marshes, rivers, streams and ditches that have aquatic vegetation and slow-moving water can provide suitable habitat for the southwestern pond turtle. Females leave the water to lay eggs and both males and females may use upland areas during the winter. Nests are excavated in clay or silt substrate with low moisture. The southwestern pond turtle is designated a California Species of Special Concern. Suitable habitat exists in the Ventura River and, although most records appear to be from upper portions of the watershed, four individuals were observed in the study reach by Matt Stoecker during his field visit conducted on July 11, 2007.

Two-striped Garter Snake

The two-striped garter snake (*Thamnophis hammondii*) occurs in coastal drainages from the city of Salinas south to Baja California. They occur west of the San Joaquin Valley and their range extends eastward at Mount Pinos and Mount San Jacinto. They occur from sea level to 7000 feet in elevation. There are no CNDDB records of this species within five miles of the study area. The majority of CNDDB records that exist for this species in Ventura County are from the upper portion of the Santa Clara River watershed.

The two-striped garter snake inhabits aquatic sites including streams, coastal lagoons, sloughs, and ponds, and it appears to prefer areas with dense riparian vegetation. In summer they occupy stream and streamside areas, and in winter they occur in coastal sage scrub and grasslands where they overwinter in small mammal burrows. They feed on tadpoles, fish, including sticklebacks and tidewater gobies, fish eggs, newts, earthworms and small frogs. The two-striped garter snake is a California Species of Special Concern (CDFG 2006). Although there are no records of this species from this watershed, suitable habitat exists in the study area; this species has potential to occur near the project site.

Arroyo Chub

The arroyo chub (Gila orcuttii) is a small fish that is silver or grey to olive-green dorsally, white ventrally, and usually has a dull grey lateral band (Moyle 1976). On average, adults reach a length of 10-100mm. Males and females have chunky bodies, fairly large eyes, and small mouths. Arroyo chub is found in slow-moving or backwater sections of warm to cool (10-24 C) streams with mud or sand substrates, and depths that are typically greater than 40 cm (Wells and Diana 1975). The arroyo chub is native to the Los Angeles, San Gabriel, San Luis Rey, Santa Ana, and Santa Margarita rivers, and to Malibu and San Juan creeks (Wells and Diana 1975). There are no CNDDB (2007) records of this species in the Ventura River but, in 1978, EDAW Inc. conducted a fish survey about 1,000 feet above the Ojai Valley Wastewater Treatment Plant.

Juvenile arroyo chub were observed during this effort (RWQCB-LA 2002). More recent surveys conducted in 1992 (Hunt et al.) and 1995 (Engle et al. 1995) in the Ventura River Estuary and surrounding areas reported the occurrence of arroyo chub (CERES 1997). As a result, it is likely that this species occurs within the project vicinity. The arroyo chub is listed as a California Species of Special Concern, although the Ventura River is not part of its native range.

<u>Southern Steelhead</u>

Steelhead (*Oncorhynchus mykiss*) are the anadromous form of coastal rainbow trout, spending part of their life in the ocean and part in fresh water. This species is federally listed as endangered from the Santa Maria River in southern San Luis Obispo County south to Malibu Creek in Los Angeles County. It is also a California Species of Special Concern. These fish are genetically distinguishable from northern and central California stocks, and exhibit greater tolerance to the warmer temperatures typically found in the more arid coastal regions of the state. Once relatively abundant, most populations have been extirpated or reduced to just a few individuals, largely as a result of loss of habitat and water diversions. Natural population stressors include floods and associated channel scouring, as well as prolonged dry periods. In addition, ocean survival can be quite variable.

In the Ventura River, historical runs numbered in the thousands of fish. The adults enter the river during the winter wet season, and typically spawn upstream in the tributaries, although spawning in the lower River has been reported in dry years with low flow (DFG 1947). Juveniles remain in fresh water for 1 – 3 years, before migrating to the ocean in the spring. Major factors responsible for the decline of this population include construction of dams that block access to spawning and rearing areas, and reduced flows in the tributaries and mainstem as water has been appropriated for urban and agricultural uses. Loss of riparian habitat, sedimentation, excess nutrients, and culverts and road crossings have also contributed to loss of habitat and reduced water quality (ENTRIX and Woodward-Clyde Consultants 1997).

The reach of interest (discharge outfall downstream to the estuary) is used seasonally during the winter wet season for upstream migration, typically between January and March, but possibly later if the storms and associated high river outflows are delayed. These elevated flows may be required to breach the berm at the mouth of the estuary, and are also needed to provide sufficient water to negotiate shallow riffles and other barriers in the stream channel. Spawning may occur as late as June, and may occur in this reach if flows are too low to permit access to upper reaches (ENTRIX and Woodward-Clyde Consultants 1997).

This reach is also a migratory corridor for smolts moving downstream in the spring. This occurs predominantly during April and May, but may extend from March until June, depending on conditions. Smolts, as well as post-spawn adults, may residualize opportunistically in deeper pools if downstream flows drop to the point where passage is no longer possible. This reach also has the ability to support juvenile steelhead in the deeper pools, riffles and runs. However, there is some concern that summer temperatures could periodically reach stressful or lethal levels, limiting overall utilization of this reach (ENTRIX and Woodward-Clyde Consultants 1997). Notably, snorkel and electrofishing surveys conducted by Thomas R. Payne and Associates in 2006 and 2007 (unpublished data) revealed few juveniles in the lower River in the summer months. Moreover, Habitat Suitability Indices are being developed by TRPA for the Ventura River and tributaries, and index scores for the lower River have been among the lowest in the watershed, largely due to elevated water temperatures. At least 2 adult steelhead, presumably downstream kelts, were observed in the lower River during July and August 2007 (TRPA unpublished; Capelli 2007).

The lagoon itself could also provide juvenile rearing habitat, as well as habitat for smolts and post-spawn adults that cannot enter the ocean if the bar is closed (ENTRIX and Woodward-Clyde Consultants 1997). The extent of utilization of the lagoon is not well known for the Ventura River, but likely varies depending on whether it is a typical or dry water year. In general, lagoon utilization is higher in streams in which spawning occurs relatively close to the lagoon, the lagoon is well-mixed and tends towards low salinities. Some studies have shown that lagoon-rearing juveniles tend to be larger and have better ocean survival than those rearing upstream (e.g., Bond 2005). Observations by underwater video camera and repeated seine hauls in the Ventura River lagoon in summer 2006 and 2007 by TRPA resulted in no steelhead observed (TRPA unpublished).

Observations made in late March 1947 of steelhead in the lower Ventura River, indicated that the lagoon was open at a flow of 6-7 cfs, but the fish had difficulty negotiating the many wide shallow riffles that ranged in depth from 1 – 4 inches. This habitat feature remains today, with similar implications for migrating fish. Other features noted included occasional large pools, including one that was 40 ft wide, over 400 ft long and 4 ft deep, and approximately 2 miles of "fairly suitable spawning area" (DFG 1947). Currently, both spawning gravels and pool habitat are reduced compared with these earlier estimates. The presence of overhanging willows was noted, but no mention was made of extensive macrophyte beds. In fact, the river bed was described as open and wide, suggesting that the macrophyte beds were not a historical habitat feature. Finally, observations were also made at the time of young steelhead 9-10 inches in both the lagoon and pools in the lower River; however, they were specifically noted as being as or less abundant than the adults, which were estimated to number between 250 and 300 fish. Overall, this observation suggests that juvenile steelhead were not highly abundant in the lower River and lagoon, although they were clearly present.

Tidewater Goby

The tidewater goby (*Eucyclogobius newberryi*) is a small, grey-brown fish approximately two inches in length. Male tidewater gobies are nearly transparent with a mottled brownish upper surface. Female tidewater gobies develop darker colors, often black, on the body and dorsal and anal fins. The tidewater goby is a benthic species that inhabits shallow lagoons and the lower reaches of coastal streams where the water is brackish (Swift et al. 1989). This species is endemic to California. Habitat loss and degradation, as well as predation by introduced species, are among the major threats to this species. This species is also vulnerable to high winter outflows (i.e., flood events) that flush the fish from the estuaries into the open ocean. This situation is particularly exacerbated in lagoons that have been reduced in size and surrounded by levees, minimizing the amount of off-channel habitat available for refuge during high outflow events. In 1995, tidewater gobies were found from the mouth of the Ventura River upstream approximately 2 miles (CNDDB 2007). This species is likely to occur within the project vicinity. The tidewater goby is federally listed as endangered for populations north of Orange County, and is a California Species of Special Concern.

California Condor

The largest of all North American birds, the California condor (*Gymnogyps californianus*) is listed as federally endangered and is listed as endangered by the state of California. The California condor was on the brink of extinction prior to implementation of captive breeding programs. This bird has the largest wingspan of any North American bird, which is necessary to support their extended gliding flight used to find carrion. Condors use expansive open grasslands, sparse oak woodlands, and occasionally beaches, for foraging. They roost on trees or snags, or on isolated rocky outcrops and cliffs. Nests are placed in remote shallow caves and rock crevices on cliffs. California condors use the Sespe-Piru Critical Condor Area to nest, roost and forage. It is possible that a condor may fly over the study area as the proposed project is within this species range, but it is unlikely that a condor would use the riparian corridor as foraging or nesting habitat.

Least Bell's Vireo

The least Bell's vireo (*Vireo bellii pusillus*) is a small olive-gray, migratory songbird that is typically found in structurally diverse riparian woodlands. The ideal habitat consists of dense cover within 2 meters of the ground for nesting purposes. A dense overstory along with a well-developed shrub understory provides foraging habitat. Suitable habitat for the least Bell's vireo occurs along the mainstem from the Main Street Bridge upstream to the confluence with San Antonio Creek. Excellent vireo habitat occurs from the Main Street Bridge to the Shell Road Bridge (Entrix 2007). The only CNDDB record for this species was recorded in 1919 at Foster Memorial Park. More recently, from 1993 to 2002, surveys found breeding pairs of least Bell's vireos from 1993-1996, 2001, and 2002 (Entrix 2007). Based on these data, least Bell's vireos may occur within the study area. The least Bell's vireo is listed by the USFWS and the State of California as endangered.

Southwestern Willow Flycatcher

The southwestern willow flycatcher breeds in dense riparian tree and shrub communities adjacent to streams, rivers and lakes both natural and manmade. Historically, the breeding range of this flycatcher extended wherever dense stands of willow occurred. Currently, due to degradation of riparian habitat and brood parasitism, only small and scattered populations remain (Remsen 1978). The southwestern willow flycatcher is federally listed as an endangered species. Migratory willow flycatchers may occur near or within the study area.

Western Snowy Plover

The western snowy plover (*Charadrius alexandrinus nivosus*) is a small shorebird with pale brown upper parts, dark patches on either side of the upper breast, and dark gray to blackish legs. The Pacific coast population of the western snowy plover primarily breeds on coastal beaches from southern Washington to southern Baja California, Mexico. They prefer to breed above the high tide line on coastal beaches, sand spits, dune-backed beaches, sparsely-vegetated dunes, beaches at creek and river mouths, and salt pans at lagoons and estuaries. During the winter, snowy plovers are found on many of the beaches used for nesting, as well as on beaches where they do not nest, including estuarine sand and mudflats (USFWS 2001). The western snowy plover is federally listed as threatened, and is a California Species of Special Concern. Post-breeding birds are known from the mouth of the Ventura River; however, the area does not appear to support suitable breeding habitat for this species.

California Brown Pelican

The California brown pelican (*Pelecanus occidentalis californicus*) is common along the coast of southern California. This species is often seen foraging and diving for fish in shallow waters of oceans, bays and lagoons (Sibley 2003). California brown pelicans breed in nesting colonies on islands without mammal predators. Typically, their nests consist of a mound sticks and debris arranged on the slopes of undisturbed islands (Cogswell 1977). Normal clutch size is three eggs, which are laid in March or April. Both the male and female take turns incubating the eggs and rearing the altricial young. California brown pelicans are present within the study area. California brown pelicans were observed at the mouth of the Ventura River during the site visit. California brown pelicans are federally- and state-listed as endangered and are also fully protected by the state.

California Least Tern

The California least tern (*Sterna antillarum browni*) is the smallest tern that occurs in California. It has relatively slender wings, a short tail, and a long bill. These terns forage for small fish in estuaries and lagoons (Sibley 2003). California least terns require undisturbed sandy beaches or mudflats for nesting. They nest from April through August along the western coast of North America from the San Francisco Bay area, California, to Baja California Sur, Mexico (Keane 2001). No nesting habitat is present within the study area, but there is somewhat suitable foraging habitat present at the mouth of the Ventura River. The California least tern is federally listed as endangered. It is also listed as endangered in and fully protected by the State of California.

Prairie Falcon

The prairie falcon (*Falco mexicanus*) is an uncommon resident and winter migrant to California. There is also a contingent that makes a small southward migratory movement in the fall along the coast (Small 1994). This species occurs in a variety of open habitats including desert habitats, grasslands, sage scrub, chaparral, and occasionally forested areas. It nests on cliff ledges and less commonly, on trees, caves, buildings, and power towers (Steenhof 1998). This species is considered a California State Species of Special Concern (CDFG 2005). A prairie falcon was observed within study area during the site visit.

White-tailed Kite

The white-tailed kite (*Elanus leucurus*) is a bird of prey considered both a California State Species of Special Concern and a Fully Protected Species (CDFG 2005). Adults are white underneath and gray on back from crown to upper tail coverts, with red eyes. They occur in low elevation grassland, agricultural, wetland, oak-woodland, and oak-savannah habitats, and riparian areas adjacent to open areas. Nests are placed in trees and large shrubs; most nests are on habitat edges and are placed in upper third of the tree. They forage on small mammals, birds, lizards, and insects (Dunk 1995). In recent years, this species has become increasingly less common in southern California. Suitable foraging habitat occurs adjacent to the Ventura River. Suitable nesting habitat occurs within the study area. This species was observed during the site visit in the central portion of the study area.

Double-crested Cormorant

The double-crested cormorant (*Phalacrocorax auritus*) occurs on lagoons, rivers and open ocean. It roosts in trees and on posts, rocks, and sandbars in, or adjacent water. The double-crested cormorant is a California Species of Special Concern. This species was observed at the mouth of the Ventura River during the site visit.

White-faced Ibis

The white-faced ibis (*Plegadis chihi*) is a wading bird with a dark body, long dark legs, and a long, down-curved bill. They nest in colonies in low trees or reeds. They forage for prey in shallow muddy pools and marshes. The white-faced ibis can be found foraging with other wading birds. This species was observed during the site visit. The white-faced ibis is a California Species of Special Concern.

Tricolored blackbird

The tricolored blackbird (*Agelaius tricolor*) is a colonial nester of marshy areas throughout the Central Valley and coastal California. It is typically a resident species throughout its range. Tricolored blackbirds breed near freshwater, preferably in emergent marsh areas with tall, dense cattails (*Typha* spp.), but will also nest in willow (*Salix* spp.) thickets. Nests are usually located a few feet over water or may be hidden on the ground in vegetation. Blackbirds build nests of mud and plant material. Blackbirds are highly colonial; nesting areas must be large enough to support a minimum colony of at least 50 pairs. Tricolored blackbirds are omnivorous and often shift their diet from insects and spiders during the spring season, to seeds, cultivated grains, rice and oats during fall and winter months. Blackbirds forage on the ground in croplands, grassy fields, and flooded rice fields.

The tricolored blackbird is a California Species of Special Concern. There is a 1993 record in the CNDDB (2007) for this species, which was also observed in the study area during site visits.

Yellow-Breasted Chat

The yellow-breasted chat (*Icteria virens*) is the largest North American warbler. It is currently a California Species of Special Concern (Remsen 1978). The yellow-breasted chat was once a fairly common summer resident in riparian woodlands throughout California (Grinnell and Miller 1944), but is now much reduced in numbers, especially in southern California. From Ventura County to San Diego County it is a rare to very uncommon local breeder (Small 1994). The destruction of riparian woodland, as well as other factors such as brood parasitism by brown-headed cowbirds, has played a role in the species' decline in numbers (Eckerle et al. 2001). For breeding, the yellow-breasted chat requires dense riparian thickets of willows, vine tangles and dense brush associated with streams, swampy ground and the borders of small ponds. During migration, they frequent similar habitats, even without water, and remain beneath the canopy of shrubs (Small 1994). It can also occur at forest edges, regenerating burned-over forests, fencerows and upland thickets of recently abandoned agricultural land (Eckerle et al. 2001).

Although no recent records exist, this species is a regular seasonal visitor to the study area and may nest within the project vicinity.

American Badger

The American badger (*Taxidea taxus*) occurs from Alberta southward to central Mexico, and eastward from the Pacific coast to Ohio. It ranges throughout California in suitable habitat. Its habitat consists of grasslands, shrub, mountain meadow, and open stages of most habitats with dry soil. In montane areas, badgers use large, treeless meadows and expanses near timberline. They dig burrows in soil for cover, or reuse old burrows (CDFG 1983). Their prey includes gophers, ground squirrels, marmots, and kangaroo rats, mice, woodrats, birds and insects (CDFG 1983). Badgers declined drastically from California in the last century throughout their range mostly due to habitat loss and hunting. They have declined in coastal basins of southern California (CDFG 1983). The American badger is considered to be a California Species of Special Concern and a U.S. Forest Service Sensitive Species (CDFG 2006). There is marginally suitable habitat with the study area, although better habitat occurs in open areas adjacent to the study area

Dulzura Pocket Mouse

The historic range of the Dulzura pocket mouse (*Chaetodipus californicus femoralis*) extends from Orange County and San Diego County into Riverside County (Hall 1981). This species can be found in a variety of habitats, including coastal sage scrub, chaparral and grasslands. In particular, they seem to prefer chaparral-grassland transitional zones. Little seems to be known about the diet and foraging behavior of this specific subspecies of California pocket mouse, but like other species of pocket mouse, it is likely that the Dulzura California pocket mouse is primarily a seed eater and may consume insects (Eisenberg 1967). Marginally suitable habitat exists within the study area, but due to the rarity of this species, it is unlikely that this species will occur within the study area. There are two records of this species in the CNDDB (2007), though the location of the occurrences within Ventura County is not reported. Little is known about the natural history of this species. The Dulzura pocket mouse is a California Species of Special Concern.

Mexican long-tongued bat

The Mexican long-tongued bat (*Choeronycteris mexicana*) feeds on pollen and nectar, specializing in the flowers of agaves and columnar cactus. It will also use nectar-rich cultivars and hummingbird feeders. Southern California, including Ventura County, represents the northwestern extreme margin of the otherwise subtropical distribution of the Mexican long-tongued bat. This species has been found exclusively in residential areas, roosting in garages, sheds, porches, and under houses built on stilts. The Mexican long-tongued bat was first recorded in San Diego County in the late 1940s in developed areas along the coast and inland valleys (Olson 1947). Since then, individuals have been turned in to public health departments in Los Angeles, Orange, and Ventura counties (Constantine 1998). This species has been documented in the fall and winter in southern California in association with exotic landscaping in urbanized areas. This species has not been documented in southern California during the breeding season. It is unlikely that this species would roost or breed within the study area due to the marginal foraging habitat. There is one record of this species within Ventura County in the CNDDB dated 1994. The location is given as Ventura—the exact location is unknown (CNDDB 2007). The Mexican long-tongued bat is a California Species of Special Concern.

3.5.3 Sensitive Natural Habitats

Sensitive habitats include those that are of special concern to resource agencies or those that are protected under CEQA, Section 1600 of the California Fish and Game Code, and/or Sections 401 and 404 of the Federal Clean Water Act. Additionally, sensitive habitats are protected under the specific policies outlined in the City of San Buenaventura's *Comprehensive Plan Resources Element* (Objective 12, Policy 12.6), which requires that projects preclude construction within 100 feet from the top of creek banks.

The Ventura River is a Waters of the United States and a Waters of the State pursuant the Federal Clean Water Act and Fish and Game Code, respectively. As such, vegetation that occurs within and adjacent to this feature may fall into one of several special management categories that include wetlands (pursuant Section 404 of the Federal Clean Water Act) and riparian vegetation subject to protective measures outlined in the Fish and Game Code and other state guidelines.

3.6 Applicable Laws, Rules and Regulations

The proposed reuse of Ojai Valley Sanitary District effluent has the potential to be subject to a range of federal, state, and local laws, rules, and regulations. The two main components of the proposed project potentially subject to regulation are: (1) discharge reduction/redirection and (2) new infrastructure. This section provides an overview of the applicable requirements, permit issuance criteria, general time frames, and key regulatory issues. Table 3.2 provides a summary table of the regulations, administering agencies, and the permits/authorizations.

3.6.1 Federal Regulations

3.6.1.1 Clean Water Act

Regulatory Overview

Federal Clean Water Act (CWA) regulations apply to waters of the United States. Waters of the U.S. include wetlands and other waters of the U.S. Federal wetlands are "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions". Other waters of the U.S. are seasonal or perennial bodies of water, including lakes, stream channels, drainages, ponds, and other surface water features that exhibit an ordinary high-water mark but lack at least one of the wetland criteria (33 CFR 328).

Table 3.2. Summary of Applicable Regulations

Regulation	Regulatory Agency[1]	Permit/Authorization
Federal		
Clean Water Act Section 401	RWQCB	Water Quality Certification
Clean Water Act Section 402	RWQCB	NPDES Permit
Clean Water Act Section 404	ACOE	Section 404 Permit
Endangered Species Act	USFWS, NMFS	Biological Opinion, Section 10 HCP
Migratory Bird Treaty Act	USFWS	Compliance through project planning and avoidance
State		
CA Water Code, CA Code of Regulations	RWQCB, DHS	NPDES Permit; Waste Discharge Requirements; Water Recycling Provision; Basin Plan Compliance
Safe Drinking Water Act	DHS	Oversight and Certification
CA Fish and Game Code	CDFG	Streambed Alteration Agreement; 2081 Permit / CESA Compliance
CA Coastal Act	CCC	Consistency Determination
CA Environmental Quality Act	Lead Agency	CEQA Notice of Determination
Local		
County Ordinances	County of Ventura	Conditional Use Permit
City Municipal Codes	City of San Buenaventura	City Code Compliance

[1]RWQCB – California Regional Water Quality Control Board; ACOE – U.S. Army Corps of Engineers; USFWS – U.S. Fish and Wildlife Service; NMFS – National Marine Fisheries ServiceDHS – California Department of Health Services; CDFG – California Department of Fish and Game; CCC – California Coastal Commission

Water Quality Certification - Section 401 of the CWA (33 U.S.C. 1341) requires any applicant for a federal permit to conduct any activity that may result in a discharge of a pollutant into waters of the United States to obtain a certification that the discharge will comply with the applicable effluent limitations and water quality standards, as administered by the Regional Water Quality Control Board (RWQCB) (SWRCB 2007).

National Pollution Discharge Elimination System Permit - The National Pollutant Discharge Elimination System (NPDES) permit program was established in Section 402 of the Clean Water Act (CWA) to regulate municipal and industrial discharges to surface waters of the Unites States (EPA 2007). In California, the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs) are charged with implementing NPDES programs. Under the NPDES program, all facilities that discharge pollutants to waters of the U.S. are required to obtain an NPDES permit. Facilities seeking to obtain NPDES coverage submit a Notice of Intent to the RWQCB. Municipal non-point source discharges (i.e., stormwater) are covered by a regional general permit for Ventura County, including the Ventura River Watershed (LARWQCB 2000). As co-permittees under this regional storm water permit, the County of Ventura and the City of San Buenaventura are required to implement measures and requirements to meet storm water quality standards for projects and facilities both during the construction and operation.

Section 404 Permit - The U.S. Army Corps of Engineers (Corps) regulates discharge of dredged or fill material into waters of the United States under Section 404 of the CWA. "Discharges of fill material" is defined as the addition of fill material into waters of the U.S., including, but not limited to the following: placement of fill that is necessary for the construction of any structure, or impoundment requiring rock, sand, dirt, or other material for its construction; site-development fills for recreational, industrial, commercial, residential, and other uses; causeways or road fills; fill for intake and outfall pipes and subaqueous utility lines (33 CFR 328) (ACOE 2007). Authorization to fill waters of the U.S. is provided under either the Nationwide Permit or Individual Permit programs depending on the scale and magnitude of the fill.

Project Applicability

Elements of the CWA may potentially be applicable to both the discharge reduction/redirection and new infrastructure components of the proposed project. Section 401 Water Quality Certification and Section 404 Permits would be required for the construction of any new infrastructure components that would result in the fill of waters of the U.S. Additionally, construction activities will be required to comply with storm water requirements under the regional NPDES permit, which would likely be covered by local storm water conditions.

Diversion of recycled water from its current discharge into the Ventura River to surface discharge or subsurface injection would likely require a modification to the current NPDES permit for the Ojai Valley Sanitation District Facility. The current NPDES permit for the facility identifies the Ventura River as the sole receiving body for the treated effluent; therefore, the proposed project would require a review and modification of the existing NPDES permit by the RWQCB. See Section 3.6.2 for discussion of further RWQCB considerations related to the proposed project.

3.6.1.2 Endangered Species Act

Regulatory Overview

The federal Endangered Species Act (FESA) prohibits the "take" of endangered or threatened wildlife species. Federally listed species are those species that are federally listed as "endangered" or "threatened" under the FESA. "Take" is defined to include harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting wildlife species or any attempt to engage in such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns (50 CFR 17.3). Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns (50 CFR 17.3). Actions that result in take can result in civil or criminal penalties. FESA is administered by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). Take of listed species is permitted only through Section 7 consultation or through preparation of a Section 10 Habitat Conservation Plan (HCP). The Section 7 consultation process involves the preparation of a Biological Assessment, informal/formal consultation, and the issuance of a Biological Opinion; this process requires a federal nexus (e.g., federal permit, federal funding, or federal land). An HCP does not require a federal nexus, but is generally a more involved and prolonged approval process.

Project Applicability

FESA may potentially be applicable to both the discharge reduction/redirection and new infrastructure components of the proposed project. For construction of new infrastructure, FESA would apply only if impacts to listed species or their habitat is proposed. If discharge reduction/redirection results in loss or degradation of habitat quality for listed species in

Ventura River, authorization for the take of listed species would be required. See the biological resources section of this study for a discussion of potentially occurring listed species.

The Ventura River HCP is currently in preparation and would likely provide coverage for take of listed species associated with the proposed project. In the absence of an approved HCP, authorization for the take of federally listed species associated with this project would likely be provided under the Section 7 consultation process with the federal nexus being other federal permits.

3.6.1.3 Migratory Bird Treaty Act

Regulatory Overview

The Migratory Bird Treaty Act (16 U.S.C. 703-712) prohibits the pursuit, hunting, take, capture, possession, or killing of native birds, and the destruction of their eggs or nests, except as allowed by local game laws. Permits may be obtained to impact birds covered under this act, but such permits are rarely issued for development projects. Compliance is typically achieved through project planning and the implementation of impact avoidance measures.

Project Applicability

The Migratory Bird Treaty Act is likely to be applicable only to the construction of new infrastructure associated with the proposed project. The proposed project should be planned and implemented to avoid affecting nesting birds protected under this regulation. Typical measures employed to comply with the Migratory Bird Treaty Act include avoidance of vegetation clearing during the nesting season (generally March through August) or conducting pre-construction nesting bird surveys prior to vegetation removal.

3.6.2 State Regulations

3.6.2.1 California Water Code and Code of Regulations

<u>Regulatory Overview</u>

Recycled Water Requirements and Provisions - Under Division 7, Water Quality, of the California Water Code (CWC), the DHS is required to establish water recycling criteria and the RWQCB is responsible for developing specific Water Recycling Requirements (WRRs). Title 22 of the California Code of Regulations (CCR) established the DHS's water recycling criteria, which regulate the production and use of recycled water in California. Categories of recycled water are defined under this regulation in addition to reuse application provisions and constituent thresholds. Under Title 17 and 22 of the CCR, an engineering report for the production, distribution, and use of recycled water must be prepared and approved by the Department of Health Services (DHS).

California Drinking Water Standards - Under the California Safe Drinking Water Act, the DHS promulgates California Drinking Water Standards (CDWS). In general, these CDWS are the same as the federal standards issued by the Environmental Protection Agency under the Federal Safe Drinking Water Act. Recycled water discharged to surface water bodies or recharging groundwater features that are designated as drinking water supplies must generally meet CDWS.

Porter Cologne Act Compliance - Under the California Water Code Porter-Cologne Water Quality Act, "waters of the State" are defined as any surface water or groundwater, including saline waters, within the boundaries of the state. The RWQCB has jurisdiction over waters of the State under the California Porter-Cologne Act and regulates discharges into these waters. The RWQCB regulates waste dischargers primarily through the Water Quality Certifications, NPDES permits, Waste Discharge Requirements (WDRs), and through the California Environmental Quality Act (CEQA).

Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States. Within the Basin Plan, water quality standards can either be numeric or narrative criteria. However, where multiple beneficial uses exist for each water body, water quality standards must protect the most sensitive use. The Los Angeles RWQCB adopted a revised Water Quality Control Plan (Basin Plan) for the Los Angeles Region on June 13, 1994 (LARWQCB 1994). The Basin Plan specifies the beneficial uses of the Ventura County waterbodies and streams. The Basin Plan establishes both qualitative and quantitative objectives for receiving waters.

Section 13260 of the California Water Code requires a Report of Waste Discharge (ROWD) for persons discharging or proposing to discharge waste that could affect the quality of the waters of the State. Generally, activities that involve discharges such as those to land or groundwater, or from diffused sources must file a ROWD with the appropriate Regional Board to obtain WDRs. WDRs may include effluent limitations, as well as monitoring and reporting requirements. California Water Code (CWC) §13263 requires that waste discharge requirements issued by Regional Boards shall implement any relevant water quality control plans that have been adopted and shall take into consideration the beneficial uses to be protected and the water quality objectives reasonably required for that purpose. Additionally, the California Water Code Section 13370 requires that waste discharge requirements issued by the Regional Boards comply with provisions of the Federal Clean Water Act.

<u>Project Applicability</u>

The California Water Code and Code of Regulations sections summarized above are directly applicable to the discharge reduction/redirection component of the proposed project. In order to comply with Title 22 related to recycled water, an engineering report will be required and reviewed by the DHS and RWQCB. The engineering report will provide the basis for the establishment of the water recycling criteria and WRRs by these agencies for the proposed project. During this review and criteria establishment period, the DHS will also determine if the proposed project is required to comply with CDWS. Concurrent with the issuance of the modified NPDES for the OVSD facility, the RWQCB will establish the WDRs for the project.

3.6.2.2 Fish and Game Code

<u>Regulatory Overview</u>

Section 1600 Streambed Alteration Agreement - The California Department of Fish and Game (CDFG) is a trustee agency that has jurisdiction under Section 1600 of the California Fish and Game Code. Under this code, a project proponent must notify the CDFG if a proposed project will "substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated by the department, or use any material from the streambeds." If an existing fish or wildlife resource may be substantially adversely affected by the activity, the CDFG may propose reasonable measures that will allow protection of those resources. If these measures are agreeable to the project proponent, they may enter into an agreement with the CDFG identifying the approved activities and associated mitigation measures (CDFG 2007).

California Endangered Species Act Compliance - The State of California enacted the California Endangered Species Act (CESA) in 1984. CESA is similar to FESA but pertains to state-listed endangered and threatened species. CESA requires state agencies to consult with the CDFG when preparing California Environmental Quality Act (CEQA) documents. The purpose is to ensure that the state lead agency actions do not jeopardize the continued existence of a listed species or result in the destruction, or adverse modification of habitat essential to the continued existence of those species, if there are reasonable and prudent alternatives available (Fish and Game Code §2080). CESA directs agencies to consult with CDFG on projects or actions that could affect listed species, directs CDFG to determine whether jeopardy would occur, and allows CDFG to identify "reasonable and prudent alternatives" to the project consistent with conserving the species. CESA allows CDFG to authorize exceptions to the state's prohibition against take of a listed species if the "take" of a listed species is incidental to carrying out an otherwise lawful project that has been approved under CEQA (Fish & Game Code § 2081). Compliance with CESA is typically achieved either through obtaining a 2081 permit from the CDFG or through mitigation measures required through the CEQA process.

<u>Project Applicability</u>

Section 1600 of the Fish and Game Code and CESA may potentially be applicable to both the discharge reduction/redirection and new infrastructure components of the proposed project. For construction of new infrastructure (currently not anticipated for this project), impacts to streambed and/or riparian habitat would require a streambed alteration agreement from CDFG. Additionally, if the proposed construction results in impacts to state listed endangered or threatened species, impacts would need to be mitigated through obtaining a 2081 permit or integrating mitigation measures through the CEQA process.

If discharge reduction/redirection results in loss or degradation habitat quality for listed species in Ventura River, authorization for the take of state listed species would be required through a Section 2081 permit or through CEQA. See the biological resources section of this study for a discussion of potentially occurring listed species.

3.6.2.3 California Coastal Act

Regulatory Overview

The California Coastal Act (Pub. Res. Code §30000) was enacted in 1976 to provide protection of California's coastal resources. The Coastal Act pertains to numerous resources and issues, including but not limited to Environmentally Sensitive Habitat Areas (ESHAs), cultural resources, coastal access, and land use. The Coastal Act is administered by the California Coastal Commission (CCC) in coordination with local coastal governments to implement the planning and regulatory mechanisms of the coastal program. In most areas, including Ventura County, the Coastal Act is implemented through Local Coastal Programs (LCPs). In Ventura County, the LCP is established by the County's Coastal Zoning Ordinance and the Coastal Area Plan, which is incorporated into the County's General Plan (County of Ventura 2001). Projects proposed within the Coastal Zone or with the potential to affect coastal resources would be required to obtain a LCP consistency determination, a coastal development permit, or a LCP amendment.

Project Applicability

In the vicinity of the Ventura River, the Coastal Zone extends approximately 1 mile inland from Highway 101. Therefore, the new infrastructure components of the proposed project are not likely to be subject to the Coastal Act, the LCP, or the County's Coastal Zoning Ordinance.

The discharge reduction/redirection component of the project has the potential to affect resources within the coastal zone, specifically the riparian and estuarine habitats along the corridor and mouth of the Ventura River. Implementation of the project would likely require an LCP consistency determination.

3.6.2.4 California Environmental Quality Act

Regulatory Overview

The California Environmental Quality Act (CEQA) (Pub. Res. Code § 21000) regulations require California's public agencies to identify the significant environmental effects of projects or actions, and avoid or mitigate those significant environmental effects, where feasible. CEQA applies to projects that are implemented or approved by state or local agencies. The agency undertaking the project or with the primary discretionary authority over the project serves as the Lead Agency. The Lead Agency is responsible for conducting the environmental analysis under CEQA. When initiating the CEQA process for a project, the Lead Agency first determines if the project is exempt from CEQA. For non-exempt projects, the Lead Agency conducts an initial study to evaluate whether the project may result in significant impacts over a range of environmental resources. The evaluation of impacts considers direct impacts, indirect impacts and cumulative impacts, and whether the impact is permanent or temporary. Based on this initial study, the Lead Agency determines the appropriate level of CEQA analysis, which would typically be a negative declaration, a mitigated negative declaration, or an environmental impact report (EIR). CEQA guidelines have been established at the state level and are also often defined at the local level. For environmental analyses that require public review, Responsible Agencies, other entities, and the public are given the opportunity to contribute to the decision-making process.

Project Applicability

The proposed project would be considered a "project" under CEQA, and all components of the project would require environmental review. Additionally, as specified in the Conditional Use Permit (CUP) for the ongoing operation of the OVSD Facility, "any new diversion of effluent away from the Ventura River by the permittee beyond those already occurring as listed [in the CUP] shall require environmental review" pursuant to CEQA (County of Ventura 1994). The Lead Agency for the environmental review of the proposed project would likely be the County of Ventura. The level of environmental documentation necessary for this project would be determined during the scoping process for the project. The County of Ventura has established Initial Study Assessment Guidelines for CEQA to be used on projects where it serves as the Lead Agency (County of Ventura 2007b).

3.6.3 Local Regulations

3.6.3.1 County Ordinances

<u>Regulatory Overview</u>

Implementation of the proposed project will require consistency with local County of Ventura policies and ordinances. Ordinances and regulations are provided in the Coastal Zoning Ordinance and the Non-Coastal Zoning Ordinance (County of Ventura 2007a, 2007c). County ordinances and regulations would be applied and enforced through the County's discretionary approval process.

<u>Project Applicability</u>

Approval of the proposed project will require discretionary approval from the County, which would likely be in the form of a modified or new CUP for the OVSD Facility. Regulations within the County's ordinances that would likely apply include, but are not limited to resource protection standards/conditions for environmentally sensitive habitat, tree protection regulations, and stormwater quality protection (County of Ventura 2007a, 2007c, 2007d).

3.6.3.2 City Code

<u>Regulatory Overview</u>

Under the City of San Buenaventura's Comprehensive Plan Resource Element, objectives and policies have been established for the protection of floodplains, waters, sensitive habitats, rivers, and coastal resources. These objectives and policies are generally used to guide project planning in the City. Within the City's Municipal Code, specific regulations are established that implement the Comprehensive Plan guidelines, including restrictions on development within buffer zones of sensitive habitats. Additionally, the City's Municipal Code establishes Overlay Zones within which certain regulations apply, including the Coastal Protection Overlay Zone, the Floodplain Overlay Zone, and the Sensitive Habitat Overlay Zone.

Project Applicability

The proposed project components occur within the boundaries of the City of San Buenaventura, within their Sphere of Influence (SOI), or in some areas of the Ventura River, immediately adjacent to the City's SOI. Although the City's Code is not directly applicable to projects or activities that are outside the city boundary but within their SOI, the City should be involved in the planning of the project, and applicable regulations of the City Code should be considered during project planning and implementation.

3.7 Opportunities and Constraints

3.7.1 Impacts from Infrastructure Improvement

Engineering design for the plant, including upgrades and new construction, will largely take place in previously developed/disturbed areas and away from natural areas that support natural resources. Consequently, direct impacts to natural resources are likely to be negligible, and thus require minimal permitting and mitigation.

3.7.2 Impacts from Project Implementation

As discussed in the *Hydrological Considerations* section of this study, three possible scenarios have been examined in consideration of the project's feasibility. The first is a no-action scenario under which the OVSD Plant contribution to total flow in the Ventura River remains unchanged. Under the second scenario, flow is decreased by 1000 acre-feet/year. Under third scenario, all water is reused and no water is discharged from the OVSD Plant.

Under the first scenario, conditions would remain unchanged in the drainage and for associated natural resources.

Under the second scenario, the proposed reuse of treated effluent from the OVSD Plant is expected to reduce water flows by 1000 acre-ft/year. Conservative analyses presented suggest that in moderate dry years the average channel width could decrease by up to 9-percent and the depth by 14-percent. In the driest years the width could decrease by up to 15-percent and the depth by 18-percent. This would have an uncertain, but likely negative effect on associated vegetation and wildlife habitat.

Under the final scenario, the total reuse of treated effluent from the OVSD Plant would decrease available flow in the lower river by 67-percent in moderately dry years, and 100-percent in extremely dry years. Conservative analyses presented suggest that in moderately dry years the average channel width could decrease by up to 27-percent and the depth by 31-percent. In the driest years the width and depth could decrease by up to 100-percent, as the only contribution expected to the lower river would be from OVSD Plant discharge. This would have a still uncertain, but greater negative effect on associated vegetation and wildlife habitat.

The possible effects are a reduction of vegetation in palustrine and riverine environments, loss and conversion of vegetation and associated wildlife habitat, impaired productivity, diminished biotic diversity and decreased area for sensitive biological resources. Under more severe conditions, decreased water may increase the likelihood of eutrophication in pooled areas, as well as increase the possibility of avian botulism and other wildlife diseases. Table 3.3 lists sensitive resources potentially identified in Table 3.1 and possible associated impacts from implementation of Scenarios 2 and 3. A change in conditions represents an impact that would require additional study and consideration under CEQA and, as appropriate, other applicable federal, state, and local regulation.

3.7.3 Opportunities for Natural Resource Mitigation and Enhancement

While the magnitude of the effect is difficult to estimate for the second and third scenarios, the effects of partial or total reuse on natural resources are likely mitigable in all but the most severe of circumstances. The project design and associated infrastructure are not likely to directly impact natural resources; opportunities for natural resource mitigation are most likely to be focused on enhancement of the Ventura River and its natural vegetation. These opportunities may include invasive species control and habitat restoration.

Table 3.3. Potential Impacts to Listed and Special-Status Species

Species	Potential Impact
Salt Spring Checkerbloom	Possible habitat loss or reduction. Loss of individual plants or local populations.
Southwestern pond turtle	Possible habitat loss or reduction.
Two-striped garter snake	Possible habitat loss.
Arroyo chub	Possible habitat loss and reduced water quality.
Southern Steelhead	Possible habitat loss and reduced water quality.
Tidewater Goby	Possible habitat loss and reduced water quality.
Least Bell's Vireo	Possible foraging and nesting habitat reduction or loss.
California least tern	Possible foraging habitat reduction or loss.
White-tailed kite	Possible impacts to nesting habitat.
Double-crested cormorant	Possible reduction in foraging habitat.
White-faced ibis	Possible reduction in foraging habitat.
Tricolored Blackbird	Possible foraging and nesting habitat reduction or loss.
Yellow breasted chat	Possible foraging and nesting habitat reduction or loss.

Invasive plants of wet areas such as giant reed and salt cedar (*Tamarix* spp.) often transpire at higher rates than their native counterparts and affect surface runoff, groundwater storage, and wetland health (EPA 2001, Weisenborn 1996, Iverson 1994). There is evidence that giant reed alters hydrological regimes through excessive evapotranspiration of arid aquifers, and by retaining sediments and constricting flow (Iverson 1994).

Salt cedar consumes 10 to 20 times the water used by native species (EPA 2001). Salt cedar also increases soil salinity, by taking up and concentrating solutes through salt glands creating an allelopathic condition not favorable to less salt tolerant native plants (Weisenborn 1996). The resulting clustering of both of these species increases the wildfire likelihood and frequency (Lovich 1996, Scott 1994, Frandsen 1994).

The monotypic stands also negatively affect native wildlife, including a number of sensitive species. Unlike many native species, giant reed has poor stream shade value, resulting in increased water temperatures that affect many water dependent wildlife species (Hoshovsky 1988). This is critical to many special status fish species. The more saline conditions produced by salt cedar also affect water chemistry.

Removal of invasive species generally improves water quality and availability and helps restore wetland functions. Removal is therefore a desirable method for improving habitat conditions in riverine and palustrine envrionments.

Programs for removal of giant reed and other invasive plant species are already in place for the Ventura River. The process of controlling these species normally employs one or a combination of techniques that include cut stump herbicide application, foliar herbicide application, biomass removal and mechanical removal of all vegetative matter including roots. Funding ongoing treatment or likely required subsequent retreatment are means of offsetting water loss from OVSD Plant partial or total water reuse.

Revegetation of damaged or altered wetlands and riparian vegetation decreases available habitat for potentially recolonizing invasive plants. When used in conjunction with invasive species removal, these techniques are a more effective means of restoring plant communities and associated wildlife habitat.

Under worst-case scenarios, water is a limiting factor for maintenance of sensitive biota and habitats in the study area. Water availability is the best means for maintaining current conditions, and environmental analysis of the project should therefore explore potential adaptive management strategies aimed at providing sufficient water to maintain healthy instream and adjacent habitats. Under an adaptive management program to maintain water availability in the Ventura River, thresholds would be established and annual monitoring would dictate the management approach. Thresholds could include water levels in the river and/or aquatic and semi-aquatic indicators of ecosystem integrity. During average to above average water years, conditions would likely be above minimum threshold levels and contingency measures would not be necessary. During below average water years, monitoring may reveal conditions below minimum thresholds and the adaptive management program would require implementation of contingency measures. Contingency measures would provide for additional water availability in the river during these periods. Contingency measures could include decreased effluent reuse/diversion, decreased groundwater extraction, implementation of water conservation measures, and other identified options to improve or maintain habitat health.

3.7.4 Environmental Review

From the regulatory compliance and environmental review perspective, Section 3.6 provides an overview of the likely approvals and compliance steps necessary to implement the proposed project. With a project of this nature, it is recommended that a pre-application type meeting be convened by the City with the appropriate agencies early in the planning process. This meeting would allow the City to outline the proposed project and provide the agencies with the opportunity to express their points of view. This early coordination ensures that the proposed project is planned with sufficient knowledge of agency requirements. For the environmental review process under CEQA, the initial steps would be to establish a defined project description and to conduct the Initial Study to determine the appropriate level of CEQA documentation. Although this scoping step has not yet occurred, the City would be advised to expect an EIR for this project.

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4 ENGINEERING AND MARKET ANALYSIS

This chapter includes the identification of potential recycled water customers, the results of an assessment of the recycled water market within the City's sphere of influence, the outcome of an engineering evaluation of project alternatives, and a layout of the recommended facilities and distribution pipelines required for implementation of the selected project alternative.

4.1 Potential Recycled Water Users

The parcels and businesses listed in Table 4.1 comprise the current raw/potable water users billed the raw water rate, and future potential recycled water customers within the City's sphere of influence that can possibly use recycled water based on their historical or estimated demand and their proximity to the existing raw water pipeline. Locations of these parcels and businesses are shown on Figure 4.1a and Figure 4.1b.

Table 4.1. Potential Recycled Water Customers

Facility Name	Water Use	Parcel Number	Address
Current Raw Water Users Billed Raw Water Rate			
Finch Farms	Agricultural (lemon)	APN 063-0-110-090	4884 Ventura Avenue North
Graham Ranch	Agricultural (lemon)	APN 063-0-131-020	4850 Ventura Avenue North
Aera Energy	Industrial	--	Meter location at 3800 Ventura Avenue North
Current Potable Water Users Billed Raw Water Rate			
Aera Energy	Industrial	--	Meter location at 3600 Shell Road
A. Walbridge	Agricultural (avocado)	APN 063-0-060-245	234 Canada Larga Road
Possible Future Candidate for Recycled Water			
Brooks Institute	Landscape irrigation	APN 063-0-040-160 APN 063-0-050-360(1)	5721 Ventura Avenue N 5301 Ventura Avenue N

(1) Currently potable water is used in this parcel. There is no water connection to the other parcel.

Figure 4-1a. Location of Potential Recycled Water Users

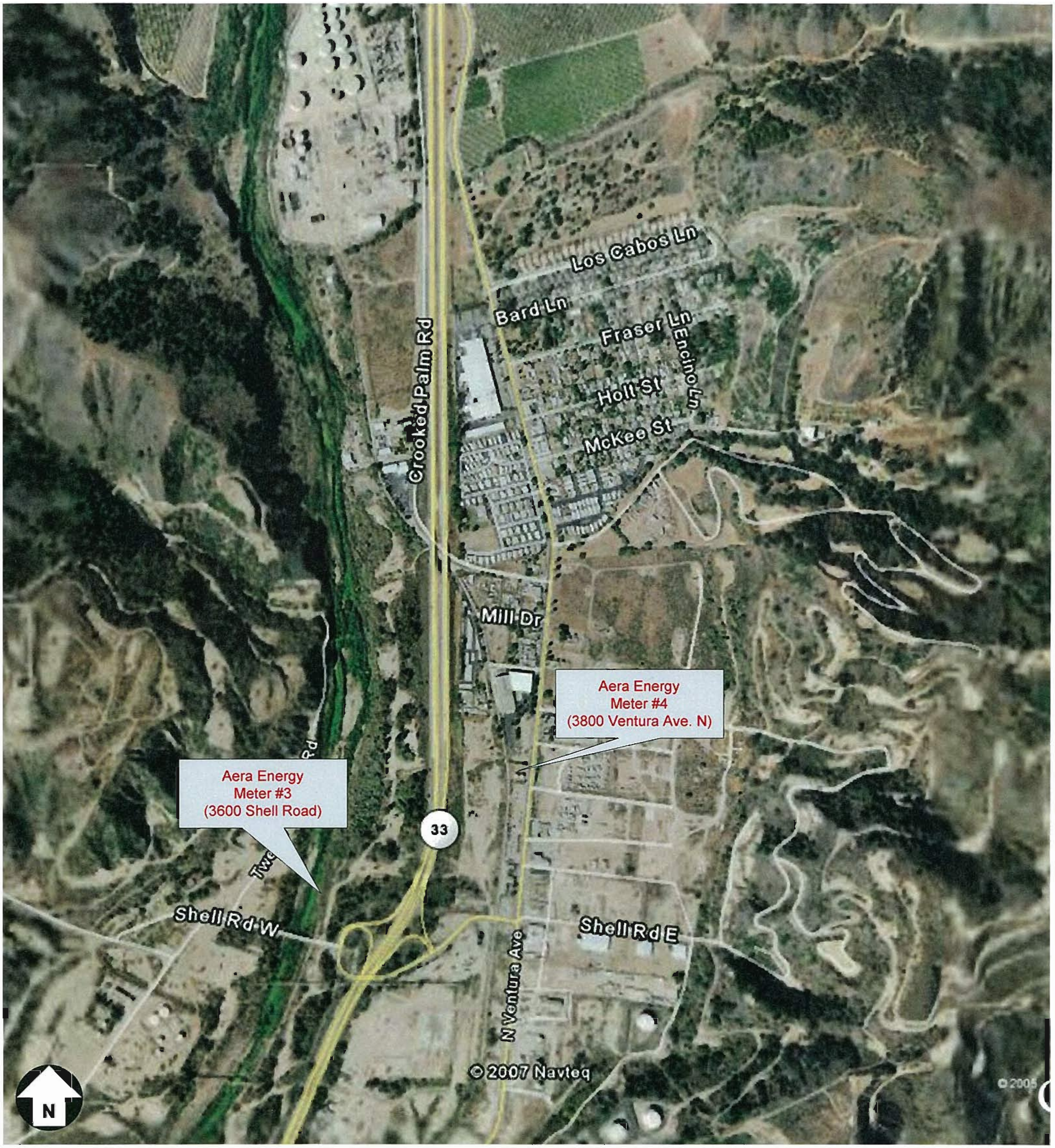


Figure 4-1b. Location of Potential Recycled Water Users (continued)

4.2 Recycled Water Market Assessment

Potential consumers of recycled water are identified below based on the type of water use (i.e., industrial, agricultural, and landscape irrigation).

Industrial: Aera Energy LCC

The City provides raw water and potable water to Aera Energy for oil recovery operations in the North Avenue area of the City. Currently, there are two water meters serving Aera Energy. Meter 3 (a potable water meter) is located at 3600 Shell Road, and Meter 4 (a raw water meter) is located at 3800 Ventura Avenue North. Aera Energy uses potable water for oil recovery operations after mixing it with the raw water. Aera Energy has expressed interest in the use of reclaimed water in lieu of their current supply of raw and potable water for oil recovery operations.

The operation requires ten barrels of water for every one barrel of oil recovered. There are two above-ground on-site water storage reservoirs: 10,000- and 3,000-barrel (1 barrel=42 gal) storage tanks. Aera Energy also provides water to a neighboring cattle-feed ranch with 125 head of cattle. Each head of cattle consumes about 8 gallons of water per day, equating to about 1,000 gallons of water per day.

The historical total water (raw plus potable water) usage by Aera Energy from 2001 to 2006 is summarized in Table 4.2. As shown, the annual total water usage averaged between 332,000 and 463,000 hundred cubic feet (HCF); between 100,000 and 189,000 HCF was raw water and 232,000 to 274,000 HCF was potable water.

The seasonal variation in water usage by Area Energy is shown in Figure 4.2. It appears from Figure 4.2 that fluctuation in seasonal water usage is not dramatic; it ranges between 50,000 and 80,000 HCF. In most years, small seasonal increases were observed in September and October, and again in January-February.

Table 4.2. Historical Water Usage at Aera Energy (100 cubic foot [HCF])

Period	2001	2002	2003	2004	2005	2006
Jan/Feb	72,905	64,591	64,738	53,659	81,430	71,612
Mar/Apr	78,342	61,003	61,181	59,722	65,441	47,554
May/Jun	75,505	62,687	62,571	62,683	56,142	48,874
Jul/Aug	70,871	70,822	50,613	60,931	54,605	53,160
Sep/Oct	80,682	74,680	51,282	76,319	69,054	59,182
Nov/Dec	85,040	51,499	51,052	64,808	70,717	51,543
Annual (HCF)	463,345	385,282	341,437	378,122	397,389	331,925
Bi-monthly Average (HCF)	77,224	64,214	56,906	63,020	66,232	55,321

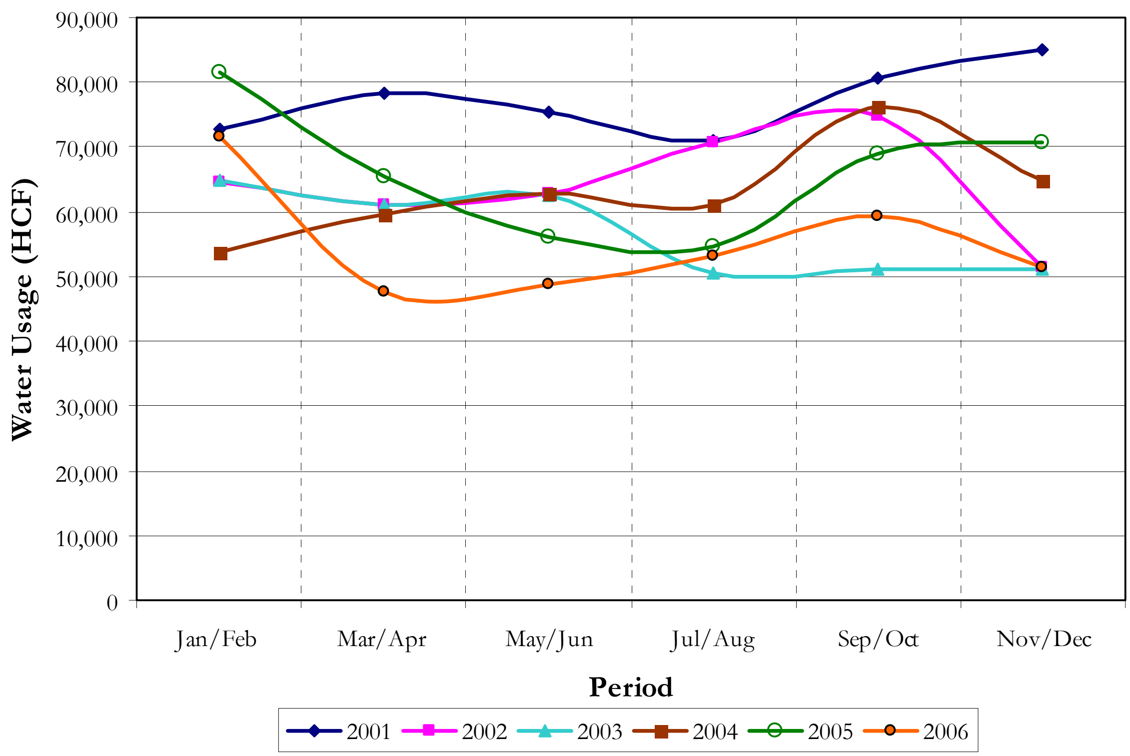


Figure 4.2. Seasonal Variation in Aera Energy Water Usage

Agricultural Irrigation: Finch Farms, Graham Ranch and A. Walbridge:

Finch Farms and Graham Ranch currently use raw water to irrigate lemon trees. A. Walbridge uses potable water on avocado trees. These farms could be recycled water users in the future, if the recycled water quality (i.e., conductivity, total dissolved solids) is suitable for their applications.

Historical water usage at Finch Farms, Graham Ranch, and A. Walbridge are summarized in Tables 4.3, 4.4, and 4.5, respectively. Seasonal variations in water usage at Finch Farms, Graham Ranch, and A. Walbridge are shown on Figures 4.3, 4.4 and 4.5, respectively. The average annual water usage at Finch Farms, Graham Ranch, and A. Walbridge are 9,000 HCF, 10,000 HCF, and 2,750 HCF, respectively. Water usage is at its peak during the summer, especially from July to September, decreasing in the winter from November to March. Although the seasonal variation of water usage by the farms is more dramatic, the maximum water usage is only about 8 percent of the water needs at Aera Energy; thus, Aera Energy is the biggest potential recycled water consumer.

Table 4.3. Historical Water Usage at Finch Farms (100 cubic foot [HCF])

Period	2001	2002	2003	2004	2005	2006
Jan/Feb	1,898	380	217	532	798	957
Mar/Apr	440	1,061	727	500	10	770
May/Jun	1,347	1,461	--	1,996	324	4
Jul/Aug	1,829	2,967	1,801	1,603	1,717	2,359
Sep/Oct	2,882	2,340	2,538	2,734	2,651	2,634
Nov/Dec	2,027	1,694	1,173	1,758	890	2,436
Annual(HCF)	10,423	9,903	6,456	9,123	6,390	9,160
Bi-monthly Average (HCF)	1,737	1,651	1,291	1,521	1,065	1,527

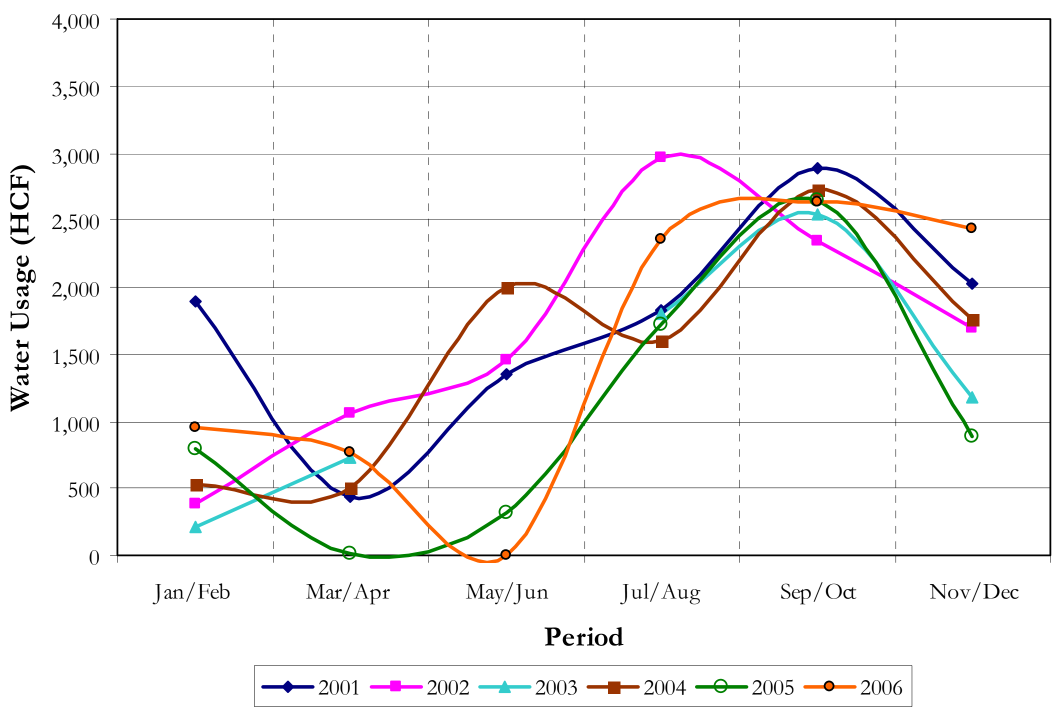


Figure 4.3. Seasonal Variation in Finch Farms Water Usage

Table 4.4. Historical Water Usage at Graham Ranch (100 cubic foot [HCF])

Period	2001	2002	2003	2004	2005	2006
Jan/Feb	900	1	10	854	7	1,788
Mar/Apr	12	1,816	879		5	848
May/Jun	1,445	1,748	33	1,764	1,128	0
Jul/Aug	2,734	2,660	2,769	2,889	3,002	2,626
Sep/Oct	2,629	2,663	2,697	2,966	2,738	2,776
Nov/Dec	3,600	2,689	1,705	797	1,739	2,752
Total (HCF)	11,320	11,577	8,093	9,270	8,619	10,790
Bi-monthly Average (HCF)	1,887	1,930	1,349	1,854	1,437	1,798

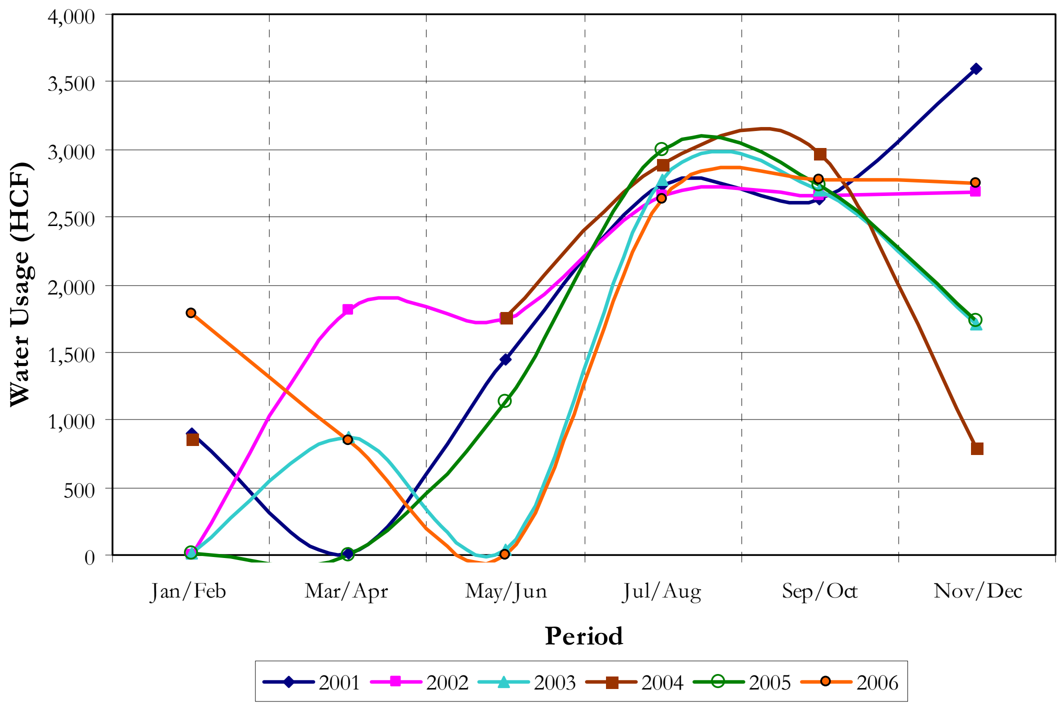


Figure 4.4. Seasonal Variation in Graham Ranch Water Usage

Table 4.5. Historical Water Usage at A. Walbridge (100 cubic foot [HCF])

Period	2001	2002	2003	2004	2005	2006
Jan/Feb	312	3	1	6	7	140
Mar/Apr	14	164	5	108	6	6
May/Jun	53	499	28	463	139	121
Jul/Aug	933	859	455	989	787	540
Sep/Oct	971	1,220	1,200	997	1,023	1,139
Nov/Dec	562	748	635	611	532	805
Total (HCF)	2,533	3,490	2,323	3,168	2,487	2,611
Bi-monthly Average (HCF)	474	582	387	529	415	458

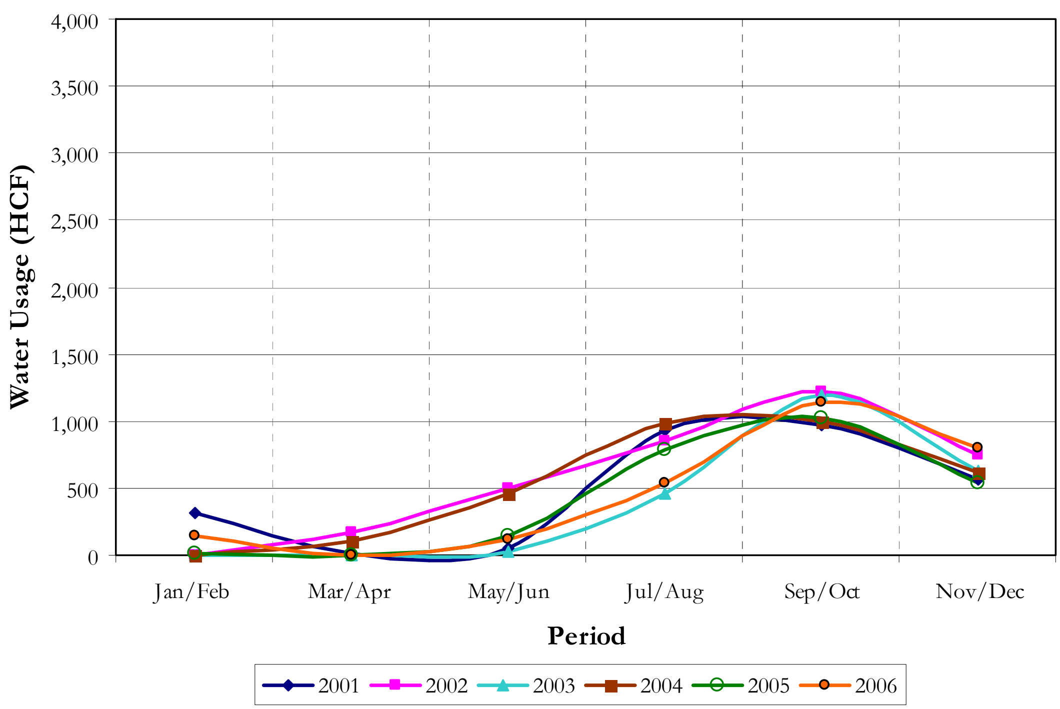


Figure 4.5. Seasonal Variation in A. Walbridge Water Usage

Landscape Irrigation: - Brooks Institute:

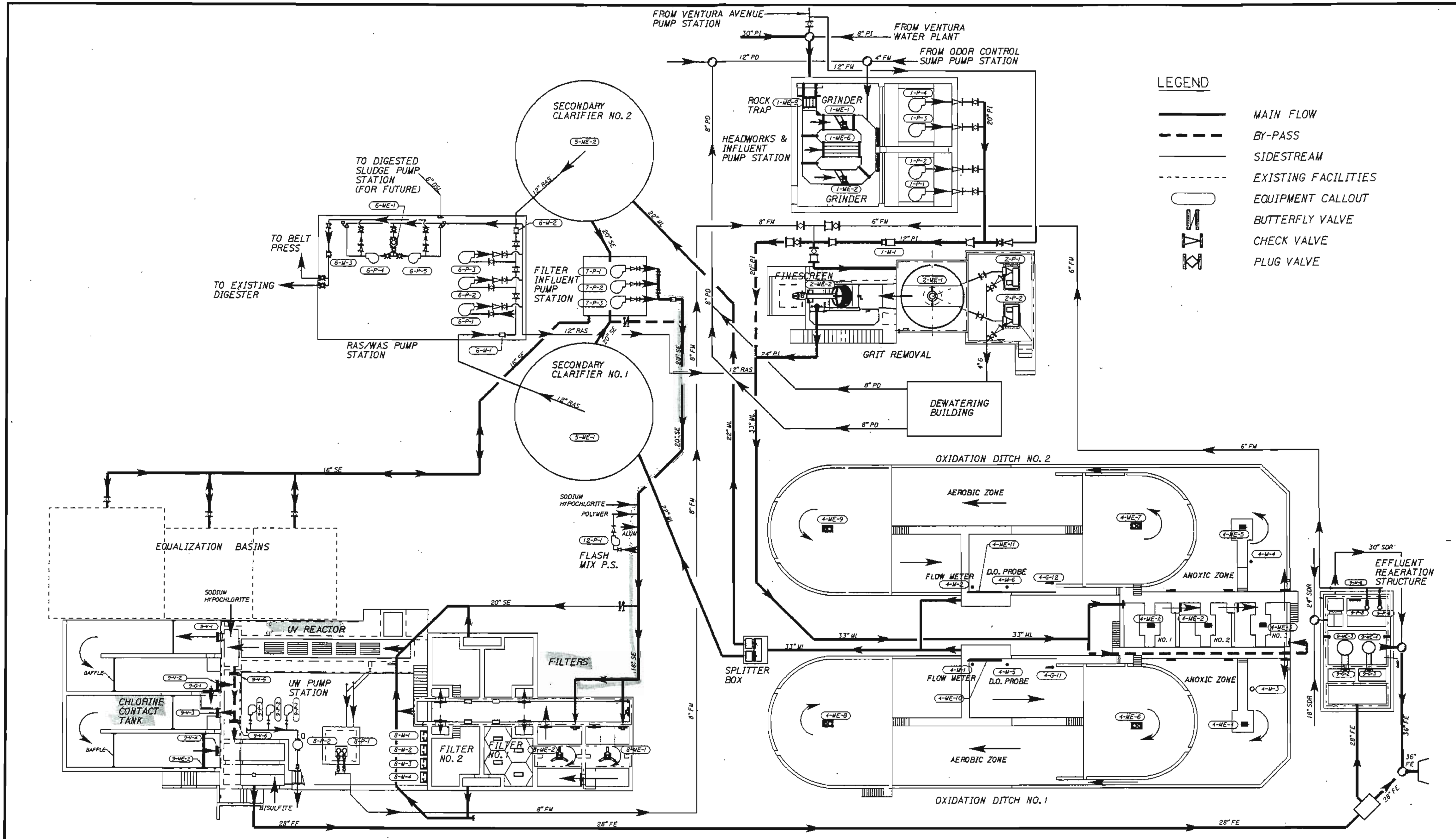
Brooks Institute is planning to expand their campus by adding a 30,000 square foot (sf) two-story building, a 37,500 sf three-story building, 400 new parking spaces, and new landscaped area. Expansion is expected to begin in January 2008, and finish late in 2009. The campus expansion will add 1.48 acres of new landscaped area.

Brooks Institute could use recycled water for landscape irrigation, but the amount needed has not been quantified. For this study, it is assumed that Brooks Institute will need up to 2.6 ac-ft per acre of landscaped area, and irrigation will occur within a 3-hour window. Based on these assumptions, the peak season recycled water demand for irrigation is about 50 gallon per minute (gpm). If irrigation happens every other day, this equates to about 2,200 HCF annual water usage.

4.3 Recycled Effluent Volume and Quality

The Ojai Valley Sanitary District will distribute the recycled water produced at the Ojai Valley Wastewater Treatment Plant (OVWTP). The plant is located at 6363 North Ventura Avenue, Ventura. The raw wastewater, a mixture of domestic, commercial and industrial, is treated to tertiary level and disinfected prior to discharge to the Ventura River. Discharge of treated wastewater from the OVWTP to the Ventura River is regulated under NPDES Permit No. CA0053961 and Order No. R4-2003-0087.

The OVWTP was originally constructed in 1963 as a secondary treatment plant with a capacity of 1.4 million gallon per day (mgd). In subsequent years, it was expanded to its current capacity of 3 mgd average and 9 mgd instantaneous peak. In 1997, a major rehabilitation and upgrade project brought the plant into compliance with effluent standards established by the Los Angeles Regional Water Quality Control Board for live stream discharge to Ventura River. Currently, treatment at the plant consists of influent grinding, grit removal and screening, biological treatment using an oxidation ditch with aerobic and anaerobic-anoxic zones for biochemical oxygen demand (BOD), nitrogen and phosphorus removal, final clarification, tertiary filtration, ultraviolet (UV) disinfection with chlorination/dechlorination as backup, and reaeration. A process flow diagram indicating the treatment available at the OVWTP is shown on Figure 4.6.



MONTGOMERY WATSON

Pasadena, California

OJAI VALLEY SANITARY DISTRICT

LIQUID PROCESS FLOW DIAGRAM

FIGURE 4-6

Collected sludge is stabilized in an aerobic holding tank, dewatered in belt filter presses, and then dried and/or composted in sludge drying beds. Sludge is composted onsite during dry weather and hauled to an offsite composting facility during wet weather.

The following are brief descriptions of the major unit processes and operations:

Influent grinding: Solids such as paper and rags are ground prior to entering the treatment process to prevent entangling these solids in the mechanical parts of the treatment chain.

Grit removal and screening: Grit consists of a wide assortment of inorganic solids such as sand, silt, glass, and metal fragments that can damage pumps and erode other mechanical equipment. Grit and screenings are collected and disposed.

Oxidation ditch: The aeration zone provides oxygen for microorganisms that are produced and maintained to breakdown and consume the organic material in the incoming wastewater. In the anoxic zone, denitrification and phosphorus removal are accomplished.

Final clarification in secondary clarifiers: In this stage, solids are separated from the effluent, and the settled solids (sludge) blanket is thickened.

Equalization Basins: These structures allow for storage of peak flows to dampen the flow fluctuation and improve filter performance throughout the day and during storm events.

Tertiary filtration: The filtration process utilizes a bed of graded granular material to trap suspended or colloidal matter in secondary effluent, and improve the efficiency and reliability of the disinfection process. In the case of the OVWTP, sand is the filtration media.

UV disinfection: Irradiation with UV light is applied to inactivate both bacteria and viruses.

Chlorination: Sodium hypochlorite is added to the treated and filtered effluent to destroy bacteria, pathogens and viruses, and to minimize algal growth. At OVWTP, chlorination is a backup to the UV system during storm events or normal process interruptions.

Dechlorination: Prior to discharge, sodium bisulfite is added to the treated effluent to remove residual chlorine and reduce effluent toxicity.

Effluent aeration: Disinfected effluent is aerated to increase the DO levels prior to being discharged to the Ventura River.

Belt filter press: Thickened sludge from the secondary clarifier is pressed between two belts to remove water.

Sludge drying beds: The sludge beds provide an area for storage, drying, and windrow composting of sludge during dry weather.

Current peak dry weather flow at the OVWTP is 2.1 mgd. Peak wet weather flow is about 4.0 mgd. Seasonal variation in the effluent flow recorded for calendar years 2004, 2005, and 2006 is shown on Figure 4.7.

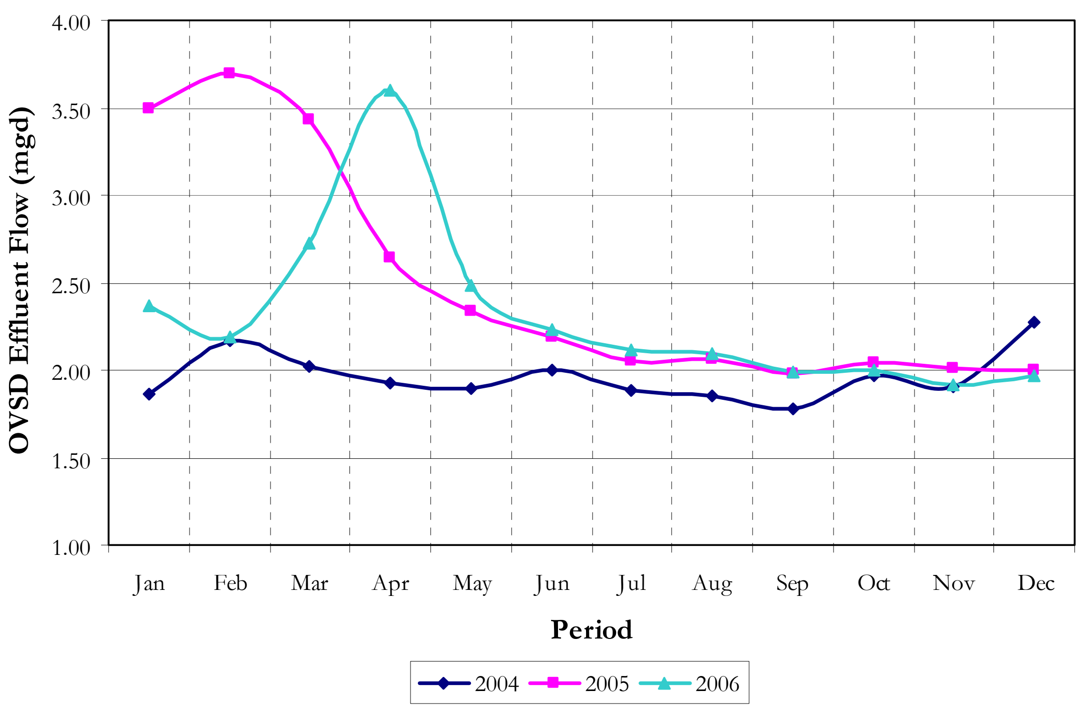


Figure 4.7. OVWTP Effluent Flow

The State of California Department of Health Services sets the standards for required levels of treatment and types of uses for recycled water. These standards are included in the California Code of Regulations, Title 22. The OVWTP currently produces disinfected tertiary effluent that meets Title 22 standards for full body contact. The effluent quality from 2004 to 2006 is summarized in Table 4.6.

Table 4.6. Historical Effluent Water Quality at the OVWTP

	TERTIATY EFFLUENT QUALITY						
	BOD mg/L	TSS mg/L	Temp. ^{O} F	D.O. mg/L	Settleable Solids ml/L	pH Units	Turbidity NTU
Average	<2	<2	71	9.1	<0.1	7.9	<2
Minimum	<2	<2	62	7.6	<0.1	7.5	<1
Maximum	5	7	80	10.9	<0.1	8.2	<2

4.4 Feasibility of Recycled Water Use

Industrial Use at Aera Energy

The water used for the oil recovery process at Aera Energy must meet specific water quality standards. A comparison of the Aera Energy water quality standards and the OVWTP effluent quality are presented in Table 4.7.

Table 4.7. Aera Energy Water Quality Standard versus OVWTP Recycled Water Quality

Parameter	Unit	Aera Energy Water Quality Standard	OVWTP Recycled Water Quality
		Maximum Value	Maximum Value (1)
BOD	mg/L	30	5
TSS	mg/L	10	7
pH	-	6-8	7.5-8.2
Turbidity	NTU	5	<2
Total Sulfide	ppm	0	NA (2)
Total Fe	ppm	5	0.14
Sulfate	ppm	100	214
Sulfate reducing bacteria	bacteria/mL	100	NA
Acid producing bacteria	bacteria/mL	100	NA

(1) Maximum value observed from 2004 to 2006 period.
(2) NA: information not available

As shown in Table 4.6, the OVWTP effluent is suitable for Aera Energy use for oil recovery process with the exception of the sulfate concentration. The OVWTP effluent has about twice as much sulfate as the Aera Energy standard. However, Aera Energy has indicated that water used previously containing high sulfate levels did not impact the oil recovery.

As mentioned earlier, Aera Energy supplies water to a neighboring cattle ranch (Atmore Ranch) that feeds 125 head of cattle. There is no indication in the Title 22 regulation that specifically allows the use of disinfected tertiary treated water as drinking water for animals. The cattle ranch is east of Ventura Road, several miles (5-6 miles) from School Canyon Road. There are four watering troughs in the ranch, but only the Hall Canyon and Hall Mountain troughs are in working condition. Currently, potable water is supplied to these troughs from the Hartman water tank. The Hartman water tank will receive recycled water after Aera Energy switches to recycled water use. Therefore, the potable water line may need to be kept active to serve the cattle ranch.

The other two troughs, currently in disrepair, are located at the upper end of Sexton Canyon, and at the four-way intersection of Sexton Canyon. Currently, a leak in the existing pipeline prevents water from being conveyed to the Sexton Canyon trough. Aera Energy does not know if the water sent to the Sexton Canyon trough is raw or potable water. If potable water is being used, the current practice will need to be continued. However, if the water source is raw water, a potable water source would need to be connected to the troughs or potable water trucked to the site by the cattle ranch. Potable water can be acquired from the Atmore Ranch House, which is several miles away from the troughs. The locations of these facilities are shown on Figure 4.8.

The infrastructure needed to convey cattle feed water in Aera Energy was not examined further since the water source to Sexton Canyon remains unknown. Aera Energy should determine if there is a need for an additional potable water line for the cattle ranch.

Irrigation Use at the Farms and Brooks Institute

Requirements associated with the use of disinfected, tertiary-treated recycled water for irrigation in California are provided in Title 22, Section 60304. According to this section, recycled water used for surface irrigation of the following areas and crops shall be disinfected and treated to tertiary level:

1. Food crops, including all edible root crops, where the recycled water comes into contact with the edible portion of the crop
2. Parks and playgrounds
3. School yards
4. Residential landscaping
5. Unrestricted access golf courses
6. Any other irrigation use not specified in this section and not prohibited by other sections of the California Code of Regulations.

Because use of disinfected tertiary recycled water for irrigation is one of the allowed uses indicated in Title 22, the OVWTP disinfected tertiary effluent can be used for this purpose at Finch Farm, Graham Ranch and A. Walbridge, if the water quality is suitable for healthy growth of the trees.

In general, recycled water with high total dissolved solids (TDS) concentration can limit the potential uses and marketability of recycled water. Certain agricultural products, such as avocado trees, cannot tolerate high TDS irrigation water. There are studies showing that crop

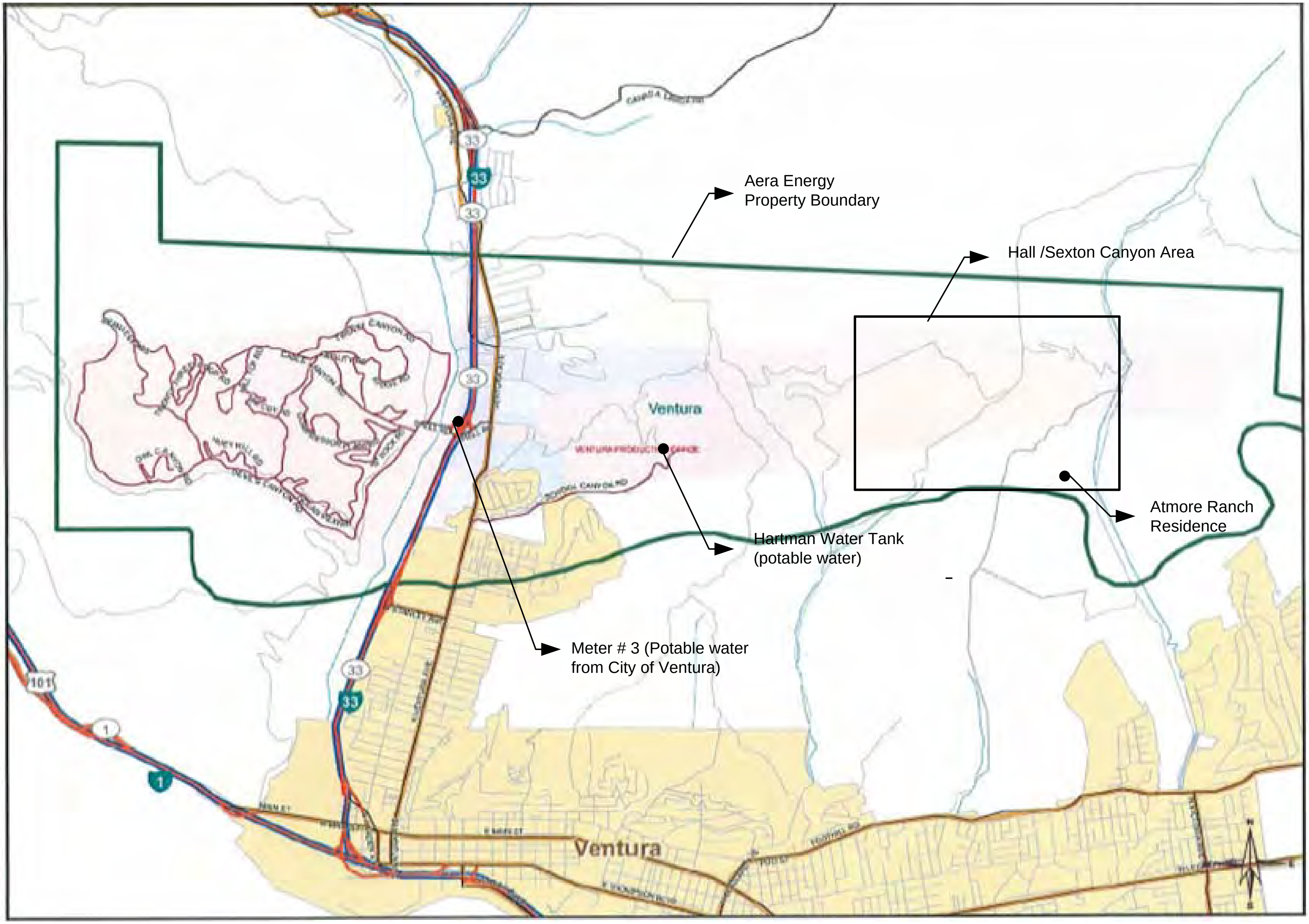


Figure 4-8. Aera Energy Facilities Location

yield drops up to 40 percent due to elevated TDS concentration (about 900 mg/L) in the irrigation water. According to San Diego County Water Authority's Agricultural Water Management Plan, water with TDS concentration greater than 500 mg/L is problematic to many of the subtropical crops grown in the Southern California, as they do not produce well and irrigation management is more difficult when irrigated with high TDS water. There are indications that citrus trees are not as sensitive as avocado trees. One study conducted in San Diego's North County showed that a Christmas tree farm, a citrus grove and a number of nurseries have successfully used recycled water *(http://www.sdcwa.org/manage/awmp.phtml).*

The OVWTP effluent TDS concentration ranged from 770 to 890 mg/L in calendar years 2003 to 2006. Based on the earlier studies mentioned above, it seems that using recycled water to irrigate avocado tress could pose some problems in terms of reducing productivity. Therefore, use of recycled water at A.Waldbridge may not be feasible. However, it could be used for irrigation of lemon trees at Finch Farms and Graham Ranch, as lemon trees exhibit higher tolerance to TDS.

4.5 Project Alternatives

Three project alternatives were considered for re-use of the OVWTP effluent by the potential recycled water users identified above. The most feasible alternative is selected and the required infrastructure described.

The following three project alternatives were identified:

- Alternative 1: Status Quo (continue providing raw/potable water to users billed raw water rate)
- Alternative 2: Provide recycled water to raw/potable water users billed raw water rate
- Alternative 3: Provide recycled water to raw/potable water users billed raw water rate <u>and</u> to potential future users

4.5.1 Alternative 1- Status Quo (Continue Providing Raw/Potable Water to Users Billed Raw Water Rate)

Raw Water Users

Alternative 1 represents continuation of the current practice. Currently, the City provides raw water to Aera Energy, Finch Farms and Graham Ranch from the 11-million gallon Kingston Reservoir, a raw water source for the Casitas Water Treatment Plant. There are several water sources for the Kingston Reservoir. These are;

- Four shallow wells in the Ventura River basin – The wells are Nye Well No. 2, No. 7, No. 8, and No 11. Currently Nye Well No. 11 is the only active well. Other wells are under rehabilitation.
- Ventura River subsurface intake – The intake is currently an active water source.
- Ventura River surface water intake – This water source is currently inactive; however it may become available in the future if the river flow is redirected.
- Lake Casitas – Currently, this water source is being used by the City while the Nye Wells are undergoing repairs cause by storm damage in 2005. In general, the City has the potential of taking up to 7 mgd of water from the Casitas MWD if needed.

Raw water is free chlorinated prior to entering the Kingston reservoir with approximately 2 mg/L.

The water surface elevation at the Kingston Reservoir is maintained between 204 and 210 ft. Farmers using the raw water begin complaining about low pressure delivery if the water level falls below 204 ft. A valve at the south-east corner of the reservoir (where the raw water pipeline leaves the reservoir) is kept open, making raw water available to the farmers and Aera Energy at all times. Raw water is withdrawn by the customers at will; i.e., there is no overall management of the raw water use. Aera Energy stores the raw water retrieved from the pipeline into storage tanks, subsequently pumping it to the application sites during the day.

Raw water is conveyed to the users through a combination of 16-, 18-, and 24-inch pipes. Total length of the raw water pipeline is about 9,400 ft (or about 1.8 miles). The City reported that the existing raw water pipeline has the capacity to convey about 1.5 mgd. However, the pipeline is a combination of reinforced concrete, cast iron and CMCL materials. In addition the age of the pipes is of concern, and some level of rehabilitation for long-term use, reliability and water loss control may be required; slip-lining may be an option to avoid pipeline failure. Moreover, as-built drawings of the pipeline do not exist and the reported capacity could not be verified. The invert elevation of critical points must be determined to calculate the capacity of the pipeline for the design phase of the project. The existing raw water pipeline alignment is shown on Figure 4.9a and Figure 4.9b. A more detailed layout of the raw water pipeline is provided in Appendix A.

Potable Water Users

The City currently provides potable water to Aera Energy through Meter #3 located near Shell Road off the Casitas pipeline. This pipeline is used to supply untreated water and therefore Aera Energy is considered a raw water customer even though they are being provided potable water through this connection.

The City currently provides potable water to A. Walbridge from its potable water system in the area. A. Walbridge was supplied with raw water in the past and therefore is considered a raw water customer even thought they are being provided potable water.

In this alternative, these raw water customers would remain being supplied with potable water.

4.5.2 Alternative 2- Provide Recycled Water to Raw/Potable Water Users Billed Raw Water Rate

Alternative 2 represents changing the current practice by providing recycled water from the OVWTP to current raw/potable water users billed the raw water rate.

<u>Recycled Water Demand</u>

Maximum month water demand for Aera Energy is about 41,000 HCF based on the last 5-year water meter data provided by the City. This equates to about 1 million gallons per day (mgd) of peak month flow. Aera Energy indicated that their maximum day water usage for industrial use is currently 38,000 barrels per day (or 2134 HCF). This equates to 1.6 mgd of peak day flow.

As indicated before, the average effluent flow from the OVWTP is 2.1 mgd which is twice the peak month recycled water demand for Alternative 2. To satisfy the peak day demand however, facilities should be sized for the peak day flow.

Maximum bi-monthly water demand is 3,150 HCF for the Finch Farm and Graham Ranch. Frequency of the raw water usage and the maximum day water demand at the farms is unknown. If agricultural irrigation occurs every other day, then total daily water demand at the two farms would be 0.15 mgd. This assumption must be verified as the project proceeds to the design phase, since it could affect the size and cost of the required infrastructure.

As mentioned above, using recycled water to irrigate avocado tress could pose problems in terms of reducing productivity. Providing recycled water to this farm would require about 1,000-ft of new pipeline. Therefore, use of recycled water at A.Walbridge is not considered feasible at this time and is not investigated further in this report.

Total maximum day recycled water demand for Alternative 2 is determined as 1.75 mgd based on the assumptions stated above.

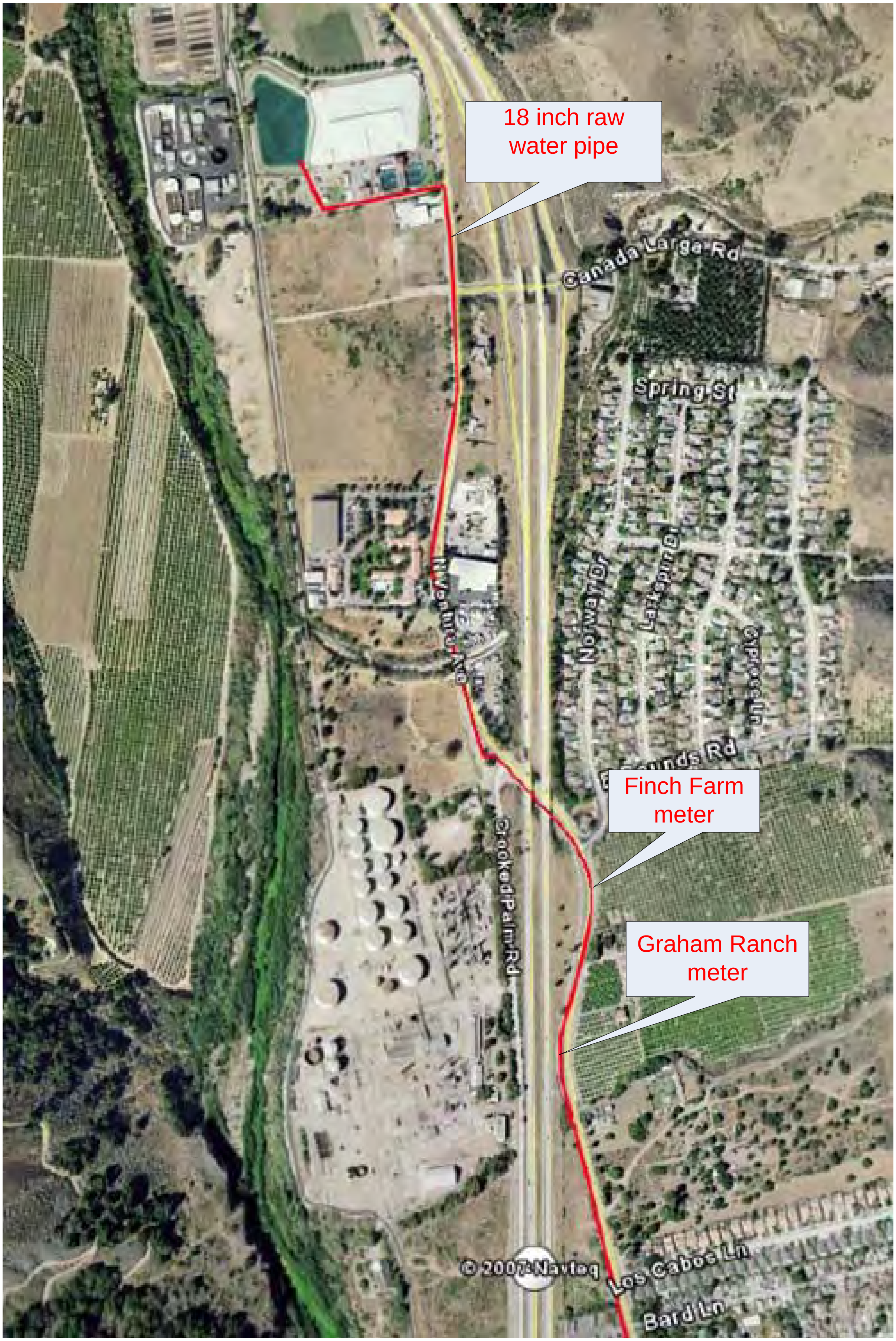


Figure 4-9a. Existing 18 inch Raw Water Pipeline

Figure 4-9b. Existing 18 inch Raw Water Pipeline (continued)

Hydraulic Evaluation

The existing raw water pipeline could be reused under this alternative. The OVWTP effluent could be conveyed through a new pipeline that connects to the existing raw water pipeline at a point where the 18-inch raw water pipeline turns east after leaving Kingston Reservoir. Although a structure likely exists at this inflection point, it was not visible during the January 4, 2007 site visit.

Tertiary effluent is aerated at the OVWTP to increase the dissolved oxygen in the effluent before discharging to Ventura River. Aeration is done at the Effluent Aeration Structure, which is shown on Figure 4.10. Since recycled water does not have to be aerated, the OVWTP effluent could be split prior to aeration. Within the Aeration Structure, disinfected effluent enters a receiving compartment prior to flowing through a gate into the second compartment where aeration takes place. A portion of the water in the first compartment could be diverted to recycled water users through a newly installed pipe at the south wall of the Aeration Structure. A motor-operated sluice gate could be installed at the new pipe inlet to control the amount of flow being diverted. The undiverted flow in the first compartment could then proceed to the aeration chamber and subsequent discharge to the Ventura River.

The following hydraulic conditions govern the infrastructure needed to satisfy the customer's existing water pressure demands at the discharge points under this alternative.

- The Finch Farms and Graham Ranch require water to be delivered at 15 psi. Aera Energy must have water delivered at 14 psi.
- The raw water reservoir water surface elevation is currently kept above 204 ft to maintain a water pressure of 15 psi at the farms.
- The minimum and maximum water level elevations at the Effluent Aeration Structure, where the recycled water demand would be extracted, are 195.12 ft and 198.40 ft, respectively.
- The invert elevation of the 18-inch raw water pipe at the inflection point noted above is not known. However, it must be lower than 196 ft in elevation, the invert elevation of the Kingston Reservoir.

Based on the data presented above, the following conclusions were reached:

- The hydraulic grade in the raw water pipe at the connection point should be kept at 204 ft after switching to recycled water use to maintain a discharge pressure of 15 psi at the farms.

- A pump station is required to lift the OVWTP effluent from 195 ft in the Aeration Structure to 204 ft elevation at the connection point to the existing raw water pipe. Variable speed pumps could be used to pump up to 1.75 mgd of recycled water. Total dynamic head for a pump is about 35 ft at 1.75 mgd flow.

- Force main would be connected to the existing 18-inch raw water pipe at the point of inflection, where the pressurized pipe transitions into a gravity flow pipe.

- A manhole needs to be constructed at the connection point. This manhole would extend above grade. The ground elevation at the connection point is not known. However, based on Google Earth data, it must be around 203 ft. The target hydraulic grade in the manhole is 204 ft. It is assumed that at least 2 ft of free board is required at the manhole. Therefore, the connection point manhole would extend several feet above grade. Ground elevation at the connection point should be surveyed for the design phase of the project.

- After switching from raw water to recycled water, the 18-inch raw water pipe from the Kingston Reservoir to the connection point manhole should be permanently plugged and abandoned in place. This is required to prevent any possibility of mixing recycled water back to the raw water reservoir.

- A back-up generator is needed if the OVWTP's existing backup generator does not have excess capacity to run the new pump station.

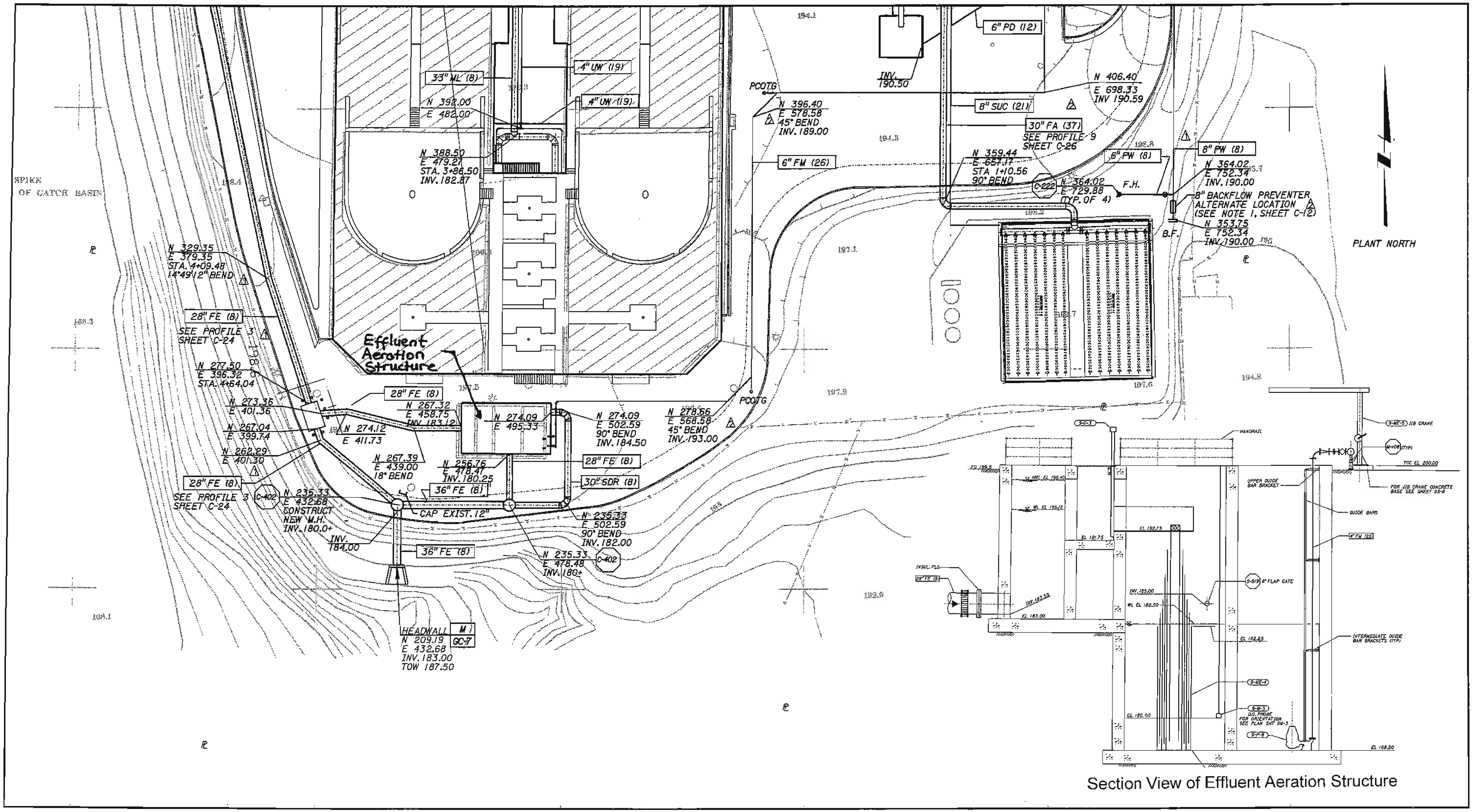


Figure 4-10. Effluent Aeration Structure at the OVWTP

Required Infrastructure:

Required infrastructure for Alternative 2 is summarized in Table 4.8, and shown on Figure 4.11 and Figure 4.12. It should be noted that in this alternative, Aera Energy's connection to the Casistas pipeline (Meter #3 location, potable water) will be terminated, and a connection will be required from the terminus of the existing raw water pipeline (converted to recycled water pipeline) to this location to supply Aera Energy with recycled water.

Submersible pump is selected as the feasible pump type for the application. Two 1-mgd capacity pumps are provided to deliver the peak demand. The third pump is included as standby. In addition to 1-mgd capacity pumps, a Jockey pump is included for small users and to maintain the pressure in the system against small leaks in the system

The proposed 18-inch force main alignment is within the City property. Therefore, no temporary easements are required for construction of the facilities. There is an existing valve at the south-east corner of the reservoir where the raw water pipeline leaves the reservoir. From conversations with the Avenue Water Treatment Plant operator, it was understood that the valve currently is not functional. Replacement of the valve is included in the cost estimate.

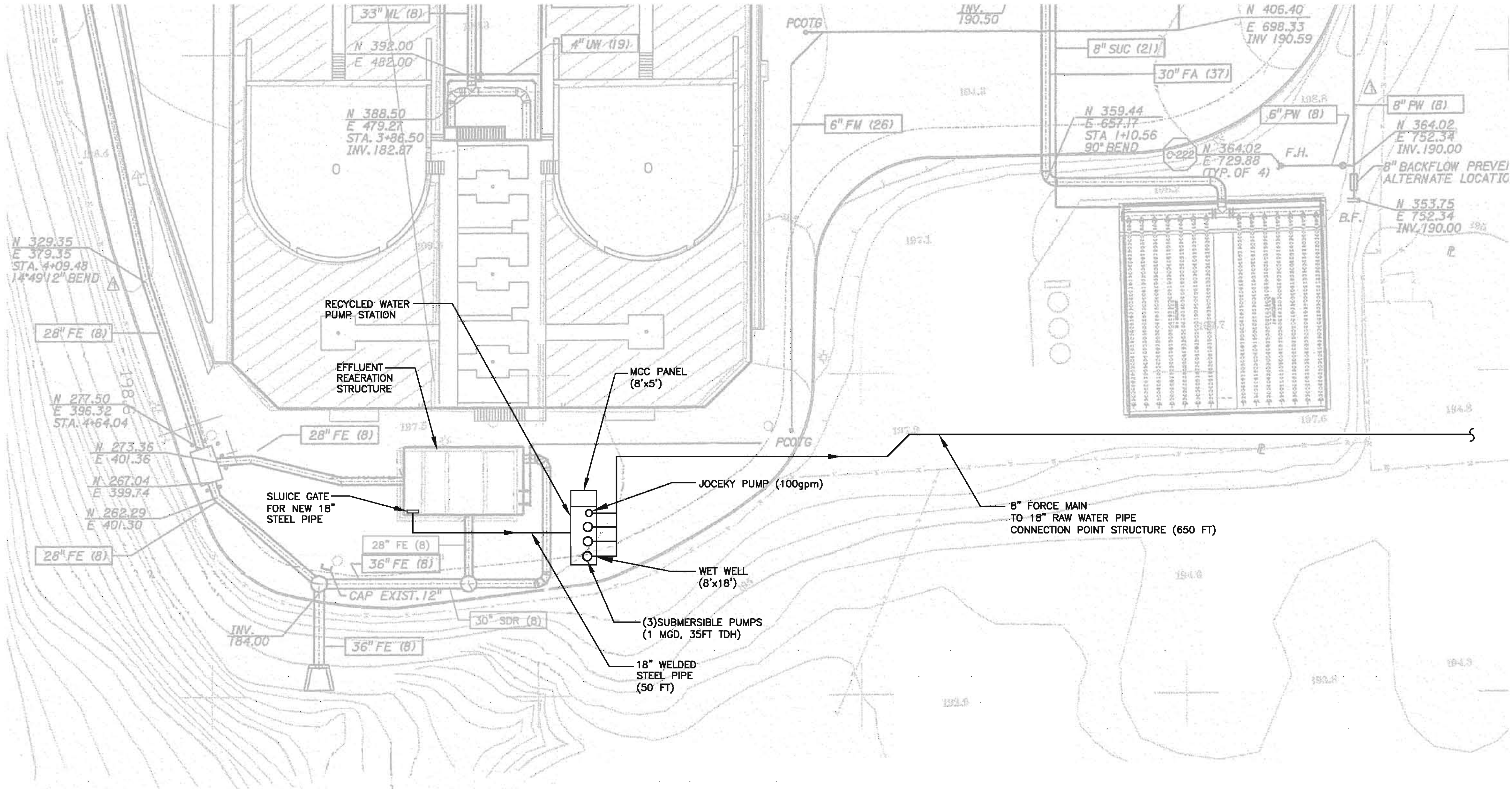


FIGURE 4-11

REQUIRED INFRASTRUCTURE AT THE OVWTP FOR ALTERNATIVE 2

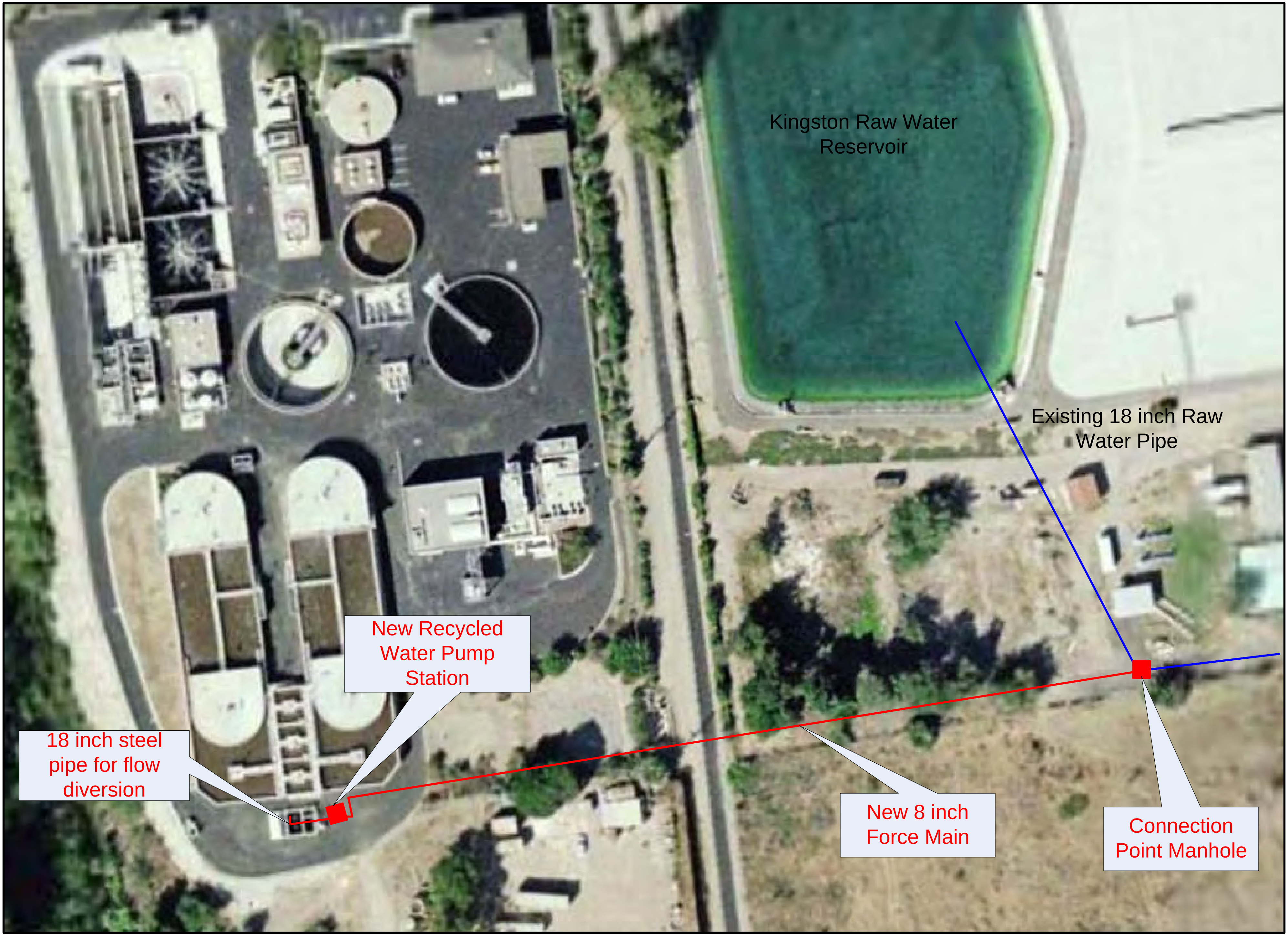


Figure 4-12. Required Infrastructure Improvements for Alternative 2

Table 4.8. Major Infrastructure Improvements for Alternative 2

Item	Improvement
Flow Diversion from Effluent Aeration Structure • Motor operated sluice gate • Depth	 18-inch diameter 17 ft
Flow Diversion Pipe • Diameter • Length	 18-inch welded steel pipe 50 ft
Recycled Water Pump Station • Pump Type • Number of Pumps • Pump TDH • Average Capacity, each • Pump Type • Number of Units • Average Capacity • Wet well size • MCC Panel • Flow meter • Discharge Force Main	 Variable Speed Submersible 3 (2 in operation, 1 standby) 35 ft 1.0 mgd Submersible jockey pump 1 100 gpm 8 ft x 18 ft 8 ft x 5 ft pad 8-inch magnetic flow meter 8-inch steel pipe 650 ft long
Connection Point Manhole • Depth • Diameter, ft	 about 9 ft 6
Backflow Prevention	▪ Plug and abandon the 18-inch raw water pipe in place ▪ Replace existing 18-inch valve

4.5.3 Alternative 3- Provide Recycled Water to Raw/Potable Water Users Billed Raw Water Rate and to Potential Future Users

Alternative 3 represents changing the current practice by providing recycled water from the OVWTP to current raw/potable water users billed the raw water rate, and to future potential future users. The Brooks Institute represents the sole future user identified that could use recycled water for landscape irrigation if reclaimed water is available. Peak landscape irrigation water demand, assumed to occur in the summer months, is estimated to be 50 gpm.

An important consideration when using recycled water for landscape irrigation is the pressure required at the sprinklers. A minimum pressure of 40 psi is needed at the sprinkler heads for proper operation. The water pressure of the 8-inch force main at the point where Brooks Institute would divert flow is estimated to be 15 psi. Brooks or the City could install a small booster pump station to deliver recycled water to Brooks Institute use areas through a backbone irrigation line. The following improvements are needed in addition to the new infrastructure listed for Alternative 2:

- Two 50-gpm capacity pumps to provide 40 psi or greater discharge pressure;
- 3-inch diameter, 50-ft long force main

The required infrastructure for Alternative 3 is shown on Figure 4.13, assuming that the booster pump station is constructed on the City's property. Alternatively, the booster pump station would be installed and owned by Brooks and located on Brooks property.

4.6 Cost Estimate

A planning level construction cost estimate for Alternative 2 and the additional infrastructure needed for Alternative 3 are summarized in Table 4.9 and Table 4.10, respectively. The basis of the cost estimate and more detailed cost estimate table for Alternatives 2 and 3 are provided in Appendix B. Reported costs in Tables 4.9 and 4.10 are in May 2007 dollars; for planning purposes, an annual incremental increase in costs of 5 percent should be incorporated into the estimates.

Table 4.9. Planning Level Construction Cost Estimate for Infrastructure Improvements Required in Alternative 2 (in May 2007 Dollars)

Item	Cost
Flow Diversion from Effluent Aeration Structure	$17,000
18-inch Gravity Steel Pipe	$48,000
Recycled Water Pump Station	$253,000
8-inch Force Main	$66,000
Connection Point Manhole	$44,000
Electrical and Instrumentation	$95,000
Raw Construction Cost	**$523,00**
Labor, Material, Equipment Mark-up, Sales Tax, Contractor General Conditions, Material Shipping and Handling, Worker's Travel/Subsidence, and Earthquake insurance	$160,000
Subtotal	**$684,000**
Start-up, Training, O&M (2%)	$14,000
Construction Contingency (30%)	$209,000
Builder's Risk, Liability Auto Insurance (2.85%)	$26,000
Performance Bond (1%)	$9,000
Payment Bond (1%)	$9,000
Total Construction Cost	**$951,000**

Figure 4-13. Required Infrastructure Improvements for Alternative 3

Table 4.10. Planning Level Construction Cost Estimate for Additional Infrastructure Improvements Required in Alternative 3

Item	Cost
Site Construction	$4,500
Concrete slab	$8,500
Equipment (pumps)	$9,000
Mechanical (pipes and valves)	$10,000
Electrical and Instrumentation	$5,000
Raw Construction Cost	**$37,000**
Labor, Material, Equipment Mark-up, Sales Tax, Contractor General Conditions, Material Shipping and Handling, Worker's Travel/Subsidence, and Earthquake insurance	$9,000
Subtotal	**$49,000**
Start-up, Training, O&M (2%)	$900
Construction Contingency (30%)	$15,000
Builder's Risk, Liability Auto Insurance (2.85%)	$1,900
Performance Bond (1%)	$700
Payment Bond (1%)	$700
Total Construction Cost	**$68,000**

Project cost and revenue are presented in Table 4.11 for each alternative. Under Alternative 1, the City receives about $463,228 of revenue for supplying Aera Energy, Finch Farms, and Graham Ranch with raw and potable water. The annual revenue under Alternative 2, where recycled water replaces raw and potable water, is estimated to be $200,000. In addition to this annual revenue, under Alternative 2, about 400,000 HCF of water become available for additional potable water use in the City of Ventura. The project cost, however, is about $951,000. It will take the City about 5.4 years to recover the project cost assuming that the water demands and recycled water unit price remain the same and the inflation rate is at 4 percent. Providing recycled water to Brooks Institute under Alternative 3 would bring about $1,100 additional annual revenue as compared to Alternative 2. Construction cost of the additional infrastructure to provide recycled water to Brooks Institute is about $68,000. With the assumed 4 percent inflation rate, the City could not recover the total project cost. The City can only recover $24,000 after 70 years. If there were no inflation, total project cost would be recovered after 68 years.

4.7 Recommended Project

According to Title 22 Regulations, Article 7, Section 13551, the use of raw water suitable for nonpotable applications, including industrial and irrigation uses, is not allowed if suitable recycled water is available and that the use of recycled water does not cause any loss or decreasing of any existing water rights. Currently, the raw water from the Kingston Reservoir is used directly for nonpotable uses, as well as production of drinking water. If recycled water is provided for industrial and irrigation uses in the area instead of raw water, about 157,000 HCF of additional raw water could become available annually for production of drinking water. In addition, about 242,000 HCF of potable water is currently used annually for industrial purposes at Aera Energy. This volume of water could become available for drinking water if replaced with recycled water. This is an important addition to the drinking water supply, considering the population increase and limited drinking water supplies in the area. Reducing the demand for potable and raw water would potentially make more water available within the basin, which would help alleviate environmental concerns associated with water diversions. Therefore, Alternative 1 is not recommended provided that the water rights are not affected by supplying recycled water to the consumers.

As explained above, about 400,000 HCF of water could become available as an additional potable water source if Alternative 2 is selected. Use of recycled water for nonpotable applications means less dependence on the potable water sources. Cost analysis indicated that it will take the City about 5.4 years to recover the project cost. The 5.4-year payback period is considered feasible for the project. Therefore, Alternative 2 is the recommended alternative for re-use of the OVWTP effluent; i.e., provide recycled water to the City’s current raw water users.

It seems that providing recycled water to Brooks Institute under Alternative 3 may not be a cost-effective option for the City, considering that a separate booster pumping system and force main would need to be constructed just for this user. Payback analysis showed that the City could not recover the total project cost with the 4 percent inflation rate assuming that the water demand and recycled water unit price remain the same. The City can only recover about 35 percent of the investment for the project after 70 years. Therefore Alternative 3 is considered not a feasible investment. The preferred option for the City might be letting Brooks Institute to draw enough irrigation water from the 8-inch force main for their use in the future. Brooks Institute could construct the booster pump station on their property and distribute the flow within the property for irrigation use. It should be noted that the landscape irrigation water demand has not been determined by Brooks Institute yet. This demand has been estimated with limited information in this study for the initial evaluation. Alternative 3 should be re-evaluated when Brooks Institute defines their water demand for the landscape irrigation.

In conclusion, market analysis, required infrastructure evaluation for the water distribution, and economic analysis indicated that re-use of the OVWTP effluent is feasible when Aera Energy and the two local agricultural users are considered as the potential users. Providing recycled water to the identified future potential user is cost-prohibitive due to the infrastructure needed to convey the water and the low water demands of this user. Indeed, the City estimated that the current users of raw and potable water could be supplied recycled water (i.e., 1000 acre-ft) at a cost of approximately $529/per acre-foot (in 2007 dollars), including capital expenditures (slip-lining of the existing pipe is included in the estimate), environmental review and permit compliance costs. The details of this estimate are included in Appendix E.

Table 4.11. Project Cost and Revenue for the Project Alternatives

Alternative 1	Annual Average Water Usage	Unit Price ($/HCF)	Annual Revenue	Investment
Annual income due to raw water usage	Raw Water: 381,434 HCF by Aera 17,900 HCF by farms 399,334 HCF total	$1.16	$463,228	$0

Alternative 2		Annual Average Water Usage	Unit Price ($/HCF)	Annual Earning	Investment
Annual income due to raw water usage		Recycled Water: 381,434 HCF by Aera 17,900 HCF by farms 399,334 HCF total	$0.50	$199,667	$951,000
Total Annual				$199,667	$951,000
Payback Time	i = 4%				5.4 years

Alternative 3		Annual Average Water Usage	Unit Price ($/HCF)	Annual Earning	Investment
Annual income due to raw water usage		Recycled Water: 2,000 HCF by Brooks 2,000 HCF total	$0.50	$1,000	$68,000
Total Annual				$1,000	$68,000
Payback Time	i = 4%				not fully recovered

Unit Prices:

Raw water, Irrigation, Municipal Parks =	$1.16 per HCF at City and County	Source: *City of San Beunaventura FY*
Reclaimed Water=	$0.50 per HCF at City and County	*2006-2007 Water Rates*

Note: The reclaimed water rate used in Table 4.11 reflects the City' s current rate for reclaimed water. The actual rate for reclaimed water from the OVSD system would be determined by OVSD, based on the cost of delivery, and any treatment beyond what is currently required.

5 SUMMARY OF FEASIBILITY ANALYSIS

From an environmental perspective, potential impacts related to reuse of the Ojai Valley Sanitary District discharge would be associated with alterations in water quality and quantity resulting directly or indirectly from reduced levels of discharge. There is some perception among the local community that the discharge contributes excess nutrients to the river, which further contribute to the production of dense macrophyte beds downstream. Although the impact of such nutrients is largely speculative, it is possible that reducing effluent discharge will improve water quality downstream, resulting in a positive benefit. However, given the number of small farms and ranches in close proximity to the river that contribute fertilizers and animal waste products in run-off draining to the river, it is somewhat problematic at this point to separate the relative contributions of nutrients from these different sources. Nonetheless, dense macrophyte beds are present in the discharge channel and continue downstream, in some areas completely inundating the wetted channel and reducing or eliminating fish passage.

Conversely, reducing discharge flow does have the potential to reduce habitat (e.g., depth and wetted area) and, possibly, water quality due to reduced circulation and increased temperature. Reduced flows may also affect lagoon breaching dynamics and salinity. The extent of these impacts depends upon the amount of water diverted relative to other flows in the river (surface and groundwater), as well as the extent of other diversions downstream. Clearly, the impacts have the greatest potential to be significant during dry months in dry years, when effluent flow is likely to comprise a high proportion of total flow and diversions are probably highest. Conversely, during wet weather periods, the impact of removing all or a portion of the discharge would likely be negligible, as the discharge would comprise only a small percentage of the overall flows.

This feasibility analysis is a preliminary evaluation based on existing data as to whether or not the proposed project is "doable". In this case, "doable" is a function of cost-benefit analysis and environmental evaluation. The cost-benefit analysis from the engineering side is relatively straightforward and involves a comparison of the potential market for recycled water, the infrastructure and related costs necessary to deliver the water, and the estimated value of that water. Conversely, the environmental assessment at this preliminary level is a qualitative effort to relate changes in discharge flows to potential impacts on organisms in the receiving environment. This effort is made even more difficult by the fact that flow requirements, as well as temporal and spatial distributions, are not well-characterized for the primary species of concern in the lower River (i.e., southern steelhead). Thus, there are no specific flow optima and habitat preferences against which to compare. Consequently, the environmental evaluation of feasibility is a qualitative assessment, based on existing data, as to whether the proposed project is likely to create negative impacts so severe as to not be mitigable.

In order to make an evaluation of environmental feasibility, boundaries were necessary to aid in forming a basis for this determination. At one extreme, a boundary was established at the lowest edge of historical flows in the lower river. This boundary was selected because it was assumed that flows that consistently fell outside of the historical range would not provide sufficient habitat to sustain biological resources at the current level. The upper boundary of the analysis was identified as the current discharge flow; i.e., without any reduction. This was selected as the "status quo", and corresponds to what the lower River has experienced over the past 20-odd years. The extent to which the proposed level of reuse departed from the "status quo" was then used to estimate the potential level of impact and the corresponding level of mitigation that might be necessary to compensate for the impact.

In terms of a making a preliminary feasibility analysis based on the potential environmental impacts associated with recycling all or a portion of OVSD discharge, the engineering and market analysis suggest that it would be economical to provide recycled water to Aera Energy and local agricultural users. This level of use would account for approximately half of the existing discharge, and was selected as one point for comparison. The other point of comparison was a full-reuse scenario that assumed that a local market could be developed for all of the recycled water. These two options were then compared with streamflow parameters associated with historical flows and un-impeded effluent discharge levels to ascertain the extent to which these parameters would be altered at the different levels of re-use. As noted in the text, this hydrological analysis was somewhat simplistic in that a number of key variables were not quantified (e.g., ground water contribution to surface flows). Furthermore, no allowances were made for additional appropriations within this reach. Nonetheless, it is helpful to use this analysis as a basis for further speculation since it utilizes available data and serves as a reasonable point for determining whether or not it may be appropriate to move forward.

The option of using the entire discharge flow for water re-use provides a point of reference for evaluating the maximum potential level of environmental impacts. Section 2 (Hydrology) provided a comparison of different flow scenarios with respect to historical flows, as well as modeled differences in stream parameters (e.g., depth, width, velocity--see Tables 2.1 and 2.2).

Complete reuse would leave approximately 1.5 cfs present in the lower River in the summer months during moderately dry years (i.e., 25th percentile water years) when some upstream surface flows would remain in the River. However, during extremely dry years, which might be expected to occur one year in 20, complete reuse would leave no water in the lower River since upstream contributions would be nil. Given that the lower River has had the benefit of continuous flows from the discharge for the past twenty-odd years, complete cessation of flows would create a condition outside of the range of flows that has been supporting local biological resources. Thus, the local biological resources would likely not be sustainable under these conditions. In addition, elimination of the discharge (i.e., complete reuse) will also mean elimination of the wetted discharge channel that currently supports habitat downstream of the discharge point.

An evaluation of feasibility includes not just the extent of potential impact, but also the potential for mitigating such impacts. Concomitantly, the greater the impact, the more problematic it will be to mitigate. In this case, complete removal of flows in the lower River will also mean elimination of the associated aquatic community. In the absence of such a community, the possibility for mitigation is questionable, since there will be no community present locally to benefit from any mitigation efforts. It is possible that offsets could be undertaken in different parts of the watershed, or in different watersheds entirely, but it is not likely that such efforts could be successfully implemented for all species, or be justified for endangered species.

Thus, based on this qualitative analysis, full re-use of the discharge will potentially be associated with a range of impacts that could include complete elimination of aquatic habitat in very dry years. This level of impact would be problematic to effectively mitigate. In addition, it is not clear if a local market currently exists for this amount of recycled water, or if such markets can be supplied economically. Using these findings as a basis for evaluation, the preliminary feasibility analysis suggests that current data do not support complete re-use of the discharge. Consequently, re-use of all available OVSD effluent is not a recommendation of this report.

A similar qualitative analysis was undertaken regarding the feasibility of partial re-use (i.e., 1000 acre-ft/yr, corresponding to a reduction in discharge flow of 1.4 cfs). In a moderately dry water year (i.e., 25th percentile), the preliminary hydrological analysis suggests that relatively modest reductions will occur in parameters such as stream width, depth and velocity (see again Tables 2.1 and 2.2, Section 2), typically ranging from 10 to 30 percent. Even in an extremely dry year, there would still be more flow in the lower River than would be present in a moderately dry year in the absence of the discharge. Thus, flows associated with this scenario would remain within historical ranges, and would also be present even during extremely dry years, continuing to support a biological community that has depended on perennial dry weather flows for at least the past 20-odd years.

The fact that flows associated with the partial re-use scenario are within historical ranges for moderately dry years, and exceed those historically associated with extremely dry years, suggests that they have the potential to sustain the local biological community. However, they do represent a reduction in flow, compared with the zero re-use scenario. Consequently, the feasibility analysis requires some estimate of the potential for mitigating or reducing the differences in flows. Assuming that "flow area" (an estimate of the wetted cross-section of stream) provides a reasonable estimate of potential carrying capacity (and further assuming that carrying capacity is actually achieved and not otherwise limited by other factors such as predation, temperature or water quality), then the model predicts reductions of 21 and 36%, respectively, during moderately and extremely dry water years, compared with no re-use (Table 2.2). These reductions are moderate in magnitude, and suggest that measures to mitigate the potential loss of carrying capacity could be effectively implemented. Consequently, there is reasonable potential that the option to reuse part of the available OVSD effluent can be implemented without loss of environmental values and, considering the significant benefits of conserving as much as 1000 acre-feet per year of potable water supply, this option merits the additional study necessary to definitively determine the level of impact and the adequacy of potential mitigation.

For the purposes of illustrating the concept of potential mitigation measures that could be applied in this case, the following options could be considered:

- Purchase of water rights in the lower River. This would benefit local biological resources under a wide range of flow conditions, and remove a potential threat to these resources that is currently not regulated.
- Removal of dense macrophyte beds in the lower River. This would benefit local biological resources under a wide range of flow conditions, including improving fish passage and water quality, as well as eliminating water losses through transpiration.
- Habitat improvement and maintenance projects. Key habitats in the lower River include the few deep pools present in this reach. These have the potential to fill-

in during seasonal high–flow events in which large volumes of sediment are transported downstream. Decommissioning of the Matilija Dam may also result in the mobilization of sediments that will be transported downstream and may settle in these areas, as well. Thus, continued maintenance of these habitat units as appropriate will help to ensure that the potential to support valued ecological resources in this reach is not compromised.

- Removal of non-native species. Significant numbers of large carp are present in the lower River, and tend to be associated with the deeper pools. Juvenile steelhead would tend to be confined to these pools during the dry season, and would be vulnerable to predation; indeed, a quick calculation suggests that carp could potentially be a major factor limiting juvenile abundance in the lower River. Thus, removal of carp (and other exotic species) would not only reduce the predation pressure on juvenile steelhead, but also reduce competition for food resources. In addition, biomass may be limited by water quality during the summer months (e.g., by available dissolved oxygen), and removal of large carp should also concomitantly reduce the oxygen demand, ultimately increasing the carrying capacity for steelhead.
- Purchase of water rights/habitat easements in the upper watershed. This option would not directly address potential impacts to the lower River, but could provide off-sets by protecting habitat in other reaches that has been identified as valuable, but otherwise limited in achieving its potential due to local land uses and/or water appropriations. Species of interest would include steelhead and the red-legged frog.

Another potential option for mitigation could include incorporation of seasonality into water re-use options. In this approach, less water would be recycled during dry periods, leaving more flow in the River during periods in which natural surface flows were most limited. Finally, since the City is currently providing the potential recycled water users with raw or potable water that is obtained from the River, implementing a level of water re-use would reduce the immediate demand on the River as a source of water for these customers. The extent to which this water might be "left in the river" is not known at this time, but could be a potential consideration in the future.

In this discussion of potential impacts, it may be helpful to consider steelhead as a key environmental receptor to evaluate the possible level of effects associated with reducing the discharge from approximately 3.1 to 1.7 cfs. The main habitat features necessary for steelhead in the lower River are sufficient depth over riffles to permit passage, and pool habitat suitable for temporary or long-term residence. Passage is largely a function of seasonal increases in river flow, and the discharge is a minor contribution to these events. In other words, a reduction in discharge flow of 1.4 cfs will not have a large effect (i.e., approximately 0.5 inches) on the depths over the broad shallow riffles that currently limit passage during low flows downstream of the discharge point (see Table 2.1). Similarly, passage through the dense stands of macrophytes downstream of the discharge point will not be affected by a change in flow of 1.4 cfs; in this case, only seasonal increases in outflows related to precipitation events will provide the necessary depth to ensure passage. For example, recent observations of at least two adult steelhead (July-August 2007) in the lower River included notations that macrophytes completely blocked some sections of the channel, even though the flow was estimated to be at least 6 and 7 cfs (estimate based on summation of Foster Park Gage and OVSD discharge, and not including any surfacing groundwater or tributary influences—Capelli 2007).

Steelhead also depend on pool habitat, especially during summer dry periods when riffle habitat in southern California streams typically becomes too shallow to provide the necessary habitat. The bedrock pools that currently occur in the lower reaches downstream of the treatment plant are a function of local geology; thus, existing resting areas for adults and smolts, as well as rearing habitat for juveniles will largely be maintained, regardless of a reduction in flow of 1.4 cfs. However, this reduction in flow will reduce the amount of water flowing through these pools, with a concomitant reduction in potential carrying capacity. As noted above, the anticipated reduction in carrying capacity would be a function of the discharge flow relative to other flows in the lower River and, even during extremely dry water years, is projected to be within a range that is mitigable.

In summary, this preliminary evaluation suggests that an intermediate level of re-use of effluent from the OVSD discharge is potentially feasible from both economic and environmental perspectives. However, the extent of associated environmental impacts may vary, depending on other factors such as increased utilization of water from the Foster Park well-fields, increased utilization of groundwater resources in the lower Ventura River, and increased utilization of existing water rights. In addition, the interactions between river flows and estuary conditions and dynamics remains largely unknown, and needs to be further evaluated to determine if any anticipated changes are within the range of natural variation and potentially mitigable. Regardless, should this project continue to be developed, it will provide an opportunity to evaluate steelhead issues on a watershed-wide basis, with the potential for applying mitigation measures that will provide the greatest overall benefit.

6 IMPLEMENTATION AND SCHEDULE

There is no fixed timeframe for undertaking this project; however, further development of this project will require a number of steps to be undertaken. The first is submittal of this report to the State Water Resources Control Board, as it provides the necessary documentation that the recycled water can be provided to an identified market at a rate that falls within State guidelines. Moreover, this report also provides a preliminary assessment of the potential environmental impacts associated with reducing the discharge to the Ventura River, and suggests that anticipated impacts associated with an intermediate level of re-use are likely to be mitigable.

To qualify for additional funding to pursue studies related to the potential implementation of the water re-use project, the City will also need to obtain an agreement with OVSD with respect to facility operations and supply, as well as assurances from potential users of recycled water.

Thus, the City would need to execute a Memorandum of Understanding (MOU) with OVSD with regards to the use and operation of facilities associated with reuse of the effluent. As part of the City's March 18, 1963 Ground Lease Agreement with OVSD, OVSD also has the option to participate in the costs and revenues generated through reuse of the effluent. Finally, the City may need to develop a MOU with the Casitas Municipal Water District (Casitas) since the reuse of OVSD's effluent would be within Casitas's service area.

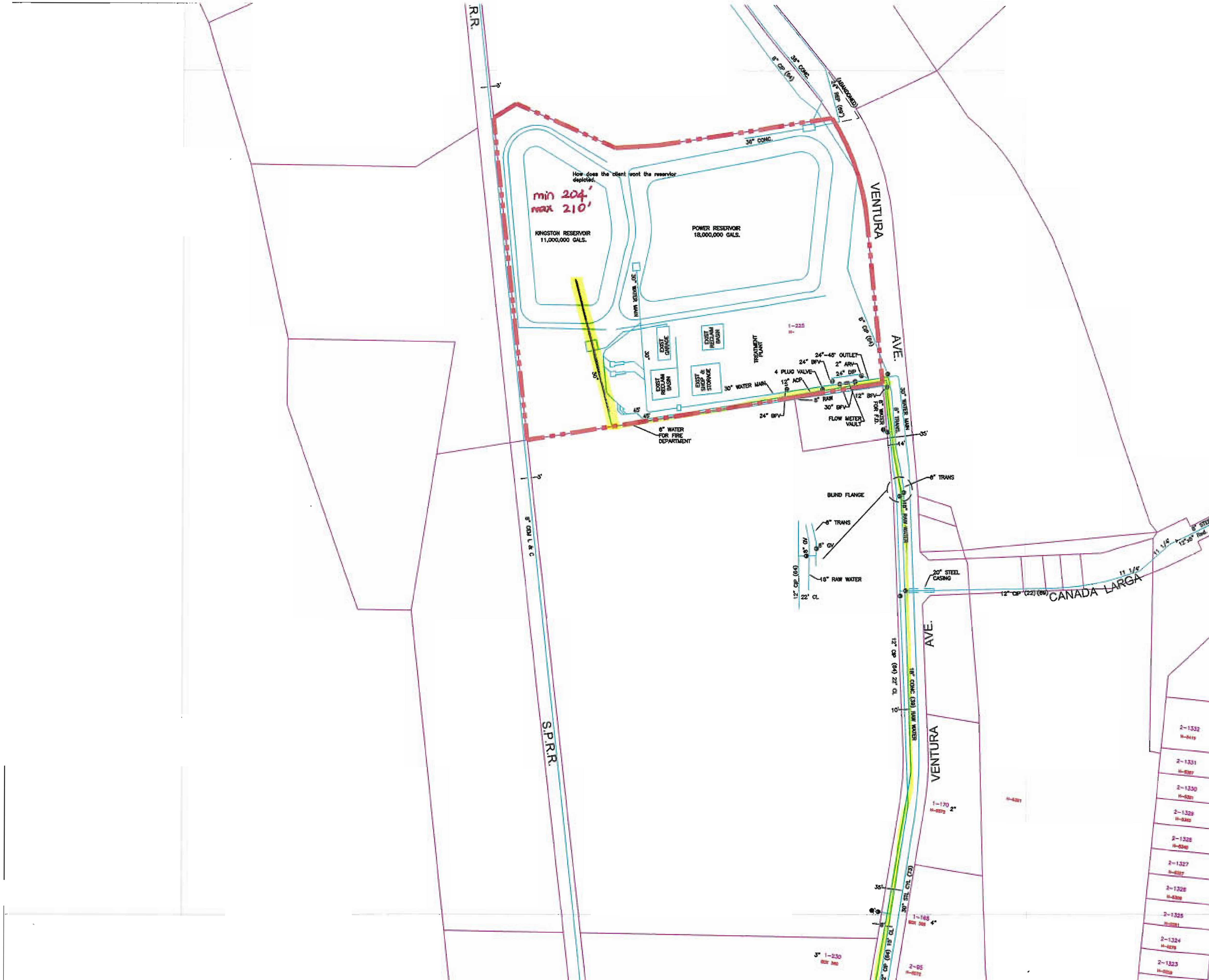
With respect to market assurances, until a full environmental impact analysis can be completed, the exact number of potential recycled water customers is unknown. Therefore, only those customers identified in this feasibility analysis are considered potential customers at this time. Moreover, since the largest potential customer is Aera Energy, with a current demand close to the amount of effluent available for reuse, an extraterritorial water service agreement between the City and Aera Energy to purchase the recycled water would provide sufficient market assurance for the City to move forward with the proposed project.

From the regulatory compliance and environmental review perspective, Section 3.6 provided an overview of the likely approvals and compliance steps necessary to implement the proposed project. With a project of this nature, it is recommended that the City convene a pre-application type meeting with the appropriate agencies early in the planning process. This meeting would allow the City to outline the proposed project and provide the agencies with the opportunity to express their points of view. This early coordination ensures that the proposed project is planned with sufficient knowledge of the agencies requirements. For the environmental review process under CEQA, the initial steps would be to establish a defined project description and to conduct an Initial Study to determine the appropriate level of CEQA documentation. Although this scoping step has not yet occurred, the City should expect an EIR for this project.

On the engineering side, following project approval, the first step would be preparation of a Pre-Design Report presenting the recommended design criteria and a preliminary design. Once approved, Final Plans and Specifications would be prepared at increasing levels of detail to allow thorough review of the engineering details at increasing levels of complexity. Once these are approved, a bid process would be undertaken for construction services. The Project Engineers could provide technical assistance during the bid, as well as during the construction phase; the level of this assistance would depend on the extent to which the City is involved in managing the project. Following completion of construction, the Project Engineers would also be available to provide assistance during start-up.

APPENDIX A

Existing Raw Water Pipeline



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SCALE 1" = 100'

DATE OF MAP PRODUCTION: 03-31-2006

LEGEND

	Water Main Line
	Water Main Line (Abandoned)
	Water Service Line
	ROW / Property Line
	Water Easement Line
	City Boundary
MAIN STREET	Street Name
	Fire Hydrant
	Gate Valve (Size as noted)
	Blow Off (Size as noted)
	Butterfly Valve (Size as noted)
	Plug
	Plug and Block
	Reducer (Sizes as noted)
H-123	House Address
84-230	Water Account Number
6" ACP	Water Main Pipe Text (Typ) (Size as noted)
H 30	Atlas Grid Cell Designation
260	Water Pressure Zone

LOCATION AND INFORMATION PERTAINING TO WATER FACILITIES DEPICTED ON THIS DRAWING WERE COMPILED FROM ORIGINAL HARDCOPY CITY ATLAS MAPS AND DO NOT REPRESENT A FIELD SURVEY. ACTUAL PHYSICAL LOCATIONS OF FACILITIES MUST BE FIELD VERIFIED.

SCALE 1" = 2000'

Water System Atlas

T 7

Prepared By:
Sage Consultants, Inc.
1978 Ventura Blvd
Camarillo, CA 93010
(805) 482-6088

Rev	Description	Date
A	Task 1 Review	06/27/2002
B	Task 1 Final	07/01/2004

N
W E
S

SCALE 1" = 100'

DATE OF MAP PRODUCTION: 03-31-2006

LEGEND

	Water Main Line
	Water Main Line (Abandoned)
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H 30	Atlas Grid Cell Designation
260	Water Pressure Zone

LOCATION AND INFORMATION PERTAINING TO WATER FACILITIES DEPICTED ON THIS DRAWING WERE COMPILED FROM ORIGINAL HARDCOPY CITY ATLAS MAPS AND DO NOT REPRESENT A FIELD SURVEY. ACTUAL PHYSICAL LOCATIONS OF FACILITIES MUST BE FIELD VERIFIED.

SCALE 1" = 2000'

Water System Atlas

Q 8

Prepared By:
Sage Consultants, Inc.
1976 Ventura Blvd
Camarillo, CA 93010
(805) 482-6088

Rev	Description	Date
A	Task 1 Review	06/27/2002

N
W E
S

SCALE 1" = 100'

DATE OF MAP PRODUCTION: 03-31-2006

LEGEND

	Water Main Line
	Water Main Line (Abandoned)
	Water Service Line
	ROW / Property Line
	Water Easement Line
	City Boundary
MAIN STREET	Street Name
	Fire Hydrant
	Gate Valve (Size as noted)
	Blow Off (Size as noted)
	Butterfly Valve (Size as noted)
	Plug
	Plug and Block
	Reducer (Sizes as noted)
H-123	House Address
84-230	Water Account Number
6" ACP	Water Main Pipe Text (Typ) (Size as noted)
H 30	Atlas Grid Cell Designation
260	Water Pressure Zone

LOCATION AND INFORMATION PERTAINING TO WATER FACILITIES DEPICTED ON THIS DRAWING WERE COMPILED FROM ORIGINAL HARDCOPY CITY ATLAS MAPS AND DO NOT REPRESENT A FIELD SURVEY. ACTUAL PHYSICAL LOCATIONS OF FACILITIES MUST BE FIELD VERIFIED.

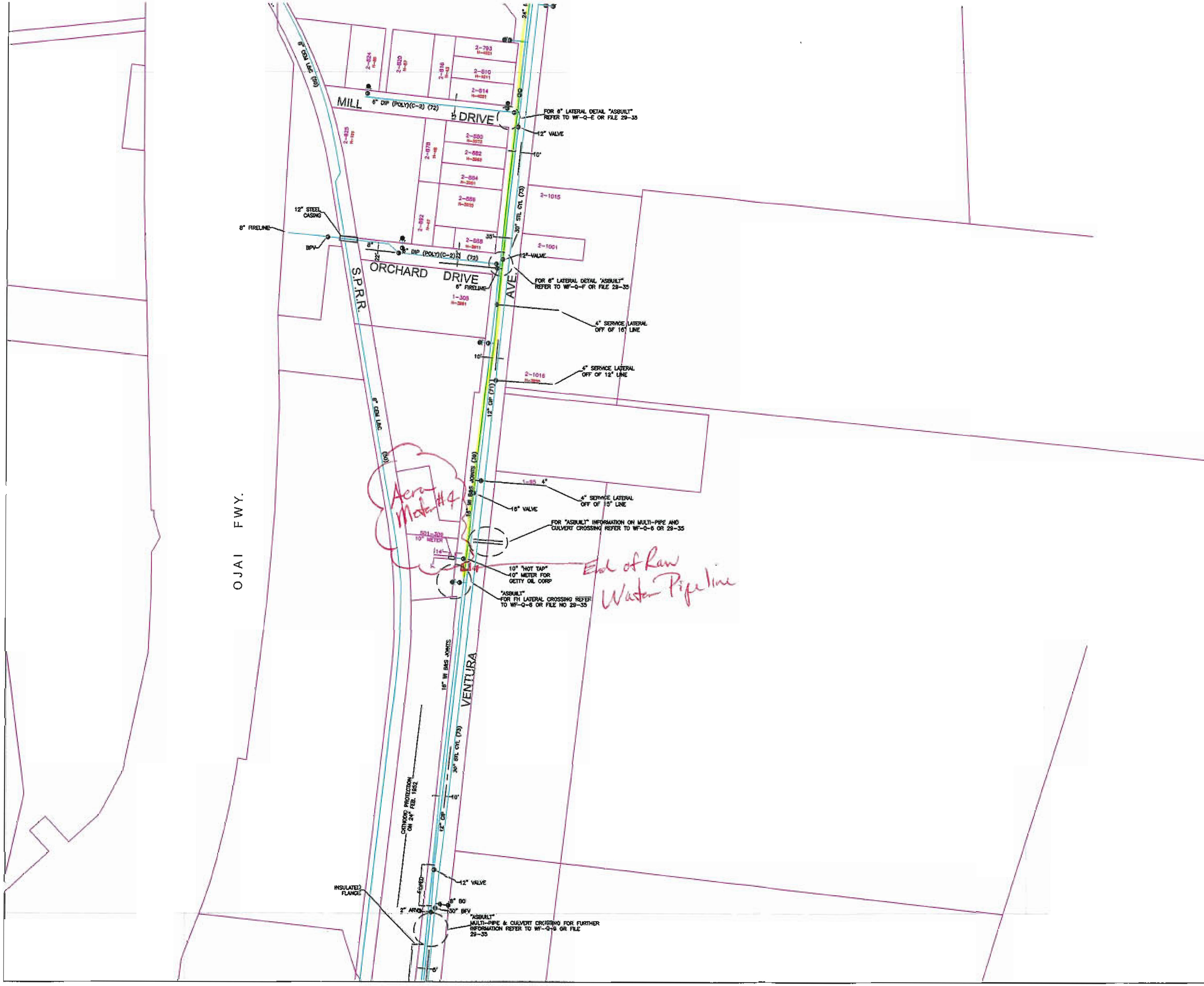
SCALE 1" = 2000'

Water System Atlas

S 7

Prepared By:
Sage Consultants, Inc.
1978 Ventura Blvd
Camarillo, CA 93010
(805) 482-6088

Rev	Description	Date
A	Task 1 Review	06/27/2002
B	Task 1 Final	07/01/2004



N
W
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S

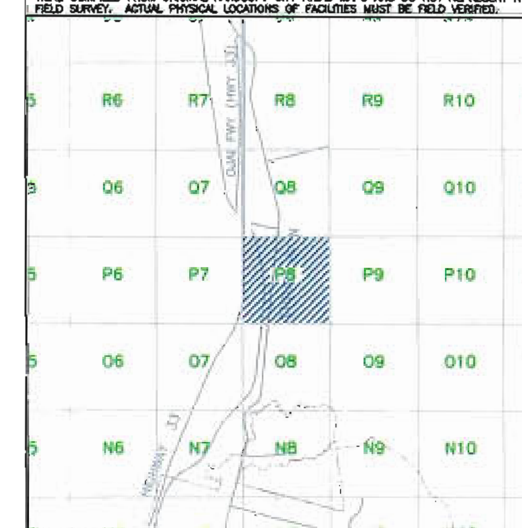
SCALE 1" = 100'

DATE OF MAP PRODUCTION: 03-31-2006

LEGEND

- Water Main Line
- Water Main Line (Abandoned)
- Water Service Line
- ROW / Property Line
- Water Easement Line
- City Boundary
- MAIN STREET — Street Name
- Fire Hydrant
- Gate Valve (Size as noted)
- Blow Off (Size as noted)
- Butterfly Valve (Size as noted)
- Plug
- Plug and Block
- Reducer (Sizes as noted)
- H-123 — House Address
- 84-230 — Water Account Number
- 8" ACP — Water Main Pipe Text (Typ) (Size as noted)
- H 30 — Atlas Grid Cell Designation
- 260 — Water Pressure Zone

LOCATION AND INFORMATION PERTAINING TO WATER FACILITIES DEPICTED ON THIS DRAWING WERE COMPILED FROM ORIGINAL HARDCOPY CITY ATLAS MAPS AND DO NOT REPRESENT A FIELD SURVEY. ACTUAL PHYSICAL LOCATIONS OF FACILITIES MUST BE FIELD VERIFIED.



SCALE 1" = 2000'

Water System Atlas

P 8

Prepared By:
Sage Consultants, Inc.
1978 Ventura Blvd
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Rev	Description	Date
A	Task 1 Review	06/27/2002
B	Task 1 Final	07/01/2004

APPENDIX B

Basis of Cost Estimate and Detailed Cost Estimate Tables-Engineering

BASIS OF ESTIMATE REPORT
Ojai Valley WWTP Upgrade
Effluent Re-Use Feasibility Study

Introduction

Brown and Caldwell (BC) is pleased to present this estimate of probable construction cost (estimate) prepared for the Ojai Valley WWTP Upgrade, Effluent Re-Use Feasibility Study

Summary

This Basis of Estimate contains the following information:

- Scope of work
- Background of this estimate
- Class of estimate
- Estimating methodology
- Direct cost development
- Indirect cost development
- Bidding assumptions
- Estimating assumptions
- Estimating exclusions
- Contractor and other estimate markups
- Allowances for known but undefined work

Scope of Work

The scope of work presented in this estimate is infrastructure improvements required to deliver flows from the Effluent Reaeration Structure to the 18 inch Kingston Raw Water Reservoir outflow pipe for effluent re-use.

Background of this Estimate

The attached estimate of probable construction cost is based on documents dated May 2007 received by the estimating department. These documents are described as a feasibility study based on the current design progression and ongoing discussions with the project design team. Further information can be found in the detailed estimate reports.

Class of Estimate

In accordance with the Association for the Advancement of Cost Engineering International (AACE) criteria, this is a Class 5 estimate. A Class 5 estimate is defined as a Conceptual Level or Project Viability Estimate. Typically, engineering is from 0 percent to 2 percent complete. Class 5 estimates are used to prepare planning level cost scopes or evaluation of alternative schemes, long range capital outlay planning and can also form the base work for the Class 4 Planning Level or Design Technical Feasibility Estimate.

Expected accuracy for Class 5 estimates typically ranges from -50 percent to +100 percent, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. In unusual circumstances, ranges could exceed those shown.

Estimating Methodology

This estimate was prepared using quantity take-offs, vendor quotes, and equipment pricing furnished either by the design team or by the estimator. The estimate includes direct labor costs, including a shift differential if applicable, and anticipated productivity adjustments to labor, and equipment. Where possible, estimates for work anticipated to be performed by specialty subcontractors have been used.

Construction labor crew and equipment hours were calculated from production rates contained in documents and electronic databases published by R.S. Means, Mechanical Contractors Association (MCA), National Electrical Contractors Association (NECA), and Rental Rate Blue Book for Construction Equipment (Blue Book).

This estimate was prepared using BC's estimating system, which consists of a Windows-based commercial estimating software engine using BC's material and labor database, historical project data, the latest vendor and material cost information, and other costs specific to the locale of the project.

Direct Cost Development

Costs associated with the General Provisions and the Special Provisions of the construction documents, which are collectively referred to as Contractor General Conditions (CGC), were based on the estimator's interpretation of the contract documents. The estimates for CGCs are divided into two groups: a time-related group (e.g., field personnel), and non-time-related group (e.g., bonds and insurance). Labor burdens such as health and welfare, vacation, union benefits, payroll taxes, and workers compensation insurance are included in the labor rates. No trade discounts were considered.

Indirect Cost Development

Local sales tax has been applied to material and equipment rentals. A percentage allowance for contractor's home office expense has been included in the overall rate markups. The rate is standard for this type of heavy construction and is based on typical percentages outlined in Means Heavy Construction Cost Data, 2007.

The contractor's cost for builders risk, general liability, and vehicle insurance has been included in this estimate. Based on historical data, this is typically two to four percent of the overall construction contract amount. These indirect costs have been included in this estimate as a percentage of the gross cost, and are added to the net totals after the net markups have been applied to the appropriate items.

Bidding Assumptions

The following bidding assumptions were considered in the development of this estimate.

1. Bidders must hold a valid, current Contractor's license in California, applicable to the type of project.

2. Bidders will develop estimates with a competitive approach to material pricing and labor productivity, and will not include allowances for changes, extra work, unforeseen conditions, or any other unplanned costs.

3. Estimated costs are based on a minimum of four bidders. Actual bid prices may increase for fewer bidders or decrease for a greater number of bidders.

4. Bidders will account for General Provisions and Special Provisions of the contract documents and will perform all work except that which will be performed by traditional specialty subcontractors as identified here:

   a. Electrical
   b. Painting
   c. Plumbing

Estimating Assumptions

As the design progresses through different completion stages, it is customary for the estimator to make assumptions to account for details that may not be evident from the documents. The following assumptions were used in the development of this estimate.

1. Contractor performs the work during normal daylight hours, nominally 7 a.m. to 5 p.m., Monday through Friday, in an 8-hour shift. No allowance has been made for additional shift work or weekend work.

2. Contractor has complete access for lay-down areas and mobile equipment.

3. Equipment rental rates are based on verifiable pricing from the local project area rental yards, Blue Book rates, and rates contained in the estimating database.

4. Contractor markup is based on conventionally accepted values that have been adjusted for project-area economic factors.

5. Major equipment costs are based on both vendor supplied price quotes obtained by the project design team and/or estimators, and on historical pricing of like equipment.

6. Process equipment vendor training using vendors' standard Operations and Maintenance (O&M) material, is included in the purchase price of major equipment items where so stated in that quotation.

7. Bulk material quantities are based on manual quantity take-offs that have been entered into the estimating program.

8. There is sufficient electrical power to feed the specified equipment. It is assumed that the local power company will supply power and transformers suitable for this facility.

9. Soils are of adequate nature to support the structures. No piles have been included in this estimate.

10. Asphalt removal and replacement is assumed to be 3 inches thick.

11. 12 inches of granular fill is assumed under all structural slabs.

12. It was assumed that structural excavations would need to be shored to limit excavation extent.

13. The foundation slab for the wet well is assumed to be 24 inch thick.

14. Wall for the wet well are assumed to be 12 inch thick.

15. The MCC pad is assumed to be a slab on grade of 12 inch thickness with a thickened edge.

16. The wet well was assumed to be covered with a 12 inch thick concrete slab and metal hatch.

17. Pipelines are to be installed with bedding from 6 inched under the pipe invert to 12 inches above the pipe crown.

18. The 18 inch gravity line is assumed to be welded steel.

19. The 8 inch force main is assumed to be ductile iron pipe.

20. Excavation for the 18 inch gravity line and the portion of the 8 inch force main within pavement will require shoring to limit excavation width. The remainder of the 8 inch force main's excavation will be laid back to stable trench slope.

21. The estimate assumes shoring of the 30 inch SDR as low production rates for installing the 18 inch gravity line underneath.

22. No building permit cost is included in the estimate.

23. No escalation is included in the estimate which reflects "today's" cost.

24. The MCC is assumed to be located outside on a pad.

25. Bypass pumping was not included for connection to the Dewater Reaeration Structure. It was assumed that the owner would be responsible for closing and draining this structure prior to construction.

26. The force main is assumed to connect to an existing manhole structure some distance above the invert an end within the structure with a flap valve. Bypass pumping and modification of the manhole invert channel are not included in this estimate.

27. High groundwater and dewatering of excavations was not included in this estimate.

28. Rock excavation was not included in this estimate.

Estimating Exclusions

The following estimating exclusions were assumed in the development of this estimate.

1. Hazardous materials remediation and/or disposal.

2. O&M costs for the project with the exception of the vendor supplied O&M manuals.

3. Utility agency costs for incoming power modifications.

4. Permits beyond those normally needed for the type of project and project conditions unless otherwise noted.

Contractor and Other Estimate Markups

Contractor markup is based on conventionally accepted values which have been adjusted for project-area economic factors. Estimate markups are shown in Table 1.

Table 2. Estimate Markups, May 2007

Item	Rate, percent
Prime Contractor	
Labor (employer payroll burden)	18
Materials and process equipment	15
Equipment (construction-related)	15
Subcontractor	5
Sales Tax (State and local for materials, process equipment and construction equipment rentals, etc.)	8.25
Startup, Training, O&M	2
Builder's Risk, Liability, and Vehicle Insurance	2.85
Material Shipping and Handling	4
Worker's Travel Subsistence	1
Earthquake Insurance (if applicable)	0.1
Subcontractor Markups	Same as Prime
Contractor General Conditions	12
Contingency	30
Performance Bond	1
Payment Bond	1

Labor Markup. The labor rates used in the estimate were derived chiefly from the latest published State Prevailing Wage Rates. These rates include costs beyond raw labor for such items as Payroll Tax and Insurance (PT&I), FICA, and Workers Compensation Insurance. In addition to these markups, the General Contractor (GC) typically adds a percentage to each raw labor dollar to cover overhead and profit, payroll and accounting costs, additional insurance, retirement, 401k contributions, and sick leave/vacation cost.

Materials and Process Equipment Markup. This markup consists of the additional cost the contractor must bear beyond the raw dollar amount for material and process equipment. This includes shop drawing preparation, submittal and/or re-submittal cost, purchasing and scheduling materials and equipment, accounting charges including invoicing and payment, inspection of received goods, receiving, storage, overhead and profit.

Equipment (Construction) Markup. This markup consists of the costs associated with operating the construction equipment used in the project. Most GCs will rent rather than own the equipment and then charge each project for its equipment cost. The equipment rental cost does not include fuel, delivery and pick-up charges, additional insurance requirements on rental equipment, accounting costs related to home office receiving invoices and payment. However, the crew rates used in the estimate do account for the equipment rental cost. Occasionally, larger contractors will have some or all of the equipment needed for the job, but in order to recoup their initial purchasing cost they will charge the project an internal rate for equipment use which is similar to the rental cost of equipment. The GC will apply an overhead and profit percentage to each individual piece of equipment whether rented or owned.

Subcontractor Markup. This markup consists of the GC's costs for subcontractors who perform work on the site. This includes costs associated with shop drawings, review of subcontractor's submittals, scheduling of subcontractor work, inspections, processing of payment requests, home office accounting, and overhead and profit on subcontracts.

Sales Tax (Materials, Process Equipment and Construction Equipment). This is the tax that the contractor must pay according to state and local taxation laws. The percentage is applied to both the material and equipment the GC purchases as well as the cost for rental equipment. The percentage is based on the local rates in place at the time the estimate was prepared.

Contractor Startup, Training, and O&M Manuals. This cost markup is often confused with either vendor startup or owner startup. It is the cost the GC incurs on the project beyond the vendor startup and owner startup costs. The GC generally will have project personnel assigned to facilitate the installation, testing, startup, and O&M Manual preparation for equipment that is put into operation by either the vendor or owner. These project personnel often include an electrician, pipe fitter or millwright, and/or I&E technician. These personnel are not included in the basic crew makeup to install the equipment but are there to assist and trouble shoot the startup and proper running of the equipment. The GC also incurs a cost for startup for such things as consumables (oil, fuel, filters, etc.), startup drawings and schedules, startup meetings, and coordination with the plant personnel in other areas of the plant operation.

Builders Risk, Liability, and Vehicle Insurance. This percentage comprises all three items. There are many factors which make up this percentage, including the contractor's track record for claims in each of the categories. Another factor affecting insurance rates has been a dramatic price increase across the country over the past several years due to domestic and foreign influences. Consequently, in the construction industry we have observed a range of 0.5 to 1 percent for Builders Risk Insurance, 1 to 1.25 percent for General Liability Insurance, and 0.85 to 1 percent for Vehicle Insurance. Many factors affect each area of insurance, including project complexity, and contractor's requirements and history. Instead of using numbers from a select few contractors, we believe it is more prudent to use a combined 2.85 percent to better reflect the general costs across the country. Consequently, the actual cost could be higher or lower based on the bidder, region, insurance climate, and on the contractor's insurability at the time the project is bid.

Material Shipping and Handling. This can range from 2 percent to 4 percent, and is based on the type of project, material makeup of the project, and the region and location of the project. Material shipping and handling covers delivery costs from vendors, unloading costs (and in some instances loading and shipment back to vendors for rebuilt equipment), site paper work, and inspection of materials prior to unloading at the project site. BC typically adjusts this percentage by the amount of materials and whether vendors have included shipping costs in the quotes that were used to prepare the estimate. This cost also includes the GC's cost to obtain local supplies, e.g., oil, gaskets, and bolts that may be missing from the equipment or materials shipped.

Construction Contingency. The contingency factor covers unforeseen conditions, area economic factors, and general project complexity. This contingency is used to account for those factors that can not be addressed in each of the labor and/or material installation costs. Based on industry standards, completeness of the project documents, project complexity, the current design stage, and area factors, construction contingency can range from 10 percent to 50 percent.

Range of Accuracy. The amount of contingency in the estimate should not be confused with the accuracy of the estimate. The Expected Accuracy Range defines the window within which the bids are expected to fall based on the project complexity, information available during the estimate process, outside influences (wage rates, material, bidding climate), and includes a level of contingency appropriate to the project definition at the time the estimate was prepared. It is important to understand that AACEI, notes on its ranges of accuracy that,

> "The state of process technology and availability of applicable reference cost data affect the range markedly. The +/- value [of the ranges] represents typical percentage variation of actual costs from the cost estimate after application of contingency (typically at a 50 percent level of confidence) for given scope."

While a 50-percent level of confidence in the contingency may seem broad, typically this results in a 90-percent confidence that the actual cost will fall within the bounds of the low and high ranges. The caution here is that these estimates are not what are often referred to as "bid quality," i.e., estimates prepared by contractors who are receiving competitive bids from subcontractors, equipment vendors, and materials suppliers. In general, we receive reasonable budget values from those willing to provide quotations.

Performance and Payment Bonds. Based on historical and industry data, this can range from 0.75 percent to 1.25 percent of the project total. There are several contributing factors including such items as size of the project, regional costs, contractor's historical record on similar projects, complexity, and current bonding limits. BC uses 1 percent for each bond which we have determined to be reasonable for most heavy construction projects.

Allowances for Known but Undefined Work

1. Electrical/Instrumentation

BROWN AND CALDWELL
Environmental Engineers & Consultants

Detailed Estimate Report

Monday, May 21, 2007   3:30:19 PM

Ojai Valley WWTP Upgrade

Effluent Re-Use Feasibility Study

Project Number::	132047-500
Client::	Ojai Valley Sanitary District
Estimator(s)::	Bob Ferguson
Estimating Office::	Arvada, CO
Estimate Issue Number::	01
Estimate Original Issue Date::	5/17/2007
Estimate Revision Number::	Rev 2
Estimate Revision Date::	5/21/2007
BC Project Manager::	Azhar Malik
Estimate QA/QC Reviewer::	Butch Matthews
Estimate QA/QC Date::	5/17/2007

PROJECT LOCATION / PROCESS AREA
1101 - Intake Sluice Gate
1102 - 18 inch Gravity Pipe
1103 - Reclaimed Water Pump Station
1104 - 8 inch Force Main
1105 - Connection Point Manhole
1106 - Electrical/Instrumentation

Item	Item Description	Quantity	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Grand Total
1101 - Intake Sluice Gate											
01 - GENERAL REQUIREMENTS											
01200 - General equipment rental											
0330	Rent trench box, 3000 lbs 6'x 8'	10.00	day						583		583
	GENERAL REQUIREMENTS Total								**583**		**583**
02 - SITE CONSTRUCTION											
02040 - Drilling, core											
0080	Drilling, core, 6"tk reinf conc slb w/bit,layout&setup,24"dia core,ea	1.00	each					433			433
0991	Drilling, core, Add'l Inch reinf conc slb w/bit,layout&setup,24"dia core,ea	6.00	in					519			519
02160 - Rubbish handling											
9999	Dump Charge, typical urban city, fees only, bldg constr mat'ls	5.90	ton							195	195
02320 - Backfill											
0040	Backfill, dozer backfilling, trench, up to 300' haul, no compaction	16.10	cuyd	0.75	12				24		37
02340 - Bedding											
0010	Bedding, crushed stone 3/4" to 1/2"	3.00	cuyd	8.09	24	32.00	96		7		127
02360 - Compaction											
0030	Compaction, vibratory plate, 8" lifts, common fill	0.50	cuyd	1.87	1				0		1
0030	Compaction, vibratory plate, 8" lifts, common fill	14.50	cuyd	1.87	27				9		36
0040	Compaction, vibratory plate, 8" lifts, select fill	2.60	cuyd	1.73	4				1		6
02450 - Excavating, trench											
0040	Excavate trench, common earth, 14'-20' deep, 1-1/2 CY hyd backhoe	17.60	cuyd	2.04	36				34		69
02460 - Hauling											
0050	Hauling, LCY, no loading, 20 c.y dump truck, 20 MI RT, 0.4 lds/hr	5.90	cuyd	5.36	32				68		100
0900	Loading Trucks, F.E. Loader, 3 C.Y.	5.90	cuyd	0.70	4				9		13
	SITE CONSTRUCTION Total				**141**		**96**	**952**	**152**	**195**	**1,535**
11 - EQUIPMENT											
11050 - Sluice gates											
0060	Hydraulic structures, sluice gate, HD, self cont, 18" x 18"	1.00	each	1,171.72	1,172	5,141.00	5,141		660		6,972
0380	Hydraulic structures, Sluice Gate, elec operator	1.00	each	364.12	364	5,000.00	5,000				5,364
	EQUIPMENT Total				**1,536**		**10,141**		**660**		**12,336**
15 - MECHANICAL											
15065 - PIPE, BLACK STEEL,WELDED											
0060	Piping, water dist, blk steel, pl end, welded, 1/4" wall, 18" dia	4.00	lnft	107.31	429	31.84	127		379		936
15330 - Flexible connectors											
0130	Connectors, flex, Dresser type, 18" dia.	1.00	each	238.00	238	503.50	504				742
15350 - Sleeves and escutcheons											
0150	Pipe sleeve, stl, wtr stop, 12" L w/link seal, 24" dia for 18" carrier	1.00	each	201.58	202	460.00	460				662
	MECHANICAL Total				**869**		**1,091**		**379**		**2,339**
1101 - Intake Sluice Gate	**1101 - Intake Sluice Gate Total**				**2,545**		**11,328**	**952**	**1,774**	**195**	**16,793**

Item	Item Description	Quantity	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Grand Total
1102 - 18 inch Gravity Pipe											
01 - GENERAL REQUIREMENTS											
01090 - Scaffolding											
0110	Heavy duty shoring, buy, frames 6' high 4' wide	20.00	each	419.92	8,398	107.06	2,141				10,540
0120	Heavy duty shoring, acessories, cross braces	20.00	each	26.24	525	16.96	339				864
0130	Heavy duty shoring, accessories, U-head, 8"x8"	20.00	each	26.24	525	16.96	339				864
0150	Heavy duty shoring, accessories, base plate, 8"x8"	20.00	each	26.24	525	13.78	276				801
0160	Heavy duty shoring, accessories, leveling jack	20.00	each	26.24	525	32.33	647				1,172
	GENERAL REQUIREMENTS Total				**10,498**		**3,742**				**14,240**
02 - SITE CONSTRUCTION											
02060 - Site demolition											
0170	Site dml, pavement removal, bituminous roads, 3" thick	28.00	sqyd	3.06	86				71		156
02160 - Rubbish handling											
9999	Dump Charge, typical urban city, fees only, bldg constr mat'ls	47.50	ton							1,568	1,568
02170 - Saw cutting											
0010	Saw cutting, asphalt, up to 3" deep	120.00	lnft	0.82	99	0.30	36		63		198
02300 - Soldier beams & lagging											
0290	Soldier beams & lag, wood sheeting, in trench, jacks at 4' OC, 15' D	2,520.00	sqft	1.93	4,861	0.58	1,462				6,323
02320 - Backfill											
0040	Backfill, dozer backfilling, trench, up to 300' haul, no compaction	146.90	cuyd	0.75	111				223		334
02340 - Bedding											
0010	Bedding, crushed stone 3/4" to 1/2"	22.60	cuyd	8.09	183	32.00	723		51		957
02360 - Compaction											
0030	Compaction, vibratory plate, 8" lifts, common fill	3.90	cuyd	1.87	7				2		10
0030	Compaction, vibratory plate, 8" lifts, common fill	132.20	cuyd	1.87	247				80		327
0040	Compaction, vibratory plate, 8" lifts, select fill	19.40	cuyd	1.73	34				11		44
02450 - Excavating, trench											
0040	Excavate trench, common earth, 14'-20' deep, 1-1/2 CY hyd backhoe	155.60	cuyd	2.04	317				296		614
02460 - Hauling											
0050	Hauling, LCY, no loading, 20 c.y dump truck, 20 MI RT, 0.4 lds/hr	47.50	cuyd	5.36	255				550		805
0900	Loading Trucks, F.E. Loader, 3 C.Y.	47.50	cuyd	0.70	33				70		103
02610 - Asphltc concrete pavement											
0020	Asphaltic conc pavement, and lg paved areas, binder course, 2" thick	28.00	sqyd	0.71	20	6.85	192		14		226
0050	Asphaltic conc pavement, and lg paved areas, wearing course, 1" thick	28.00	sqyd	0.47	13	4.05	113		9		136
	SITE CONSTRUCTION Total				**6,265**		**2,526**		**1,441**	**1,568**	**11,799**
15 - MECHANICAL											
15065 - PIPE, BLACK STEEL,WELDED											
0060	Piping, water dist, blk steel, pl end, welded, 1/4" wall, 18" dia	60.00	lnft	107.31	6,439	31.84	1,910		5,684		14,033
15190 - Pipe, steel											
2230	Pipe, steel, welding labor per joint, schedule 40, 18" pipe size	7.00	each	403.16	2,822				656		3,478
15195 - Pipe, steel, fittings											

Item	Item Description	Quantity	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Grand Total
0105	Pipe, steel ftngs, CI, standard weight, black, elbow, straight, 18"	2.00	each	1,528.70	3,057	713.12	1,426				4,484
	MECHANICAL Total				**12,318**		**3,336**		**6,340**		**21,994**
1102 - 18 inch Gravity Pipe	**1102 - 18 inch Gravity Pipe Total**				**29,081**		**9,604**		**7,780**	**1,568**	**48,033**

Item	Item Description	Quantity	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Grand Total
1103 - Reclaimed Water Pump Station											
01 - GENERAL REQUIREMENTS											
01090 - Scaffolding											
0790	Scaffold,h.d. shoring for suspended slab forms,fl area to 8'-2" H, 3 u	1.28	csf	45.32	58	10.44	13				71
	GENERAL REQUIREMENTS Total				**58**		**13**				**71**
02 - SITE CONSTRUCTION											
02060 - Site demolition											
0170	Site dml, pavement removal, bituminous roads, 3" thick	67.00	sqyd	3.06	205				169		374
02160 - Rubbish handling											
9999	Dump Charge, typical urban city, fees only, bldg constr mat'ls	218.50	ton							7,211	7,211
02170 - Saw cutting											
0010	Saw cutting, asphalt, up to 3" deep	100.00	lnft	0.82	82	0.30	30		53		165
02280 - Sheet piling											
0100	Sheet piling, stl, no wales, 40' exc, 38 PSF, drive, extrct&salvage	31.50	ton	322.58	10,161	450.00	14,175		9,574		33,910
0170	Sheet piling, steel, rent steel sheet piling and wales, first month	31.50	ton			240.00	7,560				7,560
0180	Sheet piling, steel, rent steel sheet piling and wales, per added mo	63.00	ton			24.00	1,512				1,512
0190	Sheet piling, steel, rental piling left in place, add to rental	6.50	ton			800.00	5,200				5,200
0200	Sheet piling, stl, wales, connections & struts, 2/3 salvage	9.00	ton			245.00	2,205				2,205
02320 - Backfill											
0040	Backfill, dozer backfilling, trench, up to 300' haul, no compaction	416.70	cuyd	0.75	314				634		948
02340 - Bedding											
0010	Bedding, crushed stone 3/4" to 1/2"	24.10	cuyd	8.09	195	32.00	771		54		1,020
0010	Bedding, crushed stone 3/4" to 1/2"	1.72	cuyd	8.09	14	32.00	55		4		73
02360 - Compaction											
0030	Compaction, vibratory plate, 8" lifts, common fill	10.40	cuyd	1.87	19				6		26
0030	Compaction, vibratory plate, 8" lifts, common fill	375.00	cuyd	1.87	700				226		926
0040	Compaction, vibratory plate, 8" lifts, select fill	20.70	cuyd	1.73	36				12		47
0130	Compaction, walk behind, vibrating plate 18" wide, 6" lifts, 4 passes	0.74	cuyd	2.67	2				1		3
02420 - Excavating, structural											
0040	Excavating, structural, mach excav, com earth, hyd backhoe, 1-1/2 CY b	508.10	cuyd	6.80	3,455				3,226		6,681
02460 - Hauling											
0050	Hauling, LCY, no loading, 20 c.y dump truck, 20 MI RT, 0.4 lds/hr	218.50	cuyd	5.36	1,172				2,530		3,702
0900	Loading Trucks, F.E. Loader, 3 C.Y.	218.50	cuyd	0.70	152				322		474
02590 - Membrane lining systems											
0020	Membrane lining, T-lock liner	1,136.00	sqft					18,744			18,744
02610 - Asphltc concrete pavement											
0020	Asphaltic conc pavement, and lg paved areas, binder course, 2" thick	48.00	sqyd	0.71	34	6.85	329		24		387
0050	Asphaltic conc pavement, and lg paved areas, wearing course, 1" thick	48.00	sqyd	0.47	23	4.05	194		16		233
	SITE CONSTRUCTION Total				**16,564**		**32,032**	**18,744**	**16,850**	**7,211**	**91,400**
03 - CONCRETE											
03040 - Fip,elevated slabs											

Item	Item Description	Quantity	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Grand Total
0010	Forms in place, elev slab, flat plate plywd, to 15' high	128.00	sqft	4.72	604	4.53	579				1,183
0060	Forms in place, elev slab, edge forms, 7" to 12" high	157.48	sfca	8.07	1,270	1.23	193				1,464
03090 - Forms place, slab grade											
0030	Forms in place, SOG, edge forms, over 12", wood	419.95	sfca	4.56	1,917	2.63	1,102				3,019
0030	Forms in place, SOG, edge forms, over 12", wood	142.17	sfca	4.56	649	2.63	373				1,022
03110 - Forms in place, walls											
0080	Forms in place, walls, job built plyform, 8-16' high	2,016.00	sfca	7.11	14,340	2.28	4,593				18,933
03120 - Waterstop											
0030	Waterstop, PVC, ribbed, w/center bulb, 3/16" thick, 9" wide	209.97	lnft	3.02	634	12.97	2,723				3,357
03130 - Reinforcing in place											
0070	Reinforcing in place, A615 Gr 60, slab on grade, #3 to #7	0.16	ton	835.62	131	1,250.00	197				328
0070	Reinforcing in place, A615 Gr 60, slab on grade, #3 to #7	0.10	ton	835.62	80	1,250.00	120				201
0070	Reinforcing in place, A615 Gr 60, slab on grade, #3 to #7	0.29	ton	835.62	241	1,250.00	361				602
0080	Reinforcing in place, A615 Gr 60, walls, #3 to #7	2.34	ton	640.64	1,502	1,250.00	2,931				4,433
0080	Reinforcing in place, A615 Gr 60, walls, #3 to #7	3.53	ton	640.64	2,259	1,250.00	4,408				6,667
0080	Reinforcing in place, A615 Gr 60, walls, #3 to #7	0.47	ton	640.64	303	1,250.00	592				895
0130	Reinforcing in place, A615 Gr 60, dowels, longer and heavier dowels	966.57	lb	1.32	1,281	2.49	2,407				3,687
0130	Reinforcing in place, A615 Gr 60, dowels, longer and heavier dowels	1,488.27	lb	1.32	1,972	2.49	3,706				5,678
0130	Reinforcing in place, A615 Gr 60, dowels, longer and heavier dowels	287.51	lb	1.32	381	2.49	716				1,097
0200	Reinforcing in place, unloading & sorting, add to above	8.26	ton	34.30	283				97		380
0210	Reinforcing in place, crane cost for handling, add to above	8.26	ton	97.99	809				277		1,086
03150 - Concrete, ready mix											
0030	Concrete, ready mix, regular weight, 4000 psi	17.78	cuyd			125.00	2,222				2,222
0030	Concrete, ready mix, regular weight, 4000 psi	37.33	cuyd			125.00	4,667				4,667
0030	Concrete, ready mix, regular weight, 4000 psi	0.99	cuyd			125.00	123				123
0030	Concrete, ready mix, regular weight, 4000 psi	8.42	cuyd			125.00	1,053				1,053
0030	Concrete, ready mix, regular weight, 4000 psi	4.74	cuyd			125.00	593				593
03170 - Placing concrete											
0120	Placing conc, incl vib, slab on grade, slab over 6" thick, pumped	17.78	cuyd	17.17	305				117		423
0120	Placing conc, incl vib, slab on grade, slab over 6" thick, pumped	0.99	cuyd	17.17	17				7		23
0120	Placing conc, incl vib, slab on grade, slab over 6" thick, pumped	8.42	cuyd	17.17	145				56		200
0120	Placing conc, incl vib, slab on grade, slab over 6" thick, pumped	4.74	cuyd	17.17	81				31		113
0130	Placing conc, incl vib, walls, 8" thick, pumped	37.33	cuyd	31.76	1,186				456		1,642
03180 - Finishing floors											
0030	Finishing floors, monolithic, screed, float & broom finish	240.00	sqft	0.65	155						155
0030	Finishing floors, monolithic, screed, float & broom finish	54.22	sqft	0.65	35						35
0030	Finishing floors, monolithic, screed, float & broom finish	128.00	sqft	0.65	83						83
03190 - Finishing walls											
0010	Finishing walls, break ties & patch voids	1,032.00	sqft	0.75	779	0.03	33				812
0020	Finishing walls, carborundum rub, wet rub	1,080.00	sqft	2.33	2,516	0.03	34				2,550
	CONCRETE Total				**33,960**		**33,726**		**1,041**		**68,727**

Item	Item Description	Quantity	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Grand Total
08 - DOORS and WINDOWS											
08060 - Floor, industrial											
0150	Access hatch, dbl. leaf, traffic loaded, alum., 6'x10'	1.00	each	558.56	559	980.50	981	75			1,614
	DOORS and WINDOWS Total				**559**		**981**	**75**			**1,614**
09 - FINISHES											
09020 - Coatings & Paints											
0610	Miscellaneous painting, pipe, to 8" dia, paint 2 coats, brushwork	60.00	lnft	1.81	109	0.68	41				149
	FINISHES Total				**109**		**41**				**149**
11 - EQUIPMENT											
11110 - Pumps submersible											
0030	Submersible Pump, guide rails, base elbow	3.00	each	1,120.00	3,360	14,000.00	42,000	375	171		45,906
0120	Pumps, submersible, sump pump, auto, cast iron,3" discharge,5 HP	1.00	each	224.00	224	1,325.00	1,325				1,549
	EQUIPMENT Total				**3,584**		**43,325**	**375**	**171**		**47,455**
14 - CONVEYING SYSTEMS											
14020 - Material handling											
990	Crane, davit type	1.00	each	412.96	413	2,500.00	2,500				2,913
	CONVEYING SYSTEMS Total				**413**		**2,500**				**2,913**
15 - MECHANICAL											
15030 - Pipe,watr dstr,ductl iron											
0060	Flange, gskt & bolt set, 4" pipe	20.00	each	56.00	1,120	8.70	174				1,294
0090	Flange, gskt & bolt set, 8" pipe	30.00	each	89.60	2,688	14.45	434				3,122
0190	Piping, pipe, D.I.C.L., tyton, push-on joint, 4" diameter	20.00	lnft	5.23	105	10.61	212		40		357
0210	Piping, pipe, D.I.C.L., tyton, 8" diameter	90.00	lnft	10.47	942	12.75	1,148		356		2,446
0480	Piping, water dist, DI, 90< bend or elbow, 4" dia	1.00	each	99.41	99	45.00	45				144
0500	Piping, water dist, DI, 90< bend or elbow, 8" dia	6.00	each	149.08	894	112.80	677				1,571
0680	Piping, fittings, wye or tee, 8" diameter	4.00	each	223.72	895	243.00	972				1,867
1110	Piping, plug, 8" dia	1.00	each	140.00	140	40.15	40				180
15135 - Pipe hangers and supports											
1105	Pipe support, CI saddle, adjustable, 8" pipe	8.00	each	8.45	68	310.00	2,480				2,548
15280 - Valves, plug											
0120	Valves, semi-steel, lubricated plug valve, flanged, 200 psi, 4" pipe	1.00	each	268.77	269	350.00	350				619
0150	Valves, semi-steel, lubricated plug valve, flanged, 200 psi, 8" pipe	3.00	each	501.73	1,505	1,175.00	3,525				5,030
15285 - Valves, steel											
0140	Valves, steel, cast, check valve, swing type, 300 lb., 4" size	1.00	each	287.97	288	1,150.00	1,150				1,438
0160	Valves, steel, cast, check valve, swing type, 300 lb., 8" size	3.00	each	522.63	1,568	3,000.00	9,000				10,568
15715 - Piping, testing											
0060	Nondestructive hydraulic pressure test, 6" - 10" pipe	1.00	each	806.32	806	1,325.00	1,325				2,131
	MECHANICAL Total				**11,387**		**21,532**		**396**		**33,315**
17 - INSTRUMENTATION											
17080 - FLOW INSTRUMENTS											

Item	Item Description	Quantity	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Grand Total
0080	Mag Meters, 8"	1.00	each	812.00	812	6,872.08	6,872				7,684
	INSTRUMENTATION Total				**812**		**6,872**				**7,684**
1103 - Reclaimed Water Pump Station	**1103 - Reclaimed Water Pump Station Total**				**67,446**		**141,021**	**19,194**	**18,458**	**7,211**	**253,328**

Item	Item Description	Quantity	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Grand Total
1104 - 8 inch Force Main											
02 - SITE CONSTRUCTION											
02060 - Site demolition											
0170	Site dml, pavement removal, bituminous roads, 3" thick	17.00	sqyd	3.06	52				43		95
02160 - Rubbish handling											
9999	Dump Charge, typical urban city, fees only, bldg constr mat'ls	264.70	ton							8,735	8,735
02170 - Saw cutting											
0010	Saw cutting, asphalt, up to 3" deep	40.00	lnft	0.82	33	0.30	12		21		66
02300 - Soldier beams & lagging											
0290	Soldier beams & lag, wood sheeting, in trench, jacks at 4' OC, 15' D	160.00	sqft	1.93	309	0.58	93				401
02320 - Backfill											
0040	Backfill, dozer backfilling, trench, up to 300' haul, no compaction	619.30	cuyd	0.75	466				942		1,408
02340 - Bedding											
0010	Bedding, crushed stone 3/4" to 1/2"	163.70	cuyd	8.09	1,324	32.00	5,238		368		6,930
02360 - Compaction											
0030	Compaction, vibratory plate, 8" lifts, common fill	34.60	cuyd	1.87	65				21		85
0030	Compaction, vibratory plate, 8" lifts, common fill	557.40	cuyd	1.87	1,041				336		1,377
0040	Compaction, vibratory plate, 8" lifts, select fill	140.70	cuyd	1.73	243				79		322
02450 - Excavating, trench											
0040	Excavate trench, common earth, 14'-20' deep, 1-1/2 CY hyd backhoe	707.20	cuyd	2.04	1,443				1,347		2,790
02460 - Hauling											
0050	Hauling, LCY, no loading, 20 c.y dump truck, 20 MI RT, 0.4 lds/hr	264.70	cuyd	5.36	1,420				3,064		4,484
0900	Loading Trucks, F.E. Loader, 3 C.Y.	264.70	cuyd	0.70	184				390		574
02610 - Asphltc concrete pavement											
0020	Asphaltic conc pavement, and lg paved areas, binder course, 2" thick	17.00	sqyd	0.71	12	6.85	116		9		137
0050	Asphaltic conc pavement, and lg paved areas, wearing course, 1" thick	17.00	sqyd	0.47	8	4.05	69		6		83
	SITE CONSTRUCTION Total				**6,599**		**5,529**		**6,625**	**8,735**	**27,488**
15 - MECHANICAL											
15030 - Pipe,watr dstr,ductl iron											
B0010	Piping, water dist, DI, cement lined, 18' L, restrained jt, 8" dia	700.00	lnft	20.93	14,651	21.36	14,952		5,543		35,147
B2615	Piping, water dist, DI, elbow, 8" dia	2.00	each	198.77	398	216.23	432		150		980
15715 - Piping, testing											
0060	Nondestructive hydraulic pressure test, 6" - 10" pipe	1.00	each	806.32	806	1,325.00	1,325				2,131
	MECHANICAL Total				**15,855**		**16,709**		**5,694**		**38,258**
1104 - 8 inch Force Main	**1104 - 8 inch Force Main Total**				**22,454**		**22,238**		**12,319**	**8,735**	**65,746**

Item	Item Description	Quantity	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Grand Total
1105 - Connection Point Manhole											
01 - GENERAL REQUIREMENTS											
01200 - General equipment rental											
0330	Rent trench box, 3000 lbs 6'x 8'	10.00	day						583		583
01220 - Wellpoint equipment rent											
0080	Rent wellpoint header pipe, 18" diameter	1,000.00	lf_dy					1,690			1,690
0160	Rent wellpoint pump, diesel, 175 HP, 12" suction	10.00	days					5,600			5,600
	GENERAL REQUIREMENTS Total							**7,290**	**583**		**7,873**
02 - SITE CONSTRUCTION											
02060 - Site demolition											
1150	Piping demo, plug existing pipe, 18" dia	1.00	each	280.00	280	242.00	242				522
02160 - Rubbish handling											
9999	Dump Charge, typical urban city, fees only, bldg constr mat'ls	38.00	ton							1,254	1,254
02260 - Wellpoints											
0331	Wellpoints, pump operation, 2 cks @ 2 hr (night shift), per 24 hour day	10.00	days	378.63	3,786						3,786
02320 - Backfill											
0040	Backfill, dozer backfilling, trench, up to 300' haul, no compaction	2.60	cuyd	0.75	2				4		6
0040	Backfill, dozer backfilling, trench, up to 300' haul, no compaction	75.00	cuyd	0.75	56				114		171
02340 - Bedding											
0010	Bedding, crushed stone 3/4" to 1/2"	1.90	cuyd	8.09	15	32.00	61		4		80
02360 - Compaction											
0030	Compaction, vibratory plate, 8" lifts, common fill	0.40	cuyd	1.87	1				0		1
0030	Compaction, vibratory plate, 8" lifts, common fill	12.00	cuyd	1.87	22				7		30
0030	Compaction, vibratory plate, 8" lifts, common fill	75.00	cuyd	1.87	140				45		185
0040	Compaction, vibratory plate, 8" lifts, select fill	1.60	cuyd	1.73	3				1		4
02450 - Excavating, trench											
0040	Excavate trench, common earth, 14'-20' deep, 1-1/2 CY hyd backhoe	50.00	cuyd	2.04	102				95		197
0040	Excavate trench, common earth, 14'-20' deep, 1-1/2 CY hyd backhoe	75.00	cuyd	2.04	153				143		296
02460 - Hauling											
0050	Hauling, LCY, no loading, 20 c.y dump truck, 20 MI RT, 0.4 lds/hr	38.00	cuyd	5.36	204				440		644
0900	Loading Trucks, F.E. Loader, 3 C.Y.	38.00	cuyd	0.70	26				56		82
02570 - Catch basins or manholes											
0030	CB or manholes, conc, precast, 4' ID, 8' deep	1.00	each	790.52	791	1,275.00	1,275		264		2,330
0040	CB or manholes, conc, precast, 4' ID, for depths over 8', add	12.00	vlf	98.81	1,186	174.00	2,088		397		3,670
0260	Catch bsns or manholes, frs and covs, hvy traffic, 36" diam, 1150 lb.	1.00	each	404.29	404	860.00	860		112		1,377
0310	CB or manholes, inverts, single channel brick, concrete	1.00	each	153.52	154	100.00	100				254
0350	Catch basins or manholes, steps, standard sizes, aluminum	20.00	each	10.38	208	26.50	530				738
	SITE CONSTRUCTION Total				**7,533**		**5,156**		**1,683**	**1,254**	**15,626**
15 - MECHANICAL											
15025 - Pipe,watr dstr,cncrt pipe											
0140	Pipe, Flange, gskt & bolt set, 18" pipe size	2.00	each	165.93	332	83.00	166				498

Item	Item Description	Quantity	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Grand Total
15030 - Pipe,watr dstr,ductl iron											
0210	Piping, pipe, D.I.C.L., tyton, 8" diameter	4.00	lnft	10.47	42	12.75	51		16		109
0260	Piping, pipe, D.I.C.L., tyton, 18" diameter	4.00	lnft	20.93	84	38.06	152		32		268
1150	Piping, plug, 18" dia, temporary	1.00	each	280.00	280	242.00	242				522
15055 - Pipe,watr dstr,plyv chlrd											
0120	18" dia., General piping, Wellpoint Discharge, PVC, Install and Remove	400.00	lnft	19.88	7,953						7,953
15255 - Valves, iron body											
B1405	Valves, iron body, butterfly, flg type, 18" size	1.00	each	688.72	689	3,200.00	3,200				3,889
15265 - Multipurpose valves											
0130	Chk valve, red valve, flg. 150#, 8",	1.00	each	588.00	588	1,848.68	1,849				2,437
15330 - Flexible connectors											
0140	Connectors, flex, Dresser type, 8" dia.	1.00	each	140.00	140	282.48	282				422
0180	Connectors, flex, Dresser type, 18" dia. w. joint harness	2.00	each	350.00	700	1,866.48	3,733				4,433
15350 - Sleeves and escutcheons											
0110	Pipe sleeve, stl, wtr stop, 12" L w/link seal, 12" dia for 8" carrier	1.00	each	111.99	112	196.00	196				308
	MECHANICAL Total				**10,919**		**9,871**		**48**		**20,838**
1105 - Connection Point Manhole	**1105 - Connection Point Manhole Total**				**18,452**		**15,027**	**7,290**	**2,314**	**1,254**	**44,337**

Item	Item Description	Quantity	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Grand Total
1106 - Electrical/Instrumentation											
16 - ELECTRICAL											
16195 - Electrical & Instrument											
0101	Electrical/Instrumentation, allowance	1.00	lsum					95,000			95,000
	ELECTRICAL Total							**95,000**			**95,000**
1106 - Electrical/Instrumentation	**1106 - Electrical/Instrumentation Total**							**95,000**			**95,000**

Item	Item Description	Quantity	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Grand Total
	Grand Total				139,979		199,218	122,436	42,645	18,962	523,238

Category	Percent	Amount	Hours
Labor	26.75 %	139,979	2,748.2
Material	38.07 %	199,218	
Equipment	8.15 %	42,645	436.0
Subcontractor	23.40 %	122,436	
Other	3.62 %	18,962	
Net Costs		523,238	
Labor Mark-up	18.00 %	25,196	
Material Mark-up	15.00 %	29,883	
Subcontractor Mark-up	5.00 %	6,122	
Equipment Mark-up	15.00 %	6,397	
Sales tax (material)	8.25 %	16,435	
Sales tax (equipment)	8.25 %	3,518	
Contractor General Conditions	12.00 %	62,789	
Material Shipping & Handling	4.00 %	7,969	
Worker's Travel/Subsistence	1.00 %	1,400	
Earthquake Insurance	0.10 %	523	
Start-up, training, O & M	2.00 %	13,669	
Subtotal		697,139	
Construction Contingency	30.00 %	209,142	
Subtotal		906,280	
Bldg Risk, Liability Auto Ins.	2.85 %	25,829	
Subtotal		932,109	
Performance Bond	1.00 %	9,321	
Subtotal		941,430	
Payment Bond	1.00 %	9,414	
Subtotal		950,845	
Total Estimate		950,845	

BROWN AND CALDWELL
Environmental Engineers & Consultants

Detailed Estimate Report

Wednesday, June 13, 2007 7:44:00 AM

Ojai Valley WWTP Upgrade
Effluent Re-Use Feasibility Study
Alternative 3 - Pump Station

Project Number::	132047-500
Client::	Ojai Valley Sanitary District
Estimator(s)::	Bob Ferguson
Estimating Office::	Arvada, CO
Estimate Issue Number::	01
Estimate Original Issue Date::	6/13/2007
Estimate Revision Number::	
Estimate Revision Date::	
BC Project Manager::	Azhar Malik
Estimate QA/QC Reviewer::	
Estimate QA/QC Date::	

PROJECT LOCATION / PROCESS AREA
1107 - Alternative 3 Pump Station

Item	Item Description	Quantity	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Grand Total
1107 - Alternative 3 Pump Station											
02 - SITE CONSTRUCTION											
02320 - Backfill											
0040	Backfill, dozer backfilling, trench, up to 300' haul, no compaction	32.40	cuyd	0.75	24				49		74
02330 - Backfill, structural											
0080	Backfill, structural, 300 H.P., 300' haul, common earth	8.27	cuyd	0.50	4				12		16
02340 - Bedding											
0010	Bedding, crushed stone 3/4" to 1/2"	4.31	cuyd	8.09	35	32.00	138		10		182
0010	Bedding, crushed stone 3/4" to 1/2"	8.40	cuyd	8.09	68	32.00	269		19		356
02360 - Compaction											
0030	Compaction, vibratory plate, 8" lifts, common fill	3.70	cuyd	1.87	7				2		9
0030	Compaction, vibratory plate, 8" lifts, common fill	2.10	cuyd	1.87	4				1		5
0030	Compaction, vibratory plate, 8" lifts, common fill	29.20	cuyd	1.87	55				18		72
0040	Compaction, vibratory plate, 8" lifts, select fill	7.45	cuyd	1.73	13				4		17
0040	Compaction, vibratory plate, 8" lifts, select fill	7.20	cuyd	1.73	12				4		16
0130	Compaction, walk behind, vibrating plate 18" wide, 6" lifts, 4 passes	1.85	cuyd	2.67	5				2		7
02420 - Excavating, structural											
0030	Excavating, structural, mach excav, com earth, hyd backhoe, 1 CY bkt	14.24	cuyd	9.07	129				120		250
0030	Excavating, structural, mach excav, com earth, hyd backhoe, 1 CY bkt	9.72	cuyd	9.07	88				82		170
02450 - Excavating, trench											
0010	Excavate trench, cont ftg, no sht or dewtrg, 4'-6' D, 1-1/2 CY hyd bac	36.50	cuyd	1.81	66				62		128
02460 - Hauling											
0040	Hauling, LCY, no loading, 12 c.y dump truck, 5 MI RT, 1 lds/hr	19.60	cuyd	5.36	105				227		332
0040	Hauling, LCY, no loading, 12 c.y dump truck, 5 MI RT, 1 lds/hr	13.20	cuyd	5.36	71				153		224
0900	Loading Trucks, F.E. Loader, 3 C.Y.	19.60	cuyd	0.70	14				29		42
0900	Loading Trucks, F.E. Loader, 3 C.Y.	13.20	cuyd	0.70	9				19		29
02720 - Fence,chain link industrl											
0030	Fence, ch lnk w/ barbed wire, 6 Ga wire, galv steel	40.00	lnft	6.86	274	20.00	800		57		1,132
0180	Fence, double swing gates, 6' high, 12' opening	1.00	opng	534.45	534	725.00	725		111		1,371
	SITE CONSTRUCTION Total				**1,518**		**1,932**		**982**		**4,431**
03 - CONCRETE											
03050 - Fip,equipment foundations											
0010	Forms in place, equipment foundations	65.62	sfca	12.88	845	2.68	176				1,021
03090 - Forms place, slab grade											
0030	Forms in place, SOG, edge forms, over 12", wood	262.47	sfca	4.56	1,198	2.63	689				1,887
03130 - Reinforcing in place											
0070	Reinforcing in place, A615 Gr 60, slab on grade, #3 to #7	0.37	ton	835.62	311	1,250.00	465				776
0070	Reinforcing in place, A615 Gr 60, slab on grade, #3 to #7	0.11	ton	835.62	93	1,250.00	139				231
0070	Reinforcing in place, A615 Gr 60, slab on grade, #3 to #7	0.44	ton	835.62	371	1,250.00	555				926
0070	Reinforcing in place, A615 Gr 60, slab on grade, #3 to #7	0.26	ton	835.62	216	1,250.00	323				539
0100	Reinforcing in place, A615 Gr 60, dowels, 2' long, deformed, #4	63.62	each	2.00	127	0.89	57				184

Item	Item Description	Quantity	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Grand Total
0200	Reinforcing in place, unloading & sorting, add to above	1.18	ton	34.30	40				14		54
03150 - Concrete, ready mix											
0030	Concrete, ready mix, regular weight, 4000 psi	3.70	cuyd			125.00	463				463
0030	Concrete, ready mix, regular weight, 4000 psi	9.72	cuyd			125.00	1,215				1,215
0030	Concrete, ready mix, regular weight, 4000 psi	0.44	cuyd			125.00	56				56
03170 - Placing concrete											
0120	Placing conc, incl vib, slab on grade, slab over 6" thick, pumped	3.70	cuyd	17.17	64				24		88
0120	Placing conc, incl vib, slab on grade, slab over 6" thick, pumped	9.72	cuyd	17.17	167				64		231
0120	Placing conc, incl vib, slab on grade, slab over 6" thick, pumped	0.44	cuyd	17.17	8				3		11
03180 - Finishing floors											
0030	Finishing floors, monolithic, screed, float & broom finish	121.87	sqft	0.65	79						79
03190 - Finishing walls											
0010	Finishing walls, break ties & patch voids	65.62	sqft	0.75	50	0.03	2				52
0020	Finishing walls, carborundum rub, wet rub	65.62	sqft	2.33	153	0.03	2				155
0050	Finishing walls, sandblast, heavy penetration	129.17	sqft	3.17	409	0.54	69				479
	CONCRETE Total				**4,130**		**4,210**		**105**		**8,446**
05 - METALS											
05290 - Anchor bolts											
0040	Anchor bolts, J-type, incl nut, washer, 3/4" dia, 8" long	8.00	each	16.32	131	2.48	20				150
	METALS Total				**131**		**20**				**150**
11 - EQUIPMENT											
11090 - Pumps, general utility											
0060	Pumps, gen util, W/mot, mtd on base, sgl stage, 50 gpm 3 hp	2.00	each	1,463.37	2,927	3,000.00	6,000				8,927
	EQUIPMENT Total				**2,927**		**6,000**				**8,927**
15 - MECHANICAL											
15070 - Pipe,copper											
0210	Piping, curb stops, 3" diameter	2.00	each	40.73	81	406.00	812				893
15075 - Distribution connection											
0030	Distribution connection, tapping saddle	2.00	each	409.34	819	80.30	161		297		1,277
0630	Distribution connection, connect lateral to main	2.00	each	636.76	1,274	132.50	265		463		2,001
15080 - Valve Boxes											
0010	Valve, box,cover with marker	2.00	each	83.98	168	15.90	32				200
15190 - Pipe, steel											
0650	Pipe, steel, sch. 40, galvanized, 3" diameter	50.00	lnft	18.75	938	7.98	399		218		1,555
15195 - Pipe, steel, fittings											
0630	Pipe, steel ftngs, CI, std weight, galv CI, 90< elb, straight, 3"	6.00	each	80.63	484	74.73	448				932
0780	Pipe, steel ftngs, CI, standard weight, galv CI, tee, straight, 3"	2.00	each	134.39	269	164.30	329				597
2000	Union, galvanized, 150# MI, 3"	4.00	each	89.59	358	105.47	422				780
15250 - Valves, bronze											
0380	Valves, bronze, chk, swing, class 150, regrinding disc, thrded, 3" siz	2.00	each	62.02	124	272.00	544				668
0740	Valves, bronze, gate, N.R.S., threaded, class 150, 3" size	4.00	each	62.02	248	226.00	904				1,152

Item	Item Description	Quantity	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Grand Total
	MECHANICAL Total				**4,762**		**4,315**		**978**		**10,056**
16 - ELECTRICAL											
16195 - Electrical & Instrument											
0101	Electrical/Instrumentation	1.00	lsum					4,964			4,964
	ELECTRICAL Total							**4,964**			**4,964**
1107 - Alternative 3 Pump Station	**1107 - Alternative 3 Pump Station Total**				**13,468**		**16,477**	**4,964**	**2,065**		**36,974**

Item	Item Description	Quantity	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Grand Total
	Grand Total				13,468		16,477	4,964	2,065		36,974

Category	Percent	Amount	Hours
Labor	36.43 %	13,468	258.7
Material	44.56 %	16,477	
Equipment	5.59 %	2,065	39.6
Subcontractor	13.43 %	4,964	
Other			
Net Costs		36,974	
Labor Mark-up	18.00 %	2,424	
Material Mark-up	15.00 %	2,471	
Subcontractor Mark-up	5.00 %	248	
Equipment Mark-up	15.00 %	310	
Sales tax (material)	8.25 %	1,359	
Sales tax (equipment)	8.25 %	170	
Contractor General Conditions	12.00 %	4,437	
Material Shipping & Handling	4.00 %	659	
Worker's Travel/Subsistence	1.00 %	135	
Earthquake Insurance	0.10 %	37	
Start-up, training, O & M	2.00 %	984	
Subtotal		50,209	
Construction Contingency	30.00 %	15,063	
Subtotal		65,272	
Bldg Risk, Liability Auto Ins.	2.85 %	1,860	
Subtotal		67,132	
Performance Bond	1.00 %	671	
Subtotal		67,803	
Payment Bond	1.00 %	678	
Subtotal		68,481	
Total Estimate		68,481	

APPENDIX C

Summary of Site Visit

Field Visit Lower Ventura River
6-7 Feb 2007

Objective: to cover area from Ojai Valley Sanitation District (OVSD) discharge point downstream to the ocean, and identify key habitat features and hydrological considerations.

Field personnel: Ricardo Montijo and Jeff Trow of Foothill Associates (terrestrial and riparian considerations); Greg Kamman of KHE (hydrological considerations); and Howard Bailey of Nautilus Environmental (aquatic ecology).

General observations: The discharge entered a side channel on the east side (right bank) of the river, which extended approximately 100-yds downstream before merging with the main river channel. Both the side channel and main channel were characterized by dense stands of aquatic macrophytes that occurred on an intermittent basis. Relatively large cobble was present throughout the river nearly to the mouth, indicating a high energy system. Depositional areas were also present on an intermittent basis, as were bedrock formations particularly downstream of Canada Larga. In some areas, the center of the riverbed was considerably higher than either of the two sides, with the wetted channel usually favoring one side or the other. Stands of riparian scrub were present in the riverbed, as well as along the higher margins. The berm at the mouth of the river was breached, and the river was flowing freely to the ocean.

Hydrologic/Geomorphic observeations:
The attached Figure presents GPS waypoint (WP) locations surveyed during the February 6, 2007 field visit. Notable hydrologic/geomorphic observations from the site visit are as follows.

- The highly interconnected alluvial groundwater aquifers and surface water system was very evident between the Foster Park area and WP578 (confluence of Canada Larga). Upstream of Canada Larga, the River channel is underlain by an alluvium aquifer that thins downstream to WP578, where the bedrock shallows, forcing groundwater to upwell and augment surface water flows. At the Foster Park Bridge, the alluvial aquifer occupies a U-shaped valley with sand and gravel to a depth of 45- to 50-feet in depth.

- Active channel geometry of the river also is controlled by bedrock conditions. Three distinct channel morphologies were repeatedly observed during the site visit.

    1. Within the alluvial fill basin reaches (e.g., Foster Park Bridge to WP578) the active channel is approximately 120-feet wide with a low-flow channel width of 40-feet. The low flow channel(s) occupy or border the margins of the active channel due to the deposition of large and continuous longitudinal cobble-

boulder-gravel bars in the middle of the channel[1] whose apex is 4- to 5-feet above the low flow channel beds.

2. As bedrock shallows and is exposed at the ground surface, a greater percentage of the active channel becomes inundated by upwelling groundwater and becomes more of a pond-like surface water versus narrow low flow channel. The active channel immediately upstream of these bedrock dams or weirs becomes more planar in cross-section and the entire active channel width becomes inundated with shallow, slow moving water, displaying a less obvious preferred low flow pathway. These areas of quiescent pooling are the locus of large expanses of emergent vegetation.

3. Within zones where bedrock (mostly mudstone) is exposed, the low flow channel is much more well-defined, displaying the typical step-pool and eroded slot like morphology, resulting in narrower and deeper low flow channels. Most of the well developed and extensive pools observed during our site visit were associated with bedrock controls over the channel bed (e.g., long 4-foot deep pool/run extending between WP586 and WP588).

- Considerable bank stabilization efforts were observed along much of the river. Where not present, appreciable bank erosion was observed, resulting in erosional scarps up to 8- to 10-feet high (e.g., WP 578).

- A notable transition in channel bed material grain size was observed around WP590 at the "Aera Bridge." At this location, There was an enormous in-channel bar/deposit at and immediately downstream of the bridge, consisting of cobble-boulder-gravel material. This size material consistently dominated the river bed between the treatment plant and this location. However, downstream of this deposit, it appears that the channel bed material grain-size decreases noticeably. Although a preliminary assessment of channel slope did not indicate any notable change between upstream and downstream reaches, this section of the river canyon/corridor widens, possibly leading to a change in river hydraulics and reduced sediment transport capacity (i.e., a decrease in unit area stream power due to increased channel cross-sectional area).

Flows: Prior to our site visit on February 6, 2007, there was a single high flow event (approximately 175-cfs) that occurred on the Ventura River this winter on January 28, 2007, approximately 10-days prior to our site visit. There was not much evidence of this small peak flow event observed, apart from possible signs of limited and localized bed mobilization on the river bottom.

During the February 6, 2007 site visit, flows were measured downstream of the plant at WP 586 at 14.9-cfs, and upstream of the plant at the USGS gauge at the Foster Park Bridge the following morning (7.6-cfs). Assuming that the plant was discharging at 2-

[1] Large mid-channel longitudinal bars of this type reflect conditions where sediment supply typically exceeds the rivers sediment transport capacity.

mgd (3.1-cfs), these data suggest approximately 4.2-cfs of accretionary flows into the River between the two flow measurement points. Based on the local geology (i.e., bedrock reaching to the surface), this additional water would likely be associated with surfacing ground water upwelling, reinforcing the interaction between surface flows and the ground water aquifer. A small portion of the difference in flow could also be attributed to small tributaries entering the river from the south side. A lot of seep and spring activity was observed emanating from the left bank between WP579 and WP581. There also were surface water drainages of 15- to 20-gpm entering the river at WP579 and WP591.

Habitat constraints: Several constraints (i.e., barriers) to upstream movement of large fish (e.g., steelhead) were noted. These were typically extended sections of shallow water, usually associated with a widening of the channel or bedrock constrictions. In other cases, the channel split into two or three smaller channels, such that insufficient water was present in any individual channel to allow passage. An unexpected barrier to fish passage was the presence of dense patches of aquatic macrophytes that completely obscured the channel. These were typically associated with wider shallower portions of the channel, and extended above the surface by 1 – 2 feet. Specific barriers included:

- A wide and shallow gravel-cobble bed riffle just downstream of treatment plant outfall.
- Bedrock drop spanning entire low flow channel width, probably not passable at flows less than observed during site visit.
- Another wide and shallow gravel bed riffle at WP50 with water depth of 4 inches.
- A 150- to 200-foot long shallow riffle that would be very difficult to pass at flows observed during site visit.

These barriers would be passable during periods of high water. In addition, they are not likely to be permanent in the sense that the channel is probably reconfigured following every major outflow event. However, although the precise locations of the barriers may change, the general types of barriers are likely to remain consistent. Regardless, deeper areas (i.e., pools) were observed, typically associated with bedrock formations that would be suitable holding areas in the event that adult steelhead entered the river, but were unable to proceed upstream due to a rapid drop in flow.

Biological attributes: Biological attributes were also noted during the site visit. The bird community was particularly diverse (see Table 1 for a list). Table 2 is a list of plants observed; in addition, periphyton and filamentous algae were abundant on bottom substrate. This observation did not appear to be related to the WWTP discharge, as dense algal cover was noted upstream of the discharge, as well. Aside from an abundance of small fish in the side channel that receives the WWTP discharge, the aquatic community appeared relatively sparse. Larger fish were limited to small groups of carp that were present in a few of the pools. One crayfish was observed in a seep draining into the river, and several small *Gambusia* were noted in a back water. One dead stickleback was found at WP585. Most of the cobble in the wetted channel appeared fairly well embedded, and the aquatic macrobenthos appeared to be primarily comprised of small mayfly nymphs and a few cased caddis larvae. Please note that these observations are not intended to be exhaustive; the main objective of the visit was to identify major habitat features and get a sense of the dynamics that affect the lower reaches downstream of the WWTP.

Vegetation on the Ventura River was primarily comprised of riparian and freshwater hydrophytes. These included species such as willows (*Salix spp.*), mulefat (*Baccharis salicifolia*), and watercress (*Rorippa nasturtium-aquaticum*). Halophytic plants and salt-tolerant aquatic plants such as quailbush (*Atriplex lentiformis*) and bulrush (*Scirpus californicus*) become more prevalent downstream, and endemic plants adapted to dunes such as dune bursage (*Ambrosia dumosa*) occur at the river mouth. Scoured areas support limited stands of alluvial sage scrub typified by such plants as California sagebrush (*Artemisia californica*) and scalebroom (*Lepidospartum squamatum*). Slopes are covered with coastal sage scrub, chaparral plants, and a mix of ornamental and invasive exotic plants.

Invasive exotic plants are common throughout the river. Ngaio tree (*Myoporum laetum*), for example, occurs in clusters near the mouth of the Ventura River. Giant Reed (*Arundo donax*), is a common invasive found in clusters throughout the stretch of the Ventura River surveyed.

Wildlife detected varied by stretch of river surveyed. Upper reaches supported a mix of terrestrial and freshwater birds, mammals, amphibians and reptiles. Among the species detected here were red-winged blackbirds (*Agelaius phoenicius*), mallard (*Anas platyrhynchos*) Pacific treefrog (*Pseudacris regilla*), bobcat (*Felis rufus*) and mule deer (*Odocoileus hemionus*). Several species of herons, egrets, ducks, and belted kingfisher (*Ceryle alcyon*), and western gull (*Larus occidentalis*) were observed near the river mouth. The wastewater treatment plant supports flocks of gulls including ring-billed (*Larus delawarensis*) and mew gull (*Larus canus*).

Several animals designated by the State of California as Species of Concern were detected. Such species included monarch butterfly (*Danaus plexippus*), white-faced ibis (*Plegadis chihi*), tricolored blackbird (*Agelaius tricolor*), double-crested cormorant (*Phalacrocorax auritus*), and prairie falcon (*Falco mexicanus*). Brown pelican (*Pelecanus occidentalis*), a species observed at the river mouth, is federally listed as endangered under the Federal Endangered Species Act. White-tailed kite (*Elanus leucurus*) was observed approximately midway between the treatment plant and the river mouth. Potential habitat for several other species listed in the California Natural Diversity Database (CNDDB), but not detected during the survey, was also assessed. The results of this assessment along with several comprehensive analyses performed by other surveyors will be summarized in the feasibility study.

Table 1. Wildlife Detected

Scientific Name	Common Name
Butterflies	
Scientific Name	**Common Name**
Danaus plexippus	Monarch
Nymphalis antiopa	Mourning Cloak
Reptiles and Amphibians	
Scientific Name	**Common Name**
Pseudacris (=*Hyla*) *regilla*	Pacific Treefrog
Uta stansburiana	Side-Blotched Lizard
Birds	
Scientific Name	**Common Name**
Accipiter cooperi	Cooper's Hawk
Actitis macularia	Spotted Sandpiper
Agelaius phoeniceus	Red-Winged Blackbird
Agelaius tricolor	Tricolor Blackbird
Anas clypeata	Northern Shoveler
Anas cyanoptera	Cinnamon Teal
Anas platyrhynchos	Mallard
Aphelocoma californica	Western Scrub Jay
Ardea alba	Great Egret
Ardea herodias	Great-Blue Heron
Aythya americana	Redhead
Bombycilla cedrorum	Cedar Waxwing
Bucephala albeola	Bufflehead
Buteo jamaicensis	Red-Tailed Hawk
Butorides virescens	Green Heron
Callipepla californica	California Quail
Calypte anna	Anna's Hummingbird
Carduelis psaltria	Lesser Goldfinch
Carduelis tristis	American Goldfinch
Carpodacus mexicanus	House Finch
Cathartes aura	Turkey Vulture
Ceryle alcyon	Belted Kingfisher
Chamaea fasciata	Wrentit
Charadrius vociferus	Killdeer
Cistothorus palustris	Marsh Wren
Colaptes auratus	Northern Flicker
Columba livia	Rock Pigeon
Corvus brachyrhynchos	American Crow
Corvus corax	Common Raven
Dendroica coronata	Yellow-Rumped Warbler

Birds	
Scientific Name	**Common Name**
Dendroica townsendii	Townsend's Warbler
Egretta thula	Snowy Egret
Elanus leucurus	White-Tailed Kite
Euphagus cyanocephalus	Brewer's Blackbird
Falco mexicanus	Prairie Falcon
Fullica Americana	American Coot
Gallinago gallinago	Common Snipe
Geothlypis trichas	Common Yellowthroat
Larus canus	Mew Gull
Larus delawarensis	Ring-Billed Gull
Larus occidentalis	Western Gull
Melospiza melodia	Song Sparrow
Mergus merganser	Common Merganser
Nycticorax nycticorax	Black-Crowned Night Heron
Oxyura jamaicensis	Ruddy Duck
Pelecanus occidentalis	Brown Pelican
Picoides nuttallii	Nutall's Woodpecker
Picoides villosus	Hairy Woodpecker
Pipilo maculatus	Spotted Towhee
Pipilo crissalis	California Towhee
Phalacrocorax auritus	Double-Crested Cormorant
Plegadis chihi	White-Faced Ibis
Podily podiceps	Pied-Billed Grebe
Porzana carolina	Sora
Psaltriparus minimus	Bushtit
Recurvisrostra americana	American Avocet
Regulus calendula	Ruby-Crowned Kinglet
Sayornis nigricans	Black Phoebe
Sayornis saya	Say's Phoebe
Tachycineta thalassina	Violet-Green Swallow
Tringa flavipes	Lesser Yellowlegs
Zonotrichia leucophrys	White-Crowned Sparrow
Mammals	
Scientific Name	**Common Name**
Canis latrans	Coyote
Felix rufus	Bobcat
Odocoileus hemionus	Mule Deer
Sylvilagus audubonii	Audubon's Cottontail

Table 2. Plants Detected

Plants	
Scientific Name	**Common Name**
Ambrosia acanthicarpa	Annual Bursage
Ambrosia chamissonis	Dune Bursage
Anagallis arvensis	Pimpernel
Artemesia californica	California Sagebrush
Artemesia douglasiana	Mugwort
Asclepias sp.	Milkweed
Atriplex lentiformis	Quailbush
Baccharis pilularis	Coyote Brush
Baccharis salicifolia	Mulefat
Calystegia macrostegia	Island Morning-Glory
Carpobrotus edulis	Hottentot Fig
Centaurea sp.	Star-Thistle
Chenopodium album	Lamb's Quarters
Cynodon dactylon	Bermuda Grass
Daucus pusilla	Rattlesnake Weed
Epilobium ciliatum	Northern Willow-Herb
Eremocarpus setigerus	Doveweed
Erigeron sp.	Fleabane
Eucalyptus ficifolia	Red-Flowering Gum
Eucalyptus globulus	Blue Gum
Foeniculum vulgare	Sweet Fennel
Glycyrrhiza sp.	Licorice
Gnaphalium californicum	California Everlasting
Heteromeles arbutifolia	Christmas Berry
Heterotheca grandiflora	Telegraph Weed
Hirschfeldia incana	Mustard
Lactuca serriola	Prickly Lettuce
Lepidospartum squamatum	California Broomsage
Leymus condensatus	Giant Rye Grass
Lobularia maritima	Sweet Alyssum
Lotus sp.	Lotus
Lotus scoparius	Common Deerweed
Lupinus sp.	Lupine
Malosma laurina	Laurel Sumac
Medicago sativa	Alfalfa

Plants	
Scientific Name	**Common Name**
Myoporum laetum	Ngaio Tree
Nicotiana glauca	Tobacco Tree
Platanus racemosa	Western Sycamore
Pinus halepensis	Aleppo Pine
Polypogon interruptus	Beard Grass
Polypogon monspeliensis	Rabbitfoot Grass
Quercus agrifolia	Coast Live Oak
Rafinesquia sp.	Rafinesquia
Raphanus sativus	Wild Radish
Rhamnus crocea	Redberry
Rorippa nasturtium-aquaticum	Watercress
Rumex sp.	Rumex
Rumex crispus	Curly-Leaved Dock
Salix spp.	Willows
Salvia mellifera	Black Sage
Sambucus mexicana	Blue Elderberry
Scirpus californicus	Bulrush
Schinus molle	Peruvian Peppertree
Silybum sp.	Milk Thistle
Solanum sp.	Nightshade
Spartium junceum	Spanish Broom
Taraxacum officinale	Common Dandelion
Trichostema lanatum	Woolly Bluecurls
Typha angustifolia	Cattail
Typha latifolia	Broadleaf Cattail
Urtica dioica var. *holosericea*	Mountain Nettle
Xanthium strumarium	Cocklebur

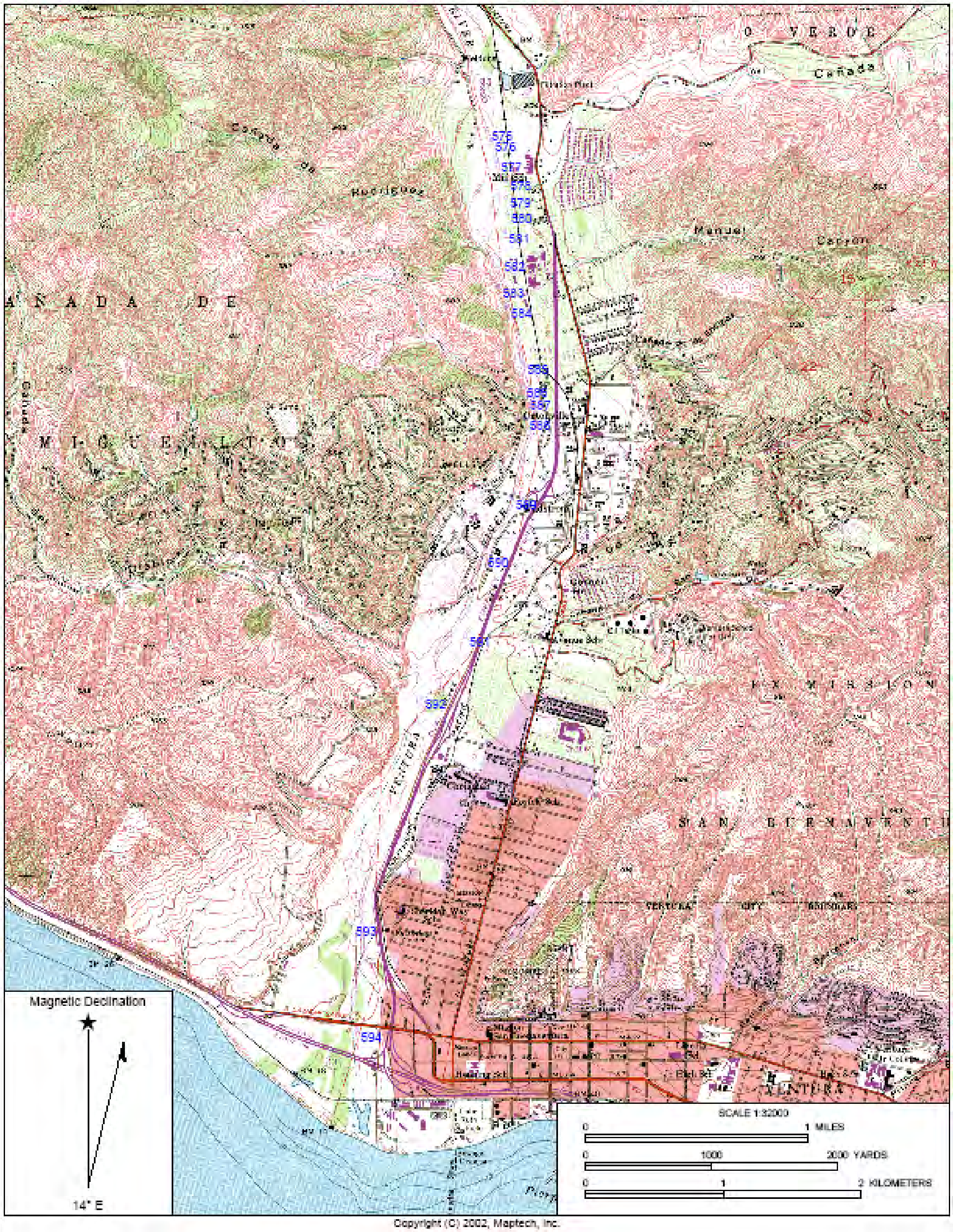

Figure 1. Map showing waypoints associated with notable habitat features observed during site visit February 2007.

Photographs Taken During Site Visit
February 2007

Photo 1. Discharge channel at point of discharge.

Photo 2. River (on left) meeting discharge channel (on right). Note shallow riffle low-flow barrier to upstream migration.

Photo 3. Large flat and shallow riffle showing dense macrophyte growth and potential low-flow barrier to upstream migration.

Photo 4. Potential barrier to upstream migration at low flow.

Photo 5. Small tributary entering from east side.

Photo 6. Influence of bedrock, showing channel constriction, and probable location of rising groundwater as bedrock surfaces.

Photo 7. Second tributary entering from east side of river; estimated flow 15-20 gpm.

Photo 8. Habitat contrast: narrow channel with gradient.

Photo 9. Habitat contrast: wide shallow flat.

Photo 10. Habitat contrast: deep pool with bedrock substrate.

Photo 11. Habitat contrast: wide channel, shallow riffle, largely inundated with macrophytes.

Photo 12. River channel divides, showing one channel to right, and elevated center. Center is approximately 15’ elevated compared to wetted channels.

Photo 13. Debris at Aera Energy Bridge showing extent of high-flow events.

Photo 14. Small tributary entering east side showing source of fine sediments, as well as possible contaminants.

APPENDIX D

Summary of Agencies Contacted

Interview Contacts for Ventura Water Re-Use Feasibility Study

Agency	Contact	Phone	
California State Parks	Barbara Fosbrink	(805) 585-1848	X
Casitas Water District	Steve Wickstrum	(805) 649-2251	
Santa Barbara Channel Keeper (web site)	Ben Pitterle	(805) 563-3377	X
US Army Corps of Engineers	John Markham	(805) 585-2150	X
	Mark Deleplane	(415) 904-5200	X
LA Regional Water Quality Control Board	Blythe Ponek-Bacharowski	(213) 576-6720	X
Coastal Commission	Gary Timm	(805) 585-1800	X
California Dept. Fish & Game	Martin Potter	(805) 640-3677	X
National Marine Fisheries Service	Mark Capelli	(805) 963-6478	X
	Anthony Spina	(562) 980-4045	X
NOAA Fisheries	Stan Glowacki	(562) 980-4061	X
Heal the Bay	Kirsten James	(310) 451-1500	X
Ventura County Planning Dept.	Pat Richards	(805) 654-5192	X
Ventura County Watershed Protection District	Theresa Stevens	(805) 477-7139	X
US Fish and Wildlife Service	Chris Dellith	(805) 644-1766	X
Surfrider	Paul Jenkin	(805) 648-4005	
Ojai Valley Sanitary District	John Correa	(805) 646-5548	X

Note: All agencies/individuals contacted by phone and/or email. "X" denotes response and discussion of issues.

APPENDIX E

City of San Buenaventura
Utilities Division

Economic Analysis of OVSD Effluent Re-Use Water Project

City of San Buenaventura
Utilities Division

Economic Analysis of Ojai Sanitary District Effluent Re-Use Water Project

Year	Reclaimed Water Sales, AF	Design & Construction Cost $ /a/	O&M Costs, $		Present Worth Factor at 6%	Present Worth of Costs, $				Present Worth of Sales, AF
			Fixed /b/	Variable /b/		Design & Construction Cost	O & M Costs		Total	
							Fixed	Variable		
2007		310,000			1.06000	328,600	0	0	328,600	0
2008		950,845	0	0	1.00000	950,845	0	0	950,845	0
2009	1,000	1,000,000	10,000	325,000	0.94340	943,396	9,434	306,604	1,259,434	943
2010	1,000		10,000	325,000	0.89000	0	8,900	289,249	298,149	890
2011	1,000		10,000	325,000	0.83962	0	8,396	272,876	281,272	840
2012	1,000		10,000	325,000	0.79209	0	7,921	257,430	265,351	792
2013	1,000		10,000	325,000	0.74726	0	7,473	242,859	250,331	747
2014	1,000		10,000	325,000	0.70496	0	7,050	229,112	236,162	705
2015	1,000		10,000	325,000	0.66506	0	6,651	216,144	222,794	665
2016	1,000		10,000	325,000	0.62741	0	6,274	203,909	210,183	627
2017	1,000		10,000	325,000	0.59190	0	5,919	192,367	198,286	592
2018	1,000		10,000	325,000	0.55839	0	5,584	181,478	187,062	558
2019	1,000		10,000	325,000	0.52679	0	5,268	171,206	176,474	527
2020	1,000		10,000	325,000	0.49697	0	4,970	161,515	166,485	497
2021	1,000		10,000	325,000	0.46884	0	4,688	152,373	157,061	469
2022	1,000		10,000	325,000	0.44230	0	4,423	143,748	148,171	442
2023	1,000		10,000	325,000	0.41727	0	4,173	135,611	139,784	417
2024	1,000		10,000	325,000	0.39365	0	3,936	127,935	131,872	394
2025	1,000		10,000	325,000	0.37136	0	3,714	120,693	124,407	371
2026	1,000		10,000	325,000	0.35034	0	3,503	113,862	117,365	350
2027	1,000		10,000	325,000	0.33051	0	3,305	107,417	110,722	331
2028	1,000		10,000	325,000	0.31180	0	3,118	101,337	104,455	312
Total		2,260,845				2,222,841	114,699	3,727,724	6,065,265	11,470

Unit Cost ($/AF) = (Total present worth of costs)/(Total present worth of sales)= $529 per acre-foot

/a/ All costs adjusted to 2007 dollars

1) $310,000 for EIR and Permit Costs
2) $950,845 Design and Construction Costs
3) $1,000,000 Replace costs for existing 24 inch pipeline replacement or lining

/b/ We assumed that for the first two years,

1) fixed costs equals $10,000 for monitoring (for downstream river monitoring).
2) variable costs equals $325/acre-foot of water distributed. ($25/AFT for Pumping Costs and $300/AFT Maintenance and Distibution O&M)

/c/ Useful lives: Pipelines, 50 yr; pump station mechanical/electrical, 20 yrs; storage reservoir, 75 yrs; site work, 100yrs. No salvage value for engineering, legal & administration costs.