Engineering Report for the Vista Canyon Factory (Municipal Wastewater Treatment Facility) (2009)

ENGINEERING REPORT FOR THE VISTA CANYON WATER FACTORY (MUNICIPAL WASTEWATER TREATMENT FACILITY)

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Job No. 898-002

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Asano, Takashi, Franklin L. Burton, Harold L. Leverenz, Ryujiro Tzuchihashi, and George Tchobanoglous. *Water Reuse Issues, Technologies, and Applications.* New York: Metcalf & Eddy, Inc. 2007. Print.

CHAPTER 1

OVERVIEW

This report provides information and analysis for the development of a municipal wastewater treatment plant, or water factory, in conjunction with the Vista Canyon mixed-use project. The project site is mostly disturbed, vacant land, with the exception of open storage and a residential use on the western portion of the site. Although most of the project site is not currently developed, it is surrounded by existing development. The project site also has been subject to repeated disturbance from utility construction and maintenance, illegal unauthorized dumping, unauthorized off-road vehicle activity, and various flood control activities.

The approximately 185-acre project site is located immediately south of State Route 14 (SR-14), west of La Veda Avenue, north of the Metrolink rail line, and east of the Colony Townhome community in unincorporated Los Angeles County. The project applicant is Vista Canyon Ranch, LLC. The project applicant is proposing annexation of the project site and various surrounding areas to the City of Santa Clarita.

The project site is bisected by the Santa Clara River. The majority of the proposed development on the project site would be located south of the Santa Clara River, with a smaller commercial development proposed north of the River.

Project Description

The project applicant is proposing a Specific Plan (SP) designation for the project site, and has designed the Specific Plan so as to deliver a mixed-use, transit-oriented neighborhood to the eastern Santa Clarita Valley. The proposed land uses shown on the tentative tract map include 1,117 dwelling units (96 single family residential lots and 1,021 multi-family residential units) and up to 950,000 square feet of commercial and medical office, retail, theater, restaurant, and hotel uses within four Planning Areas ("PA"). A residential overlay over the corporate office campus site within PA-2 would allow for a conversion of up to 250,000 square feet of office floor area to 233 attached residential units. If implemented, this conversion would permit a maximum of 1,350 residential units and 700,000 square feet of commercial floor area. The proposed project would include various parks/recreation amenities, including the Oak Park, Town Green, Community Garden, and the River Education/Community Center, a Metrolink station, bus transfer station, private recreational facilities, and various trail, road, and buried bank stabilization protection improvements.

Purpose of Study

The purpose of the study is to describe the facilities required to treat and reuse wastewater (sewage) generated by the proposed Vista Canyon project, to assess the water factory's potential impacts on water and sewer service, and to identify mitigation measures, if any, for these impacts.

Ownership/Maintenance of the Water Factory

The Vista Canyon project site is proposed for annexation to the City of Santa Clarita. As proposed, the water factory would be owned and operated by the City of Santa Clarita ("City"). As such, it would be considered a "municipal wastewater treatment plant" or publically-owned treatment work (POTW). The project site is not currently within the boundary of the Santa Clarita Valley Sanitation District, but is within the Santa Clarita Water Division of Castaic Lake Water Agency (CLWA) service boundaries.

The project applicant proposes to construct the water factory in conjunction with the project, and provide a turn-key facility to City. The City would likely contract for operation of the water factory. All costs associated with the ongoing maintenance of the proposed plant would be paid for by future residents and property owners within the Vista Canyon project through an assessment district.

The Vista Canyon water factory would treat the wastewater generated by both the project and a portion of the existing flows from a City of Santa Clarita sewer line crossing the project site. All solids from the Vista Canyon water factory would be sent to the Santa Clarita Valley Sanitation District's existing Valencia water reclamation plant for processing and disposal. Recycled water from the Vista Canyon water factory would then be delivered to CLWA as the wholesale water agency for the Santa Clarita Valley to offset existing water demands. CLWA would distribute the recycled water through its future reclaimed water distribution system both within and outside of the project boundary. Initially, some of the water may be directed to the percolation pond, or infiltration basin, adjacent to the Vista Canyon water factory until the CLWA recycled system is operational.

Additional discussion on ownership/maintenance responsibilities is included in Chapter 5.

Regulatory Considerations

Permits for the Vista Canyon water factory would need to be issued by the Los Angeles Regional Water Quality Control Board (RWQCB) prior to construction of the facility for recycled water production and use. All of the sewage generated in the sewer service area would be treated and reused on and off-site or discharged to adjacent percolation ponds. The Vista Canyon water factory would not discharge treated water to the Santa Clara River.

The Vista Canyon water factory also must comply with State and County Department of Public Health requirements for the use of recycled water, including the California Code of Regulations, Title 22, requirements for unrestricted reuse. The diesel emergency generators for the water factory and pump station also would need to be permitted by the South Coast Air Quality Management District (SCAQMD). A more detailed discussion of permitting is included in Chapter 6.

CHAPTER 2

PLANNING AND DESIGN CRITERIA

This chapter provides the planning and design criteria and estimates the flow and strength of the wastewater to be treated at the Vista Canyon water factory.

WASTEWATER FLOW GENERATION FACTORS

Wastewater flow generation factors were taken from the Santa Clarita Valley Sanitation District's Rate and Mean Loadings Ordinance. A copy of this Ordinance is included in Appendix A for reference. Table 2-1 summarizes the projected flows to the facility. The total projected average flow is 0.395 mgd.

TABLE 2-1
VISTA CANYON ESTIMATED WASTEWATER GENERATION
AVERAGE DAILY FLOW

Land Use	Count		Generation Factor		Flow, gpd
Res - SF	96	DU	260	gpd/DU	24,960
Res - MF	1,021	DU	156	gpd/DU	159,276
Hotel	200	rooms	125	gpd/room	25,000
Commercial	50,000	sf	200	gpd/1,000sf	10,000
Theater	31,000	sf	125	gpd/1,000sf	3,875
Retail	94,000	sf	150	gpd/1,000sf	14,100
Restaurant	39,000	sf	1,000	gpd/1,000sf	39,000
Office	596,000	sf	200	gpd/1,000sf	119,200
Total					**395,411**

DESIGN WASTEWATER STRENGTH LOADINGS

Average daily strength loadings of chemical oxygen demand (COD) and suspended solids (SS) are shown in Tables 2-2 and 2-3. These strengths are based on the Santa Clarita Valley Sanitation District's Rate and Mean Loadings Ordinance (Appendix A) prescribing the connection fee rate and mean loadings per unit of usage.

TABLE 2-2
VISTA CANYON ESTIMATED WASTEWATER GENERATION
AVERAGE DAILY COD

Land Use	Count		Generation Factor		COD lbs/day
Res - SF	96	DU	1.22	lbs/day/unit	117.12
Res - MF	1,021	DU	0.73	lbs/day/unit	745.33
Hotel	200	rooms	0.54	lbs/day/room	108.00
Commercial	50,000	sf	0.86	lbs/day/1,000sf	43.00
Theater	31,000	sf	0.54	lbs/day/1,000sf	16.74
Retail	94,000	sf	2.10	lbs/day/1,000sf	197.40
Restaurant	39,000	sf	16.68	lbs/day/1,000sf	650.52
Office	596,000	sf	0.86	lbs/day/1,000sf	512.56
Total					**2,390.67**

TABLE 2-3
VISTA CANYON ESTIMATED WASTEWATER GENERATION
AVERAGE DAILY SS

Land Use	Count		Generation Factor		SS lbs/day
Res - SF	96	DU	0.59	lbs/day/unit	56.64
Res - MF	1,021	DU	0.35	lbs/day/unit	357.35
Hotel	200	rooms	0.28	lbs/day/room	56.00
Commercial	50,000	sf	0.45	lbs/day/1,000sf	22.50
Theater	31,000	sf	0.28	lbs/day/1,000sf	8.68
Retail	94,000	sf	1.00	lbs/day/1,000sf	94.00
Restaurant	39,000	sf	5.00	lbs/day/1,000sf	195.00
Office	596,000	sf	0.45	lbs/day/1,000sf	268.20
Total					**1,058.37**

WATER FACTORY DESIGN FLOW

As determined in the previous section, the treatment capacity required to accommodate Vista Canyon's wastewater flows is 395,411 gpd, based on Santa Clarita Valley Sanitation District's flow generation factors. Table 2-4 summarizes previous tables and presents the design loading for the facility. This table includes the average flow, COD, suspended solids, and biological oxygen demand (BOD).

Table 2-5 provides the peak flows expected at the Vista Canyon water factory. To convert to peak dry weather flow, the average daily flow was multiplied by a factor of 2.0. To convert average daily flow rate to peak wet weather flows, the Sanitation Districts of Los Angeles County (LACSD) peaking equation was used. This peaking equation, in million gallons per day, is shown below.

$$2.65\ Q_{average}^{0.90} = Q_{peak}$$

TABLE 2-4
WATER FACTORY DESIGN LOADING

Flow	COD		SS		BOD[1]	
MGD	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l
0.395	2,391	726	1,058	321	1,434	436

[1.] Assumes BOD to COD ratio is 0.6

TABLE 2-5
PEAK FLOWS TO THE WATER FACTORY

Average Flow	Peak Dry		Peak Wet	
MGD	Weather Factor	Flow, MGD	Weather Factor	Flow, MGD
0.395	2	0.791	2.65*Q(avg)^0.906	1.143

TREATMENT CAPACITY DISCUSSION

The 395,411 gpd treatment capacity of the water factory is based on Santa Clarita Valley Sanitation District's generation rates. The water balance in Chapter 4, however, shows that the estimated treatment capacity required specifically for the Vista Canyon project is only 214,265 gpd, based on the project's interior potable water demands.

At the proposed Vista Canyon water factory location, a drainage area also could be situated to serve more than the Vista Canyon project. Figure 2-1 provides a map of the project and the sewer drainage basin for the water factory. The estimated wastewater flow generated by those off-site areas is 96,432 gpd.

Additionally, the Vista Canyon water factory would be located in the vicinity of an existing sewer mainline, and partial flows from this mainline would be directed to the water factory for treatment and use. These off-site flows also would allow the water factory to start up with flows greater than those generated by the initial development in the Vista Canyon project.

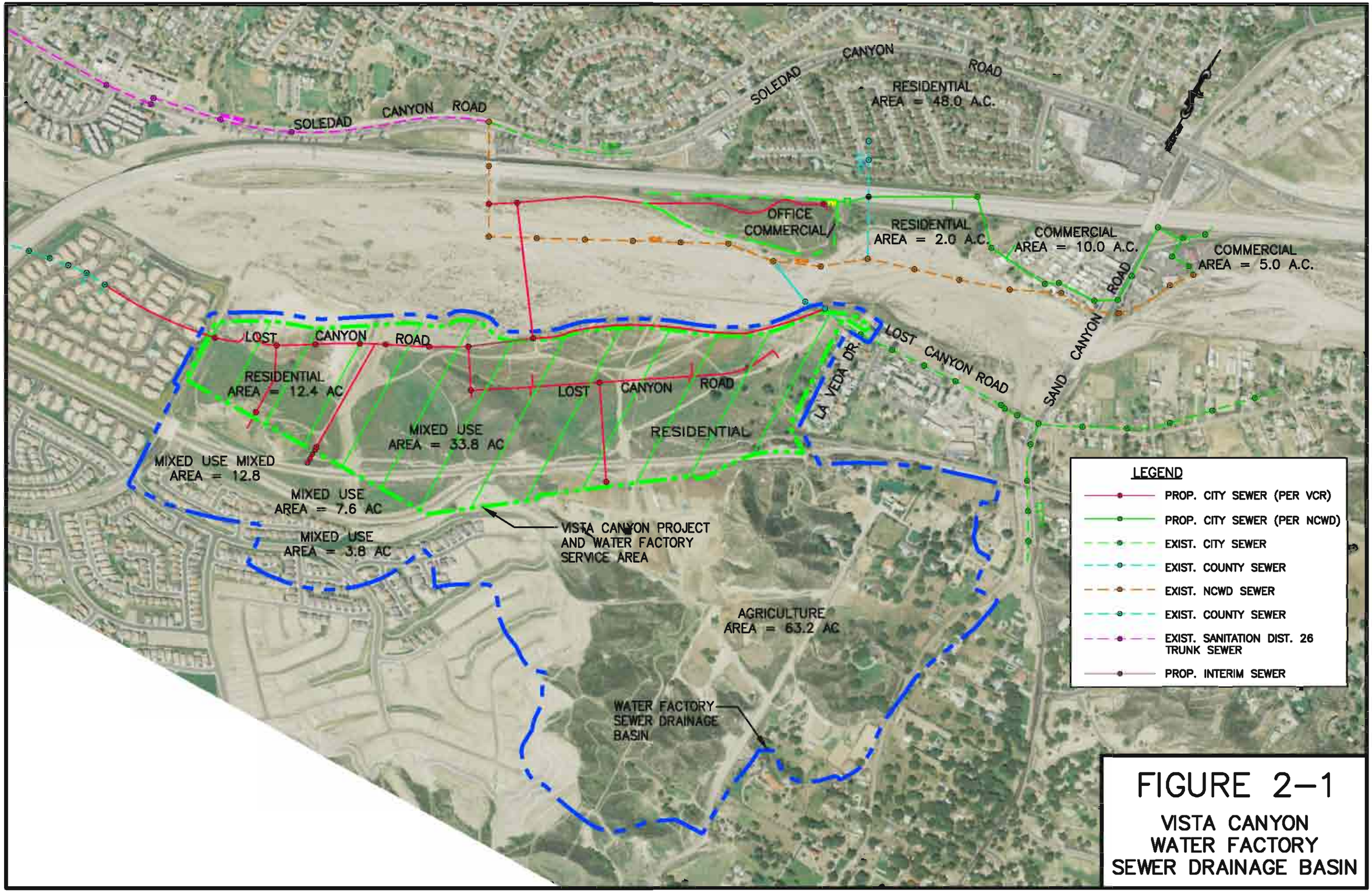


FIGURE 2–1

VISTA CANYON WATER FACTORY SEWER DRAINAGE BASIN

\\PACIFIC\DWG\898002\FIGURE_2-1.DWG 04-08-10 14:50:25 LAYOUT: LAYOUT

At the treatment capacity of 395,411 gpd, the Vista Canyon project would construct a larger water recycling plant than is needed solely for the project based upon its projected water demand. Discussed further in Chapter 4, the Vista Canyon project's total potable and non-potable water demand is anticipated to be 297,922 gpd (333.7 acre-feet per year, afy), as follows:

- recycled water (non-potable) demand is 117,922 gpd (132.1 afy), and
- potable water demand is 180,001 gpd (201.6 afy).

Constructing the Vista Canyon water factory at a treatment capacity of 395,411 gpd (442.9 afy), and supplying the Vista Canyon recycled water demand of 117,922 gpd (132.1 afy), results in an excess recycled water supply of 277,489 gpd (310.8 afy). This excess supply would be utilized by CLWA over time to offset existing water demands within the Santa Clarita Valley. Initially, this excess water may be directed to percolation ponds adjacent to the Vista Canyon water factory until the CLWA system is operational. Since this excess (277,489 gpd) is far greater than the Vista Canyon project's potable water demand of 180,001 gpd, the project would result in no net increase in water demand for CLWA and the Santa Clarita Water Division.

CHAPTER 3

WATER FACTORY FACILITY

The process flow schematic for the Vista Canyon water factory is shown on Figure 3-1 and a preliminary site layout is shown on Figure 3-2. The water factory would be designed to produce disinfected tertiary recycled water in accordance with the requirements of California Code of Regulations, Title 22, Section 60304(a), including the reliability requirements of Title 22. No solids would be treated on site. The water factory will be a scalping plant with waste activated sludge processed at Santa Clarita Valley Sanitation District's existing facilities downstream.

TREATMENT PROCESS

The final selection of the treatment process would be completed during final design of the water factory. The process would be a variation of the extended aeration activated sludge process. At this time, the water factory could consist of a conventional system, sequencing batch reactors, or membrane bioreactors. All of these technologies would produce disinfected tertiary recycled water in accordance with the requirements listed above. These processes also require approximately the same footprint space, but the discussed layout would assume worst case special needs. All treatment processes would be located in concrete tanks.

Headworks

The headworks would be designed to pump flow to the start of the treatment process and provide screening to protect downstream equipment. If a conventional system or sequencing batch reactor system is used, course screening or a comminutor would be installed upstream of the influent pump station, and provide protection for downstream processes. If the membrane bioreactor process is used, a fine screen and screening compacter would be needed.

Flow Equalization

After the headworks and prior to the treatment process, a flow equalization basin may be installed. The purpose of this basin would be to balance incoming flow variations such that a constant flow rate is conveyed through the treatment process portion of the plant. This equalization only would be needed if the peak flow cannot be accommodated in the secondary or tertiary process. A bypass line would be provided to allow the flow equalization tank to be taken off-line without shutting down the plant.

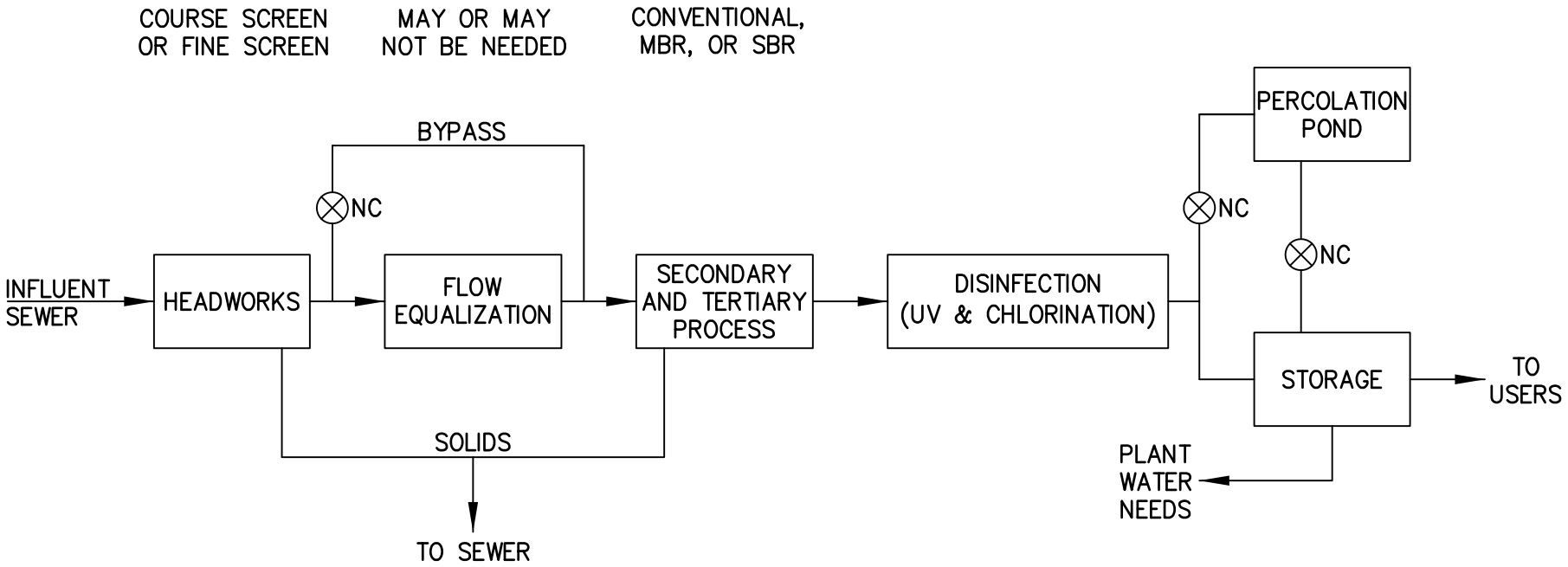


FIGURE 3–1

VISTA CANYON WATER FACILITY PROCESS FLOW SCHEMATIC

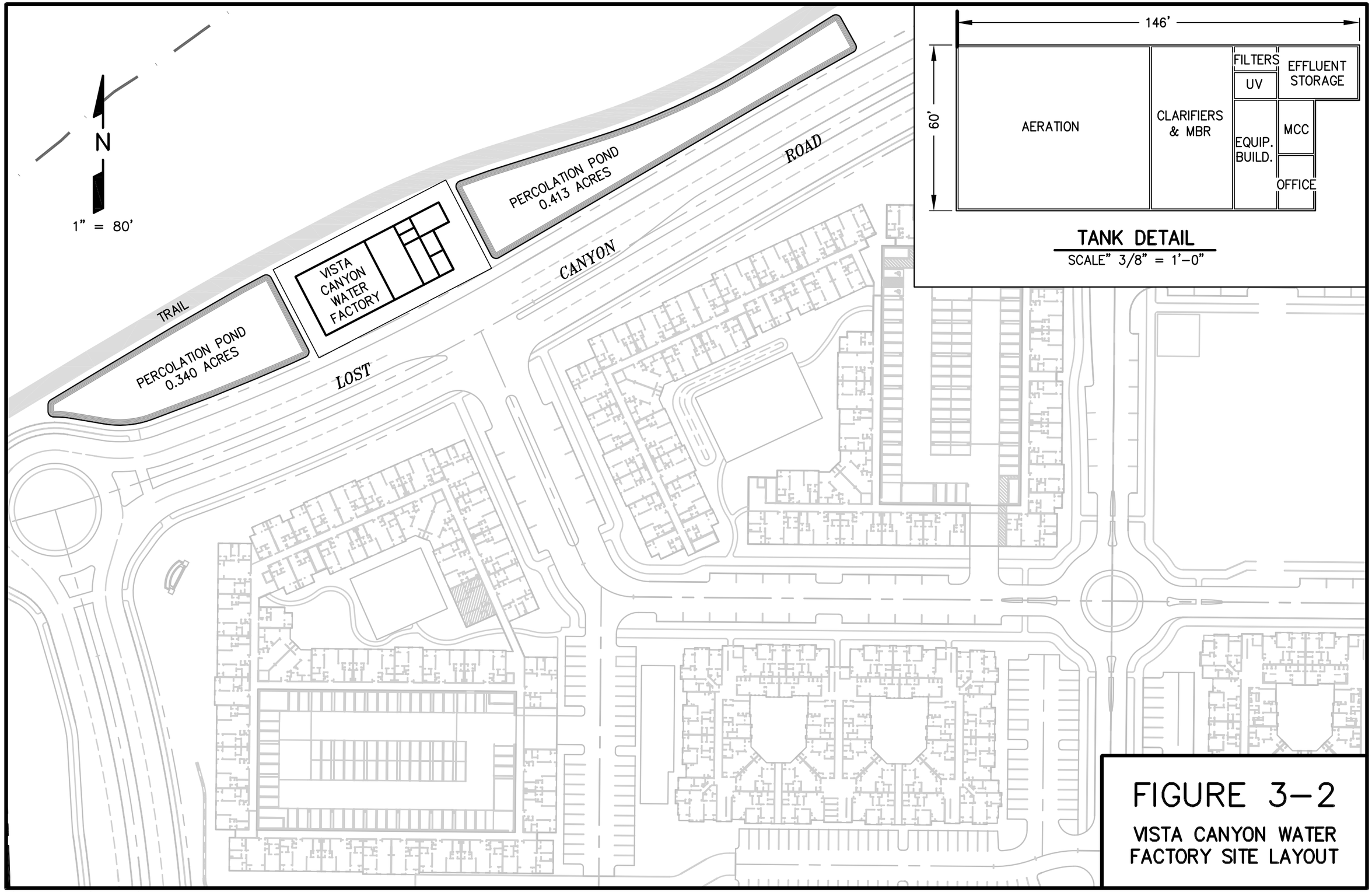


FIGURE 3-2

VISTA CANYON WATER FACTORY SITE LAYOUT

Secondary and Tertiary Process

One of three processes would be used for secondary and tertiary treatment. These are the conventional extended aeration activated sludge with sand filters, sequencing batch reactors with sand filters or membrane bioreactors. Each process is discussed below. Each process would have tank and equipment redundancy.

Conventional Extended Aeration Activated Sludge with Sand Filters. If this process is selected, aeration tanks, sedimentation tanks, and tertiary filters would be required. These facilities are described below. An Aeromod-type system is described.

Aeration Tanks. An Aeromod system would utilize four aeration tanks. Each of the tanks would be sized for 90,000 gallons. The four tank system would allow for one tank to be taken out of service for inspection and repair while the other three remain in service to treat the flows.

Sedimentation Tank. An Aeromod system would use four sedimentation tanks, which would allow one tank to be taken out of service while treating the flow with the remaining three tanks.

Filters. Following secondary treatment, the water would be coagulated, flocculated, and filtered to remove small particulate matter. Coagulation would be done by polymer injection. The flocculation tank would provide adequate detention time for particles to flocculate before reaching the filter. Two upflow, continuously backwashing filters with a moving sand bed would be provided. Each filter would be sized for the entire plant flow. The backwash would be diverted downstream to the plant drainage system and then to the sewers.

Sequence Batch Reactor System. The sequencing batch reactor system provides for aeration and sedimentation in one tank.

Process Tanks. Three process tanks would be provided for this system. Each tank would operate on a timed sequence for filling, aeration, and decanting. Two of the tanks would be able to treat the flow if one was out of service. Each tank would be approximately 180,000 gallons.

Filters. The filters would operate as described for the conventional system.

Membrane Bioreactor System. If the membrane bioreactor system is used the filter would not be needed. Aeration tanks and membrane tanks would provide both secondary and tertiary treatment.

Process Tanks. Three process tanks would be provided for this system. Each tank would be approximately 136,000 gallons.

Membrane Tank. In the membrane bioreactor system, a membrane is used in place of the sedimentation tanks and filters. The membrane is able to provide a better single-step solids liquid separation then the two-step system. Four membrane tanks would be provided for this system.

Disinfection

Disinfection would be accomplished through a combination of ultraviolet (UV) and chlorination. UV would be the primary disinfectant. The UV is utilized to reduce the amount of chlorine added to the system to reduce effluent chlorine levels. In order to provide continuous disinfection in the piping system, a small amount of chlorine would be added after the UV disinfection. This small amount of chlorine would be added after the diversion system to the percolation ponds.

EFFLUENT USE AND DISPOSAL

The effluent use and disposal system would have storage, a pump station, and percolation ponds for disposal of excess recycled water. An alternate diversion system would be built into the design to divert water, which does not meet recycled water effluent turbidity limits to the percolation ponds before the storage tank. Although this water would not meet water recycling requirements, it would meet the effluent requirements for the percolation ponds.

Storage

A 100,000 gallon storage tank would be provided to serve as a forebay for the effluent pumps and provide for in-plant water needs.

Effluent Pumps

Effluent pumps would be provided to pump to the recycled water system. These pumps would be sized as required by the recycled system.

Percolation Ponds

In order to dispose of effluent when there is no demand for recycled water, percolation ponds would be provided. These ponds would have separate discharge requirements and could be used to discharge effluent that does not meet reclamation standards. Additionally, the percolation ponds could receive treated stormwater from the Vista Canyon project.

To allow for the most conservative space requirement, the percolation ponds have been sized assuming that CLWA does not take the excess recycled water from the water factory and that the ponds will receive some treated stormwater from developed portions of the Vista Canyon project. These assumptions are in addition to rain which would fall directly into the percolation pond, which has been accounted for in the sizing as well.

The required volume of storage would be divided between two ponds. The ponds would be approximately five feet deep, with two feet of free board and comprise approximately 0.75 acres total. Combined, the ponds would have a working volume of approximately 84,000 ft^3 (628,000 gal) and an overflow volume of approximately 146,800 ft^3 (1,098,000 gal).

As an alternative to open ponds, which would contain water in some months and no water in others, the project may construct a buried piping system. Under this arrangement, a decorative basin would remain full of water all year long and overflow into the buried piping.

The size of the percolation ponds could be reduced if an arrangement is made with CLWA to utilize the excess recycled water.

Water factory operation and maintenance plans would include the required maintenance of these ponds.

EMERGENCY GENERATOR

A diesel emergency generator would be provided to operate the plant during a power outage. Fuel storage would be provided with sufficient capacity to operate the generator at maximum load for 24 hours.

PLANT DRAINAGE SYSTEM

A plant drainage system would be provided to allow all of the process tankage to be drained. This system would discharge to the downstream sewers. A submersible pump station may be needed to pump the drainage to the downstream sewer. The drains from the restrooms in the operations building would be conveyed to this system.

SPILL CONTAINMENT SYSTEM

The process area of the treatment plant would contain piping, equipment, and tankage. Overflows, pipe breaks, or equipment failures could cause spills of sewage or partially treated sewage. To contain these spills and prevent them from exiting the site, the process area would drain to a single location connected to the plant drainage system. These liquids would then be pumped to the headworks of the plant. Flows from incidental rain events would be returned to the plant headworks.

Adjacent to this, the location would also have a normally-closed valve connection to the storm drain system, so that during substantial rain events, the valve could be opened to direct site runoff to the storm drain.

SYSTEM SIZING TABLES

Tables 3-1 through 3-3 provide preliminary equipment, tank, and power requirements for the water factory.

TABLE 3-1
VISTA CANYON WATER FACTORY
FACILITY SIZING CRITERIA

Item	Size	Redundancy Criteria
Influent Pump Station	2 each 785 gpm @ 40' 20 HP	Each pump capable of pumping peak flow
Screening		
For Conventional or SBR		
Coarse Screen	1 mechanically cleaned 1 HP 1 manual cleaned	Either screen capable of screening peak flow.
For MBR		
Fine Screen	2 each at 785 gpm 0.5 HP each Screening Compactor	Either screen capable of screening peak flow.
Aeration Tanks	3 tanks each at 145,000 gallon	18 hours detention with one tank out of service
Solids Separation		
For Conventional	Minimum of 3 tanks each 25' x 25'	Maximum overflow rate of 400 gpd/sf with one tank out of service.
For SBR	Make Aeration tank Deeper	
For MBR	Minimum of 4 tanks Each 20' x 30'	Maximum flux of 10 gpd/sf with one tank out of service.
RAS Pumps (worst case MBR)	2 each 1,570 gpm @ 10' 15 HP each	400% return with with one pump out of service.
Aeration		
Blowers	3 each at 385 scfm 50 HP each	770 scfm with one out of service.
Filters (worst case conv. or SBR)	3 at 30 sf each	Maximum rate of 5 gpm/sf with one out of service.
Ultraviolet Disinfection	2 units each at 785 gpm 4 KW power	Each unit will handle peak flow
Effluent Storage	100,000 gallons	
Effluent Pumps	2 each at 785 gpm @ 100 psi 75 HP each	Each unit will handle peak flow
Percolation Pond	32,810 sf with 2' of freeboard	Maximum average rate of 1' per day
Emergency Generator	500 KW	

TABLE 3-2
VISTA CANYON WATER FACTORY
MOTOR HORSEPOWER NEEDS

Item	Quantity	HP	Connected Load, HP	Duty Load, HP
Influent Pump	2	20	40	20
Screening	2	½	1	1
RAS Pumps	2	15	30	15
Aeration Blowers	3	50	150	100
Effluent Pumps	2	75	150	75
Total			**361**	**206**

TABLE 3-3
VISTA CANYON WATER FACTORY
OTHER POWER NEEDS

Item	Description	Connected Load, kw	Emergency Load, kw
Ultraviolet Disinfection	2 @ 4 kw each	8	4
Site Lighting	20,000 sf @ 0.5 w/sf,	10	5
Building	1,200 sf @ 25 w/sf	30	10
Miscellaneous	Equipment 10,000 w	10	0
Total		**58**	**19**

CHAPTER 4

RECYCLED WATER AVAILABILITY, USE, AND STORAGE

This chapter discusses the availability and use of the tertiary effluent from the proposed Vista Canyon water factory. As determined in Chapter 2, the water factory would be designed conservatively to treat 395,411 gpd (442.9 afy); and thus, there would be 395,411 gpd of recycled water available (on average). The Vista Canyon project water balance, shown in the following sections, illustrates the generation of only 214,265 gpd (240.0 afy) of wastewater and an average recycled water demand of 117,922 gpd (132.1 afy). The last section discusses the excess recycled water generated by the water factory.

RECYCLED WATER DEMAND AND USE

To determine the use of recycled water useage by the Vista Canyon project, a water balance of the project's total water demands was completed. Table 4-1 provides the Vista Canyon project's water demands. The detailed determination of Table 4-1 is found in Appendix B. This total demand shown at 297,922 gpd (333.7 afy) is less than the estimated wastewater flow based on the plant sizing generation factors in Chapter 2; thus, the wastewater generation factors are considered very conservative.

TABLE 4-1
VISTA CANYON WATER DEMANDS

Land Use	Acreage	Units or Square Footage	Total Demand, ac-ft/yr	Total Demand, gpd
Res-SF	7.7	96	29.0	25,903
Res-MF	28.1	1,021	106.3	94,942
Commercial	15.1	950,000	116.2	103,780
Landscape/OS/Park	30.4	-	48.6	43,430
Bank Protection	22.3	-	33.5	29,867
Santa Clara River	55.0	-	-	-
Hardscape	26.7	-	-	-
TOTAL	**185.3**	**1,117 units 950,000 sf**	**333.7**	**297,922**

Recycled water would be utilized at the Vista Canyon project for irrigation of landscaped areas, and of the re-vegetated areas above the soil cement bank protection. Additionally, the retail, office, and commercial spaces would be dual-plumbed to receive recycled water for public toilet facilities.

Landscape Irrigation Demands

Figure 4-1 shows the areas to be irrigated with recycled water on the Vista Canyon project. The majority of the project would be landscaped with low water use plants. Appendix C provides additional background on the water use factor for the landscape and park land uses. The soil cement bank protection irrigation water use factor is estimated based on our previous evaluations. Use of recycled water for this purpose would be temporary, likely lasting approximately five years.

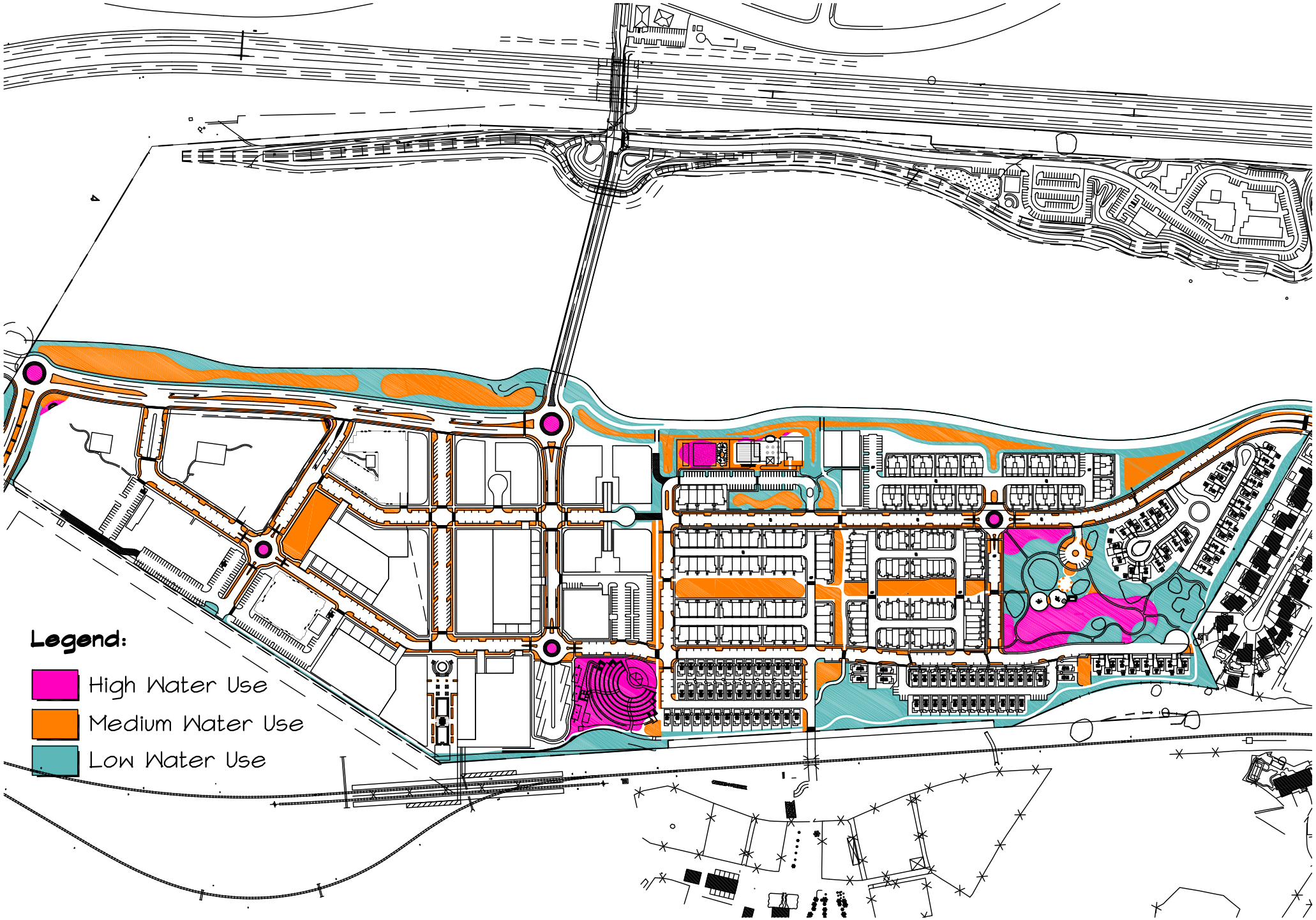
Dual-Plumbed Demands

The Vista Canyon retail, office, and commercial spaces would be dual-plumbed for recycled water to supply the public toilet facilities. In the water balance for the project, these areas are combined with the theater and hotel and are collectively designated as the "Commercial" land use. The dual-plumbed recycled water demand percentage of the total Commercial water demand was determined to be 43 percent. Appendix D provides the calculations for determining this percentage.

Table 4-2 summarizes the use of recycled water within the Vista Canyon project.

TABLE 4-2
VISTA CANYON RECYCLED WATER DEMANDS

Use Area	Acres	Water Use Factor, ac-ft/ac/yr	Annual Demand, ac-ft
Landscape/OS/Park	30.4	1.6	48.6
Bank Protection	22.3	1.5	33.5
Dual-plumbed	15.1	3.33	50.3
TOTAL			**132.4**



VISTA CANYON RANCH

Santa Clarita, California

IRRIGATION WATER USE MAP

SCALE: N.T.S.
APRIL 2009

YAMASAKI
LANDSCAPE ARCHITECTURE
1223 HIGH STREET, AUBURN, CA 95603
(530) 885-0040
FAX (530) 885-0042

FIGURE 4-1

Table 4-3 provides the project's water percentages of interior and exterior use for each land use type and whether the demand is anticipated to be met with potable or recycled (non-potable) water. Table 4-4 then summarizes project's potable water delivery of 180,001 gpd and recycled water delivery of 117,922 gpd. The demands and deliveries provided in Tables 4-3 and 4-4 are based on average water demands.

TABLE 4-3
VISTA CANYON WATER DEMANDS

Land Use	Total Demand, ac-ft/yr	Total Demand, gpd	Interior Potable Demand			Exterior Potable Demand			Interior Recycled Demand			Exterior Recycled Demand		
			%	ac-ft/yr	gpd	%	ac-ft/yr	gpd	%	ac-ft/yr	gpd	%	ac-ft/yr	gpd
Res-SF	29.0	25,903	60	17.4	15,542	40	11.6	10,361	0	0.0	0	0	0.0	0
Res-MF	106.3	94,942	100	106.3	94,942	0	0.0	0	0	0.0	0	0	0.0	0
Commercial	23.6	21,035	57	66.3	59,155	0	0.0	0	43	50.0	44,626	0	0.0	0
Landscape/OS/Par	48.6	43,430	0	0.0	0	0	0.0	0	0	0.0	0	100	48.6	43,430
Bank Protection	33.5	29,867	0	0.0	0	0	0.0	0	0	0.0	0	100	33.5	29,867
TOTAL	**333.7**	**297,922**		**190.0**	**169,639**		**11.6**	**10,361**		**50.0**	**44,626**		**82.1**	**73,296**

TABLE 4-4
VISTA CANYON WATER DELIVERIES

Land Use	Potable Deliveries		Recycled Water Deliveries	
	ac-ft/yr	gpd	ac-ft/yr	gpd
Res-SF	29.0	25,903	0.0	0
Res-MF	106.3	94,942	0.0	0
Commercial	66.3	59,155	50.0	44,626
Landscape/OS/Park	0.0	0	48.6	43,430
Bank Protection	0.0	0	33.5	29,867
TOTAL	**201.6**	**180,001**	**132.1**	**117,922**

EXCESS RECYCLED WATER

In comparing the proposed treatment plant capacity of 395,411 gpd (442.9 afy) and the project's recycled water demand of 117,922 gpd (132.1 afy), there is anticipated to be an average recycled water excess of 277,489 gpd (310.8 afy). This excess is far greater than the project's total potable water demand of 180,001 gpd (201.6 afy), resulting in no net increase in water demand for the Vista Canyon project to CLWA and its Santa Clarita Water Division.

To compare how season influences impact the excess of recycled water, Table 4-5 provides a month-by-month analysis illustrating that excess recycled water is available from the proposed water factory ranging from 6.6 million gallons (MG) in summer months to 10.4 MG in winter months for an annual total of 310.6 ac-ft (101.2 MG) of excess recycled water. Three options have been identified to address this excess recycled water.

TABLE 4-5
MONTHLY RECYCLED WATER DEMANDS AND DELIVERIES

Key Average Demands		
Landscape RW Demand	73,296	gpd
Dual-plumbed RW Demand	44,626	gpd
RW Available	395,411	gpd

Month	Days per Month	% of Avg Demand	Landscape RW Demand, MG	Dual-plumbed RW Demand, MG	RW Available, MG	Excess RW, MG
January	31	22	0.5	1.4	12.3	10.4
February	28	70	1.4	1.2	11.1	8.4
March	31	78	1.8	1.4	12.3	9.1
April	30	61	1.3	1.3	11.9	9.2
May	31	90	2.0	1.4	12.3	8.8
June	30	122	2.7	1.3	11.9	7.8
July	31	169	3.8	1.4	12.3	7.0
August	31	187	4.3	1.4	12.3	6.6
September	30	139	3.1	1.3	11.9	7.5
October	31	143	3.2	1.4	12.3	7.6
November	30	66	1.5	1.3	11.9	9.1
December	31	53	1.2	1.4	12.3	9.7
Annual Total, MG			**26.8**	**16.3**	**144.3**	**101.2**
Annual Total, ac-ft			**82.3**	**50.0**	**442.9**	**310.6**

Castaic Lake Water Agency

The excess recycled water from the Vista Canyon water factory could be sold to CLWA as a supply to its recycled water system to offset existing CLWA potable water demands. CLWA is currently expanding its recycled water facilities in the Santa Clarita Valley. CLWA would utilize the excess water generated by the Vista Canyon water factory. The Vista Canyon project, and water factory, is included in CLWA's Preliminary Design Report for these facilities, known as Phase 2B.

Percolation Ponds

If no direct recycled water use can be identified for the excess recycled water, the excess recycled water from the Vista Canyon water factory could be discharged to percolation ponds.

Water Factory Flow

Also to be considered is the off-site wastewater flow diverted to the Vista Canyon water factory from the sewer mainline adjacent to the project (discussed in Chapter 2). The off-site sewage flow diverted to the water factory could be reduced so that no excess recycled water is generated.

CHAPTER 5

JURISDICTIONAL CONSIDERATIONS

The Vista Canyon project is currently within the service area of CLWA's Santa Clarita Water Division. It is outside of the Santa Clarita Valley Sanitation District. The project would be annexed into both the City of Santa Clarita and the Santa Clarita Valley Sanitation District.

SEWER

The Vista Canyon project would annex into the City of Santa Clarita, which would be the sewer service provider for the project. The project also would annex into the Santa Clarita Valley Sanitation District and pay fees for the discharge of solids into its system. Based on a treatment capacity of 395,411 gpd, the estimated flow, COD, and SS discharged to the sewer system from the water factory is estimated to be 36,218 gpd, 524 lbs/day, and 686 lbs/day, respectively.

City of Santa Clarita

The City of Santa Clarita currently owns portions of the conveyance system within its boundaries. The larger lines are owned by the Santa Clarita Valley Sanitation District. The City also contracts for maintenance of its lines with the County of Los Angeles. It is anticipated that the entire sewer system in the Vista Canyon project would be owned by the City. The City would contract with the County of Los Angeles for the operation and maintenance of the sewer system. The City would consider private contract operators for the water factory.

Santa Clarita Valley Sanitation District

The Vista Canyon water factory would discharge solids to the conveyance system for treatment at a downstream facility. The downstream facilities are operated by the Santa Clarita Valley Sanitation District. In order to provide for collection of fees and treatment of solids, the project area would annex into the Santa Clarita Valley Sanitation District and an agreement would be reached between the applicant and the Santa Clarita Valley Sanitation District for charges for treatment of solids from the water factory.

RECYCLED WATER

Recycled water produced at the water factory would be utilized by CLWA and incorporated into its recycled water program for the Santa Clarita Valley. This water would be used on-site and off-site for irrigation and other uses as approved by the State Department of Public Health. The City would enter into a contract with CLWA for the sale of recycled water.

CHAPTER 6

REGULATORY REQUIREMENTS

A number of permitting agencies will need to review and permit elements of the recycled water system for the Vista Canyon water factory. The reviewing agencies would be the Los Angeles Regional Water Quality Control Board (RWQCB), the State Department of Public Health, and the County Department.

LOS ANGELES REGIONAL WATER QUALITY CONTROL BOARD

The water factory would need a waste discharge permit for the discharge to the percolation ponds. The plant would be located within Reach 8 of the Santa Clara River for groundwater (Santa Clara-Mint Canyon) and Reach 7 for surface water (Lang gaging station to Bouquet Canyon Road Bridge).

The RWQCB also would issue the permit for the production of the recycled water. The recycled water purveyor's permit would be issued under section 13260 of the Water Code related to water recycling requirements or under Section 13523.1 of the Water Code as a master reclamation permit.

STATE DEPARTMENT OF PUBLIC HEALTH

The effluent from the water factory would need to meet the requirements of California Code of Regulations, Title 22, for unrestricted reuse. Some onsite testing of the disinfection system would likely be needed prior to distribution and use of the recycled water.

COUNTY DEPARTMENT OF PUBLIC HEALTH

The recycled water piping and distribution system would need approval from the County Department of Public Health.

OTHER AGENCIES

The South Coast Air Pollution Control District would need to issue a permit for the emergency diesel generator. A permit also would be needed for various chemicals used in conjunction with the treatment process.

WATER QUALITY

The following paragraphs provide a brief description of water quality related to the water factory. Analysis related to the potential water quality impacts from the water factory is included in the Vista Canyon Water Quality Technical Report (Geosyntec, 2010).

Potable Water Quality

Potable water to the Vista Canyon project would be provided by the Santa Clarita Water Division of CLWA (SCWD). Tables 6-1 and 6-2 provide some of the State Department of Public Health primary and secondary maximum contaminant levels (MCLs) for drinking water. Table 6-3 provides average water quality data for five CLWA groundwater wells in the area. Figure 6-1 shows the location of these wells.

TABLE 6-1
PRIMARY DRINKING WATER STANDARD
MAXIMUM CONTAMINANT LEVELS (MCLs)

Parameter	MCL, mg/L
Aluminum	1
Arsenic	0.01
Barium	1
Beryllium	0.004
Cadmium	0.005
Chromium	0.05
Cyanide	0.15
Fluoride	2
Mercury	0.002
Nickel	0.1
Nitrate (as NO_3)	45
Nitrate+Nitrite (NO_3-N + NO_2-N)	10
Nitrite (as nitrogen)	1
Selenium	0.05
Thallium	0.002

TABLE 6-2
SECONDARY DRINKING WATER STANDARDS

Consumer Acceptance Contaminant Levels			
Constituents	***Maximum Contaminant Levels/Units***		
Aluminum	0.2 mg/L		
Color	15 Units		
Copper	1 mg/L		
Foaming Agents (MBAS)	0.5 mg/L		
Iron	0.3 mg/L		
Manganese	0.05 mg/L		
Odor—Threshold	3 Units		
Silver	0.1 mg/L		
Turbidity	5 Units		
Zinc	5 mg/L		
Consumer Acceptance Contaminant Level Ranges			
Constituent, Units	***Recommended***	***Upper***	***Short Term***
Total Dissolved Solids (TDS), mg/L	500	1,000	1,500
Specific Conductance, µS/cm	900	1,600	2,200
Chloride, mg/L	250	500	600
Sulfate, mg/L	250	500	600

TABLE 6-3
AVERAGE GROUNDWATER QUALITY OF FIVE SCWD WELLS

Parameter	**Units**	**Average Concentration**
TDS	mg/L	670
Chloride	mg/L	79
Sulfate	mg/L	123
Nitrate+Nitrate as N	mg/L	3.816
Boron	mg/L	1.4
Aluminum	µg/L	<DLR
Arsenic	µg/L	<DLR
Barium	mg/L	0.103
Beryllium	µg/L	<DLR
Cadmium	µg/L	<DLR
Chromium	µg/L	<DLR
Cyanide, total (2006)	mg/L	<DLR
Fluoride	mg/L	0.3
Mercury, Total	µg/L	<DLR
Nickel	µg/L	<DLR

TABLE 6-3
AVERAGE GROUNDWATER QUALITY OF FIVE SCWD WELLS

Parameter	Units	Average Concentration
Nitrate as NO3	mg/L	17
Nitrite as N	mg/L	<DLR
Selenium	µg/L	<DLR
Thallium	µg/L	<DLR
Color	Color unit	<5
Copper	µg/L	<DLR
MBAS	mg/L	<0.050
Iron	mg/L	<DLR
Manganese	µg/L	<DLR
Odor	TON	1
Silver	µg/L	<DLR
Turbidity	NTU	0.07
Zinc	µg/L	<DLR
Specific Conductance	µmhos/cm	1059
Alkalinity as CacO3	mg/L	289
Hardness as CaCO3	mg/L	391
Volatile Organic Chemicals (VOCs)	µg/L	ND
Synthetic Organic Chemicals (SVOCs)	µg/L	Waived

n/a = not analyzed
ND = none detected
<DLR = Less than detection limit for purposes of reporting

Water Factory Effluent Quality

The recycled water quality effluent from the Vista Canyon water factory has been estimated based on the potable water quality, the addition of constituents based on a typical use cycle, and typical constituent removals from the proposed treatment processes. Table 6-4 provides an estimate of constituent quantities added as the result of using the potable water. Table 6-5 then provides the anticipated recycled water effluent quality. As indicated above, analysis related to potential impacts on water quality from the Vista Canyon water factory is found in the Vista Canyon Water Quality Technical Report (Geosyntec, 2010).

TABLE 6-4 CONSTITUENT ADDITION FROM A USE CYCLE	
Parameter	**Estimated Addition, mg/L**
TDS	265
Chloride *	37
Sulfate	23
Boron	0.15
Aluminum	0.15
Fluoride	0.3
Manganese	0.3

Source – Asano, 2007
* Source – SCVJSS Chloride Report, October 2002

TABLE 6-5 VISTA CANYON WATER FACTORY EFFLUENT QUALITY	
Parameter	**Estimated Concentration, mg/L**
TDS	935
Chloride	116
Sulfate	146
NO_3-N + NO_2-N	<10
Boron	1.415
Aluminum	<1
Fluoride	1.3
Manganese	0.3

Recycled water effluent quality limits generated under water reclamation requirements in place for LACSD's Valencia Water Reclamation Plant are provided in Table 6-6. For comparison, the Water Quality Control Plan for the Los Angeles Region (Basin Plan) water quality objectives for groundwater in Reach 8 are provided in Table 6-7.

TABLE 6-6 VALENCIA WATER RECLAMATION PLANT RECYCLED WATER LIMITS	
Parameter	**Limit, mg/L**
TDS	1000
Chloride, Cl	300
Sulfate, SO_4	450
NO_3-N + NO_2-N	10
B	1.0

Source: RWQCB Order No. 87-48, *Water Reclamation Requirements*

TABLE 6-7 GROUNDWATER WATER QUALITY OBJECTIVES FOR THE EASTERN SANTA CLARA BASIN (SANTA CLARA-MINT CANYON)	
Parameter	**Objective, mg/L**
TDS	800
Chloride, Cl	150
Sulfate, SO_4	150
NO_3-N + NO_2-N	10
B	1.0

DWR Basin No. 4-4.07

Emerging Contaminants

Emerging contaminants is the term used to collectively address chemicals and microorganisms that have only recently been identified in water and are under consideration to be regulated. Chemicals identified as emerging contaminants include the broad classes of endocrine disrupting compounds, EDCs, (originating in pharmaceuticals, personal care products, fertilizers, etc.) and pharmaceutically active compounds (PhACs) such as antibiotics, anti-inflammatory, X-ray contrast media, and antidepressants. (Asano et.al., 2007)

Of the broad category of emerging contaminants, the California Department of Public Health presently regulates methyl tertiary-butyl ether (MTBE) and perchlorate. Perchlorate is regulated as a primary drinking water standard with an MCL of 0.006 mg/L, while MTBE has a secondary MCL of 0.005 mg/L.

As required by the SWRCB *Recycled Water Policy*, the SWRCB is convening an advisory panel to provide recommendations on emerging contaminant monitoring.

CHAPTER 7

PRELIMINARY USER FEE AND FISCAL ANALYSIS

This chapter presents a fiscal analysis of the Vista Canyon water factory to assist with the establishment of user fees. Operation and maintenance costs, replacement costs, and occupancy schedules are provided to give an overall fiscal analysis of the water factory. Final rate analysis and developer fees, including cost sharing agreements, would be based on detailed financing studies to be conducted as part of the facilities planning and feasibility studies.

COSTS

Table 7-1 provides an estimate of the yearly cost to operate the Vista Canyon water factory. The yearly operational costs are estimated to be $651,000. This includes operating expenses of $349,000 and capital reserve contribution of $175,000 per year. The remaining $127,000 is the solids treatment cost for the discharge to Santa Clarita Valley Sanitation District sewer.

REVENUE

Yearly fees were estimated to be $351 per year per equivalent dwelling unit (EDU) and the recycled water produced was valued at $263 per acre foot (consistent with CLWA wholesale water rate). An increase in operational costs would constitute an increase in user fees.

TABLE 7-1
VISTA CANYON WATER FACTORY
CONNECTION FEE ANALYSIS

Year of Operation	Total	2012	2013	2014	2015	2016	2017	2018	2019
Vista Canyon EDUs Connected									
Residential EDUs	709	90	90	90	90	90	90	90	79
Other EDUs	812	10	10	111	111	111	111	111	237
Total EDUs	1,521	100	100	201	201	201	201	201	316
Cumulative VC EDUs		*100*	*200*	*401*	*602*	*803*	*1,004*	*1,205*	*1,521*
Water Factory Flow Rate, mgd		0.395	0.395	0.395	0.395	0.395	0.395	0.395	0.395
Flow from VC, mgd		0.026	0.052	0.104	0.157	0.209	0.261	0.313	0.395
% of flow from VC		7	13	26	40	53	66	79	100
Flow from Off-site, mgd		0.369	0.343	0.291	0.239	0.187	0.134	0.082	0.000
% of flow from off-site		93	87	74	60	47	34	21	-
Expenses (thousand of dollars)									
Operation and Maintenance		$ 349	$ 349	$ 349	$ 349	$ 349	$ 349	$ 349	$ 349
Capital Reserve		$ 175	$ 175	$ 175	$ 175	$ 175	$ 175	$ 175	$ 175
Solids to LACSD [1]		$ 127	$ 127	$ 127	$ 127	$ 127	$ 127	$ 127	$ 127
Total Expenses		**$ 651**	**$ 651**	**$ 651**	**$ 651**	**$ 651**	**$ 651**	**$ 651**	**$ 651**
Revenue (in thousands of dollars)									
Vista Canyon Cost per EDU =	351	$ 35	$ 70	$ 141	$ 212	$ 282	$ 353	$ 424	$ 535
Others		$ 499	$ 464	$ 394	$ 323	$ 252	$ 182	$ 111	$ -
RW Sales [2]		$ 116	$ 116	$ 116	$ 116	$ 116	$ 116	$ 116	$ 116
Total Revenue		**$ 651**	**$ 651**	**$ 651**	**$ 651**	**$ 651**	**$ 651**	**$ 651**	**$ 651**

[1] $199.08 per year, X=0.2798 (Flow portion), Y=0.3239 (COD portion), Z=0.3963 (SS portion)

[2] Water Factory flow @ $263 per ac-ft (CLWA wholesale water rate)

APPENDIX A

SCVSD SERVICE CHARGE RATE AND MEAN LOADINGS ORDINANCE

AN ORDINANCE PRESCRIBING THE CONNECTION FEE RATE AND MEAN LOADINGS PER UNIT OF USAGE FOR SANTA CLARITA VALLEY SANITATION DISTRICT OF LOS ANGELES COUNTY THE BOARD OF DIRECTORS OF SANTA CLARITA VALLEY SANITATION DISTRICT OF LOS ANGELES COUNTY ORDAINS AS FOLLOWS:

SECTION 1.0 - USER CATEGORIES AND MEAN LOADINGS

Pursuant to Section 3.04(2) of the Master Connection Fee Ordinance of Santa Clarita Valley Sanitation District of Los Angeles County, the following shall constitute the user categories and mean loadings per unit of usage for flow, chemical oxygen demand (COD), and suspended solids:

DESCRIPTION	UNIT OF MEASURE	FLOW (Gallons per Day)	COD (Pounds per Day)	SUSPENDED SOLIDS (Pounds per Day)
RESIDENTIAL				
Single Family Home	Dwelling Unit	260	1.22	0.59
Condominiums	Dwelling Unit	195	0.92	0.44
Multi-Unit Residential	Dwelling Unit	156	0.73	0.35
Mobile Home Parks	No. of Spaces	156	0.73	0.35
COMMERCIAL				
Hotel/Motel/Rooming House	Room	125	0.54	0.28
Store	1000 ft^2	100	0.43	0.23
Supermarket	1000 ft^2	150	2.00	1.00
Shopping Center	1000 ft^2	325	3.00	1.17
Regional Mall	1000 ft^2	150	2.10	0.77
Office Building	1000 ft^2	200	0.86	0.45
Medical, Dental, Veterinary Clinic or Building	1000 ft^2	300	1.29	0.68
Restaurant	1000 ft^2	1,000	16.68	5.00
Indoor Theatre	1000 ft^2	125	0.54	0.28
Car Wash				
Tunnel - No Recycling	1000 ft^2	3,700	15.86	8.33
Tunnel - Recycling	1000 ft^2	2,700	11.74	6.16
Wand	1000 ft^2	700	3.00	1.58
Bank, Credit Union	1000 ft^2	100	0.43	0.23
Service Shop, Vehicle Maintenance & Repair Shop	1000 ft^2	100	0.43	0.23
Animal Kennels	1000 ft^2	100	0.43	0.23
Gas Station	1000 ft^2	100	0.43	0.23
Auto Sales	1000 ft^2	100	0.43	0.23
Wholesale Outlet	1000 ft^2	100	0.43	0.23
Nursery/Greenhouse	1000 ft^2	25	0.11	0.06
Manufacturing	1000 ft^2	200	1.86	0.70
Light Manufacturing	1000 ft^2	25	0.23	0.09
Lumber Yard	1000 ft^2	25	0.23	0.09
Warehousing	1000 ft^2	25	0.23	0.09
Open Storage	1000 ft^2	25	0.23	0.09
Drive-in Theatre	1000 ft^2	20	0.09	0.05
Night Club	1000 ft^2	350	1.50	0.79
Bowling/Skating	1000 ft^2	150	1.76	0.55
Club & Lodge Halls	1000 ft^2	125	0.54	0.27
Auditorium, Amusement	1000 ft^2	350	1.50	0.79
Golf Course and Park (Structures and Improvements)	1000 ft^2	100	0.43	0.23
Campground, Marina, and Recreational Vehicle Park	Sites, Slips, or Spaces	55	0.34	0.14
Convalescent Home	Bed	125	0.54	0.28
Horse Stables	Stalls	25	0.23	0.09
Laundromat	1000 ft^2	3,825	16.40	8.61
Mortuary, Funeral Home	1000 ft^2	100	1.33	0.67

DESCRIPTION	UNIT OF MEASURE	FLOW (Gallons per Day)	COD (Pounds per Day)	SUSPENDED SOLIDS (Pounds per Day)
COMMERCIAL				
Health Spa, Gymnasium				
With Showers	1000 ft^2	600	2.58	1.35
Without Showers	1000 ft^2	300	1.29	0.68
Convention Center, Fairground, Racetrack, Sports Stadium/Arena	Average Daily Attendance	10	0.04	0.02
INSTITUTIONAL				
College/University	Student	20	0.09	0.05
Private School	1000 ft^2	200	0.86	0.45
Library, Museum	1000 ft^2	100	0.43	0.23
Post Office (Local)	1000 ft^2	100	0.43	0.23
Post Office (Regional)	1000 ft^2	25	0.23	0.09
Church	1000 ft^2	50	0.21	0.11

SECTION 2.0 - COST ALLOCATION FACTORS

Pursuant to Section 3.04(1) of the Master Connection Fee Ordinance of Santa Clarita Valley Sanitation District of Los Angeles County, the proportions of the total capital costs required to construct an incremental expansion of the sewerage system of the next anticipated configuration for conveyance, treatment, and disposal of wastewater which are attributable to flow, COD, and suspended solids, designated as X, Y, and Z, respectively, shall be:

X = 0.5498 Y = 0.1849 Z= 0.2653

SECTION 3.0 - CONNECTION FEE RATE

Pursuant to Section 3.03 of the Master Connection Fee Ordinance of Santa Clarita Valley Sanitation District of Los Angeles County, the connection fee rate, to be effective commencing July 16, 2007, shall be $3,330 capacity unit.

SECTION 4.0 - VALIDITY

If any part, section, subsection, paragraph, sentence, clause, or phrase of this Ordinance is held invalid or unconstitutional for any reason by any court, that decision does not affect the validity or constitutionality of the remainder of this Ordinance. The Board of Directors declares that it would have adopted each provision of this Ordinance irrespective of the validity of any other provision.

SECTION 5.0 - EFFECTIVE DATE

This Ordinance shall become effective ~~on~~ thirty days after its adoption.

ATTEST:

Clerk, Board of Directors
Santa Clarita Valley Sanitation District
of Los Angeles County

PRO TEM Chairperson, Board of Directors
Santa Clarita Valley Sanitation District
of Los Angeles County

PASSED AND ADOPTED by the Board of Directors of Santa Clarita Valley Sanitation District of Los Angeles County on June 13, 2007 by the following vote:

AYES: Directors Weste and Yaroslavsky

NOES: None

ABSTAIN: None

ABSENT: Director McLean

M. Alma Horvath

Secretary of the Board of Directors
Santa Clarita Valley Sanitation District
of Los Angeles County

APPENDIX B

DETAILED PROJECT WATER DEMAND CALCULATIONS

The water duty factors for the residential and commercial development presented in this appendix are based on actual water use provided by Valencia Water Company (VWC) and the Santa Clarita Water Division (SCWD) for uses and product type similar to the Vista Canyon uses and product type. The landscape water duty factor is based on the Conceptual Landscape Plan for the project (Appendix C). The bank protection water duty factor is based on a conceptual vegetation plan.

TABLE B-1
VISTA CANYON WATER DUTY FACTORS AND DEMANDS

Land Use	Acreage	Units or Square Footage	Water Duty Factor		Total Demand, ac-ft/yr	Total Demand, gpd
Res-SF	7.7	96	270	gpd/unit	29.0	25,903
Res-MF	28.1	1,021	See Tbl.B-2	af/ac/yr	106.3	94,942
Hotel/Theater	1.7	171,000	0.107	gpd/sf	20.5	18,296
Office/Commercial	7.9	412,000	0.051	gpd/sf	23.6	21,035
Retail and Office	5.5	367,000	13.1	af/ac/yr	72.2	64,450
Landscape/OS/Park	30.4	-	1.6	af/ac/yr	48.6	43,430
Bank Protection	22.3	-	1.5	af/ac/yr	33.5	29,867
Santa Clara River	55.0	-	0		-	-
Hardscape	26.7	-	0		-	-
TOTAL	**185.3**	**1,117 units 950,000 sf**			**333.7**	**297,922**

TABLE B-2
MULTI-FAMILY RESIDENTIAL WATER DUTY FACTORS FOR VARYING PRODUCTS

Land Use	Acreage	Water Duty Factor		Demand, ac-ft/yr	Demand, gpd
Multi Family, PA1 and PA2	12.4	4.9	af/ac/yr	60.6	54,120
Multi Family, PA3 55-63	11.7	3.4	af/ac/yr	39.3	35,060
Multi Family, PA3 71-72	4.0	1.6	af/ac/yr	6.5	5,762
Total	**28.1**			**106.3**	**94,942**

APPENDIX C

LANDSCAPE IRRIGATION INFORMATION

ESTIMATED WATER USE (gallons/month)

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
Monthly ETo (inches)				2.81	2.83	4.14	5.62	6.02	6.81	7.64	7.75	5.83	5.19	3.67	3.19	**61.5**
Average Rainfall (inches)				3.52	4.80	3.13	0.88	0.28	0.06	0.03	0.05	0.15	0.88	1.29	2.49	**17.64**
Effective Rainfall (25%)				0.88	1.20	0.78	0.22	0.07	0.02	0.01	0.01	0.04	0.22	0.32	0.62	**4.41**
Net ET				1.93	1.63	3.36	5.40	5.95	6.80	7.63	7.74	5.79	4.97	3.35	2.57	**57.09**
Water Use	**Irrigation Efficiency**	**Plant Coefficient**	**Square Footage**													
High	0.65	0.7	135,800	174,998.1	147,796.4	304,433.3	489,632.1	539,502.1	616,120.4	692,058.7	701,579.4	525,221.1	450,642.9	303,526.6	232,801.9	**5,178,313.1**
Medium	0.85	0.4	423,000	238,193.8	201,168.8	414,370.8	666,448.9	734,328.0	838,614.9	941,976.2	954,934.9	714,889.9	613,379.9	413,136.6	316,871.8	**7,048,314.6**
Low	0.85	0.1	760,000	106,990.1	90,359.5	186,124.0	299,350.6	329,840.0	376,682.8	423,109.9	428,930.6	321,108.9	275,513.4	185,569.6	142,330.1	**3,165,909.6**
TOTAL			**1,318,800**	**520,182.1**	**439,324.7**	**904,928.1**	**1,455,431.7**	**1,603,670.1**	**1,831,418.2**	**2,057,144.8**	**2,085,444.9**	**1,561,220.0**	**1,339,536.2**	**902,232.9**	**692,003.8**	**15,392,537.3**

Equation: $EWU = \frac{(\text{Net ETo}) \times (\text{Plant Factor}) \times (\text{Hydrozone Sq. Ft.}) \times (.62)}{\text{Irrigation Efficiency}}$

Calculation Note:

The required gallons per month was derived by subtracting the effective monthly rainfall from the monthly ET which results in the plant water demand per month or the net ET. Note, the inconsistancy of rainfall was taken into account by taking 25% of the average monthly rainfall to get a 'consistant' or usable rainfall figure. This is the effective rainfall. The efficiency of the irrigation system, plant water needs and square footage of the site were taken into account with an end result of the monthly water demand per water use (high, medium and low).

All figures were taken from the local CIMIS Santa Clarita station.

YAMASAKI
LANDSCAPE ARCHITECTURE

APPENDIX D

INTERIOR RECYCLED WATER DEMAND CALCULATION

DEXTER WILSON ENGINEERING, INC.

Estimate of commercial space, dual-plumbed facilities

Assume no dual plumbing in theater + hotel, only in:

Corporate office / General commercial	412,000 sf
Retail and office	367,000 sf
Total	779,000 sf

office + commercial (per 5,000 sf)

Device	WFU/Device	Count	WFU
1.6 gpf flushometer toilets	2.5	2.0	5.0
Lavatory	1.0	2.0	2.0
Kitchen Sink	1.5	1.0	1.5
Drinking Fountain	0.5	1.0	0.5
			9.0

% of water demand met by recycled water via dual-plumbed toilets = 5.0/9.0 = 55%

Retail Space (per 5,000 sf)

Device	WFU/Device	Count	WFU
1.6 gpf flushometer toilets	2.5	2.0	5.0
Lavatory	1.0	2.0	2.0
Drinking Fountain	0.5	1.0	0.5
Kitchen Sink	1.5	1.0	1.5
Dishwasher	1.5	1.0	1.5
Mop Basin	3.0	1.0	3.0
			13.5

% of water demand met by recycled water via dual-plumbed toilets = 5.0/13.5 = 37%

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Total Commercial Net Acreage = 15.1 acres

This includes:

Hotel	140,000 sf
Theater	31,000 sf
Commercial	50,000 sf
Retail/Restaurant	133,000 sf
Office	596,000 sf
	950,000 sf

Hotel + Theater will not be dual plumbed, therefore the % of Commercial demand which will be met with reacyled water is

$$0\%(140,000 + 31,000) + 55\%(50,000 + 596,000) + 37\%(133,000)$$

$$= \cancel{0} + 355,300 + 49,210$$

$$= 404,510/950,000$$

$$= 43\%$$

Ac-ft/ac/yr Calculation, Dual-Plumbed Recycled Water

From Table 4-1, Commercial demand = 116.2 ac-ft/yr
Commercial acreage (net) = 15.1 acres

$$= \frac{116.2 \text{ ac-ft/yr}}{15.1 \text{ ac}} * 43\%$$

$$= 3.33 \text{ ac-ft/ac/yr}$$

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