SEWERAGE FACILITIES PLAN

UPDATE

YEAR 2000 AMENDMENT

(An amendment and supplement to the Sewerage Facilities Plan prepared in 1997 by McDonald-Stevens Engineers, Inc.)

Prepared for:

VICTOR VALLEY WASTEWATER RECLAMATION AUTHORITY
20111 SHAY ROAD
VICTORVILLE, CA 92394

MEMBER AGENCIES:

TOWN OF APPLE VALLEY
CITY OF HESPERIA
CITY OF VICTORVILLE
SAN BERNARDINO COUNTY SERVICE AREA 64 (SPRING VALLEY LAKE)
SAN BERNARDINO COUNTY SERVICE AREA 42 (ORO GRANDE)

Adopted by the Board of Commissioners
October 26, 2000

VICTOR VALLEY WASTEWATER RECLAMATION AUTHORITY
SEWERAGE FACILITIES PLAN
YEAR 2000 UPDATE

Table of Contents

Table of Contents (continued)

LIST OF TABLES **PAGE**

LIST OF FIGURES **PAGE**

CHAPTER 1
SUMMARY AND RECOMMENDATIONS

INTRODUCTION

The Victor Valley Wastewater Reclamation Authority (VVWRA) is a California Joint Powers Authority (JPA) that owns and operates regional wastewater collection and treatment facilities which serve the Victor Valley. The service area includes the Town of Apple Valley, the City of Hesperia, the City of Victorville, the Southern California Logistics Airport, and San Bernardino County Services Areas 42 (Oro Grande) and 64 (Spring Valley Lake).

VVWRA owns and maintains 31.5 miles of interceptor sewer, two pump stations and a Regional Wastewater Reclamation Plant. A portion of the interceptor system is constructed in the stream bed of the Mojave River. The existing Reclamation Plant is rated for 9.5 MGD, which is further defined as 8.3 MGD for discharge to the Mojave River and 1.2 MGD for discharge to percolation ponds. In September 2000 a construction project began that will expand the capacity of the regional treatment facility to 11.0 MGD. The processes at the regional treatment plant consist of screening, grit removal, primary clarification, biological oxidation of wastes with complete nitrification, secondary clarification, coagulation, flocculation, filtration, and disinfection.

Biosolids, which are generated as a component of the liquid treatment phase, are stabilized by dissolved air flotation thickening and anaerobic digestion. The digested biosolids are further dewatered and dried prior to disposal. A lease agreement was recently negotiated and a regional compost facility was constructed on land owned by VVWRA. As a condition of the lease, the regional compost facility must accept and process all of the biosolids generated by VVWRA.

In 1998 the treatment system was upgraded in order to meet a whole effluent toxicity standard that requires no measurable toxic impact on the receiving stream. The upgrade added complete nitrification and dechlorination of the disinfected effluent. As an added benefit, the treatment system now accomplishes total nitrogen removal with an effluent nitrate concentration of less than 10 mg/l (the drinking water standard for nitrate is 10 mg/l).

OBJECTIVES

Growth in the population and the resulting flow of wastewater is utilizing the capacity of portions of the existing collection and treatment facilities. In addition, the regional aquifer system is in a condition of severe overdraft, which could be reduced through the implementation of recycled water projects. The purpose of this amendment to the 1997 Sewerage Facilities Plan is to update and revise population projections contained in the original Plan, and to use the revised populations to adjust the findings and recommendations suggested by the Plan. This amendment, like the original

1997 Sewerage Facilities Plan, considers population growth, projected wastewater flows, interceptor capacity, regional wastewater treatment, subregional reclamation facilities, and water recycling for the study period up to and including the year 2020.

POPULATION PROJECTIONS

Population projections developed for this amendment are based on each entity's best estimates for planning. The estimated total resident population within the VVWRA service area is summarized in Table 1-1.

TABLE 1-1
RESIDENT POPULATION PROJECTIONS

MEMBER ENTITY	2000	2005	2010	2015	2020
Victorville inc SCLA	63,639	71,372	82,740	95,919	111,196
CSA 42	725	725	725	725	725
CSA 64	7,810	8,770	9,838	11,024	11,025
Apple Valley	56,112	62,484	67,781	76,310	85,895
Hesperia	63,589	69,385	75,709	82,610	90,140
TOTAL	191,875	212,736	236,793	266,588	298,981

Because the residents and businesses in some portions of the service area still use private septic systems, not all of the resident population is sewered. The City of Victorville is approximately 90% sewered, and 100% of the population growth is expected to be sewered. The Town of Apple Valley is approximately 30% sewered, and 50% of the population growth is expected to be sewered. The City of Hesperia is approximately 18% sewered, and 87% of the population growth is expected to be sewered. Both CSA 42 and CSA 64 are entirely sewered, and all of the population growth is expected to be sewered. The estimated total sewered population within the VVWRA service area is summarized in Table 1-2.

TABLE 1-2
SEWERED POPULATION PROJECTIONS

MEMBER ENTITY	2000	2005	2010	2015	2020
Victorville inc SCLA	57,275	65,009	76,376	89,555	104,832
CSA 42	725	725	725	725	725
CSA 64	7,810	8,769	9,837	11,024	11,024
Apple Valley	16,758	19,944	22,593	26,857	31,650
Hesperia	11,700	15,364	20,176	26,494	34,791
TOTAL	94,268	109,811	129,707	154,655	183,022

WASTEWATER FLOWS

Wastewater flow projections were developed based upon the estimated sewered population, as summarized in Table No. 1-2, and a wastewater flow of approximately 80 gallons per person per day. Also, flow contributions from septic abandonment and commercial, industrial, and institutional sources were estimated and included. Where equivalent dwelling unit data is shown, the unit factor for flow is 245 gallons per day per EDU. The wastewater flow projections for each member agency are summarized in Table 1-3.

TABLE 1-3
WASTEWATER FLOW PROJECTIONS

MEMBER AGENCY	2000	2005	2010	2015	2020
Victorville/SCLA	5.38	6.33	7.58	8.96	10.29
CSA 42	0.05	0.05	0.05	0.05	0.05
CSA 64	0.74	0.89	1.04	1.21	1.28
Apple Valley	1.46	1.87	2.26	2.80	3.42
Hesperia	1.06	1.52	2.07	2.75	3.58
TOTAL	8.69	10.66	13.00	15.77	18.62

Note: The flow shown is the average daily flow in million gallons per day (MGD).

INTERCEPTOR IMPROVEMENTS

The VVWRA interceptor system extends south approximately 15 miles north from the regional treatment facility to serve each of the member entities. The pipeline ranges in size from 10-inch diameter to 42-inch diameter. The interceptor system was designed to provide approximately 20 years of capacity for sewage flows. Most of the interceptor system has now been in use for 20 years, and portions are reaching capacity. The required improvements in most cases would involve the installation of a new or parallel sewer to provide additional capacity.

Table 1-4 shows the interceptor improvements that are anticipated if no subregional reclamation facilities are constructed:

TABLE 1-4
INTERCEPTOR IMPROVEMENTS WITHOUT SUBREGIONAL FACILITIES

DESCRIPTION	YEAR	CONSTRUCTION COST
Hesperia Interceptor	2004	$575,000
Main Interceptor (VSD 5 - VSD 1)	2008	$500,000
Apple Valley Interceptor	2008	$380,000
Lower Narrows Interceptor	2009	$750,000
North Apple Valley Interceptor	2010	$1,400,000
Upper Narrows Interceptor	2012	$950,000

Note: construction costs shown are in 2000 dollars.

WASTEWATER TREATMENT IMPROVEMENTS

Treatment Facility improvements must be designed and constructed in time to accommodate the growing of the service population and the resulting flow of sewage. Wastewater flows and loadings are expected to grow from residential as well as commercial, industrial, and institutional sources. The construction of additional capacity should be initiated when the existing facilities reach 80% of the current rated capacity, so that construction can be completed before the facilities reach 90% of rated capacity. For example, engineering to design the expansion of treatment capacity from 11.0 MGD to 12.5 MGD should begin when the wastewater flow reaches 80% of 11 MGD, or 8.8 MGD. The latter is expected to occur early in 2001.

Table 1-5 shows the treatment facility improvements that are anticipated if no subregional reclamation facilities are constructed:

TABLE 1-5
TREATMENT IMPROVEMENTS WITHOUT SUBREGIONAL FACILITIES

DESCRIPTION	YEAR	CONSTRUCTION COST
11.0 MGD Expansion	2000	$14,000,000
12.5 MGD Expansion	2002	$9,500,000
14.5 MGD Expansion	2005	$11,000,000
20.0 MGD Expansion	2009	$20,000,000
25.0 MGD Expansion	2018	$20,000,000

Note: Construction costs include engineering, legal, environmental review, construction, construction management engineering, and contingencies. All costs are shown are in 2000 dollars.

RECLAMATION AND RECYCLING

The 1997 Sewerage Facilities Plan identified numerous potential customers of recycled water within the service area. Many of the potential users of recycled water include landscape irrigation for golf courses, parks, and cemeteries. The 1997 Sewerage Facilities Plan evaluated reclamation opportunities using water produced at the existing regional treatment facility, as well as reclaimed water produced by the construction of one or more subregional reclamation facilities. A number of potential locations for subregional reclamation facilities were identified, including the Victorville Greentree Golf Course, the area near the Mojave Narrows Regional Park, the City of Hesperia, and the Town of Apple Valley.

The City of Victorville is currently preparing a more detailed study of potential reclamation within the City limits. VVWRA is currently preparing a SWRCB grant application to perform planning and engineering work for the actual siting, design, and construction of one or more subregional reclamation facilities.

Siting for subregional reclamation facilities will require a great deal of additional study and consideration. Items to be considered include: economics, aesthetics, public perception, access for maintenance and chemical deliveries, property values, proximity to interceptors and available sewage flows, proximity to potential reclaimed water customers, receptiveness of the respective water purveyor, and alternative effluent disposal options.

Table 1-6 shows the estimated cost to construct typical subregional reclamation facilities:

TABLE 1-6
SUBREGIONAL RECLAMATION FACILITIES

DESCRIPTION	YEAR	CONSTRUCTION COST
1.0 MGD Subregional	To be determined	$13,100,000
4.0 MGD Subregional	To be determined	$21,800,000

Note: Construction costs include land acquisition, engineering, legal, environmental review, construction, construction management engineering, and contingencies. All costs are shown are in 2000 dollars.

RECOMMENDATIONS AND IMPLEMENTATION

Table 1-7 shows construction costs and timing to improve the Regional Treatment Facility and the interceptor sewer system if no Subregional Reclamation Facilities are constructed.

At this time it appears that the most economical and best combination of possible alternatives to meet growth and to recycle wastewater is to build two subregional treatment facilities, one located near the Greentree Golf Course, and the other located upstream of the Upper Narrows, possibly near the Mojave Narrows Regional Park. In addition, to accommodate growth VVWRA should consider the construction of new interceptors to serve the City of Hesperia and the Town of Apple Valley. A new Hesperia interceptor could be extended south along the riverfront from Bear Valley Road to the Antelope Valley Wash. A new Apple Valley interceptor could be extended north along I-15 from Stoddard Wells Road to Dale Evans Parkway, or possibly turning east and following Stoddard Wells Road or the proposed Falchion Road alignment. The combination of the subregional reclamation facilities and new interceptors would accommodate growth without significantly expanding the existing interceptor system, and would produce reclaimed water close to numerous, large-volume users.

Table 1-8 shows construction costs and timing for this combination of improvements including Subregional Reclamation Facilities, interceptor expansions, improvements to the Regional Treatment Facility.

(Continued on Page 1-9)

TABLE 1-7
VICTOR VALLEY WASTEWATER RECLAMATION AUTHORITY
Projected Flows, Timing, and Capital Costs
Regional Treatment Only (no subregional facilities constructed)

Date	Year	Total Flow MGD	Sewered Population	Regional Facility: Minimum Rated Capacity MGD	Regional Facility: Treatment Capital Cost $ millions	Interceptor Expansion Capital Cost $ millions
June 30	2000	8.69	94,268	9.5	$14.0	
June 30	2001	9.07	97,194	11.0		
June 30	2002	9.45	100,208	11.0	$9.5	
June 30	2003	9.85	103,313	12.5		
June 30	2004	10.25	106,513	12.5		$0.6
June 30	2005	10.66	109,811	12.5	$11.0	
June 30	2006	11.11	113,530	14.5		
June 30	2007	11.56	117,374	14.5		
June 30	2008	12.03	121,348	14.5		$0.9
June 30	2009	12.51	125,457	14.5	$20.0	$0.8
June 30	2010	13.00	129,707	20.0		$1.4
June 30	2011	13.53	134,359	20.0		
June 30	2012	14.06	139,174	20.0		$1.0
June 30	2013	14.62	144,157	20.0		
June 30	2014	15.19	149,315	20.0		
June 30	2015	15.77	154,655	20.0		
June 30	2016	16.31	159,930	20.0		
June 30	2017	16.86	165,397	20.0		
June 30	2018	17.43	171,062	20.0	$20.0	
June 30	2019	18.02	176,934	25.0		
June 30	2020	18.62	183,022	25.0		
TOTALS					**$74.5**	**$4.6**
GRAND TOTAL		**$79.1**				

Notes: All values are in 2000 dollars. Minimum rated capacity at the regional facility assumes that the influent flow should not exceed 90% of rated capacity.

TABLE 1-8

VICTOR VALLEY WASTEWATER RECLAMATION AUTHORITY

Projected Flows, Timing, and Capital Costs

Regional Treatment, 4.0 MGD and 1.0 MGD Subregional Treatment Facilities located upstream of the Upper Narrows

				Regional Facility				Subregional Facilities		
Date	Year	Total Flow MGD	Sewered Population	Influent Flow MGD	Minimum Rated Capacity MGD	Treatment Capital Cost $ millions	Interceptor Expansion Capital Cost $ millions	Influent Flow MGD	Actual Rated Capacity MGD	Capital Cost
June 30	2000	8.69	94,268	8.69	9.5	$14.0				
June 30	2001	9.07	97,194	8.07	11.0			1.0	1.0	$13.1
June 30	2002	9.45	100,208	8.45	11.0			1.0	1.0	
June 30	2003	9.85	103,313	8.85	11.0			1.0	1.0	
June 30	2004	10.25	106,513	9.25	11.0		$0.6	1.0	1.0	
June 30	2005	10.66	109,811	5.66	11.0	$3.5		5.0	5.0	$21.8
June 30	2006	11.11	113,530	6.11	11.0			5.0	5.0	
June 30	2007	11.56	117,374	6.56	11.0			5.0	5.0	
June 30	2008	12.03	121,348	7.03	11.0		$0.4	5.0	5.0	
June 30	2009	12.51	125,457	7.51	11.0			5.0	5.0	
June 30	2010	13.00	129,707	8.00	11.0		$1.4	5.0	5.0	
June 30	2011	13.53	134,359	8.53	11.0			5.0	5.0	
June 30	2012	14.06	139,174	9.06	11.0			5.0	5.0	
June 30	2013	14.62	144,157	9.62	11.0	$9.5		5.0	5.0	
June 30	2014	15.19	149,315	10.19	12.5			5.0	5.0	
June 30	2015	15.77	154,655	10.77	12.5			5.0	5.0	
June 30	2016	16.31	159,930	11.31	12.5	$11.0		5.0	5.0	
June 30	2017	16.86	165,397	11.86	14.5		$0.5	5.0	5.0	
June 30	2018	17.43	171,062	12.43	14.5		$0.8	5.0	5.0	
June 30	2019	18.02	176,934	13.02	14.5			5.0	5.0	
June 30	2020	18.62	183,022	13.62	14.5			5.0	5.0	
TOTALS						**$38.0**	**$3.6**			**$34.9**
GRAND TOTAL		**$76.5**								

Notes: All values are in 2000 dollars. Minimum rated capacity at the regional facility assumes that the influent flow should not exceed 90% of rated capacity.

The implementation of the improvements should be accomplished in phases. The initial phases, which should be pursued by VVWRA in the near future, include:

1. Initiate the construction of the 11.0 MGD Expansion and immediately initiate engineering design work to expand the Regional Treatment Plant capacity to at least 12.5 MGD.

2. Begin engineering and CEQA work to site, design, and construct a 1.0 MGD Subregional Reclamation Facility near Greentree Golf Course and a 4.0 MGD Subregional Reclamation Facility upstream of the Upper Narrows of the Mojave River.

3. Begin engineering and environmental work to construct new interceptors to serve the northern portion of Apple Valley and the Hesperia riverfront area.

4. Begin researching and applying for State and Federal grant funds to construct Subregional Reclamation Facilities.

5. Initiate negotiations with water purveyor(s) to provide reclaimed water to potentially significant reclaimed water customers close to proposed Subregional Reclamation Facilities.

6. Apply to the State Water Resources Control Board for a change in the point of discharge for the Regional and Subregional Facilities.

7. File a water rights application with the State Water Resources Control Board for future discharges to the Mojave River.

CHAPTER 2
STUDY AREA, POPULATION AND FLOW PROJECTIONS

EXISTING WASTEWATER FLOW

The Victor Valley Wastewater Reclamation Authority (VVWRA) is a regional wastewater collection, treatment, and reclamation agency with a service area encompassing approximately 211 square miles within the high desert area of San Bernardino County. VVWRA is a four-member joint powers agency consisting of the Cities of Victorville, Hesperia, the Town of Apple Valley, and San Bernardino County Service Areas 42 (Oro Grande) and 64 (Spring Valley Lake). VVWRA also provides sewerage treatment and disposal services to then former George Air Force Base, which was incorporated into the service area of the City of Victorville pursuant to provisions of base conversion and is now identified as the Southern California Logistics Airport (SCLA). On September 15, 1998, the City of Adelanto began operating a new wastewater treatment facility, and the City withdrew from membership in VVWRA.

VVWRA began operating the Victor Valley Wastewater Reclamation Plant (VVWRP) in 1981 with a rated capacity of 4.8 mgd. In 1989, the capacity of the plant was increased to 9.5 mgd (8.3 mgd for discharge to the Mojave River and 1.2 mgd for discharge to percolation ponds). By late summer 2000 it is anticipated that a construction project will be underway to expand the overall treatment capacity to 11.0 mgd.

Based on recent flow monitoring, the VVWRA presently treats an average flow of about 8.2 mgd as follows:

TABLE 2-1
EXISTING FLOWS

ENTITY	FLOW (MGD)
Victorville	5.11
Hesperia	1.04
CSA 42	0.05
CSA 64	0.61
Apple Valley	1.24
SCLA	0.16
TOTAL	**8.21**

Since 1994 the flow of wastewater to VVWRA has been increasing at a rate of 3.9% to5.8% per year. This growth in flow is presumed to be due to a combination of several factors: a gradual

recovery and improvement in the economy, resulting in vacant homes and businesses being occupied again; new construction, resulting in new sewage flow, and; septic systems that fail and the owners connect to the regional sewer system instead of repairing the old septic system. It is anticipated that this positive growth trend will continue in the VVWRA service area as reflected in population and wastewater flow projections presented in the following analysis.

POPULATION PROJECTIONS

Population projections developed for this amendment to the Facilities Plan Update are based on each entity's best estimates for planning. The 1997 Sewerage Facilities Plan used available sources of information, which included each community's General Plan, the Sewer Master Plan, Planning Department growth forecasts, SCAG population forecasts, information excerpted from the Victor Valley Socioeconomic Forecast (dated January 24, 1997), and the State Department of Finance. This amendment reflects each entity's modification of the population projections to match current planning estimates. Population projections for the entire VVWRA service area are shown on Table 2-2. Specific criteria used for each entity's population projections are described in the following sections.

This Sewerage Facilities Plan defines capacity needs by examining future population growth as reported by the communities themselves. This approach relies on growth that is expected to occur as a part of building activity and resident population increases. In addition to estimating population growth, estimates of commercial, industrial, and institutional capacity needs have also been projected. Estimates were likewise made to compensate for the use of on-site disposal systems (private septic system) and how they can impact capacity demands. The overall methodology used, therefore, attempts to identify and differentiate the various components that go into forecasting population and commercial growth, and then transposing that information to sewage flow capacity demand.

VVWRA should continue tracking growth and use the information to perform regular updates of the Sewerage Facilities Plan. Through the use of population growth forecasts provided by each entity served by the VVWRA, and by using the current population and flow as benchmarks, needed changes in the Sewerage Facilities Plan can be routinely monitored to accommodate future growth. Updates can also be used to modify and/or reschedule facility improvements and expansions.

City of Victorville

The population of the City of Victorville in 2000 is approximately 63,640 within a service area of approximately 68 square miles. Under the City's current growth forecast, the City's population projection for the year 2020 is 111,196 residents. In 2000, the percentage of the population served by sewers was approximately 90%, and the City estimates that 100% of all of the future growth will be sewered. On this basis, the sewered population in 2020 will be approximately 104,832, or just over 94% of the entire population. Estimates of flow for Victorville's population are based on 80 gallons per person per day.

Table 2 - 2
VVWRA
2000 SEWERAGE FACILITIES PLAN UPDATE
Population Trends and Projections

Year	Victorville Including SCLA				CSA's 42 and 64				Town of Apple Valley				Hesperia				Totals			
	Population		Sewered		Population		Sewered		Population		Sewered		Population		Sewered		Population		Sewered	
	Total	Increase	Total	Percent	Total	Increase	Total	Percent	Total	Increase	Total	Percent	Total	Increase	Total	Percent	Total	Increase	Total	Percent
2000	63,639	N/A	57,275	90.00%	8,535	N/A	8,535	100.00%	56,112	N/A	16,758	29.87%	63,589	N/A	11,700	18.40%	191,875	N/A	94,268	49.13%
2001	65,116	1,477	58,752	90.23%	8,719	184	8,719	100.00%	57,332	1,220	17,368	30.29%	64,708	1,119	12,355	19.09%	195,875	4,000	97,194	49.62%
2002	66,626	1,511	60,262	90.45%	8,907	188	8,907	100.00%	58,579	1,247	17,991	30.71%	65,847	1,139	13,047	19.81%	199,959	4,084	100,208	50.11%
2003	68,172	1,546	61,808	90.66%	9,099	192	9,099	100.00%	59,853	1,274	18,628	31.12%	67,005	1,158	13,778	20.56%	204,129	4,170	103,313	50.61%
2004	69,754	1,582	63,390	90.88%	9,295	196	9,295	100.00%	61,154	1,302	19,279	31.53%	68,185	1,180	14,549	21.34%	208,388	4,259	106,513	51.11%
2005	71,372	1,618	65,009	91.08%	9,495	200	9,495	100.00%	62,484	1,330	19,944	31.92%	69,385	1,200	15,364	22.14%	212,736	4,349	109,811	51.62%
2006	73,514	2,141	67,150	91.34%	9,699	205	9,699	100.00%	63,509	1,025	20,457	32.21%	70,606	1,221	16,224	22.98%	217,328	4,592	113,530	52.24%
2007	75,719	2,205	69,355	91.60%	9,908	209	9,908	100.00%	64,552	1,042	20,978	32.50%	71,849	1,243	17,133	23.85%	222,028	4,699	117,374	52.86%
2008	77,991	2,272	71,627	91.84%	10,122	213	10,122	100.00%	65,611	1,059	21,507	32.78%	73,113	1,264	18,092	24.75%	226,836	4,808	121,348	53.50%
2009	80,330	2,340	73,966	92.08%	10,340	218	10,340	100.00%	66,687	1,077	22,046	33.06%	74,400	1,287	19,106	25.68%	231,757	4,921	125,457	54.13%
2010	82,740	2,410	76,376	92.31%	10,562	223	10,562	100.00%	67,781	1,094	22,593	33.33%	75,709	1,309	20,176	26.65%	236,793	5,036	129,707	54.78%
2011	85,222	2,482	78,859	92.53%	10,790	228	10,790	100.00%	69,407	1,626	23,406	33.72%	77,042	1,333	21,305	27.65%	242,462	5,668	134,359	55.41%
2012	87,779	2,557	81,415	92.75%	11,022	232	11,022	100.00%	71,072	1,665	24,238	34.10%	78,397	1,355	22,498	28.70%	248,270	5,809	139,174	56.06%
2013	90,413	2,633	84,049	92.96%	11,260	237	11,260	100.00%	72,777	1,705	25,090	34.48%	79,777	1,380	23,758	29.78%	254,226	5,955	144,157	56.70%
2014	93,125	2,712	86,761	93.17%	11,502	243	11,502	100.00%	74,522	1,746	25,963	34.84%	81,181	1,404	25,089	30.90%	260,330	6,104	149,315	57.36%
2015	95,919	2,794	89,555	93.37%	11,750	248	11,750	100.00%	76,310	1,787	26,857	35.19%	82,610	1,429	26,494	32.07%	266,588	6,258	154,655	58.01%
2016	98,796	2,878	92,432	93.56%	11,750	0	11,750	100.00%	78,137	1,827	27,770	35.54%	84,064	1,454	27,977	33.28%	272,747	6,159	159,930	58.64%
2017	101,760	2,964	95,396	93.75%	11,750	0	11,750	100.00%	80,008	1,871	28,706	35.88%	85,544	1,480	29,544	34.54%	279,062	6,315	165,397	59.27%
2018	104,813	3,053	98,449	93.93%	11,750	0	11,750	100.00%	81,924	1,916	29,664	36.21%	87,049	1,505	31,199	35.84%	285,536	6,474	171,062	59.91%
2019	107,957	3,144	101,593	94.11%	11,750	0	11,750	100.00%	83,886	1,962	30,645	36.53%	88,581	1,532	32,946	37.19%	292,174	6,638	176,934	60.56%
2020	111,196	3,239	104,832	94.28%	11,750	0	11,750	100.00%	85,895	2,009	31,650	36.85%	90,140	1,559	34,791	38.60%	298,981	6,807	183,022	61.22%

NOTE: DATES SHOWN ARE AS OF JULY 1, THE BEGINNING OF THE FISCAL YEAR

The City's wastewater flow has been introduced into the regional interceptor sewer system at six separate metering points denoted as VSD 1, VSD 2, VSD 3, VSD 4, VSD 5, and VSD 6.

The number of existing septic tank systems that would be subject to failure and abandonment is considered to be a minor impact on the City of Victorville's sewerage system.

Federal Prison

Phase I of the new federal prison is complete and is currently being occupied, and should be in full operation by the early fall 2000. Phase I is designed to accommodate 2,300 inmates, generating a wastewater flow of approximately 350,000 gallons per day. Phases II and III, which are currently in the planning and design stages, and are expected to be constructed within the coming years. The new phases will accommodate an additional inmate population of 2,300 per phase, generating an additional flow of 350,000 gallons per day per phase. If Phases II and III are constructed and occupied, the total expected flow from the federal prison complex would exceed 1.0 MGD. The federal prison complex is sewered through the Southern California Logistics Airport via the City's Nevada Avenue trunk line sewer, which enters VVWRA's interceptor system via SCLA 1.

Southern California Logistics Airport (SCLA)

Sterling Enterprises, in conjunction with the City of Victorville and the Victor Valley Economic Development Authority, is continuing to develop the former air force base to private, public, and commercial uses. Today SCLA is utilized for air cargo shipping, scheduled for three times per week. In addition, a major wire mill and a number of commercial businesses have located at SCLA. The flow from SCLA is expected to be 0.550 mgd by the year 2005 and 1.10 mgd by the year 2015 (including Phase I of the federal prison, but not including Phases II and III). SCLA is entirely sewered. SCLA's wastewater flow is introduced into the regional interceptor sewer system at two separate metering points denoted as SCLA 1 and SCLA 2.

County Service Area 42 (Oro Grande)

County Service Area 42 provides sewerage services to the community of Oro Grande. The number of service connections has remained stable over the years, with no measurable increase expected in the future. For planning purposes, the community is considered to be at its build out. Population and sewage flow are not expected to increase beyond 2000 figures. Using 80 gallons per person per day and an average daily flow of 57,780 gallons of wastewater, the current population of CSA 42 is approximately 725 residents. CSA 42 is entirely sewered.

County Service Area 64 (Spring Valley Lake)

The population of Spring Valley Lake in 2000 is approximately 7,810. County Service Area 64 provides sewerage services to the community of Spring Valley Lake and Victor Valley Community College. Future growth is expected to be predominantly associated with the build out of Spring

Valley Lake, and growth of facilities and the student population at the community college. Build out of Spring Valley Lake is expected by the year 2015. CSA 64 is entirely sewered . Estimates of flow for Spring Valley Lake's population are based on 80 gallons per person per day.

Town of Apple Valley

The population of the Town of Apple Valley in 2000 is approximately 56,112 residents. The Town of Apple Valley covers a total land area of 78 square miles, of which about 15 percent is currently developed. Nearly 75% of the Town's residential development has been constructed with onsite sewerage systems using septic tanks and seepage pits. Residential properties have large lot sizes (18,000 square feet or more), and the failure of onsite systems is often remedied by reconstructing a new onsite system, rather than connecting to the sewer system. It should be noted that sewer systems are not available in all parts of the service area.

The Town of Apple Valley currently estimates that approximately 30% of the homes in the area are sewered, with the remainder using private septic systems. The Town estimates that approximately 50% of all growth over the next 20 years will occur on sewers, ultimately reaching nearly 37% sewered by 2020 . Estimates of flow for Apple Valley's sewered population are based on 80 gallons per person per day, although historically Apple Valley's residents have discharged less than 80 gallons per person per day.

City of Hesperia

The population of the City of Hesperia in 2000 is approximately 63,589 residents. The City's 20-year forecast (90,140 in 2020), excludes the development of the Rancho Las Flores Project, which is a planned community development of 15,545 residential units that will have its own sewerage system (Rancho Las Flores will not be connected to VVWRA's regional system). For planning purposes, the City estimates that by the year 2020 the Rancho Las Flores Project will be about two-thirds complete, with 10,000 lots developed, with an occupancy factor of 2.67 residents per unit. The resident population of 10,000 lots would represent an additional population of 26,700.

Nearly 85% of the City's residential development has been constructed with onsite sewerage systems using septic tanks and seepage pits. The failure of onsite systems is often remedied by reconstructing a new onsite system, rather than connecting to the sewer system. Again, it should be noted that sewer systems are not available in all parts of the service area.

The City of Hesperia currently estimates that approximately 18% of the homes in the area are sewered, with the remainder using private septic systems. The City further estimates that this percentage of sewered versus un-sewered development will double over the next 20 years, ultimately reaching nearly 39% sewered by 2020. Estimates of flow for Hesperia's sewered population are based on 80 gallons per person per day.

Summary of Population Projections

Population growth within the VVWRA service area has been analyzed for each VVWRA member entity. The sewered population was estimated using the criteria discussed above. The year 2020 was selected as the planning horizon for this analysis. Population forecasts are summarized as follows:

TABLE 2-3
VVWRA - POPULATION PROJECTION SUMMARY

	RESIDENT POPULATION FORECAST				
MEMBER AGENCY	**2000**	**2005**	**2010**	**2015**	**2020**
Victorville	63,639	71,372	82,740	95,919	111,196
CSA 42	725	725	725	725	725
CSA 64	7,810	8,770	9838	11,024	11,025
Apple Valley	56,112	62,484	67,781	76,310	85,895
Hesperia	63,589	69,385	75,709	82,610	90,140
TOTALS	191,875	212,736	236,793	266,588	298,981

TABLE 2-4
VVWRA - POPULATION PROJECTION SUMMARY

	SEWERED POPULATION FORECAST				
MEMBER AGENCY	**2000**	**2005**	**2010**	**2015**	**2020**
Victorville	57,275	65,009	76,376	89,555	104,832
CSA 42	725	725	725	725	725
CSA 64	7,810	8,769	9,837	11,024	11,024
Apple Valley	16,758	19,944	22,593	26,857	31,650
Hesperia	11,700	15,364	20,176	26,494	34,791
TOTALS	94,268	109,811	129,707	154,655	183,022

PROJECTED WASTEWATER FLOWS

The per capita wastewater flow that was used for planning purposes was 80 gallons per person per day. The amount is generally considered to be reasonable and conservative. Wastewater flow projections for the resident population were calculated by applying the sewered population forecasts previously discussed to a per capita flow of 80 gallons per day.

One Equivalent Dwelling Unit (EDU) generates a wastewater flow of 245 gallons per day, which is generally the wastewater expected from one single family dwelling. Where equivalent dwelling unit data is presented, the unit factor for flow is 245 gallons per day per EDU. EDU's indicate the number of sewer connections that in turn generate connection fees for Capital Improvements.

The projected service population, wastewater flows, and the corresponding EDU's through the year 2020 are shown in Table 2-5.

Wastewater flows from the service area reflect more than just the resident sewered population. Commercial businesses, industries, and institutional sources such as schools, hospitals, and prisons also contribute significant flows to the regional collection and treatment system. Table 2-6 details the estimated sources of wastewater according to the general categories listed as domestic (resident populations), industrial (commercial business, industries, and institutional sources), and septic conversions. As previously discussed, septic conversions include private septic systems that fail and the owner elects to connect to the regional sewer system in lieu of repairing or replacing the failed septic system.

Peak flows for each metering station have been measured as part of the quarterly flow monitoring efforts, and the results are presented in the following paragraphs. Peak flows are important for planning and design considerations. Peak flows for each station were taken from the second quarter 2000 flow monitoring event, with the exception of CSA 64, which was taken from the first quarter 2000 flow monitoring event.

City of Victorville

The City of Victorville discharges to the VVWRA interceptor system at six (6) locations denoted as VSD 1, VSD 2, VSD 3, VSD 4, VSD 5, and VSD 6. The VSD 1 metering station is located adjacent to E Street and I-15, immediately south of Southwest Portland Cement. The VSD 2 metering station is located close to the railroad tracks between the Kemper Campbell Ranch and the Mojave Narrows Park. The VSD 3 and VSD 4 metering stations are both located along Turner Road; VSD 3 is located closest to National Trails Highway, and VSD 4 is located adjacent to the former George Air Force Base well water storage tanks and pump building. The VSD 5 metering station (formerly known as VSD 1 or old VSD 1) is located immediately north of Southwest Portland Cement and adjacent to the old Victorville sewage treatment ponds. The VSD 6 station is a relatively new connection located at the foot of Third Street, and does not include a metering or sampling station.

Table 2 - 5
VVWRA
2000 SEWERAGE FACILITIES PLAN UPDATE
VVWRA Service Population, Wastewater Flows, and EDU Projections

Year	Victorville including SCIA				CSA's 42 and 64				Town of Apple Valley				Hesperia				Totals			
	Sewered Population	Flow MGD	EDU's Current	EDU's Increase	Sewered Population	Flow MGD	EDU's Current	EDU's Increase	Sewered Population	Flow MGD	EDU's Current	EDU's Increase	Sewered Population	Flow MGD	EDU's Current	EDU's Increase	Sewered Population	Flow MGD	EDU's Current	EDU's Increase
2000	57,275	5.38	21,967		8,535	0.78	3,195		16,758	1.46	5,970		11,700	1.06	4,325		94,268	8.69	35,457	
2001	58,752	5.57	22,722	754	8,719	0.81	3,316	121	17,368	1.54	6,290	320	12,355	1.15	4,675	351	97,194	9.07	37,003	1,546
2002	60,262	5.75	23,487	765	8,907	0.84	3,439	123	17,991	1.62	6,616	326	13,047	1.23	5,038	363	100,208	9.45	38,581	1,577
2003	61,808	5.94	24,264	777	9,099	0.87	3,563	124	18,628	1.70	6,950	333	13,778	1.33	5,413	375	103,313	9.85	40,190	1,610
2004	63,390	6.14	25,053	789	9,295	0.90	3,688	125	19,279	1.79	7,290	341	14,549	1.42	5,802	389	106,513	10.25	41,833	1,643
2005	65,009	6.33	25,853	801	9,495	0.93	3,815	127	19,944	1.87	7,638	348	15,364	1.52	6,205	403	109,811	10.66	43,511	1,678
2006	67,150	6.57	26,824	971	9,699	0.97	3,943	128	20,457	1.95	7,940	301	16,224	1.62	6,623	418	113,530	11.11	45,330	1,818
2007	69,355	6.82	27,817	992	9,908	1.00	4,072	129	20,978	2.02	8,247	307	17,133	1.73	7,056	433	117,374	11.56	47,192	1,863
2008	71,627	7.06	28,830	1,014	10,122	1.03	4,203	131	21,507	2.10	8,561	314	18,092	1.84	7,506	450	121,348	12.03	49,101	1,909
2009	73,966	7.32	29,867	1,036	10,340	1.06	4,335	132	22,046	2.18	8,881	320	19,106	1.95	7,974	468	125,457	12.51	51,057	1,957
2010	76,376	7.58	30,926	1,059	10,562	1.09	4,469	134	22,593	2.26	9,208	327	20,176	2.07	8,460	486	129,707	13.00	53,064	2,006
2011	78,859	7.84	32,008	1,083	10,790	1.13	4,605	136	23,406	2.36	9,627	419	21,305	2.20	8,966	506	134,359	13.53	55,206	2,142
2012	81,415	8.11	33,115	1,107	11,022	1.16	4,742	137	24,238	2.46	10,057	430	22,498	2.33	9,492	526	139,174	14.06	57,406	2,200
2013	84,049	8.39	34,247	1,132	11,260	1.20	4,881	139	25,090	2.57	10,498	441	23,758	2.46	10,041	548	144,157	14.62	59,666	2,260
2014	86,761	8.67	35,405	1,158	11,502	1.23	5,021	140	25,963	2.68	10,951	453	25,089	2.60	10,612	571	149,315	15.19	61,989	2,323
2015	89,555	8.96	36,589	1,184	11,750	1.27	5,163	142	26,857	2.80	11,417	466	26,494	2.75	11,207	596	154,655	15.77	64,377	2,388
2016	92,432	9.21	37,611	1,021	11,750	1.28	5,224	61	27,770	2.91	11,896	479	27,977	2.90	11,829	621	159,930	16.31	66,560	2,183
2017	95,396	9.47	38,660	1,049	11,750	1.30	5,286	61	28,706	3.04	12,389	493	29,544	3.06	12,477	648	165,397	16.86	68,812	2,252
2018	98,449	9.74	39,738	1,078	11,750	1.31	5,347	61	29,664	3.16	12,897	507	31,199	3.22	13,154	677	171,062	17.43	71,136	2,324
2019	101,593	10.01	40,847	1,108	11,750	1.33	5,408	61	30,645	3.29	13,419	523	32,946	3.40	13,861	707	176,934	18.02	73,536	2,400
2020	104,832	10.29	41,986	1,139	11,750	1.34	5,469	61	31,650	3.42	13,958	539	34,791	3.58	14,601	739	183,022	18.62	76,014	2,479

NOTE: DATES SHOWN ARE AS OF JULY 1, THE BEGINNING OF THE FISCAL YEAR

Table 2 - 6
VVWRA
2000 SEWERAGE FACILITIES PLAN UPDATE
Estimated Sources of Wastewater Flows

Year	Victorville & SCIA					CSA's 42 and 64					Town of Apple Valley					Hesperia					Totals				
		Detail of the Sources of Flows					Detail of the Sources of Flows					Detail of the Sources of Flows					Detail of the Sources of Flows					Detail of the Sources of Flows			
	Sewered Population	Total MGD	Domestic Flow	Industrial Flow	Septic Conv.	Sewered Population	Total MGD	Domestic Flow	Industrial Flow	Septic Conv.	Sewered Population	Total MGD	Domestic Flow	Industrial Flow	Septic Conv.	Sewered Population	Total MGD	Domestic Flow	Industrial Flow	Septic Conv.	Sewered Population	Total MGD	Domestic Flow	Industrial Flow	Septic Conv.
2000	57,275	5.38	4.58	0.80	0.00	8,535	0.78	0.68	0.10	0.00	16,758	1.46	1.34	0.10	0.02	11,700	1.06	0.94	0.10	0.02	94,268	8.69	7.54	1.10	0.05
2001	58,752	5.57	4.70	0.87	0.00	8,719	0.81	0.70	0.12	0.00	17,368	1.54	1.39	0.11	0.04	12,355	1.15	0.99	0.11	0.05	97,194	9.07	7.78	1.20	0.09
2002	60,262	5.75	4.82	0.93	0.00	8,907	0.84	0.71	0.13	0.00	17,991	1.62	1.44	0.12	0.07	13,047	1.23	1.04	0.12	0.07	100,208	9.45	8.02	1.30	0.14
2003	61,808	5.94	4.94	1.00	0.00	9,099	0.87	0.73	0.15	0.00	18,628	1.70	1.49	0.12	0.09	13,778	1.33	1.10	0.13	0.09	103,313	9.85	8.27	1.40	0.18
2004	63,390	6.14	5.07	1.07	0.00	9,295	0.90	0.74	0.16	0.00	19,279	1.79	1.54	0.13	0.11	14,549	1.42	1.16	0.14	0.12	106,513	10.25	8.52	1.50	0.23
2005	65,009	6.33	5.20	1.13	0.00	9,495	0.93	0.76	0.18	0.00	19,944	1.87	1.60	0.14	0.13	15,364	1.52	1.23	0.15	0.14	109,811	10.66	8.78	1.60	0.27
2006	67,150	6.57	5.37	1.20	0.00	9,699	0.97	0.78	0.19	0.00	20,457	1.95	1.64	0.15	0.15	16,224	1.62	1.30	0.16	0.16	113,530	11.11	9.08	1.70	0.32
2007	69,355	6.82	5.55	1.27	0.00	9,908	1.00	0.79	0.21	0.00	20,978	2.02	1.68	0.17	0.18	17,133	1.73	1.37	0.17	0.19	117,374	11.56	9.39	1.81	0.36
2008	71,627	7.06	5.73	1.33	0.00	10,122	1.03	0.81	0.22	0.00	21,507	2.10	1.72	0.18	0.20	18,092	1.84	1.45	0.18	0.21	121,348	12.03	9.71	1.91	0.41
2009	73,966	7.32	5.92	1.40	0.00	10,340	1.06	0.83	0.24	0.00	22,046	2.18	1.76	0.19	0.22	19,106	1.95	1.53	0.19	0.24	125,457	12.51	10.04	2.02	0.46
2010	76,376	7.58	6.11	1.47	0.00	10,562	1.09	0.84	0.25	0.00	22,593	2.26	1.81	0.21	0.24	20,176	2.07	1.61	0.20	0.26	129,707	13.00	10.38	2.12	0.50
2011	78,859	7.84	6.31	1.53	0.00	10,790	1.13	0.86	0.27	0.00	23,406	2.36	1.87	0.22	0.26	21,305	2.20	1.70	0.21	0.28	134,359	13.53	10.75	2.23	0.55
2012	81,415	8.11	6.51	1.60	0.00	11,022	1.16	0.88	0.28	0.00	24,238	2.46	1.94	0.24	0.29	22,498	2.33	1.80	0.22	0.31	139,174	14.06	11.13	2.34	0.59
2013	84,049	8.39	6.72	1.67	0.00	11,260	1.20	0.90	0.30	0.00	25,090	2.57	2.01	0.26	0.31	23,758	2.46	1.90	0.23	0.33	144,157	14.62	11.53	2.45	0.64
2014	86,761	8.67	6.94	1.73	0.00	11,502	1.23	0.92	0.31	0.00	25,963	2.68	2.08	0.28	0.33	25,089	2.60	2.01	0.24	0.35	149,315	15.19	11.95	2.56	0.68
2015	89,555	8.96	7.16	1.80	0.00	11,750	1.27	0.94	0.33	0.00	26,857	2.80	2.15	0.30	0.35	26,494	2.75	2.12	0.25	0.38	154,655	15.77	12.37	2.67	0.73
2016	92,432	9.21	7.39	1.82	0.00	11,750	1.28	0.94	0.34	0.00	27,770	2.91	2.22	0.32	0.37	27,977	2.90	2.24	0.26	0.40	159,930	16.31	12.79	2.74	0.77
2017	95,396	9.47	7.63	1.84	0.00	11,750	1.30	0.94	0.36	0.00	28,706	3.04	2.30	0.34	0.40	29,544	3.06	2.36	0.27	0.42	165,397	16.86	13.23	2.81	0.82
2018	98,449	9.74	7.88	1.86	0.00	11,750	1.31	0.94	0.37	0.00	29,664	3.16	2.37	0.37	0.42	31,199	3.22	2.50	0.28	0.45	171,062	17.43	13.68	2.88	0.87
2019	101,593	10.01	8.13	1.88	0.00	11,750	1.33	0.94	0.39	0.00	30,645	3.29	2.45	0.40	0.44	32,946	3.40	2.64	0.29	0.47	176,934	18.02	14.15	2.95	0.91
2020	104,832	10.29	8.39	1.90	0.00	11,750	1.34	0.94	0.40	0.00	31,650	3.42	2.53	0.42	0.46	34,791	3.58	2.78	0.30	0.49	183,022	18.62	14.64	3.02	0.96

NOTE: DATES SHOWN ARE AS OF JULY 1, THE BEGINNING OF THE FISCAL YEAR

Average and peak flows from each Victorville station are summarized as follows:

TABLE 2-7
VICTORVILLE - AVERAGE AND PEAK FLOWS

STATION	AVERAGE DAILY FLOW (MGD)	TYPICAL PEAK FLOW (MGD)	PEAKING FACTOR
VSD 1	0.628	1.147	1.826
VSD 2	1.633	2.711	1.660
VSD 3	1.699	3.957	2.329
VSD 4	0.122	0.403	3.303
VSD 5	0.078	0.324	4.154
VSD 6	0.951	1.494	1.571
TOTAL	**5.111**	**9.210**	**1.802**

Southern California Logistics Airport (SCLA)

SCLA discharges to the VVWRA interceptor system at two metering stations denoted as SCLA 1 and SCLA 2. SCLA 1 is located on the former Air Force Base, north of the intersection of Nevada Avenue and Phantom East Road. SCLA 2 is located at the intersection of Shay Road and Phantom East Road. The flow from SCLA 1 includes the new Federal Prison Complex, which has only recently began operating. SCLA is expected to be fully redeveloped by the year 2015. The average daily flow from SCLA 2 is 0.156 MGD, and the typical peak flow is 0.229 MGD. Therefore, the peaking factor is approximately 1.468. The flow from SCLA 2 is currently negligible.

County Service Area 42 (Oro Grande)

CSA 42 is not expected to experience any significant growth, and the daily average wastewater flow is approximately 50,000 gallons. Flow studies performed by CSA personnel in 1995 determined the typical peaking factor to be approximately 3.2.

County Service Area 64 (Spring Valley Lake)

CSA 64 Spring Valley Lake discharges to the VVWRA interceptor system at a metering station located on Ridgecrest Drive, adjacent to the Mojave Narrows Park. The flow from CSA 64 includes the Victor Valley Community College, which tends to be quite seasonable. Spring Valley Lake is expected to grow and should reach build out by the year 2015. The college is expected to continue growing, even after Spring Valley Lake reaches build out. The average daily flow from CSA 64 is

0.61 MGD, and the typical peak flow is 1.09 MGD. Therefore, the peaking factor is approximately 1.793.

Town of Apple Valley

The Town of Apple Valley discharges to the VVWRA interceptor system at a metering station located adjacent to the Desert Knolls Wash, close to Highway 18 and the Mojave River. The average daily flow from Apple Valley is 1.243 MGD, and the typical peak flow is 2.361 MGD. Therefore, the peaking factor is approximately 1.899.

City of Hesperia

The City of Hesperia discharges to the VVWRA interceptor system at a metering station located adjacent to the railroad tracks and immediately north of Bear Valley Road. The average daily flow from Hesperia is 1.038 MGD, and the typical peak flow is 1.527 MGD. Therefore, the peaking factor is approximately 1.471.

Peaking Factors Summary

A summary of the average and peak flows and the corresponding peaking factors are as follows:

TABLE 2-8
SUMMARY OF AVERAGE AND PEAK FLOWS

ENTITY	AVERAGE DAILY FLOW (MGD)	TYPICAL PEAK FLOW (MGD)	PEAKING FACTOR
VICTORVILLE	5.111	9.210	1.802
APPLE VALLEY	1.243	2.361	1.899
HESPERIA	1.038	1.527	1.471
CSA 64	0.608	1.090	1.793
CSA 42	0.049	0.157	3.204
SCLA	0.156	0.229	1.468
TOTAL	**8.205**	**14.574**	**1.776**

CHAPTER 3
EXISTING INTERCEPTOR SYSTEM

GENERAL SYSTEM DESCRIPTION

The VVWRA interceptor system extends approximately 15 miles from the regional treatment facility south to each of the member entities. The interceptor system extends as far south as I Avenue and Hercules in Hesperia, as far east as Nanticoke and Tajanta Roads in Apple Valley, and as far west as Highway 395 and Auburn Avenue in Adelanto. The total service population is approximately 95,000 residents.

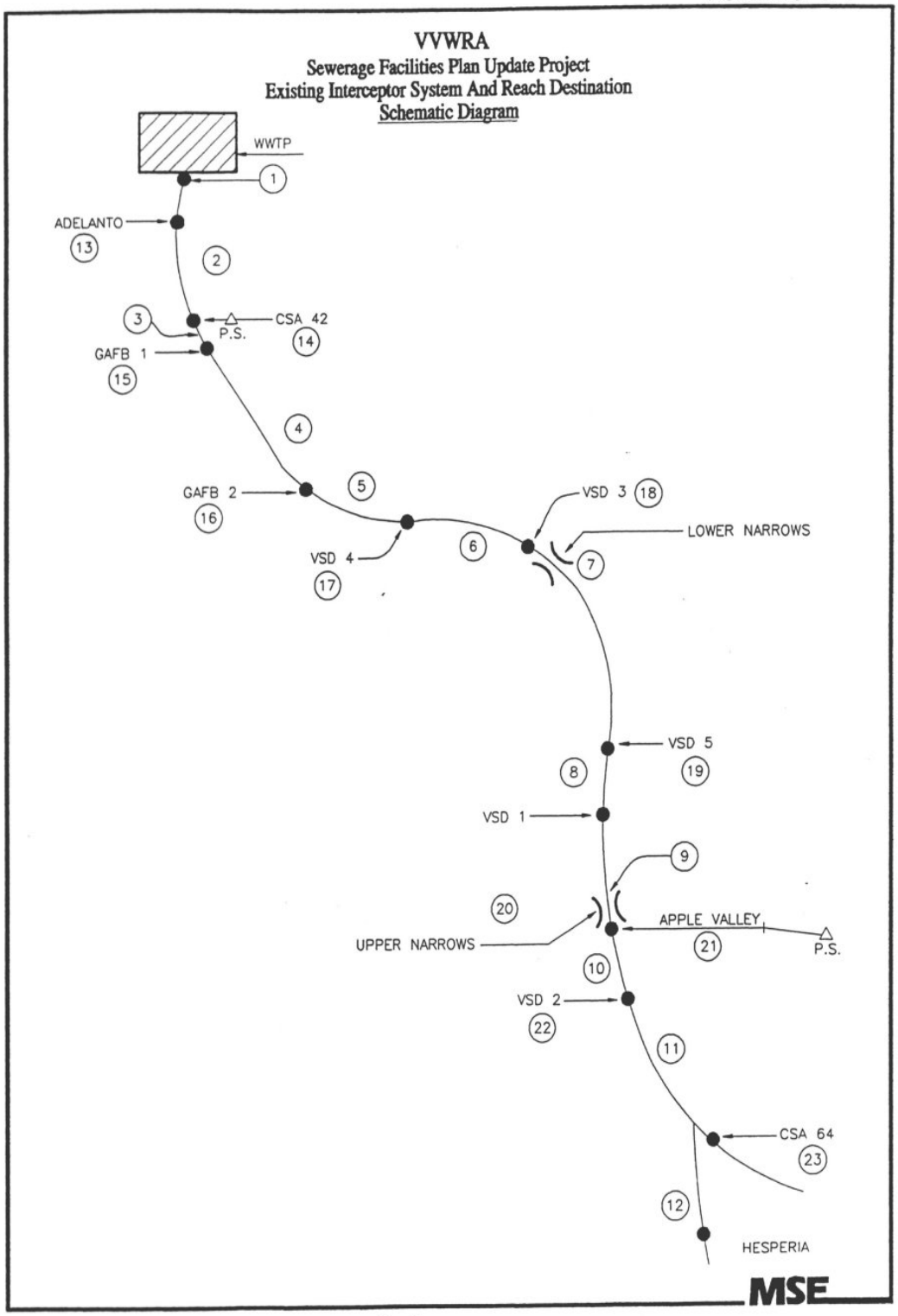
The interceptor system consists of both gravity and force main pipelines, ranging in size from 6-inch to 42-inch diameter. The relatively small pipelines less than 21-inch diameter are constructed of PVC, and the larger pipelines are vitreous clay pipe (VCP). The force mains are typically constructed of PVC or welded steel. Two active pumping stations are operated by the VVWRA: one serving the Town of Apple Valley, the second serving County Service Area 42 (Oro Grande). Wastewater collected by each entity is discharged through separate metering stations to the interceptor system operated by VVWRA. The general configuration of the interceptor system is shown on Figure IV-1 (copied from the 1997 Sewerage Facilities Plan).

The main stem of the interceptor has been damaged several times by floodwaters in the Mojave River. In 1983, Reach 7 in the Lower Narrows was damaged by a flood event that destroyed approximately 150 feet of pipe, resulting in a 3-day spill of untreated sewage to the river. A temporary emergency bypass and pumping station was installed in the river channel to allow the replacement of the damaged pipeline. The temporary bypass was in use for nearly 8 months.

In 1993, the most serious damage event occurred again in Reach 7, the Lower Narrows of the Mojave River. At this location, an unknown length of pipe was destroyed by high flows in the river, resulting in a one week spill of untreated sewage to the river. The failure of the Lower Narrows Interceptor necessitated the construction of a semi-permanent emergency bypass pipeline and pump station near Southdown Cement that was in use for several years. The damage was eventually repaired using 5,000 feet of 33-inch and 36-inch diameter, 3/8-inch thick welded steel pipe supported by piers in the riverbed.

Also in 1993, manholes located in Reaches 9 and 10 through the Upper Narrows were damaged by debris carried by floodwaters in the Mojave River. Remedial measures taken by VVWRA involved cutting and sealing of the manholes below the riverbed level. The total length involved was approximately 1,700 feet. Video inspections completed after the repair in 1997 indicated that the pipeline remains essentially intact and undamaged, with the exception of approximately 100 feet of sewer located immediately south of the Highway 18 Bridge. A 100-foot section of the pipeline has clearly settled and is completely full of water, rendering an inspection impossible unless a means can be developed to bypass and drain the submerged section of pipe.

FIGURE NO. IV-1



In 1993, a parallel 42-inch diameter relief sewer was completed from the VSD No. 3 metering station on Turner Road to the existing junction structure located immediately upstream of the treatment plant. The total length of the paralleled sewer was approximately 19,600 feet.

In 1999 the VVWRA Board of Commissioners adopted a goal to cease using the Upper Narrows Interceptor within a five year period of time. The Board's decision was based on the potential for damage to the interceptor and the environmental impacts of a sewage spill in the Mojave River as a result of flood events and other natural disasters. To move forward with this goal, in 2000 the Commission approved the preparation o f a conceptual design study to convey sewage around the Upper Narrows of the Mojave River, and to eventually abandon that portion of the gravity sewer.

EXISTING INTERCEPTOR - CAPACITY CONSIDERATIONS

The interceptor system was designed to provide a nominal twenty (20) years of firm capacity for the service area. Most of the interceptor system was constructed prior to the startup of the treatment facility, which occurred in February 1981. The Apple Valley, Adelanto, and Hesperia Interceptors were completed in the early 1980's, after the plant began operation. Most of the interceptor system has now been in service for nearly 20 years.

Interceptor capacity for gravity sewers is considered to be fully utilized when the flow of sewage occupies 75% of the cross-sectional area of the respective pipe. The flow of sewage typically varies significantly during any 24-hour period. Usually the highest flows occur during the morning hours, and the lowest flows occur during the middle of the night. In the Victor Valley, the highest flows typically occur on weekends, which reflects the employment base and the corresponding large number of commuters that travel during the week to jobs outside the area. Interceptors must be capable of conveying sewage during the highest flow periods, in order to prevent surcharging of the sewer. Surcharging can result in overflows at manholes, backups into businesses and residences, odors, plugging, and even structural failures of the pipe.

Engineering calculations can be used to evaluate sewer pipelines for estimated maximum capacity, using pipe size, slope, and pipeline roughness. Engineering calculations of pipeline capacity are limited in their accuracy due to the following factors:

1. The roughness coefficient must be estimated, based on the respective pipe material. For example, PVC sewer pipe is assumed to have a given roughness coefficient. Typically, engineers are conservative when assigning roughness coefficients for capacity calculations. Actual field conditions often reveal that pipelines are smoother, or capable of passing flow more quickly, than the roughness coefficient would indicate. Sometimes corrosion and/or encrustation of the pipeline can result in conditions where the pipeline resists the smooth flow of liquid and cannot pass as much flow as expected. Grease and grit accumulations also impact the ability of a sewer pipeline to pass flow.

2. The slope of the pipe must be considered, which is usually based on information found in the engineering design drawings and/or record drawings. Over time, settlement and/or ground movement can sometimes change the slope of a sewer pipeline, affecting the pipe's ability to pass sewage. If recent elevation data is not available, engineering calculations based on slope may provide inaccurate information.

3. Sewer pipelines typically have a capacity for storage that is difficult to estimate. For example, peak flows may partially fill tributary (lateral) sewers before the level in the main interceptor rises, reducing the effect of the peak flow on the interceptor. Likewise, large interceptors on relatively flat slopes act as reservoirs and can absorb and store high flows, releasing the sewage to the treatment facility at a slower rate. In this way, large flat pipelines serve to equalize the flow over time.

4. With long interceptor systems such as that found at VVWRA, peak flows do not enter a given length of the main interceptor at the same time. For example, wastewater from a washing machine in Hesperia will arrive at the treatment plant many hours after wastewater discharged in SCLA, even if both activities occur at the same time during the day.

Hydraulic models can be used to estimate flows and capacity in the interceptor system at any given time. Models, however, are subject to the accuracy of the information entered into the model (usually a computer software program). To fully evaluate the capacity of a given interceptor, both average and peak flows must be considered, which typically requires the collection of diurnal flow data. Due to the effects of equalization, it is quite possible that the actual capacity for an interceptor could be measured as some flow-rate in a range between the average daily and the peak hourly flow for a given location.

Possibly the best method to measure actual capacity in a sewer pipeline is to collect field data at key points in the system. Instruments that can record water levels and flow must be used for several days or weeks at a time to collect data and fully analyze how the interceptor behaves during the usual daily variations in flow. However, the data collection process is time consuming, labor intensive, and tedious.

EXISTING INTERCEPTOR CAPACITY - MAIN STEM

The existing main interceptor is divided up and shown on Figure IV-1 as Reaches 1 through 11. The 1997 Sewerage Facilities Plan determined that Reaches 7, 8, and 9 would require improvements (paralleling) in the year 1999 due to full utilization of the remaining capacity, with a total estimated cost of $2,058,700 (in 1998 dollars). However, after reviewing the most recent flows and projections shown in Chapter 2 of this amendment, and based on average daily flows, Reach 8 may not require improvements until 2008, Reach 7 may not require improvements until 2009, Reach 9 may not require improvements until 2012, and Reach 10 may not require improvements until 2019. It is possible that Reaches 7, 8, and 9 may already be experiencing some surcharging based on peak hourly flows. Although staff is relatively certain that surcharging is not occurring in the main stem, staff

is currently working to collect field data to establish the true remaining capacity in the main stem interceptor.

Table 3-1 shows the improvements necessary to the main stem interceptor system based on projected population growth and estimated average daily flows. It should be noted that the improvements shown in Table 3-1 apply only if all of the wastewater is conveyed to the regional treatment facility for treatment (i.e. without any sub-regional treatment facilities). Likewise, if the Upper Narrows Interceptor is replaced with a different mechanism to convey sewage around the Upper Narrows, the costs shown for that section of the interceptor would also change.

TABLE 3-1
MAIN STEM INTERCEPTOR IMPROVEMENTS

Reach ID	Reach Description	Year of Improvement (see note 1)	Construction Cost (see note 2)
7	Lower Narrows	2009	$750,000
8	VSD 5 to VSD 1	2008	$500,000
9	Upper Narrows	2012	$950,000

Note 1: improvements based on calculated capacity and average daily flow rates. Actual field measurements will be used to determine if improvements are needed earlier or later than the year indicated.

Note 2: construction costs shown are in 2000 dollars.

EXISTING INTERCEPTOR CAPACITY - MEMBER ENTITIES

The existing Hesperia Interceptor is shown on Figure IV-1 as Reach 12. The 1997 Sewerage Facilities Plan determined that the Hesperia Interceptor would require improvements (paralleling) in the year 2005 due to full utilization of the remaining capacity, with a total estimated cost of $537,120 (in 1998 dollars). However, after reviewing the most recent flows and projections shown in Chapter 2 of this amendment, and based on average daily flows, it appears that the Hesperia Interceptor may require paralleling as early as 2004. It is possible that the Hesperia Interceptor may already be experiencing some surcharging, based on peak hourly flows. Although staff is relatively certain that surcharging is not occurring in the Hesperia Interceptor, staff is currently working to collect field data to establish the true remaining capacity in the interceptor.

The existing Adelanto Interceptor is shown on Figure IV-1 as Reach 13. The 1997 Sewerage Facilities Plan determined that a second Adelanto Interceptor would be needed in 2005 to relieve the flow on the existing interceptor, and to better serve the southern portion of the City of Adelanto, at an estimated construction cost of $901,649 (in 1998 dollars). However, the Adelanto Interceptor

is currently not in use, since the City of Adelanto separated from VVWRA in 1998 and began operating their own treatment facility. Therefore, no improvements are currently anticipated at this time for the Adelanto Interceptor.

The existing CSA 42 (Oro Grande) Interceptor and Pump Station is shown on Figure IV-1 as Reach 14. The 1997 Sewerage Facilities Plan determined that the CSA 42 Interceptor and Pumping Station would not require expansion or improvements during the 20-year planning period. No improvements are currently anticipated at this time for the CSA 42 Interceptor and Pump Station.

The existing SCLA 1 Interceptor is shown on Figure IV-1 as Reach 15. The 1997 Sewerage Facilities Plan determined that the SCLA 1 Interceptor would not require improvements during the 20-year planning period. However, the capacity of the SCLA 1 Interceptor must be monitored closely as the redevelopment of the former Air Force Base proceeds. The SCLA Interceptor currently serves the new Federal Prison Complex. The SCLA 1 Interceptor has a current rated capacity of 1.7 MGD.

The existing SCLA 2 Interceptor is shown on Figure IV-1 as Reach 16. The 1997 Sewerage Facilities Plan determined that the SCLA 1 Interceptor would not require improvements during the 20-year planning period. However, the capacity of the SCLA 2 Interceptor must be monitored closely as the redevelopment of the former Air Force Base proceeds. The SCLA 2 Interceptor currently carries very little sewage flow. Like the SCLA 1 Interceptor, the SCLA 2 Interceptor has a current rated capacity of 1.7 MGD.

The existing Apple Valley Interceptor is shown on Figure IV-1 as Reach 21. The 1997 Sewerage Facilities Plan determined that the Apple Valley Interceptor would require improvements (paralleling) in the year 2002 due to full utilization of the remaining capacity, with a total estimated cost of $357,270 (in 1998 dollars). The 1997 Sewerage Facilities Plan also anticipated the construction of a second Apple Valley Interceptor in the year 2010 to serve the northern portion of the Town, with a total estimated cost of $1,320,240 (in 1998 dollars). After reviewing the most recent flows and projections shown in Chapter 2 of this amendment, and based on average daily flows, it appears that the existing Apple Valley Interceptor may not require improvements until 2008. It is possible that the Apple Valley Interceptor may already be experiencing some surcharging, based on peak hourly flows. Although staff is relatively certain that surcharging is not occurring in the Apple Valley Interceptor, staff is currently working to collect field data to establish the true remaining capacity in the interceptor.

The existing CSA 64 (Spring Valley Lake) Interceptor is shown on Figure IV-1 as Reach 23. The 1997 Sewerage Facilities Plan determined that the CSA 64 Interceptor would not require improvements (paralleling) during the 20-year planning period. However, the capacity of the CSA 64 Interceptor must be monitored closely as the development of the Victor Valley College and the build out of Spring Valley Lake proceeds. The CSA 64 Interceptor has a current rated capacity of 5.0 MGD.

Table 3-2 shows the improvements necessary to the Member Entity interceptors between now and 2020 based on projected population growth and estimated average daily flows. It should be noted that Table 3-2 applies only if all wastewater is conveyed to the regional treatment facility for treatment (i.e. no sub-regional treatment facilities).

TABLE 3-2
MEMBER ENTITY INTERCEPTOR IMPROVEMENTS

Reach ID	Reach Description	Year of Improvement (see note 1)	Construction Cost (see note 2)
12	Hesperia Interceptor	2004	$575,000
21	Apple Valley (existing)	2008	$380,000
N/A	Apple Valley (new north)	2010	$1,400,000

Note 1: improvements based on calculated capacity and average daily flow rates. Actual field measurements will be used to determine if improvements are needed earlier or later than the year indicated.

Note 2: construction costs shown are in 2000 dollars.

Tables 3-3 and 3-4 show the existing interceptor system at average daily flows and peak hourly flows for each year from 2000 until 2020. The areas of concern, indicating flows exceeding the calculated rated capacity, are shown in boxes.

TABLE 3-3

VICTOR VALLEY WASTEWATER RECLAMATION AUTHORITY

Interceptor System Capacity at Daily Average Flows with no Subregional Treatment Facilities

Reach ID No.	Reach Description	1997 SFP Maximum Peak Capacity (mgd)	1995 SFP Maximum Peak Capacity (mgd)	2000 Average Flow (mgd)	2001 Average Flow (mgd)	2002 Average Flow (mgd)	2003 Average Flow (mgd)	2004 Average Flow (mgd)	2005 Average Flow (mgd)	2006 Average Flow (mgd)	2007 Average Flow (mgd)	2008 Average Flow (mgd)	2009 Average Flow (mgd)	2010 Average Flow (mgd)	2011 Average Flow (mgd)	2012 Average Flow (mgd)	2013 Average Flow (mgd)	2014 Average Flow (mgd)	2015 Average Flow (mgd)	2016 Average Flow (mgd)	2017 Average Flow (mgd)	2018 Average Flow (mgd)	2019 Average Flow (mgd)	2020 Average Flow (mgd)
1	WWTP to Adelanto	32.20	30.61	8.69	9.07	9.45	9.85	10.25	10.66	11.11	11.56	12.03	12.51	13.00	13.53	14.06	14.62	15.19	15.77	16.31	16.86	17.43	18.02	18.62
2	Adelanto to CSA 42	32.20	29.03	8.69	9.07	9.45	9.85	10.25	10.66	11.11	11.56	12.03	12.51	13.00	13.53	14.06	14.62	15.19	15.77	16.31	16.86	17.43	18.02	18.62
3	CSA 42 to SCIA 1	30.20	29.03	8.63	9.01	9.39	9.79	10.19	10.60	11.05	11.50	11.97	12.45	12.94	13.47	14.01	14.56	15.13	15.71	16.25	16.80	17.37	17.96	18.57
4	SCIA 1 to SCIA 2	26.60	26.00	8.27	8.60	8.94	9.28	9.63	10.00	10.39	10.80	11.22	11.65	12.09	12.56	13.05	13.56	14.08	14.61	15.15	15.70	16.27	16.86	17.47
5	SCIA 2 to VSD 4	71.00	53.75	8.27	8.60	8.93	9.28	9.63	9.99	10.39	10.80	11.22	11.65	12.09	12.56	13.05	13.56	14.08	14.61	15.15	15.70	16.27	16.86	17.46
6	VSD 4 to VSD 3	28.00	26.00	8.15	8.47	8.81	9.15	9.50	9.86	10.25	10.65	11.06	11.49	11.93	12.40	12.88	13.38	13.89	14.42	14.95	15.50	16.06	16.64	17.24
7	VSD 3 to VSD 5	9.50	9.16	6.47	6.76	7.05	7.34	7.64	7.95	8.28	8.62	8.96	9.32	9.68	10.08	10.49	10.91	11.35	11.80	12.24	12.70	13.17	13.66	14.17
8	VSD 5 to VSD 1	11.40	8.59	6.39	6.68	6.97	7.26	7.56	7.87	8.20	8.54	8.88	9.24	9.61	10.00	10.41	10.83	11.27	11.72	12.16	12.62	13.09	13.58	14.09
9	VSD 1 to VSD 6	5.00	9.51	5.77	6.05	6.32	6.59	6.88	7.17	7.47	7.78	8.11	8.44	8.78	9.15	9.53	9.92	10.33	10.75	11.16	11.59	12.03	12.48	12.95
9	VSD 6 to AV	5.00	7.88	4.83	5.09	5.33	5.58	5.84	6.10	6.37	6.65	6.93	7.22	7.52	7.85	8.19	8.54	8.90	9.28	9.64	10.02	10.41	10.82	11.23
10	AV to VSD 2	7.40	7.32	3.37	3.55	3.71	3.88	4.05	4.23	4.42	4.63	4.83	5.05	5.27	5.49	5.73	5.97	6.22	6.48	6.73	6.98	7.25	7.53	7.81
11	VSD 2 to Split	5.20	5.21	1.75	1.90	2.02	2.14	2.27	2.40	2.53	2.67	2.81	2.96	3.11	3.27	3.43	3.60	3.77	3.95	4.12	4.29	4.48	4.66	4.86
12	Hesperia	1.40	2.32	1.06	1.15	1.23	1.33	1.42	1.52	1.62	1.73	1.84	1.95	2.07	2.20	2.33	2.46	2.60	2.75	2.90	3.06	3.22	3.40	3.58
13	Adelanto	1.50	1.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	CSA 42	0.25	N/A	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
15	SCLA 1	1.70	N/A	0.36	0.41	0.46	0.51	0.56	0.61	0.66	0.71	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.10	1.10	1.10	1.10	1.10
16	SCLA 2	1.70	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	Apple Valley	2.30	2.04	1.46	1.54	1.62	1.70	1.79	1.87	1.95	2.02	2.10	2.18	2.26	2.36	2.46	2.57	2.68	2.80	2.91	3.04	3.16	3.29	3.42
23	Split to CSA 64	5.00	6.16	0.72	0.75	0.78	0.81	0.85	0.88	0.91	0.94	0.97	1.00	1.04	1.07	1.10	1.14	1.17	1.21	1.22	1.24	1.25	1.27	1.28

Note: Peak Capacity rating is based on a depth to diameter ratio of 75%, which was used in both the 1995 Sewerage Facilities Plan and the 1997 Sewerage Facilities Plan.

TABLE 3-4

VICTOR VALLEY WASTEWATER RECLAMATION AUTHORITY

Interceptor System Capacity at Peak Hourly Flows with no Subregional Treatment Facilities

Reach ID No.	Reach Description	1997 SFP Maximum Peak Capacity (mgd)	1995 SFP Maximum Peak Capacity (mgd)	2000 Peak Flow (mgd)	2001 Peak Flow (mgd)	2002 Peak Flow (mgd)	2003 Peak Flow (mgd)	2004 Peak Flow (mgd)	2005 Peak Flow (mgd)	2006 Peak Flow (mgd)	2007 Peak Flow (mgd)	2008 Peak Flow (mgd)	2009 Peak Flow (mgd)	2010 Peak Flow (mgd)	2011 Peak Flow (mgd)	2012 Peak Flow (mgd)	2013 Peak Flow (mgd)	2014 Peak Flow (mgd)	2015 Peak Flow (mgd)	2016 Peak Flow (mgd)	2017 Peak Flow (mgd)	2018 Peak Flow (mgd)	2019 Peak Flow (mgd)	2020 Peak Flow (mgd)
1	WWTP to Adelanto	32.20	30.61	16.30	17.01	17.74	18.48	19.23	20.00	20.84	21.70	22.57	23.47	24.40	25.38	26.39	27.43	28.50	29.60	30.60	31.64	32.71	33.81	34.95
2	Adelanto to CSA 42	32.20	29.03	16.30	17.01	17.74	18.48	19.23	20.00	20.84	21.70	22.57	23.47	24.40	25.38	26.39	27.43	28.50	29.60	30.60	31.64	32.71	33.81	34.95
3	CSA 42 to SCIA 1	30.20	29.03	16.15	16.86	17.58	18.32	19.08	19.85	20.68	21.54	22.42	23.32	24.24	25.22	26.24	27.28	28.34	29.44	30.45	31.48	32.55	33.65	34.79
4	SCIA 1 to SCIA 2	26.60	26.00	15.62	16.26	16.91	17.58	18.26	18.96	19.72	20.50	21.31	22.14	22.99	23.90	24.84	25.81	26.80	27.83	28.83	29.87	30.93	32.04	33.18
5	SCIA 2 to VSD 4	71.00	53.75	15.61	16.25	16.90	17.57	18.25	18.95	19.72	20.50	21.31	22.13	22.98	23.89	24.83	25.80	26.80	27.82	28.83	29.86	30.93	32.03	33.17
6	VSD 4 to VSD 3	28.00	26.00	15.21	15.84	16.48	17.14	17.81	18.50	19.25	20.02	20.81	21.62	22.45	23.34	24.27	25.21	26.19	27.20	28.18	29.20	30.24	31.32	32.44
7	VSD 3 to VSD 5	9.50	9.16	11.30	11.85	12.38	12.93	13.49	14.06	14.66	15.28	15.91	16.56	17.23	17.95	18.70	19.47	20.26	21.08	21.86	22.68	23.52	24.39	25.28
8	VSD 5 to VSD 1	11.40	8.59	10.98	11.53	12.06	12.61	13.16	13.74	14.34	14.95	15.58	16.23	16.90	17.63	18.38	19.14	19.94	20.75	21.54	22.35	23.19	24.06	24.96
9	VSD 1 to VSD 6	5.00	9.51	9.84	10.37	10.87	11.38	11.91	12.45	13.01	13.58	14.17	14.77	15.39	16.06	16.76	17.48	18.22	18.98	19.71	20.46	21.24	22.05	22.88
9	VSD 6 to AV	5.00	7.88	8.37	8.86	9.32	9.80	10.28	10.77	11.27	11.79	12.32	12.86	13.42	14.03	14.66	15.31	15.98	16.67	17.33	18.00	18.70	19.43	20.18
10	AV to VSD 2	7.40	7.32	5.59	5.94	6.24	6.56	6.89	7.22	7.58	7.95	8.33	8.73	9.13	9.55	9.98	10.42	10.88	11.36	11.79	12.24	12.70	13.18	13.69
11	VSD 2 to Split	5.20	5.21	2.91	3.20	3.44	3.68	3.92	4.18	4.44	4.70	4.98	5.26	5.55	5.86	6.17	6.49	6.82	7.16	7.46	7.77	8.09	8.43	8.78
12	Hesperia	1.40	2.32	1.56	1.69	1.82	1.95	2.09	2.24	2.39	2.54	2.71	2.87	3.05	3.23	3.42	3.62	3.82	4.04	4.26	4.50	4.74	5.00	5.26
13	Adelanto	1.50	1.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	CSA 42	0.25	N/A	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
15	SCLA 1	1.70	N/A	0.53	0.60	0.67	0.75	0.82	0.89	0.96	1.04	1.11	1.18	1.25	1.33	1.40	1.47	1.54	1.61	1.61	1.61	1.61	1.61	1.61
16	SCLA 2	1.70	N/A	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
21	Apple Valley	2.30	2.04	2.78	2.93	3.08	3.23	3.39	3.55	3.69	3.84	3.98	4.13	4.29	4.48	4.68	4.89	5.10	5.31	5.54	5.77	6.00	6.24	6.50
23	Split to CSA 64	5.00	6.16	1.30	1.35	1.40	1.46	1.51	1.57	1.62	1.68	1.74	1.79	1.85	1.91	1.97	2.03	2.09	2.16	2.18	2.21	2.24	2.26	2.29

Note: Peak Capacity rating is based on a depth to diameter ratio of 75%, which was used in both the 1995 Sewerage Facilities Plan and the 1997 Sewerage Facilities Plan.

10/15/00

Interceptor Capacity