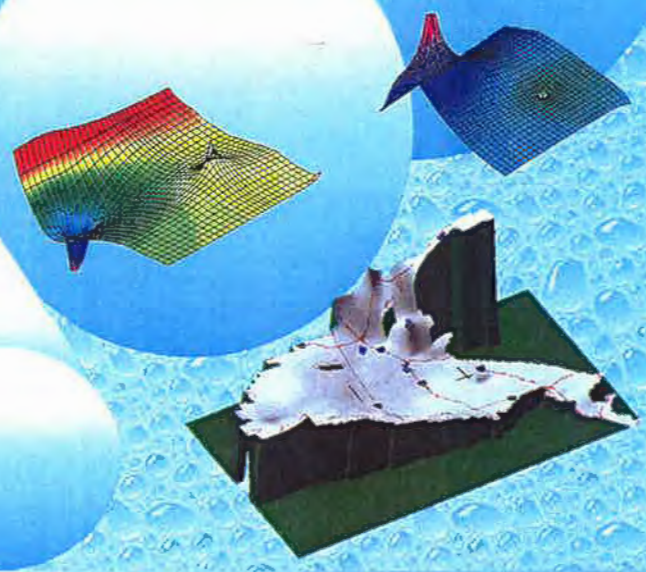
Upper Los Angeles River Area Watermaster

City of Los Angeles VS. City of San Fernando, ET AL

Case No. 650079 - County of Los Angeles

GROUND WATER PUMPING AND SPREADING PLAN

2001-2006 Water Years



July 2002

UPPER LOS ANGELES RIVER AREA WATERMASTER

CITY OF LOS ANGELES VS. CITY OF SAN FERNANDO, ET AL
CASE NO. 650079 - COUNTY OF LOS ANGELES

P.O.Box 51111, Room 1450
Los Angeles, CA 90051-0100

GROUNDWATER PUMPING AND SPREADING PLAN FOR THE UPPER LOS ANGELES RIVER AREA LOS ANGELES COUNTY, CALIFORNIA

2001-2006 WATER YEARS

ULARA WATERMASTER
Melvin L. Blevins, P.E.

ASSISTANT WATERMASTER
Mark G. Mackowski, R.G., C.E.G.

WATERMASTER ADMINISTRATOR
Patricia T. Kiechler

GROUNDWATER HYDROLOGY/MODELING CONSULTANT
Hadi Jonny, P.E.

WATERMASTER STAFF

Andy J. Agra	Water Resources Engineer
Vahe Dabbaghian	Water Resources Engineer
Michael Hedvig	Management Assistant
Billie Washington	Clerk Typist

Copies of this report may be purchased for $40.00 (including shipping).
Call 213/367-0921 to order.

JULY 2002

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

As Watermaster for the Upper Los Angeles River Area (ULARA), I am pleased to submit the 2002 ULARA Pumping and Spreading Plan. This report is prepared in compliance with Section 5.4 of the ULARA Watermaster's Policies and Procedures that established the Watermaster's responsibility for water quality management in the ULARA groundwater basins. The Pumping and Spreading Plan includes the individual plans submitted by the five major water rights holders, which incorporates changes in recharge, spreading, and pumping, or pumping patterns, especially in relation to the present and future plans for groundwater cleanup.

In the Sylmar Basin, the City of San Fernando can pump all its groundwater rights, but due to operational problems Los Angeles may not be able to pump its full right in this Water Year. Glendale plans to pump its full adjudicated amount in the San Fernando Basin (SFB), but it has limited pumping capacity in the Verdugo Basin. Crescenta Valley Water District (CVWD) is pumping all its assigned water rights from the Verdugo Basin, and on an interim basis continues to pump in excess of its prescriptive rights until Glendale has the ability to pump its full water right. Both Burbank and Los Angeles are planning to pump their adjudicated amount in the SFB.

Currently, there are five groundwater cleanup plants in operation: the City of Los Angeles' North Hollywood Operable Unit (OU) and the Pollock Wells Treatment Plant, the Burbank OU, CVWD's Glenwood Nitrate Removal Plant, and the Glendale OU. The City of Burbank's Granular Activated Carbon (GAC) Treatment Plant has been temporarily removed from service due to elevated levels of hexavalent chromium.

The Pumping and Spreading Plan discusses the difficulty the City of Glendale had in accepting the groundwater treated at its new Glendale OU because of the presence of hexavalent chromium. Hexavalent chromium has presented a challenge to all the water purveyors in the SFB and will continue to impact pumping and water quality in the forseeable future.

The Watermaster will continue to address the capacity limitations of the spreading grounds. Projected spreading is decreasing, which lowers the water table. The Watermaster is working with the County and City of Los Angeles to find ways to maximize spreading in the Hansen and Tujunga Spreading Grounds and to explore spreading in new areas, possibly the Boulevard Pit. A methane gas mitigation plan for the Tujunga Spreading Grounds has been developed, but below-normal rainfall this year did not permit its implementation.

The groundwater model this year simulates the effect on groundwater elevations of projected pumping in the SFB for the next five years. The most significant feature are the pumping cones of depression formed in Layer I (Upper Zone) as a result of pumping at Los Angeles' Tujunga and Rinaldi-Toluca wells, the Burbank OU, and the Glendale OU (Plate 3).

I wish to acknowledge and express appreciation to the parties who have provided information and data that were essential to the completion of this report.

M L Blevins

MELVIN L. BLEVINS
ULARA Watermaster

II. INTRODUCTION

As a result of the groundwater contamination that was discovered in the SFB, the ULARA Watermaster and Administrative Committee, jointly with the Regional Water Quality Control Board (RWQCB), revised the ULARA Watermaster's Policies and Procedures in July 1993, in order to prevent further degradation of the groundwater quality and to limit the spread of contamination in the ULARA basins. The Policies and Procedures were revised again in February 1998 to organize the material into a more accessible and complete document.

Section 5.4 of the Policies and Procedures assigns the responsibility for this annual Pumping and Spreading Plan to any party who produces groundwater. Each municipal pumper is required to submit to the ULARA Watermaster annually (on or before May 1 of the current Water Year) a Groundwater Pumping and Spreading Plan. This plan should include projected groundwater pumping and spreading amounts, recent water quality data on each well, and facility modification plans. In order to obtain future groundwater contamination levels, a monitoring program should also be included in the plan.

The ULARA Watermaster is required to evaluate and report on the impact of the combined pumping and spreading of each party as it relates to the implementation of the San Fernando Judgment (January 26, 1979) and groundwater management, and make the needed recommendations. The Watermaster's evaluation and recommendations are to be included in a Groundwater Pumping and Spreading Plan for ULARA, and the Administrative Committee is to review and approve the plan by July of the current Water Year.

This is the July 2002 Groundwater Pumping and Spreading Plan for ULARA, prepared following the revisions of the Policies and Procedures. This report provides guidance to the Administrative Committee for use in protecting the water quality within ULARA, improving basin management, and providing overall protection of each party's water right.

III. PLANS FOR THE 2001-2006 WATER YEARS

A. Projected Groundwater Pumping for 2001-2006 Water Years

The total 2001-2002 ULARA pumping is projected at 115,975 acre-feet (AF) (Table 3-1B), approximately 16,000 AF below the 22-year average (1979-2002). The estimated pumping for 2002-2003 is 117,288 AF, a 14,000 AF decrease from the historical average (Appendices A-E).

In 2001-2002, the City of Burbank plans to pump 10,354 AF (Table 3-1A), a 700 AF increase from its five-year average, and a 2,600 AF increase from its historical 22-year average. This increase is due to pumping at the Burbank OU. As of October 1, 2001, Burbank has a storage credit of 37,265 AF. Burbank's annual return water credit of 20 percent is approximately 5,000 AF, and its right to purchase Physical Solution water from Los Angeles is 4,200 acre-feet per year (AF/yr). The plant capacity is 9,000 gpm (14,000 AF/yr). Pumping in excess of Burbank's annual return water credit can come from its banked storage or Physical Solution purchases from Los Angeles. Burbank may also purchase and import water from the Metropolitan Water District (MWD) and store it in the SFB for later extraction, or purchase water from other water rights holders in the SFB.

CVWD plans to pump 3,400 AF, which is an increase of about 700 AF compared to its average pumping since 1979, but a reduction of 300 AF from its five-year average. The projection reflects pumping a portion of Glendale's allocation of the Verdugo Basin Safe Yield, which Glendale is currently unable to pump. Pumping beyond the CVWD's prescriptive right of 3,294 AF requires the Watermaster's annual approval. This additional pumping was approved by the Watermaster and the Administrative Committee.

The City of Glendale resumed significant pumping from the SFB when the Glendale OU began operating in September 2000. In the SFB, Glendale accumulates 20 percent return water credit for water delivered to its entire service area within the SFB. In addition, Glendale has the right to purchase from Los Angeles up to 5,500 AF/yr of Physical Solution water. Glendale expects to pump 6,920 AF from the SFB in 2001-2002. Glendale had storage credit of 73,254 AF in the SFB as of October 1, 2001. Glendale plans to extract 2,900 AF from the Verdugo Basin in 2001-2002, an increase of about 600 AF over its 22-year historical average, and 300 AF more than the average of the past five years.

The City of Los Angeles plans to pump about 87,581 AF this year from the San Fernando Basin, approximately 22,000 AF below its 1979-2001 annual average and about 5,400 AF less than the

past five-year average. A total of 1,520 AF of groundwater will be pumped from the Sylmar Basin, about 1,300 AF less than the 1979-2001 average and 2,100 AF less than the average of the last five years (1996-2001). There has been no pumping in the Sylmar Basin since June 2001 while the Mission Wells Sand Trap Tank was being repaired. Repairs should be completed and pumping should resume in May 2002. As of October 1, 2001, Los Angeles has a storage credit of 234,270 AF in the SFB and 4,360 AF in the Sylmar Basin.

In 2001-2002 the City of San Fernando plans to pump 3,300 AF from the Sylmar Basin, 700 AF above its average pumping for the past five years and 900 AF above the past 22-year average. San Fernando has storage credit of 1,040 AF as of October 1, 2001.

Estimated capacities of ULARA well fields are provided in Table 3-1. Actual and projected amounts of pumping and spreading by the major parties during 2001-02 are shown in Tables 3-1A, 3-1B, and 5-1A.

B. Constraints on Pumping as of 2001-2002

SAN FERNANDO BASIN

City of Burbank - In January 1996, a portion of Burbank's pumping capability was restored when the Burbank OU was activated under Phase I of the Consent Decree with the United States Environmental Protection Agency (USEPA). The City assumed the 18-year operation of the facility on March 12, 2001 under provisions of the Second Consent Decree. Although the USEPA turned over operating control of the facility to the City of Burbank, negotiations continued with Lockheed Martin (Lockheed) over several issues including the pumping capacity of the eight supply wells.

In June 2000, the Burbank OU went offline due to breakthrough of 1,2,3-Trichloropropane (1,2,3-TCP) in the liquid phase carbon contactors. An investigation revealed inefficient design of the contactor piping and other design flaws. Repair plans include replacing distribution headers and underdrains in the liquid-phase carbon contactors and replacing corroded screens in the vapor-phase contactors.

In November 2000, the Burbank City Council requested that the use of Well VO-1 be minimized because of elevated levels of hexavalent chromium. Burbank Water and Power made a formal proposal to the USEPA to substitute production from City Wells No. 11A and No. 12 for production from Well VO-1, which has the highest chromium

levels among the Burbank OU wells. The proposed substitution was intended to reduce the overall level of chromium in the Burbank water system. The proposal has been withdrawn. In January 2002, EPA approved a mode of operation using the existing wells and blending the output with MWD water to keep total chromium levels at 5 ppb or less, the goal established by the Burbank City Council for the City's delivered water. The Burbank OU will pump about 10,054 acre-feet of groundwater during 2001-2002, a reduction from its design capacity of 14,000 AF/yr.

In addition, hexavalent chromium was identified in the Lake Street/GAC wells at levels that could not be blended down to 5 ppb. The facility has been shut down, but production may be resumed in the future.

Lockheed invoked a "force majeure" provision of the Second Consent Decree in October 2001. Lockheed claimed the sustainable yield of the aquifer was only 4,500 gpm, not 9,000 gpm as specified in the Consent Decree, a problem beyond their control. Burbank demonstrated to the USEPA's satisfaction that the causes of reduced pumping were flawed design and inadequate maintenance. These problems are now being addressed with Lockheed's cooperation.

City of Glendale – Glendale began accepting treated water from the Glendale OU in February 2002. Between September 2000 and February 2002, nearly 8,000 AF of treated water was discharged to the Los Angeles River due to concern over the levels of hexavalent chromium. The City of Glendale, working cooperatively with the USEPA and the Watermaster, developed a goal of serving water with 6 ppb or less of hexavalent chromium, enabling the City to accept most of the treated water into its potable system.

The Glendale OU is operating at 90% of capacity from five wells. The system has eight wells and treatment facility designed to treat groundwater contaminated by TCE and PCE at a rate of 5,000 gpm using aeration and GAC. The Grandview Pumping Station blends and conveys the treated water to the Glendale potable water system.

The two wells highest in hexavalent chromium, GS-3 and GN-3, are operating at 50% capacity. The City of Glendale has developed a schedule satisfactory to the USEPA to increase pumping to full capacity within this Water Year. Various options are being explored, including wellhead treatment and using the water for non-potable purposes such as irrigation.

City of Los Angeles - Several of the well fields within the SFB cannot be fully utilized because of groundwater contamination, primarily from volatile organic compounds (VOCs) such as TCE and PCE. The well fields that have been most impacted are the Crystal Springs Well Field, which has been completely abandoned and removed from service, and the Pollock and Headworks Well Fields. The Pollock Well Field was partially restored when the Pollock Wells Treatment Plant was placed into service March 17, 1999. The Headworks Well Field Remediation Project (Headworks Project) planned to restore four wells in the Headworks Well Field by treating groundwater at a rate of approximately 13,500 gpm using aeration. The project has been suspended because of the discovery of 1,2,3-TCP within the ten-year capture zone. The California Department of Health Services (DHS) has recently indicated that it would require additional treatment before a permit would be issued for this facility. The Tujunga Well Field has also experienced low levels of TCE, PCE, and nitrates and is being evaluated. LADWP is planning to add up to four new wells in the west branch of the North Hollywood Well Field to restore capacity resulting from contamination and obsolescence of some existing wells.

SYLMAR BASIN

City of San Fernando - All of San Fernando's groundwater is pumped from the Sylmar Basin, where there are no limitations related to contamination. However, nitrate levels have been rising for several years in San Fernando's wells.

City of Los Angeles - The number of wells at the Mission Well Field have been reduced from six to three because of their age and condition. Old septic systems, and possibly past agricultural practices, are the likely cause(s) of the high nitrate levels. The City of Los Angeles Bureau of Sanitation is investigating the location of septic systems, identifying potential sewer connections, and attempting to obtain project funding.

The Mission Wells have not been pumping since June 2001 while the Mission Wells Sand Trap Tank roof is repaired and an interior coating is applied.

VERDUGO BASIN

Crescenta Valley Water District - All of CVWD's groundwater rights are in the Verdugo Basin. Contamination from VOCs is minimal, however, nitrate contamination is

widespread. High nitrate levels are reduced in the supply by treating a portion of the groundwater by ion exchange at the Glenwood Nitrate Removal Plant, and blending untreated groundwater with treated groundwater and/or MWD water to meet drinking water standards. The CVWD has been given permission by the Watermaster and Administrative Committee on an annual basis to pump in excess of its prescriptive right until the City of Glendale is able to pump its entire prescriptive right. CVWD is at the beginning of a ten year program to construct new wells to replace old wells. Two new wells have been constructed in the past two years, though the well capacity appears less than anticipated. Of major concern is that water demand and basin recharge have been affected by the below- normal rainfall. As a result, CVWD has entered Phase One of a voluntary conservation effort.

City of Glendale - The City of Glendale currently does not have the capability of pumping its entire adjudicated right from the Verdugo Basin. Glendale is in the process of studying and evaluating various alternatives to increase its pumping capacity. Limitations in pumping are caused by the lack of wells, rather than contaminant problems. Additional extraction capacity in the Verdugo Basin may be developed.

TABLE 3-1: ESTIMATED CAPACITIES OF ULARA WELL FIELDS

Party/Well Field	Number Standby Wells	Number Active Wells	Estimated Capacity (cfs)
	SAN FERNANDO BASIN		
City of Los Angeles			
Aeration	---	7	4
Erwin	3	2	10
North Hollywood	8	21	129
Pollock	1	2	10
Rinaldi-Toluca	---	15	117
Tujunga	---	12	107
Verdugo	2	3	12
Whitnall	1	4	20
City of Burbank	3	10	24
City of Glendale		8	11
TOTAL:	18	84	444
	SYLMAR BASIN		
City of Los Angeles		3	9
City of San Fernando		4	9
TOTAL:		7	18
	VERDUGO BASIN		
CVWD		10	18
City of Glendale		5	15
TOTAL:		15	33

TABLE 3-1A: 2001-02 ACTUAL AND PROJECTED GROUNDWATER EXTRACTIONS
(acre-feet)

		2001			2002								
Party/Well Field	Total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
		SAN FERNANDO BASIN											
City of Los Angeles		Actual							Estimated				
AERATION	1,771	23	0	181	108	162	100	196	203	196	203	203	196
ERWIN	860	68	30	0	75	0	33	107	111	107	111	111	107
HEADWORKS	-	0	0	0	0	0	0	0	0	0	0	0	0
No HOLLYWOOD	21,370	2054	722	0	1285	0	1625	2024	2768	2678	2768	2768	2678
POLLOCK	1,981	304	17	0	20	3	132	226	431	417	431	0	0
RINALDI-TOLUCA	28,420	3165	700	0	2094	0	0	0	4551	4404	4551	4551	4404
TUJUNGA	25,818	3564	230	0	2399	568	330	1488	3321	3214	3321	3752	3631
VERDUGO	4,620	517	226	0	217	0	177	571	590	571	590	590	571
WHITNALL	2,741	431	187	0	193	0	112	298	308	298	308	308	298
TOTAL:	87,581	10,126	2,112	181	6,391	733	2,509	4,910	12,283	11,885	12,283	12,283	11,885
City of Burbank	300	11	3	3	11	29	35	35	35	35	35	35	35
Burbank OU	10,054	974	898	599	884	787	884	838	838	838	838	838	838
City of Glendale	6,920	560	379	378	450	571	653.35	633	659	659	659	659	659
TOTAL:	104,855	11,671	3,393	1,162	7,736	2,120	4,081	6,416	13,815	13,417	13,815	13,815	13,417
		SYLMAR BASIN											
City of Los Angeles	1,520	0	0	0	0	0	0	0	308	298	308	308	298
City of San Fernando	3,300	332	262	243	249	248	280	280	281	281	281	281	281
TOTAL:	4,820	332	262	243	249	248	280	280	589	579	589	589	579
		VERDUGO BASIN											
Crescenta Valley Water District	3,400	326	279	266	262	245	288	289	289	289	289	289	289
City of Glendale	2,900	158	228	226	224	183	268	268	269	269	269	269	269
TOTAL:	6,300	484	507	492	486	428	556	557	558	558	558	558	558
ULARA TOTAL:	115,975	12,487	4,162	1,897	8,471	2,796	4,917	7,253	14,962	14,554	14,962	14,962	14,554

TABLE 3-1B: HISTORICAL AND PROJECTED PUMPING
(acre-feet)

Party/Wellfield	Historical Average Pumping		Projected Groundwater Pumping				
			SAN FERNANDO BASIN				
City of Los Angeles	1979-2001(A)	1996-2001(B)	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
AERATION (12yrs.)	1302	1487	1771	2390	2390	2390	2390
ERWIN	4683	1396	860	994	994	994	994
HEADWORKS (10 yrs)	3928	0	0	0	0	0	0
No HOLLYWOOD	31196	22648	21370	21647	25276	25276	25276
POLLOCK (14 yrs.)	1468	1540	1981	3600	2400	2400	2400
RINALDI-TOLUCA (14 yrs	32971	32117	28420	25108	25900	25900	25900
TUJUNGA (9 yrs.)	22249	28419	25818	25272	22179	27179	22179
VERDUGO	5162	2856	4620	5261	5261	5261	5261
WHITNALL	6780	2524	2741	2728	2600	2600	2600
TOTAL City of Los Angeles	**109739**	**92987**	**87581**	**87000**	**87000**	**92000**	**87000**
City of Burbank (C)	1682	1330	300	300	300	300	300
Burbank OU	6026	8325	10054	10140	10140	10140	10140
City of Glendale (C)	4126	1598	6920	7025	7025	7025	7025
TOTAL San Fernando Basin	**121573**	**104240**	**104855**	**104465**	**104465**	**109465**	**104465**
			SYLMAR BASIN				
City of Los Angeles	2814	3667	1520	3323	3300	3300	3300
City of San Fernando	2424	2615	3300	3400	3400	3500	3500
TOTAL Sylmar Basin	**5238**	**6282**	**4820**	**6723**	**6700**	**6800**	**6800**
			VERDUGO BASIN				
Crescenta Valley Water District	2668	3724	3400	3200	3300	3400	3500
City of Glendale	2288	2596	2900	2900	2900	2900	2900
TOTAL Verdugo Basin	**4956**	**6320**	**6300**	**6100**	**6200**	**6300**	**6400**
TOTAL ULARA	131767	116842	115975	117288	117365	122565	117665

A. 22 year average or less depending on life of well field indicated in parathensis.

B. 5 year average.

C. Includes Forest Lawn and GOU pumping for Glendale and Valhalla and Lake St. GAC pumping for Burbank.

IV. GROUNDWATER PUMPING AND TREATMENT FACILITIES

A. Well Fields

There are ten production well fields located in the SFB, two in the Sylmar Basin, and two in the Verdugo Basin. The locations of the well fields are shown in Plate 4, and their estimated capacities are given in Table 3-1.

B. Active Groundwater Pumping and Treatment Facilities

Glendale OU

The Glendale OU been producing and treating groundwater for VOCs since September 2000. Due to concern and confusion about the health risk of hexavalent chromium, nearly 8,000 AF of treated water were discharged to the Los Angeles River between September 2000 and February 2002. In February 2002, the Glendale City Council agreed to stop discharging the treated water and to accept it into the potable system as long as hexavalent chromium was below six ppb.

The Glendale OU is comprised of a water treatment plant, a facility to blend the treated groundwater with water from the Metropolitan Water District to reduce nitrate levels, disinfection equipment, and associated piping (Appendix C, Figure 5). The treatment plant has the capacity to treat 5,000 gpm from the eight wells in the Glendale North and South Well Fields. Currently, the wells are being pumped at 4,200 gpm to maintain the desired low levels of hexavalent chromium while modifications are being designed to use additional water for the power plant and irrigation.

Burbank OU

The remediation of groundwater contamination in the SFB has been significantly enhanced by the startup of the Burbank OU on January 3, 1996. The Burbank OU, consisting of air-stripping towers followed by liquid and gaseous phase GAC contactors, produces 9,000 gpm (14,000 AF) annually. Under the terms of the Second Consent Decree entered on June 22, 1998, Burbank assumed operation of the Burbank OU on March 12, 2001 as the long-term primary operator for the next 18 years. Although the USEPA has turned over operations of the facility to the City of Burbank, there have been continuing negotiations with Lockheed over several issues including the pumping capacity of the eight wells. These issues have been resolved and the design and maintenance problems are being corrected.

GAC Treatment Plant - City of Burbank

This facility has been operated by the City of Burbank since November 1992. Two wells can deliver water at 2,000 gpm to the GAC plant for removal of VOCs. When the plant is in use the treated water supplements production from the Burbank OU and can be delivered to the Burbank distribution system. However, current plans are to keep the plant shut down, except for emergencies, until July 2004 or later because of chromium concerns. At that time, the facility may be used to produce water for the Magnolia Power Plant.

North Hollywood OU (Aeration Facility) - City of Los Angeles

This facility is designed to treat up to 2,000 gpm of VOC-contaminated groundwater by air-stripping and deliver the treated water to Los Angeles' water distribution system. Between October and December 2001 the facility was out of service due to electrical problems and a broken chlorination line. The facility operates below design capacity because of low well production and hexavalent chromium contamination.

Pollock Wells Treatment Plant - City of Los Angeles

Pollock Wells Treatment Plant, treating 3,000 gpm of groundwater, began operating in March 1999. This project is funded by the City of Los Angeles. The Pollock Wells Treatment Plant reduces rising groundwater flowing out of ULARA and enhances the overall groundwater cleanup program in the Los Angeles River Narrows area of the SFB. The groundwater is processed through liquid-phase GAC vessels for VOC removal, followed by chlorination and blending of treated groundwater to reduce nitrate levels. The processed water is delivered to LADWP's distribution system.

Glenwood Nitrate Removal Plant - CVWD

Groundwater pumped from the CVWD wells is high in nitrates. A portion of the pumped groundwater is treated in an ion-exchange process and blended with untreated water and/or imported MWD water to reduce nitrate levels below the Maximum Contaminant Level (MCL).

TREATED GROUNDWATER IN THE SAN FERNANDO VALLEY TABLE 4.1 ACTUAL GROUNDWATER TREATMENT									
Water Year	Burbank GAC	Lockheed Aqua Detox	Burbank OU	Glendale OU	CVWD Glenwood Nitrate Removal Plant	Los Angeles North Hollywood OU	Los Angeles Pollock Wells Treatment Plant	Annual Total	AF
1985-86		1							1
1986-87		1							1
1987-88		1							1
1988-89		924							924
1989-90		1,108				1,148			2,256
1990-91		747				1,438			2,185
1991-92		917			847	786			2,550
1992-93	1,205	692			337	1,279			3,513
1993-94	2,395	425	378		1,550	726			5,474
1994-95	2,590		462		1,626	1,626			6,304
1995-96	2,295		5,737		1,419	1,182			10,633
1996-97	1,620		9,280		1,562	1,448			13,910
1997-98	1,384		2,580		1,391	2,166			7,521
1998-99	1,555		9,184		1,281	1,515	1,513		15,048
1999-00	1,096		11,451	979	1,137	1,213	1,851		17,727
2000-01	995		9,133	6,345	989	1,092	1,256		19,810
Total AF	**15,135**	**4,815**	**48,205**	**7,324**	**12,139**	**15,619**	**4,620**		**107,857**

TABLE 4.2 PROJECTED GROUNDWATER TREATMENT							
	Burbank GAC	Burbank OU	Glendale OU	CVWD Glenwood Nitrate Removal Plant	Los Angeles North Hollywood OU	Los Angeles Pollock Wells Treatment Plant	Annual Total AF
2001-02	0	10,054	6,300	900	1,790	1,980	21,024
2002-03	0	10,140	6,600	850	2,390	3,600	23,580
2003-04	0	10,140	6,600	900	2,390	2,400	22,430
2004-05	0	10,140	6,600	900	2,390	2,400	22,430
2005-06	0	10,140	6,600	1,000	2,390	2,400	22,530
Total AF	**0**	**50,614**	**32,700**	**4,550**	**11,350**	**12,780**	**111,994**

C. Proposed Groundwater Pumping and Treatment Facilities

Headworks Well Field Remediation Project

The Headworks Well Field Remediation Project has been suspended due to permitting issues. The project was designed to restore the use of the well field by pumping and treating the groundwater for VOCs from four wells with a combined flow of approximately 13,500 gpm.

North Hollywood Well Field Restoration Project

LADWP is planning to add up to four new North Hollywood Wells in the west branch to restore pumping capacity lost from contamination and age. The new wells are expected to be operational in Spring 2003.

D. Other Groundwater Remediation Projects

Many privately owned properties in the SFB have been found to have groundwater contamination, and are under Cleanup and Abatement Orders from the Regional Water Quality Control Board (RWQCB). Each site typically has monitoring wells and some have extraction wells and treatment facilities. The RWQCB is in the process of evaluating and closing a significant number of cases in the underground tank program.

The RWQCB, funded in part with a grant from the USEPA, is investigating sites suspected of hexavalent chromium contamination. A database of sites in the San Fernando Superfund area with either confirmed chromium contamination or a history of chromium use has been created. The RWQCB is conducting inspections of these sites and will evaluate additional information provided by the California Department of Toxic Substances Control, the South Coast Air Quality Management District, and the Los Angeles County Department of Sanitation. In March 2002, a Cleanup and Abatement Order was issued to Drilube in Glendale to assess, cleanup, and abate the effects of contamination discharged to soil and groundwater. The contaminants include hexavalent chromium and other VOCs.

E. Dewatering Operations

Metropolitan Transit Authority (MTA)

As part of the planned transportation system in Los Angeles County, the MTA constructed the Universal City Subway Station and the associated rail lines. The construction project was completed in June 2000. To ensure the safe and continued operation of facilities constructed below the water table at locations within ULARA, the MTA must continue to collect and dispose of infiltrated groundwater. In August 2002, MTA will begin construction of a pedestrian underpass project at Universal City that will require dewatering.

Northeast Interceptor Sewer (NEIS) Project

The NEIS Project, located northerly of the intersection of the Los Angeles River and the Arroyo Seco, will require dewatering during construction. This project is under the direction of the Los Angeles Department of Public Works Bureau of Engineering.

Trunkline Replacement

The LADWP is continuing a long-term project to replace its aging city trunklines. A current project on Burbank Boulevard near Balboa, an area of historic shallow water table, will require dewatering during construction.

Other Permanent Dewatering Operations

Many facilities along the southern and western boundaries of the SFB have deep foundations in areas of high groundwater that require a dewatering program. The amount of groundwater pumped is required to be reported to the Watermaster on a monthly basis. These activities are subject to approval by the affected Administrative Committee party, and the dewaterer is required to pay for the replacement cost of the extracted groundwater. The pumped groundwater is subtracted from the affected party's water right.

F. Unauthorized Pumping in the County

Unauthorized Pumping

There are a significant number of individuals, primarily within the unincorporated hill and mountain area, who are pumping groundwater without reporting the production to the Watermaster. This groundwater has been adjudicated and is the property of the City of Los Angeles. The volume produced by each pumper is probably small, but the cumulative effect may be relatively large. The Watermaster enforces the Judgment at the direction of the Los Angeles Superior Court, and is investigating and conducting negotiations with the City of Los Angeles and Los Angeles County in an attempt to resolve the problem. The Watermaster Office has begun evaluating pumping by lessees on U.S. Forest Service land (Angeles National Forest) within ULARA.

V. GROUNDWATER RECHARGE FACILITIES AND PROGRAMS

A. Existing Spreading Operations

There are six spreading facilities located in the SFB (Plate 2). The Los Angeles County Department of Public Works (LACDPW) operates the Branford, Hansen, Lopez, and Pacoima Spreading Grounds. The LACDPW, in cooperation with the City of Los Angeles, operates the Tujunga Spreading Grounds. Headworks Spreading Grounds, operated by the City of Los Angeles, has not been used since the early 1980s. The spreading facilities are used primarily for spreading native and imported water. There are no plans for modifications of existing spreading grounds, or for the construction of new facilities in the 2001-2002 Water Year. There is an investigation and analysis being made by the LACDPW Flood Control Section and the LADWP to identify ways to maximize spreading. Estimated capacities are shown in Table 5-2.

B. Future Spreading Operations

East Valley Water Recycling Project

The East Valley Water Recycling Project (EVWRP) was originally designed to deliver tertiary-treated water from the Tillman Water Reclamation Plant for spreading at the Hansen Spreading Grounds. This project has been refocused to maximize non-potable uses for the water including cooling water for the Valley Steam Plant and irrigation.

Headworks Spreading Grounds

The Headworks Spreading Grounds project would restore SFB recharge operations to this site. The diversion facilities in the Los Angeles River near Griffith Park would be rehabilitated, modified or replaced; earthwork would be reconfigured for the settling and spreading basins; and monitoring wells would be installed. LADWP is studying the diversion of stormwater flows for recharge that would otherwise flow to the ocean. LADWP is sponsoring this study in cooperation with the U.S. Army Corps of Engineers under a Federal Funding Authority Program for improvements to the environment and ecosystem restoration.

Boulevard Pit Spreading Facility

Vulcan Materials, CalMat Division, is currently mining sand and gravel from its Boulevard Pit, located between the existing Hansen and Tujunga Spreading Grounds. LADWP, LACDPW, and the Watermaster are investigating the feasibility of ultimately acquiring the Boulevard Pit for conversion into a new stormwater retention and recharge facility.

C. Actual and Projected Spreading

Table 5-1A shows the actual and projected spread volumes for the 2001-2002 Water Year. As shown in Table 5-1A, the 2001-2002 Water Year will experience below-average recharge activities. Overall, approximately 2,400 AF will be spread compared to the 32-year historical average of 33,607 AF, and compared to the past five-year average of 26,173 AF. Rainfall precipitation on the valley fill is estimated at 4.7 inches for 2001-02 compared to the long-term average of 18.46 inches per year and the previous five-year average of 19.28 inches per year. It is the lowest recorded rainfall since record-keeping began in 1870.

TABLE 5-1A: 2001-2002 SPREADING OPERATIONS
(acre-feet)

	Operated by:						
	LACDPW				LADWP	LACDPW and LADWP	
Month	Branford	Hansen	Lopez	Pacoima	Headworks	Tujunga	Total
Oct-01	25	87	0	269	0	51	432
Nov-01	113	229	0	81	0	0	423
Dec-01	68	191	0	92	0	9	360
Jan-02	73	222	0	220	0	40	555
Feb-02	33	139	0	71	0	1	244
Mar-02	26	136	0	0	0	0	162
Apr-02					0		0
May-02					0		0
Jun-02					0		0
Jul-02					0		0
Aug-02					0		0
Sep-02					0		0
TOTAL	338	1,004	0	733	0	101	2,176
1969-2001 Average	511	14,530	557	6,855	2,251	8,903	33,607
1996-2001 Average	526	13,213	478	6,782	0	5,174	26,173

Table 5-1B: HISTORICAL PRECIPITATION ON THE VALLEY FILL
(inches per year)

1969-01 Average	1996-01 AV	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02**
18.46	19.28	15.17	37.04	9.81	14.84	19.52	4.7

* - Includes native and imported waters.

** - Estimated.

TABLE 5-2: ESTIMATED CAPACITIES OF ULARA SPREADING GROUNDS

Spreading Ground	Type	Total Wetted Area (acres)	Capacity (acre-feet/year)
	Operated by the LACDPW		
Branford	Deep basin	7	1,000
Hansen	Shallow basin	105	36,000
Lopez	Shallow basin	12	5,000
Pacoima	Med. depth basin	107	29,000
	Operated by LADWP		
Headworks	Shallow basin	28	11,000
	Operated by LACDPW and LADWP		
Tujunga	Shallow basin	83	43,000
	TOTAL:	342	125,000

D. Hansen and Tujunga Spreading Grounds Task Force

During the 1997-1998 Water Year, precipitation in ULARA was 225 percent of a normal year. This resulted in an above-average volume of stormwater runoff that could be captured in upstream reservoirs and diverted into ULARA spreading grounds. In April 1998, the Watermaster's Office received a notice from the LACDPW indicating that spreading at both the Hansen and Tujunga Spreading Grounds would be temporarily suspended. The basis for curtailing spreading was that the groundwater table had risen to a level that threatened to inundate the base of the Bradley-East Landfill near the Hansen Spreading Grounds and the Sheldon-Arleta Landfill adjacent to the Tujunga Spreading Grounds. At that time, Los Angeles County's reservoirs were entirely full, meaning that thousands of acre-feet of runoff would be spilled and lost to the ocean. The suspended spreading activities spanned over one month.

In response to this undesirable condition, the Watermaster's Office in May 1998 formed the Tujunga and Hansen Spreading Grounds Task Force. The task force was comprised of representatives from the LACDPW, LADWP, Los Angeles Bureau of Sanitation and the Watermaster's Office. After a series of meetings, the task force developed preliminary

mitigation measures to improve the utilization of both spreading grounds, particularly during years of above-normal runoff.

- Hansen Spreading Grounds Mitigation Plan

Above-average recharge at the Hansen Spreading Grounds affects the Bradley-East Landfill, located approximately 3,000 feet downgradient. The RWQCB and the Watermaster's Office prohibit groundwater inundation of the unlined landfill. The groundwater table is allowed to rise to a designated level, and then spreading is temporarily suspended until the groundwater table recedes to a safe level. This occurs only in years when above-average runoff is available. To assure the safety of the landfill, an alert groundwater level, with a 10-foot buffer zone, was established in the late 1980s. The Hansen Spreading Grounds Mitigation Plan established an improved location to record the groundwater levels approximately 1,000 feet further downgradient from its previous location and closer to the existing Bradley-East Landfill. The Watermaster's Office estimated that this change should improve the volume of groundwater recharge by at least 25 percent or approximately 7,000 AF/yr.

- Tujunga Spreading Grounds Mitigation Plan

The Tujunga Spreading Grounds are located adjacent to the Sheldon-Arleta Landfill. Methane gas has been produced by the landfill since the early 1990s, which has been a source of the environmental concern.

During the spreading of surface water, water moves through the soil column and displaces the air from voids contained in the soil matrix. A significant migration of air mass has the potential to displace methane gas out of the landfill. In recent years, the methane has occasionally migrated and caused elevated levels at a nearby high school, and in at least one instance, forced an evacuation of the school grounds. In order to avoid these episodes, a methane gas monitoring system was constructed. When methane gas is detected at specific concentrations, the spreading activities are suspended, resulting in local storm water runoff being lost to the ocean.

The Tujunga Spreading Grounds Mitigation Plan consists of continuous operation of the perimeter methane gas flare system, situated around the landfill, prior to and during spreading of surface water. This may improve containment of the methane gas within the landfill, and halt its migration out of the landfill. The plan requires close coordination between the Los Angeles Bureau of Sanitation, the operators of the existing perimeter flare system, and the LACDPW.

The goal is to contain methane gas within the landfill and improve the spreading capacity by at least 25 percent. Unfortunately, due to the lack of heavy storm runoff this plan has not been implemented.

In the meantime, the Bureau of Sanitation and the LADWP are working with their consultant, GeoSyntec, to conduct a full study to identify the most effective alternative to solve the methane migration problem. GeoSyntec has recommended a pilot project for implementation in 2002-2003.

VI. BASIN MANAGEMENT ACTIVITIES AND INVESTIGATIONS

A. Groundwater Investigation Programs

Holchem Inc. - Pacoima Area Groundwater Investigation

A significant groundwater contaminant plume exists in the Pacoima area near the intersection of San Fernando Road and the Simi Valley Freeway (118 Freeway). This area is located approximately 2.5 miles north and upgradient of the LADWP's Tujunga Well Field. Groundwater samples at one of the sites, Holchem, Inc., have been collected beginning in 1989. The ULARA Watermaster and LADWP were informed of these site investigations beginning in January 1996 by the RWQCB. Concentrations of TCE were found to be as high as 24,000 ppb at this site, which is the highest level found in the San Fernando Valley.

There are four primary VOCs present in the groundwater beneath the Pacoima area: PCE, TCE, 1,1-TCA and 1,1-DCE. To help characterize the extent of contaminant migration, LADWP installed two monitoring wells: PA-01, approximately one half mile downgradient, and PA-02, approximately one and one quarter miles downgradient of the site.

Holchem has installed a soil vapor extraction system. Off-site data from three new wells installed by Holchem was added to the monitoring conducted in March 2002. The sampling data will provide plume definition and help determine if there is one plume or two separate plumes. DTSC is the lead agency at this site.

The Price Pfister site, also located in the Pacoima area down-gradient from Holchem, is under the jurisdiction of the RWQCB. Due to the close proximity of the Price Pfister, Holchem and D&M Steel sites, the RWQCB and DTSC are coordinating oversight efforts.

Chromium Investigations

The RWQCB has prepared a draft report for the USEPA of its investigation of potential hexavalent chromium contaminated sites in the San Fernando Valley. As a result of this investigation, a Cleanup and Abatement Order was issued in March 2002 to Drilube located in Glendale. Recent semi-annual groundwater monitoring at Drilube detected TCE, PCE, and hexavalent chromium in MW3 at levels of 1,480 ppb, 262 ppb and 2,620 ppb, respectively; and

in MW1 at levels of 112 ppb, 180 ppb, and 2,540 ppb, respectively. It is anticipated that Cleanup and Abatement Orders will be issued to other sites in the future.

VII. ULARA WATERMASTER MODELING ACTIVITIES

A. Introduction

The purpose of the groundwater modeling study presented herein is to evaluate the effects of groundwater pumping in the SFB, as projected over a five-year period. The projected pumping values were extracted from the "Year 2002 Pumping and Spreading Plans" submitted by each party pursuant to the provisions established in the revised February 1998 Policies and Procedures. The groundwater flow model used for this study is a comprehensive three-dimensional computer model that was developed for the USEPA to incorporate data, characterizations, and findings during the Remedial Investigation Study of the San Fernando Valley (December 1992). The model is a tool to estimate the future response to pumping and spreading in the San Fernando Basin for the next five years. Up-to-date groundwater elevations for specific locations can be obtained by contacting the Watermaster's Office at (213) 367-0921.

The model code, "Modular Three-Dimensional Finite-Difference Groundwater Flow Model," commonly called MODFLOW, was developed by the U.S. Geological Survey (McDonald-Harbaugh) and was used to develop the San Fernando Basin Goundwater Flow Model. This model consists of 64 rows, 86 columns, and four layers to reflect the varying geologic and hydrogeologic characteristics of the SFB in three dimensions. In the deepest portion of the SFB the model is subdivided into four layers, each layer characterizing a specific zone. The model has a variable horizontal grid that ranges from 1,000 by 1,000 feet near the southeastern SFB to 3,000 by 3,000 feet in the northwestern SFB (Figure 7-1) or where less data are available. The model is actively updated.

B. Model Input

The input data for this model is illustrated in Table 7-1. Table 7-1A is the Basin Recharge, which consists of precipitation, delivered water, hill and mountain runoff, spreading, and sub-surface inflow. Table 7-1B is the Basin Extraction of major producers such as the City of Los Angeles, City of Burbank, City of Glendale, the City of San Fernando, Crescenta Valley Water District, and other individual producers. Both tables represent a projected value for the five-year study, from Fall 2001 to Fall 2006 except for the first half of Water Year 2001-2002 where the actual values were known.

In Table 7-1A, the percolation and spreading values were derived from the average or normal rainfall and recharge conditions over the five-year study period except for the first half of Water Year 2001-2002 where actual values were known. The LACDPW estimated the spreading

recharge for the second half of the water year. A significant fact is that anticipated spreading amounts are low due to below normal precipitation on the valley floor and hill and mountain areas. Reduced spreading adversely impacts the level of the water table. The values of the sub-surface inflow from the adjacent basins are constant throughout the five-year study.

All Table 7-1A values were derived from the "Pumping and Spreading Plans" submitted by producers. Each well field's values were assigned to individual wells, then each well was assigned a percentage of pumping to each model layer based on the percentage of the well's perforations contained within each layer.

The model's initial head values (groundwater elevations) were derived from the actual data of Water Year 2000-2001. The Water Year 2000-2001 experienced a continuous decline in groundwater elevation as a result of low artificial recharge. At the close of every Water Year, the Watermaster staff updates the model-input files with the actual basin recharge and extraction data.

C: <u>Simulated Groundwater Elevations and Flow Directions</u>

After running the model for five stress periods (Water Years 2001-2006), each lasting 365 days, the MODFLOW generated numerical data: the head (groundwater elevations), the drawdown (change in groundwater elevations), and the cell-by-cell flow (source of vector or flow direction data). These numerical data were used to develop the following figures or Plates.

- The simulated groundwater contour results for Model Layer 1 (water table) are shown on Plate 1, and for Layer 2 on Plate 2.

- Additionally, the change in groundwater elevation contours were generated from the drawdown data from the Fall 2001 to Fall 2006 stress period and is shown on Plate 3 for Layer 1 and Plate 4 for Layer 2.

- The horizontal groundwater flow direction is shown on Plate 5 for Layer 1 and Plate 6 for Layer 2.

- Finally, Plates 7 through 9 depict the most recent TCE, PCE and NO_3 contaminant plumes that are superimposed onto the Layer 1 horizontal groundwater flow direction.

D. Evaluation of Model Results

Plate 1: Simulated Groundwater Contour Model Layer 1 – Fall 2006

- The most noticeable feature is the cone of depression (pumping cone) that has developed around the Burbank OU. These extractions are derived primarily from Layer 1, although Layer 2 does provide some recharge to Layer 1. The Burbank OU projected pumping for the period from 2002 through 2006 is 10,140 AF/yr. The radius of influence extends as far as 7,000 feet in the downgradient (southeasterly) direction. An upgradient radius of influence is usually larger than the downgradient radius of influence.

- In a more subtle manner, Plate 1 illustrates the pumping influence (pumping cones) of the Glendale OU, North Hollywood OU, North Hollywood West Wells, and Pollock Treatment Plant Wells.

Plate 2: Simulated Groundwater Contour Model Layer 2 – Fall 2006

- The most significant features are the cones of depression near the Rinaldi-Toluca (R-T), Tujunga (TJ), North Hollywood-West (NHW), and Burbank OU. Over 75 percent of the R-T (25,900 AF/yr), TJ (27,179 AF/yr), NH (25,276 AF/yr) pumping is derived from Layers 2-4.

Plate 3: Change in Groundwater Elevation Model Layer 1 – Fall 2001 to Fall 2006

- As shown in Plate 3, there is a continuous basinwide decline in the groundwater elevations over the five-year study period, with the exception of the immediate areas near the Hansen and Pacoima Spreading Grounds.

- The primary reason for the decline in water levels is that basin extractions are projected to increase over the basin recharge for the 5-year study period by about 44,000 AF.

- The water table within the cone of depression at the Rinaldi-Toluca Well Field is lowered by about 16 feet due to pumping and the groundwater level is lowered approximately 12 feet at the lowest point in the pumping cone near the Burbank OU.

- The water table near the Glendale North OU wells will decline between two to four feet and approximately two feet near the South OU Wells. Full-scale operation of the OU plant started at the beginning of the 2000-2001 Water Year. The North OU Wells will pump 4,158 AF/yr and the South OU Wells 2,442 AF/yr.

- The area near the Tujunga and Rinaldi-Toluca Well Fields will experience about a 12 foot decline in the water table. The area near the North Hollywood, Erwin, Whitnall, and Verdugo Well Fields will experience a 10 to 20 foot depression in the water table.

Plate 4: Change in Groundwater Elevation Model Layer 2 – Fall 2001 to Fall 2006

- The area near the Tujunga, Rinaldi-Toluca, and West North Hollywood Well Fields will experience a 5 to 20 foot decline in the water table. The area near the East North Hollywood, Erwin, Whitnall and Verdugo Well Fields will experience a 5 to 15 foot depression in the water table.

Plate 5: Simulated Groundwater Flow Direction Model Layer 1 – Fall 2006

- This plate consists of superimposed groundwater flow direction arrows to illustrate the general movement of groundwater flow in Layer 1.

- The Rinaldi-Toluca, North Hollywood, Glendale OU, and Burbank OU Well Fields and the Hansen Spreading Grounds cause the most pronounced effect on the direction of groundwater movement. In particular, the Burbank OU creates such a significant pumping cone that groundwater flows toward the well field from all directions (radial flow).

- A groundwater divide apparently develops just north of the Verdugo and Burbank Water and Power (BWP) wells and south of the Whitnall, Erwin, and Burbank OU wells. This is primarily due to the 'pumping trough' formed by the Burbank OU extractions.

Plate 6: Simulated Groundwater Flow Direction Model Layer 2 – Fall 2006

- Similar to Plate 5, a groundwater divide forms between the Verdugo and Burbank PSD wells and the Burbank OU, Erwin and Whitnall wells. The effect of the Rinaldi-Toluca, North Hollywood, Glendale and Burbank OU pumping create the most significant impact to the natural direction of groundwater movement.

Plates 7 – 9: Simulated Groundwater Flow Direction and TCE, PCE and NO_3 Contamination Model Layer 1 – Fall 2006

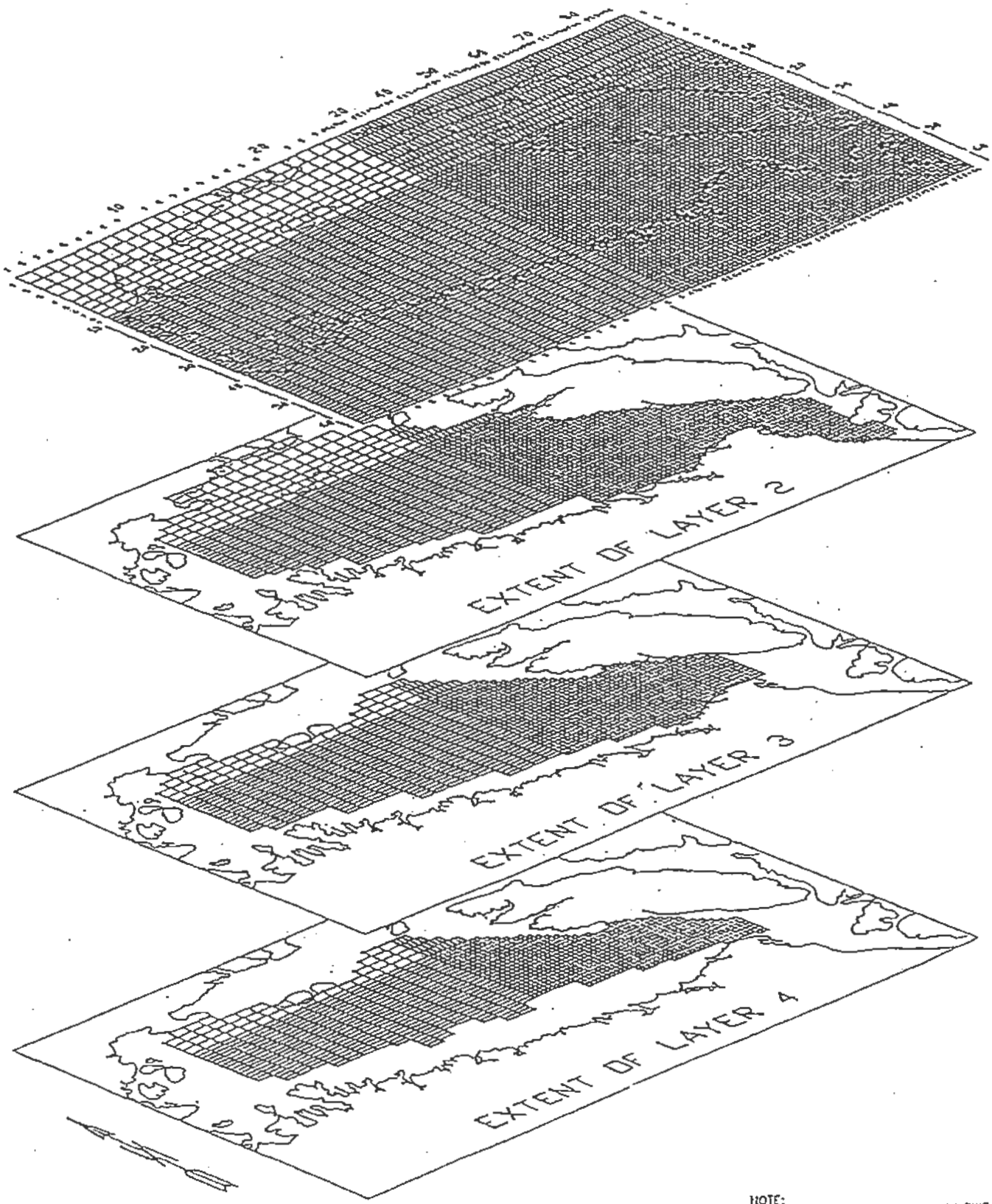
- Plates 7 through 9 depict the most recent TCE, PCE and NO_3 contaminant plumes that are superimposed onto the interpolated horizontal direction of groundwater movement for Layer 1, Fall 2006. The Burbank OU appears to contain the >5,000 µg/L TCE and PCE plumes and a portion of the 1,000-5,000 µg/L TCE and PCE plumes. The uncaptured portion of these plumes will migrate in the direction of the Los Angeles River Narrows Area (southeasterly) and toward the Glendale OU.

- The Burbank OU pumping (10,140 AF/yr) tends to flatten the horizontal gradient in a southeasterly direction and slows the natural movement of groundwater southeasterly of the Burbank OU area plume.

- The Glendale North and South OU wells pumping tend captures a portion of the plumes uncaptured by Burbank OU wells.

- The Pollock Wells (2,400 AF/yr) have a less pronounced effect on Layer 1 because 75 percent of the Pollock pumping originates from Layer 2.

- Plate 9 (NO_3 contamination) indicates that Layer 1 extractions by the Burbank and Glendale OU facilities may be impacted by NO_3 contamination above 45 mg/L.



NOTE:
LAYER SURFACES ARE SHOWN IN TWO DIMENSIONS FOR THE PURPOSE OF THIS ILLUSTRATION ONLY. ACTUAL MODEL LAYER THICKNESS VARIES BY NODE.

REMEDIAL INVESTIGATION
of Groundwater Contamination
in the San Fernando Valley

FIGURE 7-1
MODEL LAYER CONFIGURATION

MODFIGS RE. -/08/92

MODEL INPUT
Pumping and Spreading Scenario
Water Years 2001 - 2006

BASIN RECHARGE (AF/Y) 7-1A

WATER YEAR	RAINFALL (IN/Y)		PERCOLATION (A)			H&M (B)	SPREADING GROUNDS (B)							SUB-SURFACE INFLOW (B)				TOTAL RECHARGE
	VALLEY	HILL & MTN	VALLEY FILL	RETURN WATER	SUB TOTAL	HILL & MTN	BRANFORD	HANSEN	HW	LOPEZ	PACOIMA	TUJUNGA	SUB-TOTAL	PACOIMA	SYLMAR	VERDUGO	SUB-TOTAL	
2001-02	5.00	7.00	3,474	64,400	67,874	1,196	338	1,242	-	-	733	101	2,414	350	400	70	820	72,304
2001-02	18.57	23.06	12,874	61,525	74,399	3,939	438	12,973	-	579	6,127	6,696	26,813	350	400	70	820	105,971
2002-03	18.57	23.06	12,874	61,525	74,399	3,939	438	12,973	-	579	6,127	6,696	26,813	350	400	70	820	105,971
2003-04	18.57	23.06	12,874	61,525	74,399	3,939	438	12,973	-	579	6,127	6,696	26,813	350	400	70	820	105,971
2004-05	18.57	23.06	12,874	61,525	74,399	3,939	438	12,973	-	579	6,127	6,696	26,813	350	400	70	820	105,971

BASIN EXTRACTION (AF/Y) 7-1B

WATER YEAR	LADWP (C)										BURBANK (C)			GLENDALE (C)			OTHERS (C)		
	AE	EW	HW	NH	PQ	RT	TJ	VD	WH	TOTAL LADWP	BURBANK PSD	LOCKHEED	NON-BURBANK (VMP)	CITY OF GLENDALE	GU-NORTH	GU-SOUTH	TOTAL NON-LADWP	TOTAL NON-GLENDALE (E. LAWN)	TOTAL EXTRACTION
2001-02	-1,773	-860	0	-21,370	-1,981	-28,422	-25,818	-4,623	-2,738	-87,585	0	-10,054	-300	-500	-3,969	-2,331	-2,430	-400	-107,569
2002-03	-2,390	-994	0	-21,647	-3,600	-25,108	-25,272	-5,261	-2,728	-87,000	0	-10,140	-300	-25	-4,158	-2,442	-2,430	-400	-106,895
2003-04	-2,390	-994	0	-25,276	-2,400	-25,900	-22,179	-5,261	-2,600	-87,000	0	-10,140	-300	-25	-4,158	-2,442	-2,430	-400	-106,895
2004-05	-2,390	-994	0	-25,276	-2,400	-25,900	-27,179	-5,261	-2,600	-92,000	0	-10,140	-300	-25	-4,158	-2,442	-2,430	-400	-111,895
2005-06	-2,390	-994	0	-25,276	-2,400	-25,900	-22,179	-5,261	-2,600	-87,000	0	-10,140	-300	-25	-4,158	-2,442	-2,430	-400	-106,895

NOTES: (A) Model Recharge Package (Aerial)
(B) Model Well Package (Source)
(C) Model Well Package (Sink)

PROJECT: *WATERMASTER*
PROJECT NO.: *PS00-05*
DATE: 2/15/01

VIII. WATERMASTER'S EVALUATION AND RECOMMENDATIONS

The Watermaster is encouraged by the five year projected pumping and spreading plan because of the progress of the groundwater cleanup program which has restored Burbank's and Glendale's groundwater pumping capability in the San Fernando Basin. In addition, the issue of discharging treat water containing low levels of chromium was satisfactorily resolved through the cooperative efforts of the USEPA, City of Glendale, and the Watermaster's Office.

However, overall basin water levels are projected to decline due to continued pumping and reduced recharge. In addition, the gap between Stored Water Credits and basin groundwater levels continues to grow. Over the long term, these trends cannot continue without severely impacting basin operation. The Watermaster's office is investigating the cause(s) of this imbalance.

City of Los Angeles

The Watermaster approves of Los Angeles' projected average annual pumping from the SFB of approximately 88,000 AF/yr for Water Years 2001-2002 to 2005-2006. This is approximately 21,000 AF/yr less than the 1979-2001 average and 5,000 AF/yr less than the average over the last five years (1996-2001). As of October 1, 2001 Los Angeles' accumulated stored water credit was 234,270 AF in the SFB.

The loss of Los Angeles' Headworks, Crystal Springs, and Pollock Well Fields due to VOC contamination has caused rising groundwater levels in the Los Angeles River Narrows area. The Watermaster is pleased by the partial restoration of pumping in this area by the construction of the Pollock Wells Treatment Plant, and encourages Los Angeles to operate this facility at least 2,000 AF/yr to minimize underflow and loss of water from ULARA. .

In the Sylmar Basin, Los Angeles plans to pump an average of 2,949 AF/yr for Water Years 2001-2002 through 2005-2006. This represents an increase of 100 AF over the long-term average (1979-2001) of 2,814 AF/yr, but is lower than the average of 3,667 AF/yr during the past five years (1996-2001). As of October 1, 2001 Los Angeles' Stored Water Credits were 4,360 AF in the Sylmar Basin.

City of Burbank

The Watermaster is pleased that Burbank's pumping capability has been restored through the construction of the Burbank Operable Unit. However, Burbank's Stored Water Credit is showing

the impact of this pumping, dropping from 42,443 AF on October 1, 2000 to 37,265 AF on October 1, 2001. At current pumping rates Burbank's stored water will be depleted in a few years, eventually requiring arrangements to purchase or replace extractions that are in excess of Burbank's Return Flow Credits and Physical Solution purchase rights. The Watermaster encourages a cooperative spirit between all the purveyors to promote the continued operation of the Burbank OU.

City of Glendale

The Watermaster congratulates the City of Glendale on its agreement to accept treated water from the Glendale OU. Glendale's Stored Water Credit decreased from 74,484 AF on October 1, 2000 to 73, 254 AF on October 1, 2001. It is estimated that the facility can be operated for approximately 35 years before exhausting Glendale's Stored Water Credit.

In the Verdugo Basin, Glendale expects to pump an average of 2,900 AF/yr for the next five years. The long-term average (1979-2001) is 2,288 AF/yr, and the five-year average (1996-2001) is 2,596 AF/yr.

City of San Fernando

San Fernando expects to pump an average of 3,420 AF/yr over the next five years from the Sylmar Basin. The long-term average (1979-2001) is 2,424 AF/yr, and the five year average (1996-2001) is 2,615 AF/yr. As of October 1, 2001 San Fernando's Stored Water Credit was 1,040 AF in the Sylmar Basin.

Crescenta Valley Water District (CVWD)

The Watermaster supports CVWD's increased pumping in the Verdugo Basin until Glendale has the ability to pump its full right. CVWD expects to pump an average of 3,360 AF/yr during the next five years. The long-term average (1979-2001) is 2,668 AF/yr, and the five-year average (1996-2001) is 3,724 AF/yr.

CVWD is currently experiencing lower water levels in the Verdugo Basin combined with increased demand. The Watermaster encourages CVWD to pursue long-term solutions that may include artificial spsreading of stormwater and/or imported supplies, as well as new, more efficient wells.

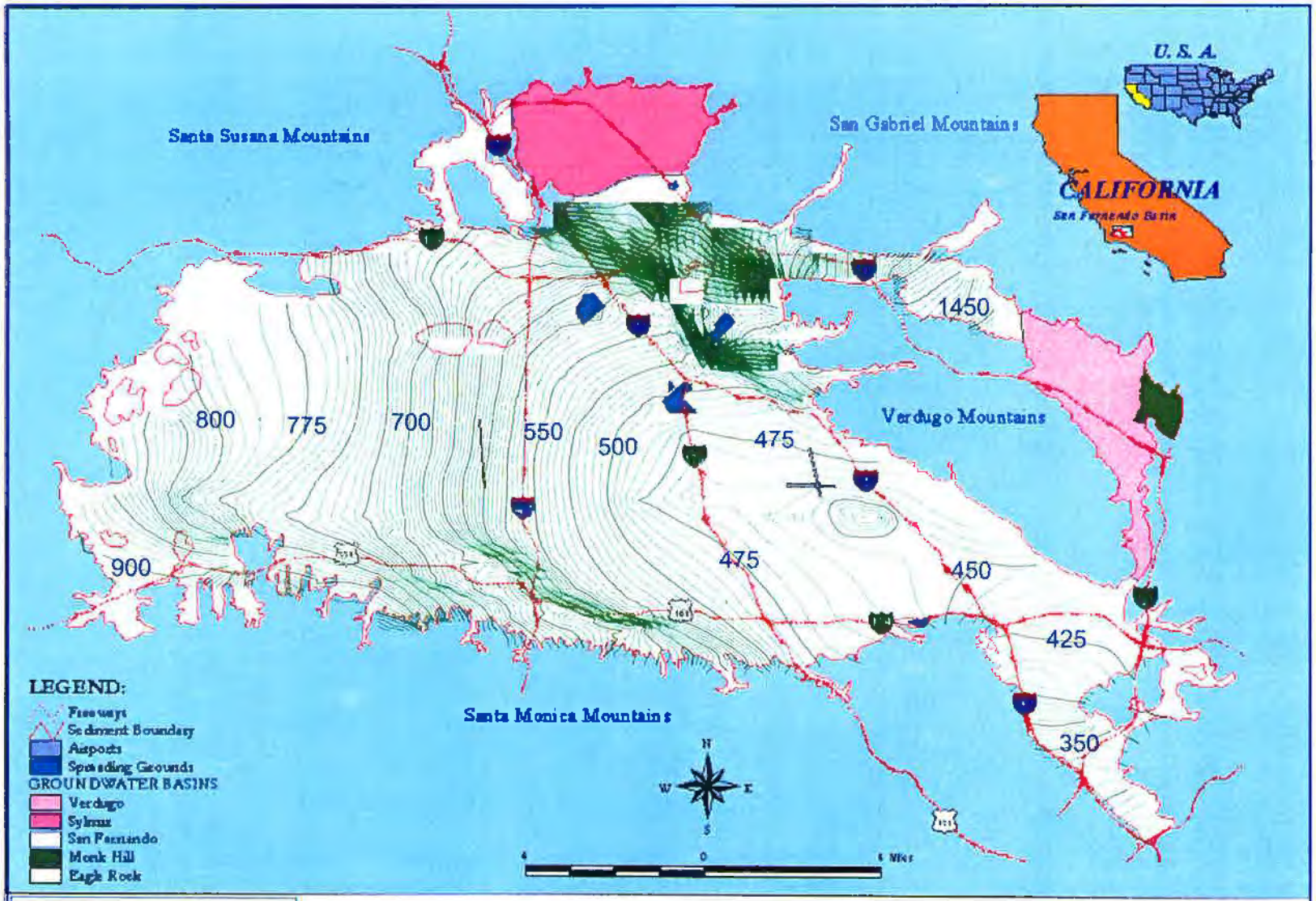
Recommendations

The Watermaster strongly recommends that all water purveyors continue to manage their basins with respect to actual groundwater levels and accumulated Stored Water Credit. In the long term, pumping must realistically reflect what the basins can provide.

In addition, the Watermaster encourages expanding conjunctive use programs such as recharging the basins using imported supplies, as well as seeking new opportunities to increase spreading capacity in wet years.

Finally, the Watermaster supports the use of recycled water and urban runoff for beneficial uses, which will effectively stretch the supply of potable groundwater.

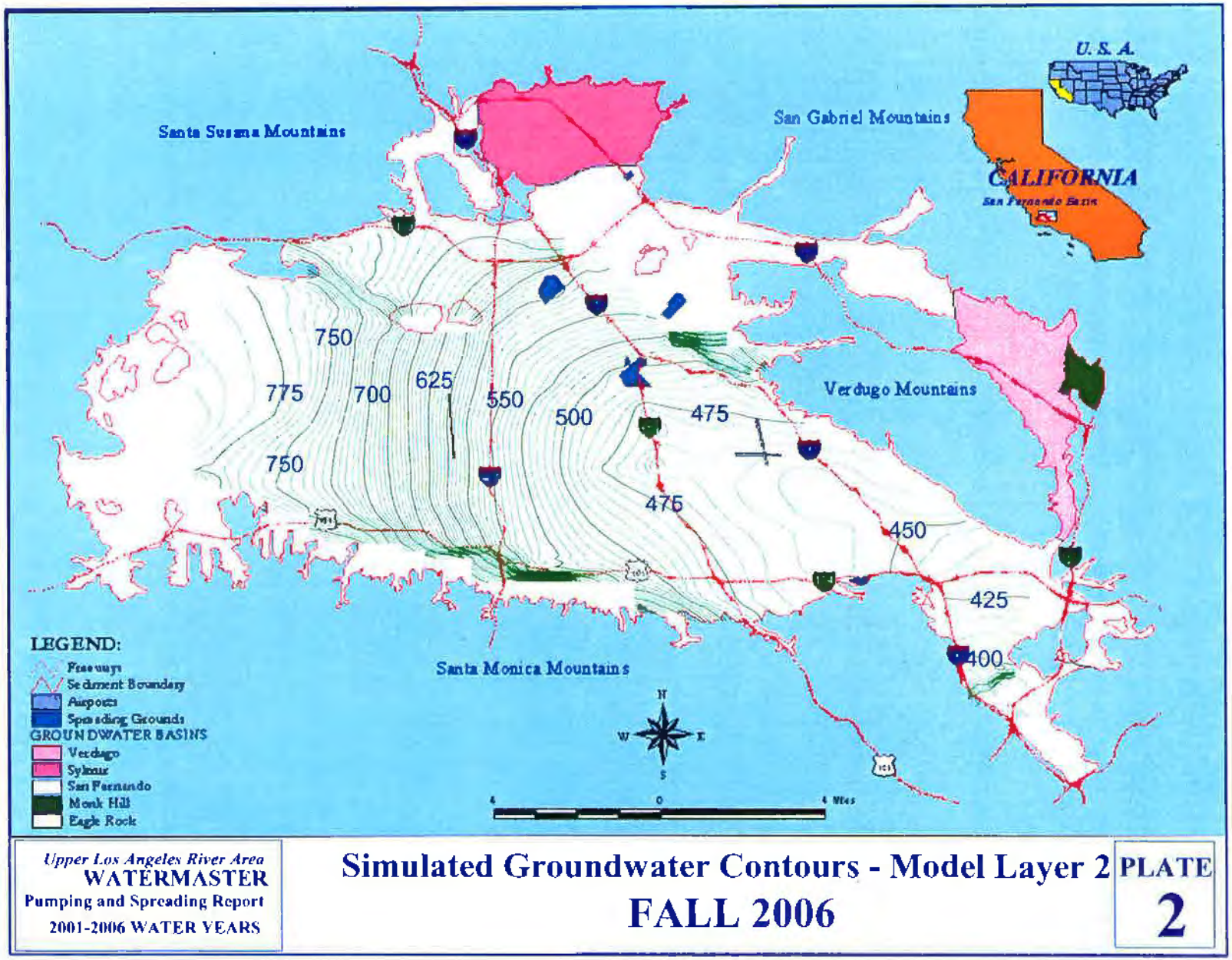
PLATES



Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
2001-2006 WATER YEARS

Simulated Groundwater Contours - Model Layer 1
FALL 2006

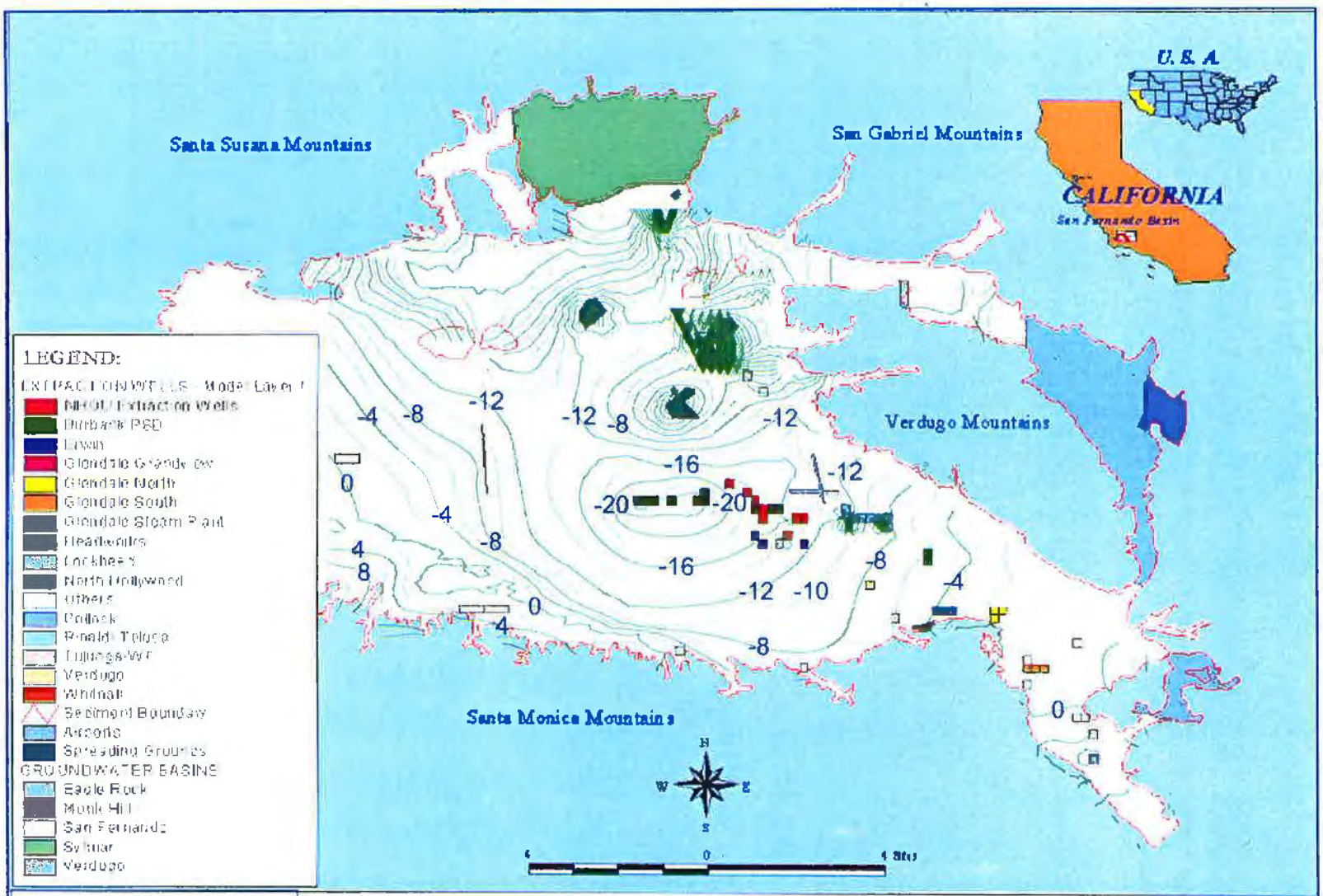
PLATE 1



Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
2001-2006 WATER YEARS

Simulated Groundwater Contours - Model Layer 2
FALL 2006

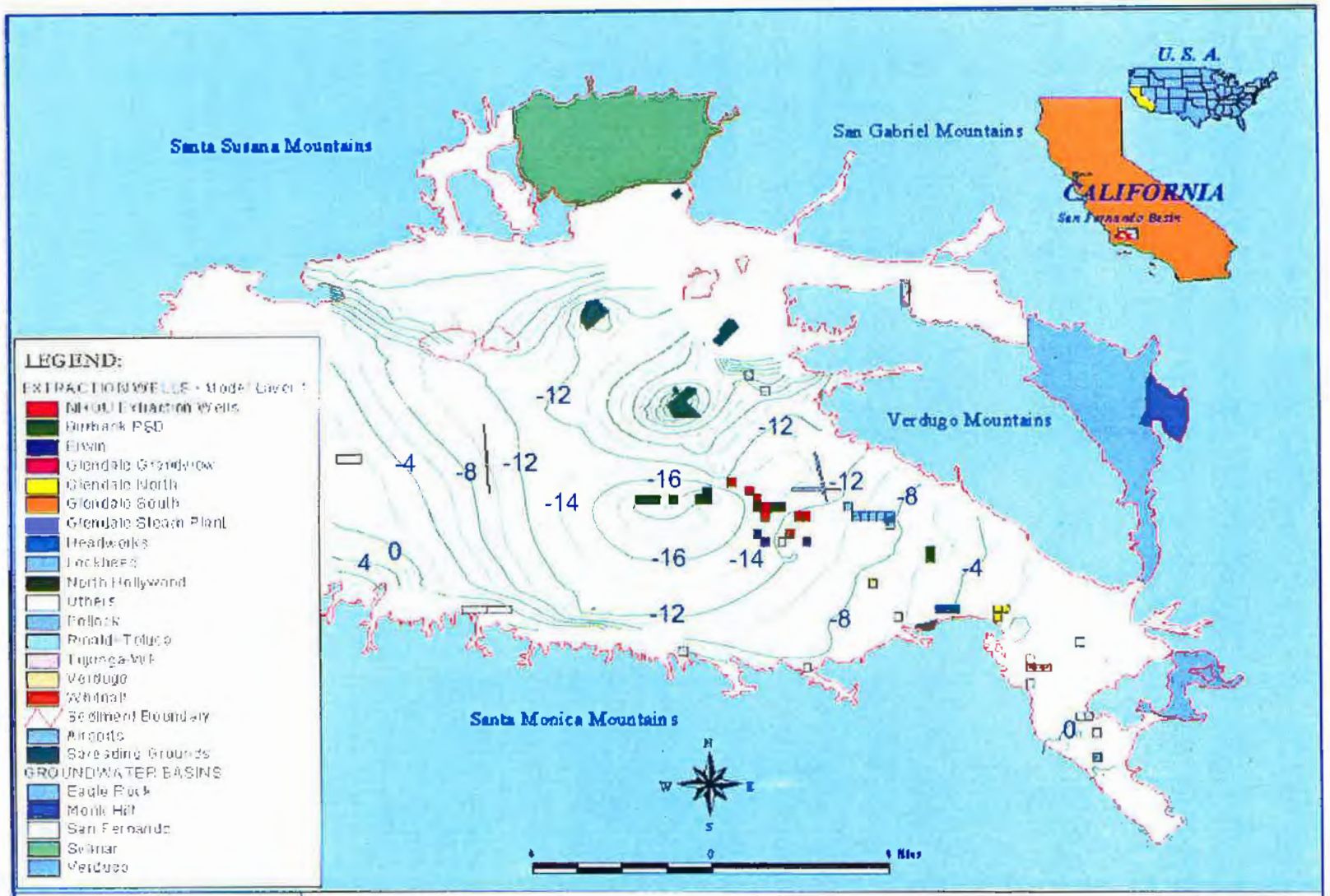
PLATE 2



Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
2001-2006 WATER YEARS

Change in Groundwater Elevation - Model Layer 1
Fall 2001 - Fall 2006

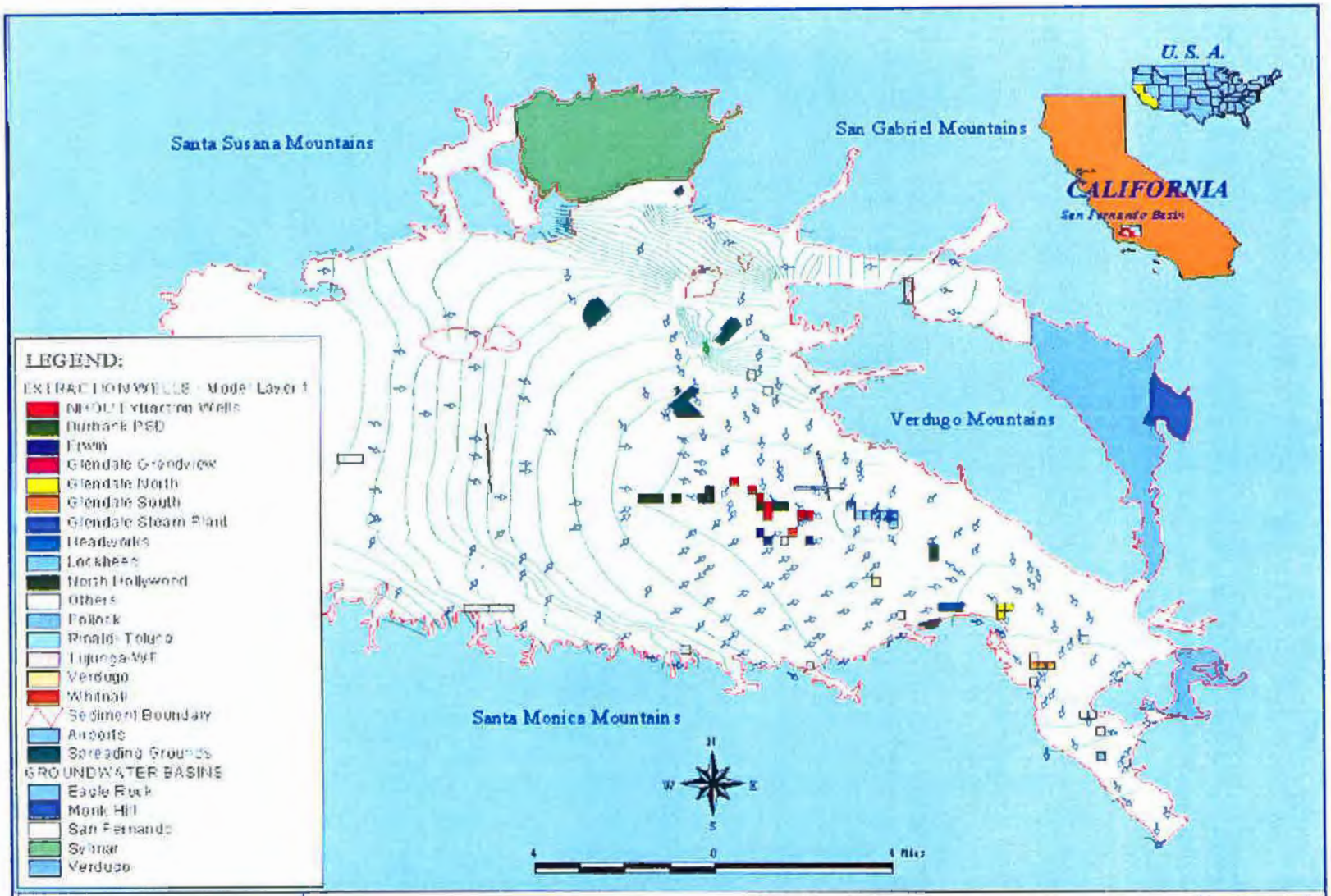
PLATE
3



Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
2001-2006 WATER YEARS

Change in Groundwater Elevation - Model Layer 2
Fall 2001 - Fall 2006

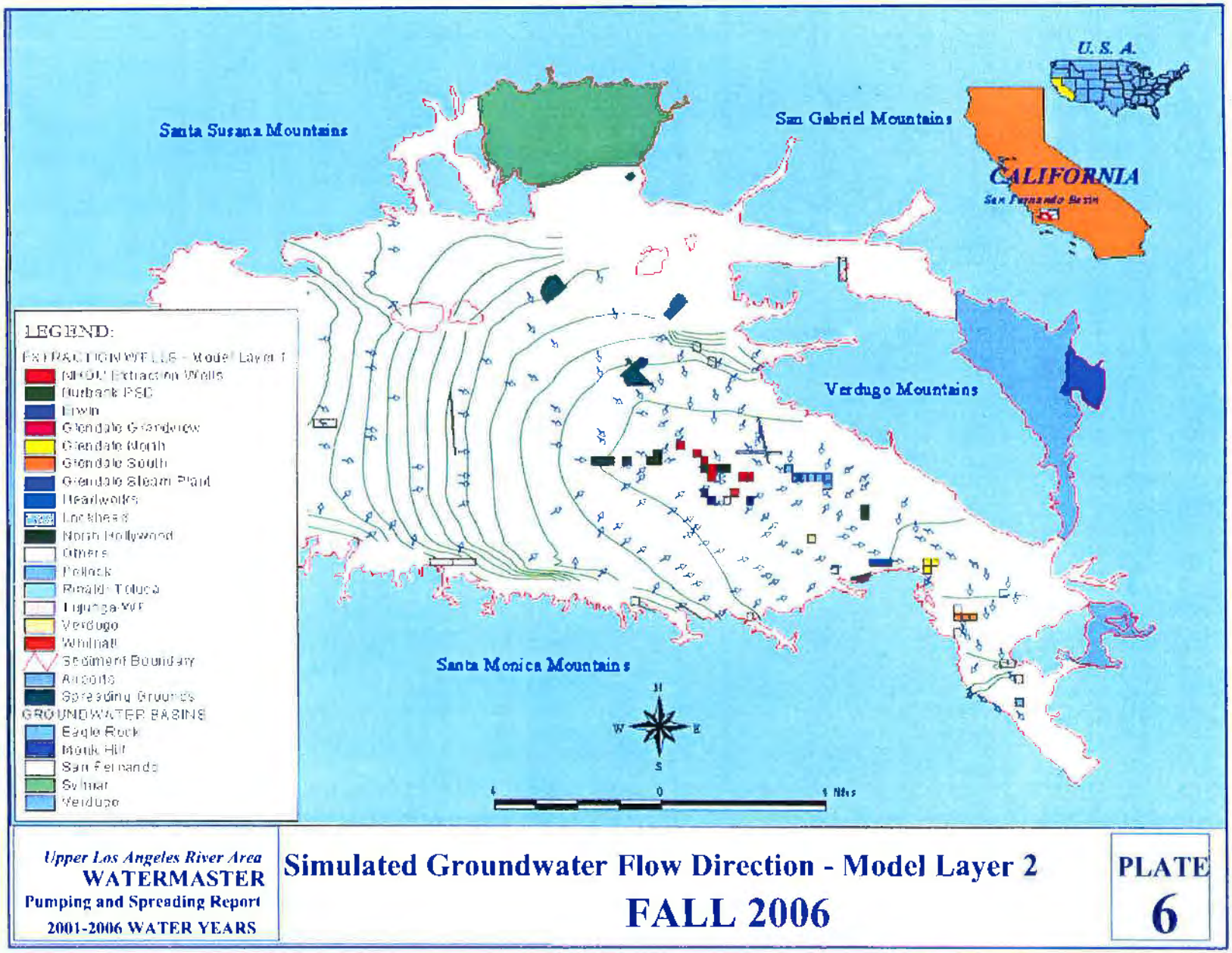
PLATE 4



Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
2001-2006 WATER YEARS

Simulated Groundwater Flow Direction - Model Layer 1
FALL 2006

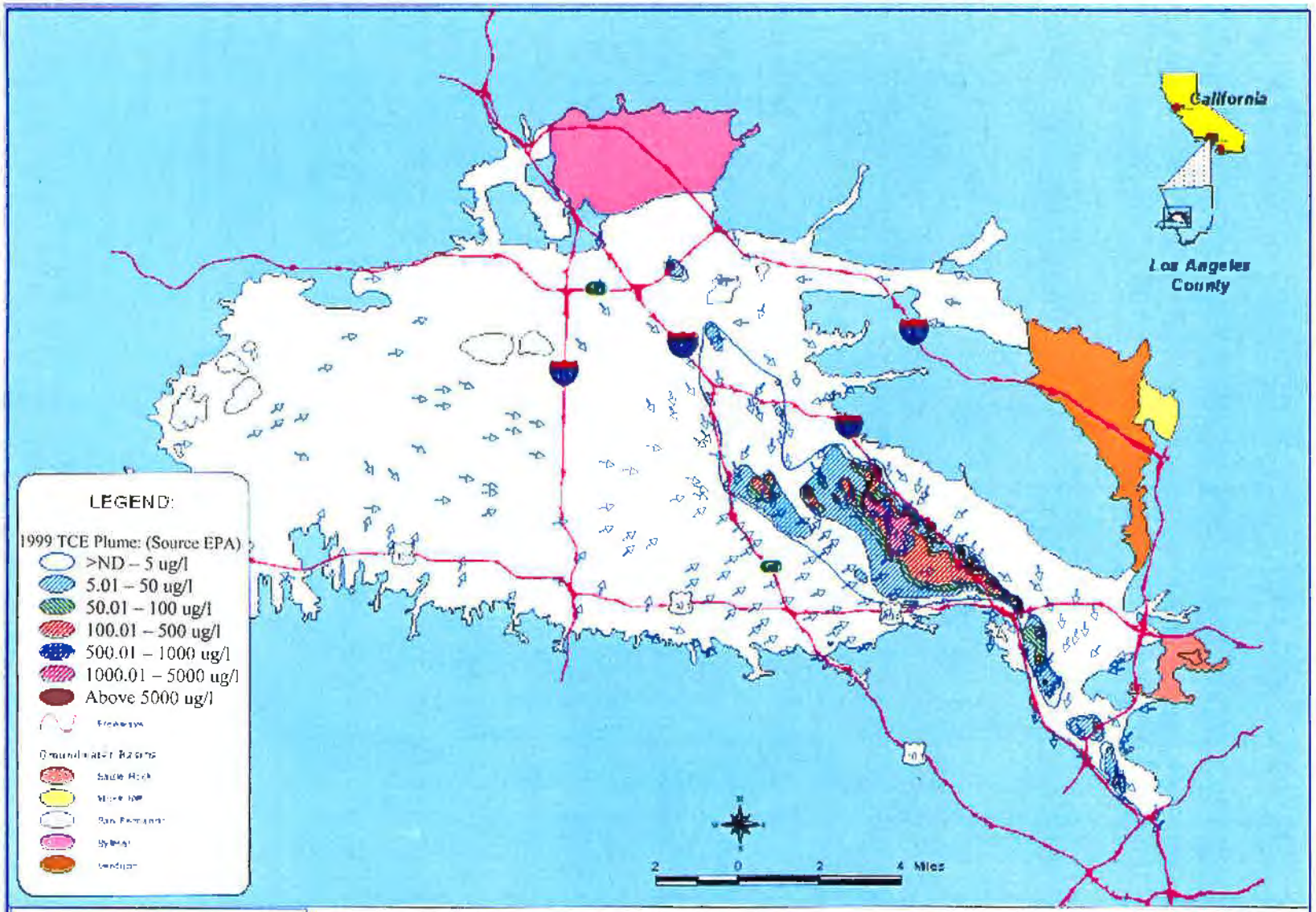
PLATE
5



Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
2001-2006 WATER YEARS

Simulated Groundwater Flow Direction - Model Layer 2
FALL 2006

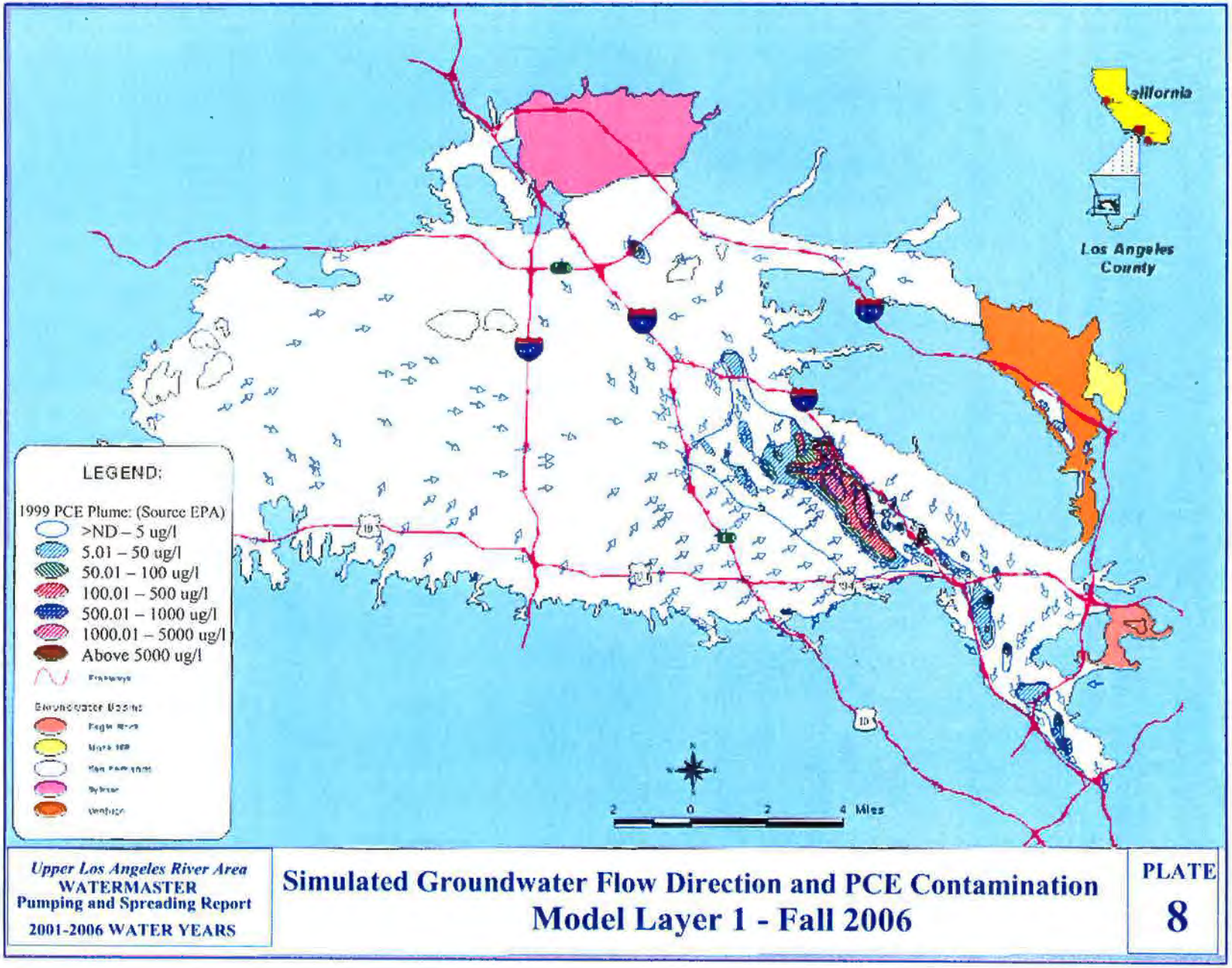
PLATE
6



Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
2001-2006 WATER YEARS

Simulated Groundwater Flow Direction and TCE Contamination Model Layer 1 - Fall 2006

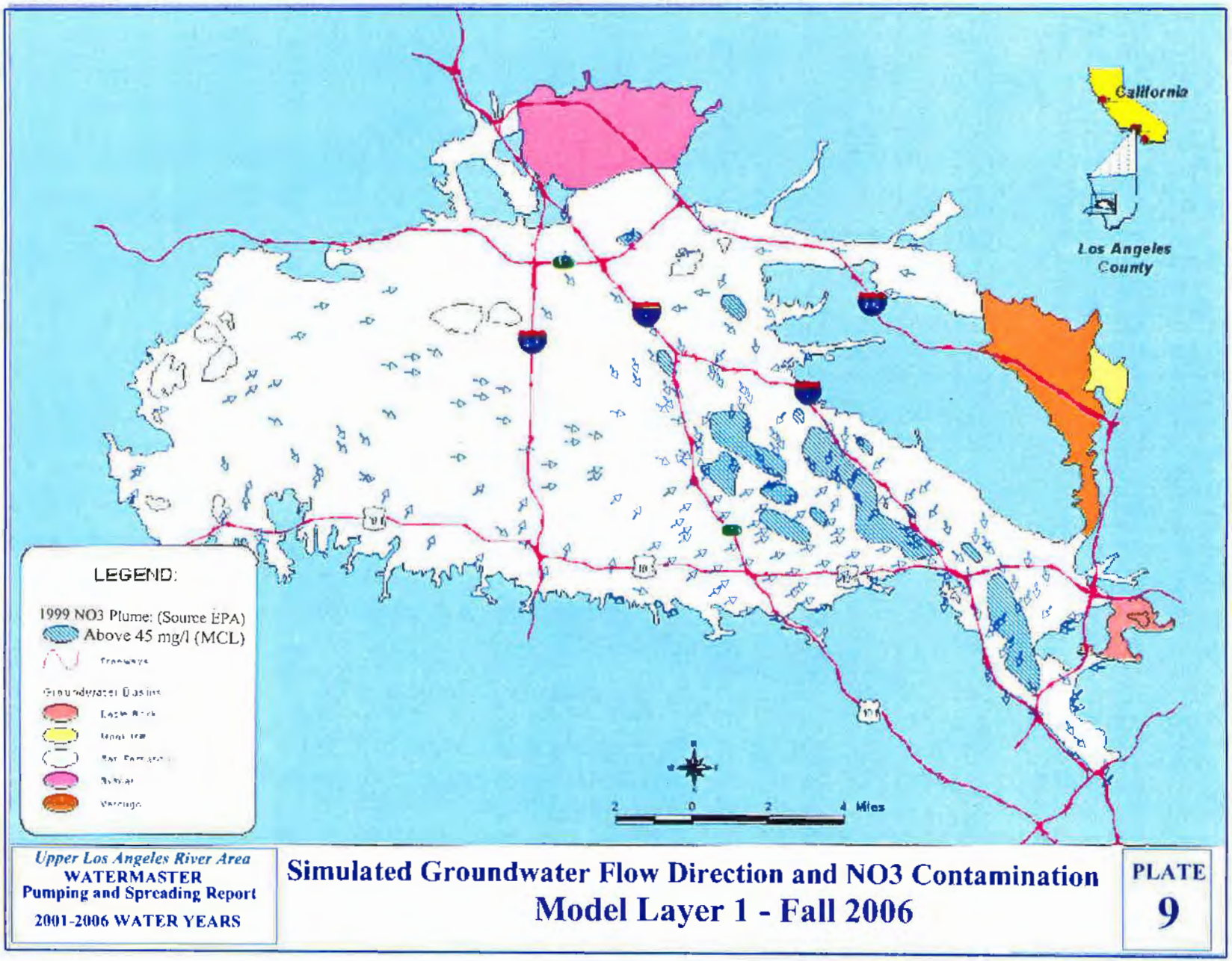
PLATE 7



Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
2001-2006 WATER YEARS

Simulated Groundwater Flow Direction and PCE Contamination Model Layer 1 - Fall 2006

PLATE
8



Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
2001-2006 WATER YEARS

Simulated Groundwater Flow Direction and NO3 Contamination Model Layer 1 - Fall 2006

PLATE
9

APPENDIX A

CITY OF LOS ANGELES

PUMPING AND SPREADING PLAN

2001-2006 Water Years

CITY OF LOS ANGELES
GROUNDWATER PUMPING AND SPREADING PLAN
IN THE UPPER LOS ANGELES RIVER AREA
FOR THE 2001-2006 WATER YEARS

APRIL 2002

Prepared by:
City Groundwater Group
Water Resources Section
WATER RESOURCES BUSINESS UNIT
Los Angeles Department of Water and Power

TABLE OF CONTENTS

Introduction

The water rights in the Upper Los Angeles River Area (ULARA) were set forth in a Final Judgment, entered on January 26, 1979, ending litigation that lasted over 20 years. The ULARA Watermaster's Policies and Procedures give a summary of the decreed extraction rights within ULARA, together with a detailed statement describing the ULARA Administrative Committee operations, reports to and by the Watermaster and necessary measuring tests and inspection programs. The ULARA Policies and Procedures have been revised several times since the original issuance, to reflect current groundwater management thinking.

In Section 5.4 of the ULARA Policies and Procedures as amended in February 1998, it is stated that:

> *"...all parties or non-parties who pump groundwater are required to submit annual reports by May 1 to the Watermaster that include the following:*
>
> - *A 5-year projection of annual groundwater pumping rates and volumes.*
> - *A 5-year projection annual spreading rates and volumes.*
> - *The most recent water quality data for each well."*

This report constitutes Los Angeles' 2002 Groundwater Pumping and Spreading Plan for the Water Years 2001 - 2006.

Section 1: Facilities Description

This section describes facilities that influence groundwater conditions in ULARA and relate to Los Angeles.

a. Spreading Grounds: There are six spreading ground facilities that can be used for groundwater recharge of native water in ULARA. The Los Angeles County Department of Public Works (LACDPW) operates the Branford, Hansen, Lopez, and Pacoima spreading grounds; the City of Los Angeles Department of Water and Power (LADWP) operates the Headworks Spreading Grounds. LACDPW and LADWP operate the Tujunga Spreading Grounds cooperatively. Estimated capacities for these are shown in Table 1-1 and their locations are shown in Figure 1-1.

Table 1-1

Estimates Capacities of ULARA Spreading Grounds			
Spreading Ground	Type	Total wetted area [ac]	Capacity [ac-ft/yr.]
Operated by LACDPW			
Branford	Deep basin	7	1,000
Hansen	Shallow basins	105	36,000
Lopez	Shallow basins	12	5,000
Pacoima	Med. depth basins	107	29,000
Operated by LADWP			
Headworks	Shallow basins	28	11,000
Operated by LACDPW and LADWP			
Tujunga	Shallow basins	83	43,000
TOTAL:			125,000

b. Extraction Wells: The LADWP has nine well fields in the San Fernando Basin, and one in the Sylmar Basin. The well fields are shown in Figure 1-1, and their rated capacities are shown in Table 1-2. The rated capacities are approximate as operating capacities vary depending on the water levels. Actual groundwater pumping is dependent on maintenance schedules and water quality for each well.

Table 1-2

Rated Capacities of LADWP Well Fields in ULARA				
Well Field	Number of Wells			Rated Capacity of All Wells (cfs)
San Fernando Basin	Active	Stand-by	Total	cfs
Aeration	7	---	7	4
Crystal Springs (A)	—	---	—	---
Erwin	2	3	5	10
Headworks			—	—
North Hollywood	21	8	29	129
Pollock	2	1	3	10
Rinaldi-Toluca	15	---	15	117
Tujunga	12	---	12	107
Verdugo	3	2	5	12
Whitnall	4	1	5	20
Sylmar Basin				
Mission	3	---	3	9
TOTALS	69	15	84	418

(A) Wellfield has been abandoned pursuant to sale of property to DreamWorks, Inc.

c. Groundwater Treatment Facilities: The LADWP operates two groundwater treatment facilities. Water treated at these facilities is delivered to the water distribution system for consumption

North Hollywood Groundwater Treatment Facility: This plant was placed into service in December 1989 to treat up to 2,000 gpm of groundwater to remove VOCs by using aeration with granular activated carbon (GAC) for off-gas treatment. This facility is a part of the North Hollywood Operable Unit (NHOU) that also includes a system of shallow wells. The NHOU is financed, in part, by the U.S. Environmental Protection Agency.

Pollock Wells Treatment Plant: This plant was placed into service in March 1999 to remove VOCs from the groundwater at a rate up to 3,000 gpm from the Pollock Well Field. The facility features the use of liquid-phase GAC, restores the use of Pollock Wells, and addresses the excessive rising groundwater discharges from the San Fernando Basin into the Los Angeles River.

In addition, the LADWP has the North Hollywood Advanced Oxidation process (AOP) Demonstration Project that features the use of ozone and hydrogen peroxide to remove VOCs

from the groundwater at a rate of upto 4,000 gpm. This demonstration facility is not currently in operation.

Section 2: Annual Pumping And Spreading Projections

a. Pumping Projections for the 2001-2006 Water Year: The City of Los Angeles has the following three sources of water supply: 1. Los Angeles Aqueduct supply imported from the Owens Valley/Mono Basin area, 2. Local groundwater supply from the Central, San Fernando, and Sylmar Basins, 3. Purchased water from the Metropolitan Water District of Southern California (MWD). The MWD sources of supply are the State Water Project and the Colorado River Aqueduct. Use of San Fernando Basin groundwater can fluctuate annually depending on the availability of imported water which varies due to climatic and operational constraints.

The San Fernando Basin and Sylmar Basin provide most of the City's local groundwater supply. The City of Los Angeles has the following average annual water rights which comprise approximately 15% of the City's supply:

San Fernando Basin	87,000 AF
Sylmar Basin	3,600 AF

Table 2-1 shows the amount of groundwater extractions that are expected during the 2001-02 Water Year from the San Fernando and Sylmar Basins. Appendix B provides groundwater extraction projections from 2001 to 2006. These projections are based upon assumed demand and Los Angeles Aqueduct flows and are subject to yearly adjustments.

Section 3: Water Quality Monitoring Program Description

All of LADWP's 69 active wells in ULARA are monitored in conformance with the requirements set forth in Title 22, California Code of Regulations. For all active wells, monitoring is required whether the well is in production or not. State regulations require the following types of monitoring regimens:

1. Inorganic compounds
2. Organic compounds
3. Phase II and V Initial monitoring
4. Radiological compounds
5. Quarterly organics compounds

Each well, whether on active or standby status, is monitored every three years for a full range of inorganic and organic compounds. Phase II and V Initial monitoring involves analysis for newly regulated organic compounds at all wells. Each well must be sampled for four consecutive quarters within a three-year period. Quarterly organics compounds analysis monitoring are performed four times a year for each well where organic compounds have been detected. A complete list of the parameters that must be tested for is contained in Title 22 of the California Code of Regulations. Appendix A provides a recent report for TCE, PCE, and nitrates in Los Angeles' San Fernando and Sylmar Basins wells.

Section 4: Groundwater Treatment Facilities Operations Summary

North Hollywood Operable Unit (NHOU): The NHOU Aeration Tower was out of service from October 4, 2001 to December17, 2001 due to electrical problems and also to a break in a chlorine vacuum line caused by nearby construction. In March 2002 the Aeration Tower was shut down for a week to change out the granular activated carbon. A power bump due to high winds caused a loss of power to the aeration wells and required a brief shut down of the tower in mid March.

	Aeration Well No.							Average Flow to Facility	Influent to Facility TCE/PCE	Effluent from Facility TCE/PCE
Mon/Yr	2	3	4	5	6	7	8	(gpm)	(ug/L)	(ug/L)
4/01	---	227	---	353	255	279	302	1021	44.4/17.9	<0.5/<0.5
5/01	---	---	---	96	263	285	309	941	61.3/18.2	<0.5/<0.5
6/01	---	---	---	66	261	285	308	1042	88.4/15.6	<0.5/<0.5
7/01	141	253	221	59	260	281	305	1434	76.4/15.4	1.3/<0.5
8/01	136	226	224	69	257	276	299	1142	61.2/13.0	<0.5/<0.5
9/01	109	210	291	75	259	275	297	1064	69.0/14.3	0.7/<0.5
10/01	145	169	173	60	258	274	299	1389	---	---
11/01	---	---	---	---	---	---	---	0	----	---
12/01	---	231	---	75	258	275	296	862	78.3/12.4	<0.5/<0.5
1/02	---	206	258	70	165	275	294	1168	66/14.4	0.9/<0.5
2/02	---	209	258	67	258	272	292	1239	58.8/12.7	0.6/<0.5
3/02	109	199	258	59	258	270	291	1104	68.9/13.1	0.7/<0.5

Section 5: Plans For Facilities Modifications

This section describes any plans for modifications to existing facilities, or plans to construct new facilities in the 2001-2002 Water Year, as of the printing of this report (April 2002).

a. Spreading Grounds:. LADWP plans to restore the full groundwater recharge capacity of the Tujunga Spreading Grounds by developing and implementing a mitigation action plan to control the methane gas migration from Sheldon-Arleta Landfill to the local neighborhood as a result of recharge. LADWP is investigating the possibility of developing a multi-objective project to restore the recharge activity of the Headworks Spreading Grounds while incorporating other compatible uses including passive recreation.

b. Extraction Wells: LADWP is planning to add up to four new North Hollywood Wells in the west branch to restore diminished capacity resulting from contamination and obsolescence of some existing wells.

c. Groundwater Treatment Facilities:

Headworks Well Field Remediation. The Headworks Well Field was taken out of service in the mid 1980s due to contamination by TCE and PCE. LADWP submitted to the California Department of Health Services (DHS) the Source Water Assessment and the Raw Water Characterization elements of DHS Policy 97-005 for the Headworks Well Field Remediation Project. In reviewing the submittals, DHS has indicated that the recently established State Action level for 1,2,3 trichloropropane of 5 parts-per-trillion and the presence of this compound within the ten-year capture zone of the Headworks Project would require additional treatment than that already planned As a result, LADPW has suspended activity on the Headworks Project to evaluate other options to ensure that maximum inflows can be restored to the Silver Lake Reservoir service area.

East Valley Water Recycling Project. The LADWP has stopped work on the groundwater recharge portion of this project to focus on direct non-potable (irrigation, industrial, commercial) use of the recycled water supply. Tertiary treated recycled water from the Donald C. Tillman Water Reclamation Plant will be used, but only for non-potable projects. The Hansen Area

Water Recycling Project Phase I, scheduled to be on line by early 2004, will use some of the recycled water for cooling towers at the Valley Generating Station. The Hansen Area Water Recycling Project Phase II that is being planned to deliver recycled water to the proposed Canyon Trails Golf Club and the Hansen Dam Recreation Area. Other areas that will benefit from recycled water include irrigation projects in the West Valley and the Sepulveda Basin.

APPENDIX A:
2001-2002 Water Quality Sampling Results

ULARA WELLS

Number	Owner Name	Well Name	Well	Date	PCE	TCE	NO3
1	NHE-1	3800E	NH AERATION WELL-001	6/17/98	3.66	240.00	
2	NHE-2	3810U	NH AERATION WELL-002	1/23/02	7.17	362.00	51.80
3	NHE-3	3810V	NH AERATION WELL-003	1/23/02	7.33	30.50	37.60
4	NHE-4	3810W	NH AERATION WELL-004	1/23/02	18.50	57.60	43.30
5	NHE-5	3820H	NH AERATION WELL-005	1/23/02	39.00	29.90	47.80
6	NHE-6	3821J	NH AERATION WELL-006	1/23/02	9.51	16.50	26.40
7	NHE-7	3830P	NH AERATION WELL-007	1/23/02	9.25	202.00	36.80
8	NHE-8	3831K	NH AERATION WELL-008	1/23/02	15.50	27.40	47.00
9	EW-1	3831H	ERWIN-001	10/22/97	0.72	-99.00	
10	EW-2	3821G	ERWIN-002	5/4/95	4.30	13.20	
11	EW-3	3831G	ERWIN-003	7/30/96	1.40	24.00	14.66
12	EW-4	3821F	ERWIN-004	4/7/97	0.60	8.10	4.43
13	EW-6	3821H	ERWIN-006	11/7/00	-99.00	-99.00	27.00
14	EW-10	3811F	ERWIN-010	1/20/02	-99.00	-99.00	11.43
15	M-5	4840J	MISSION-005	1/30/02	-99.00	5.50	35.24
16	M-6	4840K	MISSION-006	2/22/01	-99.00	-99.00	8.69
17	M-7	4840S	MISSION-007	1/30/02	-99.00	-99.00	13.59
18	NH-02	3800	NORTH HOLLYWOOD-002	9/28/99	5.06	38.50	32.40
19	NH-04	3780A	NORTH HOLLYWOOD-004	1/17/02	-99.00	-99.00	8.15
20	NH-07	3770	NORTH HOLLYWOOD-007	1/23/02	-99.00	-99.00	13.40
21	NH-11	3810	NORTH HOLLYWOOD-011	11/15/01	7.48	13.20	24.52
22	NH-15	3790B	NORTH HOLLYWOOD-015				
23	NH-16	3820D	NORTH HOLLYWOOD-016	5/23/96	12.60	2.70	16.30
24	NH-17	3820C	NORTH HOLLYWOOD-017	12/9/97	6.16	1.65	11.92
25	NH-18	3820B	NORTH HOLLYWOOD-018	11/10/99	8.18	83.70	36.90
26	NH-20	3830C	NORTH HOLLYWOOD-020	7/21/99	3.00	9.58	39.50
27	NH-21	3830B	NORTH HOLLYWOOD-021	3/23/01			10.94
28	NH-22	3790C	NORTH HOLLYWOOD-022	1/25/02	-99.00	-99.00	20.42
29	NH-23	3790D	NORTH HOLLYWOOD-023	12/6/00	-99.00	-99.00	28.85
30	NH-25	3790F	NORTH HOLLYWOOD-025	2/6/01	-99.00	-99.00	10.94
31	NH-26	3790E	NORTH HOLLYWOOD-026	11/17/00	12.40	19.60	30.78
32	NH-27	3820F	NORTH HOLLYWOOD-027	3/23/01	-99.00	-99.00	14.40
33	NH-28	3810K	NORTH HOLLYWOOD-028	11/15/01	7.77	20.20	23.49
34	NH-30	3800D	NORTH HOLLYWOOD-030	10/18/01			28.71
35	NH-32	3770C	NORTH HOLLYWOOD-032	1/17/02	-99.00	-99.00	4.17
36	NH-33	3780C	NORTH HOLLYWOOD-033	1/17/02	-99.00	-99.00	4.20
37	NH-34	3790G	NORTH HOLLYWOOD-034	1/15/02	-99.00	1.18	13.02
38	NH-35	3830N	NORTH HOLLYWOOD-035	11/15/01	2.81	1.22	10.40
39	NH-36	3790H	NORTH HOLLYWOOD-036	1/15/02	-99.00	1.24	17.99
40	NH-37	3790J	NORTH HOLLYWOOD-037	1/15/02	0.77	1.33	14.00
41	NH-38	3810M	NORTH HOLLYWOOD-038				
42	NH-39	3810N	NORTH HOLLYWOOD-039				
43	NH-40	3810P	NORTH HOLLYWOOD-040	1/15/02	1.93	1.43	11.00
44	NH-41	3810Q	NORTH HOLLYWOOD-041	5/8/01	5.63	47.20	14.13
45	NH-42	3810R	NORTH HOLLYWOOD-042	5/12/99	5.73	88.50	24.50
46	NH-43A	3790K	NORTH HOLLYWOOD-043A	5/11/00	-99.00	-99.00	4.55
47	NH-44	3790L	NORTH HOLLYWOOD-044	1/15/02	-99.00	-99.00	10.14

NOTE: -99 = non-detect

--- = not tested (refer to p.8)

= above MCL

Number	Owner Name	Well Name	Well	Date	PCE	TCE	NO3
48	NH-45	3790M	NORTH HOLLYWOOD-045	1/15/02	0.67	0.84	15.15
49	P-4	3959E	POLLOCK-004	1/31/02	4.70	8.36	37.00
50	P-6	3958H	POLLOCK-006	1/31/02	11.00	13.80	42.53
51	P-7	3958J	POLLOCK-007	7/26/01			32.90
52	RT-1	4909E	RINALDI-TOLUCA-001	7/6/00	-99.00	-99.00	9.90
53	RT-2	4898A	RINALDI-TOLUCA-002	8/9/00	-99.00	-99.00	23.27
54	RT-3	4898B	RINALDI-TOLUCA-003	1/4/02	-99.00	-99.00	21.06
55	RT-4	4898C	RINALDI-TOLUCA-004	4/5/01	-99.00	-99.00	
56	RT-5	4898D	RINALDI-TOLUCA-005	7/6/00	-99.00	-99.00	12.51
57	RT-6	4898E	RINALDI-TOLUCA-006	1/11/02	-99.00	-99.00	14.58
58	RT-7	4898F	RINALDI-TOLUCA-007	1/4/02	-99.00	0.95	18.61
59	RT-8	4898G	RINALDI-TOLUCA-008	1/11/02	-99.00	-99.00	14.22
60	RT-9	4898H	RINALDI-TOLUCA-009	1/11/02	-99.00	-99.00	43.33
61	RT-10	4909G	RINALDI-TOLUCA-010	1/22/02	1.91	5.42	23.67
62	RT-11	4909K	RINALDI-TOLUCA-011	6/7/01	-99.00	2.40	
63	RT-12	4909H	RINALDI-TOLUCA-012	1/10/02	-99.00	1.08	16.20
64	RT-13	4909J	RINALDI-TOLUCA-013	1/10/02	-99.00	1.96	21.11
65	RT-14	4909L	RINALDI-TOLUCA-014	1/10/02	0.51	3.48	14.58
66	RT-15	4909M	RINALDI-TOLUCA-015	1/10/02	-99.00	2.42	11.34
67	TJ-01	4887C	TUJUNGA-001	1/10/02	-99.00	-99.00	23.04
68	TJ-02	4887D	TUJUNGA-002	1/10/02	-99.00	-99.00	19.45
69	TJ-03	4887E	TUJUNGA-003	11/16/01	-99.00	0.70	19.62
70	TJ-04	4887F	TUJUNGA-004	11/16/01	1.32	5.96	28.08
71	TJ-05	4887G	TUJUNGA-005	1/25/02	-99.00	1.26	24.32
72	TJ-06	4887H	TUJUNGA-006	1/10/02	0.56	2.91	25.47
73	TJ-07	4887J	TUJUNGA-007	1/10/02	0.91	6.33	36.46
74	TJ-08	4887K	TUJUNGA-008	1/11/02	0.77	6.84	38.05
75	TJ-09	4886B	TUJUNGA-009	1/22/02	6.49	13.40	12.85
76	TJ-10	4886C	TUJUNGA-010	1/11/02	0.92	5.00	29.59
77	TJ-11	4886D	TUJUNGA-011	1/11/02	1.09	11.50	27.29
78	TJ-12	4886E	TUJUNGA-012	1/11/02	-99.00	1.83	16.20
79	V-1	3863H	VERDUGO-001	1/31/01	0.63	10.90	33.75
80	V-2	3863P	VERDUGO-002	9/26/01	0.72	17.10	41.58
80	V-2	3853F	VERDUGO-002	8/18/98	-99.00	33.00	
81	V-4	3863J	VERDUGO-004	1/13/98	6.47	17.90	1.92
82	V-11	3863L	VERDUGO-011	1/15/02	-99.00	2.77	13.47
83	V-13	3853G	VERDUGO-013				
84	V-24	3844R	VERDUGO-024	1/15/02	-99.00	-99.00	6.02
85	WH-4	3821D	WHITNALL-004	5/18/00	4.22	15.10	
86	WH-5	3821E	WHITNALL-005	1/25/02	3.20	12.60	25.56
87	WH-6A	3831J	WHITNALL-006A	1/17/02	0.74	3.11	7.62
88	WH-7	3832K	WHITNALL-007	1/25/02	1.28	10.10	15.99
89	WH-8	3832L	WHITNALL-008	10/22/96	4.60	10.20	
90	WH-9	3832M	WHITNALL-009				

NOTE: -99 = non-detect

- - - = not tested (refer to p.8)

= above MCL

APPENDIX B:
Groundwater Extraction Projections 2001-2006

PROJECTED PUMPING BY THE CITY OF LOS ANGELES FROM THE SAN FERNANDO AND SYLMAR BASINS FOR THE NEXT 5 YEARS (IN ACRE-FEET)

SAN FERNANDO BASIN (SFB) WELL FIELDS	WATER YEAR				
	2001-02	2002-03	2003-04	2004-05	2005-06
AERATION	1,773	2,390	2,390	2,390	2,390
ERWIN	860	994	994	994	994
HEADWORKS	0	0	0	0	0
NO HOLLYWOOD	21,369	21,647	25,276	25,276	25,276
POLLOCK	1,981	3,600	2,400	2,400	2,400
RINALDI-TOLUCA	28,422	25,108	25,900	25,900	25,900
TUJUNGA	25,818	25,272	22,179	27,179	22,179
VERDUGO	4,623	5,261	5,261	5,261	5,261
WHITNALL	2,738	2,728	2,600	2,600	2,600
TOTAL SFB ACRE-FEET	87,583	87,000	87,000	92,000	87,000

Sylmar Basin	1,518	3,323	3,300	3,300	3,300

APPENDIX B

CITY OF BURBANK

PUMPING AND SPREADING PLAN

2001-2006 Water Years

GROUNDWATER PUMPING
AND
SPREADING PLAN

WATER YEARS
OCTOBER 1, 2001 TO SEPTEMBER 30, 2006

Prepared by

BURBANK WATER AND POWER
WATER DIVISION

May 2002

TABLE OF CONTENTS

TABLES

FIGURE

APPENDICES

I. INTRODUCTION

The groundwater rights of the City of Burbank are defined by the JUDGEMENT in Superior Court Case No. 650079, entitled "The City of Los Angeles, a Municipal Corporation, Plaintiff, vs. City of San Fernando, et. al., Defendants". The Final Judgement was signed on January 26, 1979.

In 1993, significant revisions were made to the Upper Los Angeles River Area (ULARA) Policies and Procedures with the addition of Section 2.9, Groundwater Quality Management. This addition has been made by the Watermaster and the Administrative Committee to affirm its commitments to participate in the cleanup and limiting the spread of contamination in the San Fernando Valley. This report is in response to Section 2.9.4, Groundwater Pumping and Spreading Plan.

The Groundwater Pumping and Spreading Plan is based on the water year, October 1 to September 30. The Draft Plan for Burbank will be submitted in May to the Watermaster for the current water year.

II. WATER DEMAND

The annual total water demand for the last ten years and the projected annual water demand for the next five years are shown in Table 2.1.

Water demand during 1990 to 1993 was affected by drought conditions in California. The City of Burbank imposed mandatory conservation from April 1991 to April 1992. Voluntary conservation was in effect prior to, and since, this period. Significant "hard conservation" in the form of retrofit showerheads and ultra-low flush toilet installations has been made.

Projected water demands for the next five years are expected to increase only slightly from the 1989-90 base year. The increase is not from residential growth, but as a rebound from the drought conditions and re-establishment of commercial-industrial demand. The projected water demand may vary significantly due to weather and/or economic conditions in the Burbank area. A variance of ±5% may be expected.

III. WATER SUPPLY

The water supply for the City of Burbank is composed of purchased water from the Metropolitan Water District of Southern California (MWD), locally produced and treated groundwater, and reclaimed water from the Burbank Water Reclamation Plant.

A. MWD

The amount of treated water purchased from the MWD has been reduced as the result of bringing several water resource projects on-line. Burbank may purchase additional quantities of untreated water for basin replenishment. See Section IV. Historic and projected use of MWD water is shown in Table 3.1.

B. GAC TREATMENT PLANT

The City placed a granular activated carbon (GAC) Treatment Plant in service in November 1992. Historic and proposed production from this plant is shown in Table 3.2. The GAC Treatment Plant will normally be operated during the summer season from May to October. However, current plans are to keep the plant shut down, except for emergencies, until July 2004 or later because of chromium concerns. At that time, the system may be used to produce water for the Magnolia Power Project. New chromium regulations due in 2004-05 will lead to decisions on the future use of the water. When the plant is operated, shutdowns for carbon change-out can be expected every two months. Mechanical maintenance will be performed when the plant is out of service during the winter season. The GAC Treatment Plant uses the groundwater produced from Well No. 7 and Well No. 15. The plant capacity is 2,000 gpm. Lockheed Martin has arranged to utilize the capacity of the GAC Treatment Plant to augment the production of the Burbank Operable Unit (BOU) to reach the required annual average of 9,000 gpm. Lockheed Martin will pay a share of the operation and maintenance cost of the GAC in proportion with the volume of water which is credited toward the 9,000 gpm.

C. EPA CONSENT DECREE

The EPA Consent Decree Project became operational January 3, 1996. The source of water is wells VO-1 through VO-8. The Second Consent Decree was entered on June 22, 1998. The plant was out of service from December 15, 1997 to December 13, 1998. The plant capacity is 9,000 gpm. Projected use of EPA Consent Decree water produced by the BOU is shown in Table 3.3.

D. RECLAIMED WATER

The City has used reclaimed water for its power plant cooling since 1967. An expansion of the reclaimed water system was completed in 1996. Historic and proposed use of reclaimed water is shown in Table 3.4.

E. PRODUCTION WELLS

The City has five wells that are mechanically and electrically operable, plus the eight wells of the BOU. Two wells are on "Active" status and three are on "Inactive" status with the Department of Health Services (DHS). Four others have had equipment pulled. We do not plan to operate the inactive wells unless an emergency develops in the 2001-2002 water year. Last year, the City had proposed using Wells 11A and 12 for the BOU (see Section V.A below).

Active Wells	Inactive Wells	Well Casings
No. 7 No. 15	No. 6A No. 13A No. 18*	No. 11A No. 12 No. 14A No. 17

*No transformer; cannot be operated.

IV. JUDGEMENT CONSIDERATIONS

A. PHYSICAL SOLUTION

The City has a physical solution right of 4,200 acre-feet per year in addition to its import return water extraction rights and use of stored water credits. The City will charge the following physical solution right holders for water used and claim the extractions against the City's rights:

Physical Solution Producers	
Valhalla	300 acre-feet
Lockheed Martin	25 acre-feet

Table 3.3 lists the extractions by Lockheed Martin. Table 4.1 lists the extractions by Valhalla.

Walt Disney Imagineering pumped groundwater for dewatering during construction of their Riverside office building. Extractions of 2,336 acre-feet were charged to Burbank's water for water year 1998-99.

B. STORED WATER CREDIT

The City has a stored water credit of 37,265 acre-feet as of October 1, 2001.

C. ALLOWANCE FOR PUMPING

The import return water extraction right (20 percent of water delivered the prior year) for the 2001-2002 water year is 5,124 acre-feet. This amount is exclusive of additional extractions allowed due to the City's stored water credits, physical solution right or pumping for groundwater clean-up.

Estimated allowable future pumping, based on 23,000 acre-feet of delivered water, will be 4,600 acre-feet per year.

D. SPREADING OPERATIONS

The City has purchased water for basin replenishment since 1989. The water has been typically spread at the Pacoima Spreading Grounds by L.A. County Public Works Department with the assistance of the Los Angeles Department of Water and Power (LADWP). The LADWP water pipelines to the Pacoima Spreading Ground were damaged during the 1994 Northridge earthquake. Replenishment water, beginning in water year 1994-95, has been taken "in lieu" through MWD service connection LA-35 at the L.A. Treatment Plant. The historic and projected spreading water is shown in Table 4.2.

V. CAPITAL IMPROVEMENTS

A. WELLS

Burbank: Burbank Water and Power (BWP) made a formal proposal to EPA on November 6, 2000 to substitute production from City Wells No. 11A and No. 12 for production from Well VO-1 in the BOU. The proposed substitution was intended to reduce the overall level of chromium in the Burbank water system as Well VO-1 has singularly high chromium levels among the BOU wells. The proposal has since been withdrawn. In January 2002, EPA approved a mode of operation using the existing wells and blending the output with MWD water to keep total chromium levels at 5 parts per billion.

We plan to continue the use of Wells No. 7 and No. 15 for the GAC Treatment Plant when it is operated.

Maintenance Activity- Well Nos. 17 and 18: Both of these wells are planned to be abandoned in accordance with County standards during Fiscal Year 2002-03. All above-ground equipment will be removed and the casings filled and sealed.

Burbank Operable Unit: Eight wells provide the production capability of the EPA Consent Decree Project. See Figure 5.1. The well field will normally produce 9,000 gpm. An additional well (VO-8/ Burbank No. 10) became operable on January 20, 1998.

B. GROUNDWATER TREATMENT FACILITIES

EPA Project: The EPA Consent Decree Project became fully operational on January 3, 1996. Production and treatment of 3,000 gpm to 8,000 gpm was performed through mid-September 1996.

The EPA Consent Decree Project was removed from production on December 15, 1997 for plant modifications required under the Second Consent Decree.

Due to problems in obtaining a new operating permit from DHS, the treatment plant did not resume operations until December 12, 1998. Only testing water was produced during the outage. Production from December 1998 through September 1999 increased from 5,000 gpm to 9,000 gpm as the plant came fully on-line.

In late June 2000, the treatment plant went off-line due to a breakthrough of 1,2,3- trichloropropane (TCP) in the plant effluent. The plant did not return to service until DHS had approved an operation and sampling plan and the carbon was changed out in the wet phase contactors. Well VO-6 was removed from service at that time because it had high concentrations of 1,2,3-TCP. The overall production of the BOU was also reduced at this time due to general mechanical problems in the BOU, including the air phase GAC screens, the wearing of well

pumps/motors and the failure of well level sensors. While these problems were being analyzed, Lockheed Martin invoked a "*force majeure*" provision of the Second Consent Decree in October 2001. EPA has ruled against the *force majeure* claim. Discussions continue between EPA and Lockheed Martin. Plans for 2002-03 include replacing distribution headers and underdrains in the liquid phase carbon contactors and replacing screens in the vapor phase contactors.

The City has taken responsibility, through its contractor, United Water Services, for full operation of the BOU as of March 12, 2001.

GAC Treatment Plant: Burbank does not plan to use the production and treatment facilities of the GAC Treatment Plant during the 2001-2002 water year. The plant will remain on an active status, but will not be operated except for emergencies.

TABLE 2.1
FIVE-YEAR PROJECTED WATER DEMAND

Water Year	Acre – Feet
91-92	20,930
92-93	21,839
93-94	24,175
94-95	22,541
95-96	23,124
96-97	24,888
97-98	22,447
98-99	22,671
99-00	26,313
00-01	25,619
01-02*	24,804
02-03*	25,932
03-04*	26,177
04-05*	29,824
05-06*	30,070

* Projected

NOTES:

(1) Water demand equals the total delivered water. [Extractions (GAC & EPA), MWD, Reclaimed, Valhalla].

(2) The last five year average water demand was 24,388 acre-feet.

TABLE 3.1
FIVE-YEAR PROJECTED USE OF MWD TREATED WATER

Water Year	Acre-Feet
91-92	18,830
92-93	18,005
93-94	18,074
94-95	17,173
95-96	12,937
96-97	10,525
97-98	16,972
98-99	10,536
99-00	10,471
00-01	12,447
01-02*	12,450
02-03*	12,892
03-04*	13,137
04-05*	13,384
05-06*	13,630

*Projected

NOTES:

(1) All values shown above are for treated water.

TABLE 3.2
FIVE-YEAR PROJECTED USE OF GAC TREATED GROUNDWATER

Water Year	Acre-Feet
92-93	1,205
93-94	2,395
94-95	2,590
95-96	2,295
96-97	1,620
97-98	1,348
98-99	1,542
99-00	1,086
00-01	987
01-02*	0
02-03*	0
03-04*	0
04-05*	0
05-06*	0

*Projected

NOTES:

(1) The GAC Treatment Plant has a treatment capacity of 2,000 gpm.

(2) Wells No. 7 and No. 15 supply water for the GAC Treatment Plant. Proposed production rates (if the plant is used) are as follows:

Well No. 7	1,050 gpm
Well No. 15	850 gpm

(3) GAC Treatment Plant production was reduced beginning in water year 1996-97 to accept the required flows from the EPA Consent Decree Project.

TABLE 3.3
FIVE-YEAR PROJECTED USE OF VALLEY/ BOU TREATED GROUNDWATER

Water Year	Acre-Feet
93-94	803 (3) (5)
94-95	462 (5)
95-96	5,737 (5)
96-97	9,280
97-98	2,102
98-99	9,042
99-00	11,345
00-01	9,046
01-02*	**10,054**
02-03*	**10,140**
03-04*	**10,140**
04-05*	**10,140**
05-06*	**10,140**

*Projected

NOTES:

(1) Burbank includes BOU extractions in its pumping rights.

(2) Lockheed Martin has physical solution right of 25 AF/year.

(3) Lockheed Martin stopped its operation of the Aqua Detox Treatment System in June 1994. (BOU378 + AD450 - 25) = 803

(4) Re-injected water has been excluded from the above values.

(5) During the water years 1993-94, 1994-95 and 1995-96, Lockheed-Martin produced water for testing of the EPA Consent Decree Project. The Watermaster did not charge Burbank for these amounts included in Table 3.3. Beginning January of water year 1995-96, all extractions shown in Table 3.3 are treated for VOC removal and beneficially used by Burbank. GAC flushing and treatment bypass are accounted for separately and charged to a 'basin account'.

Water Year	AF	Water Year	AF	Water Year	AF
1993-94	378	1996-97	320	1999-2000	107
1994-95	462	1997-98	478	2000-2001	88
1995-96	34	1998-99	142		

(6) The City of Burbank is currently using water from the BOU under an Operation Permit, issued in

October 2000, from the California Department of Health Services.

TABLE 3.4
FIVE-YEAR PROJECTED USE OF RECLAIMED WATER

Water Year	Acre-Feet
91-92	2,100
92-93	2,629
93-94	3,706
94-95	2,480
95-96	1,880
96-97	3,120
97-98	1,744
98-99	1,210
99-00	2,979
00-01	2,732
01-02*	**2,000**
02-03*	**2,600**
03-04*	**2,600**
04-05*	**6,000**
05-06*	**6,000**

*Projected

NOTES:

1) The source of reclaimed water is the Burbank Water Reclamation Plant.
2) The Upper and Lower Landfill areas were provided reclaimed water service in water year 1994-95.
3) The DeBell Golf Course and Par-3 Course were provided reclaimed water service in water year 1995-96. McCambridge Park landscaping was added to the reclaimed water system in 1996-97.
4) The Burbank Nature Center was provided reclaimed water service in water year 1998-99.
5) The BWP Power Plant reduced its reclaimed water use beginning water year 1996-97 due to decreased local power generation. Beginning water year 2000-01, power production and reclaimed water use were increased again.
6) Beginning May 2002, the Power Plant will begin to use reclaimed water as its source for demineralized water production using the Puretec treatment system.

TABLE 4.1
FIVE-YEAR PROJECTED EXTRACTIONS OF GROUNDWATER BY VALHALLA

Water Year	Acre- Feet
91-92	376
92-93	391
93-94	391
94-95	298
95-96	339
96-97	300
97-98	281
98-99	342
99-00	432
00-01	407
01-02*	300
02-03*	300
03-04*	300
04-05*	300
05-06*	300

*Projected

NOTES:

(1) Burbank includes extractions by Valhalla in its pumping rights.

(2) Valhalla has physical solution right of 300 AF/year.

TABLE 4.2
FIVE-YEAR PROJECTED BURBANK SPREADING OPERATIONS

WATER YEAR	ACRE-FEET	
91-92	503	(1)
92-93	500	(2)
93-94	0	(3)
94-95	5,380	(4)
95-96	2,000	(4)
96-97	1,500	(4)
97-98	0	
98-99	2,000	
99-00	0	(5)
00-01	0	
01-02*	0	
02-03*	100	(6)
03-04*	1,200	
04-05*	2,400	
05-06*	3,850	

*Projected

NOTES:

1) MWD water spread at the Pacoima Spreading Grounds.
2) MWD water taken at the Los Angeles Treatment Plant (LA-35). In-lieu credit to Burbank by the LADWP.
3) The Maclay pipeline was damaged in the 1994 Northridge earthquake. Deliveries to the Pacoima Spreading Grounds are precluded until repaired by the LADWP.
4) The City exercised its physical solution right in water years 1994-95, 1995-96, 1996-97, and 1998-99 for basin replenishment.
5) Starting 1999-2000, combination of physical solution purchases and MWD water delivered to Los Angeles.
6) Beginning in FY 2002-03, Burbank will begin to ramp into its long-term basin replenishment obligation.

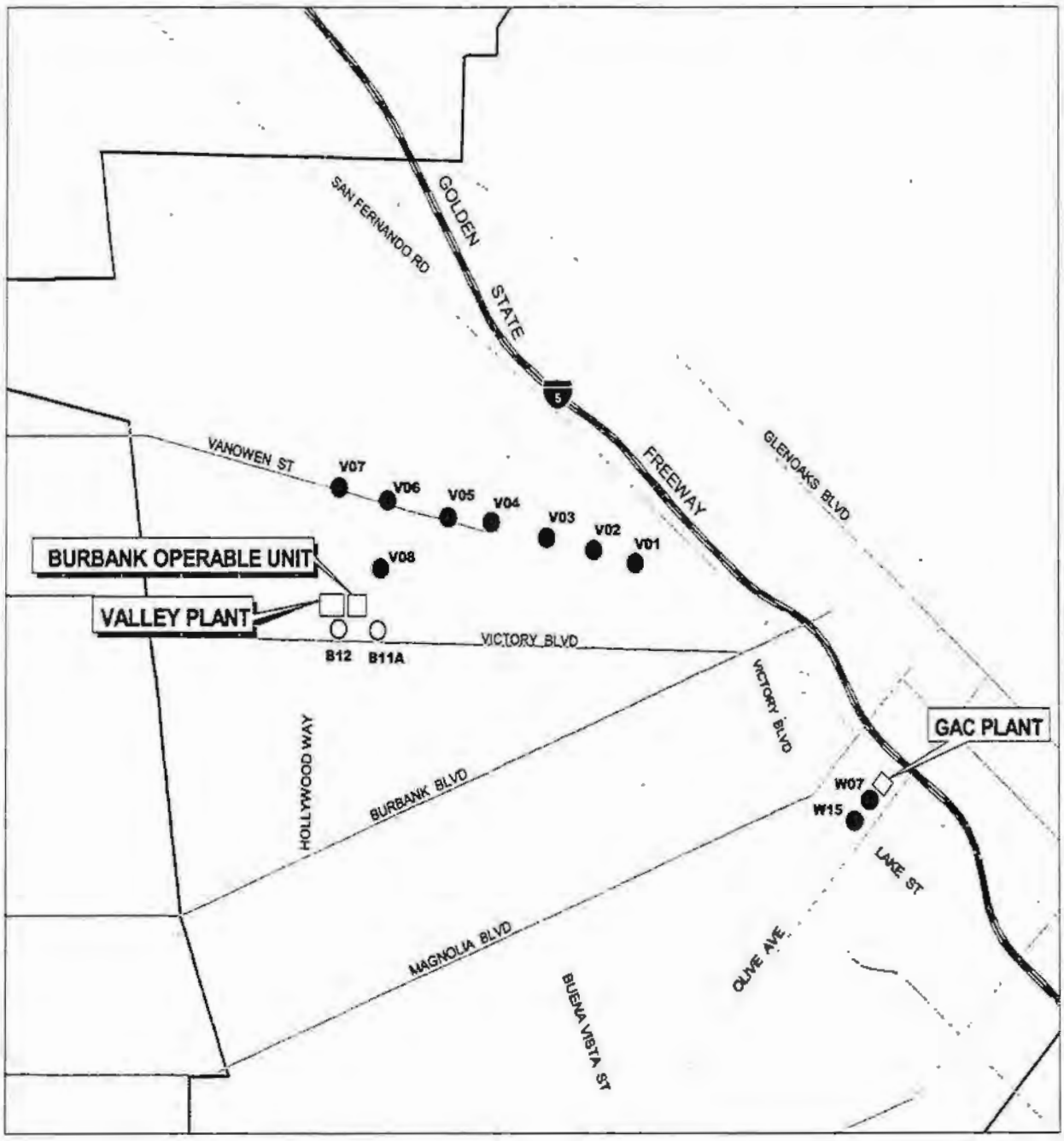


FIGURE 5.1
EPA PHASE II EXTRACTION WELLS

Water Recycling Project Phase I, scheduled to be on line by early 2004, will use some of the recycled water for cooling towers at the Valley Generating Station. The Hansen Area Water Recycling Project Phase II that is being planned to deliver recycled water to the proposed Canyon Trails Golf Club and the Hansen Dam Recreation Area. Other areas that will benefit from recycled water include irrigation projects in the West Valley and the Sepulveda Basin.

APPENDIX A:
2001-2002 Water Quality Sampling Results

LAKE STREET GAC TREATMENT PLANT

320 North Lake Street
Burbank CA 91502

OPERATOR:

City of Burbank
Burbank Water and Power, Water Division

Albert Lopez, Water Production/ Operations Superintendent

QUANTITY TREATED (10/1/00 through 10/1/01):

987 Acre-Feet

WATER QUALITY:

Contaminant VOC'S: TCE, PCE, 1,2-DCE, 1,2-DCA

DISPOSITION:

Burbank Water System
Potable Water

EPA CONSENT DECREE PROJECT – BURBANK OPERABLE UNIT

2030 North Hollywood Way
Burbank CA 91505

OPERATOR:

City of Burbank
Burbank Water and Power, Water Division

Albert Lopez, Water Production/ Operations Superintendent

QUANTITY TREATED (10/1/00 through 10/1/01):

9,046 Acre-Feet for domestic use

WATER QUALITY:

Contaminants: VOCs, Nitrate, Chromium, 1,2,3-TCP

DISPOSITION:

(1) Test Water- Waste

(2) Operation Water (backwash, etc.) - Waste

(3) Burbank Water System-
Potable water after blending

APPENDIX C

STORED GROUNDWATER

CITY OF BURBANK WATER AND POWER
WATER DIVISION

BURBANK'S STORED GROUNDWATER

70% EPA - With Ramp

WATER YEAR	DELIVERED WATER AF	RETURN FLOW CREDIT AF	SPREAD WATER AF	PUMPED GROUNDWATER AF	STORED WATER CREDIT AF
1976-77	22,743	4,549			
1977-78	22,513	4,503		3,767	(1) 782
1978-79	24,234	4,847		1,358	(2) 3,947
1979-80	24,184	4,837		677	8,117
1980-81	25,202	5,040		595	12,359
1981-82	22,120	4,424		523	16,876
1982-83	22,118	4,424		2,002	19,298
1983-84	24,927	4,985		1,063	22,659
1984-85	23,641	4,728		2,863	24,781
1985-86	23,180	4,636		123	29,386
1986-87	23,649	4,730		0	34,022
1987-88	23,712	4,742		253	38,498
1988-89	23,863	4,773		1,213	42,027
1989-90	23,053	4,611	378	1,401	45,777
1990-91	20,270	4,054	504	2,032	48,860
1991-92	20,930	4,186	503	938	52,479
1992-93	21,839	4,368	500	(3) 2,184	54,961
1993-94	24,566	4,913	0	(3) 3,539	55,810
1994-95	22,541	4,508	5,360	2,888	63,215
1995-96	23,124	4,625	2,000	8,308	61,415
1996-97	24,888	4,977	1,500	11,243	56,297
1997-98	22,447	4,489	0	3,731	57,543
1998-99	22,671	4,534	2,000	13,262	50,770
1999-2000	26,312	5,262	0	12,862	42,442
2000-01	25,619	5,124	0	10,440	37,264
2001-02	23,000	4,600	0	11,000	31,388
2002-03	23,000	4,600	100	11,000	25,088
2003-04	23,000	4,600	1200	11,000	19,888
2004-05	23,000	4,600	2,400	11,000	15,888
2005-06	23,000	4,600	3,850	11,000	13,338
2006-07	23,000	4,600	5,050	11,000	11,988
2007-08	23,000	4,600	6,000	11,000	11,588
2008-09	23,000	4,600	6,200	11,000	11,388
2009-10	23,000	4,600	6,200	11,000	11,188
2010-11	23,000	4,600	6,200	11,000	10,988
2011-12	23,000	4,600	6,200	11,000	10,788
2012-13	23,000	4,600	6,200	11,000	10,588
2013-14	23,000	4,600	6,200	11,000	10,388
2014-15	23,000	4,600	6,200	11,000	10,188
2015-16	23,000	4,600	6,400	11,000	10,188
2016-17	23,000	4,600	6,400	11,000	10,188
2017-18	23,000	4,600	6,400	11,000	10,188

NOTES:
(1) STORED WATER AS OF OCTOBER 1, 1978
(2) STORED WATER AS OF OCTOBER 1, 1979
(3) EXCLUDES 150 A.F. OF PUMPING FOR TESTING.
COLUMNS (1) THROUGH (5) - FROM ULARA WATERMASTER REPORTS -
SFB EXTRACTION RIGHTS AND STORED WATER TABLES
COLUMN (2) = 20% OF COL. (1)
COLUMN (5) = COL.(2) PREV. YR. - COL.(4) CUR. YR. + COL.(5) PREV. YR. + COL.(3) CUR. YR.
COLUMN (5) = EXTRACTIONS OF NEXT YEAR
PUMPED GROUNDWATER INCLUDES CITY, VALHALLA, LOCKHEED, & DISNEY.
SHADED AREAS OF TABLE ARE PROJECTED VALUES .

APPENDIX C

CITY OF GLENDALE

PUMPING AND SPREADING PLAN

2001-2006 Water Years

CITY OF GLENDALE

GROUNDWATER PUMPING AND SPREADING PLAN

Prepared By

GLENDALE WATER & POWER

APRIL 2002

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

The City of Glendale has recently developed many facilities by using more local resources to reduce the City's dependence on imported water supplies from northern California and the Colorado River via the Metropolitan Water District (Metropolitan). This trend in local water resource development is occurring throughout the southern California water community.

Fundamentally, it is imprudent for a city of nearly 200,000 people to be almost totally dependent on water supplies originating hundreds of miles away that Glendale has little control over. This document outlines our recent program to develop more local water resources to reduce our dependency on imported water supplies improving the overall reliability of our system and the ability of the City to meet projected water demands associated with new developments. These local facilities have been completed at a cost of about $50 million. Of this amount, the City has spent $30 million with another $20 million by the industry group responsible for contaminating Glendale's groundwater supplies.

This report discusses historic water supplies available to Glendale, its future water demands, and new sources of local water available to reduce dependence on imported water. This information is needed by a wide group of individuals and organizations including Glendale's City Manager and Council Members, regulatory agencies, and others interested in Glendale's water resource future.

EXISTING WATER SOURCES AND SUPPLIES

The City has four sources of water available to meet its customer's demand. Each of these sources and available supplies are described below, as well as the quantity of water available. The location of these sources is shown in Figure 1. Recently, there has been a significant change in the mix of supplies used to meet water demands in the City as shown on Figure 9, which is discussed in greater detail later in this report.

San Fernando Basin

The City's right to San Fernando Basin groundwater supplies is defined in "The City of Los Angeles vs. The City of San Fernando, et. al. (1979) (Judgement) and consists of an annual Return Flow credit as a water right. Additionally, there is a secondary right to produce additional water subject to a payment obligation to the City of Los Angeles equivalent to the cost of Metropolitan supplies. The right to produce water in excess of the annual Return Flow credit is a significant factor in relation to the recently completed Glendale Water Treatment Plant located on Flower Street. This plant is part of a U. S. Environmental Protection Agency's (EPA) Superfund clean-up project in Glendale. The various San Fernando Basin supplies are:

Return Flow Credit Water Right - Glendale is entitled to a groundwater return flow credit of 20 percent of all delivered water (a credit for irrigated use) in the San Fernando Basin and its tributary hill and mountain area. It is calculated by determining the amount of total water used including recycled water in the City less 105 percent of total sales by Glendale to customers in the Verdugo Basin and its tributary hills. This credit ranges from about 5,000 acre-feet per year (AFY) to 5,400 AFY depending on actual water used. Essentially, this is the City's primary water right in the San Fernando Basin. For planning purposes, this should be viewed as an assured source of water at the present time as groundwater treatment facilities have been constructed and are operational with treated water deliveries to the City.

Accumulated Groundwater Rights - The annual Return Flow credit water right is accumulative to the extent is not used. Because Glendale has not been able to fully utilize the groundwater since 1979 due to contamination, the annual unused Return Flow credit has accumulated to about 73,254 AF of pumping rights plus the on-going annual credits.

Physical Solution Water Right - Glendale has limited water rights to extract additional groundwater. Payment for the use of this water is generally charged at the rate similar to Metropolitan's water rates. Glendale's physical solution right is 5,500 AFY.

Pumping for Groundwater Cleanup - Section 2.5 of the Upper Los Angeles River Area's Policies and Procedures, dated July, 1993, provides for the unlimited extraction of basin water for Superfund activities, subject to payment of specified charges similar to physical solution water. This right will be a significant factor with the recently completed EPA treatment facility. This facility is expected to deliver about 7,000 AFY to the City.

Carry-Over Extractions - In addition to current extractions of return flow water and stored water (discussed later), Glendale may, in any one year, extract from the San Fernando Basin an amount not to exceed ten percent (10%) of its last annual credit for import return water, subject to an obligation to replace such over-extraction by reduced extraction during the next water year. This provides an important year-to-year flexibility in meeting water demands.

San Fernando Basin Summary - the Basin rights described above give the City the right to extract from a practical point of view, subject to certain conditions and payment in some cases, any quantity of water anticipated to be needed for the City's future water resource program. Each water right used to produce from the San Fernando Basin has its own costs and availability.

Verdugo Basin

The Judgement described above also gave Glendale the right to extract 3,856 AFY from the Verdugo Basin. In the early 1990's, Glendale constructed the Verdugo Park Water Treatment Plant (VPWTP) with a capacity to treat 1.150 gpm extracted groundwater from two shallow wells (referred to as Verdugo Wells A & B) and the pick-

up horizontal infiltration system in the Verdugo Basin. However, experience indicates that flows closer at 550 gpm are likely from these sources. The treatment plant and wells are shown on Figure 6.

The City also operates three wells utilizing the described right. This water is delivered to the water system. Crescenta Valley Water District also has water rights and is the only other entity allowed to extract water from the Verdugo Basin. From a planning perspective, the City can reliably produce water supplies of suitable quality of about 2,900 AFY.

Metropolitan Water District

The Metropolitan Water District of Southern California (Metropolitan) is a public agency organized in 1928 by a vote of the electorates of 13 Southern California cities that included Glendale. The first function of Metropolitan was building the Colorado River Aqueduct to import water from the Colorado River. Water deliveries through the aqueduct began in the early 1940's, and this imported water supplemented the local water supplies of the original 13 Southern California member cities. In 1972, to meet growing water demands in its service area, Metropolitan started receiving additional water supplies from the State Water Project. The State Water Project is owned and operated by the State of California Department of Water Resources (DWR). Metropolitan currently imports water from these two sources: (1) the Colorado River water via the Colorado River Aqueduct and (2) the State Water Project via the California Aqueduct. The location of these facilities is shown in Figure 2. Metropolitan's service area includes the Southern California coastal plain. It extends about 200 miles along the Pacific Ocean from the city of Oxnard on the north to the Mexican border on the south, and it reaches 70 miles inland from the coast. Metropolitan is currently composed of 26 member agencies, including 14 cities, 11 municipal water districts, and one county water authority.

Glendale's service connections to the Metropolitan system are summarized in Table 1.

TABLE 1

METROPOLITAN CONNECTIONS AND CAPACITY

Service Connection Number	Capacity (cfs)
G-1	48
G-2	10
G-3	12

Recycled Water

Since the late 1970's, the City of Glendale has been delivering recycled water from the Los Angeles/Glendale Water Reclamation Plant (LAGWRP). This is a 20 million gallon-per-day (MGD) facility that is owned by the Cities of Los Angeles and Glendale. Each City is entitled to one-half of the treated flows from the plant for recycled water deliveries. Effluent not used in the recycled water systems for Los Angeles and Glendale is discharged to the Los Angeles River and eventually reaches the ocean.

The City of Glendale has many recycled water projects designed to serve different parts of the City. Each is reviewed below.

Power Plant Project - Recycled water deliveries were first made to the Glendale Power Plant for use in the cooling towers and to Caltrans for irrigation along the 134 Freeway near the 5 Freeway in the late 1970's. A pipeline was constructed from the LAGWRP to the Glendale Power Plant.

Forest Lawn Project – This project, completed in 1992, was a joint project with the City of Los Angeles. This facility, a 30-inch diameter pipeline project, was constructed to deliver recycled water for irrigation to Forest Lawn Memorial Park in south Glendale.

Later, the City began deliveries to an irrigated street median on Brand Boulevard from Colorado Boulevard and Los Feliz Boulevard.

Los Angeles proposes to extend the system from its south Glendale terminus into Elysian Park and into the downtown Los Angeles area.

Expansion Project - In the late 1980's, planning was initiated on expanding the recycled water system to other areas in the City, and construction initiated in the early 1990's for the $16 million project. The system was composed of three phases in different part of the City to complete the backbone of the distribution system. The significance of this program was the regional involvement of the City of Pasadena in the project. Each segment is discussed below:

The Verdugo – Scholl Project was designed to deliver recycled water to the Oakmont Country Club for irrigation with another section in Glenoaks Canyon to deliver recycled water to the Scholl Canyon Golf Course for irrigation, and to the Scholl Canyon Landfill for dust control and irrigation. Another major user of this water is Caltrans for irrigation along the 134 and 2 Freeways. Additional users include schools, parks, and roadway media strips.

The portion of the project up to Scholl Canyon was a joint effort with the City of Pasadena. Pasadena provided funds for Glendale to increase the size of the facilities so deliveries could be made to Pasadena from the Scholl Canyon area. Pasadena continues to review the possibility to extend the system.

The Brand Park Project consists of a pumping plant, storage tanks, and pipeline from the Glendale Power Plant to a tank above Brand Park. This section delivers recycled water for irrigation to Brand Park, Grandview Cemetery and along the street medians on Glenoaks Boulevard.

Delivery System - The recycled water delivery system is now comprised of 20 miles of mains, 5 storage tanks, pumping plants and 42 customers currently using about 1,800 AFY. The specific features of this recycled water program are shown in more detail on Figure . The users from the various recycled water projects are shown on Figure 3 and schematic diagram of the recycled water system is shown on Figure 4. This will give the reader a general idea of the scope of the expansion program. Recycled water use has increased from 551 AF in 1991-92 to 1,665 AF in 2000-2001. The expected deliveries from the various projects are shown on Table 2. The objective is to increase the use of recycled water to meet 10 percent of demands. This will require a significant increase in users and expansion of the system. The recycled water user sites are shown in detail on Figure 7.

TABLE 2

RECYCLED WATER USE (AFY)

PROJECTS	2000	2005	2010	2020
Brand Park	111	170	170	170
Forest Lawn Pipeline	242	350	350	350
Power Plant Pipeline	472	450	450	450
Verdugo-Scholl Pipeline	839	1,020	1,040	1,080
Other Potential Projects	0	0	0	0
TOTAL	**1,664**	**1,990**	**2,010**	**2,050**

High-Rise Office Building - The City requires dual plumbing system in new high-rise office buildings so when recycled water becomes available, recycled water can be used for sanitary flushing purposes in the buildings without retrofitting. Developers of new buildings have accepted this requirement and it is routine to require this installation. A listing of office building dual plumbed is provided on Table 3.

TABLE 3

Office Buildings Dual Plumbed to Use Recycled Water for Sanitary Programs

Location	Stories
655 N Central Avenue	24
400 N Brand Boulevard	15
450 N Brand Boulevard	15
Glendale Community College Classroom and Library	4
Glendale Police Building	4

Summary of Supplies

The current use of local resources available to the City is substantially less than its water-rights primarily because of water quality problems. A general summary of the City's rights to local water resources compared to the amount currently being used is shown on Table 4.

TABLE 4

LOCAL WATER USE (AFY)

Potential Source	Right	Current Use	Future Use
San Fernando Basin[1]	5,000-5,400	6,000 AFY	7,600
Verdugo Basin	3,856	2,100 AFY	2,900
Recycled Water	10,000	1,620 AFY	2,000

(1) Return flow credit only.

PAST WATER USE, CURRENT AND TRENDS

The water quality problems in the San Fernando and Verdugo Basins and reduced ground water levels in the Verdugo Basin have severely impacted the ability of the City to produce water from the Basins. Glendale has not been able to fully utilize its rights to these water supplies for many years. The U. S. Environmental Protection Agency (EPA) has designated several locations in the San Fernando Basin as Superfund sites and required construction of clean-up treatment facilities. The Glendale clean-up project consist of the Glendale Water Treatment Plant and 8 wells is the last in a series of EPA required clean-up facilities in the San Fernando Basin was complete in the late 2000. Because of the chromium issues in the treated water supplies, the City deferred taking this water until January 2002.

The City currently has five active production wells and a pick-up system (infiltration galleries) in the Verdugo Basin. The old Grandview Wells in the San Fernando Basin have been abandoned because some wells are 80 years old, need replacement, and its groundwater contains water quality issues.

Historically, the City used ground water to meet a varying portion of its water demand. In the 1940's and 1950's essentially all of the City's water needs were obtained from the San Fernando and the Verdugo Basins with limited supplies from Metropolitan. In the 1960's, production from the San Fernando Basin reached a peak of about 17,000 acre-feet per year (AFY). The Grandview well water collection system in the San Fernando Basin and the Grandview Pumping Plant originally pumped a peak capacity of about 24,000 gpm (34.6 million gallons per day-MGD) from San Fernando Basin directly into the City's potable water system.

In the mid-1970's, the City limited production from the San Fernando Basin to about 12,000 AFY as part of a court decree arising from a lawsuit by the City of Los Angeles. In 1975, the California Supreme Court judgement in the City of Los Angeles vs. the City of San Fernando further limited the City's production right. The current right is about 5,000 to 5,500 AFY based on a Return Flow credit right from water use in the City.

Other limitations to ground water use occurred in the late 1970's, when production from the Verdugo Pick-up System in the Verdugo Basin was discontinued because of possible water quality problems.

In late 1979, Assembly Bill 1803 required that all water agencies using ground water must conduct tests for the presence of certain industrial solvents. The tests indicated that "volatile organic compounds" (VOC's) such as trichlorethylene (TCE) and perchloroethylene (PCE) were present in the San Fernando Basin groundwater supplies in concentrations exceeding State Department of Health Service maximum contaminant levels (MCL). Both chemicals were used extensively in the past as degreasers in manufacturing. At that time, the hazards to the water supplies were not known. As a result, Glendale with other communities in the San Fernando Valley, had to further limit its use of San Fernando Basin supplies. The City almost totally suspended production from the basin because of the difficulty of producing supplies meeting the MCL's for the VOC's. Except for a small quantity (about 400 ac-ft per year) used at the Glendale Power Plant for cooling tower make-up water and irrigation at Forest Lawn Memorial Park, no San Fernando Valley water was used in Glendale till the middle of 2001.

The water quality and water rights problems in the San Fernando area severely impacted the ability of the City to produce water from the Basin and made the City even more dependent of MWD water supplies. In the 1980's, the U. S. Environmental Protection Agency designated the San Fernando Basin as a Superfund site. After a decade of studies, and facility design and construction, a water treatment plant, eight extraction wells, piping to convey the untreated water from the wells to the treatment plant, a conveyance system to bring water from the treatment plant to Glendale potable distribution system, a facility to blend the treated groundwater with water from the Metropolitan Water District to reduce nitrate levels, and a disinfection facility, were completed in the summer of 2000 to begin the use of San Fernando Basin water supplies. This plant is called the Glendale Water Treatment Plant (GWTP). A general layout of the plant facilities is shown on Figure 5.

Other limitations to ground water use occurred in the late 1970's, when production from the Verdugo Pick-up System in the Verdugo Basin was discontinued because of possible water quality problems.

Due to the increase in population, economic growth, decrease in availability of local water supply, water quality problems and diminished of water rights, Glendale's dependency on imported water from MWD increased to more than 90 percent of the total potable water need. This has been reduced to 70% with the operation of the GWTP.

The City has been about 95% of the designed capacity of the treatment facility since January 2002. The supplies from one of the wells because of its high chromium 6 levels will be delivered into the City's recycled water supply system. The Goodwin Treatment facility is under design to remove the VOC's from the said well before delivering to RW system.

The City's expected annual delivery of the treated water is about 7,200 AFY and will meet about 20 percent of projected near-term water demands. This will be available in all types of years because of the large supply of water in the San Fernando Groundwater Basin.

The historic and projected water use from the various sources is plotted on Figure 4 and shows the significant reduction in production from the San Fernando Basin and corresponding increase in imported water supplies from Metropolitan. The annual water use in Glendale for fiscal year 2000-01 was 33,475 AFY. In 1991-92, the use was about 25,180 AFY because of mandatory conservation. Water use in FY 1997-98 was below normal because of the very heavy rain (El Nino) during the first half of 1998. However, with the below normal rainfall in FY 1998-99, water use was up significantly as shown on Table 5. In the fiscal year 2000-01, the use was 33,475 AFY and is equivalent to an average daily use of 30 million gallons per day (MGD).

TABLE 5

TOTAL ANNUAL WATER DEMAND

Fiscal Year	Demand	Comments
1991-92	25,180 AF	
1997-98	29,680 AF	Heavy Rainfall (El Nino)
1998-99	31,230 AF	Below Normal Rainfall
1999-00	33,435 AF	
2000-01	33,475 AF	
2005	32,429 AF	Projected
2010	33,432 AF	
2020	36,877 AF	
2025	38,990 AF	

PROJECTED WATER DEMANDS AND SOURCES

Projection Methodology - Metropolitan uses the U.S. Army Corps of Engineers IWR-MAIN (Municipal and Industrial Needs) water demand forecasting system modified for 51 of the larger cities in Metropolitan's service area including Glendale. The model (MWD-MAIN) is used to project water demands incorporating a wide range of economic, demographic, and climatic factors. The specific date includes projected population, housing mix, household occupancy, housing values, weather conditions, and conservation measures. The forecasts generate expected demands during a year of normal weather conditions. This modeling is considered the state-of-the-art approach in projecting demands and is being used by an increasing number of major cities in the country for water demand forecasting.

Projected Water Use - The projected water demand using MWD-MAIN calibrated for Glendale shows the overall water demand for year 2005 of 32,429 AFY and for year 2020 a demand of 38,990 AFY. These figures were based on incorporating projected population, housing, and employment data into the MWD-MAIN water demand forecasting model for Glendale along with a weather variable. The year 2020 demand reflects a modest increase over current use even though Glendale is essentially "built-out". These projections incorporate the 1981 and 1992 California plumbing codes changes requiring ultra-low flush toilets beginning in 1992, along with a continuation of current drought oriented public education and information programs. As additional conservation measures are carried out, there could be still more reductions in projected use.

Future Water Sources - The basic objective of the City's Water Resource Plan has been to develop more local supplies. Currently, about 70 % of the potable water used in the City comes from Metropolitan. This compare to 90% just a few years ago by building new facilities and the use of the San Fernando Basin water supplies. The change in source of water to be used in the City between now and year 2020 is presented on Figure 9, with one "pie-chart" showing the current sources and the year 2020 mix. As one can see, the City has become less dependent on MWD over time. This will contribute to increased reliability in meeting future water demands in the City.

RELATED INFORMATION ON WATER USE

Detailed information on historic and projected water use in Glendale is shown on Figure 8. From a practical sense, water use in the water year is equivalent to water use in a fiscal year. Table 6 is a tabular version of Figure 8.

TABLE 6
HISTORIC AND PROJECTED WATER USE IN GLENDALE (AF)

Water Year	San Fernando Basin	Verdugo Basin	Recycled Water	MWD Water	Total
1980-81	761	3,488	300	22,647	27,196
1985-86	6,089	2,733	300	22,080	31,202
1990-91	2,932	1,132	432	25,354	29,850
1991-92	1,577	732	551	23,316	25,176
1992-93	447	904	770	25,935	28,056
1993-94	554	1,226	625	26,977	29,382
1994-95	441	1,667	574	26,199	28,881
1995-96	496	2,059	886	27,905	31,346
1996-97	467	2,569	1,112	28,122	32,270
1997-98	267	2,696	1,087	25,626	29,678
1998-99	409	2,720	1,458	26,642	31,229
1999-00	515	2,451	1,738	28,731	33,435
2000-01	673	2,105	1,664	29,033	33,475
2001-02	3,425	2,900	1,865	24,033	32,223
2002-03	7,025	2,900	1,970	20,396	33,291
2005	7,025	2,900	1,990	20,514	32,429
2010	7,025	2,900	2,010	21,497	33,432
2015	7,025	2,900	2,030	22,971	34,926
2020	7,025	2,900	2,050	24,902	36,877
2025	7,025	2,900	2,070	26,995	38,990

A:\RAYNOTARIO\ZIP1-A\WRP\GWPSPFAPRIL2002F.WD
APRIL 29, 2002

FIGURES

FIGURE 1

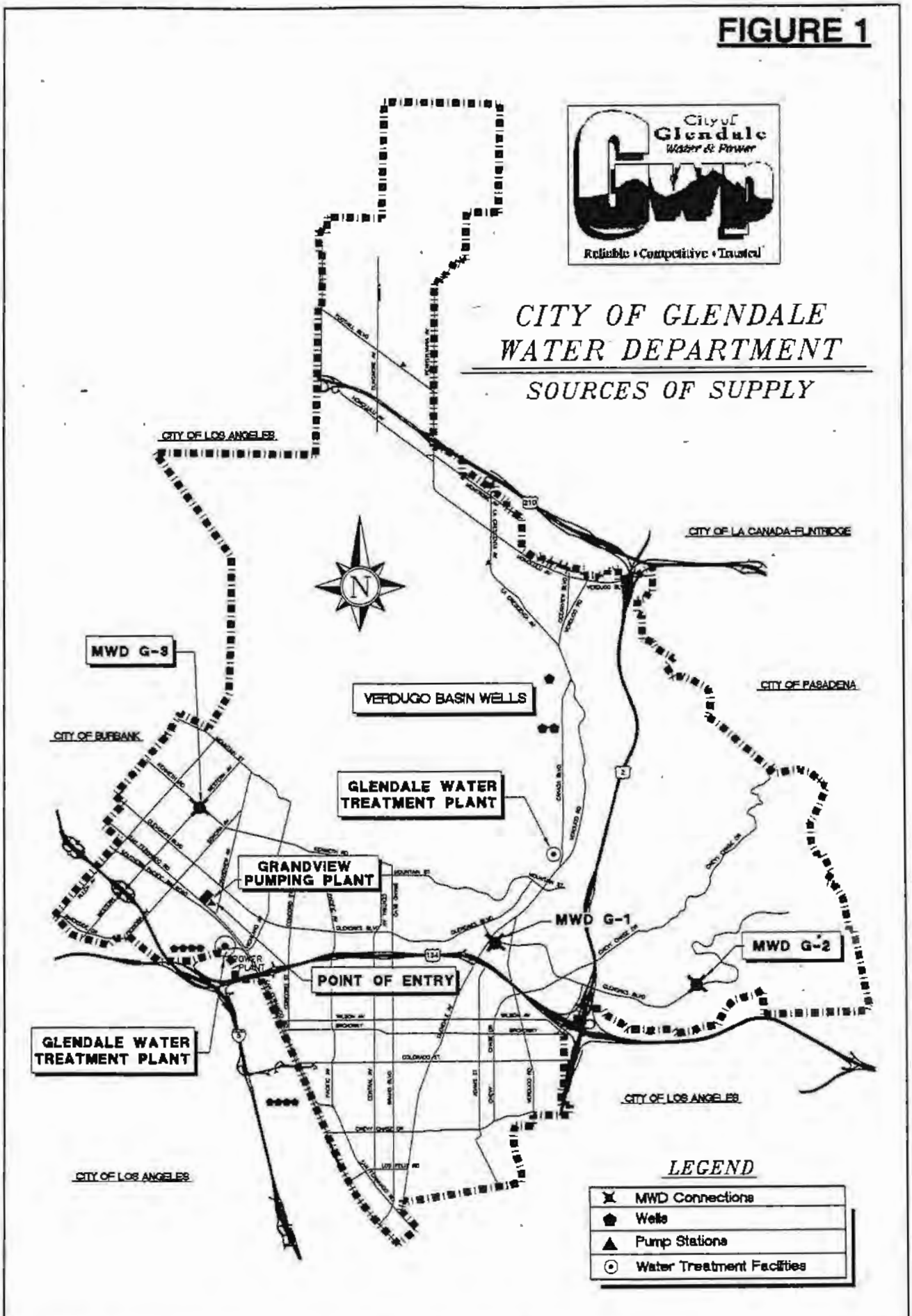
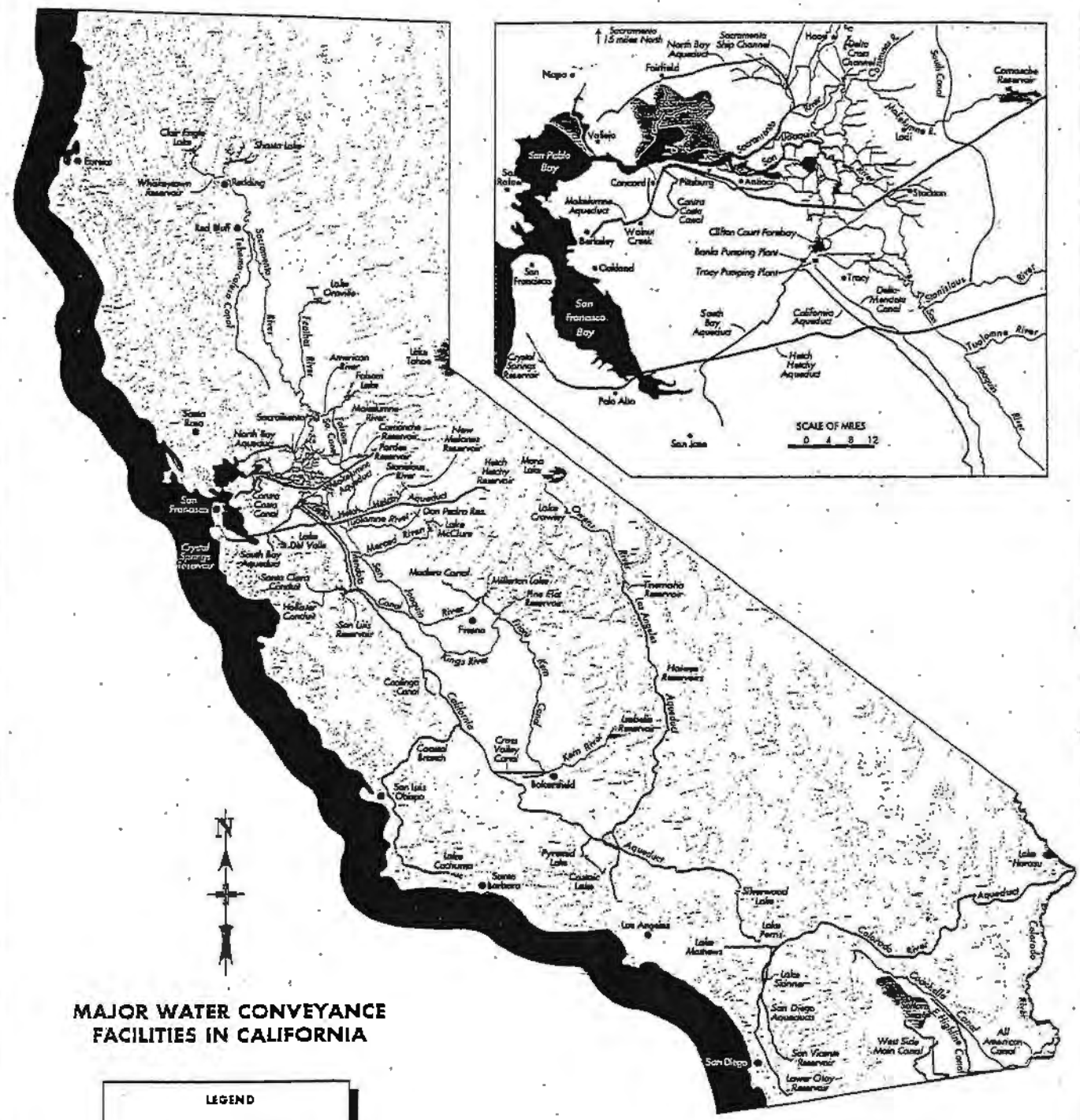

City of Glendale
Water & Power
Reliable • Competitive • Trusted
CITY OF GLENDALE
WATER DEPARTMENT
SOURCES OF SUPPLY
CITY OF LOS ANGELES
CITY OF LA CANADA-FLINTRIDGE
CITY OF PASADENA
CITY OF BURBANK
CITY OF LOS ANGELES
CITY OF LOS ANGELES
MWD G-3
VERDUGO BASIN WELLS
GLENDALE WATER TREATMENT PLANT
GRANDVIEW PUMPING PLANT
MWD G-1
MWD G-2
POWER PLANT
POINT OF ENTRY
GLENDALE WATER TREATMENT PLANT
LEGEND
MWD Connections
Wells
Pump Stations
Water Treatment Facilities

FIGURE 2


Sacramento
15 miles North
North Bay Aqueduct
Sacramento Ship Channel
Napa
Fairfield
Vallejo
Suisun Bay
Sacramento River
San Pablo Bay
San Rafael
Concord
Pittsburg
Antioch
Mokelumne Aqueduct
Contra Costa Canal
Walnut Creek
Berkeley
Oakland
San Francisco
San Francisco Bay
Clifton Court Forebay
Banks Pumping Plant
Tracy Pumping Plant
Tracy
Delta-Mendota Canal
San Joaquin River
South Bay Aqueduct
California Aqueduct
Crystal Springs Reservoir
Hetch Hetchy Aqueduct
Palo Alto
San Jose
SCALE OF MILES
0 4 8 12
Hayes
Suisun Cross Channel
South Canal
Comanche Reservoir
Middle River
Lodi
Stockton
Tuolumne River
Stanislaus River
Clear Lake
Shasta Lake
Eureka
Whiskeytown Reservoir
Redding
Red Bluff
Tehama-Colusa Canal
Sacramento River
Lake Oroville
Feather River
American River
Folsom Lake
Lake Tahoe
Yuba River
Mokelumne River
Camanche Reservoir
Pardee Reservoir
New Melones Reservoir
Stanislaus River
Hetch Hetchy Reservoir
Mono Lake
Don Pedro Res.
Lake McClure
Lake Crowley
Owens River
Tuolumne River
Merced River
Lake San Luis
South Bay Aqueduct
Santa Clara Conduit
Hollister Conduit
San Luis Canal
San Joaquin River
Madera Canal
Millerton Lake
Pine Flat Reservoir
Fresno
Kings River
Tinemaha Reservoir
Los Angeles Aqueduct
Haiwee Reservoirs
Coalinga Canal
California Aqueduct
Coastal Branch
Kern River
Isabella Reservoir
Cross Valley Canal
Bakersfield
San Luis Obispo
Lake Cachuma
Santa Barbara
Pyramid Lake
Castaic Lake
Aqueduct
Los Angeles
Silverwood Lake
Lake Perris
Lake Mathews
Lake Skinner
San Diego Aqueduct
San Diego
San Vicente Reservoir
Lower Otay Reservoir
West Side Main Canal
Coachella Canal
All American Canal
Colorado River
Lake Havasu
Aqueduct
N
MAJOR WATER CONVEYANCE FACILITIES IN CALIFORNIA
LEGEND
FEDERAL AQUEDUCT
STATE AQUEDUCT
LOCAL AQUEDUCT

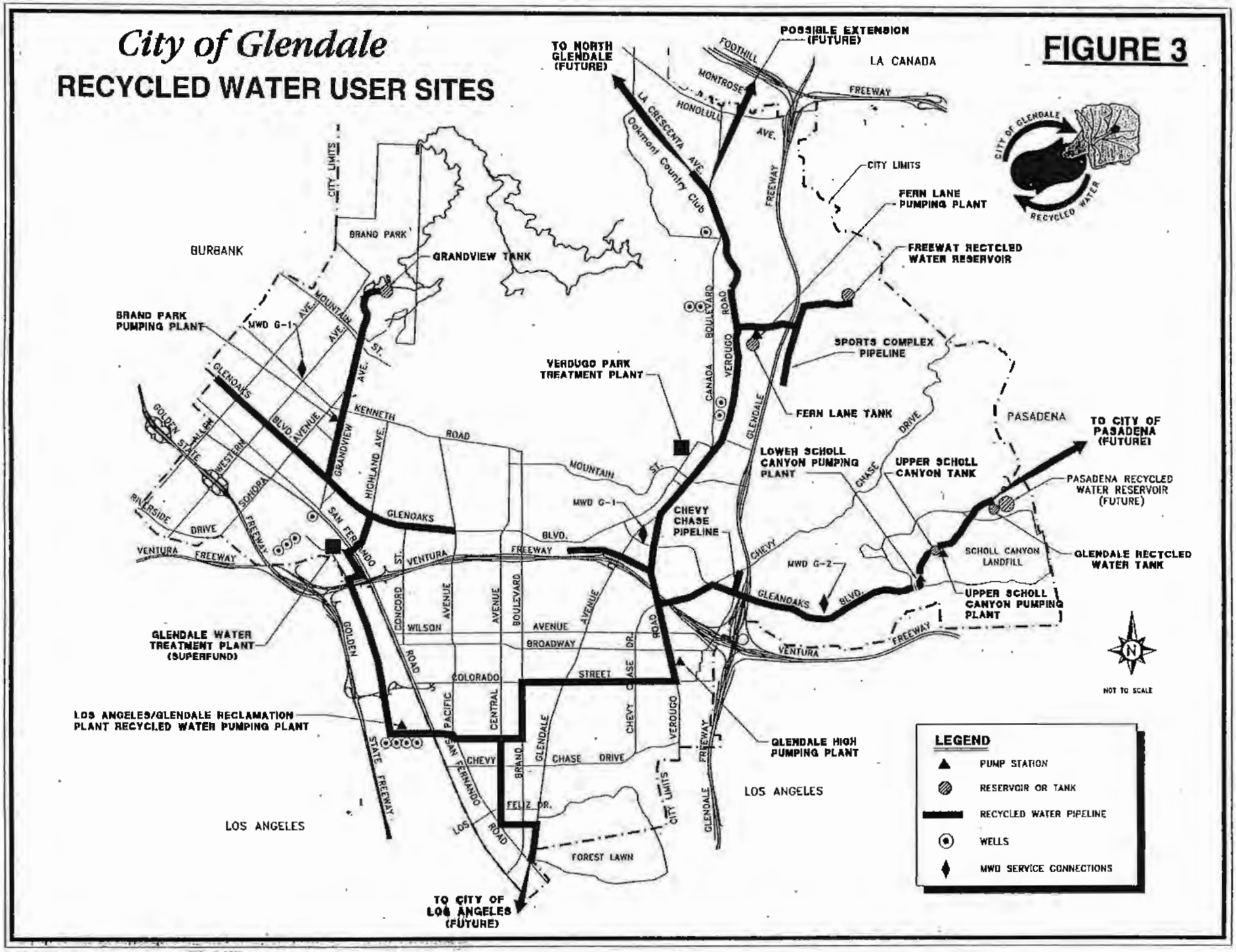

City of Glendale
RECYCLED WATER USER SITES
FIGURE 3
TO NORTH GLENDALE (FUTURE)
POSSIBLE EXTENSION (FUTURE)
LA CANADA
FOOTHILL FREEWAY
MONTROSE
HONOLULU AVE.
LA CRESCENTA AVE.
Oakmont Country Club
CITY LIMITS
FERN LANE PUMPING PLANT
FREEWAT RECTCLED WATER RESERVOIR
CITY OF GLENDALE
RECYCLED WATER
BURBANK
BRAND PARK
GRANDVIEW TANK
CITY LIMITS
BRAND PARK PUMPING PLANT
MWD G-1
MOUNTAIN AVE.
GLENOAKS BLVD
GRANDVIEW AVE.
KENNETH ROAD
HIGHLAND AVE.
VERDUGO PARK TREATMENT PLANT
VERDUGO ROAD
CANADA BOULEVARD
SPORTS COMPLEX PIPELINE
FERN LANE TANK
GLENDALE DRIVE
PASADENA
TO CITY OF PASADENA (FUTURE)
LOWER SCHOLL CANYON PUMPING PLANT
UPPER SCHOLL CANYON TANK
CHASE
PASADENA RECYCLED WATER RESERVOIR (FUTURE)
MOUNTAIN ST.
MWD G-1
CHEVY CHASE PIPELINE
GOLDEN STATE FREEWAY
ALLEN
WESTERN
SONORA
RIVERSIDE DRIVE
SAN FERNANDO ST.
GLENOAKS BLVD.
VENTURA FREEWAY
CHEVY
MWD G-2
SCHOLL CANYON LANDFILL
GLENDALE RECTCLED WATER TANK
GLEANOAKS BLVD.
UPPER SCHOLL CANYON PUMPING PLANT
GLENDALE WATER TREATMENT PLANT (SUPERFUND)
CONCORD AVENUE
WILSON AVENUE
BROADWAY
COLORADO STREET
PACIFIC AVENUE
CENTRAL AVENUE
BRAND BOULEVARD
GLENDALE AVENUE
CHEVY CHASE DR.
VERDUGO ROAD
NOT TO SCALE
LOS ANGELES/GLENDALE RECLAMATION PLANT RECYCLED WATER PUMPING PLANT
STATE FREEWAY
SAN FERNANDO ROAD
CHEVY CHASE DRIVE
FELIZ DR.
GLENDALE HIGH PUMPING PLANT
LOS ANGELES
LOS ANGELES
FOREST LAWN
TO CITY OF LOS ANGELES (FUTURE)
LEGEND
PUMP STATION
RESERVOIR OR TANK
RECYCLED WATER PIPELINE
WELLS
MWD SERVICE CONNECTIONS

FIGURE 4

CITY OF GLENDALE
SCHEMATIC DIAGRAM OF RECYCLED WATER SUPPLY SYSTEM

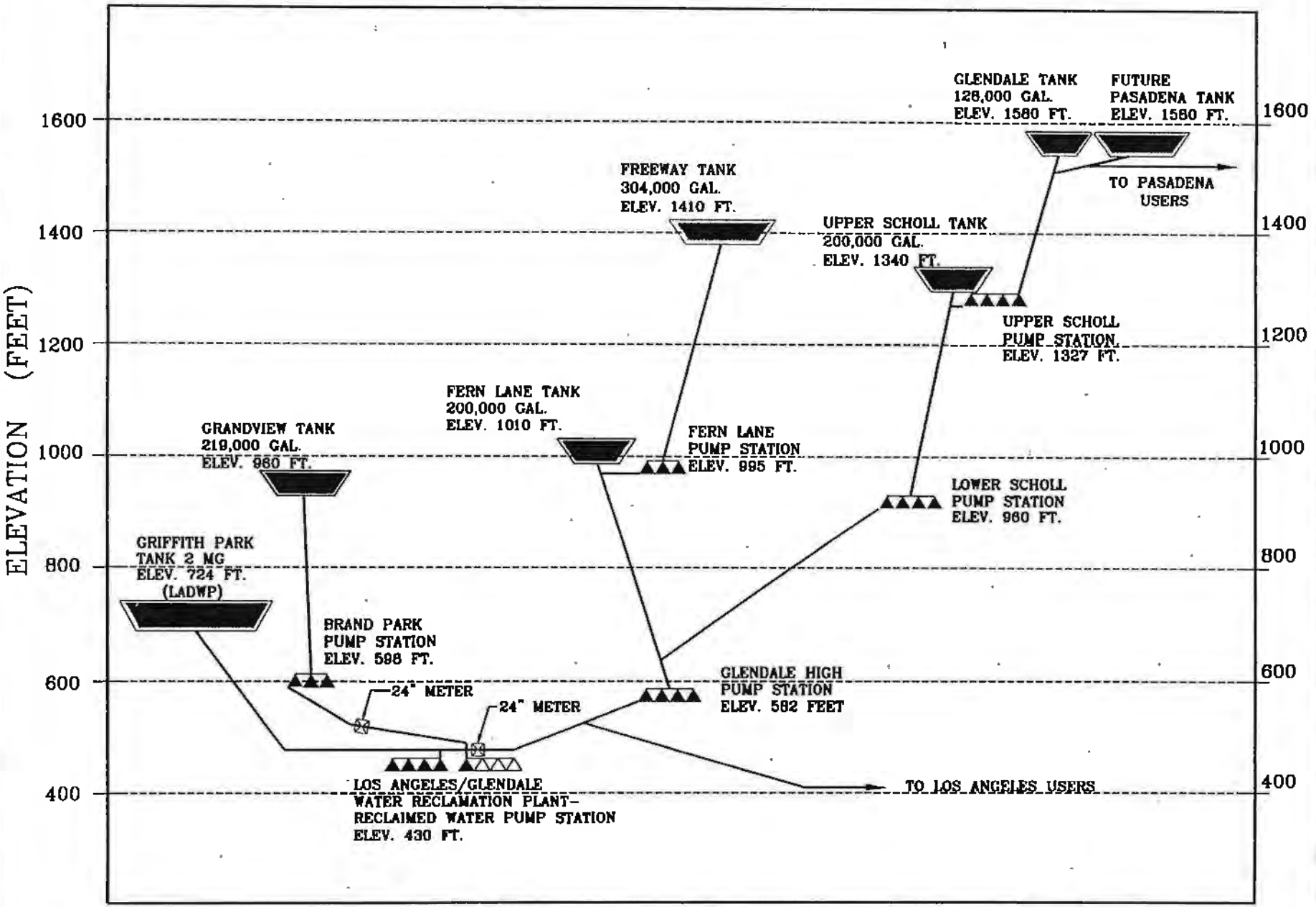


FIGURE 5

GLENDALE WATER TREATMENT PLANT AND WELL LOCATIONS

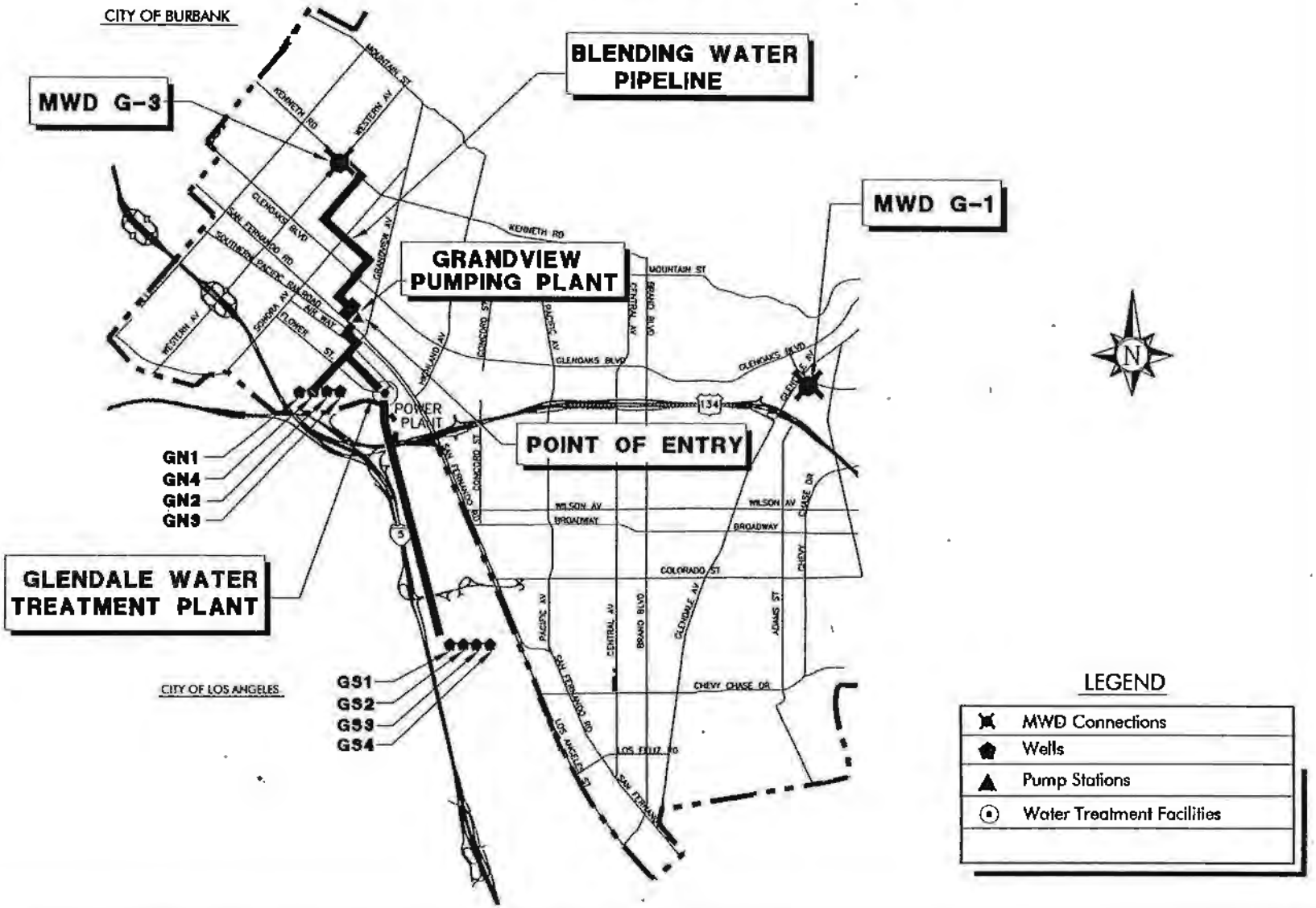
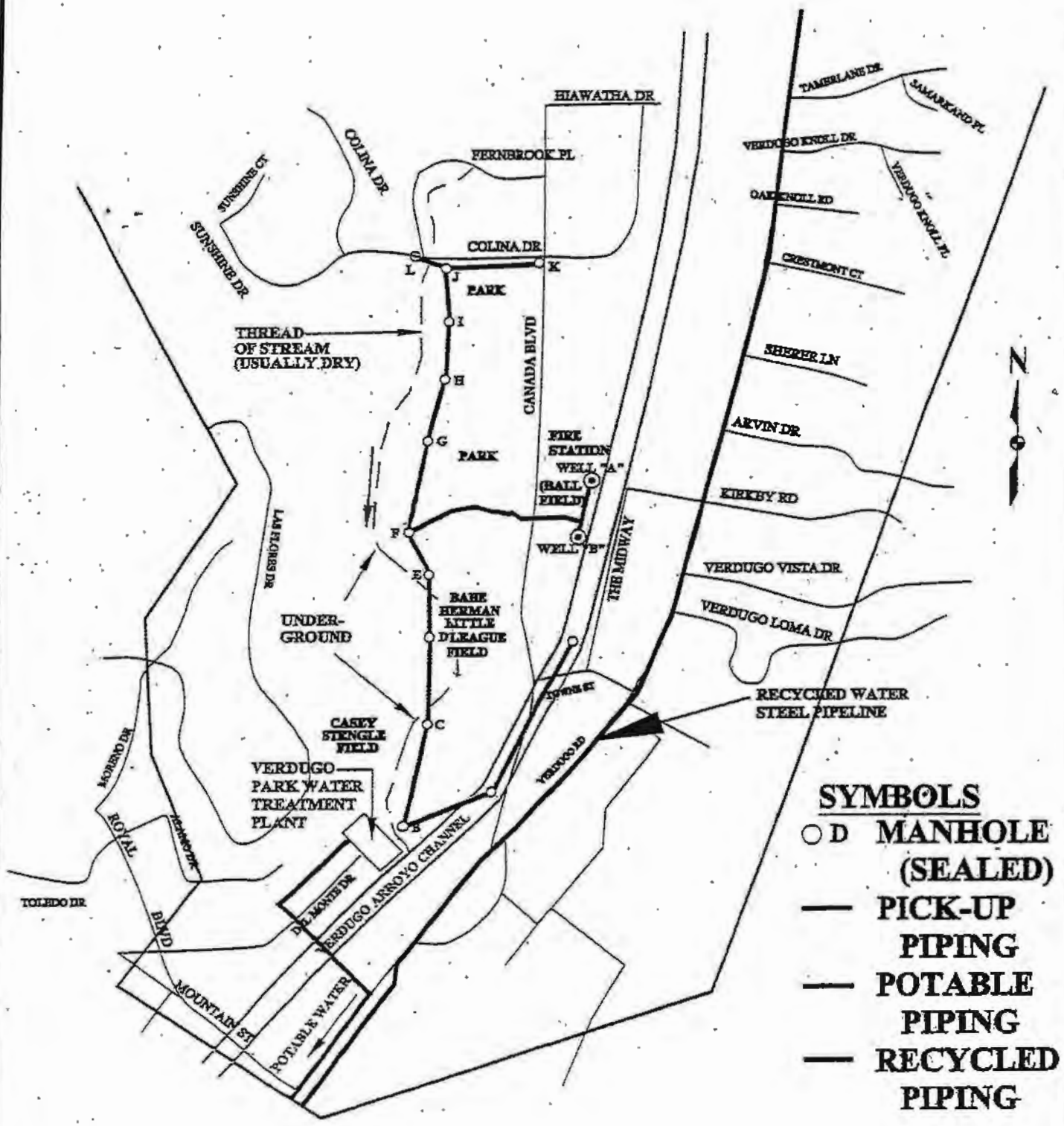


FIGURE 6

VERDUGO PARK WATER TREATMENT PLANT PICK-UP AND WELL SYSTEM



CITY OF GLENDALE
RECYCLED WATER USERS - SN 1990008
As of DECEMBER 2001

FIGURE 7

LOC. NO.	RECYCLED WATER USER PROJECT	Actual/Anticipated Delivery Date	User	Quantity A.F./year	Type of Use
	FOREST LAWN PROJECT				
1	Forest Lawn Memorial Park	1992	YES	200-400	Irrigation
2	1600 South Brand Median	1995	YES	6	Irrigation
4	323 W Garfield Avenue	2000	YES	2	Irrigation
	POWER PLANT PROJECT				
5	Caltrans - 943 West Doran Street	1978	YES	40-60	Irrigation
6	Glendale Grayson Power Plant	1978	YES	400-600	Cooling Towers
	VERDUGO SCHOLL PROJECT				
	PARKS and RECREATION - City of Glendale				
22	Adult Recreation Center	1995	YES	10	Irrigation
24	Armory	1996	YES	4	Irrigation
30	Central Library	1995	YES	4	Irrigation
31	City of Glendale - Fern Lane	1997	YES	60	Irrigation
32	Civic Auditorium	1996	YES	15	Irrigation
48	Colorado Boulevard - Parkway Irrigation	1997	YES	5	Irrigation
47	North Verdugo Road Median/La Cresenta Avenue	1996	YES	10	Irrigation
37	Glenoaks Park	1995	YES	5	Irrigation
40	Montecito Park	1995	YES	1	Irrigation
44	701 North Glendale Avenue - Median @ Monterey Road	1995	YES	6	Irrigation
43	741 S Brand Median	1995	YES	4	Irrigation
49	Parque Vaquero	1998	YES	2	Irrigation
51	Scholl Canyon Ballfield	1997	YES	20	Irrigation
50	Scholl Canyon Park	1996	YES	12	Irrigation
53	Sports Complex (Completed)	1998	YES	99	Irrigation
46	Verdugo Rd/Canada (South) Overpass	1995	YES	0.5	Irrigation
45	Verdugo Rd/Canada (North Median)	1996	YES	1.5	Irrigation
	CALTRANS (5 Meters):				
25	1970 E Glenoaks Boulevard (E/S)	1995	YES	15	Irrigation
25	1970 E Glenoaks Boulevard (W/S I2)	1995	YES	10	Irrigation
26	406 N Verdugo Road @ Chevy Chase	1995	YES	35	Irrigation
27	709 Howard Street @ Monterey Road	1995	YES	12	Irrigation
28	2000 E Chevy Chase Drive @ Harvey	1995	YES	4	Irrigation
	GLENDALE UNIFIED SCHOOL DISTRICT:				
35	Glendale High School	1995	YES	30	Irrigation
36	Glenoaks Elementary School	1998	YES	2	Irrigation
55	Wilson Junior High School	1995	YES	15	Irrigation
	OTHERS:				
33	Glendale Adventist Memorial Hospital	1997	YES(Partially)	20	Irrigation
42	Oakmont Country Club	1996	YES	250-350	Irrigation
23	Scholl Canyon Golf Course	1998	YES	150-250	Irrigation
39	Scholl Canyon Landfill (LACSD)	1997	YES	120	Dust Control/Soil Compaction
52	Scholl Canyon Landfill (PW)	1996	YES	25	Irrigation/Soil Compaction
54	Upper Scholl Pump Station	1996	YES	10	Irrigation
	Dual Plumbing:				
34	Glendale Community College	1996	YES(Partially)	25-35	Irrigation/Flushing Toilets
3	*PUBLIC WORKS - City of Glendale*	1978	YES	1.5	Street Cleaning
	BRAND PARK PROJECT				
7	Brand Park	1997	YES	55-65	Irrigation
8-16	Glenoaks Median (9 Meters)	1996	YES	30	Irrigation
17	Grand View Memorial Park	2001	YES(Partially)	50	Irrigation
20	Pelanconi Park	1996	YES	8	Irrigation
	Sub-TOTAL	***CURRENT METERS***	**42**	***1,775 - 2,415***	

GLENDALE WATER SUPPLY AND DEMAND (AF/YR)

(Use MWD Direct Deliveries for Blending)

FIGURE 8

	Fiscal Year	1989-90	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2010	2015	2020
(1)	**Water Demands (a)**	**25,857**	**25,176**	**28,056**	**29,382**	**28,881**	**31,346**	**32,270**	**29,678**	**31,229**	**33,435**	33,475	32,223	32,291	32,359	**32,429**	**33,432**	**34,926**	**36,877**
	Water Supplies:																		
(2)	*Water Production*																		
(3)	San Fernando Basin	5,771	4,373	4,805	5,090	4,979	5,535	5,555	5,575	5,588	5,601	5,626	5,651	5,676	5,701	5,725	5,843	5,843	5,843
(3A)																			
(4)	Power Plant	1,564	1,080	78	140	65	35	25	24	32	24	381	220	25	25	25	25	25	25
(5)	Glendale Water Treat. Plant (b)												6,300	6,600	6,600	6,600	6,600	6,600	6600
(6)	Forest Lawn	477	497	369	414	376	461	442	243	377	491	292	400	400	400	400	400	400	400
(7)	**Total:**	2,041	1,577	447	554	441	496	467	267	409	515	673	6,920	7,025	7,025	7,025	7,025	7,025	7,025
	Verdugo Basin																		
(8)	Wells 3,4, & 6	1,635	732	904	1,226	1,667	2,059	2,116	1,981	2,080	1,960	1,635	2,200	2,200	2,200	2,200	2,200	2,200	2,200
(9)	VPWTP						0	453	715	640	491	470	700	700	700	700	700	700	700
(10)	Other Production										0	0	0	0	0	0	0	0	0
(11)	**Total:**	1,635	732	904	1,226	1,667	2,059	2,569	2,696	2,720	2,451	2,105	2,900	2,900	2,900	2,900	2,900	2,900	2,900
	Recycled Water																		
	Brand Park Project							32	63	73	106	111	125	170	170	170	170	170	170
	Forest Lawn Project			348	299	280	292	344	239	191	200	242	350	350	350	350	350	350	350
	Power Plant Project	333	551	422	326	260	377	264	306	698	453	472	400	450	450	450	450	450	450
	Verdugo-Scholl Project					34	217	472	479	496	979	838.5	990	1000	1010	1020	1,040	1,060	1,080
(12)	**Total:**	333	551	770	625	574	886	1,112	1,087	1,458	1,738	1,664	1,865	1,970	1,980	1,990	2,010	2,030	2,050
	Metropolitan Water																		
(13)	Direct Deliveries (G1, G2, & G3)	21,848	22,316	25,935	26,977	26,199	27,905	28,122	25,628	26,642	28,731	29,033	20,538	20,396	20,454	20,514	21,497	22,971	24,902
(15)																			
(16)	**Total:**	21,848	22,316	25,935	26,977	26,199	27,905	28,122	25,628	26,642	28,731	29,033	20,538	20,396	20,454	20,514	21,497	22,971	24,902
(17)	**Total Water Supplies**	***25,857***	***25,176***	***28,056***	***29,382***	***28,881***	***31,346***	***32,270***	***29,678***	***31,229***	***33,435***	***33,475***	***32,223***	***32,291***	***32,359***	***32,429***	***33,432***	***34,926***	***36,877***

3) [(1) - 4,000 AF] * 20% return
5) 5,000 gpm @ 90%
6) Forest Lawn, et.al.
13) (1) - (7) - (11) - (12)

3A) (7) - (3) - (15)
16) (1) - (7) - (11) - (12)

(a) Projected demands from MWD

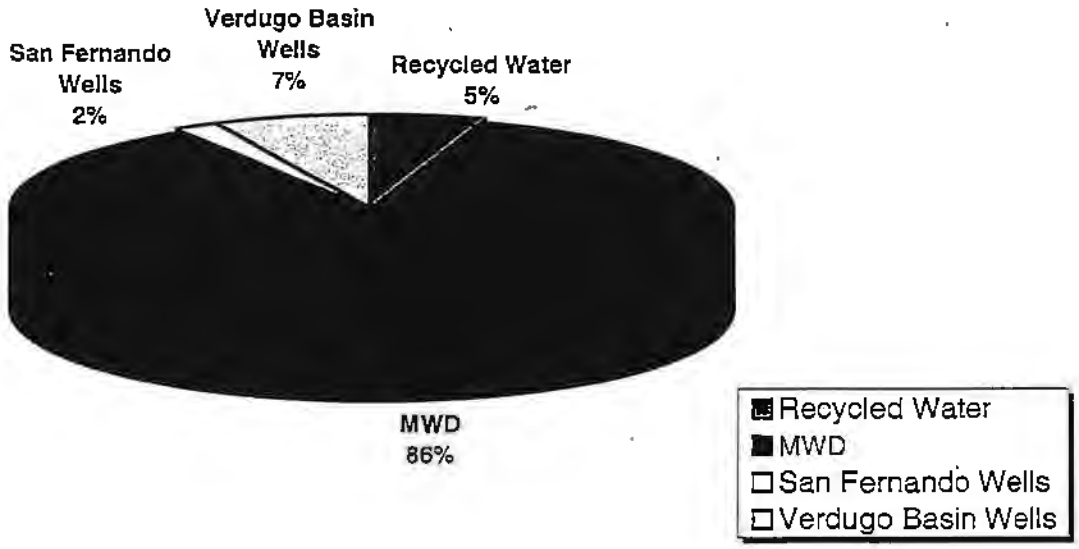
(b) Started operation Dec. 2000, not used by the system
Started delivering water to the system July 2001. 24-hr operation, 1/6/02

ed [5]

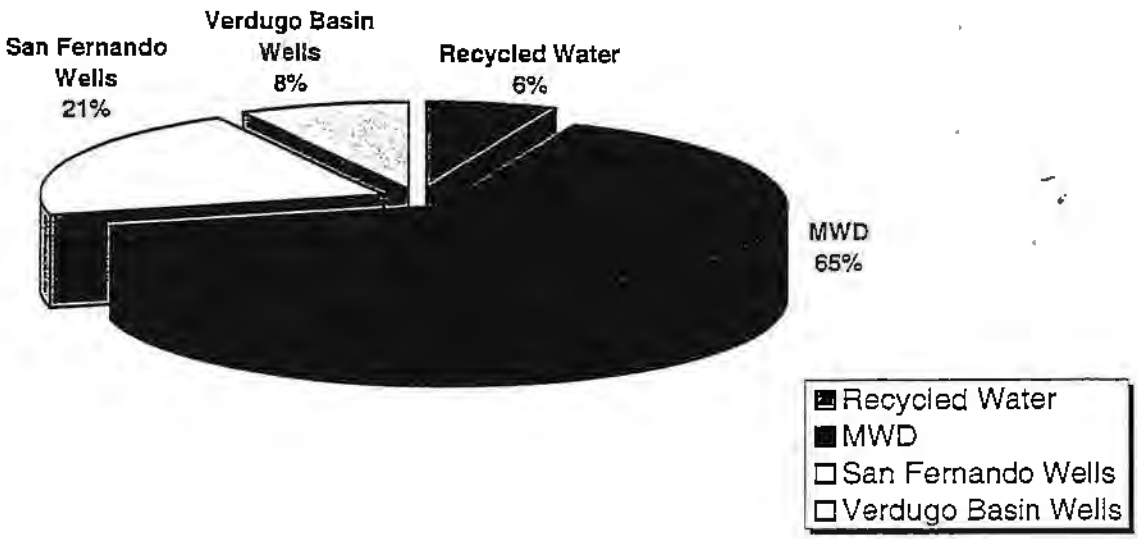
FIGURE 9

CURRENT PROJECTED SOURCES OF WATER

CURRENT MIX OF WATER SOURCES



YEAR 2020 MIX OF SUPPLIES



APPENDIX D

CITY OF SAN FERNANDO

PUMPING AND SPREADING PLAN

2001-2006 Water Years

CITY OF SAN FERNANDO

GROUNDWATER PUMPING AND SPREADING PLAN

OCTOBER 1, 2001 TO SEPTEMBER 30, 2006

2001-2002 Water Year

Prepared by:

Public Works Department

Engineering Division

117 Macneil Street

San Fernando, California 91340

APRIL 2002

TABLE OF CONTENTS

I. INTRODUCTION

The ground water rights of the City of San Fernando were defined by the JUDGMENT in Superior Court Case No. 650079, entitled "The City of Los Angeles, a Municipal Corporation, Plaintiff, vs. City of San Fernando, et. al., Defendants." The Final Judgment was signed on January 26, 1979.

On August 26, 1983, the Watermaster reported to the court pursuant to Section 10.2 of the Judgment that the Sylmar Basin was in condition of overdraft. On October 1, 1984, San Fernando and Los Angeles were assigned equal rights to pump the safe yield of the Basin (6,210 acre-feet) thus, San Fernando and Los Angeles were each allowed to pump approximately 3,105 acre-feet per year. Thereafter, on October 1, 1996, the safe yield of the Basin was determined to be 6,510 acre-feet per year. Therefore, San Fernando and Los Angeles are now allowed to each pump approximately 3,255 acre-feet per year.

In 1993, significant revisions were made to the Upper Los Angeles River Area (ULARA) Policies and Procedures with the addition of Section 2.9, Groundwater Quality Management. This addition has been made by the Watermaster and the Administrative Committee to affirm its commitments to participate in the cleanup and limiting the spread of contamination in the San Fernando Valley. This report is in response to Section 2.9.4, Groundwater Pumping and Spreading Plan.

The Groundwater Pumping and Spreading Plan is based on the water year, October 1 to September 30. The Draft Plan for San Fernando will be submitted in April to the Watermaster for the current water year.

II. WATER DEMAND

The annual total water demand for the last five years and the projected annual water demand for the next five years are shown on Table 2.1.

Water demand during the early 1990's was affected by drought conditions in the Southern California region. However, the City of San Fernando did impose voluntary conservation since 1977.

Projected water demands for the next five years is expected to slightly increase from the 1992-93 base year since public opinion is that drought conditions no longer exist and conservation habits will undoubtedly regress. The increase is therefore not from residential growth, but from a rebound of drought conditions and a re-establishment of commercial and industrial demand.

The projected water demand may vary significantly due to weather conditions, economic conditions and/or social conditions in the San Fernando area. A variance of $\pm$ 10 percent can be expected.

III. WATER SUPPLY

The water supply for the City of San Fernando is composed of locally produced and treated groundwater. Supplemental water is purchased from the Metropolitan Water District of Southern California (MWD). In case of emergency, there is an existing 6-inch water connection to the City of Los Angeles (DWP) water system at 12900 Dronfield Avenue, in Sylmar.

A. MWD: The amount of treated water purchased from the MWD has been changed beginning in 1997-98 through 2001 as reflected in the Historic and projected use of MWD water as shown in Table 2.1.

B. Production Wells: The City of San Fernando owns and operates four (4) wells that are on "active status" with the Department of Health Services as indicated below:

1. ***Well 2A***
   Location: 14060 Sayre Street, Sylmar
   Capacity: 2100 GPM

2. ***Well 3***
   Location: 13003 Borden Avenue, Sylmar
   Capacity: 1100 GPM

3. ***Well 4A***
   Location: 12900 Dronfield Avenue, Sylmar
   Capacity: 400 GPM

4. ***Well 7A***
   Location: 13180 Dronfield Avenue, Sylmar
   Capacity: 800 GPM

C. Quantity (Acre-Feet) of Water Pumped From Each Well (2000-2001)

1.	Well 2A	1,854.60
2.	Well 3	741.69
3.	Well 4A	306.87
4.	Well 7A	792.44
	Total	3,695.60

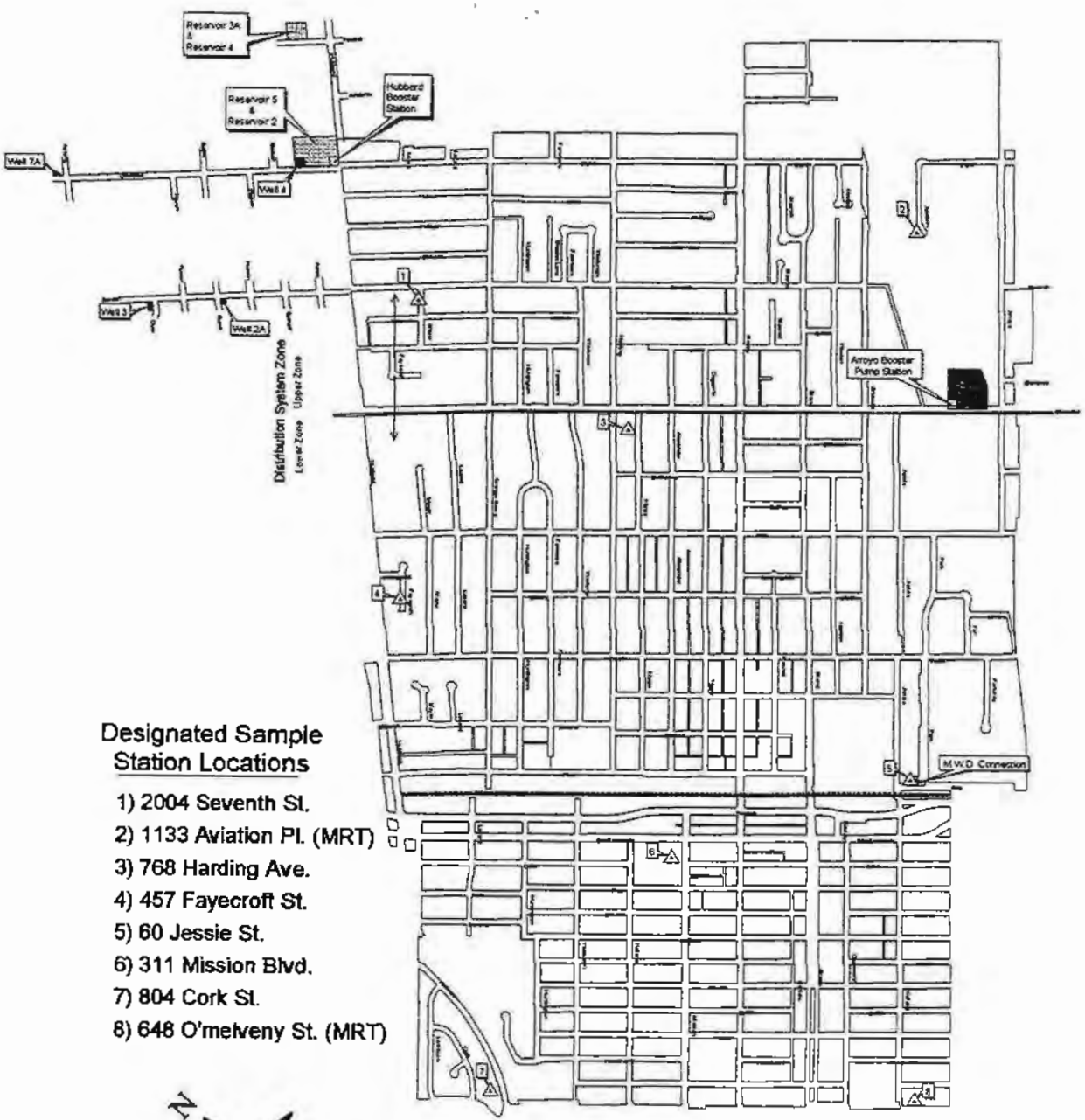
D. Wells Groundwater Level Data

1.	Well 2A	1053.5'	Taken 5/01
2.	Well 3	1076.2'	Taken 3/02
3.	Well 4A	1008.1'	Taken 3/02
4.	Well 7A	1071.3'	Taken 3/02

E. Well Locations

See next page

CITY OF SAN FERNANDO
Water Distribution System



IV JUDGMENT CONSIDERATIONS

A. Native and Imported Return Water

The safe yield of the Sylmar Basin is 6,510 acre-feet and the cities of San Fernando and Los Angeles have equal rights to pump from this basin. After subtracting the overlaying pumping rights of two private parties, San Fernando and Los Angeles are each allowed to pump approximately 3,255 acre-feet per year.

B. Stored Water Credit

San Fernando and Los Angeles each have the right to store water in the Sylmar Basin and the right to extract equivalent amounts.

As of September 30, 2001 the City of San Fernando has a stored water credit of 957.57 acre-feet accumulated during previous years through the 00-01 water year.

TABLE 2.1
FIVE-YEAR HISTORIC AND PROJECTED WATER DEMAND
PUMPED AND IMPORTED WATER
CITY OF SAN FERNANDO

(Acre – Feet)

FY	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
DEMAND										
WELLS	3,258.59	3,307.91	3,528.29	3,766.19	3,686.60	3,300	3,400	3,400	3,500	3,500
MWD	315.59	0	0	0	0	500	500	500	500	500
TOTAL	3,574.18	3,307.91	3,528.29	3,766.19	3,686.60	3,800	3,900	3,900	4,000	4,000
ACTUAL						PROJECTED				

APPENDIX A

WATER QUALITY DATA

SEE ATTACHED WATER QUALITY REPORT, 2001

CITY OF SAN FERNANDO

- WELL NO. 3
- WELL NO. 4A
- WELL NO. 2A
- WELL NO. 7A

(In Progress)

APPENDIX B

POLICIES AND PROCEDURES

(By ULARA)

WATERMASTER SERVICE

UPPER LOS ANGELES RIVER AREA

POLICIES AND PROCEDURES

February 1998

APPENDIX E

CRESCENTA VALLEY WATER DISTRICT

PUMPING AND SPREADING PLAN

2001-2006 Water Years

GROUNDWATER PUMPING

PLAN

WATER YEARS

OCTOBER 1, 2001 TO SEPTEMBER 30, 2006

Prepared by
CRESCENTA VALLEY
WATER DISTRICT

APRIL 2002

TABLE OF CONTENTS

TABLES

I. INTRODUCTION

The ground water rights of the Crescenta Valley Water District (CVWD) were defined by the JUDGEMENT in Superior Court Case No. 650079, entitled "The City of Los Angeles, a Municipal Corporation, Plaintiff, vs. City of San Fernando, et. al., Defendants". The Final Judgement was signed on January 26, 1979.

In 1993 and in February 1998, significant revisions were made to the Upper Los Angeles River Area (ULARA) Policies and Procedures with the addition of Sections or Groundwater Quality Management and various new reports and appendices. This addition has been made by the Watermaster and the Administrative Committee to affirm its commitments to participate in the cleanup and limiting the spread of contamination in the San Fernando Valley. This report is in response to Section 5.4, Groundwater Pumping and Spreading Plan. Since no groundwater spreading has been performed or is planned at this time by the CVWD, only plans/projections for groundwater pumping and treatment are discussed in this report.

The Groundwater Pumping Plan is based on the water year, October 1 to September 30. The Draft Plan for CVWD will be submitted in March or April to the Watermaster for the current water year.

II. WATER DEMAND

The annual total water demand for the last five years and the projected annual water demand for the next five years is shown in Table 2.1.

Water demand during the last five years has been affected by the fact that we have had less than normal amounts of rainfall in the Crescenta Valley since 1997-98. The CVWD has now implemented a voluntary water conservation program (Phase I) and the District's Board of Directors may implement more restrictive measures if not successful. Conservation incentives in the form of rebates for ultra-low flush toilets and high efficiency clothes washers are currently being provided along with continuous water conservation information.

The 2000-01 base year had slightly less production compared to the prior year (peak year) but was still much greater than historical averages. In any case, the water consumption patterns remain very high and as of September 2001, concluded a third consecutive year with less than average precipitation with the likelihood of a fourth dry year at the time of this writing.

Therefore, projected water demand is expected to increase again in 2001-2002, but then decrease somewhat thereafter. The decrease will hopefully be the result of a focused water conservation effort by the District and its customers.

Regardless of water conservation programs, the water demand seems to vary significantly due to weather conditions in the CVWD service area. This can be attributed to the residential character of the District and the large percentage of water consumption for outdoor landscaping. A variance of ±25% can be expected.

III. WATER SUPPLY

The water supply for the CVWD is composed of locally produced and treated groundwater and water from the Metropolitan Water District of Southern California (MWD) purchased on a wholesale basis from the Foothill Municipal (FMWD).

A. PRODUCTION WELLS

The CVWD has ten active wells that are currently in operation. Historic and projected production from these wells is shown in Table 3.1. The CVWD wells produce water which typically contain nitrate concentrations above the 45mg/L maximum contaminant level (MCL) set by the U.S. Environmental Protection Agency (EPA) and State of California Department of Health Services (DHS). As a result, an ion exchange process, the Glenwood Nitrate Removal Plant, is used to treat a portion of the produced water. Untreated water and water treated at the Glenwood Plant are blended to produce water with less than the nitrate MCL. The blended water is distributed by the CVWD system.

The District's active wells range in age from 50 to 75 years and are beyond their useful life. During 2000-01 construction was nearly completed on the first well in the District's well replacement program with the goal of replacing existing groundwater production capacity with new, modern wells over the next 10 years. The first well, although of low capacity, is awaiting permit approval from California Department of Health Services, while a second well will be completed in the summer of 2002. As the capacity of these wells initially appears to be far less than anticipated, the replacement program will be suspended until a grant-funded Verdugo Basin monitoring well study is completed in 2004.

B. GLENWOOD NITRATE REMOVAL PLANT

The Glenwood ion exchange nitrate removal plant began operation in January 1990. The plant has been out of operation for extended periods in 1992-93 and in 1997 when repairs were necessary. In the past year, the plant was in full operation continuously, although not

utilized quite as heavily as in prior years since overall groundwater production was down due to basin level decline, resulting in more imported water, thereby reducing the need for treatment. This trend should continue in the near term. The historic and projected production from the Glenwood Plant is shown in Table 3.2.

C. PICKENS GRAVITY TUNNEL PRODUCTION

A small portion of the total CVWD demand is supplied by the Pickens Gravity Tunnel. Historic and projected production from Pickens Tunnel is shown in Table 3.3.

D. MWD

The amount of treated water purchased from the MWD via FMWD is expected to remain high over the next five years to make up the difference between decreased groundwater production capacity and customer demand. Historic and projected use of MWD water is shown in Table 3.4.

IV. JUDGEMENT CONSIDERATIONS

The allowable pumping for CVWD's share of the Verdugo Basin is 3,294 acre-feet annually. Except for 2002-03, estimated future pumping is expected to realize this adjudicated quantity. For years 2003-04 and beyond, a return to normal rainfall conditions is assumed to replenish the groundwater levels and production capacity in the Verdugo Basin. However, this assumption is speculative and optimistic. For the past seven water years, the Watermaster, with approval from the ULARA Administrative Committee, has allowed CVWD to over-pump their rights in the Basin. This may or may not continue for 2001-2002 and 2002-2003. Future consideration for excess pumping in the Verdugo Basin is now addressed in the February 1998 "Policies and Procedures", Section 2.3.4. Either party, Glendale or CVWD, may pump in excess of their adjudication as long as total production does not exceed 7150 AF/year, as reviewed on an annual basis by the Watermaster. There is no projection of excess pumping beyond 2004-2005 for CVWD as it is assumed the City of Glendale will eventually develop their full prescriptive right in the Verdugo Basin.

TABLE 2.1
HISTORIC AND PROJECTED WATER DEMAND

(Acre-Feet)

96-97	97-98	98-99	99-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
5483	4991	5394	5884	5614	5770	5200	5500	5600	5700
ACTUAL					PROJECTED				

TABLE 3.1
HISTORIC AND PROJECTED COMBINED WELL AND TUNNEL GROUNDWATER PRODUCTION

(Acre-Feet)

96-97	97-98	98-99	99-2000	2000 2001	2001 2002	2002-2003	2003-2004	2004 2005	2005-2006
3672	3747	3797	3698	3412	3400	3200	3300	3400	3500
ACTUAL					PROJECTED				

TABLE 3.2
HISTORIC AND PROJECTED GLENWOOD NITRATE REMOVAL PLANT PRODUCTION BEFORE BLENDING

(Acre-Feet)

96-97	97-98	98-99	99-2000	2000-2001	2001 2002	2002-2003	2003-2004	2004-2005	2005-2006
1562	1391	1281	1137	989	900	850	900	900	1000
ACTUAL					PROJECTED				

NOTES:

(1) The Glenwood Treatment Plant has a capacity of 2.7 MGD of blended water.

(2) The Glenwood Treatment Plant began operation January 1990.

TABLE 3.3
HISTORIC AND PROJECTED PICKENS TUNNEL WATER PRODUCTION

(Acre-Feet)

96-97	97-98	98-99	99-2000	2000 2001	2001 2002	2002-2003	2003-2004	2004-2005	2005 2006
6	62	65	54	61	60	58	56	56	58
ACTUAL					PROJECTED				

TABLE 3.4
HISTORIC AND PROJECTED USE OF MWD TREATED WATER

(Acre-Feet)

96-97	97-98	98-99	99-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
1811	1244	1597	2186	2202	2370	2000	2200	2200	2200
ACTUAL					PROJECTED				

NOTES:

(1) All values shown above are for treated water.