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
1999-2004 Water Years

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 1311
Los Angeles, CA 90051-0100

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

1999-2004 WATER YEARS

ULARA WATERMASTER
Melvin L. Blevins, P.E.

ASSISTANT WATERMASTER
Richard A. Nagel, P.E.

WATERMASTER ADMINISTRATOR
Patricia T. Kiechler

WATERMASTER STAFF

Mario Acevedo, P.E.	Report Consultant
Andy J.V. Agra	Groundwater Modeler/GIS Analyst
Panla L. Giles	Senior Clerk
Hadi S. Jonny, P.E.	Groundwater Specialist/ Modeler
Mark Mackowski, CEG	Consulting Geologist
Tina C. Wilson, P.E.	Report Investigator
Billie Washington	Clerk

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

JULY 2000

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

As Watermaster for the Upper Los Angeles River Area (ULARA), I am pleased to submit the 2000 ULARA Pumping and Spreading Plan. This report is prepared for compliance with Section 5.4, revised February 1998, of the ULARA Watermaster's Policies and Procedures. This section established the Watermaster's responsibility for water quality management in the ULARA groundwater basins. This includes plans submitted by the five major water rights holders, which might incorporate changes in recharge, such as spreading, changes in pumping, or changes in pumping patterns, especially in relation to the present and future plans for groundwater cleanup.

The Pumping and Spreading Plans for the 1999-2004 Water Years features the impact of increased pumping at 9,000 gpm full-time by the City of Burbank's Operable Unit. Glendale's North and South OUs operation has been delayed by completion of the amended water permit issuance process for the new requirements of the Impaired Water Policy 97-005. However, it is the intention of Glendale following approval of its permit by DHS to annually pump approximately 7,625 AF from the operable unit. In the Verdugo Basin Glendale has limited pumping capacity. The City of San Fernando can pump all its groundwater rights from the Sylmar Basin, and Crescenta Valley Water District (CVWD) is pumping all its assigned water rights from the Verdugo Basin, and, on an interim basis continues to increase its groundwater pumping activities until Glendale has the ability to pump its full water right. This increase is subject to an annual review and approval by the Watermaster and Administrative Committee. At the encouragement of the Watermaster, Los Angeles has been increasing its pumping and during the next five years will pump approximately 40,000 acre-feet (AF) more than its average pumping for the past two decades. This practice has begun to lower some of Los Angeles' basin storage that had been close to 300,000 AF.

Currently, there are five groundwater cleanup plants in operation: the City of Los Angeles' North Hollywood OU, the City of Burbank's Granular Activated Carbon (GAC) Treatment Plant, the Burbank OU, CVWD's Glenwood Nitrate Removal Plant, and the Pollock Wells Treatment Plant. The Glendale North and South OU are expected to be on-line by the end of 2000. The Conditional Use Permit was approved for the City of Los Angeles' Headworks Well Field Remediation Project in March 2000.

The Watermaster will continue to address the capacity limitations, in above-average runoff years, for the Hansen and Tujunga Spreading Grounds. Last year a mitigation plan for the Hansen Spreading Grounds was developed and will be implemented this year. The groundwater model

this year simulates the effect on groundwater elevations of projected pumping in the San Fernando Basin (SFB) for the next five years. The most significant feature is the pumping cone of depression formed in Layer I (Upper Zone) as a result of the Tujunga and Rinaldi-Toluca wells of Los Angeles and the Burbank OU pumping (Plate 3).

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

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 details the responsibility for this annual Pumping and Spreading Plan that any party who produces groundwater 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 the information needed to project 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 ULARA 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 that the Administrative Committee is to review and approve by July of the current Water Year.

This is the July 2000 Groundwater Pumping and Spreading Plan for ULARA, prepared following the revisions of the Policies and Procedures (July 1993 and February 1998). This report provides guidance to the Administrative Committee for use in protecting the water quality within ULARA, improving basin management, and providing overall protection for each party's water rights.

III. PLANS FOR THE 1999-2004 WATER YEARS

A. Projected Groundwater Pumping for 1999-00 Water Years

The total 1999-2000 ULARA pumping is projected at 127,914 AF (Table 3-1B), approximately 29,000 AF above the 20-year average (1979-99). The estimated pumping for 2000-2001 is 122,427 AF, a 5,000 AF increase above the historical average. (Appendices A-E).

In 1999-00, the City of Burbank plans to pump 14,430 AF (Table 3-1A), an increase of 6,900 AF as compared to its past five years pumping, and overall, nearly a 363 percent increase (10,530 AF) from its historical 20-year average. This increase is due to the production by the Burbank OU. As of October 1, 1999, Burbank has a storage credit of 50,771 AF. Burbank's annual return water credit is approximately 4,500 AF and its right to physical solution water is 4,200 acre-feet per year (AF/yr). The Consent Decree II was entered on June 22, 1998. The anticipated plant capacity is 9,000 gpm (14,500 AF/yr). Pumping in excess of Burbank's annual return water and physical solution right can come from its banked storage, or from the City of Los Angeles by purchasing a portion of Los Angeles' stored water, similar to the Physical Solution Provision covered in Sections 9.1 and 9.4 of the ULARA Judgment.

CVWD plans to pump 4,132 AF, which is an increase of about 1,100 AF compared to its average pumping since 1979. The larger number reflects pumping a portion of Glendale's allocation of the Verdugo Basin safe yield, which Glendale is currently unable to pump. This additional pumping was approved by the Watermaster and the Administrative Committee. Pumping beyond the CVWD's prescriptive right of 3,294 AF will still require the Watermaster's annual approval.

The City of Glendale will resume significant pumping from the SFB when the Glendale North and South OUs come on-line beginning with 2,225 AF in 1999-00. Its annual SFB extraction rights are approximately 5,500 AF. Glendale plans to extract 2,900 AF from the Verdugo Basin in 1999-00, an increase of about 600 AF greater than its historical average, and 500 AF more than the average over the past five years. Glendale anticipates pumping an increased amount for 2000-2001. Glendale had storage credit of 69,665 AF as of October 1, 1999.

The City of Los Angeles plans to pump about 98,182 AF this year from the San Fernando Basin, approximately 16,000 AF above its 1979-99 annual average and about 11,700 AF more than the past five-year average (1994-99). A total of 2,494 AF of groundwater will be pumped from the Sylmar Basin, about a 500 AF decrease as compared to the 1979-99 average and 650 AF less

than the last five years (1994-99). The amount of Los Angeles' pumping is dependent upon the availability of imported water supplies, particularly, from the two Los Angeles Aqueducts. In 2000-2001, Los Angeles plans to pump 86,930 AF from the SFB, an increase of 6 percent compared to its average pumping. As of October 1, 1999, Los Angeles has a storage credit of 254,895 AF in the SFB and 3,090 AF in the Sylmar Basin.

In 1999-00 the City of San Fernando plans to pump 3,550 AF from the Sylmar Basin, 200 AF above its normal pumping for the past five years and 600 AF above the past 20-year average. San Fernando has storage credit of 1,991 AF as of October 1, 1999.

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 1999-00 are given in Tables 3-1A, 3-1B, and 5-1.

B. Constraints on Pumping as of 1999-00

SAN FERNANDO BASIN

City of Burbank - In January 1996, a portion of Burbank's pumping capability was restored when the Lockheed-Burbank Operable Unit (OU) was activated under Phase I of the Consent Decree with the USEPA. The Lockheed-Burbank OU was pumping at about 7,000 gpm. The facility was shutdown for a year beginning in mid-December 1997 to change the Liquid Phase GAC contactors to a downward flow system. A problem was discovered by the Department of Health Services (DHS) that caused delays in re-activating the facility. The facility was returned to service on December 12, 1998. Following a six-month operation transition, the city will begin the 18-year operation of the facility on December 12, 2000 under the Second Consent Decree. In the SFB, Burbank accumulates return flow credits from the water delivered to the hill, mountain and valley floor areas, and receives storage credits for the return water rights that it is unable to pump. In addition, Burbank has the right to purchase from Los Angeles up to 4,200 AF/yr as physical solution water. Total average annual deliveries are at levels of 9,000 gpm or approximately 14,500 AF/yr.

City of Glendale - Essentially, all of Glendale's pumping has been curtailed due to groundwater contamination by TCE and PCE. At present, Glendale is unable to pump its water rights to return waters (recharge from delivered water), physical solution waters, or stored water credits from the SFB. However, Glendale continues to accumulate 20

percent return water credit for water delivered to the hill, mountain and valley floor areas of the SFB. The unpumped water rights are added to storage credits. In addition, Glendale has the right to purchase from Los Angeles up to 5,500 AF/yr of physical solution water. The Glendale Operable Unit Water Treatment Plant has been constructed to convey treated water via the Grandview Pumping Station to the Glendale potable water system. The major agreements between Glendale, the Glendale Respondents Group (GRG) and the USEPA have been signed. The GRG retained CDM Consulting Engineers (CDM) to design and construct the required facilities. To date, construction has been completed and the parties are waiting for the State-DOHS issuance of a permit to operate the facilities. It is anticipated the city will start receiving water from this facility in the fall of year 2000. CDM will also operate and maintain the facility when it is completed.

City of Los Angeles - Several of the well fields within the SFB can not be fully utilized because of groundwater contamination, primarily from volatile organic contaminants (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 taken out-of-service, and the Pollock and Headworks Well Fields. The Pollock Well Field was restored when the Pollock Wells Treatment Plant was dedicated March 17, 1999. The Headworks Well Field Remediation Project (Headworks Project) will restore four wells in the Headworks Well Field by treating groundwater at a rate of approximately 13,000 gpm. The Conditional Use Permit was secured in March 2000. Design of the on-site treatment and distribution facilities began in November 1999 and will extend to February 2001. Construction of the on-site facilities is scheduled for completion in August 2002. The Tujunga Well Field has also experienced low levels of TCE and nitrates and is undergoing a contaminant evaluation phase.

SYLMAR BASIN

City of San Fernando - All of San Fernando's groundwater rights are pumped from the Sylmar Basin, where there are no limitations related to contamination.

City of Los Angeles - The number of wells at the Mission Well Field has been reduced from six to three, because of the age and condition of these wells. In late 1997, a new flow meter was installed and main line work was conducted. The Mission Wells will be pumped throughout the year at about 207 AF per month.

VERDUGO BASIN

Crescenta Valley Water District - All of Crescenta Valley's groundwater rights are in the Verdugo Basin. Contamination from VOCs is minimal, however, nitrate contamination is widespread. High nitrate levels are reduced by sending a portion of the pumped groundwater through a nitrate removal plant and blending with Metropolitan Water District (MWD) water to meet drinking water standards. Crescenta Valley was given permission by the Watermaster and Administrative Committee to pump in excess of its prescriptive right on an annual basis until the City of Glendale is able to pump its entire prescriptive right. CVWD will seek approval from the Watermaster and the Administrative Committee for continued pumping in excess of its prescriptive right.

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 pump capacity and availability, rather than a chemical contaminant problem. Additional extraction capacity in the Verdugo Basin will be developed.

TABLE 3-1: ESTIMATED CAPACITIES OF ULARA WELL FIELDS

Party/Well Field	Number Inactive Wells	Number Active/Standby Wells	Estimated Capacity (cfs)
	SAN FERNANDO BASIN		
City of Los Angeles			
Aeration	1	7	3
Erwin	3	5	10
North Hollywood	7	29	129
Pollock		3	6
Rinaldi-Toluca		15	126
Tujunga		12	117
Verdugo	3	5	13
Whitnall	1	5	15
City of Burbank	3	10	24
City of Glendale *		8	11
TOTAL:	18	99	454
	SYLMAR BASIN		
City of Los Angeles		3	9
City of San Fernando		4	9
TOTAL:		7	18
	VERDUGO BASIN		
CVWD		11	18
City of Glendale		5	15
TOTAL:		16	33

*Pending approval of Glendale North/South OU by DHS.

TABLE 3-1A: 1999-00 ACTUAL AND PROJECTED GROUNDWATER EXTRACTIONS
(acre-feet)

Party/Well Field	Total	1999			2000								
		Oct.	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
							SAN FERNANDO BASIN						
City of Los Angeles													
AERATION	1,451	0	0	0	0	172	139	190	190	190	190	190	190
ERWIN	1,593	198	135	58	82	229	171	0	0	0	240	240	240
HEADWORKS	-	0	0	0	0	0	0	0	0	0	0	0	0
No HOLLYWOOD	21,673	2630	2221	2548	2178	2801	1396	0	0	1210	2230	2230	2230
POLLOCK	2,374	53	0	0	0	0	161	360	360	360	360	360	360
RINALDI-TOLUCA	35,191	4778	4289	5932	4144	4764	174	0	0	2410	2900	2900	2900
TUJUNGA	29,234	4528	4347	5529	4423	4174	263	0	0	0	1990	1990	1990
VERDUGO	4,098	410	460	529	406	536	437	0	0	0	440	440	440
WHITNALL	2,569	282.98	267	229	193	220	147	0	0	0	410	410	410
TOTAL:	98,183	12,880	11,719	14,825	11,426	12,896	2,888	550	550	4,170	8,760	8,760	8,760
City of Burbank	1414	145	3	1	15	7	16	205	205	205	205	204	204
City of Glendale	2225	65	19	43	11	5	19	35	46	46	646	646	646
Lockheed	13,016	1232.85	1158	1198	1124	929	1083	1048	1048	1049	1049	1049	1049
TOTAL:	114,839	14,323	12,899	16,067	12,577	13,836	4,006	1,838	1,849	5,469	10,659	10,659	10,658
							SYLMAR BASIN						
City of Los Angeles	2,494	266	342	85	0	0	1	300	300	300	300	300	300
City of San Fernando	3,550	360	292	303	252	218	253	312	312	312	312	312	312
TOTAL:	6,044	626	634	388	252	218	254	612	612	612	612	612	612
							VERDUGO BASIN						
Crescenta Valley Water District	4,132	408	368	351	258	194	331	300	347	375	400	400	400
City of Glendale	2,900	289	263	211	251	198	283	235	234	234	234	234	234
TOTAL:	7,032	697	631	562	509	392	614	535	581	609	634	634	634
ULARA TOTAL:	127,914	15,646	14,164	17,017	13,337	14,446	4,873	2,985	3,042	6,690	11,905	11,905	11,904

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

Party/Wellfield	Historical Average Pumping		Projected Groundwater Pumping				
			SAN FERNANDO BASIN				
City of Los Angeles	1979-99(A)	1994-99(B)	1999-00	2000-2001	2001-2002	2002-03	2003-04
AERATION	666	1587	1450	2280	2280	2280	2280
ERWIN	5025	1809	1593	1680	1440	0	0
HEADWORKS	2183	0	0	0	1810	12670	11760
No HOLLYWOOD	32548	22635	21673	19630	20300	23200	18850
POLLOCK	1513	1513	2374	2520	2520	2520	2160
RINALDI-TOLUCA	20868	34041	35191	34760	37170	42480	34520
TUJUNGA	6843	19867	29234	20110	26900	31840	25870
VERDUGO	5274	2391	4098	3080	2640	0	0
WHITNALL	7257	2604	2569	2870	2460	0	0
TOTAL City of Los Angeles	**82177**	**86447**	**98182**	**86930**	**97520**	**114990**	**95440**
City of Burbank (C)	1427	2189	1414	1800	1800	1800	1800
LOCKHEED BOU (D)	2573	5449	13016	12315	12336	12336	12336
City of Glendale (C)	1436	432	2225	7625	7625	7625	7625
TOTAL San Fernando Basin	**87613**	**94517**	**114837**	**108670**	**119281**	**136751**	**117201**
			SYLMAR BASIN				
City of Los Angeles	3046	3147	2494	3492	3492	3492	3492
City of San Fernando	2944	3300	3550	3600	3700	3700	3700
TOTAL Sylmar Basin	**5990**	**6447**	**6044**	**7092**	**7192**	**7192**	**7192**
			VERDUGO BASIN				
Crescenta Valley Water District	2616	3726	4132	3600	3550	3500	3500
City of Glendale	2266	2377	2900	3065	3065	3230	3230
TOTAL Verdugo Basin	**4882**	**6103**	**7032**	**6665**	**6615**	**6730**	**6730**
TOTAL ULARA	98485	107067	127913	122427	133088	150673	131123

IV. GROUNDWATER PUMPING 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. Under the terms of the Second Consent Decree, Burbank will take over the Lockheed-Burbank OU treatment plant as the long-term primary operator beginning December 12, 2000 for 18 years. The Glendale OU is constructed and the operating systems have been undergoing testing since January 2000 under the direction of the USEPA and DHS.

B. Active Groundwater Pumping and Treatment Facilities

Lockheed-Burbank OU

The remediation of groundwater contamination in the SFB has been significantly enhanced by the startup of the Lockheed-Burbank OU on January 3, 1996. The Lockheed-Burbank OU, consisting of air-stripping towers followed by liquid and gaseous phase GAC polishers, produces 9,000 gpm or 14,000 AF annually. The USEPA Consent Decree Project was removed from production on December 15, 1997 for plant modifications required under Consent Decree II. Due to problems in obtaining a new operating permit from the DHS, the treatment plant did not resume operations until December 1998. Only testing water was produced during the outage. The plant is now fully operational and in December 2000 the City of Burbank will take over control of the facility.

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

This facility is designed to treat by air-stripping up to 2,000 gpm of groundwater. The treated water is delivered to Los Angeles' water distribution system. Between April 1999 and February 2000 the facility was out of service due to a series of unrelated problems including a mechanical problem with the main influent control valve.

GAC Treatment Plant - City of Burbank

This facility has been operated by the City of Burbank since November 1992. Two wells (Nos. 7 and 15) have been reactivated to deliver water to a GAC plant for removal of VOCs. The treated water is delivered to the Burbank distribution system and supplements the Lockheed-Burbank

OU water. The plant will be operated in the parallel configuration. Burbank plans to operate the GAC Treatment Plant at the following flow rates during the 1999-2000 Water Year:

October – April	0 gpm
May - September	1,800 gpm

Glenwood Nitrate Removal Plant - CVWD

Groundwater in the wells of the CVWD is high in nitrates. A portion of the pumped groundwater is treated in an ion-exchange process and blended with untreated water or purchased water, resulting in acceptable nitrate levels.

Pollock Wells Treatment Plant

Pollock Wells Treatment Plant, treating 3,000 gpm of groundwater, began operating in March 1999. This project is being funded by the City of Los Angeles. The Pollock Project's main focus is to reduce rising groundwater flowing past Gaging Station F-57C-R and to enhance 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 blending of the chlorinated groundwater to reduce nitrate levels. The processed water is delivered to Los Angeles Department Water and Power's (LADWP) distribution system.

TREATED GROUNDWATER IN THE SAN FERNANDO VALLEY
TABLE 4.1 ACTUAL GROUNDWATER TREATMENT
1985-1999

Water Year	Burbank GAC	Lockheed Aqua Detox	Lockheed Burbank OU	CVWD Glenwood Nitrate Removal Plant	North Hollywood Aeration Facility	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
Total AF	**13,044**	**4,815**	**27,621**	**10,013**	**13,314**	**1,513**	**70,320**

TABLE 4.2 PROJECTED GROUNDWATER TREATMENT 1999-2004								
	Burbank GAC	Lockheed BOU	CVWD Glenwood Nitrate Removal Plant	North Hollywood Aeration Facility	Glendale North/South OUs	Los Angeles' Pollock Wells Treatment Plant	Los Angeles' Headworks Well Field Remediation Project	Annual Total AF
1999-2000	1,114	13,016	1,200	1,450	1,800	2,374		20,954
2000-01	1,500	12,315	1,300	2,280	7,200	2,520	-	27,115
2001-02	1,500	12,336	1,400	2,280	7,200	2,520	1,820	29,056
2002-03	1,500	12,336	1,400	2,280	7,200	2,520	12,670	39,906
2003-04	1,500	12,336	1,400	2,280	7,200	2,160	11,760	38,636
Total AF	7,114	62,339	6,700	10,570	30,600	12,094	26,250	155,667

C. Projected Groundwater Pumping and Treatment Facilities

Glendale North and South OU

Under the Record of Decision for the Glendale North and South OUs, many new facilities have been constructed consisting of: shallow extraction wells, a combined 5,000 gpm water treatment plant, piping to convey the untreated water from the wells to the treatment plant, a piping system from the treatment plant to Glendale's potable distribution system, a facility to blend the treated groundwater with water from the MWD to reduce nitrate levels, and a disinfection facility. The original proposed site of the treatment facility was selected for an animation studio constructed by DreamWorks, Inc. The treatment plant site was relocated to City property at the Glendale Recycling Center approximately 500 feet from the previously proposed location. The major Agreements between City of Glendale, the Glendale Respondents Group (GR's), and the USEPA were signed during 1999. The GRG retained Camp-Dresser-McKee (CDM) to design and construct the required facilities. Construction was completed in 1999. Glendale has been waiting for the State-DOHS issuance of a permit to operate the facilities. This process has taken longer than anticipated because the facility must undergo the screen of the Impaired Water Policy 97-005. The City anticipates it will start receiving water from this facility in the fall of year 2000. The City's annual delivery of treated water will be about 7,200 AF/yr. and will meet about 25 percent of projected near-term water demands.

Headworks Well Field Remediation Project

The Headworks Well Field Remediation Project is intended 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 13,000 gpm. The Conditional Use Permit was secured in March 2000. Construction of the on-site facilities is scheduled for completion in August 2002.

D. Groundwater Remediation Projects

Many privately owned facilities in the SFB have been found to have groundwater contamination, and are under Clean-up and Abatement Orders from the RWQCB. Each facility has numerous monitoring wells and most have pumping wells and treatment plants. The RWQCB is in the process of evaluating and closing a significant number of cases in the underground tank program

E. Dewatering Operations

Metropolitan Transit Authority (MTA)

As part of the planned transportation system in Los Angeles County, the MTA is constructing the Universal City Subway Station. This activity requires temporary groundwater dewatering. The construction project will be completed in June 2000 when the trains are expected to start running. During the years of construction, about 1700 AF were discharged to storm drains which flow into the Los Angeles River under an existing National Pollutant Discharge Elimination System (NPDES) permit. The Watermaster and the Administrative Committee are reviewing the final phase of construction and transfer to the MTA Operations Group in order to continue monitoring any possible long-term dewatering of the site.

Permanent Dewatering Operations

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

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 City of Los Angeles operates the Headworks Spreading Grounds. The LACDPW in cooperation with the City of Los Angeles operates the Tujunga Spreading Grounds. 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 1999-2000 Water Year. Estimated capacities are shown in Table 5-1A.

B. Future Spreading Operations

East Valley Water Recycling Project

The East Valley Water Recycling Project (EVWRP) will take tertiary-treated water from the Tillman Water Reclamation Plant for spreading at the Hansen Spreading Grounds. The RWQCB, DHS, and the ULARA Watermaster have approved a Phase IA Demonstration Project that allows for the spreading of 10,000 AF/yr during a three-year demonstration period that is anticipated to begin the summer of 2000. Twelve monitoring wells were installed in the EVWRP study area to identify the nature of groundwater quality associated with the spreading of recycled water. The monitoring will provide an evaluation of the impact of the saturated and unsaturated zones on the concentrations of total organic compounds and nitrogen compounds, as well as the expected rate of movement, under known and predicted groundwater gradients. If the results of the Demonstration Project are favorable, the spreading of recycled water may be increased up to 35,000 AF/yr.

Headworks Spreading Grounds

The Headworks Spreading Grounds project would restore San Fernando Basin 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. The Headworks Spreading Grounds Stakeholders Group working with the Los Angeles Department of Water and Power have identified compatible multi-use programs for the site including: nature trails, biking paths, educational guides.

C. Actual and Projected Spreading

Table 5-1 shows the actual and projected spread volumes for the 1999-2000 Water Year. Estimated capacity of each basin is detailed on Table 5-2. As shown in Table 5-1, the 1999-2000 Water Year will experience below average recharge activities. Overall, approximately 14,480 AF will be spread as compared to the historical average of 34,399 AF, and as compared to the past five-year average of 37,860 AF. Rainfall precipitation on the valley fill is estimated at 14.43 inches for 1999-00 as compared to the long-term average of 18.57 inches per year and the previous five-year average of 20.79 inches per year.

TABLE 5-1A: 1999-00 SPREADING OPERATIONS

(acre-feet)

	Operated by:						
	LACDPW				LADWP	LACDPW and LADWP	
Month	Branford	Hansen	Lopez	Pacoima	Headworks	Tujunga	Total
Oct-99	13	18	0	0	0	0	31
Nov-99	31	9	11	0	0	0	51
Dec-99	10	14	4	0	0	0	28
Jan-00	117	18	2	79	0	13	229
Feb-00	79	2,510	3	1,590	0	763	4,945
Mar-00	143	2,250	3	934	0	1,140	4,470
Apr-00	41	1,180	133	296	0	645	2,295
May-00	16	255	5	56	0	682	1,014
Jun-00	51	205	15	59	0	420	750
Jul-00	17	24	17	0	0	396	454
Aug-00	17	0	0	0	0	178	195
Sep-00	15	0	0	0	0	3	18
TOTAL	550	6,483	193	3,014	0	4,240	14,480
1969-99 Average	509	15,048	570	7,296	2,479	9,388*	34,399
1994-1999 Average	507	12,425	617	9,155	0	9,530	37,860

Table 5-1B: HISTORICAL PRECIPITATION

(inches per year)

1969-99 Average	1994-99 AV	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00**
18.57	20.79	32.7	12.03	15.17	33.6	9.81	14.43

* - Includes native and imported waters.

** - Estimated.

Big Tujunga: Water available for spreading in storage not including recession flows equals 1,210AF. Current inflow as of 6/4/98 is 97cfs.

Pacoima: Water available for spreading in storage not including recession flows equals 968 AF. Current inflow as of 6/4/98 is 61 cfs.

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	8	1,000
Hansen	Shallow basin	105	54,000
Lopez	Shallow basin	13	5,000
Pacoima	Med. depth basin	111	29,000
	Operated by LADWP		
Headworks	Shallow basin	28	22,000
	Operated by LACDPW and LADWP		
Tujunga	Shallow basin	130	28,000
	TOTAL:	395	139,000

D. Hansen and Tujunga Spreading Grounds Task Force

During the 1997-98 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 phone call 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 environmental conditions to 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 is affected by the Bradley-East Landfill, located approximately 3,000 feet downgradient. The RWQCB and the Watermaster's Office prohibit groundwater inundation of the 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 this, an alert groundwater level, with a 10-foot buffer zone, was established in the late 1980s. The Hansen Spreading Grounds Mitigation Plan simply established a new location to record the groundwater levels – 1,000 feet further downgradient from its existing location. This new monitoring well location is also adjacent to the existing Bradley-East Landfill. The Watermaster's Office estimates 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 immediately upgradient from 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.

As is typical in 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 years when above-average volumes of water are spread, the methane has migrated and caused elevated methane gas 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 runoff 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 spreading surface water. In concept, this should contain 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 any heavy storm runoff in 1998-99, this plan was not implemented. In the mean time the Bureau of Sanitation has proposed having their consultant conduct a full study to identify the most effective alternative to solve this problem.

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) in the Pacoima Area. 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 personnel. Concentrations of TCE were found to be as high as 24,000 ppb at this site, which is the highest levels 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-0, approximately one and one quarter mile downgradient of the site. PA-01 was sampled on March 11, 1998 and more constituents were found than the three detected in April 1997. The VOCs detected: 1,1-DCA (~0.7 µg/L), PCE (~24 µg/L), TCE (~5.3 µg/L), 1,1, DCE (~13 µg/L), Cis-1,2,-DCE (~1.5 µg/L), 1,1,1-TCA (~9.3 µg/L), Toluene (~1.3 µg/L). PA-02 was installed three-quarters mile downgradient of PA-01 and was sampled on March 11, 1998. PCE was detected (~ 1.1 µg/L).

In February 2000 a CEQA Notice of Exemption was approved for a Holchem Inc. pilot study and the pilot test work plan was adopted by DTSC. Results of the pilot study were expected in May 2000. The Consent Decree was signed in April 2000 allowing the remedial investigation to begin.

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 2000 Pumping and Spreading Plans" as 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 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 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 relevant data are available. The model is actively updated.

B. Model Input

The input data of this model scenario is illustrated in Table 7-1. Table 7-1A is the Basin Recharge, which consists of precipitation, delivered water, hill and mountain runoff, spreading grounds, and sub-surface inflow. Table 7-1B is the Basin Extraction of major producers such the City of Los Angeles, City of Burbank, City of Glendale, and other individual producers. Both tables represent a projected value for the five-year study, from Fall 1999 to Fall 2004 except for the first half of water year 1999-00 where the actual values were known.

Under 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 1999-00 where actual values were known. The Los Angeles County Department of Public Works estimated the spreading recharge for the second half of the water year. The values of the Sub-surface inflow from the adjacent basins are constant in all 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 1998-99. The water year 1998-99 experienced a very low groundwater elevation due to large extraction from the basin (141,750 acre-feet) and low recharge. The valley floor rain precipitation for the same year was 60 percent below the 100-year mean. At the close of every Water Year, the Watermaster staff updates the model-input files with the actual Basin Recharge and Extraction data. This activity covers the period from 1980 to 1999.

C: Simulated Groundwater and Flow Directions

After running the model for five stress periods (Water Year 1999-2004), each 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 directions 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 1999 to Fall 2004 stress period and is shown on Plate 3 for Layer 1 and Plate 4 for Layer 2. **The contours' positive values depict the decline in water elevation and the negative values depict the rise in groundwater elevation from Fall 1999.**

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

- Finally, Plates 7-9 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 2004

- 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 OU pumping increases to 13,500 AF/yr by the 1999-00 Water Year. The radius of influence extends as far as 6,445 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 cone) of the Glendale OU and Headworks Wells.

Plate 2: Simulated Groundwater Contour Model Layer 2 – Fall 2004

- The most significant features are the cones of depression near the Rinaldi-Toluca (R-T), North Hollywood (NH), Burbank OU and Headworks Well Field (HW) areas. Except for the Burbank OU, over 75 percent of the R-T (34,520 AF/yr), NH (18,850 AF/yr), and HW (11,760 AF/yr) pumping is derived from Layers 2-4.

Plate 3: Change in Groundwater Elevation Model Layer 1 – Fall 1999 to Fall 2004

- As shown in Plate 3, the basinwide trend is a rise in the groundwater elevations over the five-year study period, with the exception of the immediate areas near the Lockheed, Headworks, Glendale-North, Glendale South, and the Pollock well fields.

- The 'big picture' reason for the rise in water levels is that basin extractions are projected to decline over the 5-year study period compared to the heavy pumping of 1998-99.

- The water table near the Rinaldi-Toluca Well Field rises by about 10 feet and declines approximately 45 feet near the Burbank OU. The area near the Burbank OU is substantially impacted because extractions increase to 13,000 AF/yr beginning in 1999-2000, which is 4,000 AF/yr increase since the 1998-99 period and an almost 600 percent increase as compared to the long term average (1979-99).

- The water table near the Glendale North OU wells will decline between 10 to 20 feet and approximately 10 feet near the South OU Wells. Full-scale operation of the OU plant is expected to begin by the 2000-01 Water Year. The North OU Wells will deliver 4,560 AF/yr and the South OU Wells 3,040 AF/yr.

- The area near the Tujunga and Rinaldi-Toluca will experience a 10 to 32 foot rise in water table. The area near the North Hollywood, Erwin, whitnall, Verdugo, and Headworks will experience a 10 to 33 foot depression in the water table.

- The water table will rise as much as 100 feet near the Hansen Spreading Grounds, primarily due to the 10,000 AF/yr increase from the EVWRP, beginning in 2000.

Plate 4: Change in Groundwater Elevation Model Layer 2 – Fall 1999 to Fall 2004

- The area near the Tujunga, Rinaldi-Toluca and West North Hollywood well fields will experience a 5 to 25 foot rise in the water table. The area near the East North Hollywood, Erwin, Whitnall and Verdugo will experience a 5 to 20 foot depression in water table.

- The Headworks Well Field is planned for reactivation in 2002-03. This well field has been out-of-service since 1987. The inactivity has contributed to a rise in the water table and an increase in groundwater storage in this area. The reactivation of the well field (11,760 AF/yr) will significantly influence pumping and groundwater flow patterns. The shift to reactivate and pump the Headworks Wells will be offset by a reduction in pumping the lower River Supply Conduit Wells, consisting of the Erwin, Whitnall and Verdugo Well Fields. The Headworks Well Field pumping will also substantially contribute to balancing basinwide groundwater storage. The total drawdown at the Headworks area will be almost 38 feet.

Plate 5: Simulated Groundwater Flow Direction Model Layer 1 – Fall 2004

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

- The Rinaldi-Toluca, North Hollywood, Headworks, 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).

- One observation is that a groundwater divide apparently develops just north of the Verdugo and Burbank Public Service Department (PSD) 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. Another water divide developed between Headworks and the Glendale North OU wells primarily due to the pumping from the Headworks Well Field.

Plate 6: Simulated Groundwater Flow Direction Model Layer 2 – Fall 2004

- Similar to Plate 5, a groundwater divide forms between the Verdugo and Burbank PSD wells and the Burbank OU, Erwin and Whitnall wells and between Headworks and the Glendale North OU wells. The effect of the Rinaldi-Toluca, North Hollywood, Headworks, 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 2004

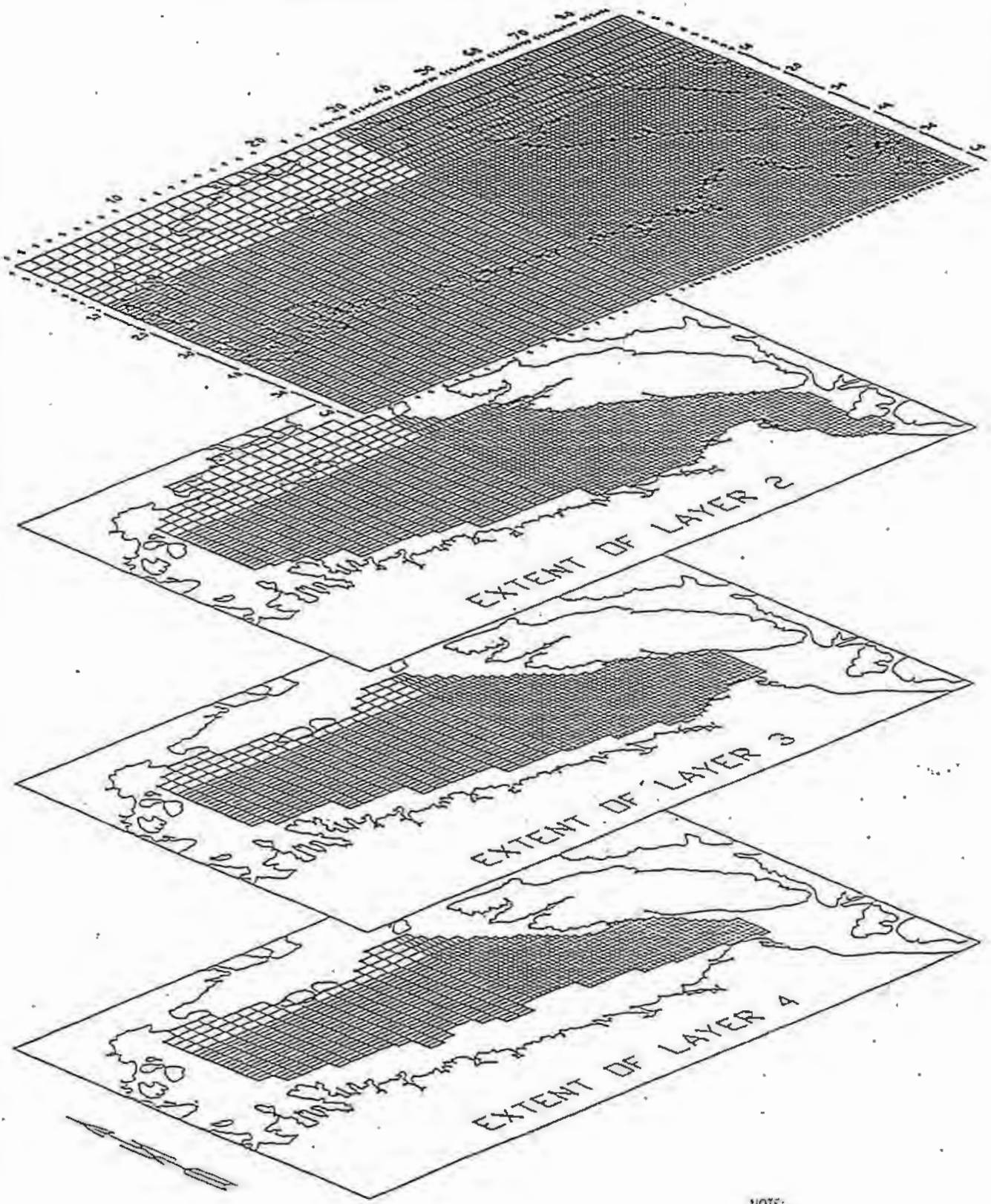
- Plates 7-9 depict the most recent TCE, PCE and NO_3 contaminant plumes that are superimposed onto the interpolated horizontal direction of groundwater movement for Layer 1, Fall 2004 The Burbank OU appears to contain the >5,000 µg/L TCE and PCE plumes and a portion of the 1,000-5,000 µg/L TCE and PCE plumes. The uncaptured portion of these plumes will migrate in the direction of the Los Angeles River Narrows Area (southeasterly) and towards the Glendale OU and Headworks wells.

- The Burbank OU pumping (14,500 AF/yr) tends to flatten the horizontal gradient in a southeasterly direction and slow the natural movement of groundwater southeasterly of the Burbank OU area plume.

- The Headworks wells pumping tends to capture the major portion of the uncaptured plumes by Burbank OU wells.

- The Glendale North and South OU Wells (7,200 AF/yr) and the Pollock Wells (2,400 AF/yr) have a less pronounced effect on Layer 1, in part because 25 percent of the Glendale OU pumping is from Layer 2 and 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

TABLE 7-1

Model Input
Pumping and Spreading Scenario
Water Years 1999 - 2004

Table 7-1A

	BASIN RECHARGE (AF/Y)																	
	RAINFALL (IN/Y)		PERCOLATION (A)			H&M (B)	SPREADING GROUNDS (B)							SUB-SURFACE INFLOW (B)				
WATER YEAR	VALLEY	HILL & MTN	VALLEY FILL	RETURN WATER	SUB TOTAL	HILL & MTN	BRANFORD	HANSEN	HW	LOPEZ	PACOIMA	TUJUNGA	SUB - TOTAL	PACOIMA	SYLMAR	VERDUGO	SUB - TOTAL	TOTAL RECHARGE
1999-00	14.38	19.02	9,989	57,651	67,640	3,243	550	11,483	-	194	3,014	4,240	19,481	350	400	70	820	91,184
2000-01	18.57	23.06	12,874	61,525	74,399	3,939	438	22,973	-	579	6,127	6,696	36,813	350	400	70	820	115,971
2001-02	18.57	23.06	12,874	61,525	74,399	3,939	438	22,973	-	579	6,127	6,696	36,813	350	400	70	820	115,971
2002-03	18.57	23.06	12,874	61,525	74,399	3,939	438	22,973	-	579	6,127	6,696	36,813	350	400	70	820	115,971
2003-04	18.57	23.06	12,874	61,525	74,399	3,939	438	22,973	-	579	6,127	6,696	36,813	350	400	70	820	115,971

Table 7-1B

	BASIN EXTRACTION (AF/Y)																	
	LADWP (C)										BURBANK (C)			GLENDALE (C)			OTHERS (C)		
WATER YEAR	AE	EW	HW	NH	PO	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 (F. LAWN & SEARS)	TOTAL EXTRACTION
1999-00	-1,450	-593	0	-21,673	-2,374	-35,191	-29,234	-4,098	-2,569	-97,182	-1,800	-13,016	-342	-25	-1,332	-888	-2,975	-618	-118,178
2000-01	-2,280	-1,680	0	-19,630	-2,520	-34,760	-20,110	-3,080	-2,870	-86,930	-1,800	-12,315	-342	-25	-4,560	-3,040	-2,975	-618	-112,605
2001-02	-2,280	-1,440	-1,810	-20,300	-2,520	-37,170	-26,900	-2,640	-2,460	-97,520	-1,800	-12,336	-342	-25	-4,560	-3,040	-2,975	-618	-123,216
2002-03	-2,280	0	-12,670	-23,200	-2,520	-42,480	-31,840	0	0	-114,990	-1,800	-12,336	-342	-25	-4,560	-3,040	-2,975	-618	-140,686
2003-04	-2,280	0	-11,760	-18,850	-2,160	-34,520	-25,870	0	0	-95,440	-1,800	-12,336	-342	-25	-4,560	-3,040	-2,975	-618	-121,136

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

PROJECT: *WATERMASTER*
PROJECT NO.: *PS99-04*
DATE: 6/20/00

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, in effect, restored Burbank's groundwater pumping capability, and will restore Glendale's San Fernando Basin pumping capability by the end of 2000.

City of Los Angeles

The Watermaster approves of Los Angeles' projected average annual pumping for 1999-00 to 2003-04 of approximately 98,000 AF/yr. This is approximately 16,000 AF/yr more than their pumping over the period 1979-99 and 12,000 AF/yr more than the last five years (1994-99). As of October 1, 1999, Los Angeles' accumulated stored water credit is 254,895 AF. This increased pumping will reduce Los Angeles' stored water account by approximately 40,000 AF. In addition, the loss of Los Angeles' Headworks, Crystal Springs and Pollock Wells has contributed to rising of the basin's water levels in the Los Angeles River Narrows area, resulting in a build-up in groundwater storage and an increase in rising groundwater outflow from the San Fernando Basin. For this reason the Watermaster is pleased with Los Angeles' efforts to operate the Pollock Wells Treatment Plant beginning March 1999 and the continued progress towards reactivating the Headworks Wells in approximately 2002.

City of Burbank

The Watermaster is particularly encouraged that Burbank's groundwater pumping capability has been fully restored through the activation of the Burbank OU. Burbank's stored water credit has already begun to show the impact of this pumping dropping from 57,543 AF (October 1, 1998) to 50,771 AF (October 1, 1999). The projected Burbank OU extractions of 14,500 AF/yr, beginning 1999-2000, is approximately 10,000 AF more than its annual return flow credit. Without the use of physical solution water, Burbank's stored water bank will be depleted within five years, unless additional physical solution water is taken from Los Angeles' stored water.

City of Glendale

Glendale's reduction in groundwater pumping due to groundwater contamination has contributed to an increase in their stored water credit from 19,841 AF (October 1, 1987) to 69,665 AF (October 1, 1999). Reinstitution of Glendale's pumping ability through the North and South OUs will provide 7,200 AF/yr of groundwater supply. This is in excess of their average annual return flow credit of 5,400 AF. Glendale can make up the difference from either banked storage

or purchasing up to 5,500 AF/yr as physical solution water from Los Angeles. The Glendale OU could be operated for at least 35 years before depletion of Glendale's stored water bank.

Model Simulations

The model simulations demonstrate that a significant portion of the "hot spot" TCE and PCE contamination in the Burbank area will be captured by the Burbank OU Wells. However, the remaining uncaptured portion will migrate towards the Los Angeles River Narrows area. Reactivation of the Headworks Wells, the Glendale North and South OUs and the Pollock Wells Treatment Plant should intercept much of this remaining contaminated groundwater. However, timely implementation of each one of these projects is important from not only a groundwater cleanup aspect but also from managing basin storage and groundwater quality in this area. Table 3-1B details anticipated start-up dates for these projects.

The change in groundwater elevation contours illustrates that over the next five years, a 10 foot rise in water levels can be anticipated near the Rinaldi-Toluca Well Field, and as much as a 45 foot drawdown near the Burbank OU Well. The rise in the water table is the result of the decline in the projected basin extractions over the 5-year study period compared to heavy pumping in 1998-99. The area near the North Hollywood, Erwin, Whitnall, Verdugo, and Headworks will experience a 10 to 33 foot depression in water table. The Headworks Well Field planned for reactivation in 2002-3 will substantially contribute to balancing basinwide groundwater storage. The total drawdown at Headworks (Layer 2) will be almost 38 feet. The water table near the Glendale North OU wells will decline between 10 to 20 feet and approximately 10 feet near the South OU wells. The model demonstrates that the radius of influence for the Burbank OU extends to approximately 6,445 feet downgradient and that the combined pumping of the Burbank OU, Rinaldi-Toluca, and North Hollywood Wells tends to flatten the horizontal gradient and slows the movement of groundwater within the contaminant plumes south of the Burbank OU.

Pacoima Area Contamination

The Pacoima Area groundwater investigation is of particular concern to the Watermaster because the contamination is upgradient of all the well fields in the SFB and is only 2.5 miles upgradient of Los Angeles' Tujunga Well Field. The Watermaster will continue to take an active role, along with the regulatory agencies of DTSC, RWQCB, and LADWP. The Watermaster will support extensive actions to define the nature and extent of contamination, and if necessary, support additional activities to control and contain contaminant migration. In response to the contamination, LADWP should be commended for installing two monitoring wells downgradient

of the Holchem, Inc., site. The first well, PA-01, is approximately 0.5 mile south of the site and has detected levels of TCE, PCE, 1,1, DCE, and 1,1,1-TCA between 5-25 µg/L. PA-02, located 1.25 miles south of Holchem, Inc., has shown 1.1 µg/L for PCE. In February 2000 a CEQA Notice of Exemption was approved for a Holchem Inc. pilot study. Results of the pilot study were expected in May 2000. The Consent Decree was signed in April 2000 allowing the remedial investigation to begin.

Hansen and Tujunga Spreading Grounds

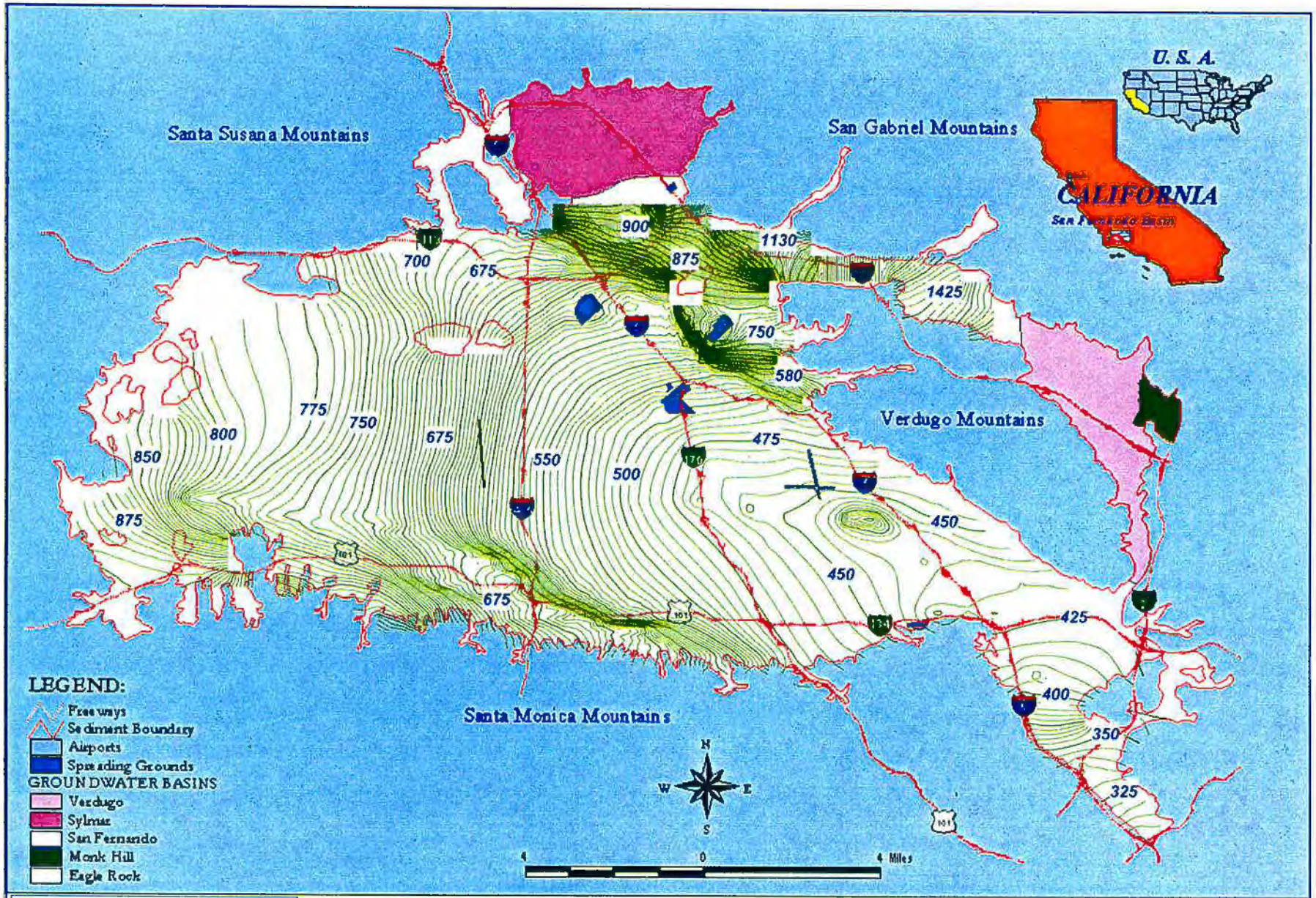
The Watermaster will continue to take an active lead in solving the landfill problems near both the Hansen and Tujunga Spreading Grounds. Last year the Watermaster wrote a letter to Waste Management, Inc., and the RWQCB to support change in the location of the monitoring well readings to 1,000 downgradient of the existing location and adjacent to the Bradley-East Landfill. This action alone should provide an additional 7,000 AF/yr. of spreading capacity for the Hansen Spreading Grounds.

The Watermaster will continue to work with the City's Bureau of Sanitation, County Public Works and the Environmental Affairs Department to address methane gas at the Sheldon-Arleta Landfill, which is downgradient of the Tujunga Spreading Grounds. The goal is to improve the use of the spreading grounds and reduce the methane at the nearby school. During the water year 1999-2000 the Tujunga Task Force agreed to limit spreading to 50 cfs. This spreading level is protective of the school. The present intake capacity is 250 cfs.

Verdugo Basin

The Watermaster also supports CVWD's increased pumping in the Verdugo Basin until Glendale has the ability to utilize its full water right. The Watermaster will continue to provide support in Glendale's pursuit to utilize all of its water rights in the Verdugo Basin. The Watermaster applauds Crescenta Valley Water District's continued operation of the Glenwood Nitrate Removal Plant in the Verdugo Basin.

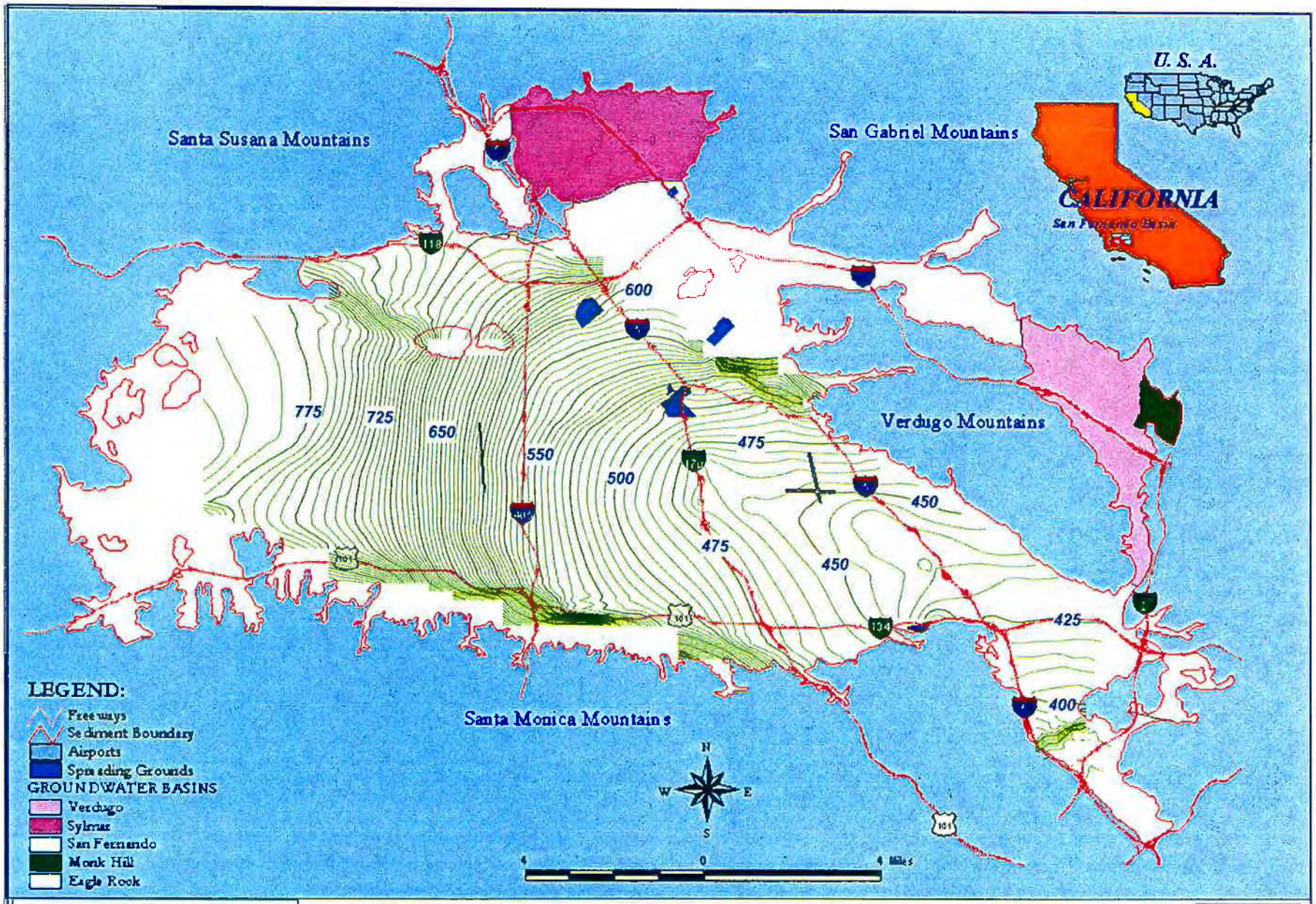
PLATES



Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
1999-2004 WATER YEARS

Simulated Groundwater Contours - Model Layer 1
FALL 2004

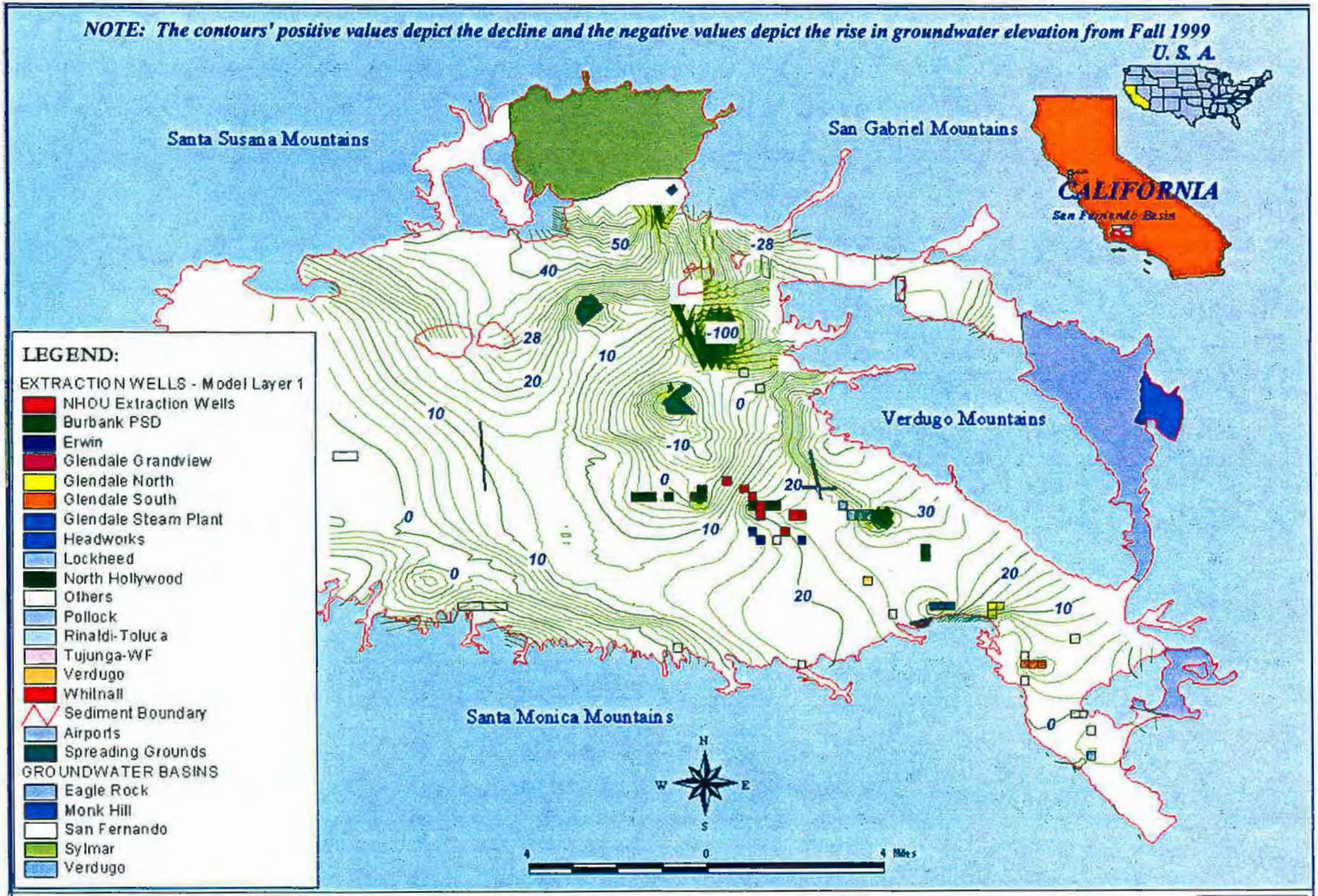
PLATE
1



Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
1999-2004 WATER YEARS

Simulated Groundwater Contours - Model Layer 2
FALL 2004

PLATE
2

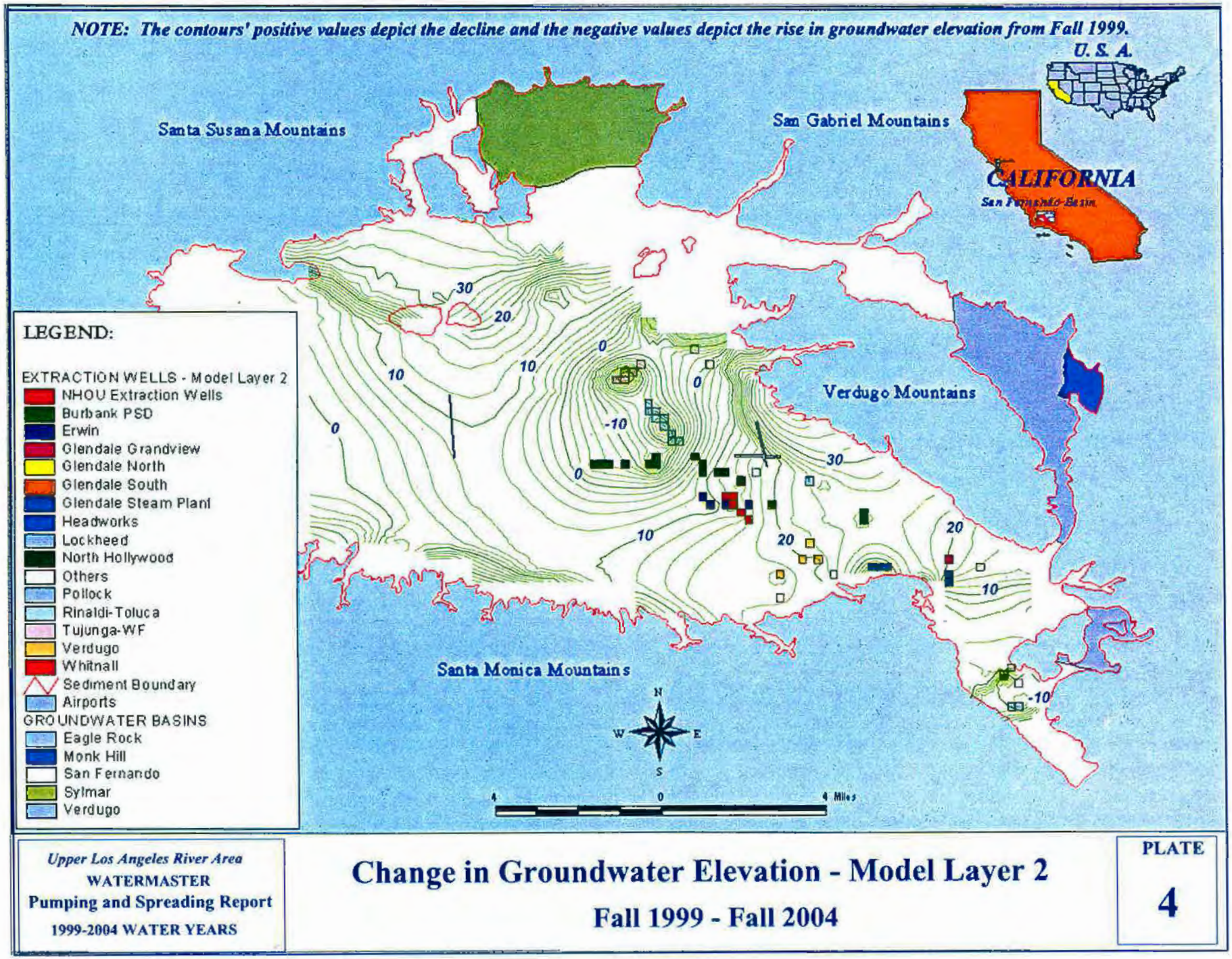


Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
1999-2004 WATER YEARS

Change in Groundwater Elevation - Model Layer 1

Fall 1999 - Fall 2004

PLATE
3

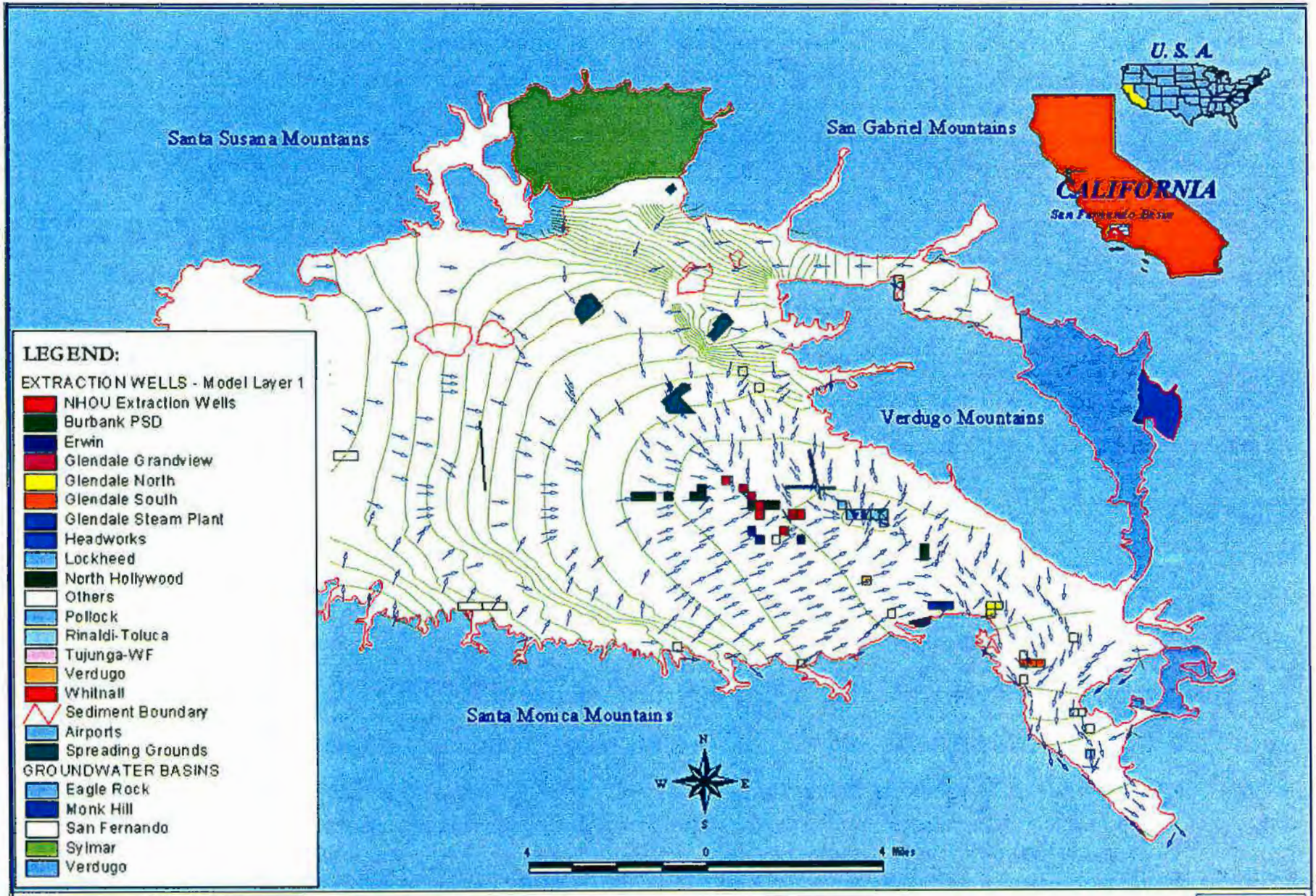


Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
1999-2004 WATER YEARS

Change in Groundwater Elevation - Model Layer 2

Fall 1999 - Fall 2004

PLATE
4

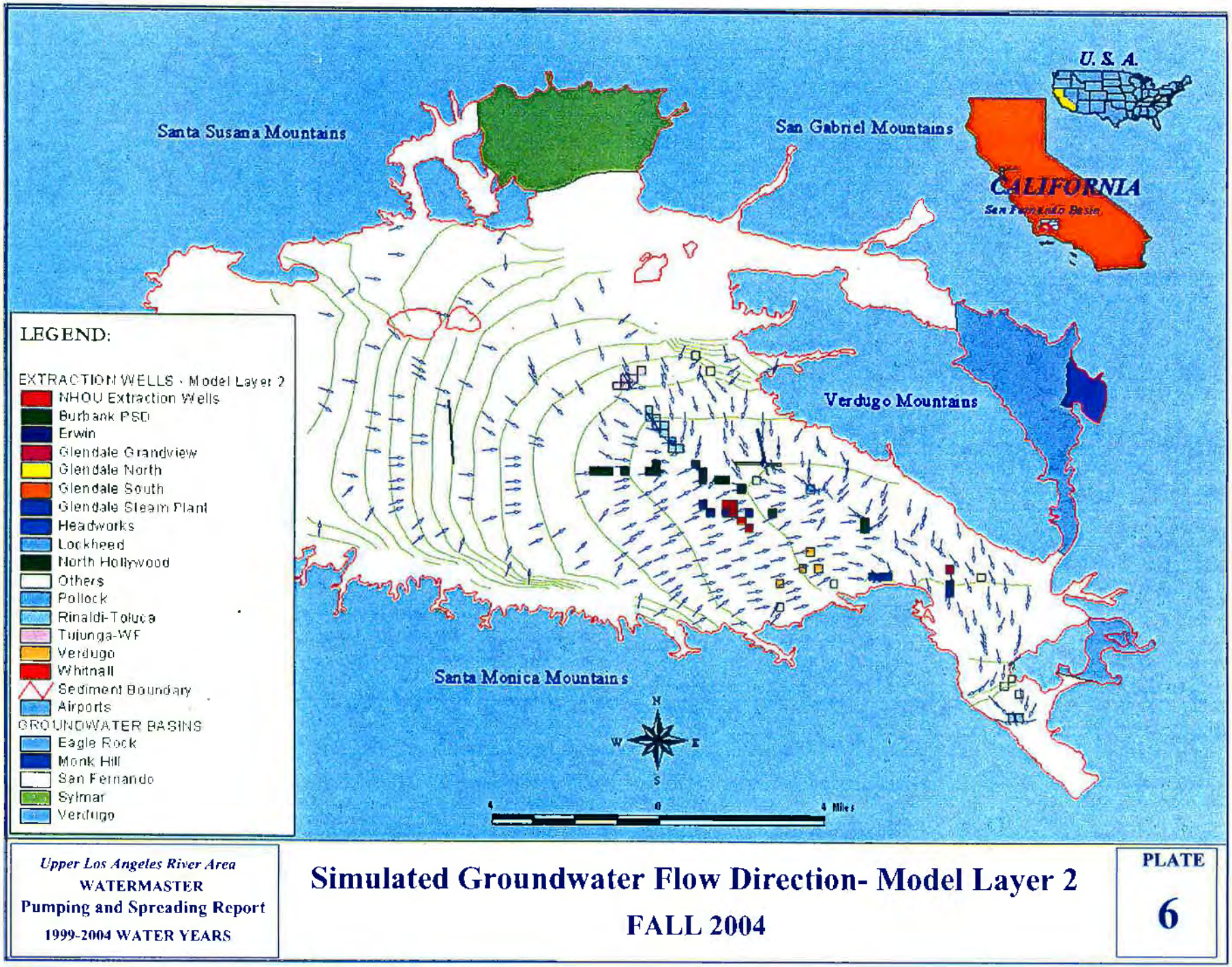


Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
1999-2004 WATER YEARS

Simulated Groundwater Flow Direction - Model Layer 1

FALL 2004

PLATE
5

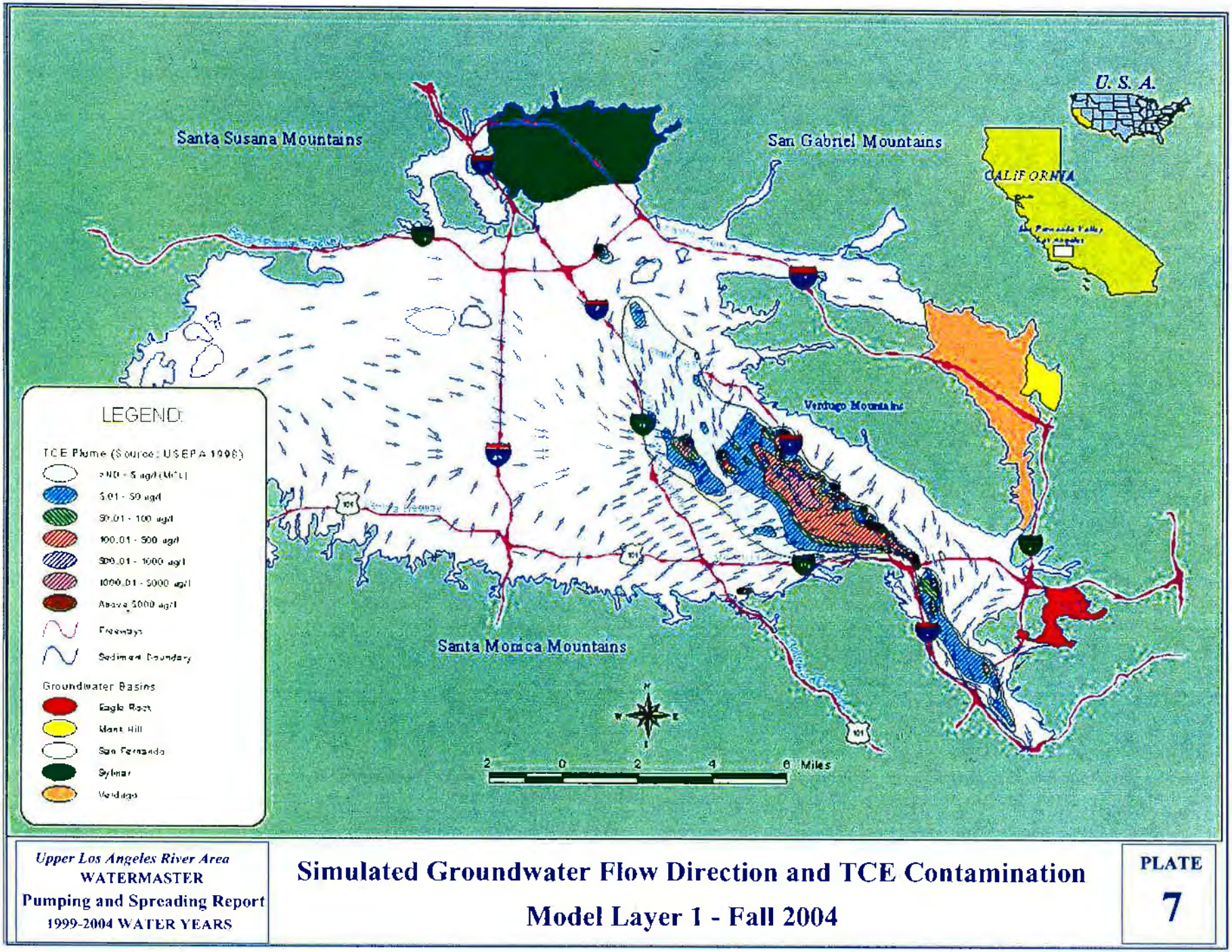


Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
1999-2004 WATER YEARS

Simulated Groundwater Flow Direction- Model Layer 2

FALL 2004

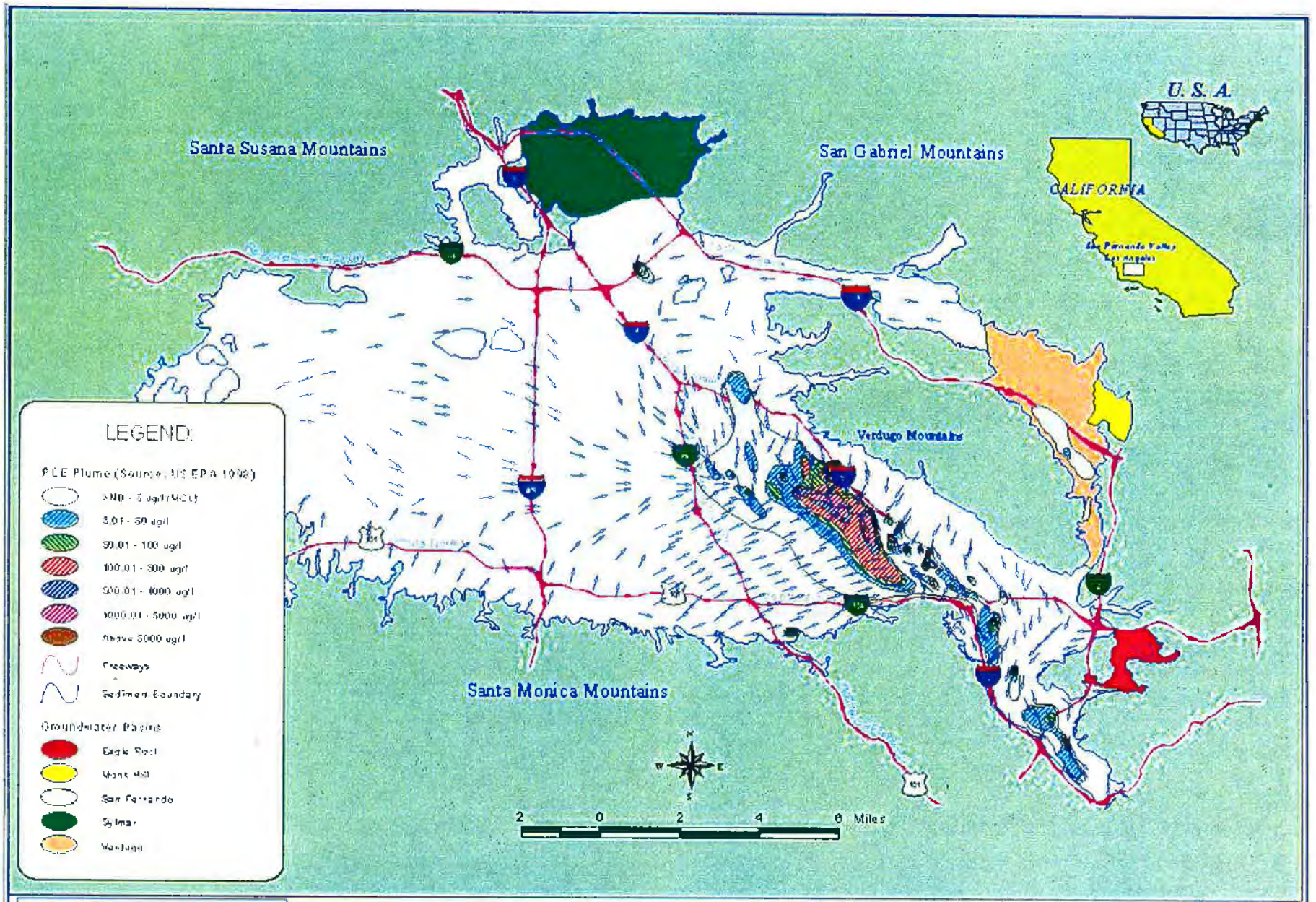
PLATE
6



Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
1999-2004 WATER YEARS

Simulated Groundwater Flow Direction and TCE Contamination
Model Layer 1 - Fall 2004

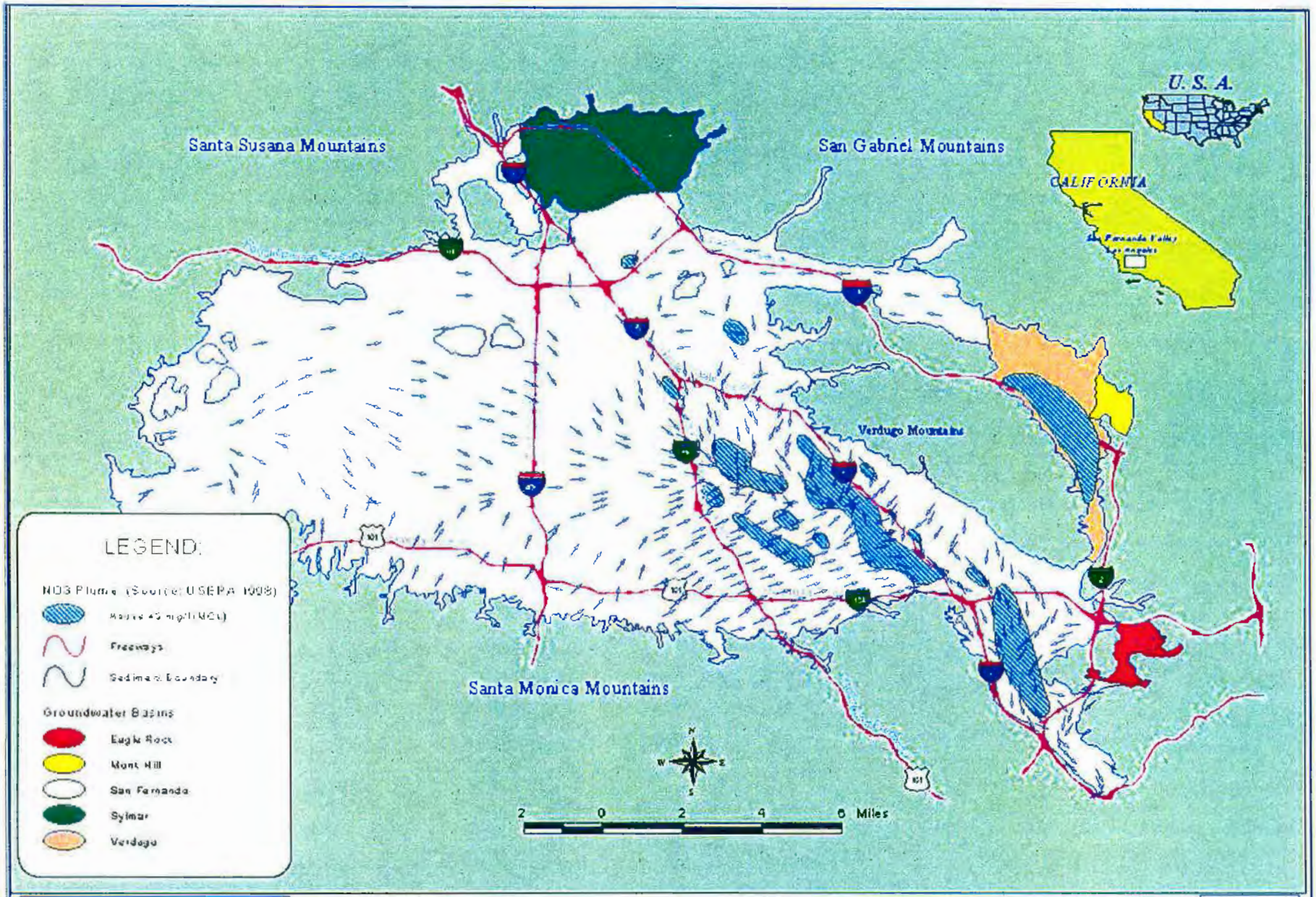
PLATE
7



Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
1999-2004 WATER YEARS

Simulated Groundwater Flow Direction and PCE Contamination Model Layer 1 - Fall 2004

PLATE
8



Upper Los Angeles River Area
WATERMASTER
Pumping and Spreading Report
1999-2004 WATER YEARS

Simulated Groundwater Flow Direction and NO3 Contamination
Model Layer 1 - Fall 2004

PLATE
9

APPENDIX A

CITY OF LOS ANGELES

PUMPING AND SPREADING PLAN

1999-2004 Water Years

CITY OF LOS ANGELES
GROUNDWATER PUMPING AND SPREADING PLAN
IN THE UPPER LOS ANGELES RIVER AREA
FOR THE 1999-2004 WATER YEARS

MAY 2000

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' 2000 Groundwater Pumping and Spreading Plan for the Water Years 1999 - 2004.

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	22,000
Operated by LACDPW and LADWP			
Tujunga	Shallow basins	83*	28,000
TOTAL:			121,000

*Recalculation of area produced smaller wetted area number.

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 estimated capacities are shown in Table 1-2. The listed capacities are approximate and may vary depending on the water levels and maintenance schedule of the available pumping equipment.

Table 1-2

Estimated Capacities of LADWP Well Fields in ULARA		
Well field	Number of wells	Estimated Initial Capacity [cfs]
San Fernando Basin		
Aeration	7	3
Crystal Springs (A)	---	---
Erwin	5	10
Headworks	---	---
North Hollywood	29	129
Pollock	3	6
Rinaldi-Toluca	15	112
Tujunga	12	112
Verdugo	5	12
Whitnall	5	15
Sylmar Basin		
Mission	3	9
TOTAL:	84	408

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

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

Advanced Oxidation Process Plant: This plant is designed to process up to 4,000 gallons per minute (gpm) of groundwater by employing an ozone and hydrogen peroxide treatment method to remove volatile organic compounds (VOCs) from the water. The plant is presently inactive due to low VOC levels in the supply wells.

North Hollywood Operable Unit: This plant is designed to process up to 2,000 gpm of groundwater containing VOCs by using aeration technology for the liquid phase and granular activated carbon for off-gas treatment.

Pollock Wells Treatment Plant: This plant was dedicated March 17, 1999. It is a 3,000 gpm facility which uses two restored Pollock production wells and treats the groundwater with Liquid Phase Granula Activated Carbon (GAC).

Section 2: Annual Pumping And Spreading Projections

a. Pumping Projections for the 1999-00 Water Year: The supply to the City of Los Angeles has three components. The most preferred source of water is Los Angeles Aqueduct supply imported from the Owens Valley/Mono Basin area, secondly, groundwater supply from the Central, San Fernando, and Sylmar Basins, and finally, 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 groundwater fluctuates depending on the availability of imported water which varies due to climatic and operational constraints.

Table 2-1 shows the amount of groundwater extractions that is expected during the 1999-00 Water Year from the San Fernando and Sylmar Basins. Appendix B provides groundwater extraction projections from 2000 to 2004. These projections are based upon assumed demand and Los Angeles Aqueduct flows and are subject to yearly adjustments.

Table 2-1

CITY OF LOS ANGELES PUMPING PROJECTION FOR WY 99-00
(Acre-Feet)
San Fernando Basin

	TOTAL	Oct-99	Nov-99	Dec-99	Jan-00	Feb-00	Mar-00	Apr-00	May-00	Jun-00	Jul-00	Aug-00	Sep-00
AERATION	1,450	0	0	0	0	172	139	190	190	190	190	190	190
ERWIN	1,593	198	135	58	82	229	171	0	0	0	240	240	240
HEADWORKS	0	0	0	0	0	0	0	0	0	0	0	0	0
No HOLLYWOOD	21,673	2630	2221	2548	2178	2801	1396	0	0	1210	2230	2230	2230
POLLOCK	2,374	53	0	0	0	0	161	360	360	360	360	360	360
RINALDI-TOLUCA	35,191	4778	4289	5932	4144	4764	174	0	0	2410	2900	2900	2900
TUJUNGA	29,234	4528	4347	5529	4423	4174	263	0	0	0	1990	1990	1990
VERDUGO	4,098	410	460	529	406	536	437	0	0	0	440	440	440
WHITNALL	2,569	283	267	229	193	220	147	0	0	0	410	410	410
TOTAL:	98,183	12,880	11,718	14,825	11,426	12,896	2,889	550	550	4,170	8,760	8,760	8,760
Sylmar Basin													
MISSION	2,493	266	342	85	0	0	1	300	300	300	300	300	300
ULARA TOTAL:	100,676	13,146	12,059	14,910	11,426	12,896	2,889	850	850	4,470	9,060	9,060	9,060

b. Spreading Projections for the 1999-00 Water Year: Native groundwater recharge from captured storm runoff occurs primarily as a result of the use of man-made spreading grounds. Spreading grounds operations are primarily controlled by the LACDPW. Table 2-2 represents the anticipated spreading volumes for 1999-00. The East Valley Water Recycling Project in Phase IA will add recycled water to the Hansen Spreading Grounds beginning in mid-2000 with an amount anticipated at 10,000 AFY. Phase IB will carry recycled water to the Pacoima Spreading Grounds.

Table 2-2

Actual and Projected Spreading in ULARA Spreading Grounds in 1999-00							
	Operated by:						
	LACDPW				LADWP	LACDPW and LADWP	Monthly Total
Month	Branford	Hansen	Lopez	Pacoima	Headworks (A)	Tujunga	
Oct-99	13	18	0	0		0	31
Nov-99	31	9	11	0		0	51
Dec-99	10	14	4	0		0	28
Jan-00	117	18	2	79		13	229
Feb-00	79	2510	3	1590		763	4945
Mar-00	143	2250	3	934		1140	4470
Projected							
Apr-00	41	1180	133	296		645	2295
May-00	16	255	5	56	0	682	1014
Jun-00	51	205	15	59	0	420	750
Jul-00	17	24	17	0	0	396	454
Aug-00	17	0	0	0	0	178	195
Sep-00	15	0	0	0	0	3	18
TOTAL:	550	6483	193	3014	0	4240	14480

(A) The Headworks Spreading Grounds has not been operated since the early 1980s due to DHS water quality constraints.

Section 3: Water Quality Monitoring Program Description

All of LADWP's 67 active wells in ULARA are monitored in conformance with the requirements set forth in title 22, California Code of Regulations. For an active wells monitoring is required whether the well is in production or not. State regulations require the following types of sampling regimens:

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

Every three years, each well whether on active or standby status, is monitored 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 monitoring involves organic compound analysis 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.

The wells are divided into clusters each consisting of three to six wells. The clusters are organized in three sampling groups to allow for efficient sample collection. Appendix A contains the most recent TCE, PCE, and nitrate data that are representative of each cluster.

Section 4: Groundwater Treatment Facilities Operations Summary

North Hollywood Operable Unit (NHOU): The NHOU was out of service from May 1999 to January 2000 due to series of unrelated problems including a mechanical problem with the main influent control valve. While the facility was shut down the water was not sampled. Provided below is a summary of facility operations.

	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)	(in ug/L)	(in ug/L)
4/99	153	293	268	124	280	290	319	1823	72.1/16.2	1.6/ND
5/99	176	293	257	113	282	166	328	---	---	---
6/99	---	---	---	---	---	---	---	---	---	---
7/99	---	---	---	---	---	---	---	---	---	---
8/99	---	---	---	---	---	---	---	---	---	---
9/99	---	---	---	---	---	---	---	---	---	---
10/99	---	---	---	---	---	---	---	---	---	---
11/99	---	---	---	---	---	---	---	---	---	---
12/99	---	---	---	---	---	---	---	---	---	---
1/00	---	---	---	---	---	---	---	1176	95.2/11.3	1.04/ND
2/00	137	149	154	339	266	271	294	1148	99.4/9.58	0.89ND
3/00	136	89	139	---	264	269	291	1105	80/10.4	0.76/<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 1999-00 Water Year, as of the printing of this report (May 2000).

a. Spreading Grounds:. There are plans to maximize the capacity of the Tujunga Spreading Grounds by spreading constantly and evenly throughout the rainy season.

b. Extraction Wells: The capacity of the existing wells has been modified by the remediation of the Pollock Well Field dedicated in March 1999. There are no plans for modifications that would significantly change the zone of extraction of any existing wells in the 1999-00 Water Year.

c. Groundwater Treatment Facilities:

Pollock Wells Treatment Plant. The Pollock Wells Treatment Plant construction began in April 1997. The project consists of four liquid-phase GAC vessels plus a pumping and chlorination station that will treat 3,000 gpm. The supply will be co-mingled with other supplies to achieve a 50/50 blend ratio for nitrate reduction. The facility became operational in February 1999. In the first seven months of service 1500 AF of water was treated.

Headworks Well Field Remediation. The Headworks well field was taken out of service in the mid 1980s due to contamination by TCE and PCE. Plans to restore the well field are underway. The present scope of work recommends a groundwater treatment facility be built in the Headworks Spreading Grounds. The facility will treat up to 30 cfs of groundwater supply to remove TCE and PCE contamination and then pump the water back into distribution at the River Supply Conduit (RSC). Planning activities for the Headworks Project have been completed with the Conditional Use Permit being secured in March 2000. Construction of the on-site facilities is scheduled for completion in August 2002.

East Valley Water Recycling Project. The Department has completed construction of the East Valley Water Recycling Project with its 10 miles of pipeline and the Balboa Pumping Station to convey recycled water from the Tillman Reclamation Plant to the Hansen Spreading Grounds. Phase I of the EVWRP is a three-year demonstration project that features 10,000 acre-feet per year of recycled water at the Hansen Spreading Grounds beginning in mid-1999. The

demonstration phase will provide an opportunity to sample the water quality at several points in the process over an extended period of time.

APPENDIX A:
1998-99 Water Quality Sampling Results

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	1/25/00	4.62	178.00	56.70
3	NHE-3	3810V	NH AERATION WELL-003	1/25/00	5.08	44.00	44.70
4	NHE-4	3810W	NH AERATION WELL-004	1/25/00	10.80	39.20	47.80
5	NHE-5	3820H	NH AERATION WELL-005	4/14/99	35.50	31.20	44.70
6	NHE-6	3821J	NH AERATION WELL-006	1/25/00	6.99	12.30	30.50
7	NHE-7	3830P	NH AERATION WELL-007	1/25/00	4.77	94.10	48.70
8	NHE-8	3831K	NH AERATION WELL-008	1/25/00	16.10	119.00	61.60
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	1/26/00	0.78	6.29	26.40
14	EW-10	3811F	ERWIN-010	1/26/99	-99.00	-99.00	11.80
15	M-5	4840J	MISSION-005	7/12/99	-99.00	5.71	26.00
16	M-6	4840K	MISSION-006	6/17/99	-99.00	-99.00	8.37
17	M-7	4840S	MISSION-007	7/12/99	-99.00	0.61	17.50
18	NH-02	3800	NORTH HOLLYWOOD-002	9/28/99	5.06	38.50	32.40
19	NH-04	3780A	NORTH HOLLYWOOD-004				
20	NH-07	3770	NORTH HOLLYWOOD-007	12/15/99	-99.00	-99.00	11.80
21	NH-11	3810	NORTH HOLLYWOOD-011	1/26/00	8.41	6.54	23.40
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				
28	NH-22	3790C	NORTH HOLLYWOOD-022	5/17/99	-99.00	-99.00	18.80
29	NH-23	3790D	NORTH HOLLYWOOD-023	1/21/00	-99.00	-99.00	24.68
30	NH-25	3790F	NORTH HOLLYWOOD-025	1/9/98	-99.00	-99.00	19.80
31	NH-26	3790E	NORTH HOLLYWOOD-026	7/6/99	-99.00	-99.00	25.80
32	NH-27	3820F	NORTH HOLLYWOOD-027	12/10/97	20.20	12.20	25.65
33	NH-28	3810K	NORTH HOLLYWOOD-028	1/26/00	8.35	8.71	27.60
34	NH-30	3800D	NORTH HOLLYWOOD-030	11/30/99	2.64	20.30	35.30
35	NH-32	3770C	NORTH HOLLYWOOD-032	11/24/99	-99.00	-99.00	4.21
36	NH-33	3780C	NORTH HOLLYWOOD-033	6/15/99	-99.00	-99.00	4.47
37	NH-34	3790G	NORTH HOLLYWOOD-034	1/21/00	-99.00	5.16	29.10
38	NH-35	3830N	NORTH HOLLYWOOD-035	12/9/99	-99.00	-99.00	18.20
39	NH-36	3790H	NORTH HOLLYWOOD-036	12/9/99	-99.00	1.87	14.70
40	NH-37	3790J	NORTH HOLLYWOOD-037	1/24/00	2.96	3.54	21.20
41	NH-38	3810M	NORTH HOLLYWOOD-038				
42	NH-39	3810N	NORTH HOLLYWOOD-039				
43	NH-40	3810P	NORTH HOLLYWOOD-040	12/15/99	3.08	5.69	15.00
44	NH-41	3810Q	NORTH HOLLYWOOD-041	12/15/99	5.63	47.20	23.70
45	NH-42	3810R	NORTH HOLLYWOOD-042	5/12/99	5.73	88.50	24.50
46	NH-43A	3790K	NORTH HOLLYWOOD-043A	6/8/98	-99.00	-99.00	19.67
47	NH-44	3790L	NORTH HOLLYWOOD-044	4/9/99	0.53	1.25	12.60

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	12/14/99	-99.00	0.91	8.86
49	P-4	3959E	POLLOCK-004				
50	P-6	3958H	POLLOCK-006	5/12/99	25.40	20.10	38.50
51	P-7	3958J	POLLOCK-007				
52	RT-1	4909E	RINALDI-TOLUCA-001	12/20/99	0.77	9.79	16.10
53	RT-2	4898A	RINALDI-TOLUCA-002	1/28/00	-99.00	-99.00	13.80
54	RT-3	4898B	RINALDI-TOLUCA-003	4/2/98	-99.00	1.09	
55	RT-4	4898C	RINALDI-TOLUCA-004	1/28/00	-99.00	-99.00	9.97
56	RT-5	4898D	RINALDI-TOLUCA-005	1/28/00	-99.00	-99.00	19.90
57	RT-6	4898E	RINALDI-TOLUCA-006	1/28/00	-99.00	0.62	11.30
58	RT-7	4898F	RINALDI-TOLUCA-007	2/4/99	-99.00	0.56	3.73
59	RT-8	4898G	RINALDI-TOLUCA-008	7/19/99	-99.00	-99.00	8.73
60	RT-9	4898H	RINALDI-TOLUCA-009	7/14/97	-99.00	-99.00	12.23
61	RT-10	4909G	RINALDI-TOLUCA-010	7/12/99	-99.00	-99.00	17.40
62	RT-11	4909K	RINALDI-TOLUCA-011	1/26/00	1.81	17.40	21.00
63	RT-12	4909H	RINALDI-TOLUCA-012	1/26/00	1.48	1.02	18.30
64	RT-13	4909J	RINALDI-TOLUCA-013	7/12/99	3.72	1.77	19.60
65	RT-14	4909L	RINALDI-TOLUCA-014	1/27/00	0.75	8.59	18.90
66	RT-15	4909M	RINALDI-TOLUCA-015	1/28/00	0.80	4.46	23.70
67	TJ-01	4887C	TUJUNGA-001	1/13/00	-99.00	-99.00	23.60
68	TJ-02	4887D	TUJUNGA-002	1/13/00	-99.00	-99.00	21.10
69	TJ-03	4887E	TUJUNGA-003	1/13/00	-99.00	-99.00	20.20
70	TJ-04	4887F	TUJUNGA-004	1/13/00	-99.00	2.89	24.10
71	TJ-05	4887G	TUJUNGA-005	1/13/00	1.44	9.57	34.40
72	TJ-06	4887H	TUJUNGA-006	1/13/00	-99.00	2.56	24.60
73	TJ-07	4887J	TUJUNGA-007	1/13/00	1.55	8.39	39.80
74	TJ-08	4887K	TUJUNGA-008	1/13/00	-99.00	3.65	31.30
75	TJ-09	4886B	TUJUNGA-009	1/27/00	-99.00	2.35	13.70
76	TJ-10	4886C	TUJUNGA-010	1/27/00	0.60	4.12	17.50
77	TJ-11	4886D	TUJUNGA-011	1/13/00	-99.00	1.15	9.79
78	TJ-12	4886E	TUJUNGA-012	12/16/99	-99.00	0.65	7.27
79	V-1	3863H	VERDUGO-001	1/26/009	-99.00	7.27	30.60
80	V-2	3863P	VERDUGO-002	11/24/99	0.85	19.20	36.10
80	V-2	3853F	VERDUGO-002	8/18/98	-99.00	33.00	26.80
81	V-4	3863J	VERDUGO-004	1/13/98	6.47	17.90	1.92
82	V-11	3863L	VERDUGO-011	1/26/00	-99.00	2.34	11.30
83	V-13	3853G	VERDUGO-013				
84	V-24	3844R	VERDUGO-024	1/26/00	-99.00	-99.00	2.30
85	WH-4	3821D	WHITNALL-004	1/31/00	3.71	12.20	21.20
86	WH-5	3821E	WHITNALL-005	1/31/00	2.09	9.39	24.60
87	WH-6A	3831J	WHITNALL-006A	1/21/00	-99.00	3.22	6.69
88	WH-7	3832K	WHITNALL-007	1/21/00	-99.00	4.11	8.37
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 2000-2004

PUMPING PROJECTIONS (AF) BY WELL FIELD SAN FERNANDO BASIN WATER YEARS 2000-01 THROUGH 2003-04				
San Fernando Basin Well Fields	2000-01	2001-02	2002-03	2003-04
Aeration	2,280	2,280	2,280	2,280
Erwin	1,680	1,440	0	0
Headworks	0	1,810	12,670	11,760
N. Hollywood	19,630	20,300	23,200	18,850
Pollock	2,520	2,520	2,520	2,160
Rinaldi-Toluca	34,760	37,170	42,480	34,520
Tujunga	20,110	26,900	31,840	25,870
Verdugo	3,080	2,640	0	0
Whitnall	2,870	2,460	0	0
Total S.F.B	86,930	97,520	114,990	95,440
SYLMAR BASIN				
Mission	3,492	3,492	3,492	3,492

APPENDIX B

CITY OF BURBANK

PUMPING AND SPREADING PLAN

1999-2004 Water Years

GROUNDWATER PUMPING

AND

SPREADING PLAN

WATER YEARS
OCTOBER 1, 1999 TO SEPTEMBER 30, 2004

Prepared by

PUBLIC SERVICE DEPARTMENT
WATER DIVISION
CITY OF BURBANK

APRIL 2000

RBD:jg
jg:\Doxsee\Groundwater 99-04.doc

TABLE OF CONTENTS

TABLES

FIGURE

APPENDIX

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 is 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 is 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 $\pm 5\%$ can 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 be operated during the summer season, from May to October. 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 2000 gpm. Lockheed Martin has arranged to utilize the capacity of the GAC Treatment Plant to augment the production of the Burbank Operable Unit 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 operated by Lockheed Martin. Consent Decree II 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 Lockheed Martin 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 six wells that are mechanically and electrically operable. Three wells are on "Active" status and three are on "Inactive" status with the DHS. Four others have had equipment pulled. We do not plan to operate the inactive wells unless an emergency develops in the 1999-2000 water year.

Active Wells	Inactive Wells		Well Casings	
No. 7	No. 6	No. 13A	No. 11	No. 14
No. 15	No. 18*		No. 12	No. 17
No. 10 (VO8)				

*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	25 Acre-feet

Table 3.3 lists the past and projected extractions by Lockheed. Table 4.1 lists

the past and projected 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. Table 4.2 lists the extractions by Disney.

B. STORED WATER CREDIT

The City has a stored water credit of 48,771 acre-feet as of October 1, 1999.

C. ALLOWANCE FOR PUMPING

The import return water extraction right (20 percent of water delivered the prior year) for the 1999-2000 water year is 4,534 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 L.A.D.W.P. The L.A.D.W.P. 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 4.3.

V. CAPITAL IMPROVEMENTS

A. WELLS

BURBANK

No capital improvements or modifications are planned for Burbank water wells. We plan to continue the use of Well No. 7 and No. 15 for the GAC Treatment Plant.

MAINTENANCE ACTIVITY

Well Nos. 17 and 18. Both of these wells are planned to be abandoned in accordance with County standards during the FY 2000-2001. All above-ground equipment will be removed and the casings filled and sealed.

LOCKHEED-MARTIN

Lockheed operates eight wells for the production capability of the EPA Consent Decree Project. See Figure 5.1. The well field will normally produce 9,000 gpm during water year 1999-2000. An additional well (VO8/Burbank No. 10/Lockheed WP-180) became operable on January 20, 1998. Lockheed Martin will perform normal operating well maintenance.

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 Consent Decree II.

Due to problems in obtaining a new operating permit from the Department of Health Services, 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.

Burbank plans to use the production and treatment facilities of the EPA Project at a flow rate of 9,000 gpm during the 1999/2000 Water Year.

GAC TREATMENT PLANT

Burbank plans to use the production and treatment facilities of the GAC Treatment Plant at the following flow rates during the 1999-2000 Water Year:

October	- April	0 gpm
May	- September	1,800 gpm

The plant will be operated in the parallel configuration.

TABLE 2.1
FIVE-YEAR PROJECTED WATER DEMAND

WATER YEAR	ACRE-FEET
89-90	23,053
90-91	20,269
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*	24,518
00-01*	25,652
01-02*	26,130
02-03*	26,527
03-04*	26,722

* Projected

NOTE:

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

(2) The last five year average water demand was 23,134 acre-feet.

TABLE 3.1
FIVE-YEAR PROJECTED USE OF MWD TREATED WATER

WATER YEAR	ACRE-FEET
89-90	22,397
90-91	17,773
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*	8,388
00-01*	9,537
01-02*	9,994
02-03*	10,391
03-04*	10,586

* Projected

NOTES:

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

TABLE 3.2
FIVE-YEAR PROJECTED USE OF GAC TREATED WATER

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*	1,114
00-01*	1,500
01-02*	1,500
02-03*	1,500
03-04*	1,500

* Projected

NOTES:

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

(2) Wells No. 7 and No. 15 are the source of supply for the GAC Treatment Plant. Proposed production rates are as follows:

Well No. 7 1050 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 EXTRACTIONS OF GROUNDWATER BY LOCKHEED

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*	13,016
00-01*	12,315
01-02*	12,336
02-03*	12,336
03-04*	12,336

* Projected

NOTES:

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

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

(3) Lockheed 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'.

1993-94	378 Acre-feet	1996-97	320 Acre-feet
1994-95	462 Acre-feet	1997-98	478 Acre-feet
1995-96	34 Acre-feet, Dec thru Oct	1998-99	142 Acre-feet

(6) The City of Burbank is currently using water from Lockheed under an Interim Operation Permit from the California Department of Health Services.

TABLE 3.4
FIVE-YEAR PROJECTED USE OF RECLAIMED WATER

WATER YEAR	ACRE-FEET
89-90	656
90-91	1,234
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*	1,700
00-01*	1,700
01-02*	1,700
02-03*	1,700
03-04*	1,700

*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.

(3) The Burbank Nature Center was provided reclaimed water service in water year 1998-99.

(5) The PSD Power Plant reduced its reclaimed water use beginning water year 1996-97 to 7/12 of the prior amounts. It was reduced to 375AF in water year 1999-2000. It will be reduced to 360AF in water year 2000-2001.

TABLE 4.1
FIVE-YEAR PROJECTED EXTRACTIONS OF GROUNDWATER BY VALHALLA

WATER YEAR	ACRE-FEET
90-91	239
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*	300
00-01*	300
01-02*	300
02-03*	300
03-04*	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
EXTRACTION OF GROUNDWATER BY DISNEY

WATER YEAR	ACRE-FEET
98-99	2,336

NOTES:

(1) 359.85 acre-feet extraction charged to L.A.D.W.P. in Water Year 1998-99 not shown in the above total.

TABLE 4.3
FIVE-YEAR PROJECTED BURBANK SPREADING OPERATIONS

WATER YEAR	ACRE-FEET
89-90	378 (1)
90-91	504 (1)
91-92	503 (1)
92-93	500 (2)
93-94	0 (3)
94-95	4,200 (4)
95-96	2,000 (4)
96-97	1,500 (4)
97-98	0
98-99	0
99-00*	2,000
00-01*	2,000
01-02*	2,000
02-03*	2,000
03-04*	3,000

* 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 L.A.D.W.P.

(3) The Maclay pipeline was damaged in the 1994 Northridge earthquake. Deliveries to the Pacoima Spreading Grounds are precluded until repaired by the L.A.D.W.P.

(4) The City exercised its physical solution right in water years 1994-95, 1995-96, and 1996-97 for basin replenishment.

(5) Starting 1999-2000, combination of physical solution purchases and MWD water delivered to Los Angeles.

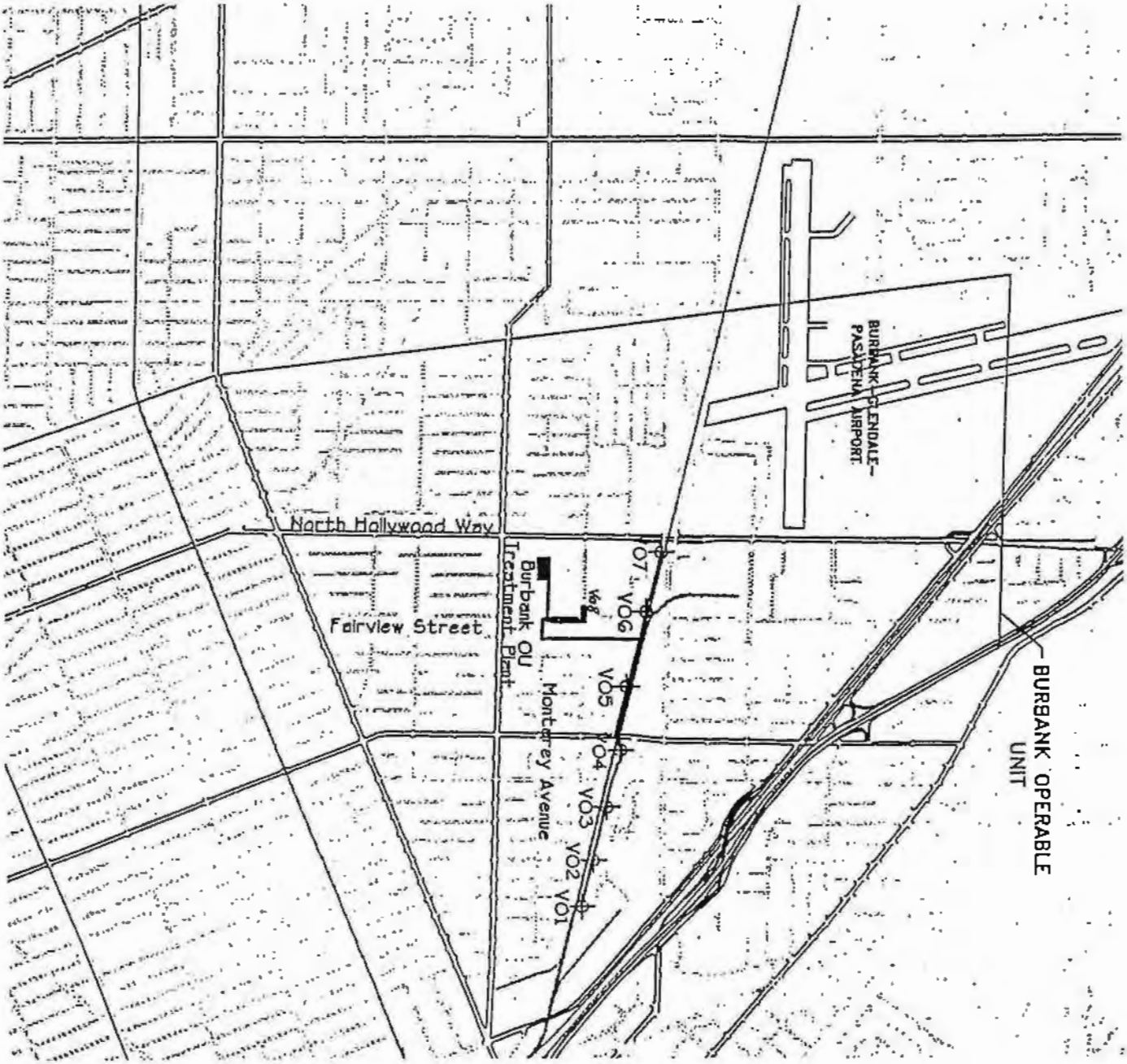


FIGURE 5.1
EPA PHASE II EXTRACTION WELLS

APPENDIX A

WATER QUALITY DATA

The 1999 Annual Water Quality Report is not yet available. Water Quality monitoring and testing of supply sources is not included with this report.

APPENDIX B

WATER TREATMENT FACILITIES

LAKE STREET GAC TREATMENT PLANT

320 LAKE STREET
BURBANK CA 91503

OPERATOR:

CITY OF BURBANK
PUBLIC SERVICE DEPARTMENT, WATER DIVISION

ALBERT LOPEZ, WATER PRODUCTION/OPERATIONS SUPERINTENDENT

QUANTITY TREATED (I0/1/98 THROUGH 10/1/99):

1,542 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 N. HOLLYWOOD WAY
BURBANK CA 91505

OPERATOR:

CITY OF BURBANK
PUBLIC SERVICE DEPARTMENT, WATER DIVISION

ALBERT LOPEZ, WATER PRODUCTION/OPERATIONS SUPERINTENDENT

QUANTITY TREATED (10/1/98 THROUGH 10/1/99):

9,042 ACRE-FEET FOR DOMESTIC USE.

WATER QUALITY:

CONTAMINANTS: VOCs, NITRATE, CHROMIUM

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
PUBLIC SERVICE DEPARTMENT
WATER DIVISION

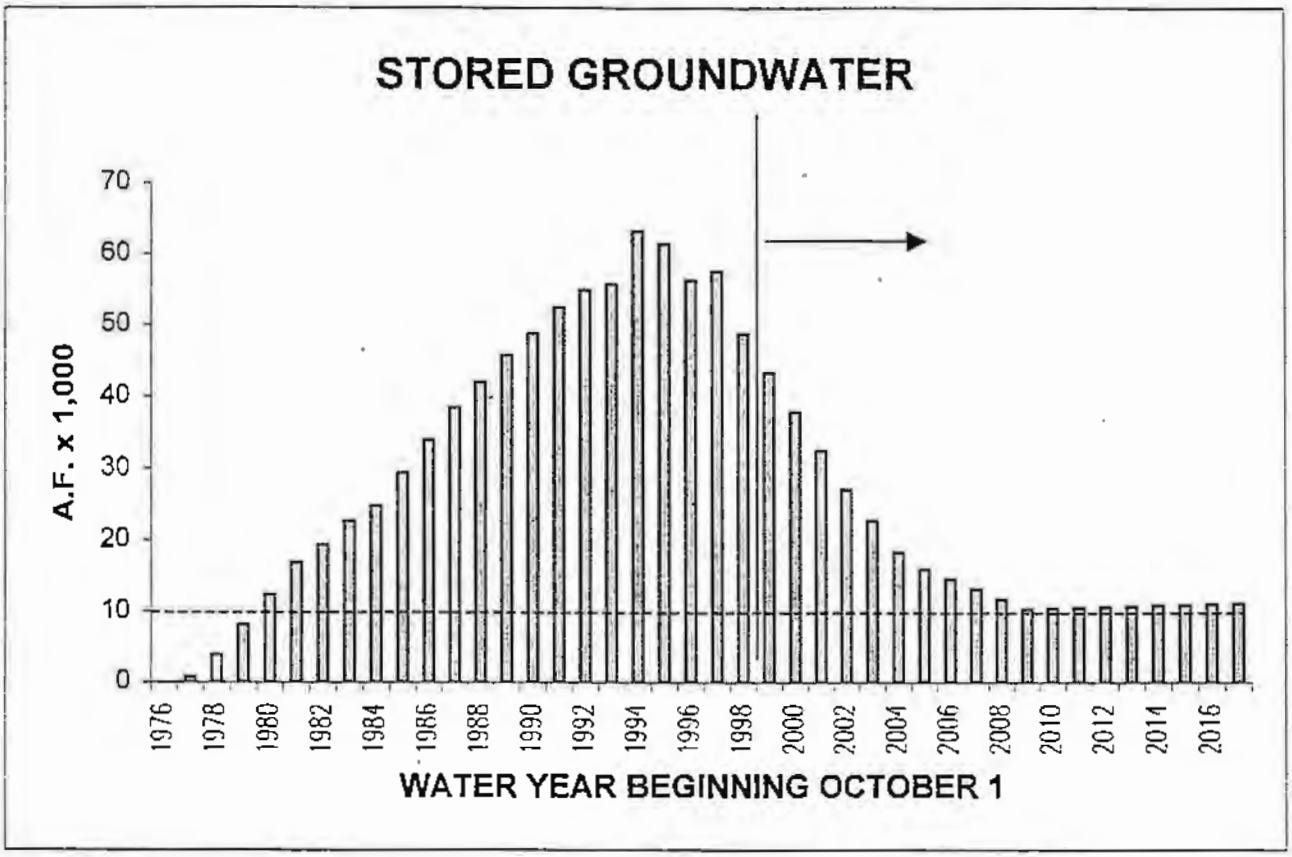
BURBANK'S STORED GROUNDWATER

1976/77 - 2017/18

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		22,859
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	* 2,184		54,981
1993-94	24,566	4,913	0	* 3,539		55,810
1994-95	22,541	4,508	5,380	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	0	13,262		48,770
1999-2000	23,000	4,600	2,000	12,000		43,304
2000-01	23,000	4,600	2,000	12,000		37,904
2001-02	23,000	4,600	2,000	12,000		32,504
2002-03	23,000	4,600	2,000	12,000		27,104
2003-04	23,000	4,600	3,000	12,000		22,704
2004-05	23,000	4,600	3,000	12,000		18,304
2005-06	23,000	4,600	5,000	12,000		15,904
2006-07	23,000	4,600	6,000	12,000		14,504
2007-08	23,000	4,600	6,000	12,000		13,104
2008-09	23,000	4,600	6,000	12,000		11,704
2009-10	23,000	4,600	6,000	12,000		10,304
2010-11	23,000	4,600	7,500	12,000		10,404
2011-12	23,000	4,600	7,500	12,000		10,504
2012-13	23,000	4,600	7,500	12,000		10,604
2013-14	23,000	4,600	7,500	12,000		10,704
2014-15	23,000	4,600	7,500	12,000		10,804
2015-16	23,000	4,600	7,500	12,000		10,904
2016-17	23,000	4,600	7,500	12,000		11,004
2017-18	23,000	4,600	7,500	12,000		11,104

NOTES:
(1) STORED WATER AS OF OCTOBER 1, 1978.
(2) STORED WATER AS OF OCTOBER 1, 1979.
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. Y
COLUMN (5) = EXTRACTIONS OF NEXT YEAR
PUMPED GROUNDWATER INCLUDES CITY, VALHALLA, LOCKHEED, & DISNEY.
*EXCLUDES 150 A.F. OF PUMPING FOR TESTING.
SHADED AREAS OF TABLE ARE PROJECTED VALUES .

GRDWTR.xls 4/24/2000



NOTES:

- 10,000 AF RECOMMENDED AS BASIN BALANCE. THIS EQUATES TO ABOUT ONE YEAR OF DOMESTIC SYSTEM PRODUCTION IF REPLENISHMENT NOT AVAILABLE FROM MWD
- DRAW DOWN STORED WATER BY FULL RETURN FLOW CREDIT OF PRIOR YEARS (~4,600 AF) PLUS PRODUCTION BALANCE (~7,400AF)
- MINIMUM SPREAD WATER SHALL BE THE ESTIMATED GAC PRODUCTION. EXPENSE QUALIFIED UNDER G.R.P. WITH M.W.D.
- GROUNDWATER PRODUCTION EQUALS GAC (~1,000 AF), EPA (~12,000AF) AND VALHALLA (~300 AF)
- ADDITIONAL SPREADING WATER WILL BE NEEDED BEGINNING 2004 TO MAINTAIN BASIN BALANCE.

APPENDIX C

CITY OF GLENDALE

PUMPING AND SPREADING PLAN

1999-2004 Water Years

CITY OF GLENDALE

GROUNDWATER PUMPING AND SPREADING PLAN

Prepared By

GLENDALE WATER AND POWER

APRIL 2000

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

The City of Glendale has recently developed many facilities to reduce the City's dependence on imported water supplies from northern California and the Colorado River via the Metropolitan Water District (Metropolitan) by using more local resources. 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 (85 percent of demands) originating hundreds of miles away that Glendale has little control over. The purpose of this document is to discuss the City's Water Resource Plan outlining our recent program to develop more local water resources. These local facilities have been completed at a cost about $50 million. Of this amount, the City has spent $25 million with another $25 million by the industry group responsible for contaminating Glendale's water supplies.

This report discusses historic water supplies available to Glendale, future water demands in Glendale, 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. Over the past few years and within the next couple of years, there will be a significant change in the mix of supplies used to meet water demands in the City as shown on Figure 2. These changes are discussed in the next section of this report.

San Fernando Basin - The City's right to San Fernando Basin 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.

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 65,000 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.

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 mid 1990's, Glendale constructed the Verdugo Park Water Treatment Plant (VPWTP) to treat extracted groundwater

from two shallow wells and the pick-up system in the Verdugo Basin. 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.

Metropolitan Water District - As a member agency of the Metropolitan Water District, Glendale has the right to purchase, without limitation, but subject to supply availability and cost factors, any amount of water. The Metropolitan water delivered to Glendale is delivered through three service connections. The service connection number and capacity are summarized in Table 1. It is anticipated that Metropolitan will eventually require annual agreements for water purchases.

TABLE 1
METROPOLITAN CONNECTIONS AND CAPACITY

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

Recycled Water - The City has been delivering recycled water from the Los Angeles/Glendale Water Reclamation Plant (LAGWRP) since the late 1970's. The first deliveries of recycled water were made to the Glendale Power Plant for use in the cooling towers and to Caltrans for irrigation of a portion of Route 134 Freeway. In 1992, the City began delivering recycled water for irrigation purposes to Forest Lawn Memorial Park followed by deliveries to many more customers as part of a major expansion of the system. Presently, recycled water is served to forty (40) users. These include two (2) golf courses, a landfill, eight (8) park sites, two (2) high schools, one (1) elementary school and other irrigation areas. Also, three (3) high-rise buildings and a college are dual plumbed to use recycled water for sanitary flushing purposes. There is a corresponding reduction in the amount of water purchased from Metropolitan with this water. The annual delivery to these users is currently 1,500 AFY. The capacity of LAGWRP is 20 million-gallons per day (MGD) with indefinite plans for expansion to 50 MGD, and Glendale is entitled to 50 percent of any effluent produced at the plant. The treated wastewater not used is discharged into the Los Angeles River. Emphasis has been and will be continuously made to increase the use of recycled water.

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 (discussed later herein). A general summary of the City's rights to local water resources compared to the amount currently being used is shown on Table 2.

TABLE 2
LOCAL WATER USE (AFY)

Potential Source	Right	Current Use	Future Use
San Fernando Basin[1]	5,000-5,400	400 AFY	7,600
Verdugo Basin	3,856	2,800 AFY	3,856
Recycled Water	10,000	1,500 AFY	3,000

PAST WATER USE AND TRENDS

The water quality problems in the San Fernando and Verdugo Basins and 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 is the last in a series of EPA required clean-up facilities and has been completed and awaits approval for operation.

The City currently has five active production wells and a pick-up system (infiltration galleries) in the Verdugo Basin. The Grandview Wells in the San Fernando Basin have been essentially abandoned because some wells were installed prior to 1920, need replacement, and also due to water quality concerns.

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.

---

[1] Return flow credit only.

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 solvent. The tests indicated that "volatile organic compounds" (VOC's) such as trichlorethylene (TCE) and perchloroethylene (PCE) were present in the San Fernando Basin ground water supplies in concentrations exceeding State Health Department maximum contaminant levels (MCL). Both chemicals were used extensively in the past as degreasers in manufacturing. At that time, the presence and hazards to the water supplies were not known. As a result, Glendale had to further limit its use of San Fernando Basin supplies. Since the early part of 1992, the City has totally suspended production from the basin because of the presence of VOC's. However, a small quantity of groundwater is used at the Glendale Power Plant for cooling tower make-up water. However, the City continues to accumulate the groundwater storage credit that can be used in the future.

The historic and projected water use from the various sources is plotted on Figure 2 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 1998-99 was 31,413 AFY. In 1990-91, the use was about 29,850 AFY. 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. The 31,413 AFY is equivalent to an average daily use of 28.0 million gallons per day (MGD).

TABLE 3
TOTAL ANNUAL WATER DEMAND

Fiscal Year	Demand	Comments
1990-91	29,850 AF	
1997-98	29,680 AF	Heavy Rainfall (El Nino)
1998-99	31,413 AF	Below Normal Rainfall
1999-00	32,500 AF	Projected

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 32,554 AFY and for year 2020 a demand of 37,000 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 plan is to develop more local supplies. Currently, about 85 percent of the potable water used in the City comes from Metropolitan. With the recently constructed facilities and their operation, dependence on Metropolitan is reduced to 60 percent of demand. This was accomplished by building new facilities.

RECENT WATER FACILITIES

Various water facilities have been constructed over the past few years and they are described below.

San Fernando Basin/EPA Treatment Facility - San Fernando Basin production is currently limited because of the volatile organic compounds in the groundwater. The entire San Fernando Valley is part of the EPA's SUPERFUND clean-up program and with many water treatment plants that have been constructed to pump and treat the groundwater. Recently, EPA has focused on the construction of clean-up facilities in

Glendale. The Glendale Water Treatment Plant has been constructed to convey treated water via the Grandview Pumping Station to the Glendale potable water system.

Facilities consist of seven shallow extraction wells and one deep well, a 5,000 gpm water treatment plant, 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. A general layout of these facilities is shown on Figure 3.

The major agreements between Glendale, Glendale Respondents Group (GRG), and the EPA have been signed. The PRPs retained CDM Consulting Engineers Inc. to design and construct the required facilities. To date, construction has been completed and waiting for the State-DOHS issuance of a permit to operate the facilities. It is anticipated the City will start receiving water from this facility in the fall of year 2000.

The City's expected annual delivery of the treated water is about 7,200 AFY and will meet about 25 percent of projected near-term water demands.

Verdugo Basin - Historically, the City's use of these water sources has been limited because of water quality problems, groundwater levels, and extraction capacity. The City has completed construction of the Verdugo Park Water Treatment Plant (VPWTP) and this facility is operational. This facility has a capacity of 1,150 gpm and will treat water from the two low capacity wells (referred to as Glorietta Wells A & B) and from the water supplies in the old Verdugo Pickup horizontal infiltration system. Experience indicates that flows closer to 550 gpm are likely from these sources. The three existing Glorietta wells and the Verdugo Park Water Treatment Plant alone will not utilize the City's entire water rights to the basin supplies. Additional extraction capacity in the Verdugo Basin will be developed. The existing wells and VPWTP will produce about 2,700 AFY with the remaining 1,000 AF coming from other basin sources not currently identified. It is anticipated that the City will be looking at other sources of supply in the Verdugo Basin. If the City were able to fully utilize its rights to these supplies, about 12 percent of demands could be met from this Basin. The treatment plant and wells are shown on Figure 2.

Recycled Water - The City has been using recycled water from the Los Angeles/Glendale Water Reclamation Plant for the past 10 years. Initially, it was used at the Glendale Power Plant for cooling towers make-up water and irrigation along the Route 134 Freeway. In 1992, the City expanded the system and began delivering recycled water for irrigation to Glendale Forest Lawn Memorial Park.

The City has completed construction of a "backbone" recycled water distribution system. It consists of pipelines, pumping plants, and storage tanks to deliver recycled water to many new users in and outside the City. The objective is to increase the use of recycled water to meet 10 percent of City's total water demands. Recycled water use has increased from 430 AF in 1990-91 to 1,500 AF in 1998-99.

The specific features of this program and recycled water user sites are shown in more detail on Figure 4. The users from the various recycled water projects are tabulated on Figure 5. This will give the reader a general idea of the scope of the expansion program. The expected deliveries from the various projects are shown on Table 4. This expanded system will also be used to deliver recycled water to the cities of Pasadena and Los Angeles.

TABLE 4
RECYCLED WATER USE (AFY)

PROJECTS	1999	2005	2010	2020
Brand Park	80	170	170	170
Forest Lawn Pipeline	350	350	350	350
Power Plant Pipeline	400	450	450	450
Verdugo-Scholl Pipeline	632	772	1,054	1,054
Other Potential Projects	0	0	0	0
TOTAL	**1,462**	**1,742**	**2,024**	**2,024**

Metropolitan Water District - The City currently has three treated water connections to the Metropolitan water system in the City. At one time, the cities of Los Angeles, Burbank and Glendale have looked at 150 cfs, equally divided, untreated water connections on the San Fernando Tunnel to percolate water into the San Fernando Basin. With this additional water delivered into groundwater storage, the City would be entitled to produce more water from the San Fernando Basin. Also, the water could be delivered at a lower cost because it is untreated compared to the current sources. Also, it may be possible to purchase this water under a different pricing program by taking advantage of special pricing for Metropolitan supplies that are periodically available (seasonal storage). The replenishment water would be taken generally during the wetter years for a storage credit in the basin and extracted in later years during drought conditions when treated Metropolitan supplies are limited. It is anticipated that about 3,000 AFY will be replenished from this source on the average. Work on this new connection is on hold.

TABLE 5
HISTORIC AND PROJECTED WATER USE IN GLENDALE (AF)

Water Year	San Fernando Basin	Verdugo Basin	Recycled Water	MWD Water	Total
1990-91	2,932	1,132	432	25,354	29,850
1991-92	1,577	732	551	23,003	25,863
1992-93	447	904	770	25,905	28,026
1993-94	554	1,226	625	27,043	29,448
1994-95	441	1,667	574	26,215	28,897
1995-96	496	2,059	886	27,906	31,347
1996-97	467	2,569	1,112	28,154	32,302
1997-98	267	2,696	1,087	25,630	29,680
1998-99	409	2,864	1,497	26,643	31,413
1999-00	4,025	2,900	1,462	23,616	32,003
2000-01	7,625	3,065	1,535	19,888	32,113
2005	7,625	3,230	1,742	19,957	32,554
2010	7,625	3,556	2,024	20,619	33,824
2015	7,625	3,556	2,024	21,886	35,091
2020	7,625	3,556	2,024	23,616	36,821

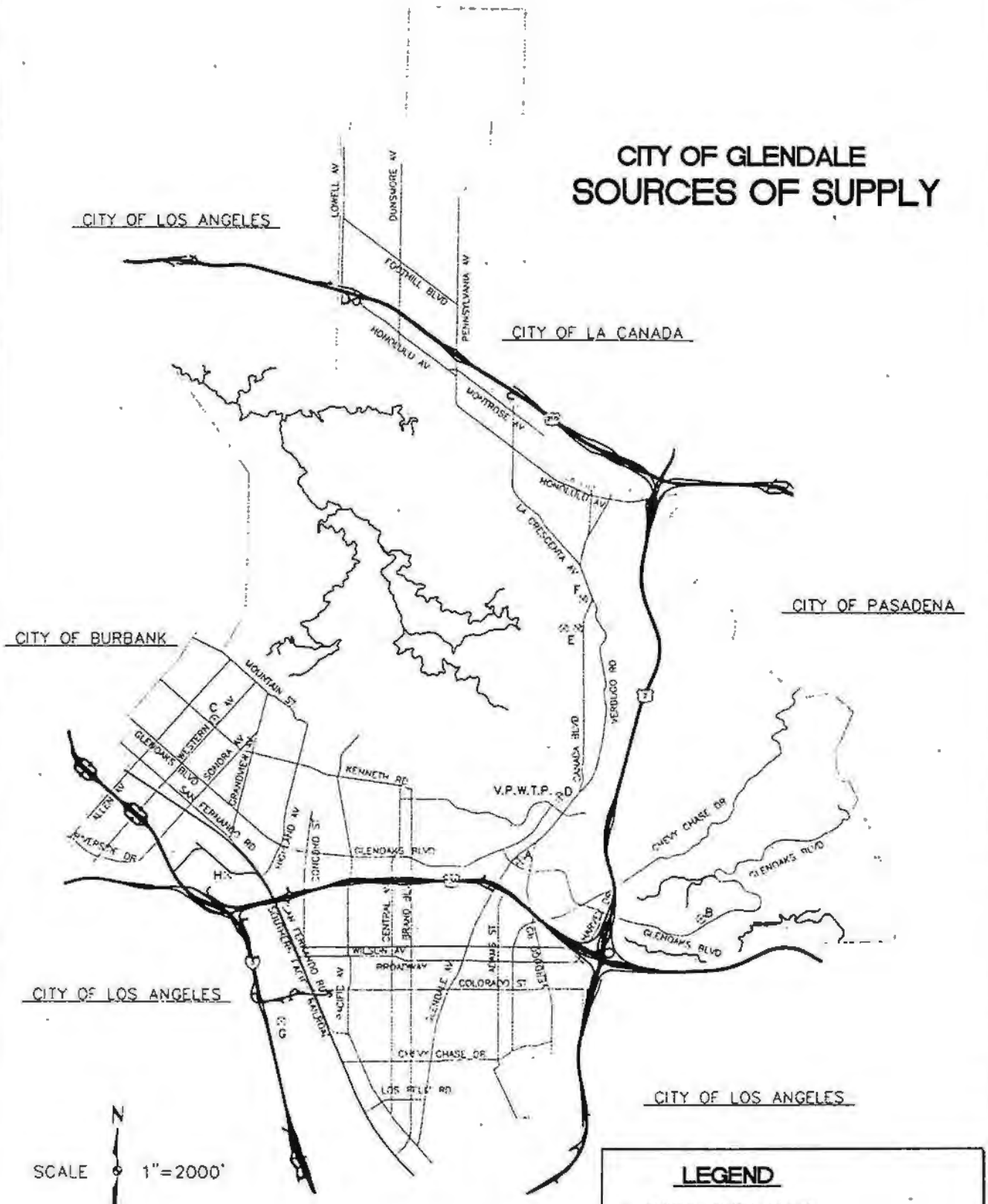
RELATED INFORMATION ON WATER USE

Detailed information on historic and projected water use in Glendale is shown on Figure B-1. From a practical sense, water use in the water year is equivalent to water use in a fiscal year. Table 5 is a tabular version of Figure B-1.

A:\RAY\ZIP1-A\WRP\GWPSPF2000UPDATED.WD
APRIL 2000

FIGURES

FIGURE 1



LEGEND

- ⊗ WATER ENTRY POINTS
- A MWD G-1
- B MWD G-2
- C MWD G-3
- D VERDUGO PARK WATER TREATMENT PLANT
- E GLORIETTA 3 & 4
- F GLORIETTA 6
- G LAGWRP-RW TREATMENT PLANT
- H GLENDALE WATER TREATMENT PLANT

Prepared: RAY NOTARIO
Drawn: PHONG NGO
Date: April 27, 2000
C:\NGO\RAY\SOURCES.DWG

GLENDALE WATER SUPPLY AND DEMAND (AF/YR)

(Use MWD Direct Deliveries for Blending)

FIGURE B-1

	Fiscal Year	1990-91	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	2005	2010	2015	2020
(1)	**Water Demands (a)**	**29,850**	**25,863**	**28,026**	**29,448**	**28,897**	**31,347**	**32,302**	**29,680**	**31,413**	**32,003**	32,113	32,223	32,333	32,443	32,554	33,824	35,091	36,821
	Water Supplies:																		
(2)	*San Fernando Basin*																		
(3)	Water Rights	5,170	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)	Physical Solution Pmts (LADWP)																		
	Water Production																		
(4)	City Production	2,445	1,080	78	140	65	35	25	24	32	25	25	25	25	25	25	25	25	25
(5)	EPA Treat. Plant (b)										3,600	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200
(6)	Physical Solution	487	497	369	414	376	461	442	244	377	400	400	400	400	400	400	400	400	400
(7)	**Total:**	2,932	1,577	447	554	441	496	467	268	409	4,025	7,625	7,625	7,625	7,625	7,625	7,625	7,625	7,625
	Verdugo Basin																		
(8)	Wells 3,4, & 6	1,132	732	904	1,226	1,667	2,059	2,116	1,981	2,080	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200
(9)	VPWTP						0	453	715	784	700	700	700	700	700	700	700	700	700
(10)	Other Production										0	165	165	330	330	330	656	656	656
(11)	**Total:**	1,132	732	904	1,226	1,667	2,059	2,569	2,696	2,864	2,900	3,065	3,065	3,230	3,230	3,230	3,556	3,556	3,556
	Recycled Water																		
	Brand Park Project							32	63	73	80	125	125	170	170	170	170	170	170
	Forest Lawn Project			348	299	280	292	344	239	191	350	350	350	350	350	350	350	350	350
	Power Plant Project	432	551	422	326	260	377	264	306	698	400	400	400	450	450	450	450	450	450
	Verdugo-Scholl Project					34	217	472	479	535	632	660	688	716	744	772	1,054	1,054	1,054
	Other Potential Project																		
(12)	**Total:**	432	551	770	625	574	886	1,112	1,087	1,497	1,462	1,535	1,563	1,686	1,714	1,742	2,024	2,024	2,024
	Metropolitan Water																		
(13)	Direct Deliveries (G1, G2, & G3)	25,354	23,003	25,905	27,043	26,215	27,906	28,154	25,629	26,643	23,616	19,888	19,970	19,792	19,874	19,957	20,619	21,886	23,616
(15)	Replenishment Deliveries (G4)																		
(16)	**Total:**	25,354	23,003	25,905	27,043	26,215	27,906	28,154	25,629	26,643	23,616	19,888	19,970	19,792	19,874	19,957	20,619	21,886	23,616
(17)	**Total Water Supplies**	**29,850**	**25,863**	**28,026**	**29,448**	**28,897**	**31,347**	**32,302**	**29,680**	**31,413**	**32,003**	**32,113**	**32,223**	**32,333**	**32,443**	**32,554**	**33,824**	**35,091**	**36,821**

3) [(1) - 4,000 AF] * 20% return

5) 5,000 gpm @ 90%

6) Forest Lawn, et.al.

13) (1) - (7) - (11) - (12)

13A) (7) - (3) - (15)

16) (1) - (7) - (11) - (12)

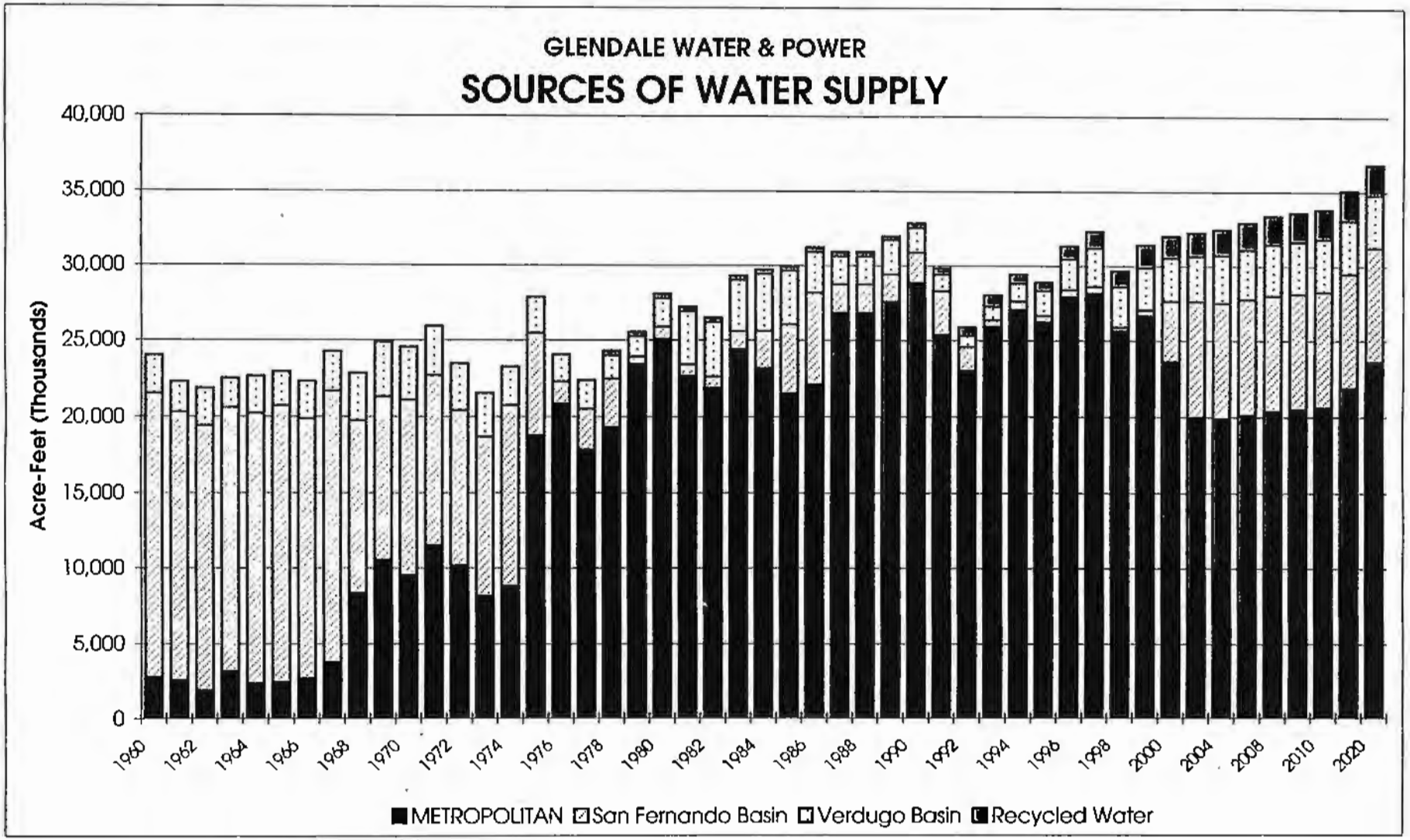
(a) Projected demands from MWD

(b) Assume operational date July, 2000

A:\RAY\ZIP2A\WRP\WTRSPDMN99UPDATED.XLS]
JANUARY 20, 2000]

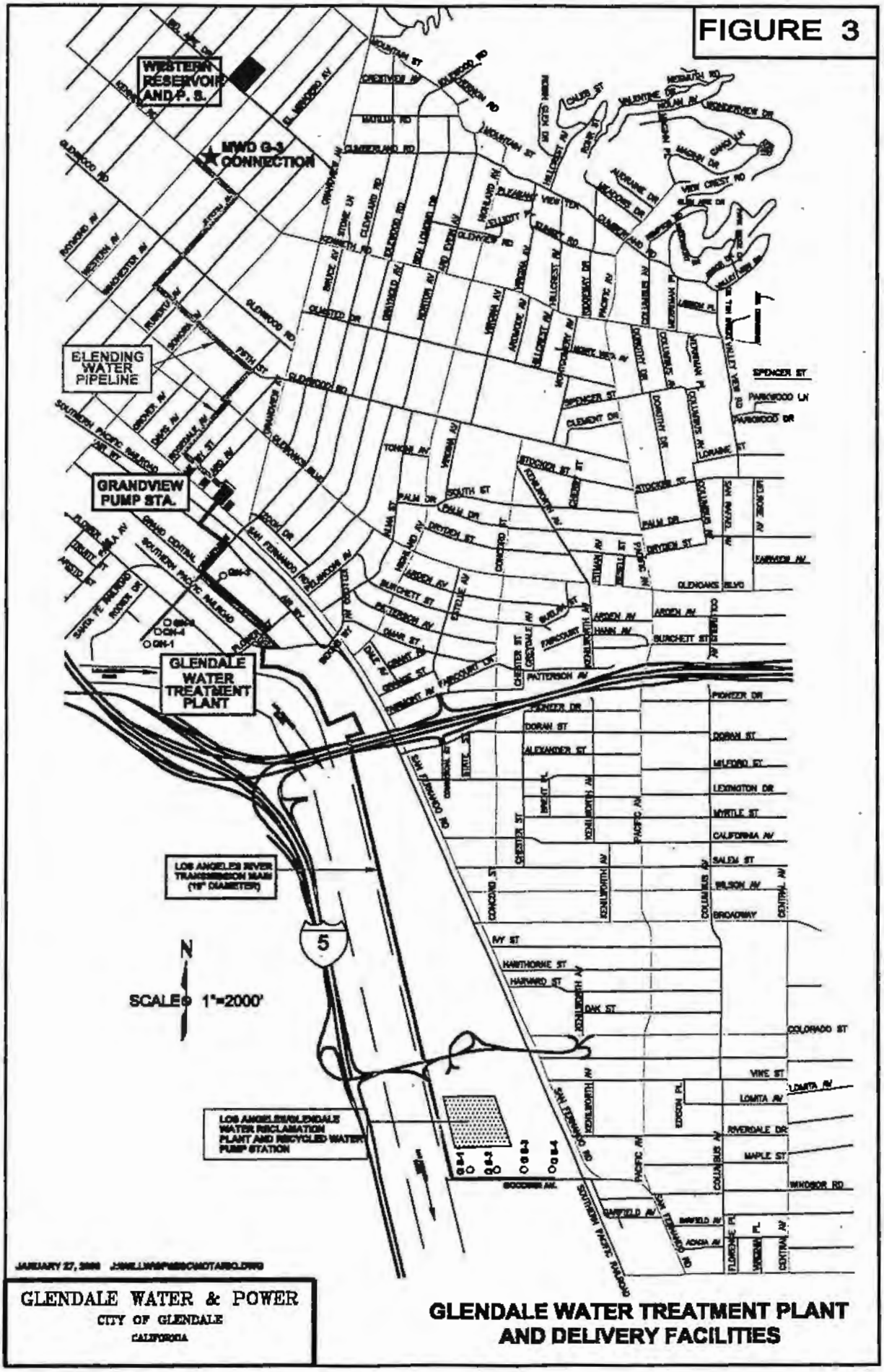
Updated[01/20/00]

FIGURE 2



A:\RAY\ZIPT\WTRPRODUPDATED XLC
APRIL 2000

FIGURE 3

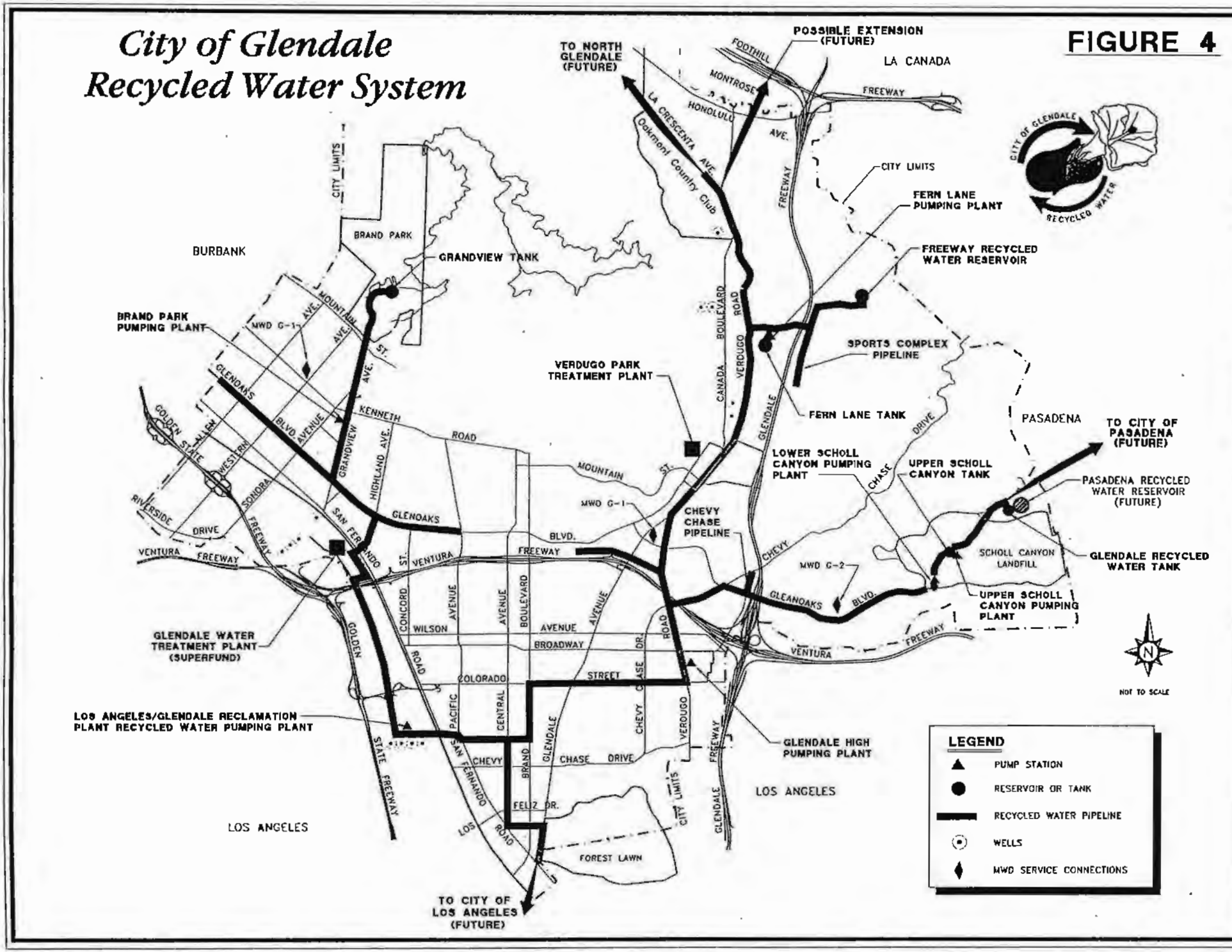


GLENDALE WATER & POWER
CITY OF GLENDALE
CALIFORNIA

GLENDALE WATER TREATMENT PLANT AND DELIVERY FACILITIES

City of Glendale Recycled Water System

FIGURE 4



CITY OF GLENDALE
RECYCLED WATER USERS - SN 1990008
As of APRIL 2000

FIGURE 5

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	2	Irrigation
	POWER PLANT PROJECT				
7	Caltrans - 943 West Doran Street	1978	YES	40-60	Irrigation
8	Glendale Grayson Power Plant	1978	YES	400-600	Cooling Towers
	VERDUGO SCHOLL PROJECT				
	PARKS and RECREATION - City of Glendale				
4	Adult Recreation Center	1995	YES	10	Irrigation
3	Armory	1996	YES	4	Irrigation
35	Carr Park	Planning Stage	NO		Irrigation
5	Central Library	1995	YES	4	Irrigation
34	City of Glendale - Fern Lane	1997	YES	2.5	Irrigation
24	Civic Auditorium	1996	YES	15	Irrigation
37	Colorado Boulevard - Parkway Irrigation	1997	YES	3	Irrigation
31	North Verdugo Road Median/La Cresenta Avenue	1996	YES	10	Irrigation
17	Glenoaks Park	1995	YES	4	Irrigation
28	Glorietta Pump Station	1997	NO		Irrigation
	Mayor's Park (Proposed)	Unknown	NO	6	
29	Montecito Park	1995	YES	1	Irrigation
14	Monterey Road Median - WJH	1996	NO	1	Irrigation
13	701 North Glendale Avenue - Median @ Monterey Road	1995	YES	12	Irrigation
	Park Site C (Proposed)	Unknown	NO	54	
	Park Site A (Proposed)	Unknown	NO	69	
2	741 S Brand Median	1995	YES	4	Irrigation
23	Parque Vaquero	1998	YES	2	Irrigation
20	Scholl Canyon Ballfield	1997	YES	17	Irrigation
18	Scholl Canyon Park	1996	YES	12	Irrigation
27	Sports Complex (Completed)	1998	YES	99	Irrigation
25	Verdugo Rd/Canada (South) Overpass	1995	YES	0.5	Irrigation
30	Verdugo Rd/Canada (North Median)	1996	YES	1.5	Irrigation
	CALTRANS (5 Meters):				
7A	1970 E Glenoaks Boulevard (E/S)	1995	YES	10	Irrigation
7A-1	1970 E Glenoaks Boulevard (W/S I2)	1995	YES	12	Irrigation
7B	406 N Verdugo Road @ Chevy Chase	1995	YES	40	Irrigation
7C	709 Howard Street @ Monterey Road	1995	YES	12	Irrigation
7D	2000 E Chevy Chase Drive @ Harvey	1995	YES	8	Irrigation
	GLENDALE UNIFIED SCHOOL DISTRICT:				
6	Glendale High School	1995	YES	15	Irrigation
36	Glenoaks Elementary School	1998	YES	1	Irrigation
15	Wilson Junior High School	1995	YES	7	Irrigation
	OTHERS:				
16	Glendale Adventist Memorial Hospital	1997	YES(Partially)	20	Irrigation
32	Oakmont Country Club	1996	YES	150-200	Irrigation
21	Scholl Canyon Golf Course	1998	YES	100	Irrigation
22	Scholl Canyon Landfill (LACSD)	1997	YES	100	Dust Control/Soil Compaction
19	Scholl Canyon Landfill (PW)	1996	YES		Irrigation/Soil Compaction
18	Upper Scholl Pump Station	1996	YES		Irrigation
	Dual Plumbing:				
26	Glendale Community College	1996	YES(Partially)	25	Irrigation/Flushing Toilets
38	Glendale Plaza - 655 N Central Avenue	Completed	NO		Flushing Toilets
39	Building - 400 N Brand	Completed	NO		Flushing Toilets
41	Building - 450 N Brand	Completed	NO		Flushing Toilets
42	Police Building - Isabel Street	Scheduled for Const.	NO		Flushing Toilets
40	Building - 611 N Brand	Planning Stage	NO		Flushing Toilets
33	*PUBLIC WORKS - City of Glendale*	1978	YES	1.5	Street Cleaning
	BRAND PARK PROJECT				
12	Brand Park	1997	YES	60	Irrigation
9	Glenoaks Median (9 Meters)	1996	YES	4	Irrigation
11	Grand View Memorial Park	1998	NO	50	Irrigation
10	Pelanconi Park	1996	YES	8	Irrigation
	TOTAL	**CURRENT METERS**	**40**	**1,597-2,067**	

APPENDIX D

CITY OF SAN FERNANDO

PUMPING AND SPREADING PLAN

1999-2004 Water Years

CITY OF SAN FERNANDO

GROUNDWATER PUMPING AND SPREADING PLAN

OCTOBER 1, 1999 TO SEPTEMBER 30, 2004

1999-2000 Water Year

Prepared by:

Public Works Department

Engineering Division

117 Macneil Street

San Fernando, California 91340

APRIL 2000

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 (6,120 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 is 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 1998-99 through 2003 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: 1250 GPM

3. ***Well 4A***
   Location: 12900 Dronfield Avenue, Sylmar
   Capacity: 500 GPM

4. ***Well 7A***
   Location: 13180 Dronfield Avenue, Sylmar
   Capacity: 900 GPM

C. Quantity (Acre-Feet) of Water Pumped From Each Well (1998-99)

1.	Well 2A	1,804.03
2.	Well 3	820.05
3.	Well 4A	288.11
4.	Well 7A	616.10
	Total	3,528.29

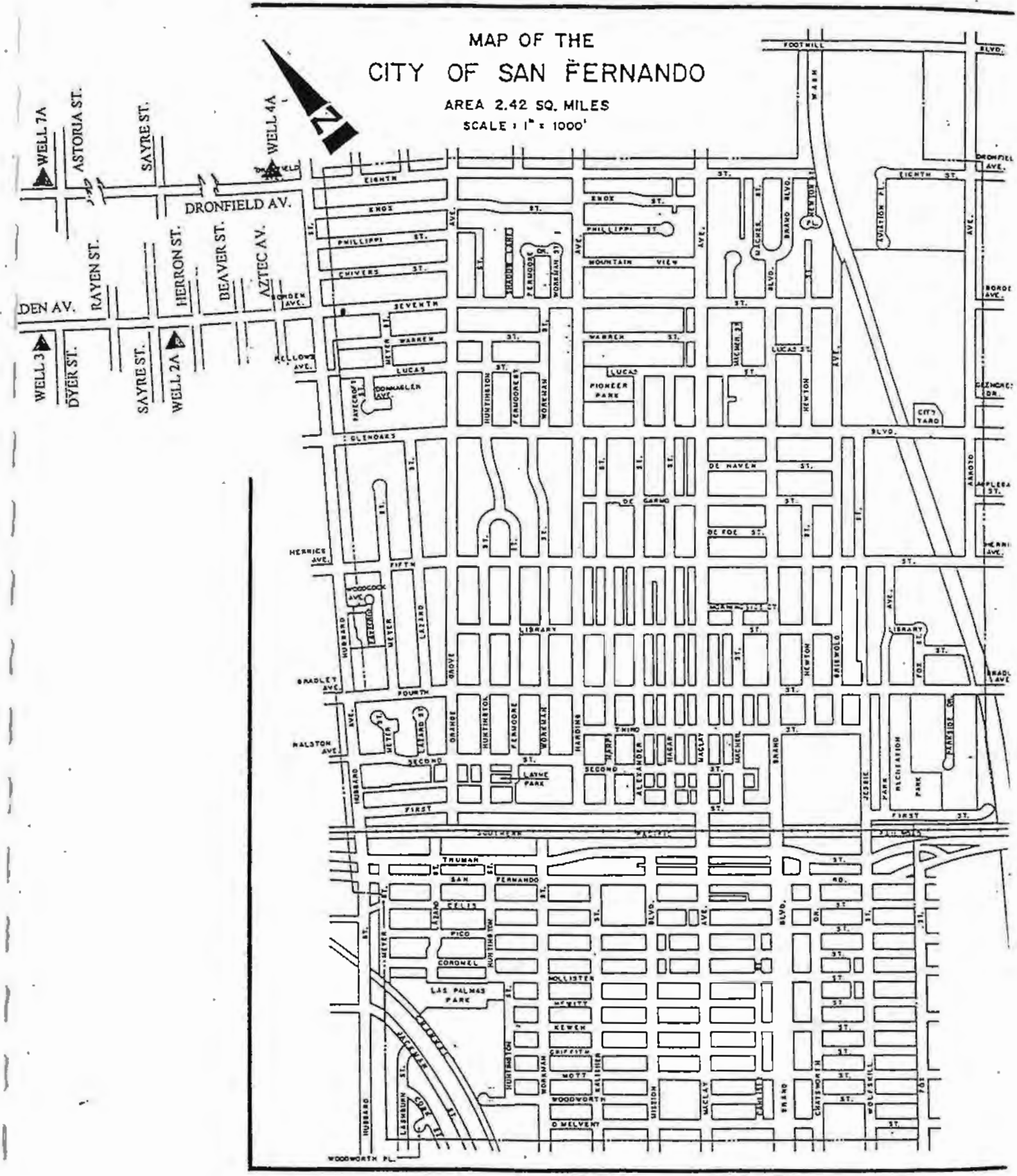
D. Wells Groundwater Level Data

1.	Well 2A	1094.5'	Taken 11/99
2.	Well 3	1053.5'	Taken 11/99
3.	Well 4A	1024.0'	Taken 11/99
4.	Well 7A	1052.1'	Taken 11/99

E. Well Locations

See next page

LOCATION MAP



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, 1999 the City of San Fernando has a stored water credit of 1990.71 acre-feet accumulated during previous years through the 97-98 water year.

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

(Acre-Feet)

DEMAND FY	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
WELLS	3,411.47	2,985.12	3,258.59	3,307.91	3,528.29	3550	3100	3200	3200	3200
MWD	9.53	614.50	315.59	0	0	0	500	500	500	500
TOTAL	3,421.00	3,599.62	3,574.18	3,307.91	3,528.29	3550	3600	3700	3700	3700
ACTUAL						PROJECTED				

APPENDIX A

WATER QUALITY DATA

SEE ATTACHED WATER QUALITY REPORT, 1998

(The new Consumer Confidence Report for 1999 will not be available until July 1, 2000, at which time a copy will be on file and a copy will be mailed to the Water Masters office.)

CITY OF SAN FERNANDO

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

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

1999-2004 Water Years

GROUNDWATER PUMPING

PLAN

WATER YEARS
OCTOBER 1, 1999 TO SEPTEMBER 30, 2004

Prepared by
CRESCENTA VALLEY
WATER DISTRICT

APRIL 2000

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 both dry and wet conditions in California. The CVWD has voluntary water conservation and an emergency water shortage ordinance on file and the District's Board of Directors can enact its provisions at any time deemed necessary. Moderate "hard conservation" in the form of retrofit "low flow" showerhead giveaways and an ultra-low flush toilet program is currently being provided.

The 1998-99 base year again saw a sizable increase in production compared to the prior year due to the relatively dry winter and spring. In any case, the water demands appear to be trending back up again strongly for 1999-2000 due to a second consecutive dry year and unusually warm fall-winter-spring.

Projected water demand is expected to decrease in 2000-2001 but then increase only slightly (<1%) thereafter. The increase is expected mainly from residential growth. However, it is seen from Table 2.1 that water use has increased dramatically from 1994-95 probably due to consumer's habits returning to less-water conserving, pre-drought consumption patterns.

The projected water demand seems to vary significantly due to weather conditions, in the CVWD service area mainly attributed to the residential character of the District and the large percentage of water consumption for outdoor landscaping. A variance of ±10% 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 contains 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 1998-99 a well replacement study was performed identifying potential sites and costs for new wells to replace existing capacity. During 1999-2000 the District has initiated work to design, permit, and construct two new wells as part of a long-term capital replacement program. The first replacement

well is currently in the design and permit stage at the time of this report and construction is projected to be completed in early 2001. The second well may be completed in early 2002 with additional wells, as needed, over a span of ten years or more into the future.

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 blending down nitrates was accomplished with additional imported water due to demand. 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 increase dramatically over the next five years to make up the difference between groundwater adjudication 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. Estimated future pumping is expected to realize this adjudicated quantity assuming continued full operation of District wells and the Nitrate Removal Plant as well as relatively stable levels of Verdugo Basin Groundwater. For the past five water years the Watermaster, with approval from the ULARA

Administrative Committee, has allowed CVWD to over-pump their rights in the Basin, as shown in Table 3.1. This will continue for 1999-2000. 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 by the Watermaster. There is no projection of excess pumping beyond 2003-2004 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)

94-95	95-96	96-97	97-98	98-99	99-2000	2000-2001	2001-2002	2002-2003	2003-2004
4686	5346	5483	4991	5394	5700	5500	5550	5600	5650
ACTUAL					PROJECTED				

TABLE 3.1
HISTORIC AND PROJECTED COMBINED WELL
AND TUNNEL GROUNDWATER PRODUCTION

(Acre-Feet)

94-95	95-96	96-97	97-98	98-99	99-2000	2000 2001	2001 2002	2002-2003	2003-2004
3707	3702	3672	3747	3797	3700	3600	3550	3500	3500
ACTUAL					PROJECTED				

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

(Acre-Feet)

93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-2001	2001-2002	2002-2003	2003-2004
1550	1626	1419	1562	1391	1281	1200	1300	1400	1400	1400
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)

94-95	95-96	96-97	97-98	98-99	99-2000	2000 2001	2001 2002	2002-2003	2003-2004
65	42	6	62	65	60	60	60	60	60
ACTUAL					PROJECTED				

TABLE 3.4
HISTORIC AND PROJECTED USE OF MWD TREATED WATER

(Acre-Feet)

93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-2001	2001-2002	2002-2003	2003-2004
1175	979	1644	1811	1244	1597	2000	1900	2000	2100	2150
ACTUAL						PROJECTED				

NOTES:

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