Upper Los Angeles River Area Watermaster

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

Case No. 650079 - County of Los Angeles

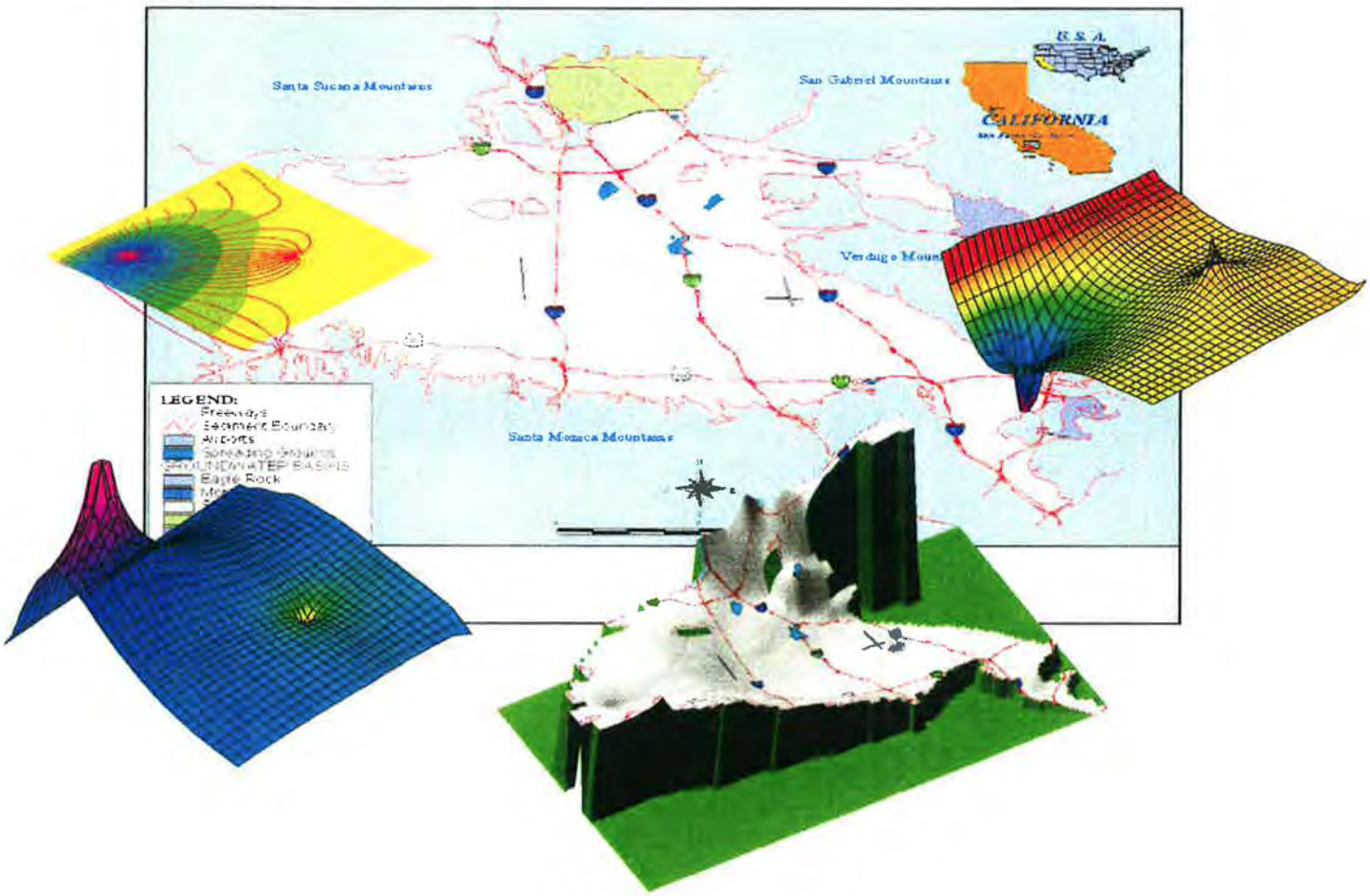
GROUND WATER PUMPING AND SPREADING PLAN

FOR THE

UPPER LOS ANGELES RIVER AREA

LOS ANGELES COUNTY

1997-2002 Water Years



JULY 1998

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

1997-2002 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 Specialist
Paula L. Giles	Clerk
Hadi S. Jonny, P.E.	Groundwater Modeler
Mark Mackowski, CEG	Consulting Geologist
Tina C. Wilson, P.E.	Report Investigator

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

JULY 1998

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

As Watermaster for the Upper Los Angeles River Area (ULARA), I am pleased to submit the 1998 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 clean-up.

The pumping and spreading plans for the 1997-2002 Water Years feature the January 3, 1996 activation of the Phase I Burbank Operable Unit (OU). Phase II of the Burbank OU is planned to begin production during the 1998-99 water year. Both of these activities restore Burbank's groundwater pumping capabilities. Glendale's North and South OUs have been delayed, but terms of an agreement between Glendale, the U.S. Environmental Protection Agency (USEPA), and the respondents have been agreed to in concept. Glendale has limited pumping capacity in the Verdugo Basin. San Fernando can pump all its groundwater rights from the Sylmar Basin, and Crescenta Valley Water District 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 will continue to pump greater than its historic 1979-97 average annual pumping for 1997-98.

Currently, there are four groundwater clean-up plants in operation: the City of Los Angeles' North Hollywood OU, the City of Burbank's Granular Activated Carbon Treatment Plant, the Burbank OU, and Crescenta Valley Water District's Glenwood Nitrate Removal Plant. One other treatment facility will come on-line in August 1998: the Pollock Wells Treatment Plant. The Glendale North and South OUs are planned to be on-line by the end of 1999. An Initial/Study Negative Declaration for the City of Los Angeles' Headworks Well Field Remediation Project was filed on May 15, 1998.

The groundwater model this year simulates the effect on groundwater elevations of projected pumping in the San Fernando Basin 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 Burbank OU pumping.

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.

M L Blevins

MELVIN L. BLEVINS
ULARA Watermaster

II. INTRODUCTION

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

Section 5.4. of the Policies and Procedures 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, that the Administrative Committee is to review and approve by July of the current water year.

This is the July 1998 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 1997-2002 WATER YEARS

A. Projected Groundwater Pumping for 1997-98 Water Year

The total 1997-98 ULARA pumping is projected at 118,603 AF, approximately 27,000 AF above the 18-year average. The estimated pumping for 1998-99 is 143,783 AF, a 52,000 AF increase above the historical average. (Appendices A-E).

In 1997-98, the City of Burbank plans to pump 8,000 AF, an increase of 5,900 AF as compared to its past five years pumping, and overall, nearly a 730% increase (6,900 AF) from its historical 18-year average. This increase is due to the start up of Phase I of the Burbank OU. As of October 1, 1997, Burbank has a storage credit of 56,297 AF. Burbank's annual return water credit is approximately 4,900 AF and its right to physical solution water is 4,200 AF/Y. Phase II will begin in mid-2000 and will remove Burbank's annual pumping volume to approximately 15,000 AF/Y. Pumping in excess of Burbank's annual pumping right can come from its banked storage, or negotiations with the City of Los Angeles for purchasing a portion of Los Angeles' stored water.

The Crescenta Valley Water District (CVWD) plans to pump 3,600 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 3,294 AF will still require the Watermaster's annual approval.

The City of Glendale will not resume significant pumping from the San Fernando Basin (SFB) until the Glendale N/S OUs come on-line. Its annual SFB extraction rights are approximately 5,500 AF. Glendale plans to extract 2,700 AF from the Verdugo Basin in 1997-98, an increase of about 500 AF greater than its historical average, and 1,200 AF more than the average over the past five years. Glendale anticipates pumping the same amount for 1998-99. Glendale had storage credit of 59,776 AF as of October 1, 1997.

The City of Los Angeles plans to pump about 96,532 AF this year, approximately 17,700 AF above its 1979-97 annual average and about 34,900 AF more than the past five year average (1993-97). A total of 3,492 AF of groundwater will be pumped from the Sylmar Basin, about a 560 AF increase as compared to the 1979-97 average and 1,200 AF more than the last five years

(1993-97). The amount of Los Angeles' pumping is dependent upon the availability of imported water supplies, particularly, from the two Los Angeles Aqueducts. In 1998-99, Los Angeles plans to pump 107,980 AF from the SFB, an increase of 37% compared to its average pumping, and 3,492 AF from the Sylmar Basin, which is 500 AF above normal pumping. As of October 1, 1997, Los Angeles has a storage credit of 296,630 AF in the SFB and 4,758 AF in the Sylmar Basin.

In 1997-98 the City of San Fernando plans to pump 3,550 AF from the Sylmar Basin, 500 AF above its normal pumping for the past four years and 660 AF above the past 17-year average. San Fernando has storage credit of 2,308 AF as of October 1, 1997.

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 1997-98 are given in Tables 3-1A, 3-1B, and 5-1.

B. Constraints on Pumping as of 1997-98

SAN FERNANDO BASIN

Burbank - In January 1996, a potion of Burbank's pumping capability was restored when the Lockheed - Burbank Operable Unit (BOU) was activated under Phase I of the Consent Decree with the USEPA. The Lockheed-BOU was pumping at about 8,000 gpm. The facility was shut down for several months beginning in mid-December 1997 to change the Liquid Phase GAC contactors to a downward flow system. Burbank plans to use the production and treatment facilities of the EPA Project at flow rates from 3,000 gpm to 9,000 gpm during the 1998/99 Water Year. In the SFB, Burbank accumulates storage credits from the water delivered to the hill, mountain, and valley floor areas and receives storage credits for the return water rights it is unable to pump. In addition, Burbank has the right to purchase from Los Angeles up to 4,200 AF/Y as physical solution water. Phase II of the BOU will commence during the 1998-99 water year bringing the total average annual deliveries to 9,000 gpm or approximately 15,000 AF/Y.

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% 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/Y of physical solution water. Under the Record of Decision (ROD) for the Glendale North and South Operable Units, many new facilities will be constructed. The major agreements between Glendale, the Potentially Responsible Parties (PRP) and the EPA are near closure. The PRPs have retained CDM Consulting Engineers to design and construct the required facilities. Construcion should be completed by the close of 1999.

Los Angeles - Several of the well fields within the SFB can not be fully utilized because of groundwater contamination, primarily from synthetic organic contaminants, 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, which are temporarily out-of-service. The Pollock Wells Treatment Plant Project, a 3,000 gpm groundwater treatment facility, is slated for operation in August 1998. The Headworks Well Field Remediation will restore four wells in the Headworks Well Field and treat at a rate of approximately 13,000 gpm. The environmental phase of the work will be completed in 1998.

SYLMAR BASIN

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

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 are typically not pumped during the winter months due to the limits set by the Judgment on the allotment of groundwater permitted Los Angeles in the Sylmar Basin and the fact that imported aqueduct water is readily available.

VERDUGO BASIN

Crescenta Valley - All of Crescenta Valley's groundwater rights are in the Verdugo Basin. Contamination from volatile organic contaminants 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 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.

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	1	6	5
North Hollywood	6	30	122
Pollock		3	6
Rinaldi-Toluca		15	126
Tujunga		12	117
Verdugo	3	5	13
Whitnall	4	5	14
City of Burbank		2	5
City of Glendale		0	15*
Lockheed		8	17
TOTAL:	15	93	461
	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

Notes:
(*) - Only two wells capable of pumping.

TABLE 3-1A: 1997-98 ACTUAL AND PROJECTED GROUNDWATER EXTRACTIONS

(acre-feet)

Party/Well Field	Total	1997			1998								
		Oct.	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
		SAN FERNANDO BASIN											
City of Los Angeles													
AERATION	2337	132	258	189	202	186	170	200	200	200	200	200	200
ERWIN	1636	141	166	10	0	154	230	35	180	180	180	180	180
HEADWORKS	0	0	0	0	0	0	0	0	0	0	0	0	0
No HOLLYWOOD	26263	2443	3394	2573	2430	2417	2416	500	0	2670	2670	2670	2080
POLLOCK	240	0	0	0	0	0	0	0	0	0	0	0	240
RINALDI-TOLUCA	41989	4976	5977	3959	4775	4455	1247	0	0	4150	4150	4150	4150
TUJUNGA	19690	2241	4138	1753	1979	3494	745	0	0	0	1780	3560	0
VERDUGO	1163	0	1	1	0	1	0	60	220	220	220	220	220
WHITNALL	3219	1	0	1	1	237	359	120	500	500	500	500	500
TOTAL:	96537	9934	13934	8486	9387	10944	5167	915	1100	7920	9700	11480	7570
City of Burbank	924	164	3	1	0	0	41	255	92	92	92	92	92
City of Glendale	500	33	16	5	5	2	4	2	87	87	87	86	86
Lockheed	7027	975	793	316	54	48	52	54	947	947	947	947	947
TOTAL:	104988	11106	14746	8808	9446	10994	5264	1226	2226	9046	10826	12605	8695
		SYLMAR BASIN											
City of Los Angeles	4004	482	590	312	0	0	0	0	420	550	550	550	550
City of San Fernando	3551	318	251	229	218	189	227	234	377	377	377	377	377
TOTAL:	7555	800	841	541	218	189	227	234	797	927	927	927	927
		VERDUGO BASIN											
Crescenta Valley Water District	3600	342	291	408	226	209	254	312	312	312	312	311	311
City of Glendale	2700	229	165	137	258	232	257	257	233	233	233	233	233
TOTAL:	6300	571	456	545	484	441	511	569	545	545	545	544	544
ULARA TOTAL:	118843	12477	16043	9894	10148	11624	6002	2029	3568	10518	12298	14076	10166

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

Party/Wellfield	Historical Average Pumping		Projected Groundwater Pumping				
			SAN FERNANDO BASIN				
City of Los Angeles	1979-97(A)	1993-97(B)	1997-98	1998-99	1999-00	2000-2001	2001-02
AERATION	535	1252	2337	1990	1990	1990	1990
ERWIN	5436	1968	1635	1300	1300	0	0
HEADWORKS	2183	0	0	0	0	5500	11000
No HOLLYWOOD	33284	14429	26263	32390	34090	34350	27290
POLLOCK	884	0	240	2400	2400	2400	2400
RINALDI-TOLUCA	19022	26116	41988	50000	50000	50000	50000
TUJUNGA	4086	14707	19689	15300	15300	15300	15300
VERDUGO	5607	2170	1162	2100	2100	400	0
WHITNALL	7708	1987	3218	2500	2500	0	0
TOTAL City of Los Angeles	**78745**	**62629**	**96532**	**107980**	**109680**	**109940**	**107980**
City of Burbank (C)	1400	2582	1300	550	550	550	550
LOCKHEED BOU (D)	898	4041	7027	14517	14517	14517	14525
City of Glendale (C)	1569	446	500	7700	7700	7700	7700
TOTAL San Fernando Basin	**82612**	**69698**	**105359**	**130747**	**132447**	**132707**	**130755**
			SYLMAR BASIN				
City of Los Angeles	2931	2196	3492	3492	3492	3492	3492
City of San Fernando	2891	3041	3550	3550	3100	3100	3200
TOTAL Sylmar Basin	**5822**	**5237**	**7042**	**7042**	**6592**	**6592**	**6692**
			VERDUGO BASIN				
Crescenta Valley Water District	2488	3401	3694	3294	3294	3294	3294
City of Glendale	2215	1540	2700	2700	3300	3300	3356
TOTAL Verdugo Basin	**4703**	**4941**	**6394**	**5994**	**6594**	**6594**	**6650**
TOTAL ULARA	93137	79876	118795	143783	145633	145893	144097

(A) All wellfields divided by 18 yrs. even if not active
(B) Average values for most recently in active service of the past four years. Well field start up: Tujunga 92/93; R-T 87/88. Wellfield shut down: Crystal Springs 87/88; Headworks 87/88; Pollock 90/91.
(C) Includes Valhalla for Burbank and Forest Lawn for Glendale.
(D) Started up 4/94.

IV. GROUNDWATER PUMPING FACILITIES

A. Well Fields

There are 12 production well fields located in the SFB, two in the Sylmar Basin, and three in the Verdugo Basin. The locations of the well fields are shown in Plate 1, and their estimated capacities are given on Table 3-1. The City of Burbank's Well No. 10/Lockheed WP-180 has been connected to the Burbank OU-Lockheed treatment plant as of May 1, 1998. Lockheed Martin will provide new pumping equipment and the connection for Phase II of the Burbank Consent Decree beginning during the water year 1997-98. Under the terms of the Second Consent Decree, Burbank will take over the Burbank OU-Lockheed treatment plant as the long-term primary operator. This decree goes into affect two years and 60 days after the plant is up and running under Phase II and will last for 18 years.

B. Active Groundwater Pumping and Treatment Facilities

Burbank OU- Lockheed

The remediation of groundwater contamination in the SFB has been significantly enhanced by the start-up of the Burbank OU on January 3, 1996. The Burbank OU-Lockheed, consisting of airstripping towers followed by liquid and gaseous phase GAC polishers, began pumping and delivering water to the municipal system at an average rate of about 6,000 gallons per minute (gpm), with a maximum rate of over 8,000 gpm. 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 was not expected to resume operations until June 1998. Only testing water was produced during the outage.

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

This facility is designed to treat by airstripping up to 2,000 gpm of groundwater. The treated water is delivered to Los Angeles' water distribution system. In August 1997 the facility was out of service for three weeks, due primarily to instrumental problems at the facility.

GAC Treatment Plant - City of Burbank

This facility is operated by the City of Burbank. 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-BOU water. The plant will be

operated in the parallel configuration. Burbank plans to use the production and GAC Treatment Plant at the following flow rates during the 1997/98 Water Year:

October – December	0 gpm
January – March	0 gpm
April – 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 anion-exchange process and blended with untreated water or purchased water to result in acceptable nitrate levels.

TREATED GROUNDWATER IN THE SAN FERNANDO VALLEY
TABLE 4.1 ACTUAL GROUNDWATER TREATMENT

Water Year	Burbank GAC	Lockheed Aqua Detox	Lockheed BOU	CVWD Glenwood Nitrate Removal Plant	Los Angeles Aeratiion Facility	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
Total AF	**10,105**	**4,815**	**15,857**	**7,341**	**9,633**	**47,751**

TABLE 4.2 PROJECTED GROUNDWATER TREATMENT								
	Burbank GAC	Lockheed BCU	CVWD Glenwood Nitrate Removal Plant	Los Angeles Aeratiion Facility	Glendale North/South OUs	Los Angeles' Pollock Wells Treatment Plant	Los Angeles' Headworks Well Field Remediation Project	Annual Total AF
1997-98	1,000	7,027	1,300	2,337		1,200		12,864
1998-99	250	14,517	1,500	1,990		2,400		20,657
1999-2000	250	14,517	1,500	1,990	7,200	2,400		27,857
2000-01	250	14,517	1,500	1,990	7,200	2,400	11,000	38,857
2000-02	250	14,525	1,500	1,990	7,200	2,400	11,000	38,865
Total AF	**2,000**	**65,103**	**7,300**	**10,297**	**21,600**	**10,800**	**22,000**	**139,100**

C. Projected Groundwater Pumping and Treatment Facilities

Glendale OU

Under the Record of Decision for the South and North Glendale OUs, many new facilities will be 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 conveyance system from the treatment plant to Glendale's 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. The 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. DreamWorks completed its construction in December 1997. Delays occurred among the City of Glendale, the PRPs and the EPA over additional costs for moving the treatment facility to the new site and changes to the original design, as well as, the designation of the facility operator. Agreements have been negotiated and are close to be signed.

Pollock Wells Treatment Plant

Construction of the Pollock Wells Treatment Plant, planned to treat 3,000 gpm of groundwater, began March 1997. 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 clean-up program in the Los Angeles River Narrows area of the SFB. The groundwater will be processed through liquid-phase GAC vessels intended for

VOC removal, followed by blending of the chlorinated groundwater to reduce nitrate levels. The processed water will then be delivered to LADWP's distribution system. The projected pumping pattern, through two existing wells, PO-4 and PO-7, will operate for a period of six months each year beginning in August 1998.

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. An alternative study will continue using Advanced Oxidation Process (AOP). This process uses ozone and hydrogen peroxide under a revised system to optimize treatment for control of bromate formation in the source water. Present plans call for the construction of three new supply wells and retrofitting one existing well by March 1999. A Negative Declaration has been prepared and was distributed for comment on May 15, 1998.

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 great 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. In April 1998, the Watermaster granted approval to the MTA to increase the groundwater discharge allowance to a total of 1700 acre-feet by January 1999. During these three years, about 1300 AF has been discharged to storm drains which flow into the Los Angeles River under an existing National Pollutant Discharge Elimination System permit. The dewatering activities are subject to review by the Watermaster and Administrative Committee, until the project is completed. The water will be charged against the Basin Account.

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 are 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. 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 1997-98 Water Year. Estimated capacities are shown in Table 5-1.

B. Future Spreading Operations

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, the California Department of Health Services, and the ULARA Watermaster have approved a Phase IA Demonstration Project which allows for the spreading of 10,000 acre-feet per year (AF/YR) during a three-year demonstration period that is anticipated to begin December 1998. 12 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 Compound 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. Map of East Valley Project is on Figure 5-1.

C. Actual and Projected Spreading

Table 5-1 shows the actual and projected spread volumes for the 1997-98 Water Year. Estimated capacity of each basin is detailed on Table 5-2. As shown in table 5-1, the 1997-98 water year will experience above average recharge activities. Overall, approximately 48,217 AF will be spread as compared to the historical average of 34,254 AF, and as compared to the past four year average of 43,220 AF. Rainfall precipitation on the valley fill is estimated at 33.6 inches for 1997-98 as compared to the long-term average of 16.99 inches/year and the previous five year average of 21.47 inches/year. 1997-98 is among one of the wettest years on record.

TABLE 5-1A: 1997-98 SPREADING OPERATIONS

(acre-feet)

	Operated by:						
	LACDPW				LADWP	LACDPW and LADWP	
Month	Branford	Hansen	Lopez	Pacoima	Headworks	Tujunga	Total
Oct-97	10	367	50	0	0	0	427
Nov-97	156	336	0	359	0	90	941
Dec-97	57	1,170	0	868	0	360	2,455
Jan-98	109	1,130	35	577	0	67	1,918
Feb-98	70	4,670	4	3,950	0	4,380	13,074
Mar-98	60	7,850	2	5,340	0	1,630	14,882
Apr-98	32	6,010	68	3,220	0	0	9,330
May-98	64	1,570	82	2,560	0	914	5,190
Jun-98	0	0	0	0	0	0	0
Jul-98	0	0	0	0	0	0	0
Aug-98	0	0	0	0	0	0	0
Sep-98	0	0	0	0	0	0	0
TOTAL	558	23,103	241	16,874	0	7,441	48,217
1969-97 Average	510	14,831	584	6917*	2,659	9285*	34,254
1992-1997 Average	441	20,481	821	9,851	23	11048*	43,220

Table 5-1B: HISTORICAL PRECIPITATION

(inches per year)

1969-97 Average	1992-97 AV	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98**
16.99	21.47	36.62	10.19	33.36	12.03	15.17	33.6

* - Includes native and imported waters.

** - Estimated.

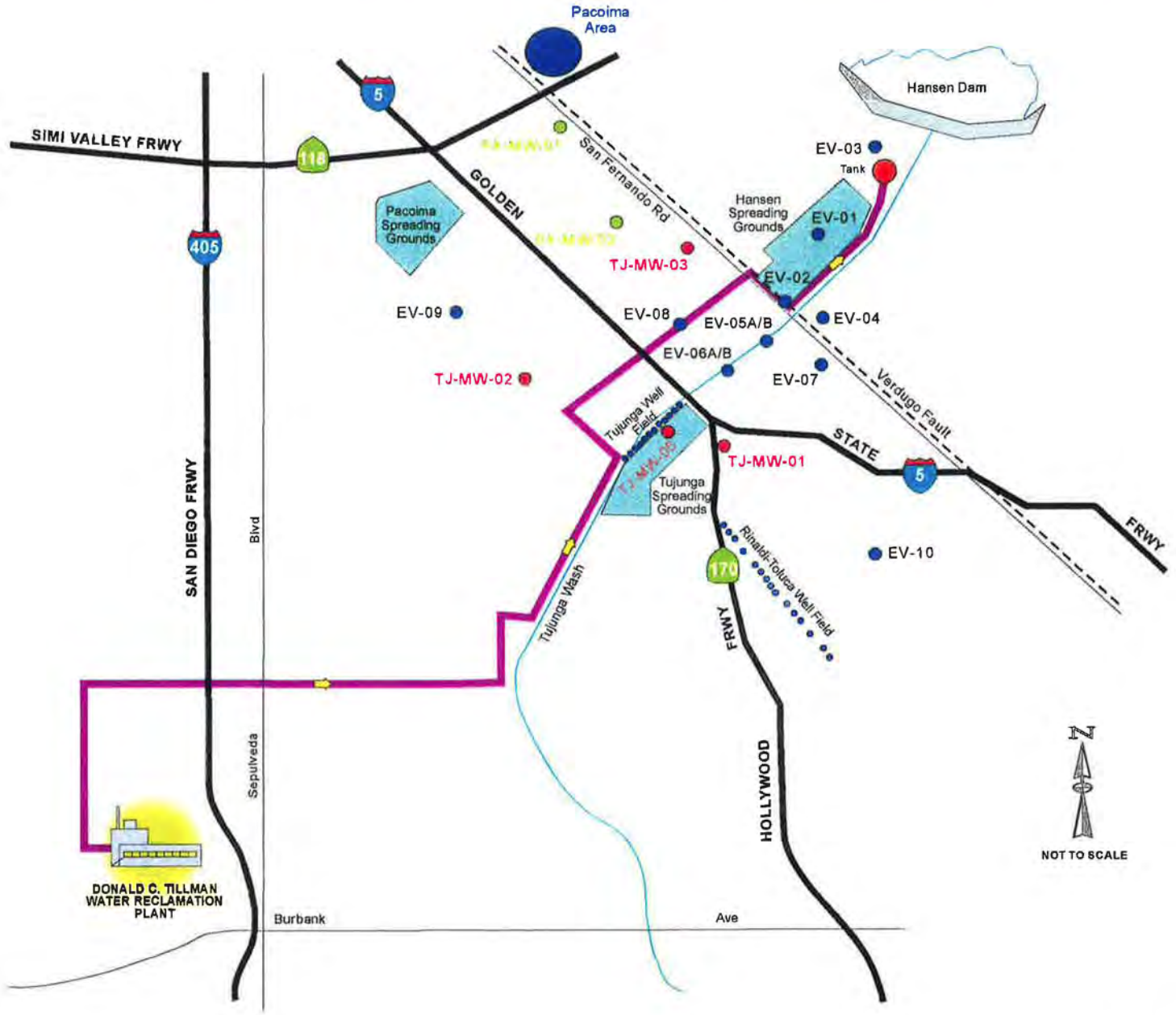
Big Tujunga: Water available for spreading in storage not including recession flows equals 1,210AF. Current inflow as of 6/4/98 is 97cfs.

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	110	36,000
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:	400	121,000

FIGURE 5-1: EAST VALLEY MONITORING WELL LOCATIONS



EVWELLS.CDR - 3/98

VI. BASIN MANAGEMENT ACTIVITIES AND INVESTIGATIONS

A. Groundwater Investigation Programs

Pacoima Area Groundwater Investigation

The Pacoima Groundwater Investigation Group (PGIG) met on June 16, 1997, October 15, 1997, and February 25, 1998 to discuss the Pacoima Area groundwater contamination. The PGIG is comprised of the regulatory lead agency - State Department of Toxics Substance Control (DTSC), the Regional Water Quality Control Board, the ULARA Watermaster, Los Angeles Bureau of Sanitation - Industrial Waste Division, and the Los Angeles Department of Water and Power (LADWP).

The PGIG's objective is to address the nature and extent of groundwater contamination near the intersection of San Fernando Road and the Simi Valley Freeway (Hwy 118), 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 Los Angeles Regional Water Quality Control Board personnel. TCE found at this site of 12,000 ppb is the highest found in the San Fernando Valley. Figure 5-1 provides a map.

There are four primary synthetic organic contaminants present in the groundwater beneath the Pacoima area: PCE, TCE, 1,1-TCA and 1,1 DCE. To help characterize the extent of contaminant migration, LADWP installed two monitoring wells, PA-01, approximately one half mile downgradient and PA-02 approximately one and one quarter mile downgradient of the site. PA-01 was sampled on March 11, 1998 and more constituents were found than the three detected last 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 one-half mile downgradient of PA-01 and was sampled on March 11, 1998. The following VOCs were detected: Carbon Disulfide (~22 µg/L) and PCE (~ 1.1 µg/L).

DTSC is in the process of coming to closure on a consent order with the property lessee, Holchem, and the property owner, Mr. Herman Benjamin. DTSC has also submitted site screening data to the USBDA for the Price Pfister site, and will continue its evaluation of any other potential source sites.

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 1998 "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 U.S. Environmental Protection Agency 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 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 as a function of depth. In the deepest portion of the SFB the model is subdivided into four layers each layer characterizing a specific zone. The model is created with a variable grid that range 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 five-year study begins with the Fall 1997 and ends in the Fall 2002. Projected pumping values for each well field were derived from the "Pumping and Spreading Plans" submitted by each party. The projected 'Well Field' values (Table 7-1) were then used to assign pumping to individual wells. Each well was then assigned a percentage of pumping to each model layer, based on the percentage of the wells' perforations contained in each layer.

Normal or average rainfall and recharge conditions were assumed over the five-year study period except for 1997-98 where actual values for the first half of the water year were known and the total was projected for the remainder of the year. Initial head values (groundwater elevations) were derived from previous simulations for the 1996-97 Water Year. At the close of every Water Year, Watermaster staff updates the model's input files with the actual basin recharge and extraction data. This activity covers the period from 1980-1997.

C. Simulated Groundwater Contours

After running the model for five stress periods (1997-2002), each 365 days in length, groundwater contours and horizontal flow direction were generated from the MODFLOW output file (data file).

- 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 was a calculated data file between the stress period (Fall 1997 – Fall 2002) and is shown on Plate 3 for Layer 1 and Plate 4 for Layer 2.

- 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 2002

- The most noticeable feature is the cone of depression (pumping cone) that has developed around the Burbank Operable Unit (OU). These extractions are derived primarily from Layer 1, although Layer 2 does provide some recharge to Layer 1. The OU pumping increases to 14,500 AF/YR by the 1998-99 Water Year. The radius of influence extends as far as 7,000 feet in the downgradient (southeasterly) direction.

- 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 2002

- The most significant features are the cones of depression near the Rinaldi-Toluca, North Hollywood, Burbank OU and Headworks Well Field areas. Except for the Burbank OU, over

75% of the R-T (50,000 AF/YR), NH (34,000 AF/YR), and HWs (11,000 AF/YR) pumping, is derived from Layers 2-4.

Plate 3: Change in Groundwater Elevation Model Layer 1 – Fall 1997 to Fall 2002

- As shown in Plate 3, the basinwide trend is a decline in the groundwater elevations over the 5-year study period, with the exception of the area near the Hansen Spreading Grounds.

- The 'big picture' reason for the decline in water levels is that basin extractions are projected to exceed recharge by 53,000, over the 5-year study period.

- The water table near the Rinaldi-Toluca Well Field declines by about 50 feet and approximately 60 feet near the Burbank OU. The area near the Burbank OU is substantially impacted because extractions increase to 14,500 AF/YR beginning in 1998-99, which is an 8,000 AF/YR increase since the 1993-97 period and an almost 600% increase as compared to the long term average (1979-97).

- The water table near the Glendale North OU wells will decline between 10-20 feet and approximately 10 feet near the South OU Wells. Full-scale operation of the OU plant is expected to begin by the 1999-00 Water Year. The North OU Wells will deliver 4,320 AF/YR and the South OU wells 2,880 AF/YR.

- The area near the Tujunga, North Hollywood, Erwin, and Whitnall Well Fields will experience a 40'-50' depression in the water table. Of a lesser magnitude, the water table near the Verdugo Well Field will recede 30 feet and close to 5 feet near the Pollock Well Field.

- The water table will rise as much as 50' near the Hansen Spreading Grounds, primarily due to the 10,000 AF/YR increase from the East Vally Water Recycling Project, beginning in 1999.

Plate 4: Change in Groundwater Elevation Model Layer 2 – Fall 1997 to Fall 2002

- The most impressive feature is the 50-foot depression near the Rinaldi-Toluca Well Field. Los Angeles projects pumping 50,000 AF/YR from the Rinaldi-Toluca Well Field, which is

approximately 45% of Los Angeles' total pumping and 38% of the San Fernando basinwide total.

- The Headworks Well Field is planned for reactivation in 2001-02. 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 (11,000 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.

Plate 5: Simulated Groundwater Flow Direction Model Layer 1 – Fall 2002

- 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 and Burbank OU Well Fields and the Hansen Spreading Grounds cause the most pronounced effect on the direction of groundwater involvement. 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 PSD wells and south of the Whitnall, Erwin, and Burbank OU wells. This is primarily due to the 'pumping trough' formal by the Burbank OU extractions.

Plate 6: Siumlated Groundwater Flow Direction Model Layer 2 – Fall 2002

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

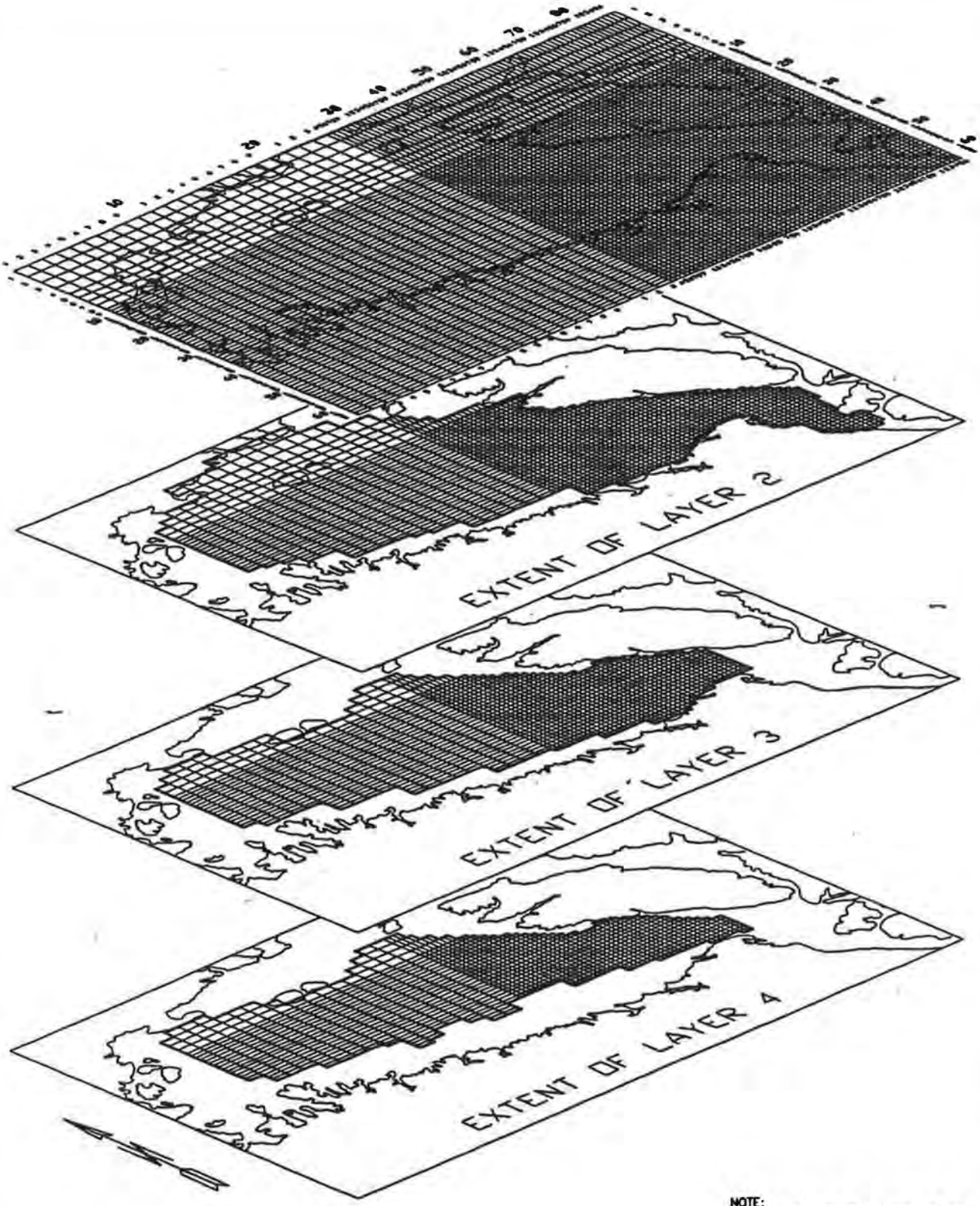
Plates 7 – 9: Simulated Groundwater Flow Direction and TCE,PCE and NO_3 Contamination Model Layer 1 – Fall 2002

- 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 2002. 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 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% of the Glendale OU pumping is from Layer 2 and 75% 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

MODFIG5 RE. , 08/92

MODEL INPUT SUMMARY

TABLE 7-1

Pumping and Spreading Scenario

Water Years 1997 - 2002

	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
1997-98	32.00	45.96	22,230	54,449	**76,679**	**7,850**	415	24,000	-	1,200	15,000	10,000	**50,615**	350	400	70	**820**	**135,964**
1998-99	18.57	23.06	12,874	61,525	**74,399**	**3,939**	352	23,252	-	1,037	4,520	4,000	**33,161**	350	400	70	**820**	**112,319**
1999-00	18.57	23.06	12,874	61,525	**74,399**	**3,939**	352	23,252	-	1,037	4,520	4,000	**33,161**	350	400	70	**820**	**112,319**
2000-01	18.57	23.06	12,874	61,525	**74,399**	**3,939**	352	23,252	-	1,037	4,520	4,000	**33,161**	350	400	70	**820**	**112,319**
2001-02	18.57	23.06	12,874	61,525	**74,399**	**3,939**	352	23,252	-	1,037	4,520	4,000	**33,161**	350	400	70	**820**	**112,319**

	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	OU-NORTH	OU-SOUTH	TOTAL NON-LADWP	TOTAL NON GLENDALE (F. LAWN & SEARS)	TOTAL EXTRACTION
1997-98	-2,337	-1,635	0	-26,263	-240	-41,988	-19,689	-1,162	-3,218	**-96,532**	-1,300	-7,027	-300	-100	0	0	-1,465	-624	**-107,348**
1998-99	-1,990	-1,300	0	-32,390	-2,400	-50,000	-15,300	-2,100	-2,500	**-107,980**	-550	-14,517	-300	-100	-2,160	-1,440	-1,465	-624	**-129,136**
1999-00	-1,990	-1,300	0	-34,090	-2,400	-50,000	-15,300	-2,100	-2,500	**-109,680**	-550	-14,517	-300	-100	-4,320	-2,880	-1,465	-624	**-134,436**
2000-01	-1,990	0	-5,500	-34,350	-2,400	-50,000	-15,300	-400	0	**-109,940**	-550	-14,517	-300	-100	-4,320	-2,880	-1,465	-624	**-134,696**
2001-02	-1,990	0	-11,000	-27,290	-2,400	-50,000	-15,300	0	0	**-107,980**	-550	-14,517	-300	-100	-4,320	-2,880	-1,465	-624	**-132,736**

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

PROJECT: *WATERMASTER*
PROJECT NO.: *PS97-98*
DATE: 5/24/98

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 clean-up program which has, in effect, restored Burbank's groundwater pumping capability, and within two years, will restore Glendale's San Fernando Basin pumping capability.

Los Angeles

The Watermaster approves of Los Angeles' projected average annual pumping for 1997-98 to 2001-02 of approximately 106,500 AF/YR. This is approximately 28,000 AF/YR more than their pumping over the period 1979-97 and 44,000 AF/YR more than the last four years (1993-97). As of October 1, 1997, Los Angeles' accumulated stored water credit was 296,630 AF. This increased pumping will reduce Los Angeles' stored water account by only approximately 43,000 AF, primarily because of the additional 10,000 AF/YR of groundwater recharge from the East Valley Water Recycling Project. 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 have the Pollock Wells Treatment Plant operational by Fall 1998 and the continued progress towards reactivating the Headworks wells.

Burbank

The Watermaster is particularly encouraged that Burbank's groundwater pumping capability has been fully restored through the activation of the Burbank OU. Over the past eleven years, Burbank's reduction in groundwater pumping has contributed to an increase in its stored water credit from 29,386 AF (October 1, 1986) to 56,297 AF (October 1, 1997). The projected Burbank OU extractions of 14,500 AF/YR, beginning 1998-99, 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 six years.

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 59,776 AF (October 1, 1997). 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 OU could be operated for at least 30 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 clean-up aspect but also from managing basin storage in this area.

The change in groundwater elevation contours illustrates that over the next five years, a 50 foot drawdown in water levels can be anticipated near the Rinaldi-Toluca Well Field, and as much as a 60 foot drawdown near the Burbank OU wells, with an average of about 40 feet. The Tujunga and North Hollywood Well Fields could also experience a 40 foot drawdown of water levels. There is little decline in water levels near the Headworks and Pollock Wells in the upper zone (Layer 1), however, a significant cone begins to develop in Layer 2 near the Headworks wells (30'). A radius of influence exists,but in a less pronounced manner, near of the Glendale North and South OU wells. The model demonstrates that the radius of influence for the Burbank OU extends to approximately 7,000 feet downgradient and that the combined pumping of the Burbank OU, Rinaldi-Toluca, and North Hollywood Wells, tends to flatten the horizontal gradient and movement of groundwater and the contaminant plumes south of the Burbank OU.

Pacoima Area Contamination

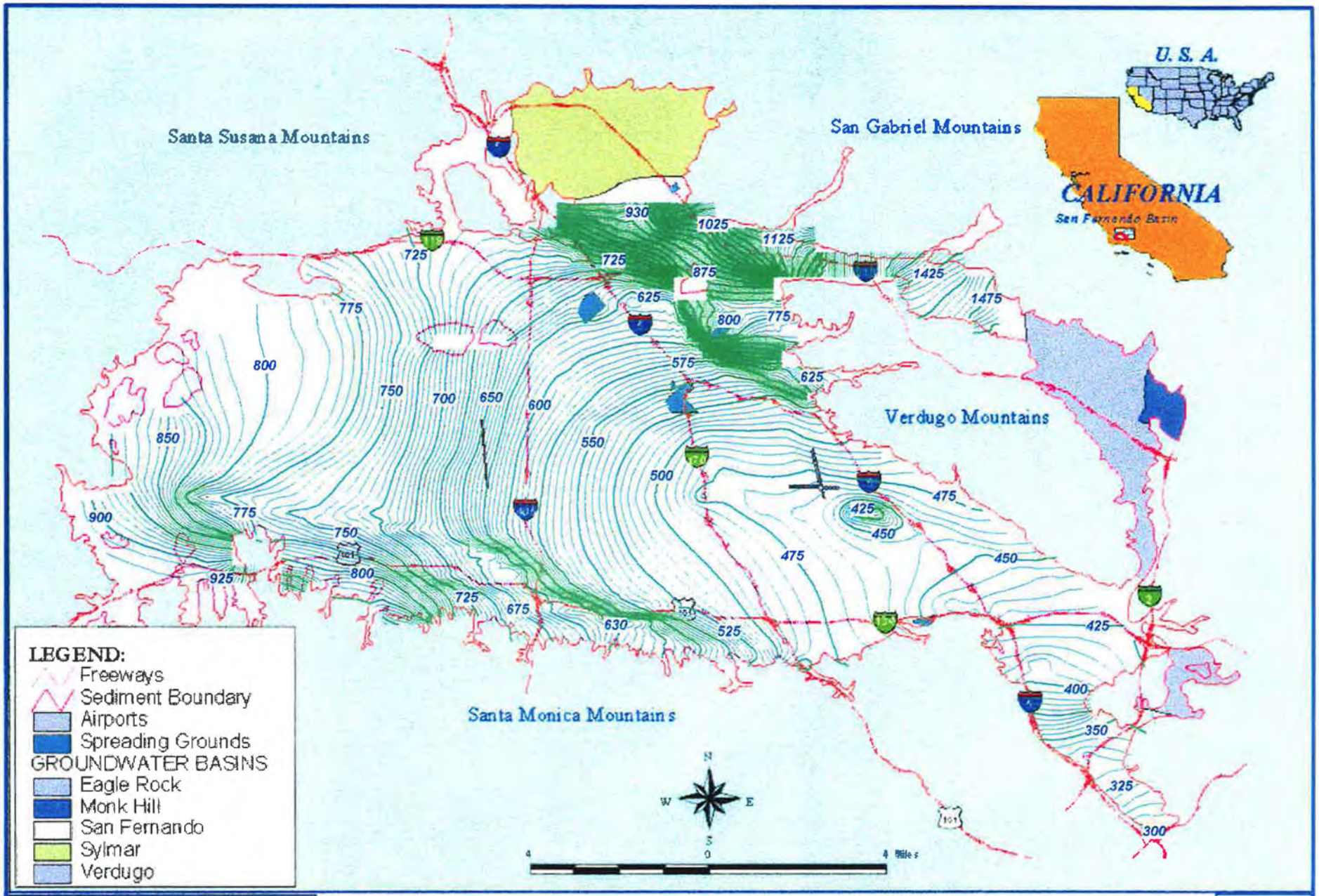
The Pacoima Area groundwater investigation is of particular concern to the Watermaster because the contamination is upgradient of all the well fields in the San Fernando Basin and is only 2.5 miles upgradient of Los Angeles' Tujunga Well Field. The Watermaster will continue to take an active role, along with the lead regulatory agency, Cal EPA - Department of Toxics Substance Control, the Regional Water Quality Control Board and the Los Angeles Department of Water and Power. The Watermaster will support aggressive 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 site. The first well, PA-01, is approximately ½ a 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 and 1/4 miles south of Holchem, has shown 1.1 µg/L for PCE. The Watermaster will continue to track the progress of the clean-up efforts.

Verdugo Basin

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

PLATES



Upper Los Angeles River Area

WATERMASTER

PUMPING & SPREADING REPORT

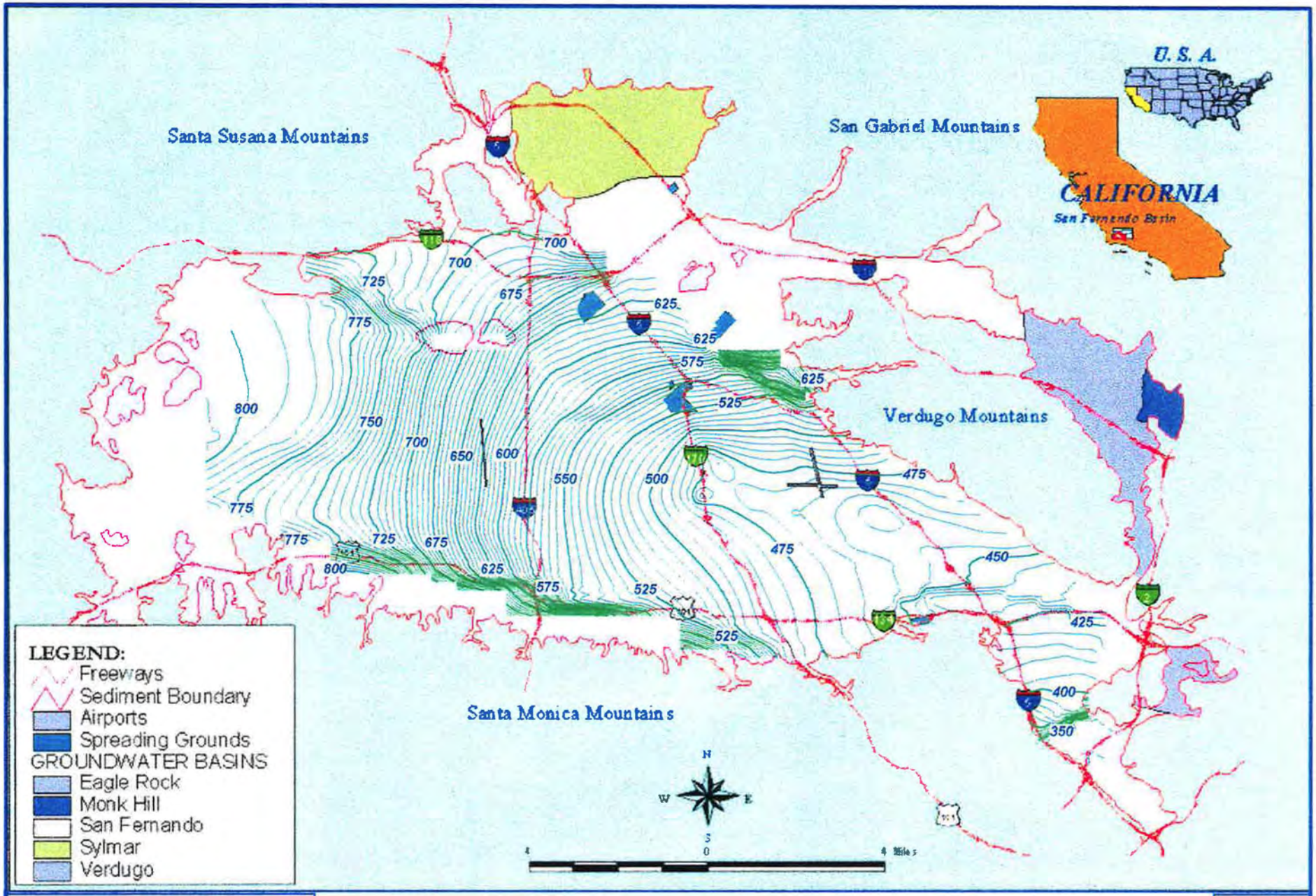
1997-2002 WATER YEARS

Simulated Groundwater Contour - Model Layer 1

FALL 2002

PLATE

1



Upper Los Angeles River Area

WATERMASTER

PUMPING & SPREADING REPORT

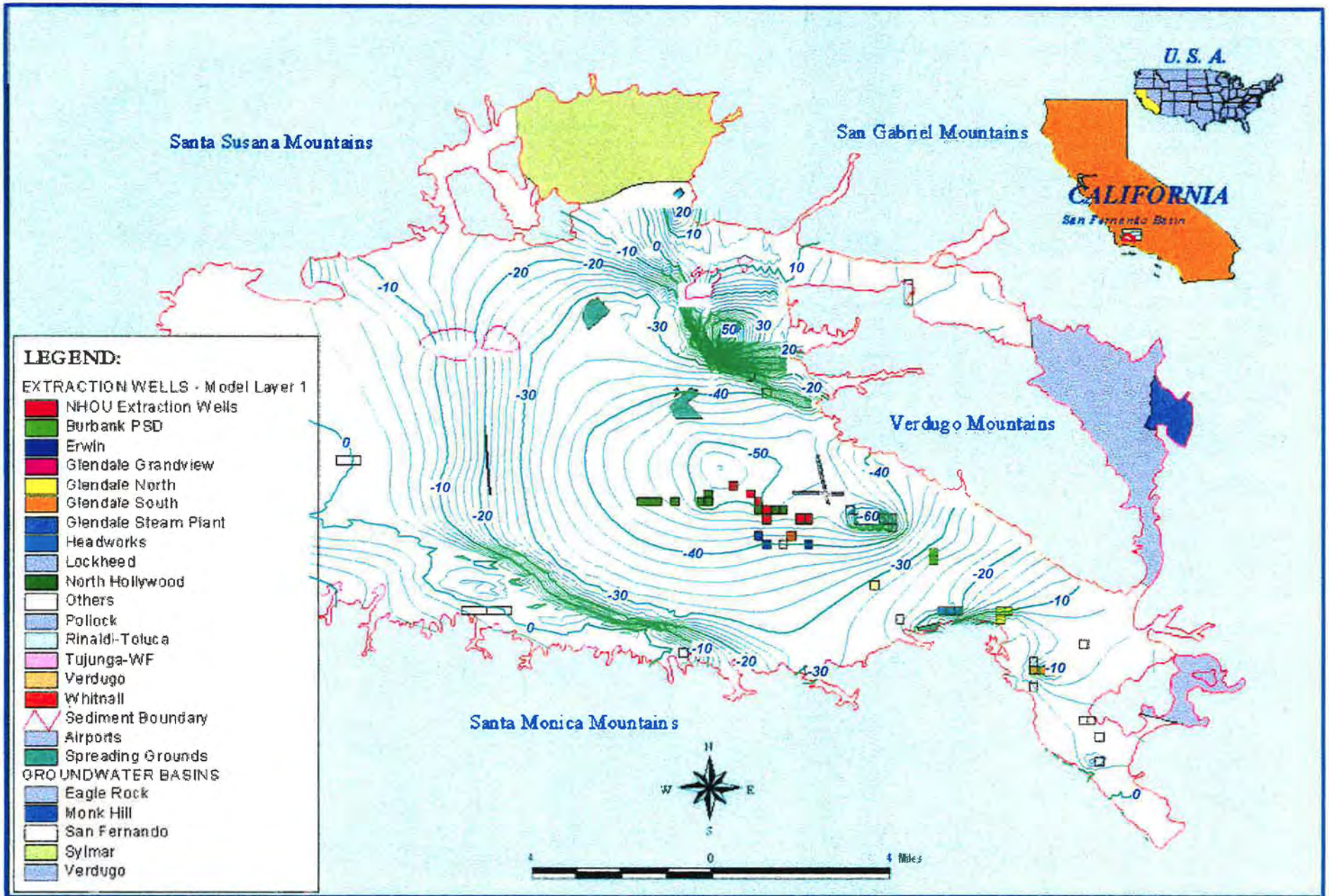
1997-2002 WATER YEARS

Simulated Groundwater Contour - Model Layer 2

FALL 2002

PLATE

2



Upper Los Angeles River Area

WATERMASTER

PUMPING & SPREADING REPORT

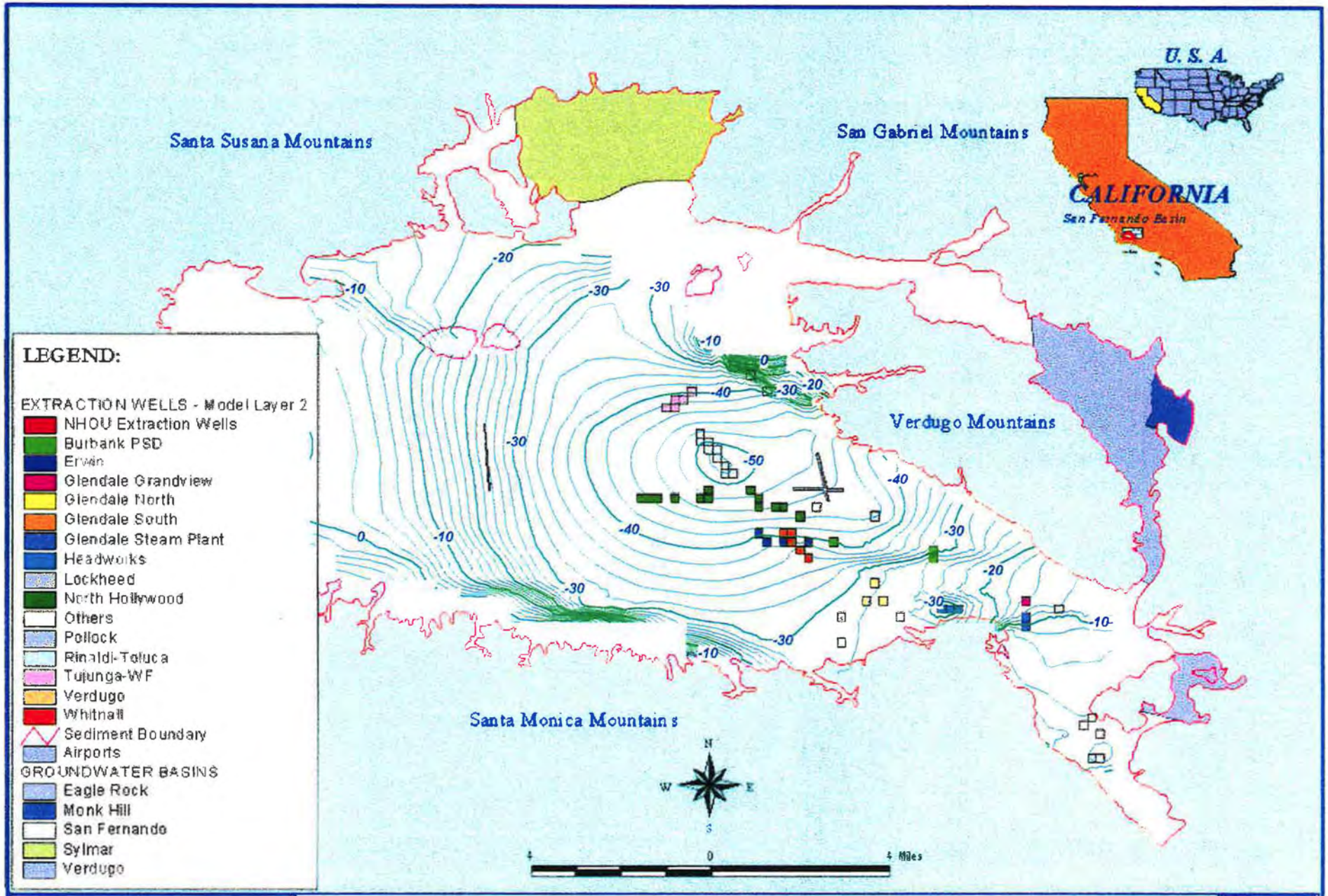
1997-2002 WATER YEARS

Change in Groundwater Elevation - Model Layer 1

Fall 1997 - Fall 2002

PLATE

3

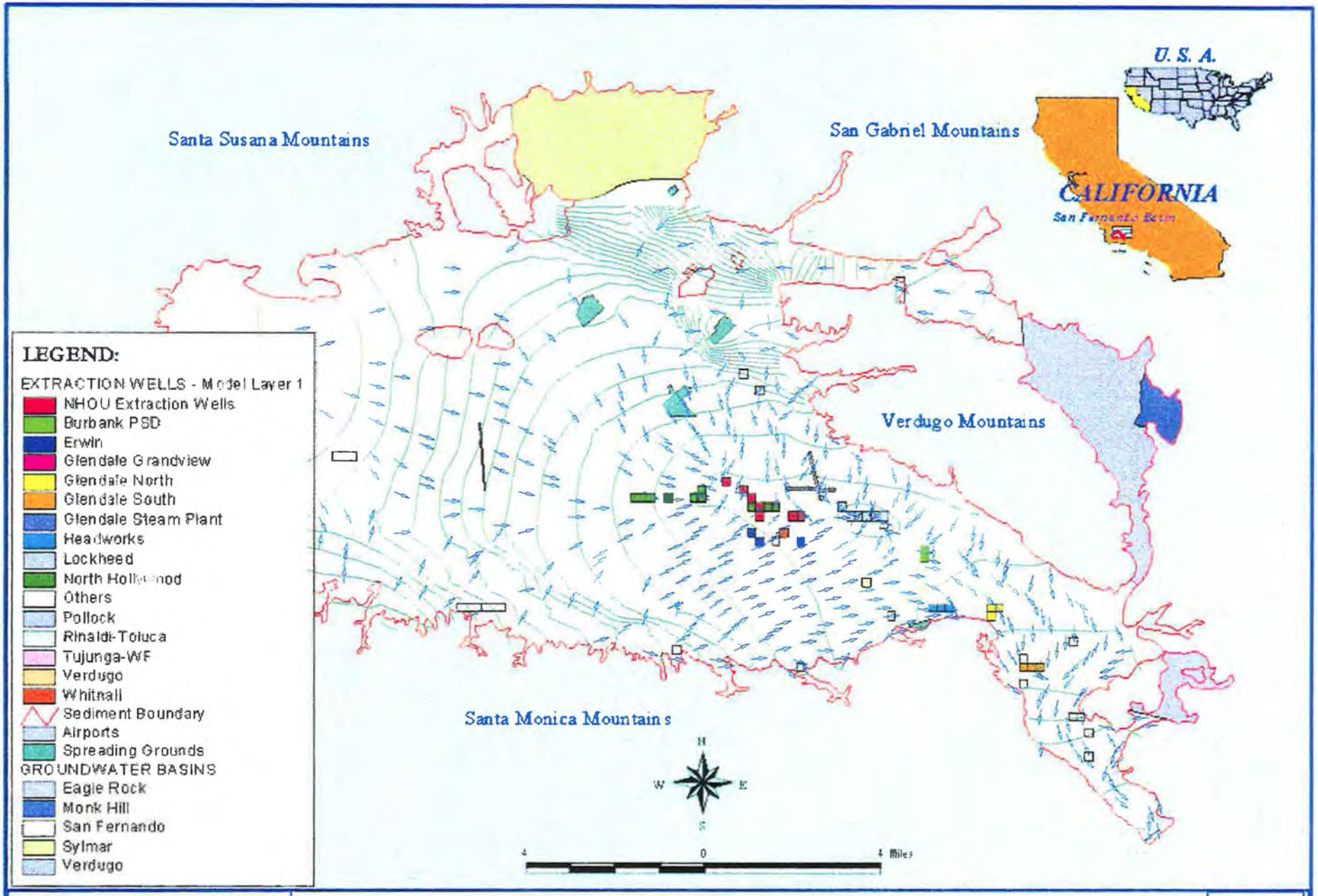


Upper Los Angeles River Area
WATERMASTER
PUMPING & SPREADING REPORT
1997-2002 WATER YEARS

Change in Groundwater Elevation - Model Layer 2

Fall 1997 - Fall 2002

PLATE
4

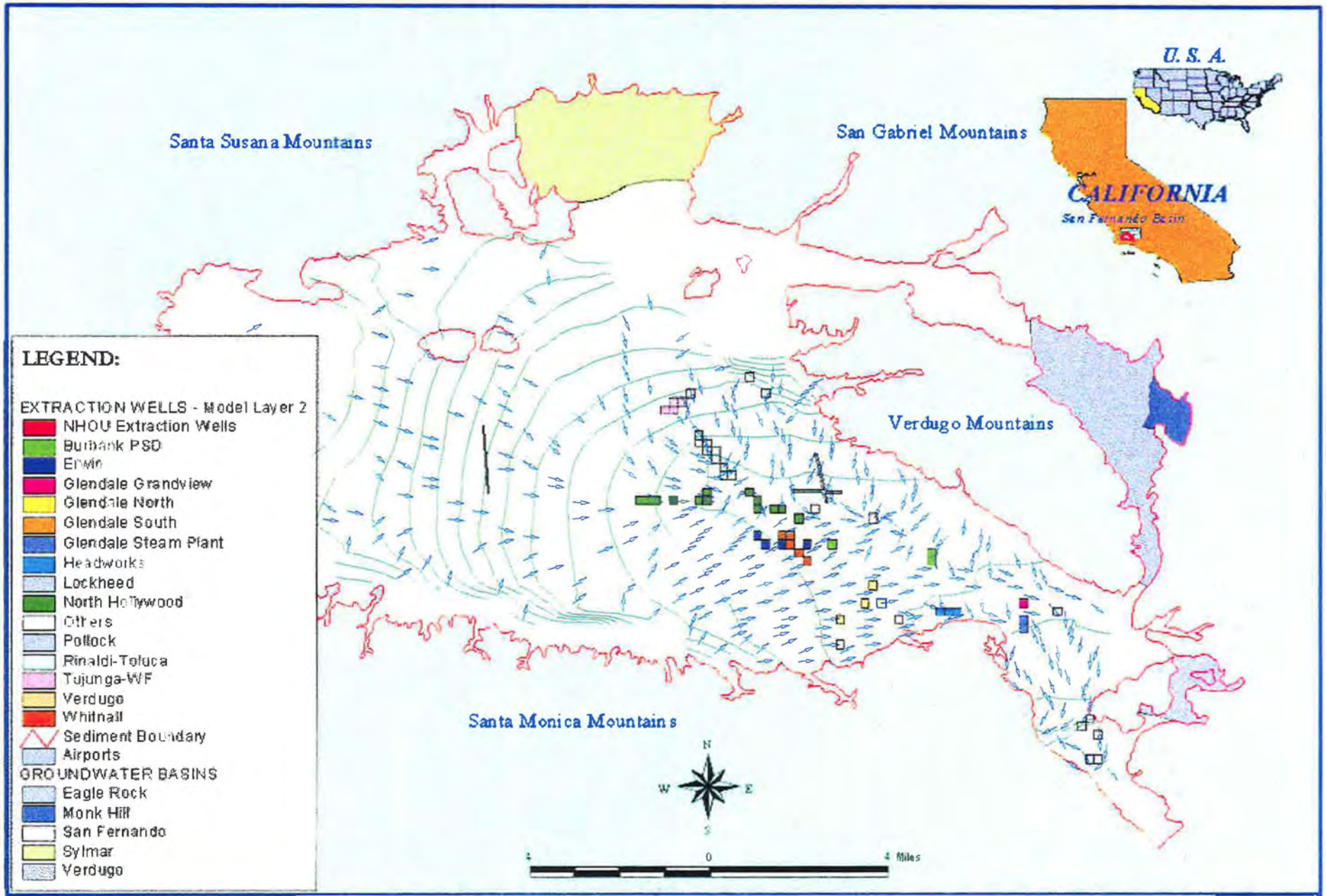


Upper Los Angeles River Area
WATERMASTER

PUMPING & SPREADING REPORT
1997-2002 WATER YEARS

Simulated Groundwater Flow Direction - Model Layer 1
Fall 2002

PLATE
5

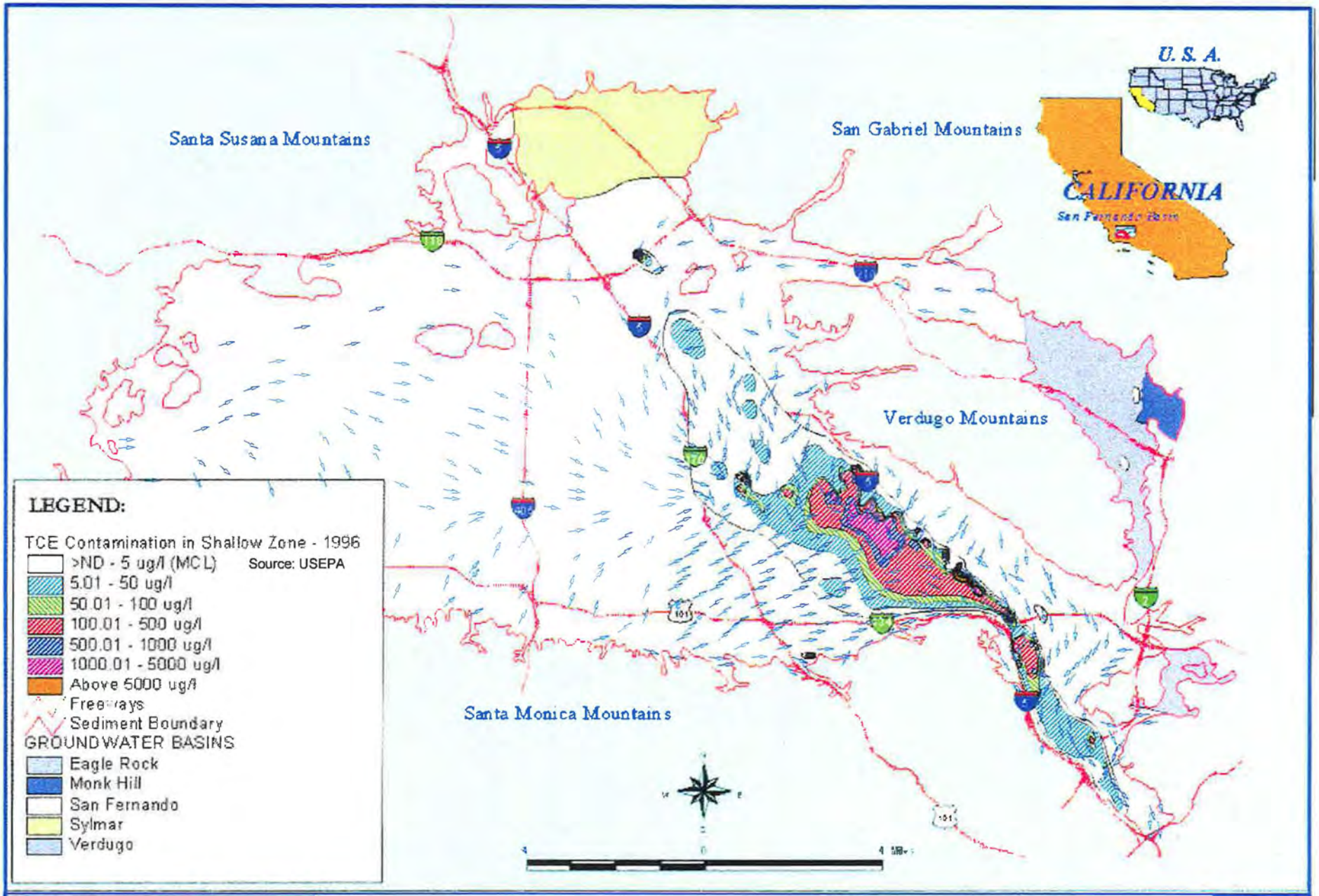


Upper Los Angeles River Area
WATERMASTER

PUMPING & SPREADING REPORT
1997-2002 WATER YEARS

Simulated Groundwater Flow Direction - Model Layer 2
Fall 2002

PLATE
6



Upper Los Angeles River Area

WATERMASTER

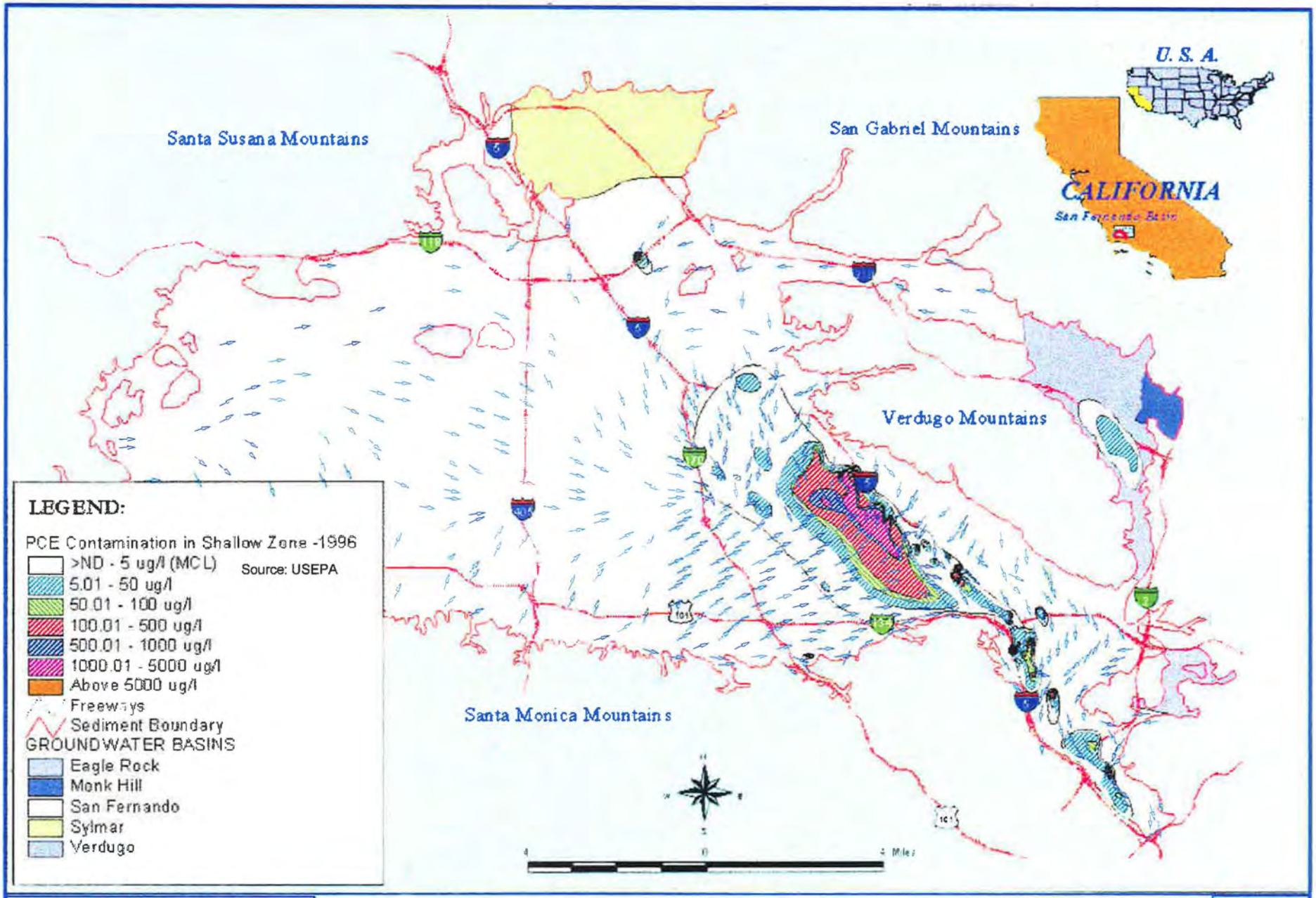
PUMPING & SPREADING REPORT

1997-2002 WATER YEARS

Simulated Groundwater Flow Direction and TCE Contamination Model Layer 1 - Fall 2002

PLATE

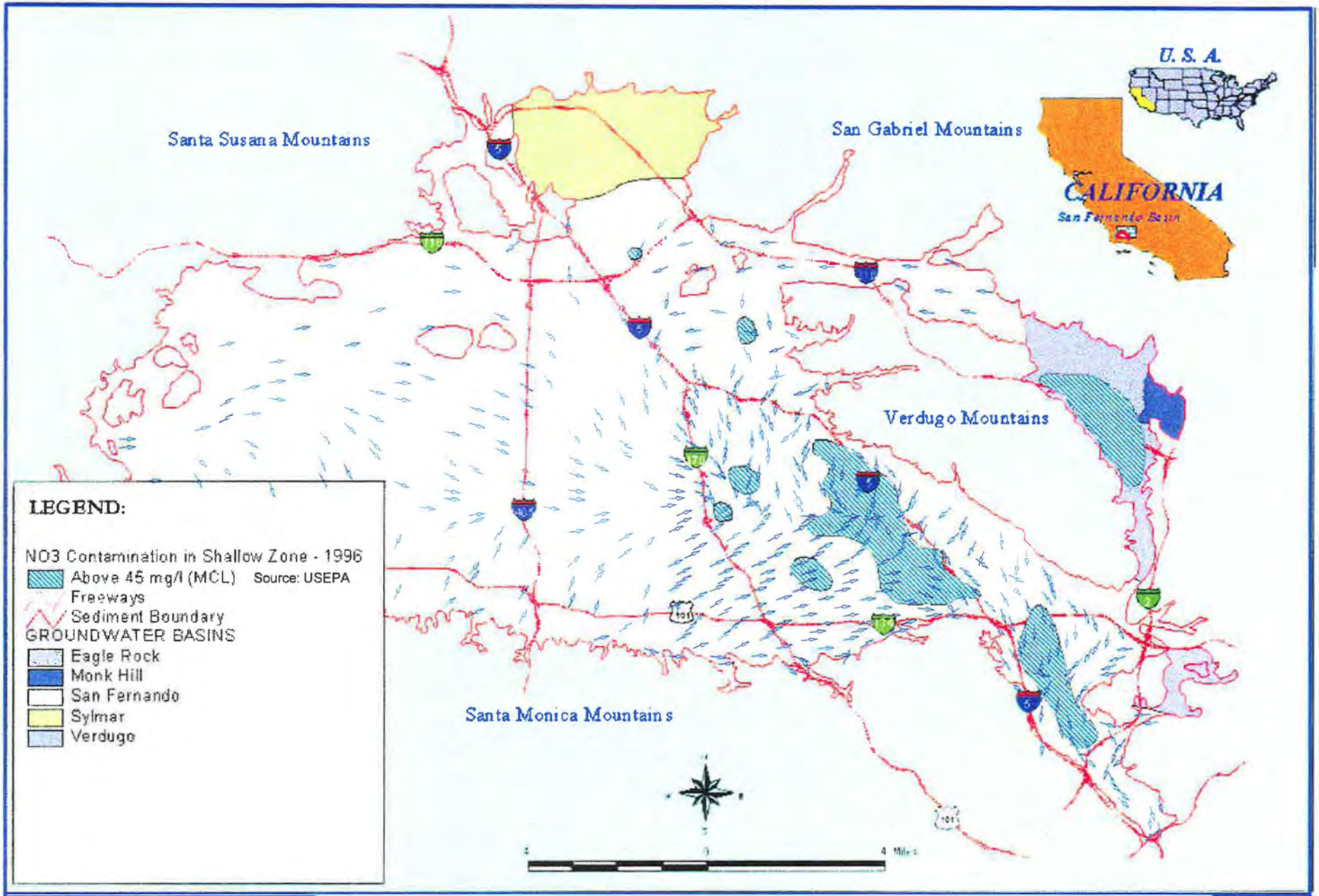
7



Upper Los Angeles River Area
WATERMASTER
PUMPING & SPREADING REPORT
1997-2002 WATER YEARS

Simulated Groundwater Flow Direction and PCE Contamination Model Layer 1 - Fall 2002

PLATE
8



Upper Los Angeles River Area
WATERMASTER
PUMPING & SPREADING REPORT
1997-2002 WATER YEARS

Simulated Groundwater Flow Direction and NO3 Contamination Model Layer 1 - Fall 2002

PLATE
9

APPENDIX A

CITY OF LOS ANGELES

PUMPING AND SPREADING PLAN

1997-2002 Water Years

CITY OF LOS ANGELES
GROUNDWATER PUMPING AND SPREADING PLAN
IN THE UPPER LOS ANGELES RIVER AREA
FOR THE 1997-2002 WATER YEARS

APRIL 1998

Prepared by:
Groundwater Group
Water Resources Section
WATER SUPPLY DIVISION
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' 1998 Groundwater Pumping and Spreading Plan for the Water Years 1997 - 2002.

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	4	10
Headworks	6	25
North Hollywood	30	129
Pollock	3	6
Rinaldi-Toluca	15	112
Tujunga	12	112
Verdugo	6	12
Whitnall	6	15
Sylmar Basin		
Mission	3	9
TOTAL:	92	433

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

c. Groundwater Treatment Facilities: The LADWP operates two groundwater treatment facilities. Water treated at these facilities is delivered to the water distribution system for consumption. The locations of these facilities are shown in Figure 1-1.

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.

Section 2: Annual Pumping And Spreading Projections

a. Pumping Projections for the 1997-98 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 1997-98 Water Year from the San Fernando and Sylmar Basins. Appendix B provides groundwater extraction projections from 1998 to 2002. 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 97-98
(Acre-Feet)

San Fernando Basin

	TOTAL	Oct-97	Nov-97	Dec-97	Jan-98	Feb-98	Mar-98	Apr-98	May-98	Jun-98	Jul-98	Aug-98	Sep-98
AERATION	2,337	132	258	189	202	186	170	200	200	200	200	200	200
ERWIN	1,635	141	168	10	0	154	230	35	180	180	180	180	180
HEADWORKS	0	0	0	0	0	0	0	0	0	0	0	0	0
No HOLLYWOOD	26,263	2443	3394	2573	2430	2417	2416	500	0	2670	2670	2670	2080
POLLOCK	240	0	0	0	0	0	0	0	0	0	0	0	240
RINALDI-TOLUCA	41,988	4976	5977	3959	4775	4455	1247	0	0	4150	4150	4150	4150
TUJUNGA	19,689	2241	4138	1753	1979	3494	745	0	0	0	1780	3560	0
VERDUGO	1,162	0	1	1	0	1	0	60	220	220	220	220	220
WHITNALL	3,218	1	0	1	1	237	359	120	500	500	500	500	500
TOTAL:	96,532	9,933	13,933	8,486	9,386	10,943	5,165	915	1,100	7,920	9,700	11,480	7,570

Sylmar Basin

MISSION	4,004	482	590	312	0	0	0	0	420	550	550	550	550
ULARA TOTAL:	100,536	10,415	14,524	8,797	9,386	10,943	5,165	915	1,520	8,470	10,250	12,030	8,120

b. Spreading Projections for the 1997-98 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 1997-98. The East Valley Water Recycling Project in Phase IA will add recycled water to the Hansen Spreading Grounds beginning approximately December 1998 with an amount anticipated at 10,000 AFY. Phase IB will carry recycled water to the Pacoima Spreading Grounds.

Table 2-2

Projected Spreading in ULARA Spreading Grounds in 1997-98							
Operated by:							
	LACDPW				LADWP	LACDPW and LADWP	Monthly Total
Month	Branford	Hansen	Lopez	Pacoima	Headworks (A)	Tujunga	
Oct-97	10	367	50	0	0	0	427
Nov-97	156	336	0	359	0	90	941
Dec-97	57	1170	0	868	0	360	2455
Jan-98	109	1130	35	577	0	67	1918
Feb-98	70	4670	4	3950	0	4380	13074
Mar-98	0	7850	2	5340	0	1630	14822
Apr-98	0	0	0	0	0	0	0
May-98	0	0	0	0	0	0	0
Jun-98	0	0	0	0	0	0	0
Jul-98	0	0	0	0	0	0	0
Aug-98	0	0	0	0	0	0	0
Sep-98	0	0	0	0	0	0	0
TOTAL:	402	15523	91	11094	0	6527	33637

(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 91 active wells in ULARA are sampled at least once every three years. 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 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 91 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 during March 1998 due to electrical problems at the facility. In August 1998 the facility was out of service for three weeks, due primarily to instrumental problems at the facility. Because of the facility shut down water supply wells were not sampled during August. 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)
4/97	169	314	---	159	298	304	330	1094	136/16.7	2.1/ND
5/97	167	299	282	157	295	298	330	1050	202.17	2.6/ND
6/97	125	124	125	125	125	125	125	1035	196/7.6	2.5/ND
7/97	169	305	287	154	293	303	325	1441	129/17.1	2.1/ND
8/97	168	312	282	147	290	290	325	1672	---	---
9/97	167	303	286	151	290	304	---	1273	107/5.1	3.1/ND
10/97	167	306	283	144	292	298	325	1526	111/11.7	ND/ND
11/97	156	469	314	132	296	295	323	1385	116/16.3	2.7/ND
12/97	161	303	262	124	291	313	325	1364	79.6/11	ND/ND
1/98	---	300	155	134	288	293	315	1499	62.9/15.7	2.2/ND
2/98	---	294	235	122	284	292	318	1318	49.7/15	1.6/ND
3/98	156	314	250	96	284	293	314	1011	70.7/16.6	1.0/ND

Section 5: Plans For Facilities Modifications

This section describes any plans for modifications to existing facilities, or plans to construct new facilities in the 1997-98 Water Year, as of the printing of this report (April 1998).

a. Spreading Grounds: There are no plans for modifications that would change the capacity of existing spreading grounds, or for the construction of new facilities in the 1997-98 Water Year.

b. Extraction Wells: The capacity of the existing wells will be modified by the remediation of the Pollock Well Field scheduled to come on-line in August 1998. There are no plans for modifications that would significantly change the zone of extraction of any existing wells in the 1997-98 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 will be operational in August of 1998. The well field has been out-of-service since 1989.

Headworks Well Field Remediation. The Headworks well field was taken out of service in the mid 1980s due to contamination of 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).

An additional alternative treatment technology will continue to be evaluated during 1998. The technology consists of modified Advanced Oxidation Process (hydrogen peroxide and ozone) system. Present plans call for the construction of three new supply wells and retrofitting one existing well by March 1999. A negative declaration has been prepared and will be distributed for comment by June 1998.

The Department purchased 100 pressure transducers with the intention of dedicating the units to key monitoring wells throughout the basin. These instruments will enhance the understanding of the groundwater system's response to the basin's pumping and spreading activities. To date, 68 transducers have been installed.

Pursuant to the East Valley Water Recycling Project, the Department anticipates completing the 10 miles of pipeline and the Balboa Pumping Station by December 1998 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 December 1998. Concurrently, twelve monitoring wells were installed in the summer of 1997 which will help to monitor the groundwater quality and groundwater levels.

The Department has installed additional monitoring wells near the Tujunga and Headworks well fields and near the Pacoima Area to provide an early detection system for the Tujunga well field.

APPENDIX A:
1996-97 Water Quality Sampling Results

ULARA WELLS

Number	Cluster	Well	Date	PCE (ug/L)	TCE (ug/L)	Date	NO^3 (mg/L)
1	11	AERATION #2	11/12/97	6.84	414.00	11/12/97	58.03
2	11	AERATION #3	12/11/97	5.40	76.80	12/11/97	43.02
3	10	AERATION #4	12/11/97	13.20	70.60	12/11/97	40.93
4	9	AERATION #5	12/11/97	16.00	44.60	12/11/97	48.73
5	9	AERATION #6	12/11/97	6.20	27.30	12/11/97	29.31
6	8	AERATION #7	12/11/97	0.70	15.00	12/11/97	38.10
7	8	AERATION #8	12/11/97	30.40	125.00	12/11/97	36.33
8	6	ERWIN #1	10/22/97	0.72	ND		
9	7	ERWIN #2	5/4/95	4.30	13.20		
10	6	ERWIN #3	7/30/96	1.40	24.00		14.66
11	7	ERWIN #4	4/7/97	0.60	8.10		4.43
12	7	ERWIN #6	12/17/97	ND	ND	11/20/97	42.22
13	7	ERWIN #10	8/27/97	ND	ND	8/27/97	16.35
14	20	MISSION #5	11/13/97	ND	3.16	11/13/97	25.16
15	21	MISSION #6	6/26/97				8.42
16	21	MISSION #7	6/10/97	ND	0.76	6/10/97	16.30
17	12	NORTH HOLLYWOOD #2	12/9/97	4.53	31.50	11/17/97	44.30
18	14	NORTH HOLLYWOOD #4	—				
19	15	NORTH HOLLYWOOD #7	12/12/97	ND	ND	9/16/97	10.63
20	10	NORTH HOLLYWOOD #11	12/8/97	18.10	51.40	11/20/97	46.07
21	14	NORTH HOLLYWOOD #15	—				
22	9	NORTH HOLLYWOOD #16	5/23/96	12.60	2.70		16.30
23	9	NORTH HOLLYWOOD #17	12/9/97	6.16	1.65	9/9/97	11.92
24	8	NORTH HOLLYWOOD #18	12/9/97	5.95	47.80	10/21/97	35.26
25	8	NORTH HOLLYWOOD #20	10/17/97	2.54	8.20	9/24/97	43.37
26	7	NORTH HOLLYWOOD #21	—				
27	12	NORTH HOLLYWOOD #22	3/11/97	ND	ND		19.58
28	12	NORTH HOLLYWOOD #23	12/8/97	ND	ND	8/14/97	28.09
29	14	NORTH HOLLYWOOD #25	11/6/97	ND	ND	11/6/97	19.67
30	12	NORTH HOLLYWOOD #26	6/4/97	ND	ND	10/9/97	22.95
31	9	NORTH HOLLYWOOD #27	12/10/97	20.20	12.20	12/10/97	25.65
32	10	NORTH HOLLYWOOD #28	12/8/97	7.11	16.10	10/22/97	28.66
33	12	NORTH HOLLYWOOD #30	12/8/97	3.86	26.00		37.21
34	15	NORTH HOLLYWOOD #32	7/30/97	ND	ND	7/30/97	4.03
35	14	NORTH HOLLYWOOD #33	11/4/97	5.57	40.20	11/4/97	4.61
36	13	NORTH HOLLYWOOD #34	11/4/97	1.20	0.76	11/4/97	11.16
37	8	NORTH HOLLYWOOD #35	12/15/97	1.18	ND	9/24/97	12.09
38	14	NORTH HOLLYWOOD #36	12/8/97	0.56	4.34	6/4/97	17.81
39	13	NORTH HOLLYWOOD #37	11/10/97	1.38	3.35	12/8/97	22.86
40	10	NORTH HOLLYWOOD #38	—				
41	10	NORTH HOLLYWOOD #39	—				
42	11	NORTH HOLLYWOOD #40	7/28/95	ND	4.60		
43	11	NORTH HOLLYWOOD #41	12/10/97	4.90	92.80	10/21/97	21.49
44	11	NORTH HOLLYWOOD #42	12/10/97	4.00	248.00	10/21/97	29.77
45	13	NORTH HOLLYWOOD #43A	12/12/97	ND	ND		19.67
46	13	NORTH HOLLYWOOD #44	1/2/97	ND	ND		8.86
47	13	NORTH HOLLYWOOD #45	1/2/97	ND	ND		13.87

B. BARBER-TURGEON

APR 2 0 1998

NOTE: ND = non-detect

— not tested (refer to p.8)

ULARA WELLS

Number	Cluster	Well	Date	PCE (ug/L)	TCE (ug/L)	Date	NO^3 (mg/L)
48	3	POLLOCK #4	—				
49	3	POLLOCK #6	—				
50	3	POLLOCK #7	—				
51	15	RINALDI-TOLUCA #1	12/9/97	0.87	7.16		15.46
52	16	RINALDI-TOLUCA #2	12/9/97	ND	ND		14.04
53	17	RINALDI-TOLUCA #3	8/10/95	ND	1.00		
54	17	RINALDI-TOLUCA #4	3/18/97	ND	1.70		
55	17	RINALDI-TOLUCA #5	12/17/97	ND	ND	10/21/97	13.42
56	17	RINALDI-TOLUCA #6	8/10/95	ND	1.10		
57	17	RINALDI-TOLUCA #7	10/8/97	ND	0.56	10/8/97	15.37
58	18	RINALDI-TOLUCA #8	12/15/97	ND	ND	9/26/97	9.97
59	18	RINALDI-TOLUCA #9	7/14/97	ND	ND	10/8/97	14.13
60	16	RINALDI-TOLUCA #10	1/28/97	ND	ND		
61	16	RINALDI-TOLUCA #11	10/8/97	3.00	3.17		18.61
62	16	RINALDI-TOLUCA #12	12/19/97	ND	ND		18.78
63	16	RINALDI-TOLUCA #13	7/8/97	1.80	0.60		22.50
64	15	RINALDI-TOLUCA #14	10/10/97	ND	5.33		15.33
65	15	RINALDI-TOLUCA #15	12/19/97	ND	ND		16.52
66	18	TUJUNGA #1	9/3/97	ND	ND	9/3/97	34.11
67	18	TUJUNGA #2	12/16/97	ND	0.76	12/16/97	22.33
68	18	TUJUNGA #3	12/16/97	ND	5.00	12/16/97	31.01
69	19	TUJUNGA #4	12/18/97	ND	1.90	10/7/97	40.05
70	19	TUJUNGA #5	12/18/97	ND	2.20	10/29/97	30.39
71	19	TUJUNGA #6	12/16/97	ND	1.80	12/16/97	44.21
72	19	TUJUNGA #7	12/18/97	ND	2.50	11/25/97	40.05
73	19	TUJUNGA #8	10/7/97	ND	3.14	12/16/97	45.58
74	20	TUJUNGA #9	12/18/97	ND	2.30	12/18/97	25.25
75	20	TUJUNGA #10	12/18/97	ND	1.60	10/29/97	21.75
76	20	TUJUNGA #11	12/18/97	ND	2.00	11/25/97	18.21
77	20	TUJUNGA #12	12/18/97	ND	ND	9/11/97	11.78
78	4	VERDUGO #1	12/23/97	ND	4.30	10/23/97	30.48
79	4	VERDUGO #2	9/10/97	0.78	15.00	9/10/97	26.80
80	4	VERDUGO #4	12/23/97	5.70	16.10	11/4/97	1.92
81	4	VERDUGO #11	12/23/97	ND	5.10		9.39
82	5	VERDUGO #13	—				
83	5	VERDUGO #24	10/17/97	0.54	1.17	6/18/97	5.32
84	6	WHITNALL #4	12/17/97	4.70	21.40	5/5/97	11.78
85	6	WHITNALL #5	12/15/97	3.04	12.60	12/15/97	28.40
86	6	WHITNALL #6A	12/17/97	ND	ND	8/5/97	7.71
87	5	WHITNALL #7	11/27/96	ND	ND		
88	5	WHITNALL #8	10/22/96	4.60	10.20		
89	5	WHITNALL #9	—				
ularatbl.xls							

NOTE: ND = non-detect
— not tested (refer to p.8)

APPENDIX B:
Groundwater Extraction Projections 1997-2001

GROUNDWATER EXTRACTION PROJECTIONS
WATER YEARS 1998-99 THROUGH 2001-2002

	Total Groundwater Extractions From Water Ctrl 5-yr Projection	Sylmar Basin Extractions	Central Basin Extractions	San Fernando Basin Extractions
Oct-98	8,400	582	1,670	6,148
Nov-98	5,800	0	1,670	4,130
Dec-98	2,000	0	0	2,000
Jan-99	11,000	0	0	11,000
Feb-99	12,000	0	0	12,000
Mar-99	12,000	0	1,670	10,330
Apr-99	11,500	0	1,670	9,830
May-99	11,900	582	1,670	9,648
Jun-99	11,000	582	1,670	8,748
Jul-99	13,700	582	1,670	11,448
Aug-99	14,000	582	1,670	11,748
Sep-99	13,200	582	1,670	10,948
Totals	126,500	3,492	15,030	107,978
Oct-99	10,000	582	1,670	7,748
Nov-99	8,500	0	1,670	6,830
Dec-99	8,500	0	0	8,500
Jan-00	8,500	0	0	8,500
Feb-00	7,800	0	0	7,800
Mar-00	8,500	0	1,670	6,830
Apr-00	7,700	0	1,670	6,030
May-00	12,700	582	1,670	10,448
Jun-00	11,900	582	1,670	9,648
Jul-00	14,800	582	1,670	12,548
Aug-00	15,000	582	1,670	12,748
Sep-00	14,300	582	1,670	12,048
Totals	128,200	3,492	15,030	109,678

Note: Projections are based upon estimated demand and Los Angeles Aqueduct flow projections, and are very rough estimates.

L. C. MIHALIC
APR 2 4 1998

	Total Groundwtr Extractions From Water Ctrl 5-yr Projection	Sylmar Basin Extractions	Central Basin Extractions	San Fernando Basin Extractions
Oct-00	10,000	582	1,670	7,748
Nov-00	7,750	0	1,670	6,080
Dec-00	7,500	0	0	7,500
Jan-01	7,300	0	0	7,300
Feb-01	6,750	0	0	6,750
Mar-01	7,500	0	1,670	5,830
Apr-01	7,800	0	1,670	6,130
May-01	13,500	582	1,670	11,248
Jun-01	12,800	582	1,670	10,548
Jul-01	15,200	582	1,670	12,948
Aug-01	15,400	582	1,670	13,148
Sep-01	14,800	582	1,670	12,548
Totals	126,300	3,492	15,030	107,778
Oct-01	10,000	582	1,670	7,748
Nov-01	7,500	0	1,670	5,830
Dec-01	6,500	0	0	6,500
Jan-02	6,500	0	0	6,500
Feb-02	6,000	0	0	6,000
Mar-02	7,900	0	1,670	6,230
Apr-02	8,000	0	1,670	6,330
May-02	13,900	582	1,670	11,648
Jun-02	13,300	582	1,670	11,048
Jul-02	15,800	582	1,670	13,548
Aug-02	15,800	582	1,670	13,548
Sep-02	15,300	582	1,670	13,048
Totals	126,500	3,492	15,030	107,978

Note: Projections are based upon estimated demand and Los Angeles Aqueduct flow projections, and are very rough estimates.

PUMPING PROJECTIONS (AF) BY WELL FIELD
SAN FERNANDO BASIN
WATER YEARS 1999-2000 THROUGH 2001-02

	1998-99	1999-00	2000-01	2001-02
S. F. BASIN				
Aeration	1,990	1,990	1,990	1,990
Erwin	1,300	1,300	1,300	1,300
Headworks	0	0	0	0
N. Hollywood	32,390	34,090	34,350	32,390
Pollock	2,400	2,400	240	2,400
Rinaldi-Toluca	50,000	50,000	50,000	50,000
Tujunga	15,300	15,300	15,300	15,300
Verdugo	2,100	2,100	2,100	2,100
Whitnall	2,500	2,500	2,500	2,500
TOTAL S.F.B.	107,980	109,680	107,780	107,980
SYLMAR BASIN				
Mission	3,492	3,492	3,492	3,492

APPENDIX B

CITY OF BURBANK

PUMPING AND SPREADING PLAN

1997-2002 Water Years

GROUNDWATER PUMPING

AND

SPREADING PLAN

WATER YEAR
OCTOBER 1, 1997 TO SEPTEMBER 30, 2002

Prepared by

PUBLIC SERVICE DEPARTMENT
WATER DIVISION
CITY OF BURBANK

MAY 1998

JWL:PF:nw
C:WP51\Doc..\LANTZ\Grdwtr97.02

TABLE OF CONTENTS

TABLES

FIGURES

APPENDIX

JWL:nw
C5:\WP51\Doc...\Lantz\Grdwtr97.002

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 five 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 conditions, economic conditions and/or social 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 Wastewater Treatment Plant.

A. MWD

The amount of treated water purchased from the MWD is expected to be reduced over the next four years as the result of bringing several water

resource projects on line. Burbank may be purchasing 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. EPA CONSENT DECREE

The EPA Consent Decree project became operational January 3, 1996. The source of water will be from wells operated by Lockheed Martin. The City of Burbank will account for the production beneficially used by Burbank. Projected use of EPA Consent Decree water produced by Lockheed Martin is shown in Table 3.3.

C. 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 taken out of service periodically for carbon change-out of the contactors. Mechanical maintenance will be performed during the change-out period. The GAC Treatment Plant uses the groundwater production of Well No. 7 and Well No. 15.

D. RECLAIMED WATER

The City has used reclaimed water for its power plant cooling for more than 20 years. An expansion of the reclaimed water system was completed in 1996. Historic and proposed use of reclaimed water is shown in Table 3.5.

E. PRODUCTION WELLS

The City has seven (7) wells that are mechanically and electrically operable. Four (4) wells are on "Inactive" status with the DHS. We do not plan to operate the inactive wells unless an emergency develops in the 1998-99 water

year. Lockheed Martin will utilize the capacity of Wells No. 7 and 15 to augment the wells in the basin to deliver an average of 9,000 gpm. Lockheed Martin will pay operation and maintenance cost of the GAC.

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	* 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 extraction rights and use of stored water credits. The City will charge the following physical solution right holders for water used and claim the extraction 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 3.4 lists the past and projected extractions by Valhalla.

B. STORED WATER CREDIT

The City has a stored water credit of 56,297 acre-feet as of October 1, 1997.

C. ALLOWANCE FOR PUMPING

The extraction right for the 1997-98 water year is 4,977 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 20,000 acre-feet of delivered water, will be 4,000 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, will be taken "in lieu" through the L.A. Treatment Plant. The historic and projected spreading water is shown in Table 4.1.

V. CAPITAL IMPROVEMENTS

A. WELLS

BURBANK

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

MAINTENANCE ACTIVITY

Well No. 18. All electrical connections and transformers have been removed.

The well may be used for level monitoring.

Well Nos. 14 and 17. Both of these wells will be abandoned in accordance with County standards. All above-ground equipment will be removed and the casings filled and sealed.

Well No. 10. Lockheed Martin has provided new pumping equipment and connection to the treatment plant for Phase II of the Burbank Consent Decree during water year 1998/99. The well is to produce 1,500 GPM with an anticipated drawdown of 20 feet. An additional 50 feet of drawdown is included for long term water level variation. After redevelopment and testing, in 1997, the well was placed into active production status on May 1, 1998.

LOCKHEED-MARTIN

Lockheed operated seven (7) wells for the production capability of the EPA Consent Decree Project until January 1998. See Figure 5.1. The well field will produce from 3,000 GPM to 9,000 GPM during water year 1998/99. An additional well (Burbank No. 10/Lockheed WP-180) became operable on January 20, 1998. Production capacity of the Lockheed Martin facilities will become a nominal 9,000 GPM. Lockheed Martin will perform normal operating well maintenance until March 2000.

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.

Burbank plans to use the production and treatment facilities of the EPA Project at flow rates from 3,000 GPM to 9,000 GPM during the 1998/99 Water Year. Monthly use will meet or exceed the monthly minimum requirement shown in Appendix C.

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 plan did not resume operations until May 1998. Only testing water was produced during the outage.

GAC TREATMENT PLANT

Burbank plans to use the production and GAC Treatment Plant at the following flow rates during the 1997/98 Water Year:

October	- December	0 GPM
January	- March	0 GPM
April	- 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
88-89	23,863
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*	21,579
98-99*	23,164
99-00*	23,372
00-01*	23,582
01-02*	23,795

* Projected

NOTES:

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

(2) Values above include Valhalla extractions.

TABLE 3.1
FIVE-YEAR PROJECTED USE OF MWD TREATED WATER

WATER YEAR	ACRE-FEET
88-89	22,936
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*	12,500
98-99*	8,147
99-00*	8,355
00-01*	8,565
01-02*	11,004

* 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*	1,000
98-99*	250
99-00*	250
00-01*	250
01-02*	250

* Projected

NOTES:

(1) The GAC Treatment Plant has a 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 1250 GPM
Well No. 15 750 GPM

(3) Treatment Plant production will be reduced beginning in water year 1996-97 in order to meet monthly minimums required by the EPA Consent Decree project.

TABLE 3.3
FIVE-YEAR PROJECTED EXTRACTIONS OF GROUNDWATER BY LOCKHEED

WATER YEAR	ACRE-FEET
93-94	803 (3)
94-95	462 (6)
95-96	5,737 (6)
96-97	9,280
97-98*	7,027
98-99*	14,517
99-00*	14,517
00-01*	14,517
01-02*	14,525

* 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) The "Policies and Procedures" allow a 50 acre-foot reduction for well development and testing.

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

(6) During the water years 1993-94, 1994-95 and 1995-96 Lockheed-Martin produced water for testing of the EPA Consent Decree Project. See Appendix C.

1993-94	378 Acre-feet	1996-97	320 Acre-feet
1994-95	462 Acre-feet	1997-98	100.6 Acre-feet, May 1998
1995-96	34 Acre-feet, Dec thru Oct		

The Watermaster will not charge Burbank for these amounts.

(7) Beginning January of water year 1995-96, all extractions are treated for VOC removal and beneficially used by Burbank. GAC flushing and treatment bypass will be accounted for separately.

(8) Currently, the City of Burbank does not have a permit from DHS to accept water from Lockheed.

TABLE 3.4
FIVE-YEAR PROJECTED EXTRACTIONS OF GROUNDWATER BY VALHALLA

WATER YEAR	ACRE-FEET
89-90	293
90-91	239
91-92	376
92-93	391
93-94	391
94-95	298
95-96	339
96-97	300
97-98*	300
98-99*	300
99-00*	300
00-01*	300
01-02*	300

* Projected

NOTES:

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

(2) Valhalla has Physical Solution right of 300 AF/year.

TABLE 3.5
FIVE-YEAR PROJECTED USE OF RECLAIMED WATER

WATER YEAR	ACRE-FEET
88-89	927
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*	3,500
98-99*	3,500
99-00*	4,000
00-01*	4,000
01-02*	4,000

* Projected

NOTES:

(1) The source of reclaimed water is the Burbank Wastewater Treatment Plant.

(2) The Upper and Lower landfill areas were provided reclaimed water service in water year 1994-95.

(3) The DeBell Golf Course and Par-3 Course were provided reclaimed water service in water year 1995-96. McCambridge Park landscaping was added to the reclaimed water system in 1996-97.

(4) The Burbank Nature Center and Starlight Park will be provided reclaimed water service in water year 1997-98.

(5) The PSD Power Plant reduced their reclaimed water use beginning water year 1996-97 to 7/12 of the prior amounts.

TABLE 4.1
FIVE-YEAR PROJECTED BURBANK SPREADING OPERATIONS

WATER YEAR	ACRE-FEET
88-89	0
89-90	378 (1)
90-91	504 (1)
91-92	503 (1)
92-93	500 (2)
93-94	0 (3)
94-95	2,200 (4)
95-96	2,000 (4)
96-97	1,500 (4)
97-98*	0
98-99*	0
99-00*	0
00-01*	0
01-02*	2,500

* 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.

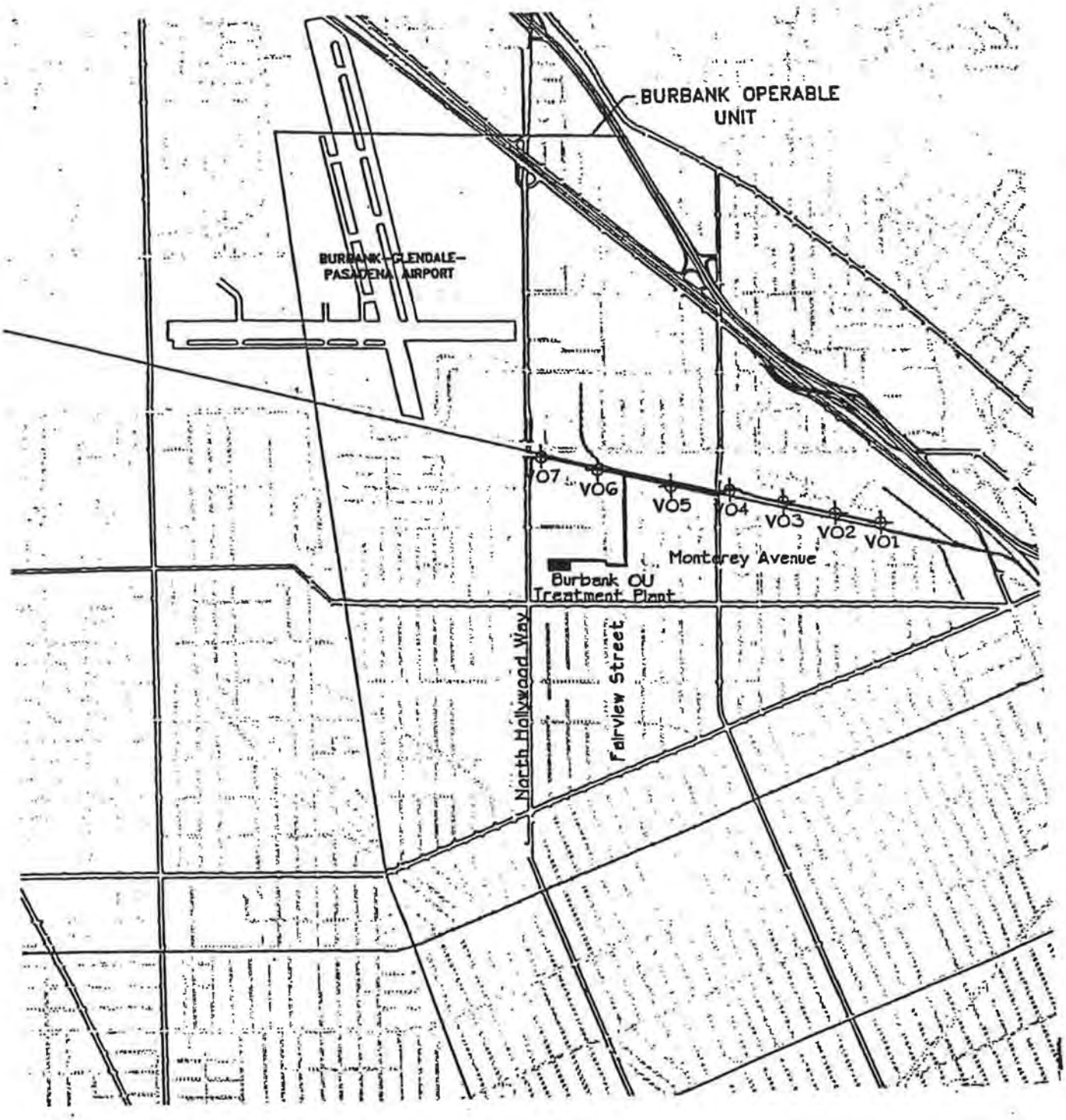


FIGURE 3.1
EPA CONSENT DECREE EXTRACTION WELLS

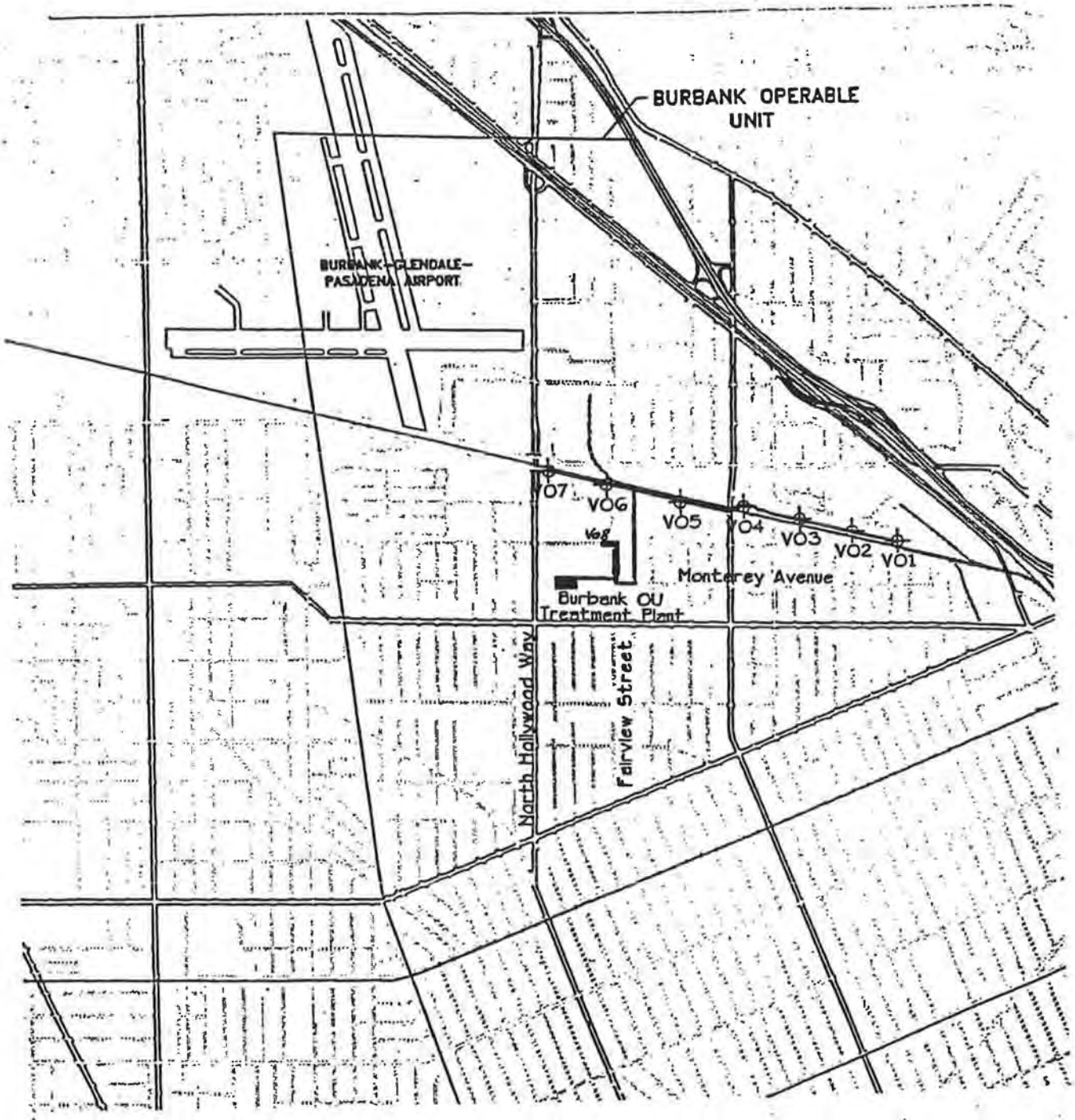
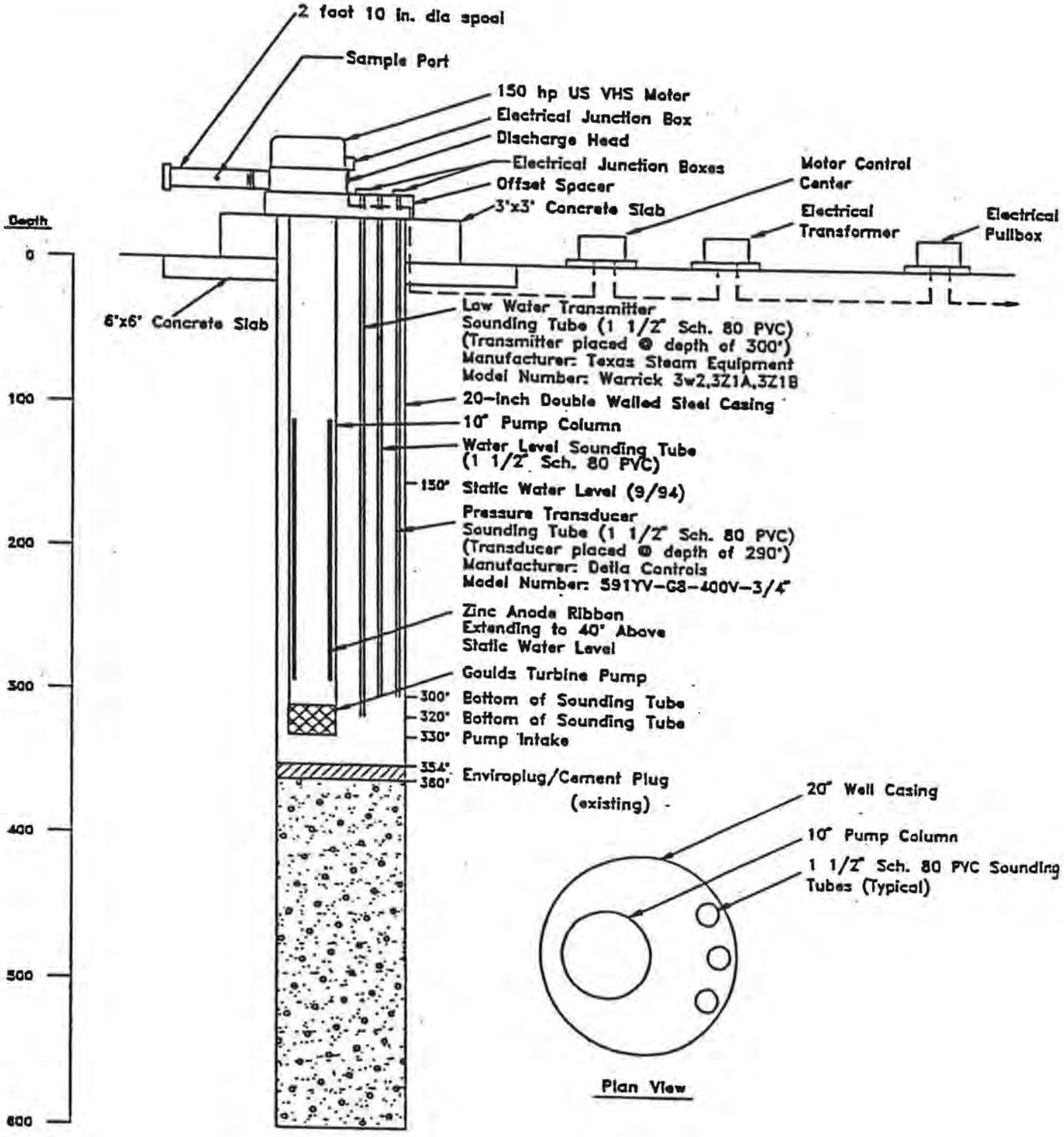


FIGURE 5.1
EPA PHASE II EXTRACTION WELLS



Drawing Not to Scale

FIGURE 5.2
WELL NO. 10 DETAIL

APPENDIX A

WATER QUALITY DATA

The 1997 Annual Water Quality Report is attached for information. Water Quality monitoring and testing of supply sources is not included with this report.

Public Service Department

Water Quality Report

'Providing Quality Water with Quality Service' 1997

Water Quality

The water supply in Burbank meets all State and Federal regulations. The attached report shows the results of monitoring performed last year. The California Department of Health Services oversees compliance with drinking water standards in accordance with Title 22 of the California Code of Regulations.

Each week, our Water Plant Operators take about 100 water samples from stations throughout the City. These samples are tested in our laboratory to ensure that they are free of microbiological contamination. In addition, the treatment facilities run by the City and the MWD test for chemical, physical, and radiological constituents to monitor the treatment process and the water source.
In addition to our monitoring program, the Water Division runs other programs to maintain the water quality after treatment.

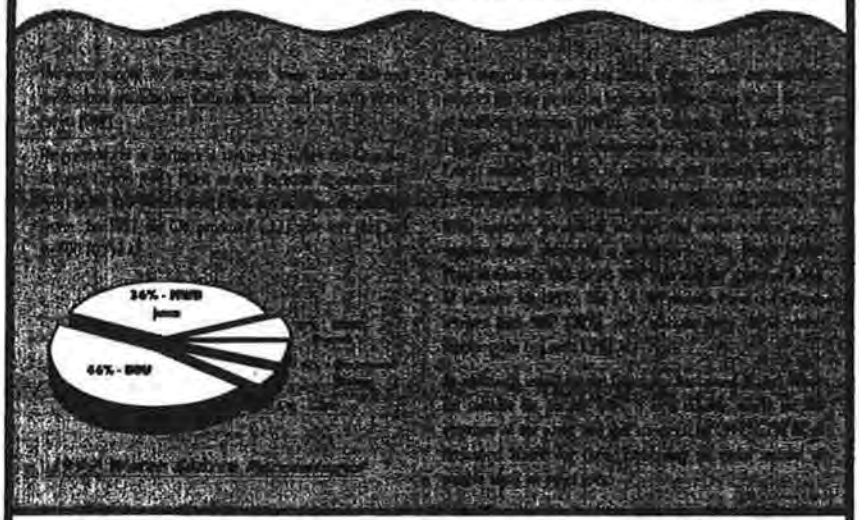
- The cross connection program requires backflow prevention devices on industrial or commercial users when their operation involves potential contaminants. The program requires annual testing of the devices to maintain effectiveness.

- The disinfectant in the water degrades over time. For this reason, our crews maintain a flushing program. Water mains and laterals known to have little use are flushed to remove stagnant water and bring in fresh water with residual disinfectant.

- The Water System has over 52 million gallons of water storage in five reservoirs and 23 tanks. These facilities are sampled and tested weekly to maintain the disinfectant residual and guard against microorganisms.

Water Sources

Where does Burbank's water come from?



Water Quality Information:

If you have any further questions or concerns please contact:

Leighton Fong
PSD - Water Division
P.O. Box 631, Burbank, CA 91503
(818) 238-3500

Conservation Information:

For informational brochures and classroom presentations on water awareness contact:

Mary Burke
PSD - Conservation
(818) 238-3731

CITY OF BURBANK 1997 WATER QUALITY TABLE (a)

	MCL	IMPORTED WATER: Weymouth Plant	IMPORTED WATER: Jensen Plant	LOCAL GROUNDWATER: Valley Plant (j)	LOCAL GROUNDWATER: GAC Plant	Overall Range
PRIMARY STANDARDS--Mandatory Health-Related Standards						
CLARITY						
Turbidity (NTU)	0.5	0.07	0.07	NA	NA	0.05 - 0.21
MICROBIOLOGICAL						
Total Coliform	5.0% (b)	Percent of Positive Samples = 0.96 %				0 - 2.4%
ORGANIC CHEMICALS (mg/L)						
Volatile Organic Compounds						
Total Trihalomethanes (THMs) (c)	0.10	Distribution System Average = 0.034				0.021 - 0.052
INORGANIC CHEMICALS (mg/L)						
Aluminum	1(@0.2)	0.191	0.071	0.030	0.027	ND - 0.386
Arsenic	0.05	0.003	0.002	0.001	ND	ND - 0.003
Barium	1	0.106	0.033	0.014	ND	ND - 0.110
Chromium	0.05	ND	ND	0.007	0.012	ND - 0.020
Fluoride	1.4-2.4 (d)	0.25	0.21	0.28	0.28	0.18 - 0.58
Nickel	0.1	ND	ND	ND	NA	ND - 0.002
Nitrate (as N)	10(e)	0.18	0.44	6.6	4.1	ND - 7.7
Nitrate + Nitrite (as N)	10	0.18	0.44	6.6	4.1	ND - 7.7
RADIONUCLIDES (pCi/L) Analyzed every four years; data based on latest tests.						
Gross Alpha	15	6.6	3.8	8.9	7.2	ND - 19
Gross Beta	50	8.8	5.7	NA	NA	ND - 10.3
Radium-228	5 (f)	ND	1.0	0.5	NA	ND - 2.9
Radium-226	5 (f)	1.0	ND	0.2	NA	ND - 1.6
Radon-222	NS	ND	ND	NA	NA	ND - 91
Strontium-90	8	ND	ND	NA	NA	ND - 2.0
Tritium	20,000	ND	ND	NA	NA	ND
Uranium	20	4.9	2.3	8.3	4.6	ND - 8.3

THE FOLLOWING CONSTITUENTS WERE TESTED AND NOT DETECTED

ORGANIC CHEMICALS

Pesticides/PCBs

2,4-D	Carbofuran	Dieldrin	Heptachlor	Oxamyl	Thiobencarb
2,4,5-TP (Silvex)	Chlordane	Endothall	Heptachlor epoxide	Pentachlorophenol	Toxaphene
Alachlor	Dalapon	Endrin	Lindane	Picloram	
Atrazine	Dibromochloropropane (DBCP)	Ethylene Dibromide (EDB)	Methoxychlor	Polychlorinated Biphenyls (PCB)	
Bentazon	Dinoseb	Glyphosate	Molinate	Simazine	

Volatile Organic Compounds

Benzene	1,2-Dichloroethane	1,2-Dichloropropane	Styrene	1,1,1-Trichloroethane	Vinyl chloride
Carbon Tetrachloride	1,1-Dichloroethylene	1,3-Dichloropropene	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	Xylenes
1,2-Dichlorobenzene	cis-1,2-Dichloroethylene	Ethylbenzene	Tetrachloroethylene	Trichloroethylene (TCE)	
1,4-Dichlorobenzene	trans-1,2-Dichloroethylene	Methyl tert-butyl-ether (MTBE)	Toluene	Trichlorofluoromethane	
1,1-Dichloroethane	Dichloromethane	Monochlorobenzene	1,2,4-Trichlorobenzene	1,1,2-Trichloro-1,2,2-trifluoroethane	

Semi-Volatile Organic Compounds

Benzo(a)pyrene	Di(2-ethylhexyl) phthalate	Hexachlorocyclopentadiene	
Di(2-ethylhexyl) Adipate	Hexachlorobenzene	2,3,7,8-TCDD (Dioxin)	

INORGANIC CHEMICALS (mg/L)

Antimony	Beryllium	Copper	Lead	Nitrite	Thallium
Asbestos	Cadmium	Cyanide	Mercury	Selenium	

SECONDARY STANDARDS--Aesthetic Standards

CHEMICAL PARAMETERS

Chloride (mg/L)	**250	95	50	41	28	25 - 98
Color (units)	15	1	1	0.04	NA	ND - 1
Corrosivity	noncorrosive	(g)	(g)	NA	NA	NA
Odor Threshold (units)	3	(h)	(h)	NA	NA	NA
pH (units)	NS	8.1	8.1	7.9	7.4	7.4 - 8.2
Specific Conductance (µmho/cm)	**900	929	525	627	562	469 - 1061
Sulfate (mg/L)	**250	227	92	153	103	73 - 277
Total Dissolved Solids (mg/L)	**500	578	316	NA	371	283 - 675
Turbidity (NTU)	5	0.07	0.08	0.19	0.27	0.06 - 0.27

THE FOLLOWING WERE TESTED AND NOT DETECTED

Iron	Manganese	MBAS (Foaming Agents)	Silver	Zinc

ADDITIONAL PARAMETERS

Alkalinity as CaCO3 (mg/L)	NS	113	93	170	181	87 - 225
Calcium (mg/L)	NS	66	38	63	63	31 - 83
Hardness as CaCO3 (mg/L) (k)	NS	273	153	250	230	135 - 320
Heterotrophic Plate Count (CFU/mL) (i)	NS	<1	<1	NA	NA	<1 - 9
Magnesium (mg/L)	NS	26	15	19	15	14 - 31
Potassium (mg/L)	NS	4.2	2.8	3.8	3.5	2.7 - 4.7
Sodium (mg/L)	NS	88	47	36	33	29 - 103
Total Organic Carbon (mg/L)	NS	2.56	2.74	1.32	NA	2.09 - 3.01

FOOTNOTES AND ABBREVIATIONS

(a) Data shown are annual averages and ranges.

(b) Total coliform MCLs are based on distribution system monthly sampling averages. No more than 5.0% of the monthly samples may be total coliform-positive. For 1997, 1,219 samples were analyzed with no MCL violations.

(c) Compliance is based on a running annual average of 4 quarterly distribution system samples, which was 0.034 mg/L for 1997.

(d) State level is dependent upon air temperature.

(e) State MCL is 45 mg/L as Nitrate, which equals 10.18 mg/L as N.

(f) Standards are for Radium-226 and -228 combined.

(g) Corrosivity is measured by the Langelier Stability Index. A positive index indicating non-corrosivity, was maintained at the MWD plant effluents.

(h) MWD has developed a flavor-profile analysis method that can more accurately detect odor occurances.

(i) Pour plate technique. 48-hour incubation at 35°C, monthly averages

(j) Data is for blended water (58% Groundwater; 42% MWD - Jensen)

(k) Hardness conversion: 17.1 mg/L = 1 grains/gallon

MWD = Metropolitan Water District of Southern California
MCL = Maximum Contaminant Level
NA = Not Analyzed
ND = None Detected
NS = No Standard
NTU = Nephelometric Turbidity Units, a measure of the suspended material in water.
mg/L = milligrams per liter (parts per million)
pCi/L = picoCuries per liter
CFU/mL = colony-forming units per milliliter
µmho/cm = micromhos per centimeter
** = recommended level
# = secondary standard
The Federal and State standards for acrylamide and epichlorohydrin are treatment techniques with which MWD complies.

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 (10/1/96 THROUGH 10/1/97):

1,620 Acre-Feet

WATER QUALITY:

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

DISPOSAL:

Burbank Water System
Potable Water

EPA CONSENT DECREE PROJECT

2030 N. HOLLYWOOD WAY
BURBANK CA 91505

OPERATOR:

CITY OF BURBANK
PUBLIC SERVICE DEPARTMENT, WATER DIVISION

ALBERT LOPEZ, WATER PRODUCTION/OPERATIONS SUPERINTENDENT

QUANTITY TREATED (10/1/96 THROUGH 10/1/97):

9,280 ACRE-FEET FOR DOMESTIC USE.

WATER QUALITY:

N/A

DISPOSAL:

(1) TEST WATER - WASTE

(2) BURBANK WATER SYSTEM
Potable water after blending

APPENDIX C

MISCELLANEOUS

TABLE 3-1
EXTRACTION WELL FLOW RATE SETPOINTS
(For Odd Months if Flow is Maintained Continuously at a Given Production Requirement)
All Values are Gallons Per Minute (gpm).

Production Requirement	VO-1	VO-2	VO-3	VO-4	VO-5	VO-6	VO-7
650-1600	–	–	–	–	850-1600	[1]	[2]
1700-2300	–	–	–	–	[1]	1700-2300	[2]
2400	(1)	1200	(2)	1200	–	–	–
2500	(1)	1200	(2)	1300	–	–	–
2600	(1)	1300	(2)	1300	–	–	–
2700	(1)	1300	(2)	1400	–	–	–
2800	(1)	1400	(2)	1400	–	–	–
2900	(1)	1400	(2)	1500	–	–	–
3000	(1)	1500	(2)	1500	–	–	–
3100	(1)	1500	(2)	1600	–	–	–
3200	(2)	1500	(3)	(1)	[1]	1700	[2]
3300	(2)	1500	(3)	(1)	[1]	1800	[2]
3400	(2)	1500	(3)	(1)	[1]	1900	[2]
3500	(2)	1500	(3)	(1)	[1]	2000	[2]
3600	(2)	1500	(3)	(1)	[1]	2100	[2]
3700	1000	(1)	1000	(2)	1700	[1]	[2]
3800	1000	(1)	1000	(2)	1800	[1]	[2]
3900	1100	(1)	1000	(2)	1800	[1]	[2]
4000	1100	(1)	1100	(2)	1800	[1]	[2]
4100	(1)	1200	(2)	1200	[1]	1700	[2]
4200	(1)	1200	(2)	1200	[1]	1800	[2]
4300	(1)	1200	(2)	1200	[1]	1900	[2]
4400	(1)	1200	(2)	1300	[1]	1900	[2]
4500	(1)	1300	(2)	1300	[1]	1900	[2]
4600	(1)	1300	(2)	1400	[1]	1900	[2]
4700	(1)	1300	(2)	1500	[1]	1900	[2]
4800	(1)	1400	(2)	1500	[1]	1900	[2]
4900	(1)	1500	(2)	1500	[1]	1900	[2]
5000	(1)	1500	(2)	1500	[1]	2000	[2]
5100	(1)	1500	(2)	1600	[1]	2000	[2]
5200	(1)	1500	(2)	1600	[1]	2100	[2]
5300	1000	1200	(1)	1400	[1]	1700	[2]
5400	1000	(1)	1000	(2)	1700	[1]	1700
5500	1100	1200	(1)	1400	[1]	1800	[2]
5600	1000	(1)	1000	(2)	1900	[1]	1700
5700	1200	1200	(1)	1400	[1]	1900	[2]
5800	1200	(1)	1100	(2)	1800	[1]	1700
5900	1200	1300	(1)	1500	[1]	1900	[2]
6000	1200	(1)	1100	(2)	1900	[1]	1800
6100	1200	1400	(1)	1500	[1]	2000	[2]
6200	1200	(1)	1100	(2)	1900	2000	[1]
6300	(1)	1300	(2)	1300	1800	1900	[1]
6400	(1)	1300	(2)	1300	1800	2000	[1]
6500	(1)	1400	(2)	1300	1800	2000	[1]
6600	(1)	1400	(2)	1400	1800	2000	[1]
6700	(1)	1400	(2)	1400	1900	2000	[1]
6800	(1)	1500	(2)	1400	1900	2000	[1]
6900	(1)	1500	(2)	1500	1900	2000	[1]
7000	1100	1200	(2)	1300	1700	1700	[1]

( ) Indicates priority of alternate well operation for 200-hp pumps.
[ ] Indicates priority of alternate well operation for 250-hp pumps.

TABLE 3-2
EXTRACTION WELL FLOW RATE SETPOINTS
(For Even Months if Flow is Maintained Continuously at a Given Production Requirement)
All values are Gallons Per Minute (gpm).

Production Requirement	VO-1	VO-2	VO-3	VO-4	VO-5	VO-6	VO-7
650-1600	–	–	–	–	[1]	850-1600	[2]
1700-2300	–	–	–	–	1700-2300	[1]	[2]
2400	(1)	1200	(2)	1200	–	–	–
2500	(1)	1200	(2)	1300	–	–	–
2600	(1)	1300	(2)	1300	–	–	–
2700	(1)	1300	(2)	1400	–	–	–
2800	1400	(1)	(2)	1400	–	–	–
2900	1400	(1)	(2)	1500	–	–	–
3000	1500	(1)	(2)	1500	–	–	–
3100	1500	(1)	(2)	1600	–	–	–
3200	1500	(1)	(3)	(2)	1700	[1]	[2]
3300	1500	(1)	(3)	(2)	1800	[1]	[2]
3400	1500	(1)	(3)	(2)	1900	[1]	[2]
3500	1500	(1)	(3)	(2)	2000	[1]	[2]
3600	1500	(1)	(3)	(2)	2100	[1]	[2]
3700	(1)	1000	(2)	1000	[1]	1700	[2]
3800	(1)	1000	(2)	1000	[1]	1800	[2]
3900	(1)	1100	(2)	1000	[1]	1800	[2]
4000	(1)	1100	(2)	1000	[1]	1800	[2]
4100	(1)	1200	(2)	1200	[1]	1700	[2]
4200	(1)	1200	(2)	1200	[1]	1800	[2]
4300	(1)	1200	(2)	1200	[1]	1900	[2]
4400	(1)	1200	(2)	1300	[1]	1900	[2]
4500	(1)	1300	(2)	1300	[1]	1900	[2]
4600	(1)	1300	(2)	1400	[1]	1900	[2]
4700	(1)	1300	(2)	1500	[1]	1900	[2]
4800	1000	(1)	(3)	(2)	1900	[1]	1900
4900	1100	(1)	(3)	(2)	1900	[1]	1900
5000	1200	(1)	(3)	(2)	1900	[1]	1900
5100	1200	(1)	(3)	(2)	2000	[1]	1900
5200	1200	(1)	(3)	(2)	2000	[1]	2000
5300	1200	(1)	1000	(2)	1600	[1]	1700
5400	1000	(1)	1000	(2)	1700	[1]	1700
5500	1100	1200	(1)	1400	[1]	1800	[2]
5600	1000	(1)	1000	(2)	1900	[1]	1700
5700	1200	1200	(1)	1400	[1]	1900	[2]
5800	1200	(1)	1100	(2)	1800	[1]	1700
5900	1200	1300	(1)	1500	[1]	1900	[2]
6000	1200	(1)	1100	(2)	1900	[1]	1800
6100	1200	1400	(1)	1500	[1]	2000	[2]
6200	1200	(1)	1100	(2)	1900	2000	[1]
6300	1100	(1)	1100	(2)	1800	1900	[1]
6400	(1)	1300	(2)	1300	1800	2000	[1]
6500	(1)	1400	(2)	1300	1800	2000	[1]
6600	(1)	1400	(2)	1400	1800	2000	[1]
6700	(1)	1400	(2)	1400	1900	2000	[1]
6800	(1)	1500	(2)	1400	1900	2000	[1]
6900	(1)	1500	(2)	1500	1900	2000	[1]
7000	1100	1200	(2)	1300	1700	1700	[1]

( ) Indicates priority of alternate well operation for 200-hp pumps.

[ ] Indicates priority of alternate well operation for 250-hp pumps.

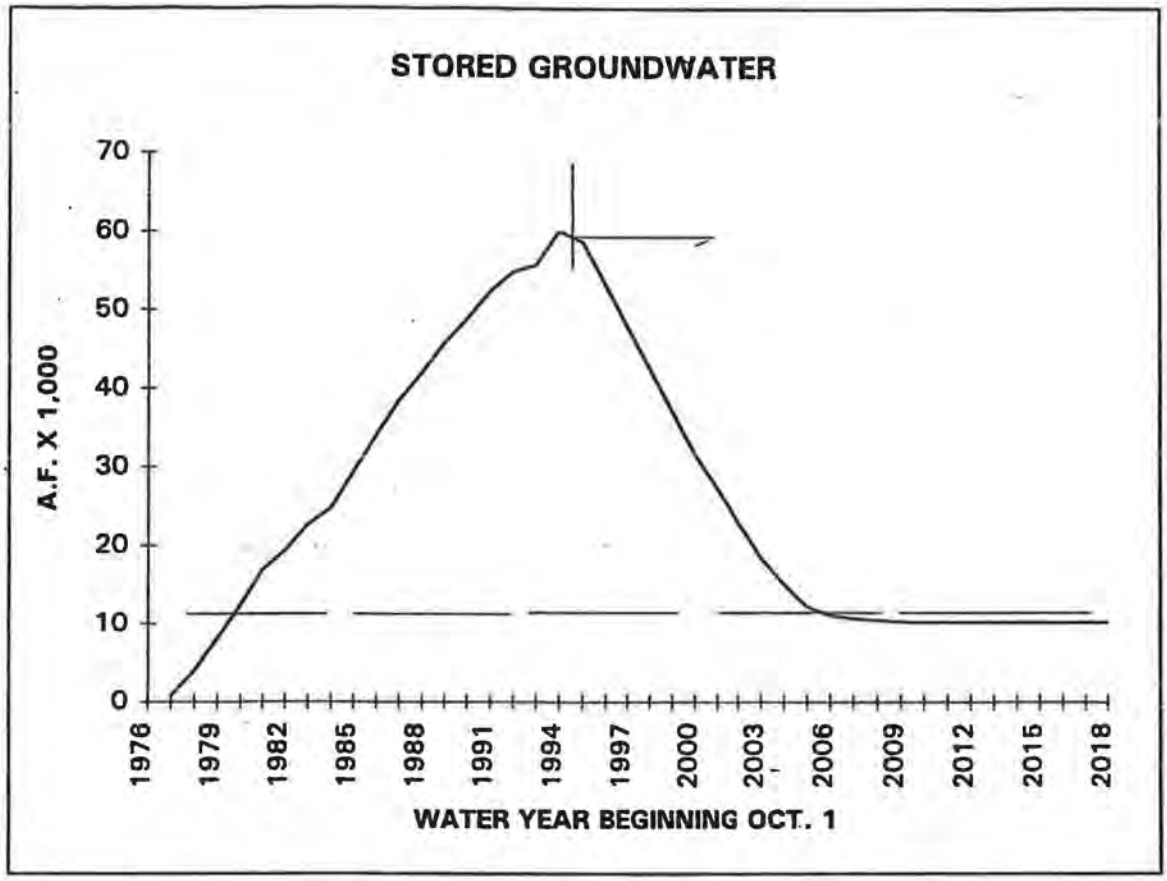
CITY OF BURBANK
PUBLIC SERVICES DEPARTMENT
WATER DIVISION

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	22,659
1984-85	23,641	4,728		2,863	24,781
1985-86	23,180	4,636		123	29,386
1986-87	23,649	4,730		0	34,022
1987-88	23,172	4,742		253	38,499
1988-89	23,863	4,773		1,213	42,028
1989-90	23,053	4,611	378	1,401	45,778
1990-91	20,246	4,049	504	2,032	48,861
1991-92	20,930	4,186	503	938	52,475
1992-93	21,839	4,368	500	* 2,184	54,977
1993-94	24,566	4,913	0	* 3,539	55,806
1994-95	22,541	4,508	2,000	2,589	60,130
1995-96	23,000	4,600	2,000	7,996	58,642
1996-97	23,000	4,600	0	10,000	53,242
1997-98	23,000	4,600	0	10,000	47,842
1998-99	23,000	4,600	0	10,000	42,442
1999-2000	23,000	4,600	0	10,000	37,042
2000-01	23,000	4,600	0	10,000	31,642
2001-02	23,000	4,600	2,000	11,000	27,242
2002-03	23,000	4,600	2,000	11,000	22,842
2003-04	23,000	4,600	2,000	11,000	18,442
2004-05	23,000	4,600	3,000	11,000	15,042
2005-06	23,000	4,600	3,500	11,000	12,142
2006-07	23,000	4,600	5,300	11,000	11,042
2007-08	23,000	4,600	6,000	11,000	10,642
2008-09	23,000	4,600	6,200	11,000	10,442
2009-10	23,000	4,600	6,200	11,000	10,242
2010-11	23,000	4,600	6,300	11,000	10,142
2011-12	23,000	4,600	6,400	11,000	10,142
2012-13	23,000	4,600	6,400	11,000	10,142
2013-14	23,000	4,600	6,400	11,000	10,142
2014-15	23,000	4,600	6,400	11,000	10,142
2015-16	23,000	4,600	6,400	11,000	10,142
2016-17	23,000	4,600	6,400	11,000	10,142
2017-18	23,000	4,600	6,400	11,000	10,142

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. YR.
COLUMN (5) = EXTRACTIONS OF NEXT YEAR
PUMPED GROUNDWATER INCLUDES VALHALLA & LOCKHEED.
*EXCLUDES 150 A.F. OF PUMPING FOR TESTING.

GRDWTR.XLS



NOTES:

- Q 10,000 AF RECOMMENDED AS BASIN BALANCE. THIS EQUATES TO ABOUT ONE YEAR OF DOMESTIC SYSTEM PRODUCTION IF REPLENISHMENT NOT AVAILABLE FROM MWD
- Q DRAW DOWN STORED WATER BY FULL RETURN FLOW CREDIT OF PRIOR YEARS (~4,600 AF) PLUS PRODUCTION BALANCE (~4,400AF)
- Q MINIMUM SPREAD WATER SHALL BE THE ESTIMATED GAC PRODUCTION. EXPENSE QUALIFIED UNDER G.R.P. WITH M.W.D. (~2,000 AF)
- Q GROUNDWATER PRODUCTION EQUALS GAC (~2,200 AF), EPA (~8,500AF) AND VALHALLA (~300 AF)
- Q ADDITIONAL SPREADING WATER WILL BE NEEDED BEGINNING 2006 TO MAINTAIN BASIN BALANCE.

APPENDIX C

CITY OF GLENDALE

PUMPING AND SPREADING PLAN

1997-2002 Water Years

CITY OF GLENDALE

GROUNDWATER PUMPING
AND
SPREADING PLAN

WATER YEAR
October 1, 1997 to September 30, 2002

Prepared By

PUBLIC SERVICE DEPARTMENT
WATER SECTION

DECEMBER 1997

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

The City of Glendale has developed a plan to reduce the City's dependence on imported water supplies from northern California and the Colorado River via the Metropolitan Water District (MWD) by using more local resources. This trend in local water resource development is occurring throughout the southern California water community, and is consistent with the state-wide policies to maximize the use of available supplies before going to other areas of the State.

Also, it is imprudent for a city of 194,000 people to be almost totally dependent on water supplies (87 percent of demands) originating hundreds of miles away that Glendale has little control. The purpose of this document is to discuss the City's Water Resource Plan designed to develop more local water resources. The implementation of this plan will cost about $50 million. Of this amount, $25 million has been spent to date.

This report discusses the history of the Glendale Water Department, existing water supplies, future water demands, the water system, and sources of local water available to reduce dependence on imported water. A wide group of individuals and organizations including the Glendale's City Manager, Council Members, regulatory agencies, and other parties interested in Glendale's water resource future need this information.

HISTORY OF GLENDALE WATER DEPARTMENT

At the time the City incorporated in 1906, there were at least 14 private water companies. In 1912, the Verdugo Canyon area was annexed to Glendale with even more water companies. The Board of Trustees (now the City Council) appointed a Water Commission to address the water supply issues. The commission recommended a bond issue of $225,000 to purchase the four largest private water companies serving the community, and establish a municipal water utility. The 1912 bond issue to purchase the water companies failed. After further independent studies, a value of $248,000 was placed on the purchase on the water systems located within the City limits. A new and successful bond election was held in July 1914. The new municipal water system began operation in 1914 after the purchase of several systems and they became part of the already established Public Service Department that included the electrical system. As Glendale grew by annexation, other water companies were purchased and added to the municipal water system. During the first five years of operation, the City relied almost entirely upon gravity water from Verdugo Canyon to supply the City. However, it became increasingly evident

that the Verdugo Canyon water resources would not supply the full requirements of the City for very long.

The City purchased a water company owned by Mr. L. C. Brand that included properties on San Fernando Road and Grandview Avenue on which a well and pumping plant were constructed. The City between 1916 and 1921 constructed other wells. These wells and the Verdugo Canyon gravity water produced enough water to meet the demands of the City in the early days. Over time, the City constructed additional wells. In the mid 1920's, it became apparent that local water supplies could not meet the anticipated water demands of the City. Glendale, in 1927, joined with other cities to form the Metropolitan Water Districts of Southern California (MWD) to import water from the Colorado River. In 1940, after MWD built the Colorado River aqueduct, the City started using the Colorado River water. When the California Aqueduct was completed in 1972, Glendale started receiving State Project water from MWD.

The most significant event concerning the City's water system was the Supreme Court's water right ruling in favor the City of Los Angeles' suit against Glendale, et al. After more than 20 years of water litigation, the Court, on May 12, 1975, ruled that the City of Los Angeles, under "Pueblo Water Rights" owned all the local water rights in the San Fernando Basin. This significantly reduced the City's right to pump groundwater. The City was granted a return flow credit equal to 20 per cent of all delivered water to the San Fernando Basin portion of the City or about 5,500 acre feet per year (AFY). Also, Glendale retained its rights to produce 3,856 AFY from the Verdugo Basin. The outcome of this litigation required the City to purchase even more water from MWD.

In the early 1980's, volatile organic compounds (VOC's) were detected in the San Fernando Basin ground water supplies. This eliminated the City's production of ground water from the San Fernando Basin. As a result, the City had to purchase even more water from MWD. In the early 1990's, about 95 per cent of the City's water supply came from MWD.

Since 1978, Glendale has been delivering recycled water from the Los Angeles/Glendale Water Reclamation Plant (LAGWRP) to its Power Plant. In the early 1990's, the City expanded its recycled water system to other areas. This resource is expected to eventually meet 10 per cent of the City's total water demands. Other programs to increase use of local water include the Federal SUPERFUND Program to clean up the contaminated ground water in the San Fernando Basin and additional production from the Verdugo Basin.

EXISTING WATER SOURCES

The City has four sources of water available to meet demands. Each of these sources is described below, as well as the quantity of water available. The location of these sources is shown in Figure 1. Over the past 5-years, there has been a significant change in the mix of supplies used to meet water demands in the City. Even more changes are expected in the future. 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 consist of a return flow credit, which is a water right. Additionally, there is a secondary right to produce additional water subject to a payment obligation to the City of Los Angeles based primarily on the cost of MWD supplies. This right to produce water in excess of the return flow credit is a significant factor in relation to the proposed U. S. Environmental Protection Agency (EPA) SUPERFUND treatment facility in Glendale, discussed later in this report. The various San Fernando Basin supplies are:

Return Flow Credit - Glendale is entitled to a return flow credit of 20 percent of all delivered water (including recycled water) in the San Fernando Basin and its tributary hill and mountain area. It is calculated by determining the amount of total water used in the City less 105 percent of total sales by Glendale to 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 use. This is the City's primary water right in the San Fernando Basin.

Physical Solution Water - Glendale has limited rights to extract water chargeable to the rights of the City of Los Angeles upon payment of specified charges generally tied to MWD'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, provide 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 proposed 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.

For the San Fernando Basin, the rights describe 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 Judgment described above gave Glendale the right to extract 3,856 AFY from the Verdugo Basin. 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 MWD water delivered to Glendale is delivered through three service connections. The service connection number and capacity are summarized in Table 1.

TABLE 1
METROPOLITAN CONNECTIONS AND CAPACITY

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

Recycled Water - 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 to the Glendale Power Plant for use in the cooling towers and to Caltrans for irrigation of a portion of Route 134 Freeway. In 1991, the City of Glendale in a cooperative project with the City of Los Angeles, constructed a pipeline from the LAGWRP to deliver recycled water to Forest Lawn Memorial Park in southern Glendale. Later Los Angeles will extend this project to the Elysian area for irrigation purposes.

In the cooperative project with the City of Pasadena, Caltrans, and the Metropolitan Water District, the recycled water system was extended into the Verdugo Canyon area, the Glenoaks Canyon area, and the Brand

Park/Glenoaks boulevard area. The location of these facilities is shown in Figure 2 and schematic diagram in Figure 3. Recycled water is used for landscape irrigation of schools, parks, cemeteries, street median strips, and golf courses. The recycled water is also used as process water in industries, cooling towers for power plants, and soil compaction for grading and landfill operations. It will also be used in dual plumbing systems in high rise commercial buildings for sanitary flushing and to even more users described later in this report. To the extent recycled water is used, there is a corresponding reduction in the amount of water purchased from MWD. The capacity of LAGWRP is 20 MGD with indefinite plans for expansion to 50 MGD, and Glendale is entitled to 50 percent of any effluent produced at the plant.

Summary of Supplies - The current use of local resources available to the City is substantially less than 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)

Source	Right	Current Use	Future Use
San Fernando Basin	5,000-5,400	100 AFY	5,000
Verdugo Basin	3,856	2,500 AFY	3,856
Recycled Water	10,000	1,700 AFY	3,000

In order to develop the "Potential Future Use," significant capital expenditures are required primarily for water treatment, extraction, and distribution facilities.

PAST WATER USE 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 the San Fernando Basin as a SUPERFUND site and has began construction of facilities in the early 1998 at Glendale with completion in two years.

The City currently has three active production wells in the Verdugo Basin (Glorietta Wells). The Grandview Wells in the San Fernando Basin have been essentially abandoned because of water quality problems.

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 satisfied from the San Fernando and the Verdugo Basins with limited supplies from MWD. In the 1960's, production from the San Fernando Basin reached a peak of about 17,000 AFY. The Grandview well water collection system in the San Fernando Basin and the Grandview Pumping Plant has a peak capacity of about 24,000 gpm (34.6 million gallons per day-MGD) to pump San Fernando Basin water supplies into the potable water system.

In the mid-1970's, the City limited production from the San Fernando Basin to about 12,000 AFY, because of the anticipated outcome of the lawsuit by the City of Los Angeles. In 1975, the California Supreme Court judgment in the City of Los Angeles vs. the City of San Fernando further limited the City's production right. The current right is about 5,500 AFY based on a return flow credit right and water use.

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 hazards to the water supplies were not known. As a result, Glendale had to further limit its use of San Fernando Basin supplies. Currently, the City has totally suspended production from the basin because of the difficulty of producing supplies meeting the MCL's for the VOC's. Except for a small quantity used at the Glendale Power Plant for cooling tower make-up water, no San Fernando Valley water is currently used in Glendale.

The historic and projected water use from the various sources is plotted on Figure 4. It shows the significant reduction in production from the San Fernando Basin and corresponding increase in imported water supplies from MWD. The annual water use in Glendale for fiscal year 1996-97 was 32,315 AFY. In 1989-90, the use was about 32,600 AFY. The recent drought and many water conservation measures have resulted in reduced water use in Glendale. The 32,319 AFY is equivalent to an average daily use of 29 million gallons per day (MGD).

GLENDALE WATER SYSTEM

Statistical information on the Glendale water system is shown on Figure 5 and the distribution system schematic diagram on Figure 6.

PROJECTED WATER DEMANDS

Projection Methodology - Metropolitan has calibrated the U.S. Army Corps of Engineers IWR-MAIN (Municipal and Industrial Needs) water demand forecasting system for 51 of the larger cities in Metropolitan's service area, which includes Glendale. The model 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. It is being used by an increasing number of major cities in the country for water demand forecasting. The model calibrated for use in MWD's service area is called MWD-MAIN, a water demand forecasting model.

Projected Water Use - The projected water demand using MWD-MAIN calibrated for Glendale shows a year 2000 demand of 32,003 AFY and a year 2010 demand of 33,215 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 2010 demand reflects a modest increase over current use. 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 Water Resource Plan is to develop more local supplies and the facilities required to increase the use of local resources thereby reducing the need for imported water. The cost of these new facilities is estimated to be $50 million. Currently, about 87 percent of the potable water used in the City comes from MWD. With the proposed supplies and facilities, the goal is to reduce dependence on MWD to 60 percent of demand. This will be accomplished by building new facilities for expanding production from the San Fernando and Verdugo Basins, and increased recycled water use.

PROPOSED WATER FACILITIES

The various features to be constructed as parts of this water resource plan are shown on Figure 7 and 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 a federal SUPERFUND clean-up program with many proposed water treatment plants constructed or to be constructed in the basin. Now the Environmental Protection Agency (EPA) is focusing on the construction of cleanup facilities in Glendale. The treated water from these facilities will be conveyed to the Glendale potable water system.

Under the Record of Decision (ROD) for the South Glendale and North Glendale Operable Units, many new facilities will be constructed. It consist of the following: seven shallow extraction wells and one deep well, a combined 5,000 gpm water treatment plant, piping to convey the untreated water from the wells to the treatment plant, a conveyance system from the treatment plant to Glendale potable distribution system, a facility to blend the treated groundwater with water from the MWD to reduce nitrate levels, and a disinfection facility. A general layout of facilities being proposed is shown on Figure 8.

The major agreements between Glendale, the Responsible Parties (PRP's), and the EPA are close to signing. The PRPs have retained CDM Consulting Engineers to design and construct the required facilities. Construction should be completed in the 1999-2000 period.

The City's basic water right of 5,500 AFY will meet about 18 percent of projected near-term water demands based on an annual use in the City of 30,000 AFY. It is anticipated that with the clean-up facilities, 7,200 AFY will be delivered to the City using the accumulated basin water storage credits, or about 22 per cent of the projected demands.

Verdugo Basin - Historically, the City's use of these supplies has been limited because of water quality problems, water 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 new low capacity wells (referred to as Glorietta Wells A & B) and from the water supplies in the old Verdugo Pickup horizontal infiltration system. Early operation indicates that flows closer to 550 gpm are likely from these sources. The three existing 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 required. The existing wells and VPWTP will produce about 2,700 AFY with the

remaining 1,000 AF coming from other basin sources such as new wells. It is anticipated that the City will be looking at other sources of supply in the Verdugo Basin. If the City were able to utilize its full rights to these supplies, about 12 percent of demands could be met from this Basin.

Recycled Water - With the completion of the "backbone" distribution system consisting of pipelines, pumping plants, and storage tanks to deliver recycled water to many new users in and outside the City, we will be looking at further expansion of the system to meet 10 per cent of the demand.

The specific features of this program are shown in detail on Figure 9. The users from the various recycled water projects are tabulated on Figure 10. This will give the reader a general idea of the scope of the expansion program. The expected deliveries from the various recycled water projects are shown on Table 3.

TABLE 3
RECYCLED WATER USE (AFY)

PROJECTS	1995	2000	2005	2010
Brand Park	0	160	170	170
Forest Lawn Pipeline	293	350	350	350
Power Plant Pipeline	371	450	450	450
Verdugo-Scholl Pipeline	216	832	935	1,054
Other Potential Projects	0	0	0	0
TOTAL	880	1,792	1,905	2,024

Metropolitan Water District - The City currently has three treated water connections to the Metropolitan water system in the City. The cities of Los Angles, Burbank and Glendale have looked at 150 cfs, equally divided, untreated water connection 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.

TABLE 4
HISTORIC AND PROJECTED WATER USE IN GLENDALE (AF)

Fiscal Year	San Fernando Basin	Verdugo Basin	Recycled Water	MWD Water	Total
1989-90	2,041	1,635	333	28,848	32,857
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	503	2,059	880	27,906	31,348
1996-97	471	2,569	1,125	28,154	32,319
1997-98*	500	2,700	1,709	26,965	31,874
1998-99*	500	2,700	1,748	26,991	31,939
1999-00*	7,700	3,300	1,792	19,211	32,003
2000-01*	7,700	3,300	1,792	19,900	32,692
2001-02*	7,700	3,300	1,792	19,900	32,692

* Projected

SUMMARY OF WATER SUPPLIES

The above information describes the many projects proposed for construction in the City at a cost of $50 million. The money will come from City sources, others benefiting from these facilities, and the parties responsible for groundwater contamination in the San Fernando Basin through the SUPERFUND Clean-Up Program.

RELATED INFORMATION ON WATER USE

Detailed information on historical and projected water use in Glendale is shown on Figure 11. From a practical sense, water use in the water year is equivalent to water use in a fiscal year. Table 4 is a tabular version of Figure 11.

CITY OF GLENDALE WATER DEPARTMENT
SOURCES OF WATER

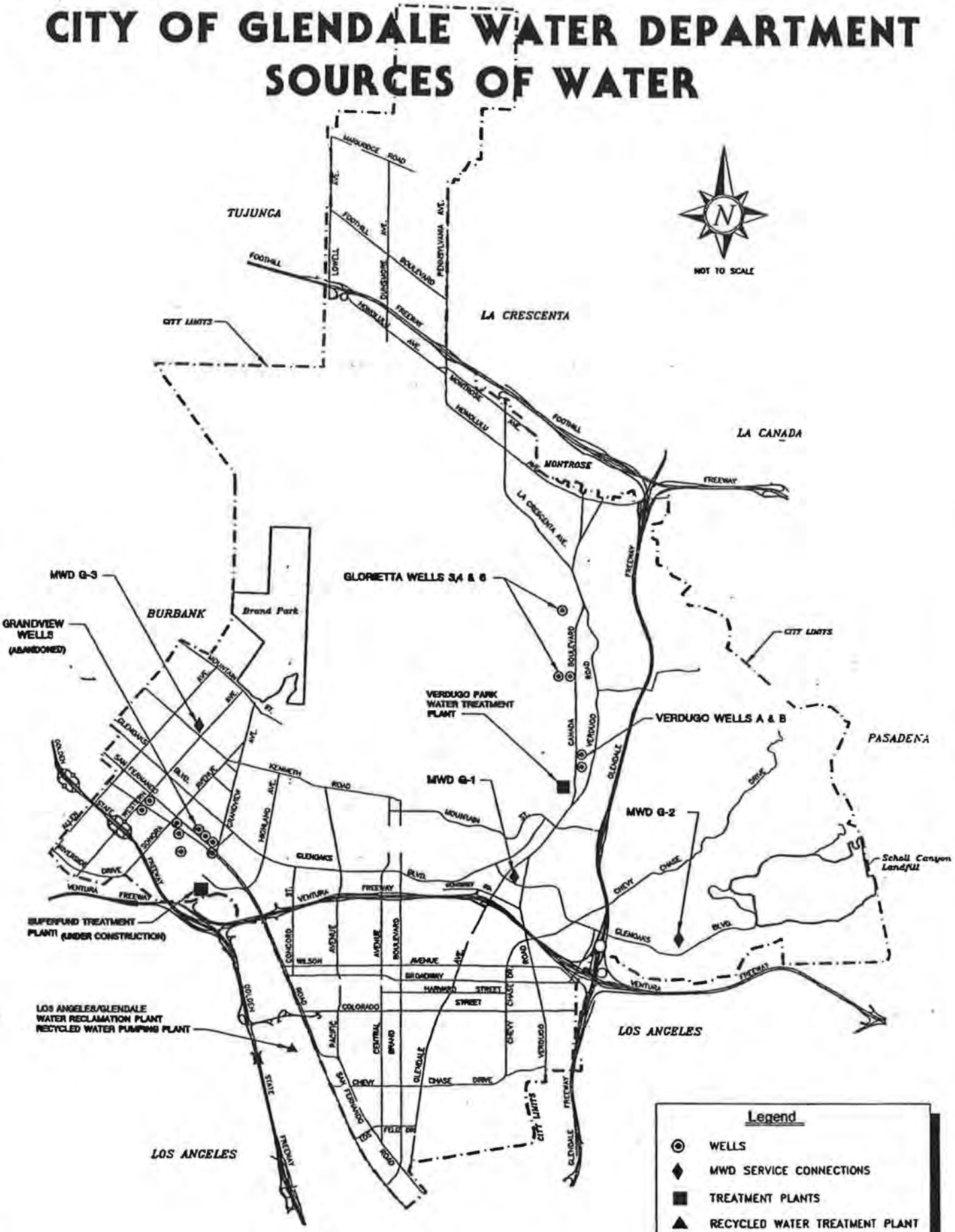


FIGURE 1

G:\USERS\WATER\AL\ACAD\SOURCES.DWG

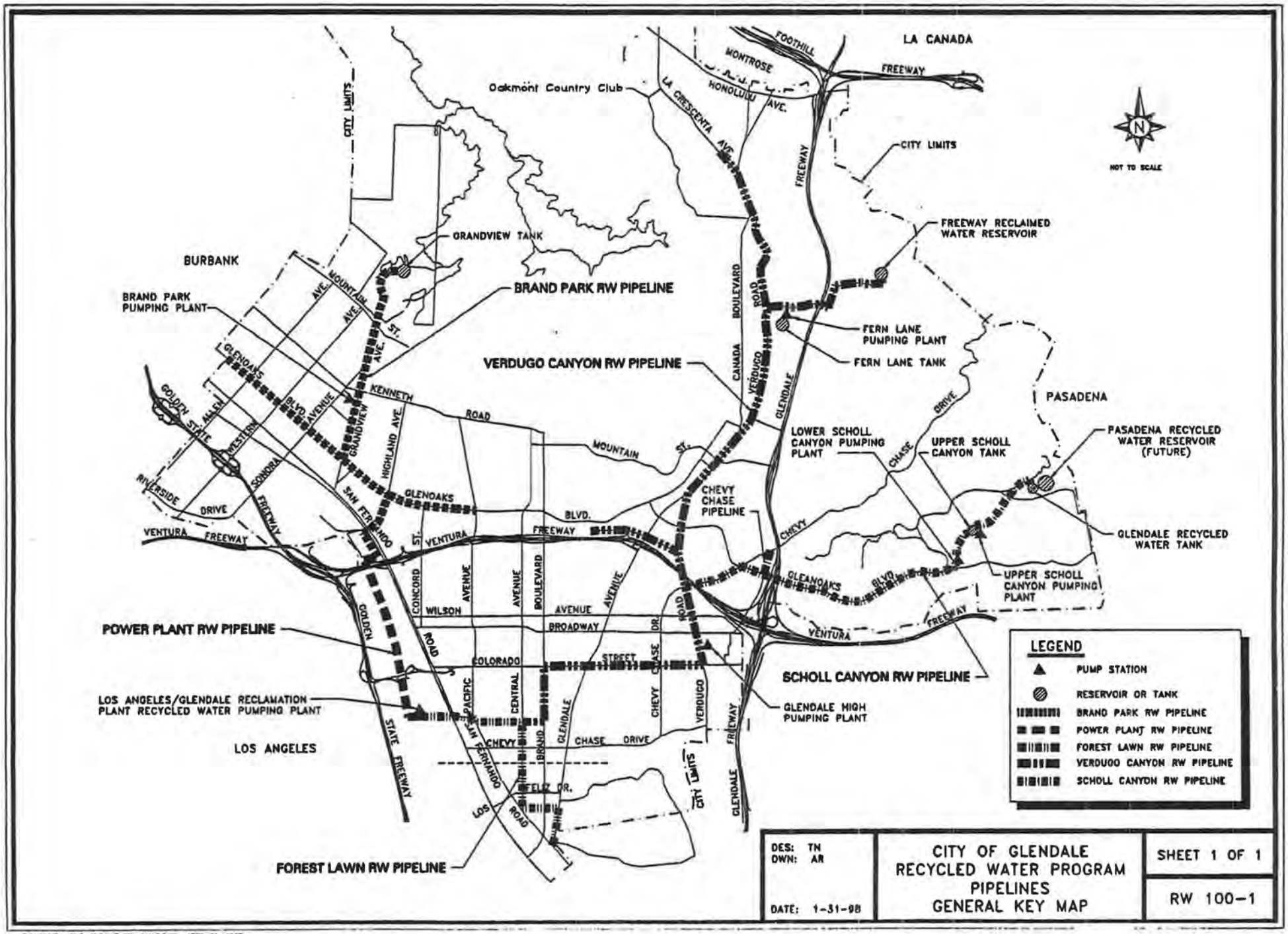

LA CANADA
FOOTHILL FREEWAY
MONTROSE
HONOLULU AVE.
Oakmont Country Club
LA CRESCENTA AVE.
CITY LIMITS
FREEWAY
NOT TO SCALE
FREEWAY RECLAIMED WATER RESERVOIR
GRANDVIEW TANK
BURBANK
BRAND PARK RW PIPELINE
BRAND PARK PUMPING PLANT
MOUNTAIN AVE.
ST.
FERN LANE PUMPING PLANT
FERN LANE TANK
VERDUGO CANYON RW PIPELINE
CANADA BOULEVARD
VERDUGO ROAD
GLENDALE
PASADENA
KENNETH ROAD
GLENOAKS BLVD
GOLDEN STATE FREEWAY
ALLEN AVENUE
WESTERN AVENUE
GRANDVIEW AVE.
HIGHLAND AVE.
MOUNTAIN ST.
LOWER SCHOLL CANYON PUMPING PLANT
UPPER SCHOLL CANYON TANK
CHASE DRIVE
PASADENA RECYCLED WATER RESERVOIR (FUTURE)
RIVERSIDE DRIVE
SONORA
SAN FERNANDO
GLENOAKS BLVD.
CHEVY CHASE PIPELINE
VENTURA FREEWAY
VENTURA ST.
GLENDALE RECYCLED WATER TANK
UPPER SCHOLL CANYON PUMPING PLANT
CONCORD AVENUE
WILSON AVENUE
BROADWAY
COLORADO STREET
CHEVY CHASE DR.
POWER PLANT RW PIPELINE
GOLDEN STATE FREEWAY
SCHOLL CANYON RW PIPELINE
LOS ANGELES/GLENDALE RECLAMATION PLANT RECYCLED WATER PUMPING PLANT
PACIFIC AVENUE
CENTRAL AVENUE
BRAND BOULEVARD
GLENDALE AVENUE
CHEVY CHASE DRIVE
VERDUGO ROAD
GLENDALE FREEWAY
GLENDALE HIGH PUMPING PLANT
LOS ANGELES
SAN FERNANDO ROAD
FELIZ ST.
CITY LIMITS
FOREST LAWN RW PIPELINE
LEGEND
PUMP STATION
RESERVOIR OR TANK
BRAND PARK RW PIPELINE
POWER PLANT RW PIPELINE
FOREST LAWN RW PIPELINE
VERDUGO CANYON RW PIPELINE
SCHOLL CANYON RW PIPELINE
DES: TN
DWN: AR
DATE: 1-31-98
CITY OF GLENDALE
RECYCLED WATER PROGRAM
PIPELINES
GENERAL KEY MAP
SHEET 1 OF 1
RW 100-1

FIGURE 2

CITY OF GLENDALE
SCHEMATIC DIAGRAM OF RECYCLED WATER SUPPLY SYSTEM

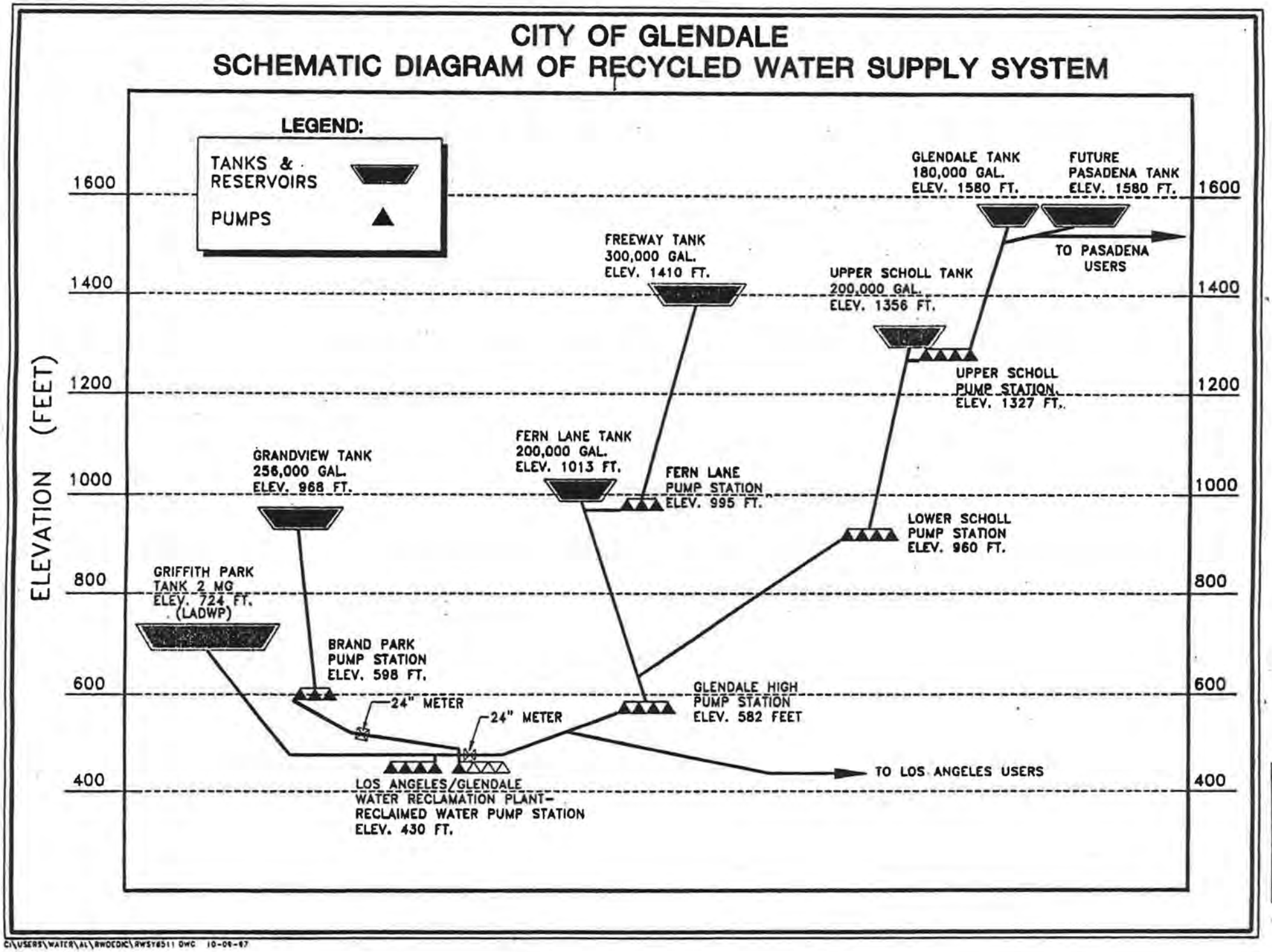


FIGURE 3

C:\USERS\WATER\AL\RWDCDNC\RWSY6511.DWG 10-09-07

FIGURE 4

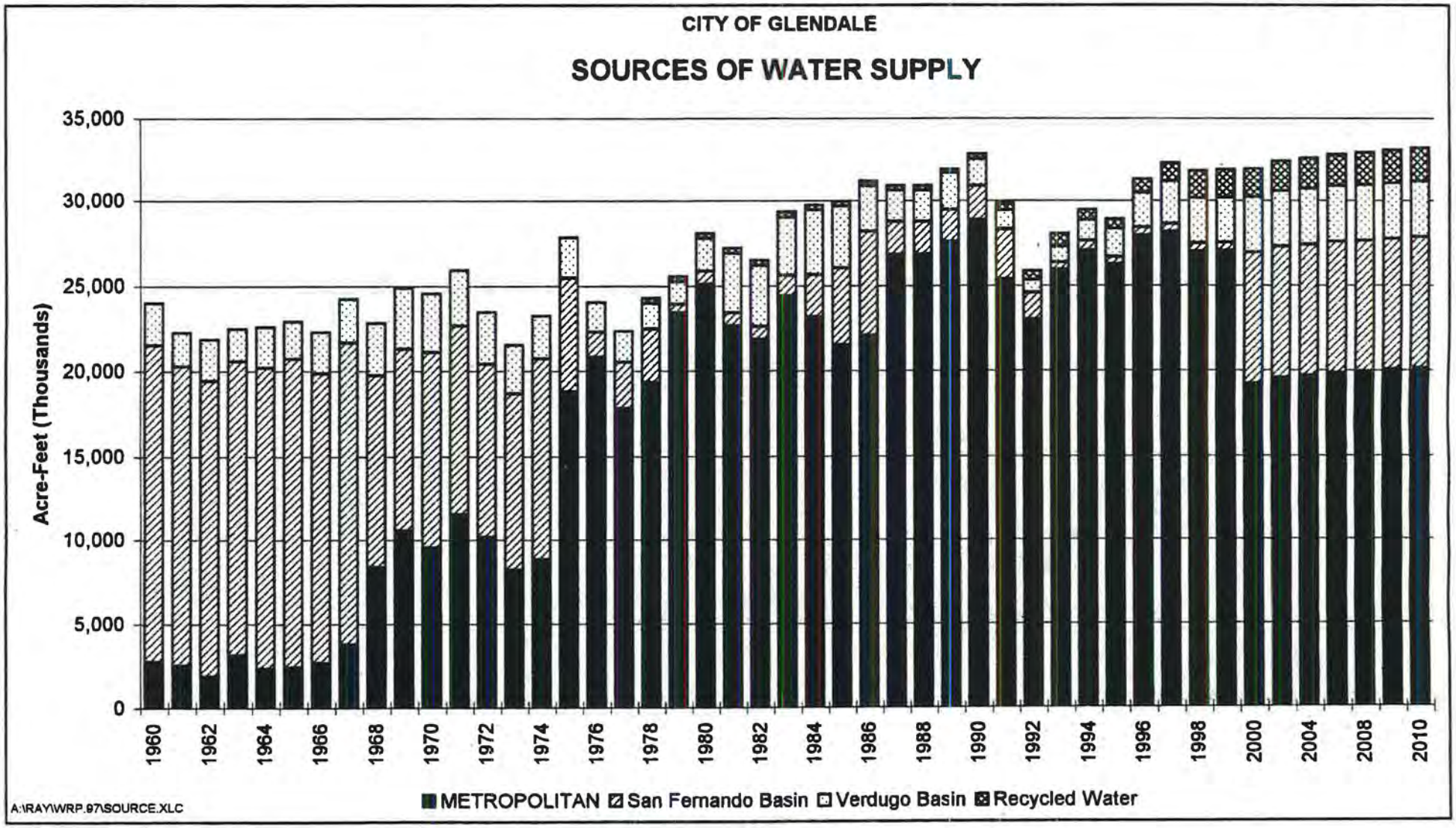

CITY OF GLENDALE
SOURCES OF WATER SUPPLY
Acre-Feet (Thousands)
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2004
2008
2010
METROPOLITAN
San Fernando Basin
Verdugo Basin
Recycled Water
A:\RAY\WRP.97\SOURCE.XLC

FIGURE 5

CITY OF GLENDALE
WATER SYSTEM STATISTICAL DATA
DECEMBER 1997

GENERAL INFORMATION		NUMBER
Service Area Population		193,500
Service Area Size		30.6 square miles
Full-time Employees		52
Annual Daily Average Consumption		29 million gallons

WATER DISTRIBUTION SYSTEM

Pumping Plants		28 stations
Total Water Storage Capacity		185 million gallons (30 Res. & Tanks)
Chlorination Facilities		13
Water Mains		378 miles
Gate Valves		6,531
Water Meters in Service		32,406
Firelines		853
Fire Hydrants		2,843
Pressure Zones		7 zones
Wells	San Fernando Basin	8 (Under Construction)
	Verdugo Basin	5

WATER TREATMENT PLANTS

Verdugo Park Water Treatment Plant(Diatomaceous Earth Process)	2 MGD
Grandview Water Treament Plant (Air Stripping + GAC)-Under Construction	7 MGD

RECYCLED WATER DISTRIBUTION SYSTEM

Pump Stations	6 stations
Total Water Storage capacity	1.1 million gallons (5 Reservoirs)
Water Mains	20 miles

WATER CUSTOMERS		NUMBER	% OF TOTAL
Residential		28,428	88
Commercial		2,928	9
Industrial		405	1
Others		645	2
	Total	32,406	

WATER SALES (1996-97)		HUNDRED CUBIC FEET	% OF TOTAL
Residential		9,785,868	77
Commercial		2,355,964	19
Industrial		224,424	2
Others		304,582	2
	Total	12,670,838	

Avg. Monthly HCF per single family Res. customer 20

WATER SOURCES (1996-97)		IN ACRE-FEET	% OF TOTAL
Metropolitan Water		28,154	87
Local Groundwater		3,036	9
Recycled Water		1,125	4
	Total	32,319	

CITY OF GLENDALE
SCHEMATIC DIAGRAM OF POTABLE WATER SUPPLY SYSTEM

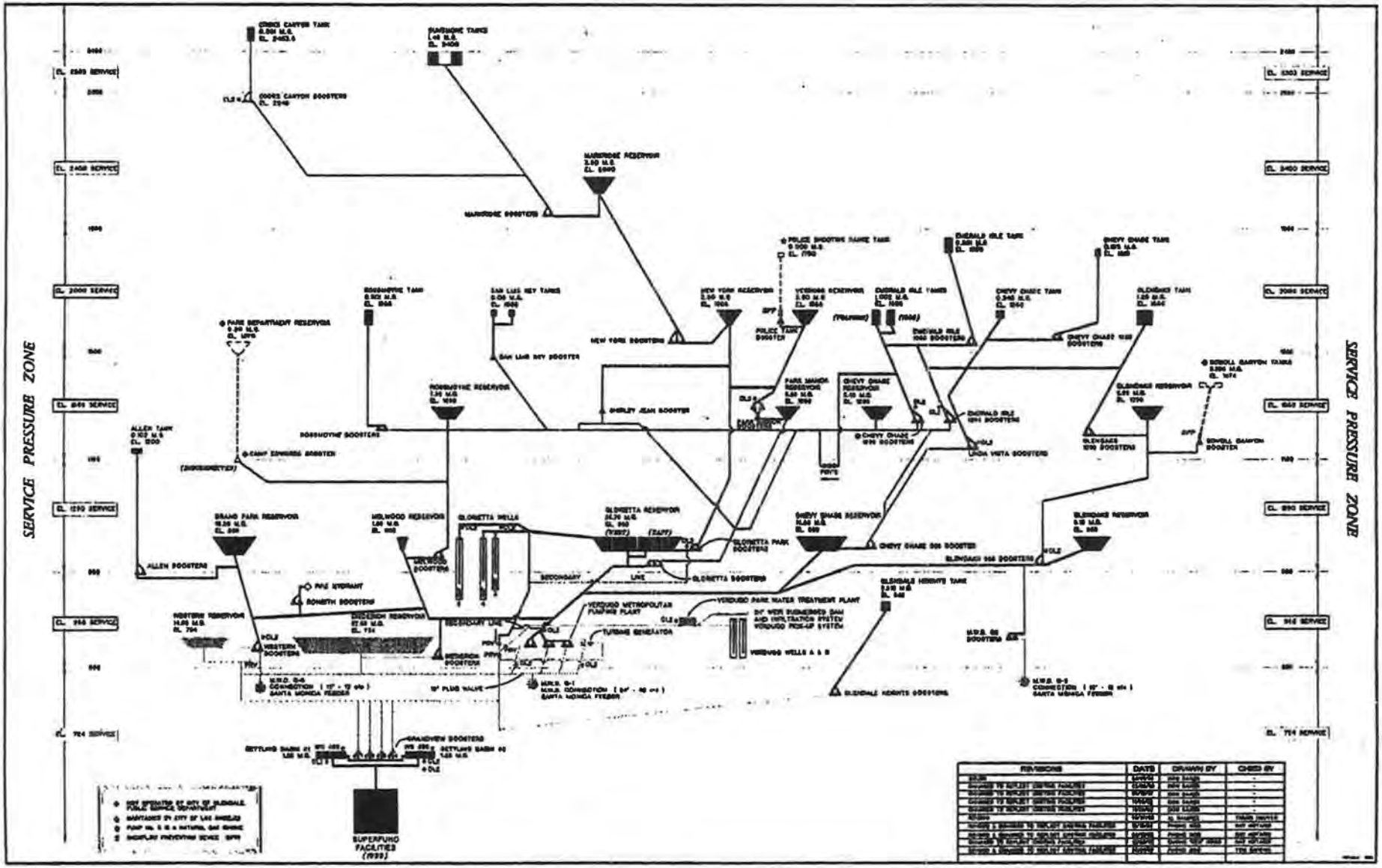
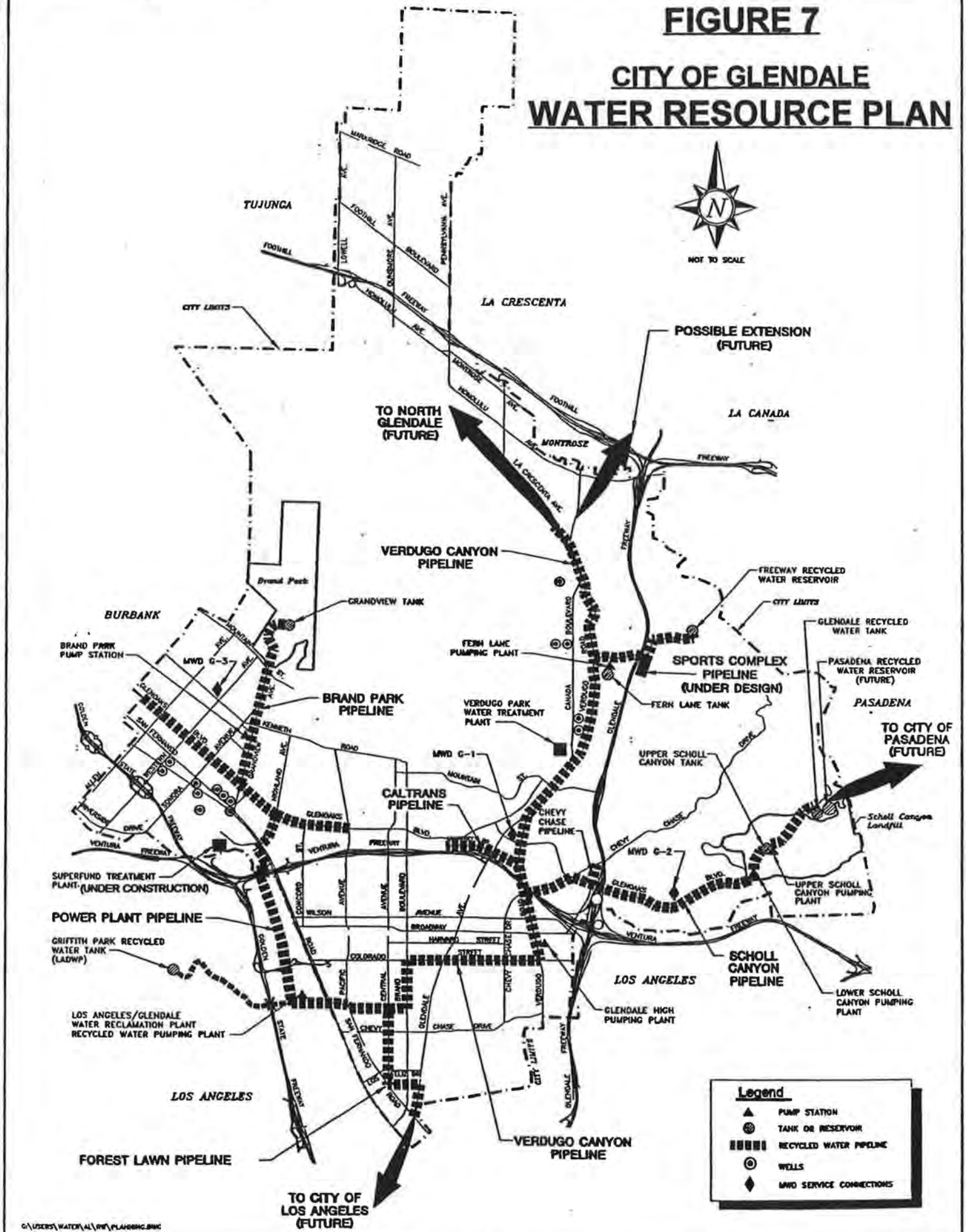


FIGURE 6

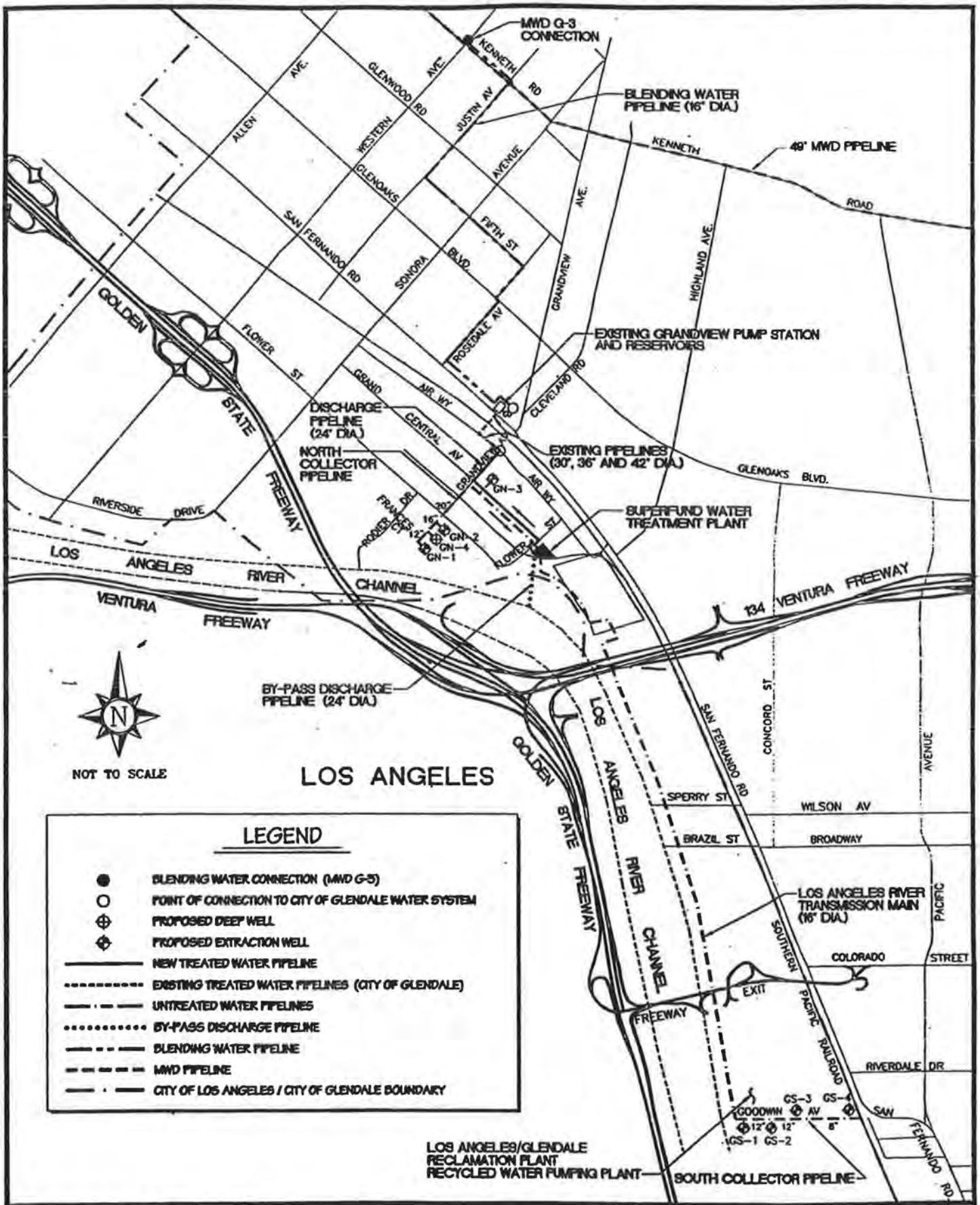
FIGURE 7

CITY OF GLENDALE
WATER RESOURCE PLAN



G:\USERS\WATER\AL\RWP\PLANNING.BMP

FIGURE 8



CITY OF GLENDALE PUBLIC SERVICE DEPARTMENT	**PROPOSED SUPERFUND FACILITIES**	DATE: 12-02-97	SHEET: 1 OF 1
		DES: TN DR: PN	4646-A

G:\USERS\WATER\PHONG\TRANG\4646-A.DWG

CITY OF GLENDALE REGIONAL RECYCLED WATER PROGRAM

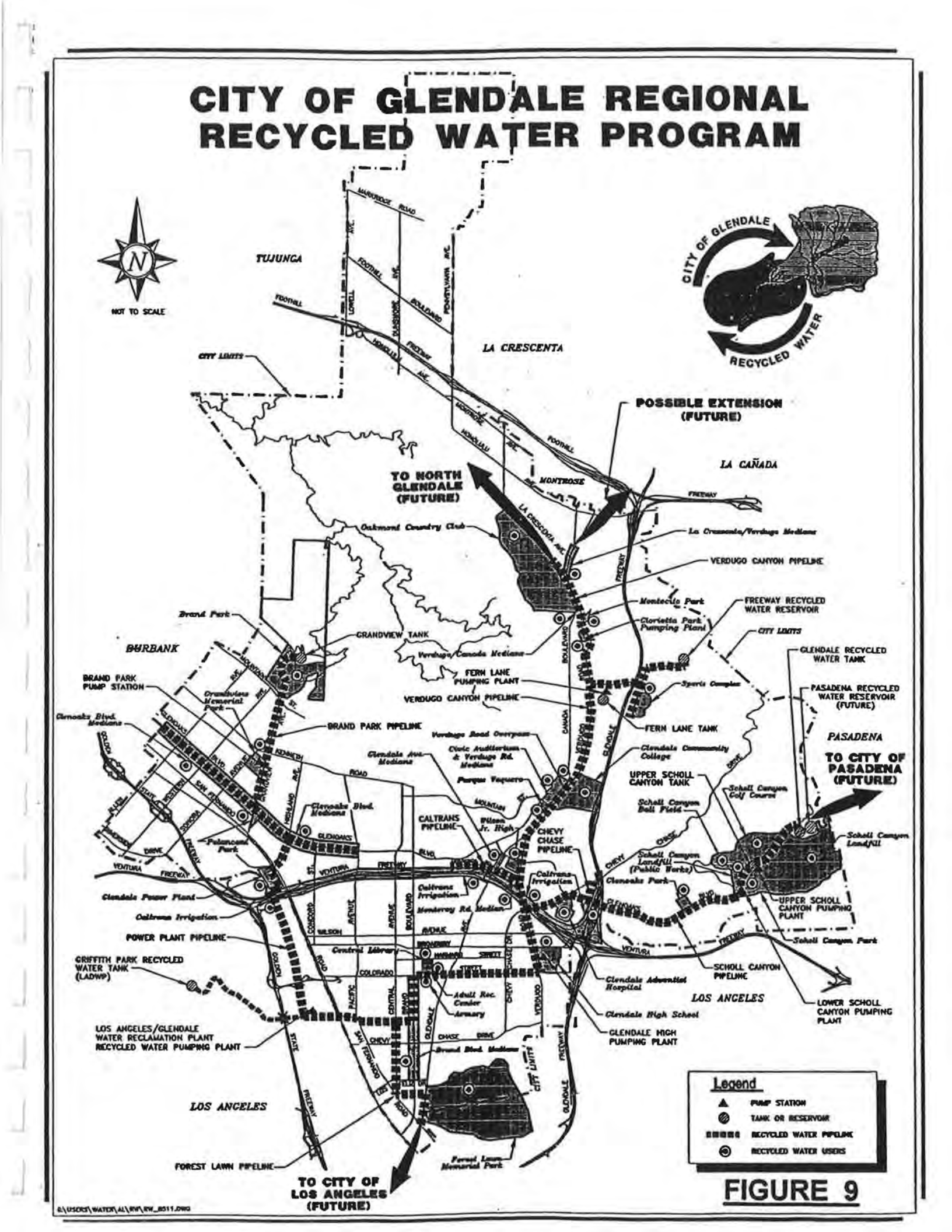


FIGURE 9

G:\USERS\WATER\AL\RW\RW_8511.DWG

CITY OF GLENDALE
RECYCLED WATER USER STATUS - SN 1990008
As of DECEMBER 1997

FIGURE 10

LOC. NO.	RECYCLED WATER USER PROJECT	Actual/Anticipated Delivery Date	User	Quantity A.F./year
	FOREST LAWN PROJECT			
1	Forest Lawn Memorial Park	1992	YES	300-600
2	1600 South Brand Median	1995	YES	2
	POWER PLANT PROJECT			
7	Caltrans - 943 West Doran Street	1978	YES	40-60
8	Glendale Grayson Power Plant	1978	YES	300-400
	VERDUGO SCHOLL PROJECT			
	PARKS and RECREATION - City of Glendale			
4	Adult Recreation Center	1995	YES	10
3	Armory	1996	YES	
5	Central Library	1995	YES	4
24	Civic Auditorium	1996	YES	15
	Colorado Boulevard - Irrigation	1997		
31	North Verdugo Road Median/La Cresenta Avenue	1996	YES	10
17	Glenoaks Park	1995	YES	4
28	Glorietta Pump Station	1997	NO	
	Mayor's Park (Proposed)	Unknown	NO	6
29	Montecito Park	1995	YES	1
14	Monterey Road Median - WJH	1996	NO	1
13	701 North Glendale Avenue - Median @ Monterey Road	1995	YES	12
	Park Site C (Proposed)	Unknown	NO	54
	Park Site A (Proposed)	Unknown	NO	69
2	741 S Brand Median	1995	YES	3
23	Parque Vaquero	1998	NO	
20	Scholl Canyon Ballfield	1997	YES	17
18	Scholl Canyon Park	1996	YES	12
27	Sports Complex (Proposed)	1998	NO	99
25	Verdugo Rd/Canada (South) Overpass	1995	YES	0.5
30	Verdugo Rd/Canada (North Median)	1996	YES	1.5
	CALTRANS (5 Meters):			
7A	1970 E Glenoaks Boulevard (E/S)	1995	YES	
7A-1	1970 E Glenoaks Boulevard (W/S I2)	1995	YES	
7B	406 N Verdugo Road @ Chevy Chase	1995	YES	100
7C	709 Howard Street @ Monterey Road	1995	YES	
7D	2000 E Chevy Chase Drive @ Harvey	1995	YES	
	GLENDALE UNIFIED SCHOOL DISTRICT:			
6	Glendale High School	1995	YES	15
15	Wilson Junior High School	1995	YES	7
	OTHERS:			
16	Glendale Adventist Memorial Hospital	1997	YES(Partially)	8
26	Glendale Community College	1996	YES(Partially)	25
32	Oakmont Country Club	1996	YES	200
21	Scholl Canyon Golf Course	1998	YES	100
22	Scholl Canyon Landfill (LACSD)	1997	YES	100
19	Scholl Canyon Landfill (PW)	1996	YES	
18	Upper Scholl Pump Station	1996	YES	
33	*PUBLIC WORKS - City of Glendale*	1978	YES	
	BRAND PARK PROJECT			
12	Brand Park	1997	YES	60
9	Glenoaks Median (6 Meters)	1996	YES	4
11	Grandview Memorial Park	1998	NO	50
10	Pelanconi Park	1996	YES	8
TOTAL	**CURRENT METERS**	35		1,650-2,070

A:\RATEWRP\RWUSTAT7.XLS
JANUARY 12, 1998

GLENDALE WATER SUPPLY AND DEMAND (AF/YR)

(Use MWD Direct Deliveries for Blending)

FIGURE 11

	Fiscal Year	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	2000	2005	2010
(1)	Water Demands (a)	31,953	32,857	29,850	25,863	28,026	29,448	28,897	31,341	32,315	31,874	31,939	32,003	32,626	33,215
	Water Supplies:														
(2)	*San Fernando Basin*														
(3)	Water Rights	5,591	5,771	5,170	4,373	4,805	5,090	4,979	5,535	5,555	5,575	5,588	5,601	5,725	5,843
(3A)	Physical Solution Pmts (LADWP)														
	Water Production														
(4)	City Production	1,411	1,564	2,445	1,080	78	140	65	35	25	100	100	100	100	100
(5)	EPA Treat. Plant (b)												7,200	7,200	7,200
(6)	Physical Solution	467	477	487	497	369	414	376	461	442	400	400	400	400	400
(7)	Total:	1,878	2,041	2,932	1,577	447	554	441	496	467	500	500	7,700	7,700	7,700
	Verdugo Basin														
(8)	Wells 3,4, & 6	2,287	1,635	1,132	732	904	1,226	1,667	2,059	2,116	2,200	2,200	2,200	2,200	2,200
(9)	VPWTP								0	453	500	500	500	500	500
(10)	Other Production												600	656	656
(11)	Total:	2,287	1,635	1,132	732	904	1,226	1,667	2,059	2,569	2,700	2,700	3,300	3,356	3,356
	Recycled Water														
	Brand Park Project									34	155	155	160	170	170
	Forest Lawn Project					348	299	280	293	357	350	350	350	350	350
	Power Plant Project	233	333	432	551	422	326	260	371	263	450	450	450	450	450
	Verdugo-Scholl Project							34	216	471	754	793	832	935	1,054
	Other Potential Project														
(12)	Total:	233	333	432	551	770	625	574	880	1,125	1,709	1,748	1,792	1,905	2,024
	Metropolitan Water														
(13)	Direct Deliveries (G1, G2, & G3)	27,555	28,848	25,354	23,003	25,905	27,043	26,215	27,906	28,154	26,965	26,991	19,211	19,665	20,135
(15)	Replenishment Deliveries (G4)														
(16)	Total:	27,555	28,848	25,354	23,003	25,905	27,043	26,215	27,906	28,154	26,965	26,991	19,211	19,665	20,135
(17)	**Total Water Supplies**	**31,953**	**32,857**	**29,850**	**25,863**	**28,026**	**29,448**	**28,897**	**31,341**	**32,315**	**31,874**	**31,939**	**32,003**	**32,626**	**33,215**

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

5) 5,000 gpm @ 90%

6) Forest Lawn, et.al.

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

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

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

(a) Projected demands from MWD

(b) Assume operational date October, 1999

A:\RAY\WRPWTRSDMN.XLS]
JANUARY 14, 1998]

Updated[01/14/98]

APPENDIX D

CITY OF SAN FERNANDO

PUMPING AND SPREADING PLAN

1997-2002 Water Years

CITY OF SAN FERNANDO

GROUNDWATER PUMPING AND SPREADING PLAN

OCTOBER 1, 1997 TO SEPTEMBER 30, 2002

1997-98 Water Year

Prepared by:

Public Works Department

Engineering Division

117 Macneil Street

San Fernando, California 91340

APRIL 1998

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 ± 10 percent can be expected.

III. WATER SUPPLY

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

A. MWD The amount of treated water purchased from the MWD has been changed beginning in 1997-1998 through 2002 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

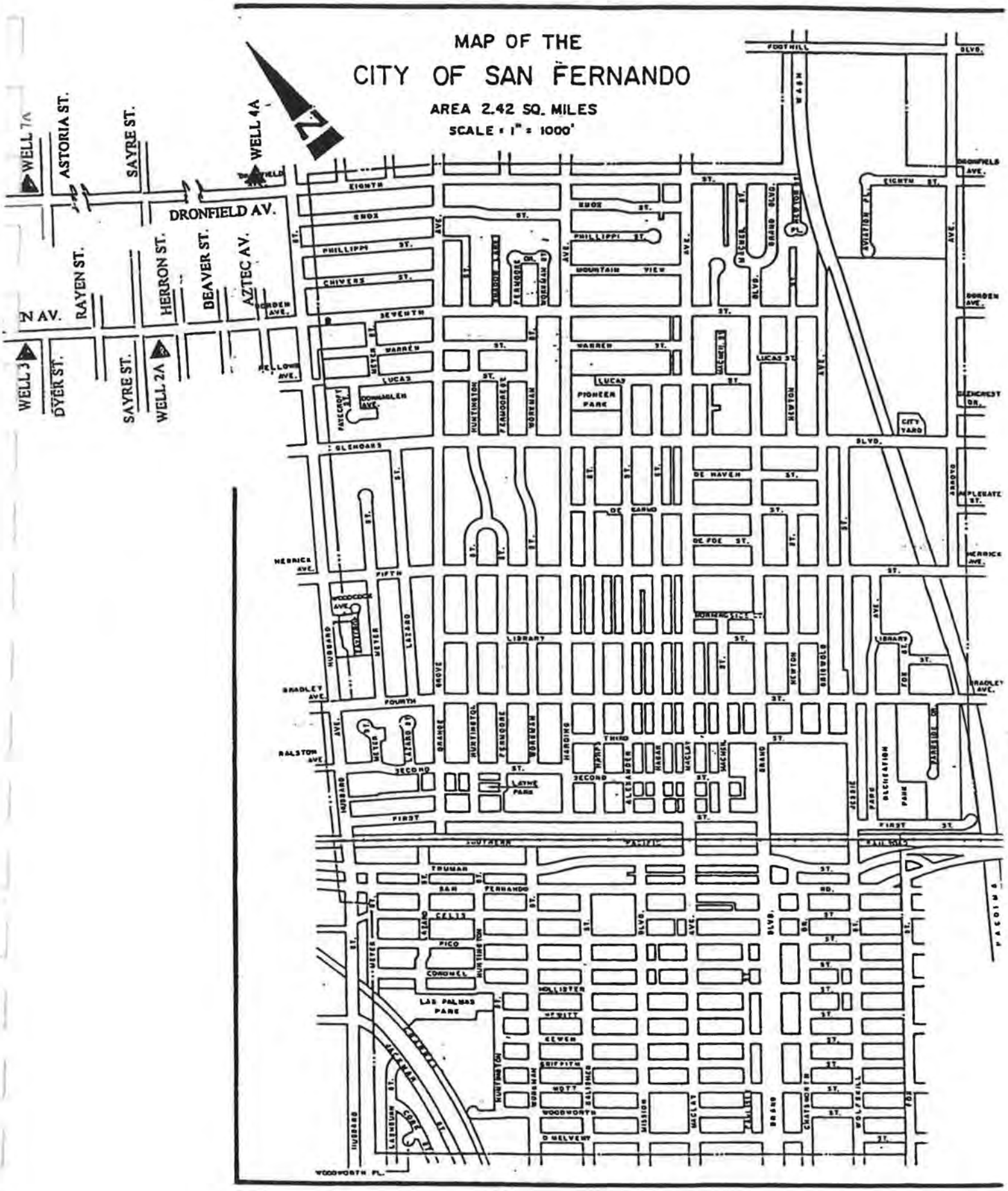
C. Quantity (Acre-Feet) of Water Pumped From Each Well (1996-97)

1.	Well 2A -	1,362.67
2.	Well 3 -	1,007.74
3.	Well 4A -	180.89
4.	Well 7A -	707.29
	Total	3,258.59

D. Wells Groundwater Level Data

1.	Well 2A -	1072.50'	Taken 10/97
2.	Well 3 -	1063.80'	Taken 10/97
3.	Well 4A -	1073.41'	Taken 10/97
4.	Well 7A -	1060.69'	Taken 10/97

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, 1997 the City of San Fernando has a stored water credit of 2308.81 acre-feet accumulated during previous years through the 96-97 water year.

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

(Acre-Feet)

DEMAND	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000-01	01-02
WELLS	2826.00	2145.00	3398.00	3411.47	2985.12	3258.59	3550	3550	3100	3100	3200
MWD	568.00	1285.00	93.00	9.53	614.50	315.59	0	0	500	500	500
TOTAL	3394.00	3430.00	3491.00	3421.00	3599.62	3574.18	3550	3550	3600	3600	3700
	ACTUAL						PROJECTED				

APPENDIX A

WATER QUALITY DATA

SEE ATTACHED WATER QUALITY REPORT, 1997

CITY OF SAN FERNANDO

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

117 MACNEIL ST. • SAN FERNANDO, CALIFORNIA 91340-2993

EARTHQUAKE TIPS

PURIFICATION OF WATER

- The easiest method of purifying water is to boil it vigorously for a minimum of 5 minutes per quart. To improve the taste of the water after it has been boiled, pour the water from one container to another several times.

- You can also purify water by adding household liquid bleach solution that contains 5.25 percent sodium hypo chlorite (Most common bleach solutions contain this amount). Add the bleach solution to the water in a clean container. Mix thoroughly by stirring or shaking. Let stand for 30 minutes. The following table shows the proper amount of 5.25 percent solution to add to the water.

Amount of Water	Amount of solution to add to:	
	Clean Water	Cloudy Water
1 quart (1/4 gallon)	2 drops	4 drops
1 gallon	8 drops	16 drops
5 gallons	1/2 teaspoon	1 teaspoon

- You can use ordinary 2 percent tincture of iodine, which you may have in your medicine cabinet, to purify small quantities of water. Add 3 drops of tincture of iodine to each quart of clear water, or 6 drops to each quart of cloudy water, and stir thoroughly.

- You can safely use water purification tablets that release chlorine or iodine to purify water. They are inexpensive and you can buy them at most sporting goods stores and some drug stores. Read/follow directions on label for use.

NOTE: Swimming pool water is best used for bathing and dish washing. The chemicals used in pool water are unhealthy for human consumption and may cause sever intestinal damage. If this is your only source of drinking water, purify the water at least twice and use sparingly with elderly and infants.

City of San Fernando
Water Quality Report
1997

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

1997-2002 Water Years

GROUNDWATER PUMPING

PLAN

WATER YEARS
OCTOBER 7, 1997 TO SEPTEMBER 30, 2002

Prepared by
CRESCENTA VALLEY
WATER DISTRICT

APRIL 1998

TABLE OF CONTENTS

TABLES

I. INTRODUCTION

The ground water rights of the Crescenta Valley Water District (CVCWD) 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 on 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 a 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 has been or is currently being provided.

The 1996-97 base year again saw a sizable increase in water consumption locally. A warm spring and summer coupled with below average rainfall may have contributed to the District's record production but as of the time of this report, the water demands appear to be trending back down quite a bit for 1997-1998.

Projected water demands for the next five years is expected to increase only slightly (0.5%) from the 1997-98 base year. The increase is expected mainly from residential growth. However, it is seen from Table 2.1 that water use has increased dramatically from 1992-93 and has continued at a much higher rate, probably due to consumer's habits returning to less-water conserving, pre-drought consumption patterns.

The projected water demand may vary significantly due to weather conditions, economic conditions and/or social conditions in the CVWD service area. 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 eleven 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.

B. GLENWOOD NITRATE REMOVAL PLANT

The Glenwood ion exchange nitrate removal plant began operation in January 1990. The plant remained in operation until August 1992 when repairs were necessary. In May 1993 the plant was put back in operation. In the past year, the plant was again down for nearly 2 months (Aug.-Oct. 1997) due to major maintenance. 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. The tunnel water was not used between July 1996 and August 1997 due to frequent coliform-positive episodes. The District made improvements acceptable to the California Department of Health Services and the tunnel has been reliably coliform-free since August 1997. 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 slightly over the next five years. 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 the Nitrate Removal Plant and relatively stable levels of Verdugo Basin Groundwater. In the past three water years (94/95 through 96/97), 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 1997-98. 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 2000-2001 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)

92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000 2001	2001 2002
4249	4806	4686	5346	5483	5270	5300	5325	5350	5380
ACTUAL					PROJECTED				

TABLE 3.1
HISTORIC AND PROJECTED COMBINED WELL
AND TUNNEL GROUNDWATER PRODUCTION

(Acre-Feet)

92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000 2001	2001 2002
2555	3631	3707	3702	3672	3600	3700	3500	3400	3294
ACTUAL					PROJECTED				

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

(Acre-Feet)

91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000 2001	2001 2002
847	337	1550	1626	1419	1562	1300	1500	1500	1500	1500
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)

92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000 2001	2001 2002
60	67	65	42	6	60	60	60	60	60
ACTUAL					PROJECTED				

TABLE 3.4
HISTORIC AND PROJECTED USE OF MWD TREATED WATER

(Acre-Feet)

91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-2000	2000 2001	2001 2002
1602	1694	1175	979	1644	1811	1670	1600	1825	1950	2086
ACTUAL						PROJECTED				

NOTES:

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