

## **CHAPTER 3. BACKGROUND**

The purpose of this chapter is to provide a brief description of the City, including its history, documents governing its water use, service area, population, climate, and customer connections. This chapter also provides a brief description of the City's water supply and distribution system.

### **BRIEF INTRODUCTION**

The City was founded in 1849 with a population of 9,087 people,<sup>1</sup> and in 1920, voters adopted a City Charter (municipal constitution) and a City Council-City Manager form of government; this form of government is still in use today. Today, the City's population is approximately 452,959. The City's Department of Utilities (DOU) is responsible for providing and maintaining water, sewer collection, storm drainage and flood control services for residents and businesses within the City Limits.<sup>2</sup>

The City has extensive surface water entitlements, consisting of five appropriative water right permits issued by the State Water Resources Control Board, pre-1914 rights and a water rights settlement contract with the Bureau of Reclamation. These water rights allow the City to divert water from the Sacramento and American Rivers. Further discussions of these items are provided in Chapters 4 and 5.

### **RESOURCE MAXIMIZATION AND IMPORT MINIMIZATION**

Water management tools have been used by the City to maximize its water resources. The City has institutionalized water conservation by adopting City ordinances in 1967, becoming a signatory to the California Urban Water Conservation Council's (CUWCC) Memorandum of Understanding (MOU) in 1991, and approving the Water Forum Agreement in 2000.<sup>3</sup>

All three components have helped the City promote water conservation while managing increasing water demands due to extensive growth within the City's service area. By reducing the demand of current and future water customers, and assuring that all new system uses are efficient, the amount of water the City will need to meet potable water demands at buildout has been minimized.

### **CITY'S WATER SERVICE AREA**

The City's current authorized place of use (POU) for water diverted under the City's Sacramento River water rights permit includes all the land within the City Limits, while the POUs for water diverted under the City's American River water rights permits includes not only the City limits, but also portions of service areas of several other water purveyors. Figure 3-1 illustrates the City's POU for each surface water source.



### Geography and Historical Climate

The City is located in the Central Valley of California, which is surrounded by the Sierra Nevada Mountains to the east, coastal ranges to the west, Klamath Mountains to the North, and is oriented in a north-south direction.<sup>4</sup> Soils within the City consist of unconsolidated clay, silt, and sand that resulted from floodplain deposits. These alluvial floodplain deposits support a variety of crops (e.g., rice, fruit, or grain fields).<sup>5</sup>

The City is also located at the confluence of the Sacramento and American Rivers, that meet on the western boundary of the City. The Sacramento River flows south from Lake Shasta, while the American River flows west from the Sierra Nevada Mountains. Additionally, the Sierra Nevada snowfields are approximately 70 miles east of the City, and provide water supply via valley streams during the dry season.<sup>6</sup>

The City’s climate is characterized by hot dry summers and cool winters. As shown in Table 3-1, precipitation averages approximately 17 inches per year, while temperatures average around 60°F. Average evapotranspiration (Et<sub>o</sub>) is based on data for Station 131 (Fair Oaks) obtained from the California Irrigation Management Information System (CIMIS) website. Rainfall and temperature data is based on data for Southern Station 11 obtained from the Western Regional Climate Center (WRCC) website.

**Table 3-1. Climate Information for the City’s Water Service Area (DWR Table 3)**

Climatological Variable	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total/Average
Average Et <sub>o</sub> , Inches <sup>(a,b)</sup>	1.59	2.20	3.66	5.08	6.83	7.80	8.67	7.81	5.67	4.03	2.13	1.59	57.06
Average Rainfall, inches <sup>(c,d)</sup>	3.66	3.1	2.36	1.12	0.5	0.16	0.03	0.07	0.27	0.9	2.13	2.94	17.24
Average Temperature, °F <sup>(c,d)</sup>	45.50	50.40	53.90	58.70	65.30	71.20	75.50	74.60	71.70	64.00	53.10	45.90	60.80
Average Max Day Temperature, °F <sup>(c,d)</sup>	61.06	67.07	72.61	78.7	88.52	95.07	99.13	98.55	93.97	85.03	73.00	61.13	76.51

- (a) Average Et<sub>o</sub> obtained from CIMIS Website ([http://www.cimis.water.ca.gov/cimis/monthlyET\\_oReport.do](http://www.cimis.water.ca.gov/cimis/monthlyET_oReport.do)) for Station 131 (Fair Oaks) downloaded on 12/28/05.
- (b) Et<sub>o</sub> data is the average since 1997, when Station 131 came online.
- (c) Average Rainfall & Temperature data obtained from WRCC Website (<http://www.wrcc.dri.edu>) for Southern Station 11 (047630 – Sacramento Airport) downloaded on 12/28/05.
- (d) Average Rainfall & Temperature data is for 1941 to 2005.



## Population & Employment within the Service Area

The City's population grew slowly between 1849 and World War II; however, annual annexations along with expansions of the aerospace industry and military installations caused the City's population to grow significantly.<sup>7</sup> Over the past twenty years, the City's population has increased from 319,700 in 1985 to 452,959 in 2005 (approximately a 42 percent increase), and by approximately 11 percent since 2000. The City's population is projected to increase to 538,303 by the year 2025 (approximately a 19 percent increase).

Over the past 15 years, the number of jobs within the City increased from 230,651 jobs in 1990 to 293,218 jobs in 2005 (27 percent increase), and by approximately 13 percent since 1999. The number of jobs is also projected to increase by approximately 38 percent over the next 20 years to 405,943 jobs.

The number of households within the City increased from 151,012 units in 1990 to 169,921 units in 2005 (12 percent increase), and by approximately 7 percent since 2000. The number of household units is also projected to increase by approximately 28 percent over the next 20 years to 217,048 units.

Table 3-2 presents the City's historic and projected population, employment, and housing units.

## Existing Customers

The City is both a water retailer and water wholesaler. The City provides retail water services to customers located within the city limits of the City of Sacramento, and wholesales and/or wheels water to other agencies serving areas adjacent to the City. The City's retail and wholesale customers are discussed in more detail below. Figure 3-2 illustrates the location of the City's current and potential future wholesale/wheeling customers.

### Retail Customers

Table 3-3 compares demographic information (in number of accounts) from fiscal year 1999/2000 to fiscal year 2004/2005. As shown in Table 3-3, the number of accounts to which the City supplies potable water has increased from 120,769 in 1999/2000 to 136,347 in 2004/2005, or by approximately 13%; nearly all of the new accounts (over 90 percent) were single family accounts. Table 3-3 also indicates that the number of metered accounts (charged by metered rate) doubled.

Table 3-3 also shows that over the last five years, retail potable water customers have been primarily residential, with about 90 percent of the City's customers being residential; about 8 percent commercial/industrial; and only 2 percent irrigation.



**Table 3-2. Historic and Projected Population for the City’s Water Service Area (DWR Table 2)**

Year	Population <sup>(a)</sup>	Employment <sup>(b)</sup>	Housing Units <sup>(c)</sup>
1985	319,700	NIA	NIA
1986	329,600	NIA	NIA
1987	340,600	NIA	NIA
1988	351,000	NIA	NIA
1989	359,300	NIA	NIA
1990	369,365	230,651	151,012
1991	373,000	232,183	152,169
1992	380,600	233,715	153,325
1993	384,000	235,247	154,482
1994	386,200	236,779	155,638
1995	383,700	238,311	156,795
1996	384,000	240,562	157,154
1997	387,400	242,813	157,513
1998	401,400	251,157	157,871
1999	400,600	259,501	158,230
2000	407,018	265,121	158,589
2001	414,674	270,740	160,309
2002	426,595	276,360	162,712
2003	435,510	281,979	165,115
2004	444,395	287,599	167,518
2005	452,959	293,218	169,921
2010	473,130	333,030	174,820
2015	493,920	356,980	186,460
2020	517,040	381,950	196,730
2025 <sup>(d)</sup>	538,300	405,940	217,050
2030 <sup>(d)</sup>	538,300	405,940	217,050

(a) Population for years 1985-1989 obtained from Department of Finance (DOF) Report 90-E4 downloaded on 12/14/05. Population data for years 1990-1999 obtained from DOF Report Revised E4 downloaded on 12/14/05. Population data for years 2000-2005 obtained from DOF Report Historical E4 downloaded on 12/14/05. Population for years beyond 2005 obtained from Sacramento Area Council of Governments (SACOG) website, downloaded on 12/14/05.

(b) Employment data for 1990, 1995, 1997, 1999, and 2005 through 2030 obtained from SACOG website, downloaded on 12/28/05. Other years are based on straight-line interpolation.

(c) Housing Units data for 1990, 1995, 2000, 2001, and 2005 through 2030 obtained from SACOG website, downloaded on 12/29/05. Other years are based on straight-line interpolation.

(d) Projections from the DOF and SACOG were through Year 2025; no growth for these categories was assumed from 2025 to 2030. However, additional growth beyond 2025 is likely to occur.

NIA – No Information Available

Shaded rows indicate future projections.



**Table 3-3. City Customer Types in Fiscal Year 2004/2005<sup>(a)</sup> (DWR Table 12)**

Year	Customer	Number of Connections	Percent of Total Connections	Number of Meters	Percent Metered
1999/2000	Single Family	99,632	82.5%	3,444	3.5%
	Multiple Family	10,446	8.7%	0	0%
	Commercial/Industrial	9,455	7.8%	6,308	66.7%
	Irrigation	1,236	1.0	914	74%
	<b>Total</b>	<b>120,769</b>	<b>100%</b>	<b>10,666</b>	<b>8.8%</b>
2004/2005	Single Family	113,850	83.5%	11,718	10.3%
	Multiple Family	10,800	7.9%	388	3.6%
	Commercial/Industrial	10,078	7.4%	8,885	88.2%
	Irrigation	1,619	1.2%	1,281	79.1%
	<b>Total</b>	<b>136,347</b>	<b>100%</b>	<b>22,272</b>	<b>16.3%</b>
Difference	Single Family	14,218	91.3%	8,274	
	Multiple Family	354	2.3%	388	
	Commercial/Industrial	623	4.0%	2,577	
	Irrigation	383	2.4%	367	
	<b>Total</b>	<b>15,578</b>	<b>100%</b>	<b>11,606</b>	

<sup>(a)</sup> Data obtained from page 39 of the Operational Statistics Report for Fiscal Year 2004/2005 and page 37 of the Operation Statistics Report for Fiscal Year 1999/2000.

Residential water use is billed at a flat rate, while Commercial/Industrial and Irrigation customers are charged by either a flat or metered rate. In response to the passage of AB2572 in 2004, the City has begun a program to retrofit all non-metered connections by 2025. Metered billing for metered connections will begin in 2010, as now required under State law. Water rates are discussed in more detail in Chapter 8.

Wholesale and Wheeling Customers

The City’s water rights and water supply facilities provide regional benefits by making water available on a wholesale (City water) and wheeling (non-City water) basis for the benefit of areas adjacent to the City. California American Water Company (California American) obtains wholesale water from the City system at the intersection of “A” Parkway and Franklin Boulevard, and has an agreement with the City that allows a maximum flow of 5.76 mgd during off-peak periods (October 15th through May 14th), and with a maximum delivery of 2,580 afa.



The agreement between California American and the City may be renegotiated in the future to include other service areas.

Sacramento County Water Agency Zone 40 (Zone 40) obtains water diverted under Sacramento County's entitlements at the City's Sacramento River Water Treatment Plant (SRWTP) and wheeled through the City system from a connection along Franklin Boulevard. The agreement between Zone 40 and the City allows Zone 40 to receive a maximum flow of 11 mgd, with a maximum annual delivery of 12,350 af.

The City also has an agreement to supply water to the Sacramento International Airport and Metro Air Park (MAP) on either a wheeling or wholesale basis by 2006, and a wholesale agreement to begin serving up to 20 mgd of surface water to the Sacramento Suburban Water District (SSWD) in 2006. In the future, the City may expand its role as a wholesaler/wheeler for the benefit of other customers in the area.

Other potential wholesale/wheeling customers include:

- Area D Customers (Del Paso Manor Water District, California American Water Company—Arden, Southern California Water Company—Arden Town, and Sacramento County Water Agency—Arden Park Vista).
- California American Water Company—Parkway.
- California American Water Company—Rosemont.
- Florin County Water District.
- Fruitridge Vista Water Company.
- Sacramento County Zone 40—Wholesale.
- Sacramento Suburban Water District – Northridge Service Area (former Northridge and Arden Arcade Water District service areas).

## OVERVIEW OF THE CITY'S WATER SYSTEM

The City's existing distribution system consists of water supply and treatment facilities, two pressure zones, groundwater wells, storage tanks, pumping facilities, and distribution/transmission pipelines. Each of these components is discussed in more detail below, while Figure 3-3 illustrates the location of major components of the City's water system.

### Water Supply and Treatment Facilities

The City treats surface water diverted from the Sacramento and American Rivers with two water treatment facilities: the SRWTP and the FWTP. Figure 3-3 illustrates the location of both water treatment plants.



### Sacramento River Water Treatment Plant

The SRWTP began operation in 1924 with an initial capacity of 32 mgd, and treats water diverted approximately one-half mile downstream of the American River confluence. A new intake structure, located approximately 700 feet downstream of the old intake structure, was completed in 2003. Other expansions and modifications completed by the City since the 1920's have increased the plant capacity to 160 mgd. The SRWTP currently has three treatment trains consisting of disinfection, grit removal, alum coagulation, flocculation, sedimentation, and filtration; all three-process trains are recombined after filtration and before post-chlorination.

### Fairbairn Water Treatment Plant

The FWTP began operation in 1964 and has a current capacity of 200 mgd due to the expansion completed in late 2005. The plant was originally designed so that the City could expand it in stages to an ultimate capacity of 404 mgd. The water treatment process involves chemical addition, coagulation, flocculation, sedimentation, filtration, and disinfection.

### **Pressure Zones**

High service pumps at each of the treatment plants pump water directly into the distribution system creating a pressure zone that encompasses the majority of the City. The Bell Avenue Booster Pump Station is an in-system booster pump station that creates a small pressure zone in the northeastern part of the City.

### **Groundwater Wells**

The City currently operates thirty-two municipal groundwater supply wells; thirty wells are located in the northern portion of the City, north of the American River, while the remaining two are located south of the American River. Fourteen additional wells are operated separately from the drinking water system and are used to meet irrigation demands of City parks. The total pumping capacity of the City's municipal supply wells is approximately 33 mgd, or about 30 mgd assuming that only 90 percent are available at any given time.

Figure 3-3 illustrates the location of the City's groundwater wells.

### **Storage Tanks**

The City currently has fifteen storage facilities: ten storage tanks are located throughout the City, while five clearwells are located at the WTPs (two at FWTP and three at SRWTP). A new ground level storage reservoir is expected to come online sometime in 2007 and will be located along Elkhorn Boulevard.

Nine of the storage tanks located throughout the City have a capacity of 3 MG each, while one storage tank (Florin Reservoir) has a capacity of 15 MG. The clearwells located at the FWTP have a combined capacity of 26 MG, while the clearwells located at the SRWTP have a combined capacity of 17.3 MG.



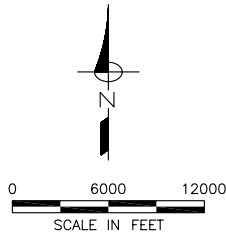
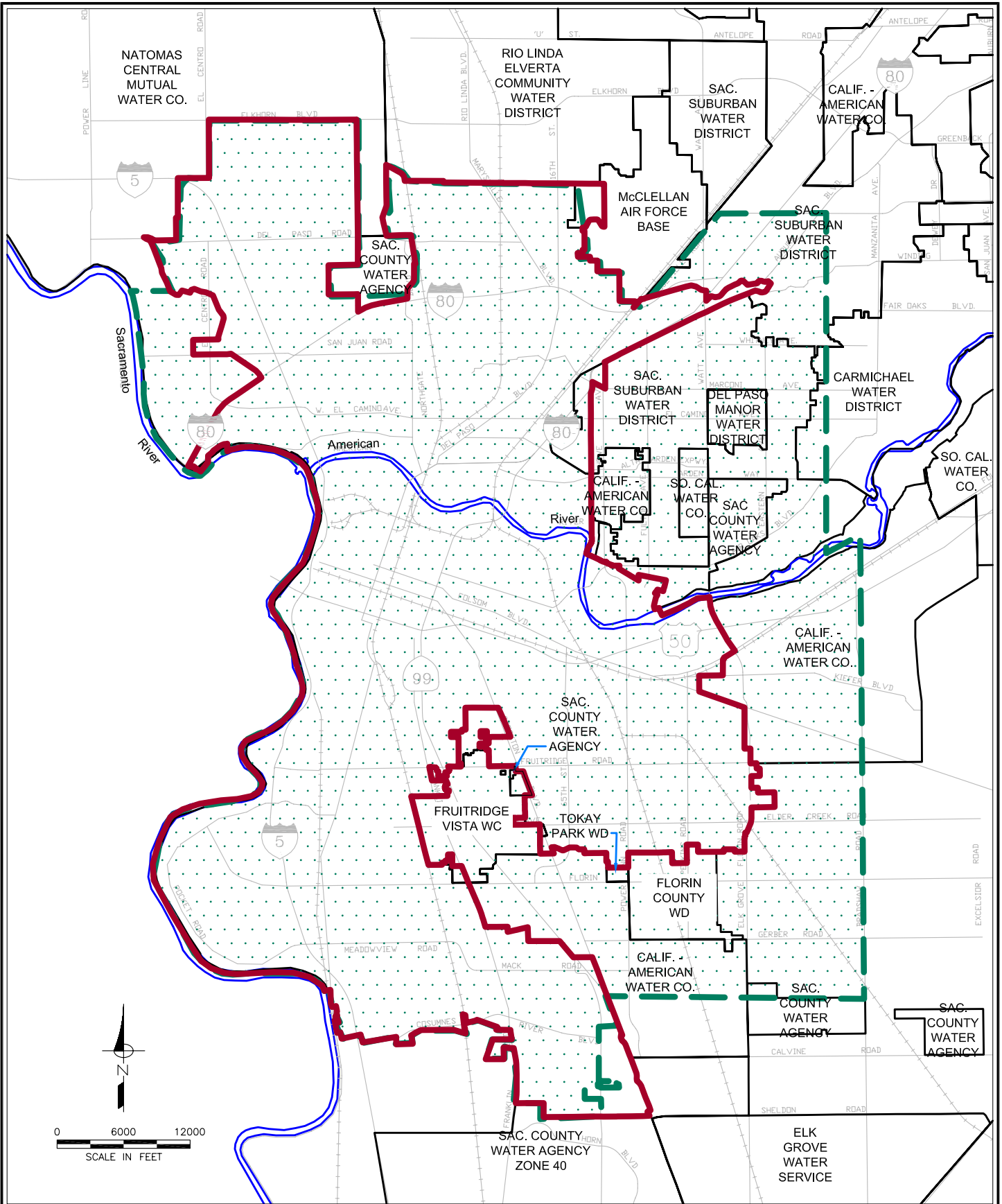
Figure 3-3 illustrates the location of ten storage tanks located throughout the City and the location of the two water treatment plants.

### **Pumping Facilities**



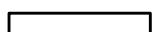
The City currently operates high lift pump stations at both the SRWTP and the FWTP, while an additional nine pump stations are located at all of the storage tanks within the distribution system; the elevated Freeport Reservoir does not have a pump station. The total capacity of the pump stations located at the treatment plants is 467 mgd (firm capacity of 409 mgd), while the total capacity of the pump stations located at the storage tanks is 180 mgd (firm capacity of 124 mgd). Consequently, the total pumping capacity of the City's system is 647 mgd (firm capacity of 533 mgd).

### **Transmission and Distribution Mains**

The City maintains just over 1,400 miles of transmission and distribution system mains ranging in size from 4 to 60 inches in diameter; only 130 miles consists of pipe that are 12 inches in diameter or larger.



**LEGEND**

	AMERICAN RIVER PLACE OF USE
	CITY LIMITS AND SACRAMENTO RIVER PLACE OF USE
	OTHER WATER ENTITIES OUTSIDE CITY LIMITS

**FIGURE 3-1**  
**City of Sacramento**  
**PLACES OF USE**









## REFERENCES

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- <sup>1</sup> Maddaus Water Management, *Urban Water Management Plan 2000*. December 2001.
- <sup>2</sup> City of Sacramento, [www .cityofsacramento.org](http://www.cityofsacramento.org) January 2006.
- <sup>3</sup> Maddaus Water Management, *Urban Water Management Plan 2000*. December 2001.
- <sup>4</sup> Department of Water Resources, Bulletin 118 – Update 2003, California’s Groundwater. October 2003
- <sup>5</sup> Maddaus Water Management, *Urban Water Management Plan 2000*. December 2001.
- <sup>6</sup> Maddaus Water Management, *Urban Water Management Plan 2000*. December 2001.
- <sup>7</sup> Maddaus Water Management, *Urban Water Management Plan 2000*. December 2001.