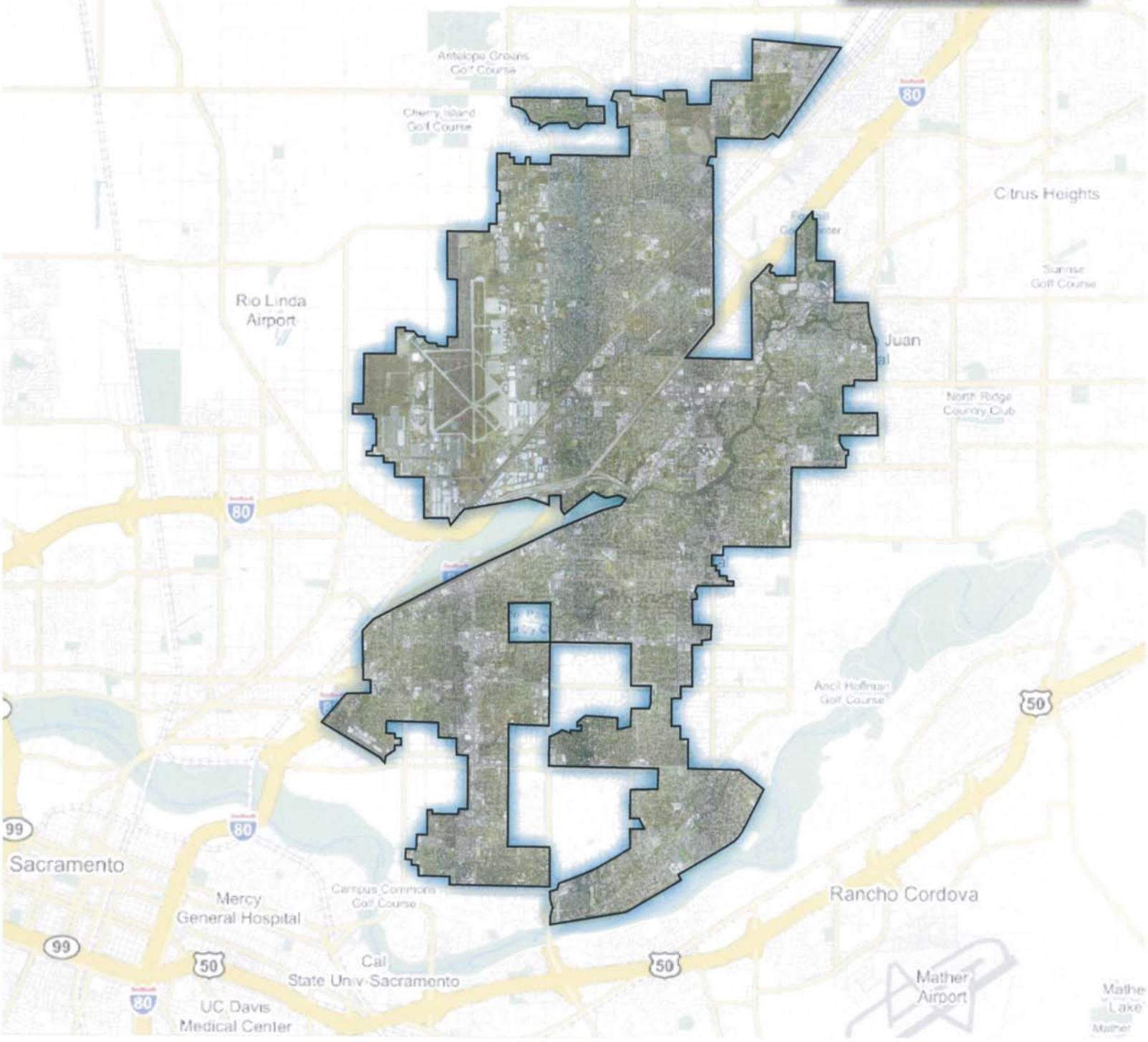
SACRAMENTO SUBURBAN WATER DISTRICT

2005 Urban Water Management Plan

December 2005

BROWN AND CALDWELL



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BROWN AND CALDWELL

December 13, 2005

Mr. Warren Jung
Sacramento Suburban Water District
3701 Marconi Avenue, Suite 100
Sacramento, California 95821-5303

017-128007-001

Subject: Submittal of 2005 Urban Water Management Plan

Dear Mr. Jung:

I am pleased to submit to you this Draft-Final 2005 Urban Water Management Plan (Plan). This draft Plan is written according to the requirements of the Urban Water Management Planning Act and the guidelines as provided by the California Department of Water Resources. The comments received during the public review period have been incorporated into this Plan.

If you have any questions, please do not hesitate to contact me at (916) 853-5365.

Sincerely,

BROWN AND CALDWELL

Melanie Holton

Melanie Holton, P.E.
Project Manager

Enclosures
MH:ds

cc: Paul Selsky, Brown and Caldwell

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SACRAMENTO SUBURBAN WATER DISTRICT

2005 URBAN WATER MANAGEMENT PLAN

December 2005

Prepared by:

BROWN AND CALDWELL
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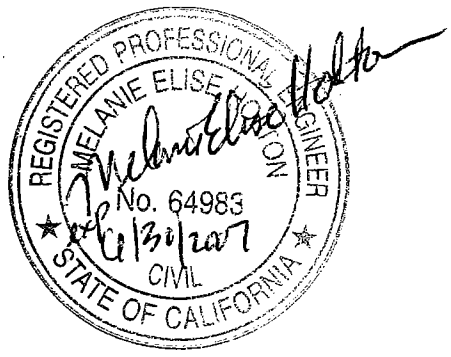

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CHAPTER 1
INTRODUCTION

This Urban Water Management Plan (Plan) is prepared for the Sacramento Suburban Water District (District) in cooperation with the District staff. The District was organized on February 1, 2002, through the consolidation of Northridge Water District and Arcade Water District. This Plan is the year 2005 Urban Water Management Plan as required by the Urban Water Management Planning Act (Act) (California Water Code Division 6, Part 2.6, Sections 10610 through 10657).

The remainder of this chapter provides an overview of the Urban Water Management Planning Act, public participation, agency coordination, and resource maximization and import minimization efforts.

1.1 Urban Water Management Planning Act

One of the purposes of this Plan is to ensure the efficient use of available water supplies, as required by the Act. The Act became part of the California Water Code with the passage of Assembly Bill 797 during the 1983–1984 regular session of the California legislature. Subsequently, assembly bills between 1990 and 2003 amended the Act. Most recently the Act was amended on January 1, 2003 by Assembly Bill 105.

The Act requires every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to adopt and submit an urban water management plan every five years to the California Department of Water Resources (DWR). According to DWR, the Act states that these urban water suppliers should make every effort to assure the appropriate level of reliability in its water service is sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry years. The Act describes the contents of the Plan as well as how urban water suppliers should adopt and implement the Plan. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.

A year 2000 Plan was not required since the District did not exist at that time. The former Northridge Water District and Arcade Water District submitted separate plans in 2000. However, the District did submit a Plan in 2003. This 2005 Plan updates the implementation plan and projected schedules in the 2003 Plan. The Plan describes the availability of water and discusses water use, reclamation, and water conservation activities. The Plan concludes that the water supplies available to the District's customers are adequate over the next 20-year planning period.

1.2 Public Participation

The Act requires the encouragement of public participation and a public hearing as part of the Urban Water Management Plan approval process. As required by the Act, prior to adopting this Plan, the District made the Plan available for public inspection and held a public hearing. This hearing provided

an opportunity for District's customers including social, cultural, and economic community groups to learn about the water supply situation and the plans for providing a reliable, safe, high-quality water supply for the future. The hearing was an opportunity for people to ask questions regarding the current situation and the viability of future plans.

A Notice of Public Hearing was published twice in the Sacramento Bee to notify all customers and local governments of the public hearing and copies of the draft Plan were made available for public inspection at the District's Administration Building and at local public libraries. A copy of the published Notice of Public Hearing is included in Appendix A. This Plan was adopted by the District's Board of Directors on December 19th, 2005. A copy of the adopted resolution is provided in Appendix B. The adopted plan will be provided to DWR and the appropriate cities and counties within 30 days of adoption.

1.3 Agency Coordination

The Act requires the District to coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable. The District coordinated the preparation of its plan with Sacramento Regional County Sanitation District's (SRCSD) Sacramento Regional Wastewater Treatment Plant (SRWTP) 2020 Master Plan Report (Carollo, November 2001), the Water Reclamation Study (Nolte and Associates, Inc., August 1994), and the current ongoing SRCSD reuse master plan. In addition, the District coordinated the preparation of the water demand projections in this Plan with the Sacramento Area Council of Government's (SACOG) demographic projections. The District sent a copy of this Plan to Sacramento County, Placer County Water Agency, City of Citrus Heights, City of Sacramento, and the SRCSD. This included the water service reliability section of the Plan. The District also sent letters to Rio Linda Water District and Fair Oaks Water District offering copies of this Plan for their review. Table 1-1 provides a summary of the plan coordination with the appropriate agencies.

Table 1-1. Coordination with Appropriate Agencies

Coordination	Sacramento County	Placer County Water Agency	City of Citrus Heights	City of Sacramento	Fair Oaks Water District	Rio Linda Water District	SACOG	SRCSD
Participated in developing the plan								
Commented on the draft	X							
Attended public meetings								
Was contacted for assistance							X	X
Was sent a copy of the draft plan	X	X	X	X				
Was sent a notice of intention to adopt	X	X	X	X	X	X		X
Not Involved / No Information								

The District also participates in the Regional Water Authority (RWA). RWA is a joint powers authority that serves and represents the interests of 21 water providers in the greater Sacramento, Placer and El Dorado County region. The Authority's primary mission is to help its members protect and enhance the reliability, availability, affordability and quality of water resources. Two of RWA's regional programs in which the District participates are a water efficiency program designed to help local purveyors implement best management practices on a regional basis and implementation of the American River Basin Regional Conjunctive Use Program, utilizing a $22 million grant from DWR. The District has completed 67 percent of its projects under this grant.

RWA is in the process of developing and implementing a regional water master plan. The regional water master plan reviewed the concepts on how the region could utilize groundwater and surface water conjunctively to meet the objectives set forth in the Water Forum process. The next step is an integrated regional water management plan that will identify specific projects and implementation programs and agreements between different affected agencies to identify projects to put conjunctive use in place.

1.4 Resource Maximization and Import Minimization

Water management tools have been used by the District to maximize water resources. Programs in which the District participates to maximize water resources are described as follows.

- Regional Water Authority - As discussed in the previous section, the District is a participant in the RWA integrated regional water management plan. The District also participates in the RWA water efficiency program.

- Water Forum Agreement - The District is a member and signatory to the Water Forum Agreement, which was developed in an attempt to preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River and in an effort to provide a reliable and safe water supply for the region. The Water Forum finalized the Water Forum Agreement which contains seven major elements to meet its objectives including purveyor specific conservation agreements. This is discussed in Chapter 6 of this plan.

- Sacramento Groundwater Authority - The District is a participating agency in the Sacramento Groundwater Authority (SGA). The SGA has an adopted a regional groundwater management plan. This is discussed in Chapter 4 of this plan.

The benefits of the programs described above and the documents developed as a result of these programs are water management tools that the District uses to maximize their water resources and minimize the need to import water.

CHAPTER 2
DESCRIPTION OF EXISTING WATER SYSTEM

This chapter describes the District's system. It contains a description of the service area and its climate, and the water supply facilities, including the groundwater wells, surface water supply facilities, booster pumping stations, reservoirs, and the piping system.

2.1 Description of Service Area

The District serves a population of approximately 170,000 in Sacramento County. Within the District are two major service areas, the north service area (NSA) and the south service area (SSA). The NSA includes the former Northridge Water District, the Capehart housing area, the former McClellan Air Force Base, and the North Highlands service area of the former Arcade Water District. The SSA includes the Town and Country service area of the former Arcade Water District. Figure 2-1 illustrates the location of the District's service area and the neighboring water systems. The service areas within the District are shown on Figure 2-2.

2.2 Local Climate

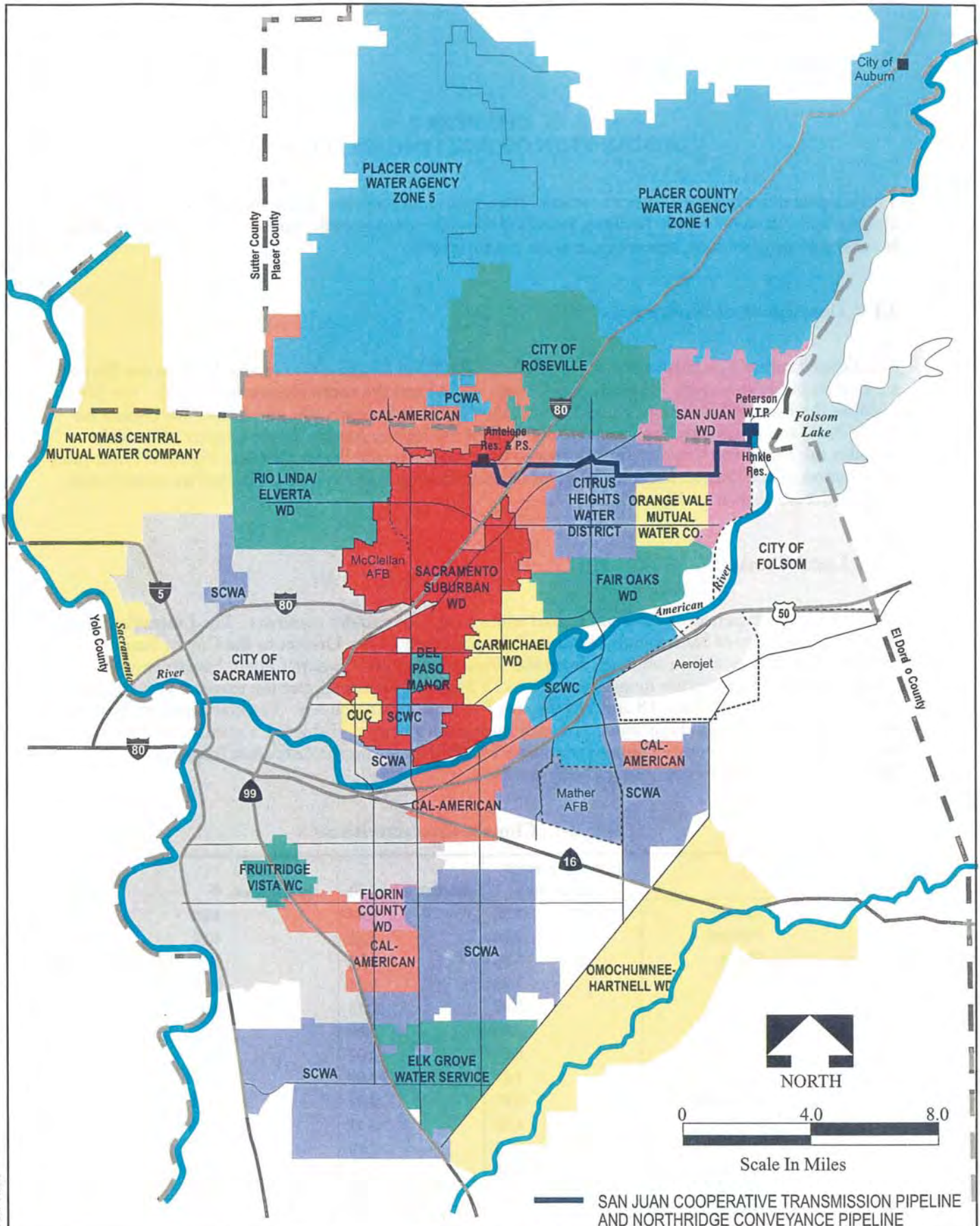
The service area experiences cool and humid winters and hot and dry summers. The District's weather is similar to the City of Sacramento because of the proximity of the District to the City of Sacramento. Based on the historical data obtained from the Western Regional Climate Center, Sacramento's average monthly temperature ranges from 46 to 75 degrees Fahrenheit, but the extreme low and high daily temperatures have been 18 and 115 degrees Fahrenheit, respectively. The combination of hot and dry weather results in high water demands during the summer. Table 2-1 summarizes the Sacramento Region's average climate conditions for 2004 based on the California Irrigation Management Information System (CIMIS) database.

Table 2-1. Climate Characteristics[a]

	Standard average ETo[b], in	Average rainfall, in	Average temperature, °F
January	1.59	2.44	46.0
February	2.20	5.40	49.9
March	3.66	0.95	60.0
April	5.08	0.24	61.9
May	6.83	0.13	66.1
June	7.80	0.00	71.8
July	8.67	0.02	75.2
August	7.81	0.00	74.6
September	5.67	0.03	71.6
October	4.03	3.49	61.0
November	2.13	2.70	51.2
December	1.59	5.14	46.8
Annual	4.76	20.5	61.3

[a] 2004 Data recorded from Sacramento Valley, Fair Oaks station 131, CIMIS www.cimis.water.ca.gov

[b] Data averaged since initial 1997 record. ETo (evapotranspiration), is the loss of water from the soil both by evaporation and by transpiration from the plants growing thereon.



BROWN AND CALDWELL	PROJECT 128007-001	SITE	**2005 Urban Water Management Plan Sacramento Suburban Water District**	Figure **2-1**
	DATE 11-10-05	TITLE	**Sacramento Suburban Water District and Neighboring Utilities**	

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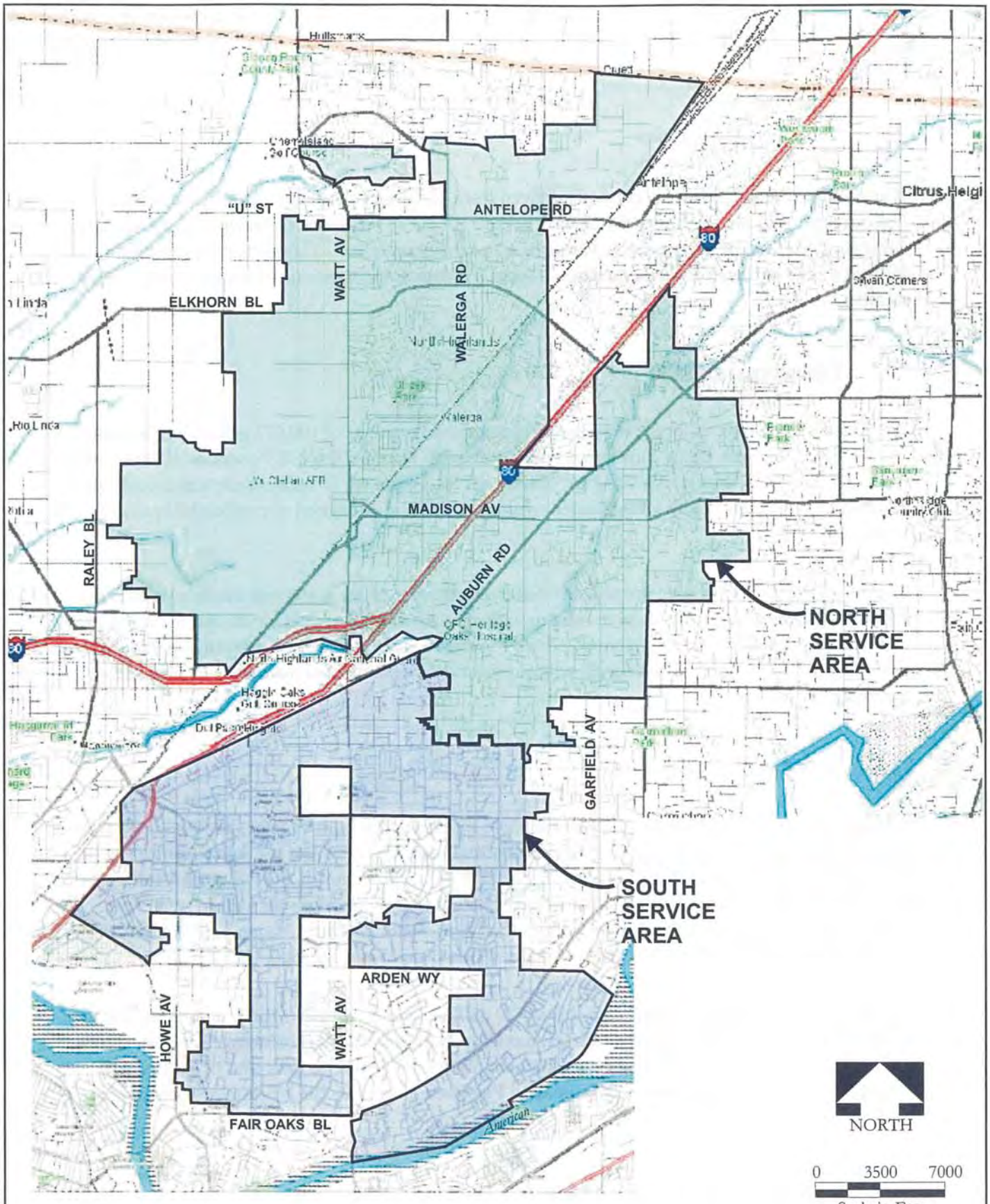

Source: 3-D Topo Quads

BROWN AND CALDWELL	PROJECT 128007-001	SITE **2005 Urban Water Management Plan Sacramento Suburban Water District**	Figure **2-2**
	DATE 7-29-05	TITLE **District Service Areas**	

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2.3 Water Supply Facilities

Water supply for the District is currently derived from active groundwater wells and surface water from Folsom Reservoir. In the future the District's water supply will also include water from the American River from the City of Sacramento's Fairbairn water treatment plant. This section describes the District's wells and surface water facilities. Figure 2-3 depicts the locations of the key water system facilities.

2.3.1 Groundwater Facilities

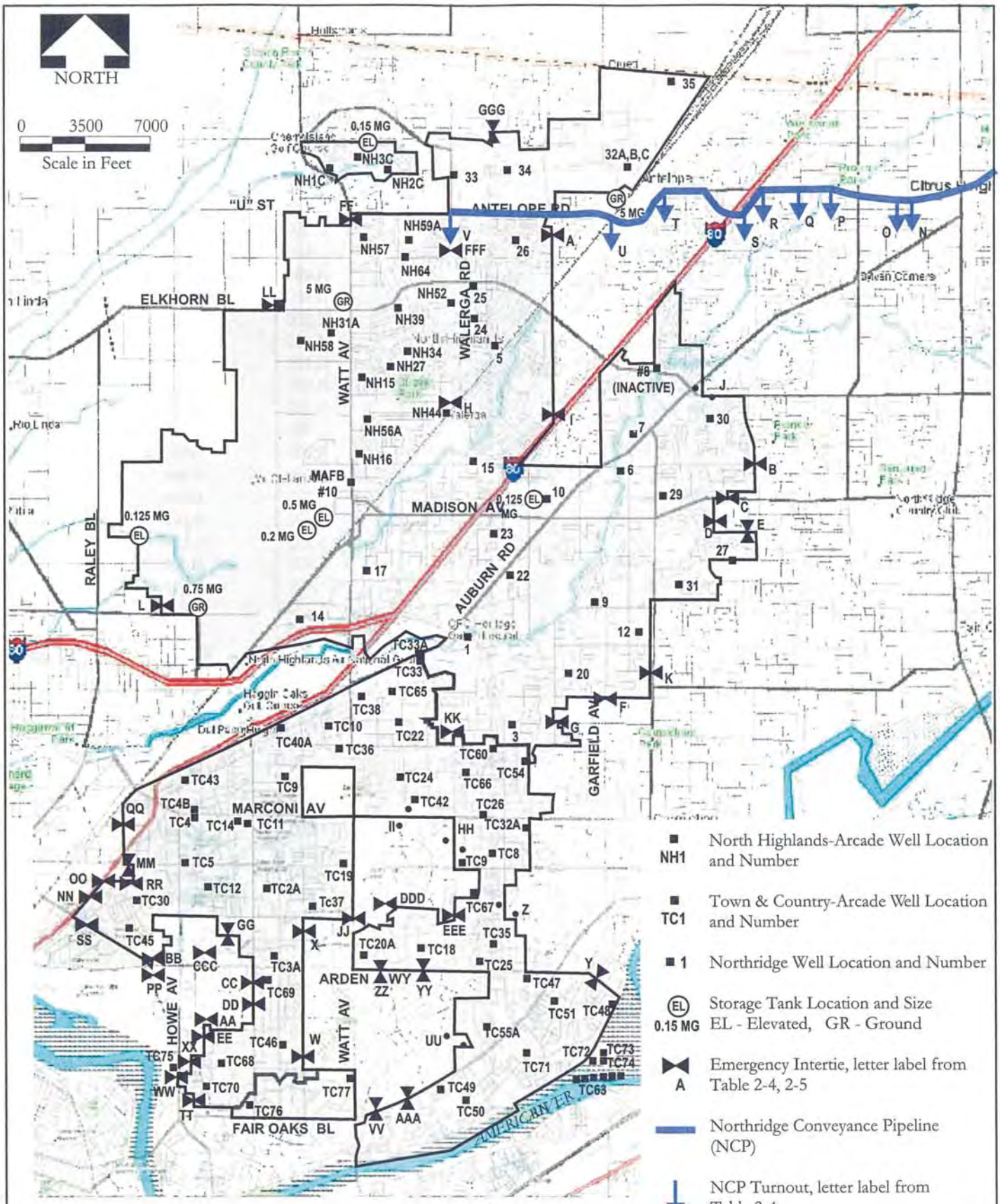
The District has a total of 91 active wells with a combined capacity of 100,677 gallons per minute (gpm). All of the wells pump directly into the distribution system. The NSA contains 41 active wells with a combined capacity of 48,725 gpm. Within the SSA there are 50 active wells with a combined capacity of 51,952 gpm. The groundwater production system is designed to provide 100 percent of the system demand.

Tables 2-2 and 2-3 summarize the capacity and characteristics of the active and inactive wells in the District. The term "active" is used to refer to wells that are fully operational and used for water supply within the District. The term "inactive" is used to refer to wells that are not currently operational and cannot contribute to the District supply without some type of additional maintenance, upgrade, or treatment prior to use.

2.3.2 Surface Water Facilities

Surface water from PCWA is used as a conjunctive supply for the NSA to help alleviate the demand on the groundwater aquifer. The surface water is diverted from Folsom Lake and treatment is provided by the Sydney N. Peterson Water Treatment Plant (WTP). The Peterson WTP is owned and operated by San Juan Water District. The San Juan Water District also supplies treated surface water from Folsom Reservoir for a family of water entities (San Juan Water District, Orange Vale Water Company, Citrus Heights Water District, City of Folsom, and Fair Oaks Water District).

The Peterson WTP has a nominal capacity of 120 million gallons per day (MGD) and transports the treated water to the Hinkle Reservoir, which has 62 million gallons (MG) of storage capacity. From the Hinkle Reservoir, the potable surface water supply for the District is delivered by gravity flow through the San Juan Cooperative Transmission Pipeline followed by the Northridge Conveyance Pipeline.



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BROWN AND CALDWELL	PROJECT 128007-001	SITE	**2005 Urban Water Management Plan Sacramento Suburban Water District**	Figure **2-3**
	DATE 8-4-05	TITLE	**Key Water System Facilities**	

Table 2-2. North Service Area Wells

Well no.	Well name	Normal flow[a] gpm	Operating status
1C	Capehart Well	800	Active
2C	Capehart Well	800	Active
3C	Capehart Well	800	Active
1	Evergreen Well	840	Active
3	Engle Well	1,080	Active
5	Hillsdale Well	1,100	Active
6	Palm Well	1,200	Active
7	Rosebud Well	1,300	Active
8	Field Well	1,100	Active
9	Cameron Well	1,240	Active
10	Walnut Well	1,130	Active
12	St. Johns Well	760	Active
14	Orange Grove Well	1,330	Active
15	Cabana Well	920	Active
17	Oakdale Well	1,120	Active
20	Cypress Well	1,300	Active
21	Yucca	No pump	Inactive
22	River College Well	1,100	Active
23	Freeway Well	1,100	Active
24	Don Julio Well	1,110	Active
25	Sutter Well	1,900	Active
26	Monument Well	800	Inactive
27	Jamestown Well	1,150	Active
29	Merrihill Well	1,080	Active
30	Park Oaks Well	1,060	Active
31	Barrett Meadows	1,100	Active
32A	Poker Lane (center)	770	Active
32B	Poker Lane (east)	1,300	Active
32C	Poker Lane (west)	2,500	Active
33	Walgera Well	1,200	Active
34	Cottage	2,370	Active
35	Antelope North Well	2,250	Active
10	MAFB	800	Active
NH 27	Melrose/Channing	720	Active
NH 31A	Watt/Elkhorn	1,460	Active
NH 34	La Cienega/Melrose	525	Active
NH 39	Thomas/Elkhorn	580	Active
NH 44	Gilman/SMUD Station	700	Active
NH 52	Weddigen/Gothberg	845	Active
NH 56A	Fairbain/Karl	2,500	Active
NH 57	Larchmont/Watt	590	Inactive
NH 58	32nd/Elkhorn	555	Active
NH 59A	Bainbridge/Holmes	2,500	Active
NH 64	Galbrath/Antelope Woods	730	Active
	Total estimated well supply	50,115	--
	Total active well supply	48,725	--

[a]Pumping capacity with current equipment under average operating pressure. The capacities are higher under lower pressures and/or different pumps

Table 2-3. South Service Area Wells

Well no.	Well name	Normal flow[a], gpm	Operating status
TC 2A	El Prado/Park Estates	910	Active
TC 3A	Kubel/Armstrong	405	Active
TC 4B	Bell/Marconi	2,050	Active
TC 5	Bell/El Camino	275	Active
TC 7	Rubicon/Seely Park	190	Active
TC 9	Ravenwood/Eastern	660	Active
TC 10	Potter/East Country Club	No pump	Inactive
TC 11	El Sutton/Marconi	115	Active
TC 12	Hernando/Sanita Anita Park	550	Active
TC 13	Calderwood/Marconi	670	Active
TC 14	Marconi South/Fulton	691	Active
TC 18	Riding Club/Ladino	760	Active.
TC 19	Balmoral/Yorktown	795	Active
TC 20A	Watt/Arden	940	Active
TC 22	West/Becerra	635	Active
TC 23	Marconi North/Fulton PO	560	Active
TC 24	Becerra/Woodcrest	540	Active
TC 25	Thor/Mercury	625	Active
TC 26	Greenwood/Marconi	525	Active
TC 28	Red Robin/Darwin	535	Active
TC 30	Rockbridge/Bowling Green	810	Active
TC 32A	Eden/Root	2,500	Active
TC 33A	Auburn/Norris	2,500	Active
TC 35	Ulysses/Mercury	915	Active
TC 37	Morse/Cottage Park	700	Active
TC 38	Watt/Auburn	1,000	Active
TC 40	Auburn Yard	700	Active
TC 40A	Auburn/Yard	2,500	Active
TC 41	Albatross/Iris	385	Active
TC 42	Becerra/Marconi	250	Active
TC 43	Edison/Truasx	750	Active
TC 45	Jamestown/Middleberry	756	Active
TC 46	Jonas/Sierra Mills	905	Active
TC 47	Copenhagen/Arden	1,015	Active
TC 48	Arden/William Pond	230	Inactive
TC 50	Columbia/Fair Oaks	515	Active
TC 51	Sudbury/Elsdon	285	Active
TC 54	North/Root	930	Active
TC 55A	Stewart/Lynndale	2,000	Active
TC 60	Whitney/Concetta	425	Active
TC 65	Merrily/Annadale	850	Active
TC 66	Eastern/Woodside Church	1,175	Active
TC 68	Northrop/Dornajo	1,940	Active
TC 69	Hilldale/Cooper	560	Active
TC 70	Sierra/Blackmer	765	Active
TC 71	River Drive/Jacob	2,500	Active
TC 72	River Walk/NETP	2,500	Active
TC 73	River Walk/NETP East	3,500	Active

Table 2-3. South Service Area Wells (continued)

Well no.	Well name	Normal flow[a], gpm	Operating status
TC 74	River Walk/NETP South	2,500	Active
TC 75	Enterprise/Northrop	2,500	Active
TC 76[b]	Fulton/Fair Oaks	440	Active
TC 77[b]	Larch/Northrop	450	Active
	Total estimated well water supply	52,182	--
	Total well water supply	51,952	--

[a]Pump capacity with current equipment under average operating pressure. The capacities are higher under lower pressures and/or different pumps. Where available, flow information is provided from the most recent pump testing performed by Sacramento Municipal Utility District (SMUD). Where SMUD pump test data is not available, the flow data provided is either design capacity of the pump or is the capacity observed by District field staff.
[b]Formerly part of the Sierra Oaks system. (Purchased from Citizens Utilities Company of California in 2000.)

The 48-inch diameter, gravity flow Northridge Conveyance Pipeline (NCP) is constructed from the terminus of the San Juan Cooperative Transmission Pipeline at C-Bar-C Park, which is located on Oak Avenue, east of Sunrise Boulevard within the Citrus Heights Water District service area. The District owns the total pipeline capacity of 59.2 mgd in the NCP and that same quantity of flow in the San Juan Cooperative Transmission Pipeline. The surface water facilities are illustrated on Figure 2-1.

Beginning in 2006, the District will receive surface water from the City of Sacramento (City) for use in the SSA. The surface water will be diverted from the American River and treated at the City's Fairbairn WTP. The District will receive up to 20 MGD of surface water from the City at an existing interconnection located near the intersection of Enterprise Drive and Northrop Avenue in the SSA.

2.4 Distribution System

This section discusses the District's distribution system, including storage, pump stations, and interconnections. The District has three pump stations, seven storage tanks with a total storage capacity 11.7 MG, and 61 interconnections. The entire distribution system consists of approximately 670 miles of pipe. Detailed descriptions of the District's service areas are provided below.

2.4.1 North Service Area Distribution System

The NSA distribution system consists of two pressure zones, seven storage facilities and pumping stations, the piping system, and interconnections. The distribution system ranges in size from 48-inch mains down to 4-inch laterals. Pipeline material consists of asbestos cement, PVC, ductile iron, mortar lined coated steel, and cast iron pipe. The District's standards include the requirement for gridding cross connecting mains at intervals of approximately 1,300 feet with a minimum size of 12-inch. Exceptions have been made where 10-inch mains and larger exist in the grid pattern.

A five MG storage tank and booster pumping station, located at the Antelope reservoir site, stores both groundwater from nearby wells and treated water from the Peterson WTP to meet peak hour

demands and fire flows. The maximum reliable pumping capacity from the Antelope reservoir is approximately 10,000 gpm. Another 5 MG capacity ground water storage reservoir and 10,000 gpm booster pump station is located near the intersection of Watt Avenue and Elkhorn Boulevard in the North Highlands area. There is also a 150,000 gallon elevated storage tank located in the Capehart area. One 125,000 gallon elevated storage tank is located in the District yard on Walnut Avenue. Two elevated storage tanks totaling 550,000 gallons and one 750,000 gallon ground storage tank are located in the former McClellan AFB area. The reservoir storage and pump station capacities are summarized in Table 2-4 and depicted on Figure 2-3.

Table 2-4. North Service Area Storage and Pump Stations

Name	Volume, MG	Pump station capacity, GPM
Antelope ground reservoir	5.000	10,000
Capehart elevated reservoir	0.150	--[a]
NSA Yard	0.125	--[a]
MCCBP elevated reservoir	0.150	--[a]
MCCBP elevated reservoir	0.500	--[a]
MCCBP ground reservoir	0.750	--[a]
Elkhorn/Watt ground reservoir	5.000	10,000
Total	11.675	20,000

[a] Not applicable.

There are five turnouts off of the NCP. There are also nineteen emergency interties along the District boundary into the NSA. The NCP interconnections are listed in Table 2-5 and depicted on Figure 2-3. Detailed information for the District's interties is provided in Appendix C.

Table 2-5. North Service Area Interconnections

Letter label for Figure 2-3	Interconnected agency	Size, in.	Remarks
A	California American Water Co.	10	Emergency intertie
B	California American Water Co.	8	Emergency intertie
C	Citrus Heights Water District	6	Emergency intertie
D	Citrus Heights Water District	12	Emergency intertie
E	Citrus Heights Water District	6	Emergency intertie
F	Carmichael Water District	12	Emergency intertie
G	Carmichael Water District	8	Emergency intertie
H	South Service Area	8	Emergency intertie
I	California American Water Co.	6	Emergency intertie
J	California American Water Co.	6	Emergency intertie
K	Carmichael Water District	18	Emergency intertie
L	City of Sacramento	24	Emergency intertie
N	Citrus Heights Water District	18	NCP[a] turnout
O	Carmichael Water District	30	NCP[a] turnout
P	Citrus Heights Water District	24	NCP[a] turnout
Q	California American Water Co.	12	Emergency intertie
R	Citrus Heights Water District	12	NCP[a] turnout
S	California American Water Co.	16	NCP[a] turnout
T	California American Water Co.	20	Emergency intertie

Table 2-5. North Service Area Interconnections (continued)

Letter label for Figure 2-3	Interconnected agency	Size, in.	Remarks
U	California American Water Co.	18	Emergency intertie
V	California American Water Co.	12	Emergency intertie
KK	South Service Area	8	Emergency intertie
LL	South Service Area	6	Emergency intertie
FFF	South Service Area	24	Emergency intertie
GGG	California American Water Co.	12	Emergency intertie

[a] Northridge Conveyance Pipeline (NCP)

2.4.2 South Service Area Distribution System

The SSA consists of a single pressure zone and a 5 MG capacity ground water storage reservoir and pump station under construction near the intersection of Enterprise Drive and Northrop Avenue. Construction of the reservoir and pump station is scheduled to be completed in May 2006. The distribution piping ranges in size from 30-inches down to 4-inches. In addition there is a 2-inch line with five services in Swanson Estates. The reservoir storage and pump station capacity is summarized in Table 2-6 and depicted on Figure 2-3.

Table 2-6. South Service Area Storage and Pump Stations

Name	Volume, MG	Pump station capacity, GPM
Enterprise/Northrop ground reservoir	5.0	13,900[a]

[a] Under construction, operational mid 2006

The SSA has two open interconnections between the City of Sacramento. There are also 34 emergency interties along the SSA boundary into neighboring service areas. The SSA interconnections are listed in Table 2-7 and depicted on Figure 2-3. Detailed information for the District's interties is provided in Appendix C.

Table 2-7. South Service Area Interconnections

Letter label for Figure 2-3	Interconnected agency	Size, in	Remarks
H	Northridge Service Area	8	Emergency intertie
W	Arden Cordova Water Service	6	Emergency intertie
X	Arden Cordova Water Service	8	Emergency intertie
Y	Carmichael Water District	6	Emergency intertie
Z	Carmichael Water District	12	Emergency intertie
AA	California American Water Company	6	Emergency intertie
BB	California American Water Company	8	Emergency intertie
CC	California American Water Company	8	Emergency intertie
DD	California American Water Company	4	Emergency intertie
EE	California American Water Company	12	Emergency intertie
FF	California American Water Company	8	Emergency intertie
GG	California American Water Company	8	Emergency intertie
HH	Del Paso Manor Water District	6	Emergency intertie

Table 2-7. South Service Area Interconnections (continued)

Letter label for Figure 2-3	Interconnected agency	Size, in	Remarks
II	Del Paso Manor Water District	10	Emergency intertie
JJ	Del Paso Manor Water District	8	Emergency intertie
KK	North Service Area	8	Open
LL	North Service Area	6	Emergency intertie
MM	Rio Linda Water District	8	Emergency intertie
NN	City of Sacramento	6	Emergency intertie
OO	City of Sacramento	6	Emergency intertie
PP	City of Sacramento	8	Emergency intertie
QQ	City of Sacramento	8	Emergency intertie
RR	City of Sacramento	6	Emergency intertie
SS	City of Sacramento	6	Emergency intertie
TT	City of Sacramento	8	Open
UU	Sacramento County	8	Emergency intertie
VV	Sacramento County	4	Emergency intertie
WW	Sacramento County	8	Emergency intertie
XX	Sacramento County	6	Emergency intertie
YY	Sacramento County	8	Emergency intertie
ZZ	Sacramento County	10	Emergency intertie
AAA	Sacramento County	10	Emergency intertie
BBB	Sacramento County	10	Emergency intertie
CCC	California American Water Company	12	Emergency intertie
DDD	Del Paso Manor Water District	12	Emergency intertie
EEE	Del Paso Manor Water District	12	Emergency intertie

CHAPTER 3
HISTORICAL AND PROJECTED WATER USE

Water demand projections along with fireflow requirements provide the basis for sizing and staging future water facilities. Water use and production records, combined with projections of population, employment, and urban development, provide the basis for estimating future water supply requirements. This chapter presents an analysis of available demographic and water use data, customer connections, historical groundwater and surface water production, unit water use, and the resulting projections for future water supply needs for the District.

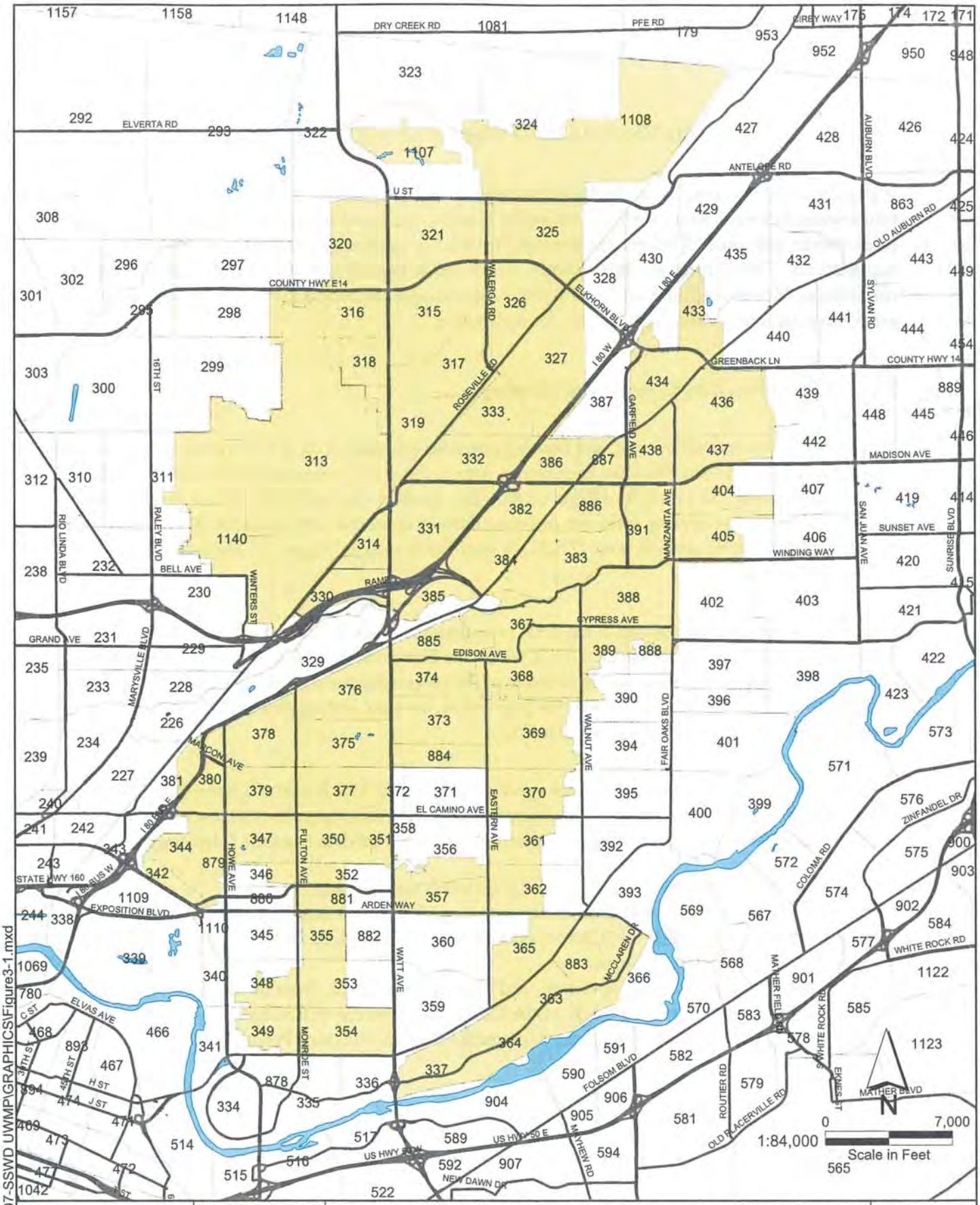
3.1 Population, Employment, and Housing

Projected population, employment, and housing estimates (dwelling units (DU)) for the District service area are based on estimates from the Sacramento Area Council of Governments (SACOG). Made in five-year increments, the projections begin in 2005 and extend to the year 2025. These demographic projections are used to develop estimates of future District water use. Projected SACOG demographic data presented by traffic analysis zone (TAZ) are used for this study. Figure 3-1 shows the TAZs within the District.

The District boundaries do not fall along TAZ boundaries in all cases. As a result, an estimate was made regarding how much of a given TAZ is within the District service area. Appendix D contains a list of the TAZs and the corresponding estimate of the proportional amount of each TAZ within the District. In most cases it is assumed that the population, housing, and employees within a TAZ are distributed uniformly within all parts of that TAZ.

SACOG projections used in this Plan were approved by the SACOG Board of Directors in December 2004. SACOG's projections are based on current growth data and region-level near-term projections that have been published recently. These projections are based on data from the following sources:

- The U.S. Census Bureau's 2000 census of population and housing
- Annual housing and population estimates for years 2000-2004 from the California State Department of Finance (DOF), Demographic Research Unit (DRU)
- InfoUSA 2004 employment data
- Projections of employment, population, and households to 2012, from the 2004 annual report of the Center for the Continuing Study of the California Economy (CCSCE)
- Current General Plan data used in the Sacramento Region Blueprint Project



P:\28000\128007-SSWD UWMP\GRAPHICS\Figure3-1.mxd

BROWN AND CALDWELL	PROJECT 128007-001	SITE **2005 Urban Water Management Plan Sacramento Suburban Water District**	Figure 3-1
	DATE 8-4-05	TITLE **Traffic Analysis Zones Within the District**	

The demographic projections in the District's 2003 UWMP were based on SACOG's 2001 demographic projections. SACOG updated their 2001 projections in December 2004. The previous 2001 projections were based on data from SACOG's housing inventory data, and from the 1990 census. For the population and household projections, the new baseline starts with household characteristics, the number of persons, and their spatial location as recorded in the 2000 Census. In consultation with the planning staff of SACOG's member jurisdictions, all available official planning documents were used to estimate the location and amount of growth through 2005. For employment, the 2004 estimates from InfoUSA were the primary source, (SACOG, 2004).

Some differences in the demographic projections in this Plan compared to the 2003 Plan are that the persons per household (PPH) are down considerably. According to SACOG, the census 2000 shows a continued decline in household size due to a variety of social and economic factors. The PPH is not geographically homogenous since it includes housing type and other important socio-economic variables.

The year 2000 population according to the year 2000 census is 168,118. This population is expected to reach 173,399 in 2025. A summary of the historic and projected population, housing, and employment within the District based on SACOG data is presented in Table 3-1. The total population, housing, and employment for the entire District are also illustrated on Figure 3-2.

Table 3-1. Population, Housing, and Employment Estimates

Year	Population	Dwelling units	Employees
1990	153,200	66,586	66,936
1997	161,528	70,556	66,403
1999	168,467	70,358	65,894
2000	168,118	71,964	66,378
2005	167,580	67,193	81,161
2010	169,963	66,986	85,548
2015	169,677	68,892	85,695
2020	171,677	70,874	84,062
2025	173,779	76,721	82,104

Note: 1990 through 1999 based on SACOG projections from 1990 census. 2000 based on 2000 census. 2005 through 2025 based on SACOG projections from 2000 census. As the table indicates there is a drop in population and dwelling units in the two data sets. Methodology to determine SACOG data within District service area differs for 1990-2000 and 2005-2025 and may result in slightly differing demographic results.

From 1990 to 2000, the District population increased 9.7 percent, which is a growth rate of approximately 0.9 percent per year. By 2025, population is expected to increase by 3.1 percent, from 168,118 in 2000 to 173,779 in 2025, which is a 0.1 percent growth rate per year. Employment is expected to grow 24 percent during the same period, which equates to an annual employment growth rate of 0.9 percent.

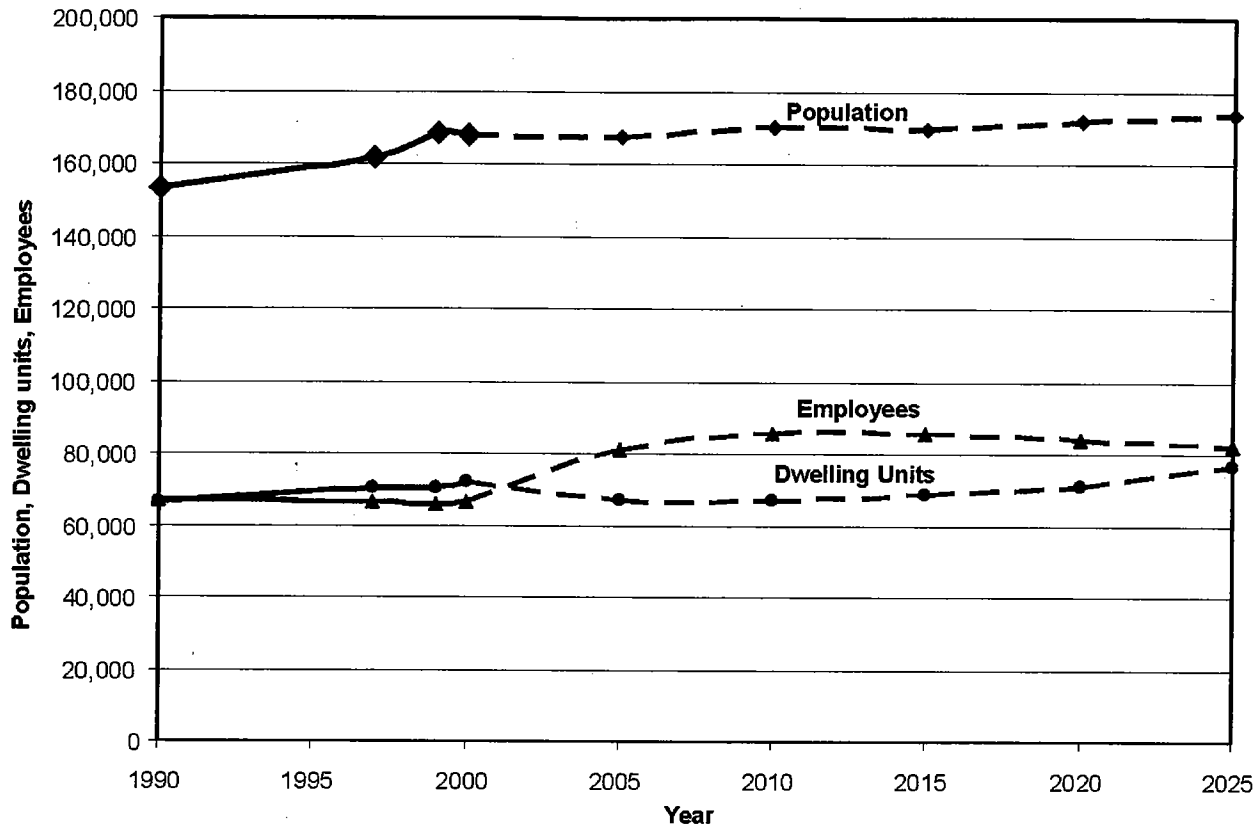


Figure 3-2. Sacramento Suburban Water District Historical and Projected Population, Housing, and Employment

SACOG is in the process of completing their Blueprint Project. This Blueprint Project consists of four scenarios of regional growth and development through the year 2050. These scenarios approach meeting housing and employment needs for the projected 2050 regional population in four different ways. Two of SACOG's Blueprint Project growth scenarios are Scenario A, also known as Basecase, and Scenario C, which was developed into what is referred to as the Preferred scenario. Scenario A, Basecase, represents how the region might look and function in 2050 if development trends from the late 1990's and early part of this century was to continue. This Scenario A, Basecase, was developed by SACOG planning staff, with review by local government planners.

SACOG's Preferred smart growth scenario is based on feedback and discussions with local governments and interested citizens in a series of planning workshops conducted by SACOG throughout the region. The planning theme for this growth projection is slightly higher housing densities compared to current development, mix of land uses, and directing population growth to "inner ring" areas. This type of development actually results in slightly higher population and employment projections versus the Basecase projections. The 2050 population, housing, and employment within the District for SACOG's Blueprint Project Scenario A, Basecase, and the Blueprint Project Preferred scenario are presented in Table 3-2.

Table 3-2. SACOG Blueprint Project 2050 Demographic Projects within Sacramento Suburban Water District Service Area

Blueprint scenario	Population	Dwelling units	Employees
Basecase	162,449	70,630	95,290
Preferred	206,949	89,978	120,805

Note: SACOG projects buildout to occur in 2050. However, it is estimated that buildout may occur sooner in some areas.

Past and current District connections by customer type are displayed in Table 3-3. There are two categories for single family connections: unmetered (flat-rate) single family and metered single family. All other connections (including commercial and multi-family residential) are currently metered.

Table 3-3. Connections by Customer Classification

	Historical connections			Projected connections[e]				
Customer Classifications	1999[a]	2002[b]	2004[c]	2005[c,d]	2010	2015	2020	2025
Single-family								
Unmetered	36,583	31,609	25,231	26,351	19,761	13,171	6,581	0
Metered	3,179	9,994	10,358	10,574	20,381	27,810	35,034	43,876
Multi-family	2,318	2,000	3,268	3,803	3,613	3,690	3,750	3,959
Commercial	1,705	1,830	4,099	2,223	3,813	3,894	3,958	4,178
Industrial	1	57	242	0	0	0	0	0
Institutional	176	77[d]	59	452	413	422	429	453
Landscape irrigation	161	43	96	150	135	138	140	148
Total	44,123	45,610	43,352	43,558	45,595	46,567	47,322	49,957

Note: Multi-family, commercial, industrial, institutional, and landscape irrigation accounts are all metered. The connections shown are total District connections. This is greater than the number of billable connections.

[a] Source: Northridge Water District 2000 UWMP (Brown and Caldwell, 2000), Arcade Water District 2000 UWMP (Brown and Caldwell, 2000)

[b] Source: SSWD 2003 UWMP (Brown and Caldwell, 2003)

[c] Source: SSWD staff

[d] The District is in the process of reclassifying the customer account categories. This results in varying customer account data from 2004 to 2005.

[e] Projected customers estimated based on projected demands and current water use characteristics by customer category

3.2 Historical Water Use

Records of historical water production obtained from the District serve as the basis for developing unit water demands for the District. Water production is the volume of water measured at the source, which includes all water delivered to residential, commercial, and public authority customers, as well as unaccounted-for water.

3.2.1 Annual Water Production and Average Daily Demand

Table 3-4 shows the breakdown between surface and groundwater production for the District from 1990 to 2004. Total water production in 2004 was 47,780 acre-feet (ac-ft). Table 3-5 presents historical annual water use from 1975 to 2004.

Table 3-4. Historical Surface and Groundwater Production Breakdown, ac-ft/yr

Year	Surface water	Groundwater	Surface water/total supply (%)	Total supply
1990	1,795	40,892	4	42,687
1991	1,386	37,019	4	38,405
1992	3,068	36,697	8	39,765
1993	3,236	36,252	8	39,488
1994	1,855	40,837	4	42,692
1995	2,455	38,806	6	41,261
1996	2,217	40,904	5	43,121
1997	1,425	42,481	3	43,906
1998	12,145	28,040	30	40,185
1999	8,573	37,252	19	45,825
2000	14,988	32,257	32	47,245
2001	14,447	34,932	29	49,379
2002	16,931	31,676	35	48,607
2003	15,072	30,316	33	45,388
2004	15,418	32,364	32	47,782

Table 3-5. Historical Water Production

Year	Annual average production	
	ac-ft/yr	mgd
1975	33,564	30.0
1976	36,607	32.7
1977	27,661	24.7
1978	32,245	28.8
1979	34,096	30.5
1980	35,191	31.4
1981	36,851	32.7
1982	34,177	30.5
1983	35,703	31.8
1984	42,217	37.7
1985	40,595	36.3
1986	40,144	35.8
1987	45,121	40.3
1988	44,997	40.2
1989	42,368	37.8
1990	42,687	38.1
1991	38,405	34.3
1992	39,765	35.6
1993	39,488	35.3

Table 3-5. Historical Water Production (continued)

Year	Annual average production	
	ac-ft/yr	mgd
1994	42,692	38.1
1995	41,261	36.9
1996	43,121	38.5
1997	43,906	39.2
1998	40,185	35.9
1999	45,825	40.9
2000	47,245	42.2
2001	49,379	44.1
2002	48,607	43.4
2003	45,388	40.5
2004	47,780	42.7

Past and current water use by customer sector is provided in Table 3-6. Additional water uses and losses are also shown. These additional water uses include unaccounted-for water and water sales to other agencies.

Table 3-6. Past and Current Water Use by Customer Category and Additional Water Uses and Losses, ac-ft/yr

Water use category	2000	2004
Single-family		
Unmetered	--[a]	7,800
Metered	--[a]	17,000
Multi-family	--[a]	5,050
Commercial	--[a]	12,000
Industrial	--[a]	800
Institutional	--[a]	140
Landscape irrigation	--[a]	95
Water sales-Sacramento County Water Agency	0	117
Saline barriers	0	0
Groundwater recharge	0	0
Conjunctive use	0	0
Raw water	0	0
Recycled	0	0
Unaccounted-for water	4,725	4,778
Total	47,245	47,780

Note: Except for single-family unmetered customers and unaccounted-for water, all other District water uses are metered

[a] Data for water use by customer category not available for the year 2000.

3.2.2 Unaccounted-for Water

Unaccounted-for water use is unmetered water use such as for fire protection and training, system and street flushing, sewer cleaning, construction, system leaks, and unauthorized connections. Unaccounted-for water can also result from meter inaccuracies. Since the District is not completely metered, data are unavailable for determining the percent of unaccounted-for water. Unaccounted-for water is assumed for this study to be approximately 10 percent of total water production.

3.3 Unit Water Use

Unit water use factors are developed to estimate future water needs based on the housing and employment projections discussed previously. There are two main categories of water users used to estimate future water needs, residential and nonresidential. Residential future water needs are determined using the projections for dwelling units within the District, coupled with a unit water use factor per dwelling unit. Nonresidential future water needs are determined using the projections for employment within the District, coupled with a unit water use factor per employee. Studies show there is a good correlation between nonresidential water use and number of employees (California Urban Water Agencies, 1992).

The unit water use factors, as seen in Table 3-7, are established by comparing year 2004 residential metered water use with metered accounts. The per dwelling unit water use factor is 485 gpd/DU. This is based on a weighted average of the single family per dwelling unit water use and the multi family per dwelling unit water use. The unit water use for single family accounts is estimated to be 680 gpd/DU. This is based on metered water usage for metered single family accounts in 2004. The unit water use for multi family DUs is estimated to be 190 gpd/DU. This is based on 2004 multi family connections, estimated number of dwelling units per connection, and 2004 water use. Estimated number of employees within the district were compared to 2004 commercial, institutional, and industrial water use to determine a per employee water use factor. For this analysis it is assumed that 2004 was a normal water year. These factors do not take into account future water conservation within the District. These unit water use factors are based on water sales and do not include unaccounted-for water.

Table 3-7. Unit Water Use Factors

Classification	Unit water use factor
Residential	485 gpd[a]/DU
Non-residential	117 gpd[a]/employee

Note: Factors do not include unaccounted-for water.
[a]Gallons per day

3.4 Projected Water Demands By Water Year Type

This section presents the projected water demands for three water year scenarios: normal year, single

dry year, and multiple dry year. The demands for all water year scenarios are projected through 2025.

3.4.1 Projected Normal-Year Water Demands

Normal-year water demands through the year 2025 are estimated based on the unit water use factors (see Table 3-7) and the housing and employment projections (see Table 3-1). These water demand projections are shown in Table 3-8 and are illustrated on Figure 3-3. The projected demand breakdown by customer category is based on the year 2004 demand breakdown by customer category. Also shown is the projected water demand from the Sacramento County Water Agency's Arden Park Water System. Sacramento County Water Agency sales are estimated to be 40 mg (123 ac-ft/yr) for 2005. Since the Sacramento County Water Agency Arden Park system is near buildout it is estimated that this demand will remain the same through 2025. The District is in negotiations with Rio LindaWater District and Del Paso Manor Water District to provide wholesale water in the future. The amount of water that would be transferred to Rio Linda Water District and Del Paso Manor Water District has not yet been determined. By 2025, water demands are expected to increase by 15 percent, from 44.9 million gallons per day (mgd) (50,131 ac-ft/yr) in 2004 to 51.7 mgd (57,862 ac-ft/yr) in 2025. Impacts to water use due to any conservation measures implemented in the future are not reflected in the projected water demands.

In summary, from 1990 to 2004, District water demands fluctuated, with an overall increase of 18 percent, which is a growth rate of approximately 1.2 percent per year. Annual average demands are expected to increase at an approximate rate of 0.7 percent per year from 2004 to 2025. The projected rate of growth in water use is less than what has historically occurred. This flattening of water demand is considered normal for an area as it reaches build-out conditions.

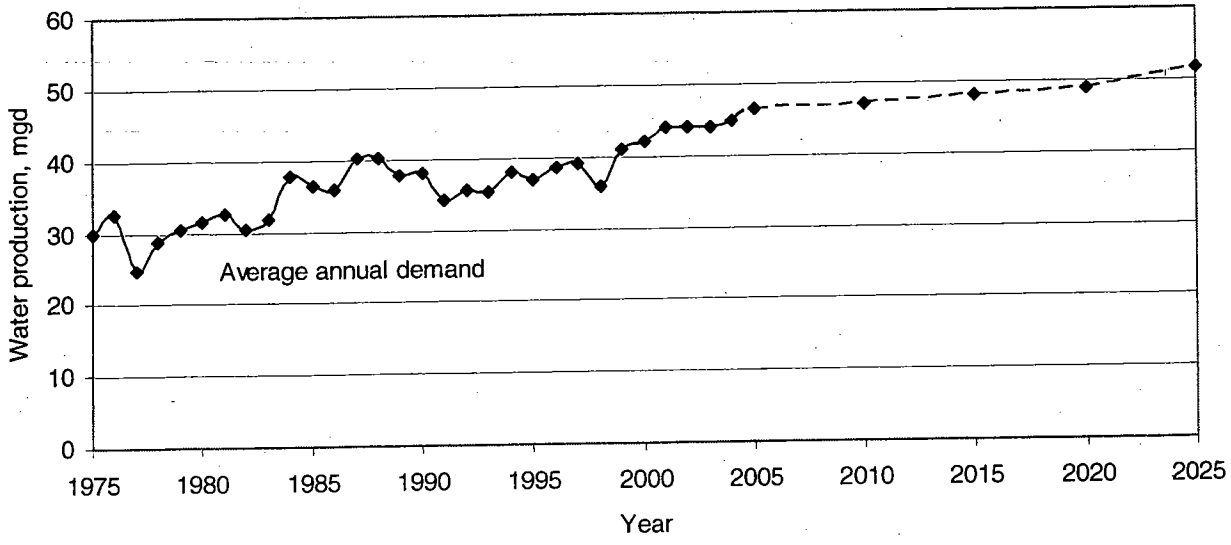


Figure 3-3. Historical and Projected Water Demand

Table 3-8. Projected Normal Year Water Demands by Customer Category and Additional Water Uses and Losses, ac-ft/yr

Water use category	2005	2010	2015	2020	2025
Single-family					
Unmetered	20,085	15,018	10,010	5,002	0
Metered	8,244	13,589	19,232	24,758	31,522
Multi family	5,468	5,522	5,644	5,744	6,083
Commercial	11,219	11,329	11,580	11,785	12,480
Industrial	-	-	-	-	-
Institutional	1,504	1,518	1,552	1,580	1,673
Landscape irrigation	146	148	151	154	163
Water sales[b]-Sacramento County Water Agency (Arden Park Water System)[c]	123	123	123	123	123
Saline barriers	-	0	0	0	0
Groundwater recharge	-	0	0	0	0
Conjunctive use	-	0	0	0	0
Raw water	-	0	0	0	0
Recycled	-	0	0	0	0
Unaccounted-for water[a]	5,238	5,289	5,406	5,502	5,826
Total annual average	46.5 mgd 52,027	52,536	53,697	54,647	57,869
Percent of year 2005	100%	101%	103%	105%	111%

Note: Water savings from future water conservation is not included in demand projections.

[a] Unaccounted-for water assumed to be 10% of total water production.

[b] The District is in negotiations with Rio Linda/Del Paso Manor to provide wholesale water in the future. The amount of water that would be transferred to Rio Linda/Del Paso Manor has not yet been determined.

[c] Sacramento County Water Agency sales are estimated to be 40 mg (123 ac-ft/yr) for 2005. Since the Sacramento County Water Agency Arden Park system is near buildout It is estimated that this demand will remain the same through 2025.

Total projected normal year water demands calculated in this plan are compared in Table 3-9 with demands projected in the previous Plan, Water Forum Proposal, and the Regional Water Master Plan. The demand projections in this report are higher than the demand projections in the last plan, the Water Forum Proposal, and the Regional Water Master Plan. Differences between demand projections may occur due to differing methodology and assumptions used in the calculation of demand projections. Differences may also occur due to updates in demographic projections based on the year 2000 census.

Table 3-9. Comparison of Projected District Demands, ac-ft/yr

Year	2003 Plan[a]	This Plan	Based on SACOG Blueprint Preferred scenario	Water Forum Proposal[b]	Regional Water Master Plan[c]
2024	--	--	--	51,539	--
2025	49,165	57,869	--	--	--
2030	--	--	--	50,081	42,695-52,180
2050 (buildout)[d]	--	--	72,023	--	--

[a] Brown and Caldwell. 2003.

[b] Sacramento City-County Office of Metropolitan Water Planning. 1999.

[c] Montgomery Watson. 1999

[d] SACOG projects buildout to occur in 2050. However, it is estimated that buildout may occur sooner in some areas.

3.4.2 Projected Single-Dry Year Water Demands

Water use patterns change during dry years. During dry years some water agencies cannot provide their customers with 100 percent of what they deliver during normal water years. One way to analyze the change in demand is to document expected changes to water demand by sector. Expected changes in demand may include assuming increasing demands due to increased irrigation needs and demand reductions resulting from rationing programs and policies. It is assumed that overall demands will not change during a single dry year. Any demand reductions due to the implementation of the District's water shortage contingency plan are not included in the single dry year demand estimates. Table 3-10 provides a estimate of the projected single-dry year water demands.

Table 3-10. Projected Single Dry Year Water Demands, ac-ft/yr

	2005	2010	2015	2020	2025
Total demand	52,027	52,536	53,697	54,647	57,869
Percent of projected normal[a]	100%	100%	100%	100%	100%

Note: Water savings from future water conservation is not included in demand projections.
[a]Projected normal from Table 3-8.

3.4.3 Projected Multiple-Dry Year Water Demands

This section projects the impact of a multiple dry year period for each 5-year period during the 20-year projection. It is assumed that overall demands will not change during a multiple dry year. Any demand reductions due to the implementation of the District's water shortage contingency plan are not included in the multiple dry year demand estimates. Tables 3-11 through 3-14 provide an estimate of the projected multiple-dry year water demands for each 5-year period.

Table 3-11. Projected Multiple Dry Year Water Demands, ac-ft/yr, Period Ending in 2010

	2006	2007	2008	2009	2010
Total demand	52,129	52,230	52,332	52,434	52,536
Percent of projected normal[a]	100%	100%	100%	100%	100%

Note: Water savings from future water conservation is not included in demand projections.
[a]Projected normal from Table 3-8.

Table 3-12. Projected Multiple Dry Year Water Demands, ac-ft/yr, Period Ending in 2015

	2011	2012	2013	2014	2015
Total demand	52,768	53,000	53,233	53,465	53,697
Percent of projected normal[a]	100%	100%	100%	100%	100%

Note: Water savings from future water conservation is not included in demand projections.
[a]Projected normal from Table 3-8.

Table 3-13. Projected Multiple Dry Year Water Demands, ac-ft/yr, Period Ending in 2020

	2016	2017	2018	2019	2020
Total demand	53,887	54,077	54,267	54,457	54,647
Percent of projected normal[a]	100%	100%	100%	100%	100%

Note: Water savings from future water conservation is not included in demand projections.
[a]Projected normal from Table 3-8.

Table 3-14. Projected Multiple Dry Year Water Demands, ac-ft/yr, Period Ending in 2025

	2021	2022	2023	2024	2025
Total demand	55,290	55,933	56,576	57,219	57,869
Percent of projected normal[a]	100%	100%	100%	100%	100%

Note: Water savings from future water conservation is not included in demand projections.
[a]Projected normal from Table 3-8.

CHAPTER 4
WATER SUPPLIES

The District uses both surface water and groundwater as its supply sources. This section describes the surface and groundwater sources, quantities, supply constraints, and the water quality of the water supply sources. In addition, this section describes current and projected water supplies, water supply reliability and vulnerability, water shortage expectations, and water shortage revenue and expenditure impacts. Recycled water is discussed in Chapter 5 of this Plan.

4.1 Surface Water

This section provides a description of the District's surface water supply as well as the physical and legal constraints of this supply. Currently, the District receives surface water from Folsom Lake via San Juan Water District in the north service area. Beginning in mid-2006, the District will begin receiving surface water from the American River via the City of Sacramento in the south service area.

4.1.1 Description

In 1991, the NSA began using surface water in limited quantities. Surface water use significantly expanded in 1998 with the completion of the Conveyance and Cooperative Transmission Pipeline. Surface water use in lieu of groundwater pumping has increased significantly over the last few years to meet approximately 60 to 70 percent of the NSA demand (30 percent of the District's overall demand). The District continues to use surface water to meet a substantial fraction of its overall water demand. Surface water supplies have included surface water from Placer County Water Agency (PCWA), section 215 Central Valley Project (CVP) water from the United States Bureau of Reclamation (USBR), surplus water from San Juan Water District on an as-available basis, and a short-term transfer from Nevada Irrigation District (NID).

The NSA began receiving surface water from PCWA via PCWA's Middle Fork Project in 2000. The former Northridge Water District and PCWA entered into a take or pay agreement for delivery of up to 29,000 ac-ft of PCWA's water right, per year. The agreement increases from 7,000 ac-ft per year starting in the year 2000 to 29,000 ac-ft per year in 2014. The 29,000 ac-ft per year will be maintained through the twenty-fifth year of the agreement. This water is not available in dry years. The terms of the agreement can be extended by mutual consent of both parties. The Northridge-PCWA contract entitlement schedule is shown in Table 4-1. In addition, the District has an annual Warren Act contract with ongoing negotiations for a long term contract that allows the use of USBR facilities to "wheel" the PCWA water to the District.

Since 1991, the NSA has received a nominal amount of Section 215 USBR CVP water. Section 215 water is surplus or "spillway" water available typically in winter and spring. This water has been treated at the Peterson WTP and delivered for use within the NSA. The District is eligible to purchase this surplus water in average water years.

Table 4-1. Northridge-PCWA Contract Water Entitlement Schedule

Year	Surface water entitlement (ac-ft)
June 1 through December 31, 2000[a]	7,000
2001	11,000
2002	12,000
2003	14,000
2004	16,000
2005	18,000
2006	20,000
2007	22,000
2008	23,000
2009	24,000
2010	25,000
2011	26,000
2012	27,000
2013	28,000
2014 and each year thereafter	29,000

Note: Schedule based on June 1, 2000 amended water contract between PCWA and Northridge Water District. These annual amounts can be increased with the approval of Northridge and PCWA.

[a] Delivery of PCWA water began June 1, 2000 and has been pro-rated to 7,000 ac-ft for the year 2000.

For the SSA, the District has a surface water entitlement of 26,064 acre-feet (ac-ft) per year from the American River through a contract with the City of Sacramento, dating to 1964. Historically, only a portion of this entitlement has been diverted through the American River Well Field located in the SSA. The American River Well Field is not currently being used because it does not meet the requirements of the Surface Water Treatment Rule. Beginning in mid-2006 the District will receive up to 20 mgd (22,400 ac-ft/yr) of this surface water from the City of Sacramento. This water will be treated at the City's Fairbairn WTP and delivered to the District via the City's Howe Avenue Transmission Main to an existing interconnection located near Enterprise Drive and Northrop Way in the SSA, as described in Section 4.7. This is a wholesale supply. The District's agreement with the City of Sacramento is provided in Appendix E. This agreement includes the wholesaler's (City of Sacramento) written water availability to the District. The District has provided a copy of this plan, including the 20-year demand projections and the reliability of wholesale supply, to the wholesaler (City of Sacramento).

4.1.2 Physical Constraints

There are no physical constraints on the current surface water supplies that limit the ability to meet current demands, although the Peterson Water Treatment Plan has limited spare capacity during high demand, summer peak periods. The capacities of the Folsom Dam diversion, Northridge Conveyance Pipeline, and the "backbone" transmission main system in the SSA are sufficient to divert, treat, and convey the current surface water entitlements.

4.1.3 Legal Constraints

Legal constraints on the current surface water entitlements include the Water Forum Agreement and the Hodge Decision. The Water Forum Agreement was developed in an attempt to preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River and in an effort to provide a safe and reliable water supply for the region. The District is a member of the Water Forum and a signatory of the Water Forum Agreement. The District surface water allocation from PCWA will be reduced to zero in dry years, as defined in the Water Forum Agreement.

The Water Forum Agreement diversion restrictions are dependant upon the March through November projected flow into the Folsom Reservoir. The District will be able to divert up to 29,000 ac-ft/yr of PCWA American River water and 26,064 ac-ft/yr of City of Sacramento entitlement American River Water in years when the projected March through November unimpaired inflow into Folsom Reservoir is greater than 950,000 ac-ft for the first 10 years. After the first 10 years the unimpaired inflow into Folsom Reservoir must be greater than 1,500,000 ac-ft. Years during which the unimpaired inflow into the Folsom Reservoir is less than 950,000 ac-ft are considered to be dry years by the Water Forum. In December, January, and February following a March through November period when unimpaired inflow into Folsom Reservoir is less than 950,000 ac-ft, the District will not divert PCWA or City of Sacramento entitlement water.

The Hodge decision can also legally constrain the surface water used by the District if minimum Hodge flows in the Lower American River are not met. Nothing in the Water Forum Agreement is intended to restrict the District's ability to take delivery of Section 215 water from Folsom Reservoir from the USBR whenever it may be possible.

4.2 Groundwater

This section provides a description of the District's groundwater supply as well as the physical and legal constraints of this supply.

4.2.1 Description

Groundwater has been the primary source of water for both the NSA and SSA. The groundwater use in the NSA has significantly declined since 1998 due to the availability of surface water as an alternative supply. Groundwater is currently the sole source of supply for the SSA, although there are plans to again utilize surface water supplies in the future.

The groundwater basin underlying the District is located in the North American Sub-basin which is part of the larger Sacramento Valley Groundwater Basin. According to California's Groundwater Resources Bulletin 118 (DWR, 2001), the North American Sub-basin Basin Number is 5-21.64. The Sacramento Valley Groundwater Basin is not adjudicated.

The water-bearing deposits underlying the District include the Fair Oaks and Mehrten Formations. The Mehrten Formation is the most productive fresh water-bearing unit in the eastern Sacramento Valley; though some of the permeable layers of the Fair Oaks Formation produce moderate amounts of water. The February 27, 2004 draft version of Bulletin 118's groundwater basin description of the North American subbasin identifies the subbasin as being in overdraft.

The Sacramento Groundwater Authority (SGA) adopted its groundwater management plan in December 2003. The District is a participating agency in SGA. The authority to prepare a plan is granted to SGA through the Joint Powers Agreement executed between the County of Sacramento and the cities of Citrus Heights, Folsom, and the City of Sacramento. The plan was prepared in compliance with Water Code Section 10753.7 resulting from the passage of SB 1938 in 2002. A copy of this plan is provided in Appendix F.

The plan establishes a goal, management objectives, and the primary components needed to manage the basin including a plan to eliminate overdraft. These components include:

- Stakeholder Involvement
- Monitoring Program
- Groundwater Resource Protection
- Groundwater Replenishment
- Planning Integration

The estimated average annual sustainable yield recommendation for the North sub-area of the county of Sacramento, as defined by the Water Forum, is 131,000 ac-ft/yr (EDAW/SWRI). October 1999). The District's portion of this yield has not been defined. It is anticipated that in the future the SGA will allocate the total safe yield to the various water supply agencies. There are several methods available to allocate the yield, including using historical groundwater pumping, percentage of demand, and proportion of overlying area. For this report, it is assumed that the District's available groundwater supply is defined based on the size of the District's service area in proportion to the size of the groundwater basin. The District covers an area of approximately 23,000 acres. The North sub-area covers an area of approximately 127,000 acres. Assuming the District's sustainable yield is proportional to land area, the estimated sustainable groundwater yield for the District is 24,000 ac-ft per year.

Wells throughout the District are generally between 200 and 600 feet deep and draw water primarily from the Mehrten. The older, shallower wells typically produce up to 1,000 gallons per minute (gpm). The former Arcade Water District recently installed one new supply well constructed to a depth of 880 feet below ground surface (River Walk/NETP) and two others to approximately 650 feet below ground surface. Some of the newer wells produce up to 2,500 gpm.

Groundwater elevation levels (levels) have been generally declining in Sacramento County for the last 40 years, with many areas declining at a rate of 1.5 to 2.0 feet per year (Montgomery Watson, 1999). A groundwater depression that was evident in 1968 significantly expanded and deepened by 1996, as seen

on the hydrologic cross section depicting the change in water levels on Figure 4-1. Groundwater levels under the NSA have dropped approximately 40 feet from 1968 to 1996. The location of cross-section A-A' is shown on Figure 4-2.

The District has an in lieu pumping recharge program in place. This program involves the importation of surface water to offset groundwater usage. Resulting in the local recovery of groundwater levels throughout the NSA. According to a June, 2002 report prepared by Luhdorff and Scalmanini for the NSA, the District has observed an increase in groundwater elevations of up to 20 feet as a result of its importation of treated surface water. Groundwater levels continue to fluctuate seasonally, as are typically observed, but also appear to have stabilized or slightly increased since 1998. As an example, Figure 4-3 shows the reduction in pumping and the resultant recovery of groundwater levels in the District's Walnut Well (Well 10).

Groundwater elevation levels plotted for selected District wells for the spring and fall months for the years 1992 through 2005 are shown on Figure 4-4. This graph indicates a fairly stable water table for those ten years, due in part to the use of surface water and decreased use of groundwater in the NSA.

DWR monitors several wells in and around the District. The Luhdorff and Scalmanini June 2002 report illustrates several hydrographs from these DWR monitored wells which indicate the dramatic decline in water levels over the last 50 years and the relative stabilization of water levels since the early 1990's. Figure 4-5 shows a hydrograph of water levels from 1955 to 2002 from DWR Well 10N/6E-10C1, which is located approximately two miles north of the NSA.

Water level data for the SSA wells, dating back as far as May of 1940 in one case; indicate a general decline of groundwater levels consistent with the rest of the County.

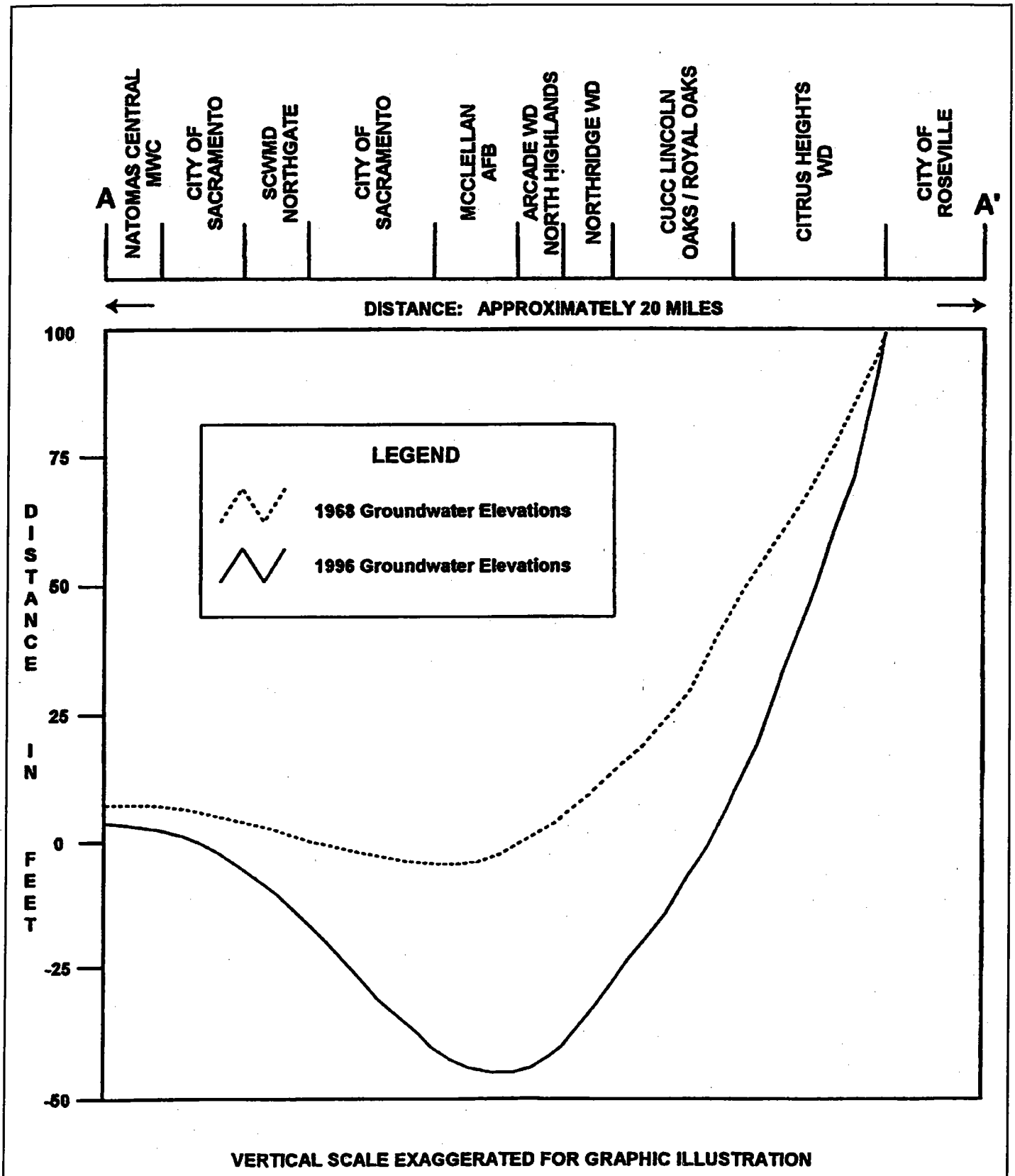
A review of groundwater pumping and groundwater levels over the last five years shows that groundwater supplies are sufficient when supplemented with a surface water supply to meet total demands. This is demonstrated by stabilizing the groundwater levels due to the reduction in groundwater pumping.

4.2.2 Physical Constraints

The physical constraint on the current groundwater supply is the pumping capacity of existing wells. The pumping capacity of the District wells is sufficient to supply the District's total demand.

4.2.3 Legal Constraints

There are no legal constraints that limit groundwater pumping. The District is a stakeholder in the SGA which may result in future groundwater legal constraints.

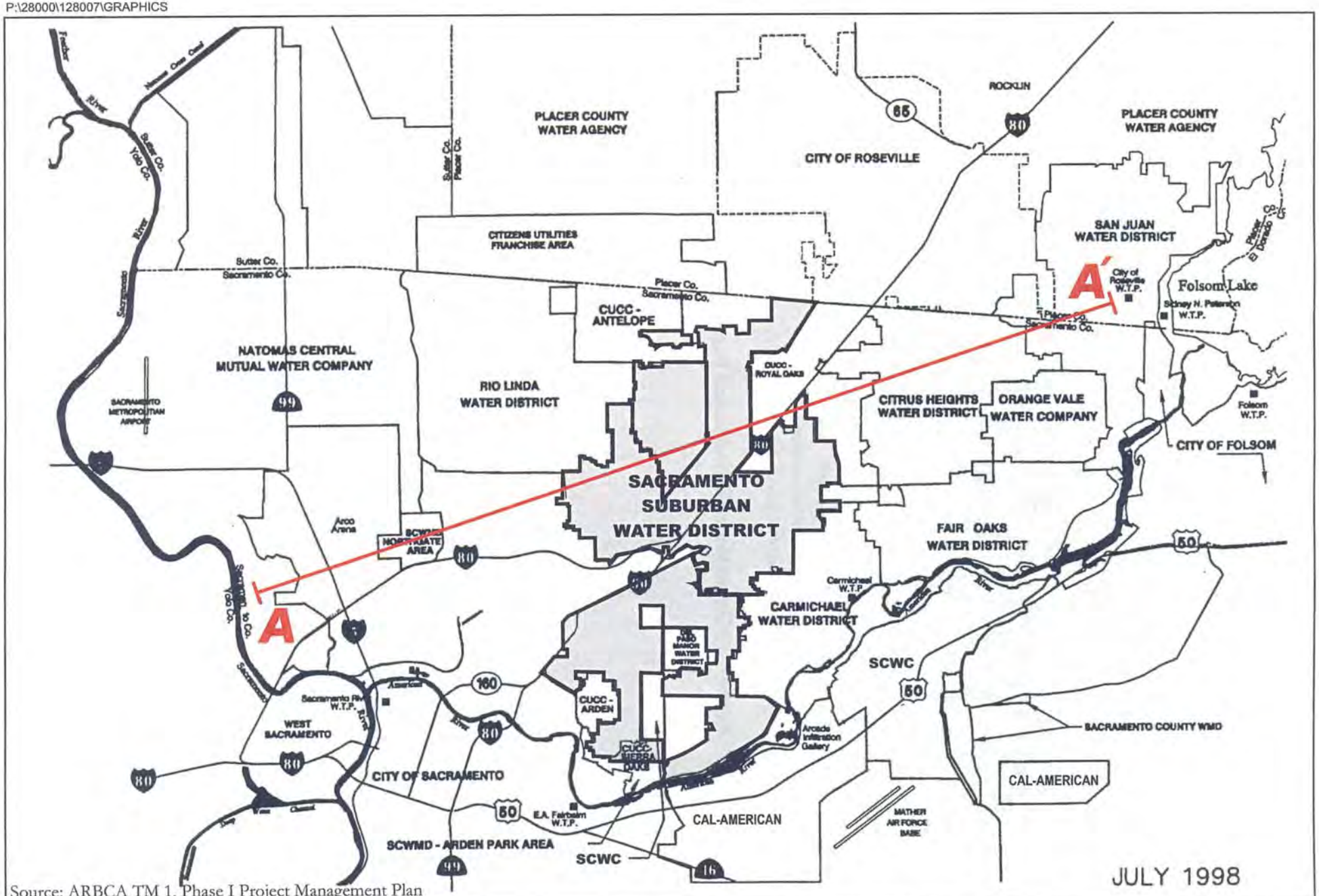


Source: ARBCA TM 1, Phase I Project Management Plan

BROWN AND CALDWELL	PROJECT 128007-001	SITE 2005 Urban Water Management Plan Sacramento Suburban Water District	Figure 4-1
	DATE 4-8-05	TITLE Hydrologic Section A-A' of Regional Aquifer System	

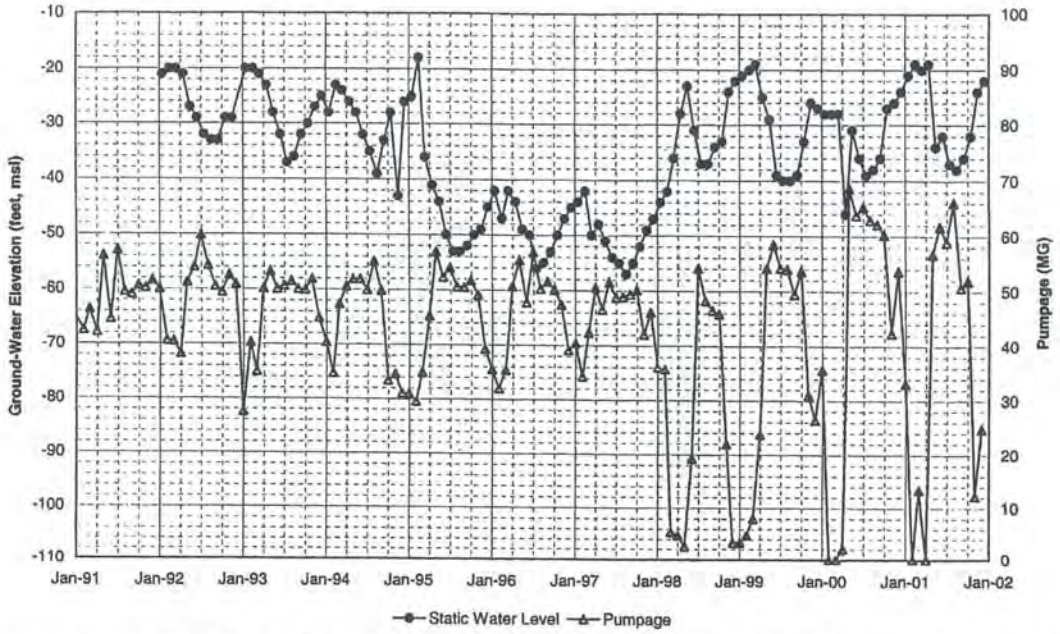
P:\28000\128007\GRAPHICS

P:\28000\128007\GRAPHICS



Source: ARBCA TM 1, Phase I Project Management Plan

BROWN AND CALDWELL	PROJECT 128007-001	SITE 2005 Urban Water Management Plan, Sacramento Suburban Water District	Figure 4-2
	DATE 4-8-05	TITLE Location of Hydrologic Section of Aquifer System	



Source: Luhdorff & Scalmanini, *In-Lieu Surface Water Use and Ground-Water Basin Conditions 2001, Northridge Service Area, Sacramento Suburban Water District*, June, 2002.

Figure 4-3. Groundwater Elevation and Pumpage

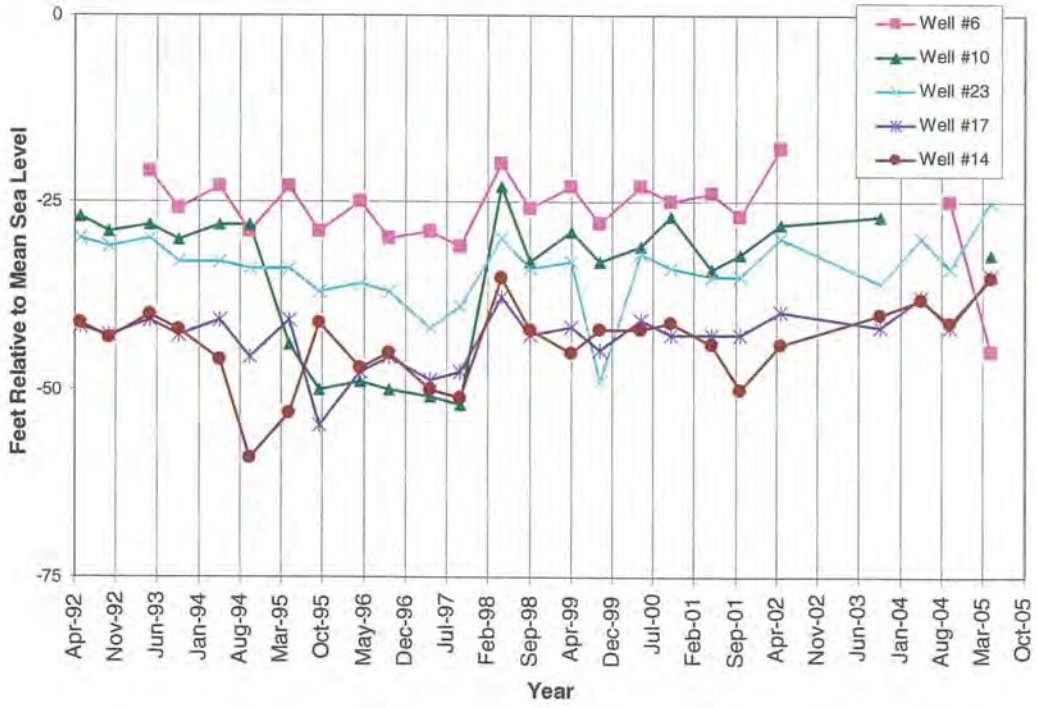
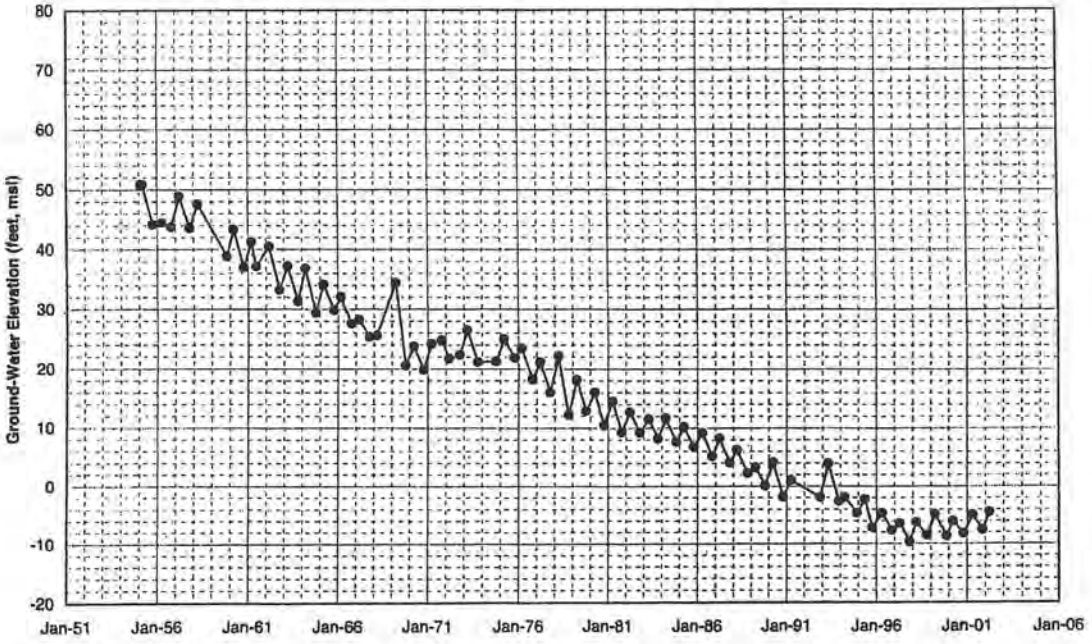


Figure 4-4. Groundwater Levels from 1992 to 2002



Source: Luhdorff & Scalmanini, *In-Lieu Surface Water Use and Ground-Water Basin Conditions 2001, Northridge Service Area, Sacramento Suburban Water District*, June, 2002.

Figure 4-5. Groundwater Elevation, DWR Well 10N/6E-10C1

The SGA, formerly the Sacramento North Area Groundwater Management Authority, was formed in 1999 to manage the groundwater basin north of the American River. SGA's goal is to protect the health of the groundwater basin within Sacramento County north of the American River. The JPA has delegated the powers necessary to protect and regulate the local groundwater basin to the overlying water purveyors. One objective of SGA is to maintain the long-term sustainable yield of the groundwater basin north of the American River through conjunctive use practices. In the future, SGA may use pumping fees as a mechanism to limit groundwater pumping, although an analysis for how to do this has not yet been done. SGA's goal is to limit the long-term average Sacramento area groundwater pumping to approximately 131,000 ac-ft per year, which was approximately the amount of groundwater pumped within the SGA boundaries in 1990.

4.3 Desalination

As shown in Table 4-2, there are no opportunities for the development of desalinated water within the District's service area as a future supply source.

Table 4-2. Opportunities for Desalinated Water

Sources of water	Opportunities
Ocean water	none
Brackish ocean water	none
Brackish groundwater	none

4.4 Water Quality

This section describes the water quality of the existing water supply sources within the District and the manner in which water quality affects water management strategies. In addition, this section describes the manner in which water quality affects the water supply.

The quality of existing surface water and groundwater supply sources over the next 20 years is expected to be adequate. Surface water will continue to be treated to drinking water standards, and no water quality deficiencies are foreseen to occur in the next 20 years. There are no expected significant changes in the water quality of the District's groundwater sources over the next 20 years. There is a possibility of the McClellan and Aerojet groundwater contamination impacting the District's water supply. The impact of the groundwater contamination on the District is not known. It is assumed that the District would provide the necessary treatment to maintain the groundwater supply.

A portion of the Aerojet contamination plume has moved under the American River in the water district east of the District (Carmichael Water District). The plume is traveling in the general direction of the District, and it may reach the District boundaries in less than 15 years.

All groundwater supplies in the District meet or exceed all current drinking water standards, including secondary standards regulated for aesthetic qualities. An exception is iron and manganese, which have secondary drinking water standards. Iron and manganese are two metals that occur naturally within the geological formations from which the groundwater is extracted, and are known to be at elevated levels in wells of surrounding water systems. Two wells (TC 75 and TC 32) have wellhead treatment for iron and manganese. Another well (TC 54) has been taken off-line due to elevated iron and manganese levels.

Some deeper system wells (>800 ft) have resulted in the presence of methane. The District has taken steps to mitigate the presence of methane through methods such as air strippers or by capping off the lower production zones.

Water quality affects the District's water management strategies through the District's efforts to be in compliance with Federal and State regulations. These regulations require rigorous water quality testing, source assessments, and treatment compliance. No other special water management strategies due to water quality effects are necessary.

The District's planned supply with the City of Sacramento is a fluoridated supply. Because the City of Sacramento surface water entering the District water system will be fluoridated, the District will also be fluoridating their large production wells in the SSA by the end of 2006.

A summary of the current and projected water supply changes due to water quality is provided in Table 4-3.

Table 4-3. Current and Projected Water Supply Changes Due to Water Quality, percent

Water supply sources	2005	2010	2015	2020	2025
Surface Water					
Purchase - USBR (215)	0	0	0	0	0
Transfer – PCWA	0	0	0	0	0
Entitlement - City of Sacramento	0	0	0	0	0
Supplier produced groundwater	0	0	0	0	0
Recycled water[a]	0	0	0	0	0
Desalination water	0	0	0	0	0

4.5 Current and Projected Normal Year Water Supplies

Based upon the Northridge-PCWA contract water entitlement schedule in Table 4-1, USBR 215 water, current and future surface water supply, and groundwater supply, current and projected water supplies during a normal water year are presented in Table 4-4. USBR 215 water projected supplies are based on deliveries occurring in 1998. In normal years, 10,000 annual acre-feet of USBR 215 water is assumed to be available. The water supply from PCWA is based on the schedule presented in Table 4-1. The City of Sacramento supply is based on an agreement with the City. The groundwater supply is based on the assumptions described in Section 4.2.1. The recycled water supply is described in Chapter 5. No water supply loss due to water quality is anticipated.

Table 4-4. Projected Normal Year Water Supplies, ac-ft/yr

Water supply sources	2005	2010	2015	2020	2025
Surface Water					
Purchase - USBR (215)[a]	10,000	10,000	10,000	10,000	10,000
Transfer - PCWA	18,000	25,000	29,000	29,000	29,000
Entitlement - City of Sacramento	11,200	22,400	22,400	22,400	22,400
Supplier produced groundwater	24,000	24,000	24,000	24,000	24,000
Recycled water[b]	0	0	0	0	0
Water supply loss due to water quality	(0)	(0)	(0)	(0)	(0)
Desalination water	0	0	0	0	0
Total	63,200	81,400	85,400	85,400	85,400
Percent of normal year supply	100%	100%	100%	100%	100%

Units of Measure: ac-ft/yr

[a]The District only purchases USBR (215) water when PCWA water is not available.

[b]Recycled water is discussed in Chapter 5 of this Plan.

4.6 Water Supply Reliability

This section describes the reliability of the water supply and vulnerability to seasonal or climatic shortage. A water supply reliability comparison is made in Table 4-5 for the year 2025, considering three water supply scenarios: average/normal water year; single dry water year; and multiple dry water years.

Table 4-5. Water Supply Reliability, 2025, ac-ft/yr

Water supply sources	Normal water year	Single dry water year	Multiple dry water years			
			Year 1	Year 2	Year 3	Year 4
Surface Water						
Purchase - USBR (215)	10,000	0	0	0	0	0
Transfer - PCWA	29,000	0	0	0	0	0
Entitlement - City of Sacramento	22,400	0	0	0	0	0
Supplier produced groundwater	24,000	58,000[b]	58,000[b]	58,000[b]	58,000[b]	58,000[b]
Recycled water[c]	0	0	0	0	0	0
Water supply loss due to water quality	(0)	(0)	(0)	(0)	(0)	(0)
Desalination water	0	0	0	0	0	0
Total	85,400	58,000	58,000	58,000	58,000	58,000
Percent of normal year supply	100%	68%	68%	68%	68%	68%

Units of measure : ac-ft/yr

[a] The District only purchases USBR (215) water when PCWA water is not available.

[b] Based on assumption that groundwater use during dry years is greater than the average groundwater yield.

[c] Recycled water is discussed in Chapter 5 of this Plan.

The definitions of these three water supply scenarios as provided by DWR (DWR, 2005) are provided below. In evaluating the water supply reliability it is assumed that the single dry year and multiple dry years in this Plan have the same definition as drier and driest years in the Water Forum Agreement.

1. Normal year is a year in the historical sequence that most closely represents median runoff levels and patterns. Normal is defined as the median runoff over the previous 30 years or more. This median is recalculated every ten years.

2. Single-dry year is generally considered to be the lowest annual runoff for a watershed since the water year beginning in 1903.

3. Multiple-dry year period is generally considered to be the lowest average runoff for a consecutive multiple year period (three years or more) for a watershed since 1903.

The basis of the water year data to develop the water supply reliability in Table 4-3 is provided in Table 4-6. This data is based on American River flows.

Table 4-6. Basis of Water Year Data

Water year type	Base year(s)
Single-dry water year	1976-1977
Multiple-dry water years	1987-1992

The surface water supply to the District is subject to significant reductions during dry years (seasonal and climatic shortages). USBR 215 water and PCWA water are assumed to not be available in dry years. The District has agreed not to divert any water from the Lower American River in "drier" and "conference" years per the Water Forum Agreement (the District could divert this water from other sources in those years). The only other source of water for the District is groundwater.

Groundwater quantity is assumed to be generally unaffected by short-term drought conditions. As shown in Table 4-6, it is assumed that the District's available groundwater supply during multiple dry years is greater than the average annual sustainable yield. During dry years the District can pump higher amounts of groundwater because less groundwater is pumped during wet periods. The objective is that the overall average of the pumping during dry, wet, and average periods does not exceed the District's long-term sustainable yield. For the purposes of this study it is assumed that the District's available groundwater supply during multiple dry year periods is greater than the average groundwater yield. It is assumed that in single and multiple dry year periods the District's groundwater will be able to meet demands when surface water is available at a minimum. Because the District is able to use more surface water and less groundwater during wet and normal years, they are able to pump more groundwater during dry years and still maintain a groundwater pumping balance within the estimated average annual sustainable yield.

Water quality issues are not anticipated to have significant impact on water supply reliability. It is assumed that any chemical contamination from the Aerojet plume or McClellan AFB and the lowering of MCLs of naturally occurring constituents such as arsenic and radon can be mitigated by constructing new treatment facilities for treatment prior to the waters delivery into the water distribution system. However, these treatment facilities have significant cost.

A summary of the factors resulting in inconsistency of the surface water and groundwater supply sources is provided in Table 4-7.

Table 4-7. Factors Resulting in Inconsistency of Supply

Water supply sources	Legal	Environmental	Water quality	Climatic
Surface water	X	X		X
Supplier produced groundwater				

The District's only inconsistent source of water is the purchased surface water supply. As shown in Table 4-5, most of the surface water supply is not anticipated to be available during dry years. In dry years, when surface water availability is inconsistent, the District's plan is to use its groundwater sources to meet most demands. The District has an adequate groundwater supply to provide water supply during single-dry and multiple-dry water years. Water demand management measures would not be solely depended upon to replace inconsistent sources. The water shortage contingency plan would be implemented when there is a need to reduce demands significantly on a short-term basis. Chapter 6 of this Plan describes the District's current demand management measures. The water shortage contingency plan is presented in Appendix G.

4.6.1 Projected Single-Dry Year Water Supplies

The projected single-dry year water supplies are provided in Table 4-8.

Table 4-8. Projected Single-Dry Year Water Supplies, ac-ft/year

Water supply sources	2005	2010	2015	2020	2025
Total supply	58,000	58,000	58,000	58,000	58,000
Percent of normal year supply	68%	68%	68%	68%	68%

Units of Measure: ac-ft/yr

4.6.2 Projected Multiple-Dry Year Water Supplies

This section projects the impact of a multiple dry year period for each 5-year period during the 20-year projection. Tables 4-9 through 4-12 provide an estimate of the projected multiple-dry year water supplies for each 5-year period.

Table 4-9. Projected Multiple Dry Year Water Supply, ac-ft/yr, Period Ending in 2010

Water supply sources	2006	2007	2008	2009	2010
Total supply	52,000	52,000	52,000	52,000	52,000
Percent of normal year supply	61%	61%	61%	61%	61%

Units of Measure: ac-ft/yr

Table 4-10. Projected Multiple Dry Year Water Supply, ac-ft/yr, Period Ending in 2015

	2011	2012	2013	2014	2015
Total supply	52,000	52,000	52,000	52,000	52,000
Percent of normal year supply	61%	61%	61%	61%	61%

Units of Measure: ac-ft/yr

Table 4-11. Projected Multiple Dry Year Water Supply, ac-ft/yr, Period Ending in 2020

	2016	2017	2018	2019	2020
Total supply	52,000	52,000	52,000	52,000	52,000
Percent of normal year supply	61%	61%	61%	61%	61%

Units of Measure: ac-ft/yr

Table 4-12. Projected Multiple Dry Year Water Supply, ac-ft/yr, Period Ending in 2025

	2021	2022	2023	2024	2025
Total supply	52,000	52,000	52,000	52,000	52,000
Percent of normal year supply	61%	61%	61%	61%	61%

Units of Measure: ac-ft/yr

4.7 Water Supply Projects

This section provides a description of the District's water supply projects and water supply programs that will and may be undertaken to meet the total projected water use and provide system reliability. There are projects currently in progress or planned for the near future, as described below. Plans to replace inconsistent sources and opportunities for exchanges of water are also presented.

The District has plans with the City of Sacramento to tie into the City's Fairbairn Water Treatment Plant (WTP). This project will provide a 20 mgd surface water supply to the District. The City of Sacramento has constructed a new transmission pipeline across the American River which connects to the existing Howe Avenue transmission main. In addition, the City of Sacramento has recently completed an expansion of their Fairbairn WTP. When the District's Enterprise/Northrop Reservoir project is completed in 2006, the District will receive a total of 20 mgd (22,400 ac-ft/yr) from this source during average water years. The supply from this source is included in the water supply quantities presented elsewhere in this report for the year 2005 and afterwards.

The Enterprise/Northrop Reservoir and Booster Pump Station includes the construction of an above ground 5 million gallon steel reservoir for potable water, 36-inch diameter transmission pipeline to and from the site, booster pump station with a capacity of 20 mgd, and standby diesel engine generator. This facility will be used to store the surface water purchased from the City of Sacramento as well as pumped groundwater from the District's wells. The primary purpose of this facility is to boost delivered surface water from the City of Sacramento into the District's water system. Although this project does not provide a new water supply to the District, it will aid in improving system performance and response during peak demand and fire flow periods. This project is currently under construction and will be operational in mid 2006.

The District is a cost sharing partner in the Sacramento River Water Reliability Study (SRWRS). The Bureau of Reclamation and PCWA, on behalf of cost sharing partners City of Roseville, City of Sacramento, and the District, initiated the SRWRS in 2002. The goal of the SRWRS is to develop a water supply plan that is consistent with the Water Forum Agreement objectives of pursuing a Sacramento River diversion to meet water supply needs of the Placer-Sacramento region, and promoting ecosystem preservation along the lower American River. An interim report was completed in June 2003 and outlines identified resource problems and opportunities, goals, objectives, criteria and constraints for study development, and preliminary alternatives. An initial alternatives report was completed in March 2005, and it documents refinements of the preliminary findings, the study process, results of initial analysis and screening of preliminary alternatives for further study. No final decisions on the amount of supply that this project will provide for the District have been made at this time. The supply that this project provides will help offset the long-term interim nature of the PCWA contract water.

Table 4-13 provides a summary and schedule of the future water supply projects. Also shown is a quantification of each project's normal-year yield, single dry-year yield, and multiple dry-year yield.

Table 4-13. Future Water Supply Projects

	Projected start date	Projected completion date	Normal water year, ac-ft/yr	Single dry water year, ac-ft/yr	Multiple dry years, ac-ft/yr			
					Year 1	Year 2	Year 3	Year 4
City of Sacramento transmission main	Under construction	2005	N/A	N/A	N/A	N/A	N/A	N/A
City of Sacramento Fairbairn WTP expansion	Under construction	Spring 2006	11,200	0	0	0	0	0
Enterprise/Northrop reservoir and booster pump station (5 mg)	May 2005	July 2006	N/A	N/A	N/A	N/A	N/A	N/A
Verner well	2006	2007	580[b]	580[b]	580[b]	580[b]	580[b]	580[b]
Verner reservoir and booster pump station (3 mg)	2007	2008	N/A	N/A	N/A	N/A	N/A	N/A
Sacramento River Diversion	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

N/A=not applicable due to the project not providing a new water supply.
TBD=To be determined
[a] First phase (10 mgd) to be completed in Spring 2006. Second phase to be completed at a later date is an additional 10 mgd.
[b] 1,200 gpm well capacity based on pre-design. Supply assumes well is on for 30 percent of day.

4.8 Transfer and Exchange Opportunities

The District currently receives water transferred from the USBR and PCWA. A description of the current water transfers is provided on page 4-1. In the near future, the District will receive water from the City of Sacramento, as described on page 4-2. This transfer from the City of Sacramento is expected to occur on a long-term basis.

In 2001 the District participated in a pilot groundwater banking and exchange program in conjunction with the Regional Water Authority. This pilot program transferred water to the California Department of Water Resources' environmental water account on a short-term basis. It is anticipated that similar transfer opportunities will occur in the future. The District intends to work with the Regional Water Authority to identify both short-term and long-term exchange and transfer opportunities with other RWA members. The District has 61 interconnections through which exchanges or transfers of water can occur with neighboring water agencies. The regional water master plan developed by the American River Basin Cooperating Agencies identifies several potential projects for transferring water. The District will consider the construction of larger interconnections, pipelines, and pumping stations.

A summary of the District's water supply transfer and exchange opportunities is provided in Table 4-14. The District's transfer of water to the Sacramento County Water Agency's Arden Park Water System is described in Chapter 3 of this Plan. The Water Code definition of short and long-term is that short-term is for a period of one year or less and long-term is for a period of more than one year.

Table 4-14. Transfer and Exchange Opportunities

Transfer agency	Transfer or exchange	Short term quantity, ac-ft/yr	Long term quantity, ac-ft/yr
USBR	Transfer	10,000	29,000
PCWA	Transfer	10,000	29,000

Note: See table 3-8 for transfer water to the Sacramento County Water Agency's Arden Park Water System from the District.

CHAPTER 5
RECYCLED WATER

The purpose of this chapter is to provide information on recycled wastewater and its potential for use as a water resource in the District. The elements of the chapter are (1) the quantity of wastewater generated in the service area, (2) description of the collection, treatment, and disposal/reuse of that wastewater, (3) the current plans for water recycling, and (4) the potential for water recycling in the service area.

5.1 Recycled Water Plan Coordination

Sacramento Regional County Sanitation District (SRCSD) is the agency responsible for collecting treating, and discharging treated wastewater in the greater Sacramento region. Most of the local water agencies are in coordination with SRCSD regarding various issues such as conservation methodologies and rebates, reuse potential, and other issues. The District has no authority or control over municipal wastewater generated in the District's area. The District also currently has no authority of reuse in its area, and there is no reuse water available in its service area. However, the local water purveyors understand that reuse will become an important element of integrated water supply planning, and support the development of a reuse supply component.

SRCSD is currently conducting a regional-wide reuse study. The study is a more detailed investigation of reuse potential for the region and is expected to develop a list of reuse projects to begin planning and design. The plan has already identified a potential project including a satellite scalping plant in the north Sacramento County area that could serve new development and existing large landscaping demands in the area. A portion of this area could include the District's NSA depending on the economics developed during the specific project planning efforts.

The planning effort involves coordination, updates, and input from individual local water districts, and from the regional water agencies, the Regional Water Authority (RWA), and the Sacramento Groundwater Authority (SGA). Table 5-1 lists the agencies involved in reuse planning and each respective involvement.

Table 5-1. Agency Participation in Reuse Planning

Participating agencies	Role
Sacramento Regional County Sanitation District	As the only agency with wastewater collection and treatment authority, SRCSD is conducting a reuse study to develop reuse supply and projects for implementation. SRCSD has joined the RWA and actively seeks input from the water purveyors on reuse supply and planning issues.
Regional Water Authority	Provides input and review of SRCSD's reuse planning process and recommendations. Updates SRCSD on supply issues and where/how reuse could become part of supply integration.
Sacramento Groundwater Authority	Provides input and review of SRCSD's reuse planning process and recommendations. Updates SRCSD on supply issues and where/how reuse could become part of supply integration.
SSWD and other local water agencies	Provides input to SRCSD on localized water demands and supply to highlight where reuse is most feasible. Some agencies, such as Sacramento County Water Agency, City of Sacramento, and City of Folsom, are requiring that a reuse distribution system be installed in new development areas.
Sacramento County Planning Agency	SRCSD is coordinating its reuse master plan with the Sacramento County Planning agency.

5.2 Wastewater Quantity, Quality, and Current Uses

The following section describes the estimated wastewater generated in the District's service area. The wastewater is collected and conveyed out of the District's service area to the SRCSD's wastewater treatment plant. This section provides a description of the regional plant treatment process and current reuse in the regional area.

5.2.1 Wastewater Generation

Municipal wastewater is generated in the District from a combination of residential and commercial sources. The quantities of wastewater generated are proportional to the population and the water use in the service area. Estimates of the wastewater flows generated within the District for the present and future conditions are presented in Table 5-2. The source of the estimates is the population projection in Chapter 3 and a per capita unit flow of 138 gallons per day (gpd) including commercial use. The per capita wastewater generation unit flow rate was obtained from the final draft of the Sacramento Regional Wastewater Treatment Plant 2020 Master Plan (Carollo Engineers, November 2001). Table 5-2 also lists the projected effluent that will meet reuse water quality, estimated from discussions with SRCSD and current status of the SRCSD reuse planning study.

Table 5-2. Wastewater Collected and Treated, ac-ft/yr

	2000	2005	2010	2015	2020	2025
Wastewater collected in service area[a]	2,758	2,750	2,789	2,784	2,817	2,851
Quantity that meets recycled water standard	0	0	0	0	0	0

Source: Carollo Engineers, November 2001, Final Draft 2020 Master Plan, SRCSD.
Note: Per capita projections and water conservation based on historically recorded values (and do not reflect any new or planned water conservation measures).
[a] Wastewater is only collected in service area. There is not treatment in the District's service area.

5.2.2 Wastewater Collection and Treatment

The wastewater is collected by gravity in a series of main, trunk, and interceptor sewers owned and operated by SRCSD. Collected wastewater is transported to the Sacramento Regional Wastewater Treatment Plant (SRWTP) in Elk Grove. The regional plant serves the entire Sacramento metropolitan area including the unincorporated county area adjacent to the City of Sacramento, the City of Citrus Heights, and the City of Folsom. The treatment plant receives and treats approximately 156 (2004) mgd of dry weather flow on average. The current capacity of the plant to treat dry weather flows is approximately 181 mgd. The treatment plant produces a disinfected secondary effluent that is discharged into the Sacramento River below Freeport. The principal treatment processes are primary sedimentation, pure-oxygen activated sludge, secondary sedimentation, and chlorination/dechlorination. Planned disposal methods and quantities are presented in Table 5-3.

Table 5-3. Disposal of Wastewater

Method of disposal	Treatment level	2005	2010	2015	2020	2025
River discharge	Secondary effluent	174 mgd	196 mgd	210 mgd	218 mgd	225 mgd
Reuse[a]	Title 22	1.0-1.5 mgd	1.0-1.5 mgd	1.0-1.5 mgd	1.0-1.5 mgd	1.0-1.5 mgd

Source: Email communication with Kent Cranev of SRCSD – September 13, 2005, 2025 river discharge volume estimated
[a] Reuse volumes dependent on outcome of ongoing reuse master plan to be completed in 2006. SRCSD has a stated goal of recycling 30-40 mgd by 2020-2030.

5.3 Water Recycling Current Uses

Currently, there are no recycled water uses within the District. A 1994 survey of reuse potential (Nolte and Associates, Inc., Sacramento County Water Reclamation Study, August 1994) evaluated the role of reclaimed water as a long term water resource. The study evaluated and identified reclaimed water markets that would be financially feasible to serve, and established a plan to implement reclaimed water use. SRCSD constructed a reclaimed water treatment facility at the regional treatment plant. The water reclamation plant is designed to treat a maximum of 5 mgd with coagulation, sand filtration, and disinfection of secondary effluent from the regional plant. SRCSD is currently serving approximately 2 mgd of reclaimed water in the Laguna Creek area, near the regional treatment plant. Uses of the recycled water include irrigation of parks, schoolyards, and streetscapes in the Laguna West and

Lakeside developments and nonpotable uses at the regional plant. The reclamation plant is capable of being expanded to 10 mgd to serve additional demand for landscape irrigation for the Elliott Ranch South development and future developments in the area. These areas can be seen on Figure 5-1. The areas that are intended for use of recycled water are located near the regional plant, which is a significant distance from the District. Current recycled water uses are presented in Table 5-4.

Table 5-4. Existing Recycled Water Uses

Type of use	Treatment level	2004, ac-ft
Agriculture	--	0
Landscape	--	0
Wildlife habitat	--	0
Wetlands	--	0
Industrial	--	0
Groundwater recharge	--	0
Total	--	0

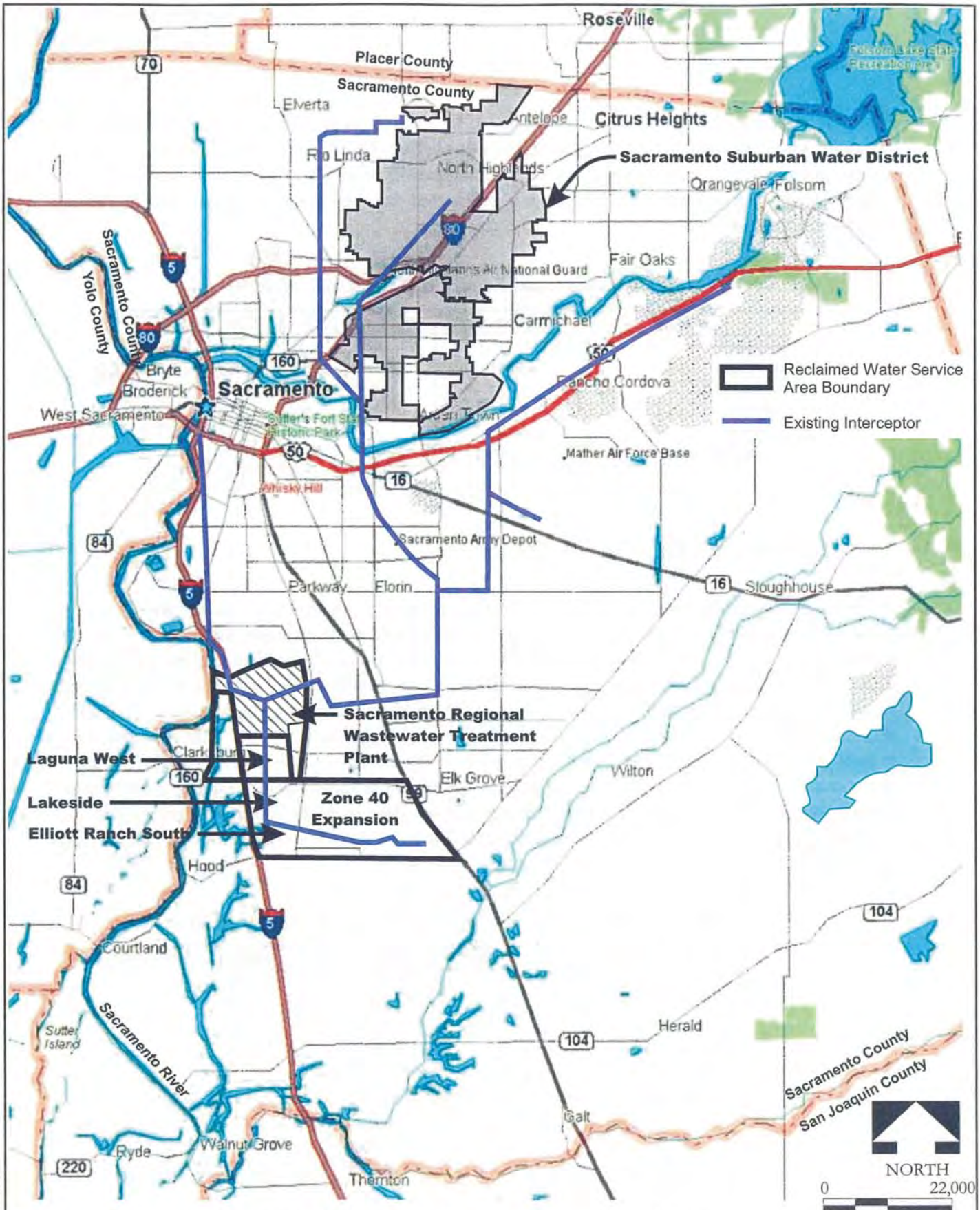
5.4 Potential and Projected Use of Reclaimed Water

Currently, no recycled water is used in the District's service area. As part of the 1994 Nolte report, the former Arcade and Northridge Water District service areas were investigated for reuse potential along with other urban water districts. The reuse potential results are being updated in the current SRCSD reuse master plan. This section presents the projected potential use and methods to optimize reuse in the future.

5.4.1 Potential Use of Reclaimed Water

The potential for landscape irrigation with recycle water as listed in the 1994 Nolte Report for the former Arcade and Northridge Water Districts was identified as 1,715 and 1,235 ac-ft/year, respectively, for a total of 2,950 ac-ft/year. The potential recycled water use included parks and schoolyards for landscape irrigation. This is an insignificant portion (six percent) of the total year 2004 water demand in the combined District area. The 1994 Nolte report concluded there is no potential use of recycled water for agricultural irrigation, wildlife habitat enhancement, wetlands, industrial reuse, and groundwater recharge.

The current SRCSD reuse study is revisiting these projections and updating them based on current and predicted water supply needs for the region. The study is not yet complete.



Source: SRCSD, Sacramento County Water Redamation Study Summary Report, August 1994

P:\28000\128007\GRAPHICS

BROWN AND CALDWELL	PROJECT 128007-001	SITE **2005 Urban Water Management Plan Sacramento Suburban Water District**	Figure **5-1**
	DATE 8-4-05	TITLE **Reclaimed Water Service Area**	

The potential recycled water demand is assumed to be constant in the future assuming that the amount of landscaping area within the District is constant throughout the planning period. Table 5-5 shows the projected recycled water demand for the planning period. Although there is potential for a recycled water demand within the District, it is anticipated that recycled water supplied to the District will be zero through 2025.

Table 5-5. Potential Recycled Water Uses, ac-ft/yr

Type of use	Treatment level	2010	2015	2020	2025
Agriculture	--	0	0	0	0
Landscape	Tertiary	2,950	2,950	2,950	2,950
Wildlife Habitat	--	0	0	0	0
Wetlands	--	0	0	0	0
Industrial	--	0	0	0	0
Groundwater recharge	--	0	0	0	0
Total		2,950	2,950	2,950	2,950

5.4.2 Projected Future Use of Reclaimed Water

Table 5-6 presents the projected possible reuse water demands in the District's service area. Projections are based on estimates from the 1994 Nolte report and preliminary information from the current SRCSD reuse master plan. The extent to which recycled water is available in the future is dependant upon the SRCSD water recycled program. Conveying reclaimed water up to the District's service area from the regional treatment plant is cost prohibitive due to the long distance. The only feasible way recycled water could be available in the District would be if SRCSD built a satellite water recycling plant north of the American River in northeast Sacramento County. This option is being investigated in the current SRCSD reuse master plan. Initial findings indicate a satellite plant may be feasible, but the actual construction of a plant could be 10-20 years in the future. Therefore, it is assumed that reuse water will not be available for the District's service area until more definitive plans are completed by SRCSD.

Table 5-6. Projected Future Use of Recycled Water, ac-ft/yr

Type of use	2010	2015	2020	2025
Agriculture	0	0	0	0
Landscape	0	0	0	0
Wildlife habitat	0	0	0	0
Wetlands	0	0	0	0
Industrial	0	0	0	0
Groundwater recharge	0	0	0	0
Total	0	0	0	0

5.5 Optimizing the Use of Reclaimed Water

The District does not have the authority or control to optimize the use of reclaimed water, therefore, the District does not have an optimization Reuse Plan. The SRCSD has taken steps to promote and expand the use of reclaimed water, but these steps are focused on areas adjacent to the regional plant. The steps include the construction of a water recycling plant and the requirement for new development in the south county to install dual distribution systems. The majority of this potential reclaimed water use consists of agricultural demands (Nolte, 1994) and does not include any areas in the District service area. As Table 5-7 indicates, the SSWD 2003 UWMP projected no reclaimed water use, and none was provided.

Table 5-7. Recycled Water Uses – 2005 Projection Versus Actual, ac-ft/yr

Method of disposal	2003 projection for 2005	2005 actual use
Agriculture	0	0
Landscape	0	0
Wildlife habitat	0	0
Wetlands	0	0
Industrial	0	0
Groundwater recharge	0	0
Total	0	0

Without plans by SRCSD to construct satellite reclamation plants, use of reclaimed water to meet water demands in the District does not appear feasible. Because SRCSD has not committed to a water recycling program in the District's area, the District does not maintain incentives to use reclaimed water as shown in Table 5-8. The District currently promotes recirculating uses of water within their service area. This is demonstrated in the District's Water Shortage Contingency Plan (Appendix G) which requires commercial car washes to use fully recycled water as a mandatory requirement during water shortages.

Table 5-8. Methods to Encourage Recycled Water Uses

Actions	Ac-ft/yr of use projected to result from this action			
	2010	2015	2020	2025
Financial incentives	0	0	0	0
Other	0	0	0	0
Total	0	0	0	0

CHAPTER 6
WATER CONSERVATION BEST MANAGEMENT PRACTICES

Water conservation is an available method to reduce water demands, thereby reducing water supply needs for the District. This chapter presents a description of the District's water conservation program, an economic analysis of water conservation BMP High Efficiency Washing Machine Rebate Programs, and a description of the methods and assumptions used to conduct the analysis.

The unpredictable water supply and ever increasing demand on California's complex water resources have resulted in a coordinated effort by the DWR, water utilities, environmental organizations, and other interested groups to develop a list of urban BMPs for conserving water. This consensus-building effort resulted in a Memorandum of Understanding Regarding Urban Water Conservation in California, which formalizes an agreement to implement these BMPs and makes a cooperative effort to reduce the consumption of California's water resources. The BMPs as defined by the MOU are presented in Table 6-1. The BMPs as defined in the MOU are generally recognized as standard definitions of water conservation measures. The MOU is administered by the CUWCC. The District is not currently an MOU signatory.

The MOU requires that a water utility implement only the BMPs that are economically feasible. If a BMP is not economically feasible, the utility may request an economic exemption for that BMP.

Table 6-1. Water Conservation Best Management Practices

No.	BMP Name
1.	Water survey programs for single-family residential and multi-family residential connections.
2.	Residential plumbing retrofit.
3.	System water audits, leak detection and repair.
4.	Metering with commodity rates for all new connections and retrofit of existing connections.
5.	Large landscape conservation programs and incentives.
6.	High-efficiency washing machine rebate programs.
7.	Public information programs.
8.	School education programs.
9.	Conservation programs for commercial, industrial, and institutional accounts.
10.	Wholesale agency assistance programs.
11.	Conservation pricing.
12.	Conservation coordinator.
13.	Water waste prohibition.
14.	Residential ULFT replacement programs.

In the year 2000, the Water Forum finalized the Water Forum Agreement which contains seven major elements to meet its objectives. Water conservation is the fifth major element in the Agreement, under which the water purveyors' conservation plans for implementing the BMPs listed in the Agreement are described. These BMPs were derived from the original MOU developed by the CUWCC, and then customized for the conservation plans prepared for the individual purveyors. Signatories of the Water Forum Agreement are committed to follow the Water Forum conservation plans. There are no economic exemptions allowed under the Water Forum conservation plans.

6.1 Current Water Conservation Program

The District conducts an ongoing water conservation program. A description of each BMP that is currently being implemented or scheduled for implementation, a schedule of implementation, and a method to evaluate effectiveness is provided in this section. The existing conservation savings are also discussed.

BMP 1. Water survey programs for single-family residential and multi-family residential connections.

Description: Water survey programs for single-family residential and multifamily residential connections consist of annual water audits, water use reviews, and surveys of past program participants. Audits are conducted by trained auditors and include installation of low flow devices. Audits identify water-use problems, recommend repairs, provide instruction in landscape principles, irrigation timer use and, when appropriate, meter reading. Customers are provided with information packets that include the evaluation results and water savings recommendations. The District's targeting and marketing strategy consists of community outreach events approximately three times a year at which the District has sign-ups for the Water Wise program. The District distributes sponges at these events that contain information about the program.

Schedule: This survey program is conducted annually and began in 2003.

Evaluation of BMP Effectiveness: Effectiveness of this BMP will be evaluated by program penetration and by comparison of prior audited customer water use to future water use. The past number of actual surveys and the projected number of surveys including expenditures and estimated water savings are provided in Tables 6-2 and 6-3, respectively.

Table 6-2. Actual Conservation Activities, Expenditures, and Water Savings, BMP 1. Water survey programs for single-family residential and multi-family residential connections

Year	2001	2002	2003	2004	2005 (proj)
Single family surveys	0	0	22	215	870
Multi family surveys	0	0	0	30	561
Expenditures, $	$0	$0	$3,000	$32,465	$100,781
Water savings, ac-ft/yr	0	0	1	13	90

Note: Water Savings are cumulative savings based on the water savings life of this BMP.

Table 6-3. Projected Conservation Activities, Expenditures, and Water Savings, BMP 1. Water survey programs for single-family residential and multi-family residential connections

Year	2006	2007	2008	2009	2010
Single family surveys	902	910	919	927	935
Multi family surveys	652	658	664	670	676
Expenditures, $	$159,777	$161,628	$163,496	$165,382	$167,284
Water savings, ac-ft/yr	60	130	190	250	260

Note: The projection of program activity from 2006 through 2010 is estimated based on requirements in the District's current Water Forum conservation agreement. The District is in the process of evaluating this BMP, and as a result actual future implementation may vary from the data provided in this table.
Note: Water Savings are cumulative savings based on the water savings life of the BMP and starting in 2006.

BMP 2. Residential plumbing retrofit.

Description: Plumbing retrofit of existing residential accounts consists of providing low flow showerheads, faucet aerators, and toilet leak detection tablets to customers. The District works with local programs and businesses to offer free water conservation information and materials to residents. The former Northridge Water District distributed approximately 4,000 retrofit kits in 1998 to customers paying their water bills at the District office. In 2002, the District distributed 500 retrofit kits to the McClellan Air Force Base. There is not an enforceable ordinance in effect in the service area requiring the replacement of high-flow showerheads and other water use fixtures with their low-flow counterparts. The District has not yet reached 75% saturation. There are an estimated 67,080 pre-1992 single family and multi-family dwelling units. It has not been estimated how many single family DUs and multi family DUs have low flow showerheads.

The District tracks the distribution and cost of low-flow devices. The District tracks the number and cost of retrofit kits distributed based on inventory. The retrofit kits are distributed at the District office as well as at community events.

Schedule: The program started in year 2001, and is conducted annually.

Evaluation of BMP Effectiveness: Effectiveness of this BMP will be evaluated by program penetration and by comparison of prior water use to future water use once the system is completely metered

The past number of actual retrofit kits and the projected number of retrofit kits distributed including expenditures and estimated water savings are provided in Tables 6-4 and 6-5, respectively.

Table 6-4. Actual Conservation Activities, Expenditures, and Water Savings, BMP 2. Residential Plumbing Retrofit

Year	1992-2001	2002	2003	2004	2005 (proj)
Single family devices	7,000	500	1,800	3,148	3,150
Multi family devices	--[a]	--[a]	--[a]	--[a]	--[a]
Expenditures, $	$49,000[b]	$3,500[b]	$12,600[b]	$22,000	$22,000
Water savings, ac-ft/yr	90	100	120	160	110

Note: Water Savings are cumulative savings based on the water savings life of this BMP.
[a]Multi family devices included in single family device count.
[b]Estimated.

Table 6-5. Projected Conservation Activities, Expenditures, and Water Savings, BMP 2. Residential Plumbing Retrofit

Year	2006	2007	2008	2009	2010
Single family devices	1,437	1,437	1,437	1,436	1,436
Multi family devices	--[a]	--[a]	--[a]	--[a]	--[a]
Expenditures, $	$46,800	$46,800	$46,800	$46,800	$46,800
Water savings, ac-ft/yr	119.2	123.1	122.2	133.2	169.3

Note: The projection of program activity from 2006 through 2010 is estimated based on requirements in the District's current Water Forum conservation agreement. The District is in the process of evaluating this BMP, and as a result actual future implementation may vary from the data provided in this table.
Note: Water Savings are cumulative savings based on the water savings life of the BMP and starting in 2006.
[a]Multi family devices included in single family device count.

BMP 3. System water audits, leak detection and repair.

Description: A system water audit, leak detection and repair program consists of ongoing leak detection and repair within the system, focused on the high probability leak areas. This also includes an ongoing meter calibration and replacement program for all production and distribution meters. The former Northridge Water District performed leak detection on approximately six miles of mortar lined steel pipe in 1996.

In addition, the District performed leak detection on another fifteen miles of mortar lined steel and tar-wrap steel pipelines and repaired all identified leaks in 2002. The District did not complete a full-scale audit during this report year. The District audited approximately 15 miles of the water system this year. Since the system is not completely metered, the District is not able to complete a pre-screening system audit for the reporting year, and they cannot calculate verifiable uses as a percent of total production. The District does keep all metered water use data on file. Once the system is completely metered, the District will be able to verify the values used to calculate verifiable uses as a percent of total production. As described in Chapter 3 of this Plan, it is estimated that the District has 10% unaccounted-for water.

Schedule: This program is conducted annually and will continue per the District signing the Water Forum Agreement. The last complete audit was performed in the year 2003. The District will audit approximately 15 miles of pipe in 2005.

Evaluation of BMP Effectiveness: Effectiveness of this BMP will be evaluated by tracking leak detection and leak repair and comparison of prior water use to future water use. The District has approximately 673 miles of distribution system lines. 41 miles of distribution system lines have been surveyed. The estimate of water saved is based on the number of leaks repaired as a result of the on-going leak detection program.

The past and projected number of miles of distribution lines surveyed and the number of leaks repaired including expenditures and estimated water savings are provided in Tables 6-6 and 6-7, respectively. Some past information is not available.

Table 6-6. Actual Conservation Activities, Expenditures, and Water Savings, BMP 3. System Water Audits, Leak Detection, and Repair

Year	2001	2002	2003	2004	2005 (proj)
Percent unaccounted-for water	10%[a]	10%[a]	10%[a]	10%[a]	10%[a]
Miles of distribution lines survey	--[b]	15	0	15	20
Miles of distribution lines repaired	--[b]	685 leaks	455 leaks	418 leaks	400 leaks[d]
Expenditures, $	--[b]	--[b]	--[b]	--[b]	--[b]
Water savings, ac-ft/yr	--[b]	8,200	13,600	18,500	23,300

Note: Water Savings are cumulative savings based on the water savings life of this BMP.
[a]The District is not completely metered and can only estimate un-accounted-for water.
[b]Data not available.
[c]A leak repair is estimated to reduce water usage by 9.5 gallons per minute (gpm) for every leak. This savings is based on Table 4-3 of AWWA manual M36, Water Audits and Leak Detection, using an assumed average leak size of 0.2 in and 100 pounds per square inch (psi) pressure. Water savings per leak given in this table range from 2.3 gpm for 0.1 inch diameter hole to 38 gpm for a 0.4 inch diameter hole, thus 9.5 gallons per minute is a conservative estimate. Over the course of one year, the water savings per leak with a 0.2 inch diameter hole is 15 ac-ft. The life span of water savings from leak repair is estimated to be five years.
[d]Estimated.

Table 6-7. Projected Conservation Activities, Expenditures, and Water Savings, BMP 3. System Water Audits, Leak Detection, and Repair

Year	2006	2007	2008	2009	2010
Percent unaccounted-for water	10%[a]	10%[a]	10%[a]	10%[a]	10%[a]
Miles of distribution lines survey	20[d]	20[d]	20[d]	20[d]	20[d]
Miles of distribution lines repaired	400 leaks[d]	400 leaks[d]	400 leaks[d]	400 leaks[d]	400 leaks[d]
Expenditures, $	$31,200[e]	$31,200[e]	$31,200[e]	$31,200[e]	$31,200[e]
Water savings, ac-ft/yr	4,800	9,500	14,300	19,000	23,800

Note: The projection of program activity from 2006 through 2010 is estimated based on requirements in the District's current Water Forum conservation agreement. The District is in the process of evaluating this BMP, and as a result actual future implementation may vary from the data provided in this table.
Note: Water Savings are cumulative savings based on the water savings life of the BMP and starting in 2006.
[a]The District is not completely metered and can only estimate un-accounted-for water.
[b]Data not available.
[c] A leak repair is estimated to reduce water usage by 7.4 gallons per minute (gpm) for every leak. This savings is based on Table 4-3 of AWWA manual M36, Water Audits and Leak Detection, using an assumed average leak size of 0.2 in and 60 pounds per square inch (psi) pressure. Water savings per leak given in this table range from 1.9 gpm for 0.1 inch diameter hole to 29.6 gpm for a 0.4 inch diameter hole, thus 7.4 gallons per minute is a conservative estimate. Over the course of one year, the water savings per leak with a 0.2 inch diameter hole is 11.9 ac-ft.
[d]Estimated
[e]Does not include cost of repairs.

BMP 4. Metering with commodity rates for all new connections and retrofit of existing connections.

Description: The District is in the process of metering all residential connections. Most of the non-residential connections are metered. The District is currently in the fifth year of their metering program. This phase consists of retrofitting existing services for water meters that are not equipped with meter setters. The District fitted 1,325 previously unmetered accounts with meters during the past year. The District requires meters for all new connections and bills by volume of use for residential and non-residential customers.

The District has not conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters. However, all new construction has separate irrigation meters. In 2004 the District had 4,400 CII accounts with mixed-use meters. No CII accounts with mixed-use meters were retrofitted with dedicated irrigation meters during reporting period.

Schedule: The District in 2004 adopted a new metering program. The 2004 metering program is scheduled to be completed in 2024.

Evaluation of BMP Effectiveness: Effectiveness of this BMP will be evaluated by comparison of prior water use to future water use once the system is completely metered. An estimate of water saved as a result of meter retrofits, number of metered and unmetered accounts, and the number of accounts without commodity rates as well as expenditures to-date and projected are provided in Tables 6-8 and 6-9, respectively.

Table 6-8. Actual Conservation Activities, Expenditures, and Water Savings, BMP 4. Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections

Year	2001	2002	2003	2004	2005 (proj)
Unmetered accounts	--[a]	31,609	--[a]	25,231	26,351
Retrofit meters installed	2,556	--[a]	2,556	1,166	945
Accounts without commodity rates	--[a]	41,603	--[a]	35,589	36,925
Expenditures, $	--[a]	--[a]	--[a]	$1,051,222[b]	$819,065[c]
Water savings, ac-ft/yr	1,500	1,500	1,900	2,000	2,600

Note: Water Savings are cumulative savings based on the water savings life of this BMP.

[a]Data not available.

[b]2004 costs based on $565,000 for labor and $417 per meter for materials (meter, meter setter, and box)

[c]2005 costs based on $425,000 (contract amount – not completed as of the date of this report) for labor and $417 per meter for materials (meter, meter setter, and box)

Table 6-9. Projected Conservation Activities, Expenditures, and Water Savings, BMP 4. Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections

Year	2006	2007	2008	2009	2010
Unmetered accounts	25,033	23,708	22,383	21,058	19,733
Retrofit meters installed	1,325	1,325	1,325	1,325	1,325
Accounts without commodity rates	26,351	25,026	23,701	22,376	21,051
Expenditures, $	$1,192,500	$1,192,500	$1,192,500	$1,192,500	$1,192,500
Water savings, ac-ft/yr	200	400	600	800	1,000

Note: The projection of program activity from 2006 through 2010 is estimated based on requirements in the District's current Water Forum conservation agreement. The District is in the process of evaluating this BMP, and as a result actual future implementation may vary from the data provided in this table.

Note: Water Savings are cumulative savings based on the water savings life of the BMP and starting in 2006.

BMP 5. Large landscape conservation programs and incentives.

Description: The large landscape conservation program consists of identifying all irrigation accounts and commercial, industrial, and institutional (CII) accounts with landscape of one acre and larger, and recording this information into a database. The District has prepared irrigation educational information for all customers. The District has hired a contract landscape water auditor to perform surveys and a landscape water-use review program contractor to provide audits and other services for the program. The District had approximately 4,400 CII accounts in 2004. 25 of these accounts have had landscape surveys. Surveys include an irrigation system check, distribution uniformity analysis, review or development of an irrigation schedule, measurement of the landscape area, measurement of the total irrigable area, and a report and information provided for the customer.

The District does not yet track survey offers and results or provide follow-up surveys for previously completed surveys. The District does offer financial incentives. The base rate per meter size is waived each month and the district has a strict tiered rate system based on ETo for participants of the program. The District does not provide landscape water use efficiency info to new customers and customers changing services. The District does have irrigated landscaping at the District facilities. Through RWA (radio spots, billboards and newspapers), bill inserts and on the bill, the District provides customer notices at the start and/or end of the irrigation.

There are approximately 100 dedicated irrigation meter accounts in the District. Ten of the dedicated irrigation meter accounts have water budgets. The budgeted water use for irrigation meter accounts with water budgets is 80% of the evapotranspiration rate (ETo) (3.8 ac-ft per acre) for Tier 1, 80-100% for Tier 2 (3.8-4.75 ac-ft per acre) and over 100% for Tier 3 (over 4.75 ac-ft per acre). ETo is the loss of water from the soil both by evaporation and by transpiration from the plants growing thereon. Participants must be within the Tier 1 budgeted use in order to receive the financial incentives of this program.

Actual water use for irrigation meter accounts with water budgets is tracked by the District but the District does not provide water use notices to accounts with budgets for each billing cycle. The

District has not developed a marketing/targeting strategy for landscape surveys at this time. The District staff promotes the program verbally when they come into contact with large landscape/irrigation customers.

Schedule: This program is conducted annually and began in August 2004.

Evaluation of BMP Effectiveness: Effectiveness of this BMP is evaluated by comparison of large landscape customer prior water use to future water use. An estimate of water saved as a result of meter retrofits, number of metered and unmetered accounts, and the number of accounts without commodity rates as well as expenditures to-date and projected are provided in Tables 6-10 and 6-11, respectively.

Table 6-10. Actual Conservation Activities, Expenditures, and Water Savings, BMP 5. Large Landscape Conservation Programs and Incentives

Year	2001	2002	2003	2004	2005 (proj)
Budgets developed	--	--	--	1	15
Surveys completed	--	--	--	14	25
Follow-up visits	--	--	--	0	5
Expenditures, $	--	--	--	$600	$5,000
Water savings, ac-ft/yr	--	--	--	53	147

Note: Water Savings are cumulative savings based on the water savings life of this BMP.

Table 6-11. Projected Conservation Activities, Expenditures, and Water Savings, BMP 5. Large Landscape Conservation Programs and Incentives

Year	2006	2007	2008	2009	2010
Budgets developed	11	11	11	11	11
Surveys completed	11	11	11	11	11
Follow-up visits	11	11	11	11	11
Expenditures, $	$20,200	$20,200	$20,200	$20,200	$20,200
Water savings, ac-ft/yr	41	82	123	165	166

Note: The projection of program activity from 2006 through 2010 is estimated based on requirements in the District's current Water Forum conservation agreement. The District is in the process of evaluating this BMP, and as a result actual future implementation may vary from the data provided in this table.
Note: Water Savings are cumulative savings based on the water savings life of the BMP and starting in 2006.

BMP 6. High-efficiency washing machine rebate programs.

Description: The District is not currently implementing this BMP since this BMP is not cost effective to the District. An economic evaluation of this BMP is provided in Appendix H of this plan and discussed in Section 6.2 of this chapter.

Schedule: Not applicable. The District is not currently implementing this BMP.

Evaluation of BMP Effectiveness: Not applicable. The District is not currently implementing this BMP.

BMP 7. Public information programs.

Description: Public information is an ongoing component of the District's water conservation program. A primary component of the District's public information program is the Antelope Gardens, a Xeriscape demonstration garden with year-round activities. The District produces a quarterly newsletter and monthly inserts that include a regular feature devoted to the promotion of water conservation. The newsletter is distributed through the mail to all District customers while the inserts are included in customer billing statements each month. The District has an active role in the Water Efficiency Committee under the Regional Water Authority (RWA), which promotes water conservation news articles, fliers, media coverage, and community events.

Schedule: The District's public information program is an ongoing, annual program.

Evaluation of BMP Effectiveness: Savings from this program cannot be directly quantified. The activities performed in this program as well as expenditures to-date and projected are provided in Tables 6-12 and 6-13, respectively.

Table 6-12. Actual Conservation Activities and Expenditures, BMP 7. Public Information Programs

Year	2001	2002	2003	2004	2005 (proj)
a. Paid advertising	--[a]	--[a]	No	No	No
b. Public service announcement	--[a]	--[a]	Yes	Yes	Yes
c. Bill inserts/newsletters/brochures	--[a]	--[a]	Yes	Yes	Yes
d. Bill showing water usage	--[a]	--[a]	No	No	yes
e. Demonstration gardens	Two gardens	Two gardens	Two gardens	Two gardens	Two gardens
f. Speaker events, media events	--[a]	--[a]	Yes	Yes	Yes
g. Speaker's bureau	--[a]	--[a]	Yes	Yes	Yes
h. Program to coordinate with other government agencies, industry, and public interest groups and media			Yes, with RWA	Yes, with RWA	Yes, with RWA
Expenditures, $	--[a]	--[a]	$5,000	$8,000	$8,000

[a]Data not available.

Table 6-13. Projected Conservation Activities and Expenditures, BMP 7. Public Information Programs

Year	2006	2007	2008	2009	2010
a. Paid advertising	No	No	No	No	No
b. Public service announcement	Yes	Yes	Yes	Yes	Yes
c. Bill inserts/newsletters/brochures	Yes	Yes	Yes	Yes	Yes
d. Bill showing water usage	yes	yes	yes	yes	yes
e. Demonstration gardens	Two gardens	Two gardens	Two gardens	Two gardens	Two gardens
f. Speaker events, media events	Yes	Yes	Yes	Yes	Yes
g. Speaker's bureau	Yes	Yes	Yes	Yes	Yes
h. Program to coordinate with other government agencies, industry, and public interest groups and media	Yes, with RWA	Yes, with RWA	Yes, with RWA	Yes, with RWA	Yes, with RWA
Expenditures, $	$8,000	$8,000	$8,000	$8,000	$8,000

Note: The projection of program activity from 2006 through 2010 is estimated based on requirements in the District's current Water Forum conservation agreement. The District is in the process of evaluating this BMP, and as a result actual future implementation may vary from the data provided in this table.

BMP 8. School education programs.

Description: School education is an ongoing component of the District's water conservation program. The RWA's Water Efficiency Committee implements the Sacramento Bee school outreach program, which is a water conservation program targeted at grades K through 8. Schools only need to request material from the Sacramento Bee to utilize the program. A program targeted at high school students is currently being developed. A program for job shadowing and volunteering is being developed for high school students. For grades 2-6th the District participates in the RWA's school education program. The program includes the following:

- Mr. Leaky activity booklets for grades 2-4th.
- School presentations that reach 15,000 3rd-6th graders.

The District will perform six classroom presentations for 4-6th grades and has purchased activity booklets appropriate for that grade level, in 2005.

Schedule: The District's school education program is an ongoing, annual program. The District began implementing this program in the year 2003.

Evaluation of BMP Effectiveness: Savings from this program cannot be directly quantified. The activities performed in this program as well as expenditures to-date and projected are provided in Tables 6-14 and 6-15, respectively.

Table 6-14. Actual Conservation Activities and Expenditures, BMP 8. School Education Programs

Year	2001	2002	2003	2004	2005 (proj)
Grades K-3rd	--[a]	--[a]	Yes	Yes	Yes
Grades 4th-6th	--[a]	--[a]	Yes	Yes	Yes
Grades 7th-8th	--[a]	--[a]	No	No	No
High School	--[a]	--[a]	No	No	No
Expenditures, $	--[a]	--[a]	$7,000	$7,000	$9,000

[a]Program not yet started.

Table 6-15. Projected Conservation Activities and Expenditures, BMP 8. School Education Programs

Year	2006	2007	2008	2009	2010
Grades K-3rd	Yes	Yes	Yes	Yes	Yes
Grades 4th-6th	Yes	Yes	Yes	Yes	Yes
Grades 7th-8th	No	No	No	No	No
High School	No	No	No	No	No
Expenditures, $	$4,000	$4,000	$4,000	$4,000	$4,000

Note: The projection of program activity from 2006 through 2010 is estimated based on requirements in the District's current Water Forum conservation agreement. The District is in the process of evaluating this BMP, and as a result actual future implementation may vary from the data provided in this table.

BMP 9. Conservation programs for commercial, industrial, and institutional accounts.

Description: The District has developed a conservation program for CII accounts that includes water audits targeted to the top water users. The program does not include surveys of past program participants to determine if audit recommendations were implemented. This program does include incentives related to the use of efficient water-use technologies. The District participates in the RWA Rinse and Save program. High-velocity, high-performance pre-rinse nozzles installed free of charge in restaurants within the District service area reduce the amount of hot water used to pre-rinse dishes for the dishwasher. The District also has a CII toilet replacement program. In 2004, District currently had 4,099 commercial accounts, 242 industrial accounts, and 59 institutional accounts.

Schedule: This program is conducted annually and began in the year 2004.

Evaluation of BMP Effectiveness: Effectiveness of this BMP will be evaluated by comparison of CII accounts prior water use to future water use. The activities performed in this program as well as expenditures to-date and projected are provided in Tables 6-16 and 6-17, respectively.

Table 6-16. Actual Conservation Activities, Expenditures, and Water Savings, BMP 9. Conservation Programs for Commercial, Industrial, and Institutional Accounts

Year	2001	2002	2003	2004	2005 (proj)
On-site surveys completed	0	0	0	19	35
Were incentives provided?	--	--	--	Yes	Yes
Follow-up visits	--	--	--	No	No
Expenditures, $	$0	$0	$0	$3,000	$6,500
Water savings, ac-ft/yr	0	0	0	6.7	19.1

Note: Water Savings are cumulative savings based on the water savings life of the BMP.

Table 6-17. Projected Conservation Activities, Expenditures, and Water Savings, BMP 9. Conservation Programs for Commercial, Industrial, and Institutional Accounts

Year	2006	2007	2008	2009	2010
On-site surveys completed	88	89	89	89	89
Will incentives be provided?	Yes	Yes	Yes	Yes	Yes
Follow-up visits	No	No	No	No	No
Expenditures, $	$70,442	$70,635	$70,635	$70,635	$70,635
Water savings, ac-ft/yr	95	190	286	381	382

Note: The projection of program activity from 2006 through 2010 is estimated based on requirements in the District's current Water Forum conservation agreement. The District is in the process of evaluating this BMP, and as a result actual future implementation may vary from the data provided in this table.
Note: Water Savings are cumulative savings based on the water savings life of the BMP and starting in 2006.

BMP 10. Wholesale agency assistance programs.

This BMP is not applicable to the District because the District is not a wholesale agency.

BMP 11. Conservation pricing.

Description: The District currently implements conservation pricing for all its metered customers. All of the District's commercial, irrigation, and multi-family customers are metered. Uniform quantity charge is considered to meet the definition of conservation pricing. Tiered rates are implemented for residential customers as they become metered. The District does not provide sewer service and the District is not a wholesaler. A discussion of the account types that apply to the District and the year the rate was effective is provided in Table 6-18.

Schedule: The implementation of this BMP is ongoing.

Evaluation of BMP Effectiveness: Effectiveness of this BMP will be evaluated by comparison of District water use prior to and following the implementation of conservation pricing.

Table 6-18. Description of District Rate Structures, BMP 11. Conservation Pricing

Account type	Define
Residential	
Water rate structure	Tiered conservation rate structure for metered customers, flat rate for unmetered customers
Year rate effective	Tiered rate structure become effective in the November following when a customer receives a water meter
Commercial, Industrial, Institutional	
Water rate structure	Tiered conservation rate structure (seasonal)
Year rate effective	Rates were recently adjusted as a result of a District study in 2003
Irrigation (dedicated meter)	
Water rate structure	Tiered conservation rate structure (seasonal)
Year rate effective	Rates were recently adjusted as a result of a District study in 2003

BMP 12. Conservation coordinator.

Description: A conservation coordinator is an ongoing component of the District's water conservation program. The conservation coordinator is responsible for implementing and monitoring the District's water conservation activities. A conservation coordinator has been selected and is in place as of 2004. This is a full time position. The conservation coordinate is Linda Higgins. The position title is Water Conservation Coordinator. Linda has four years of conservation experience in a previous position with the City of Sacramento. There are also two part time staff during the summer months. Conservation coordinator and staff information including annual expenditures historically and projected are provided in Tables 6-19 and 6-20.

Schedule: The implementation of this BMP is ongoing.

Evaluation of BMP Effectiveness: Water savings from this BMP cannot be directly quantified. Effectiveness of this BMP will be evaluated by the success of the District's water conservation program.

Table 6-19. Actual Conservation Activities and Expenditures, BMP 12. Water Conservation Coordinator

Year	2001	2002	2003	2004	2005 (proj)
Full-time positions				1	1
Part-time staff	2	2	2	2	2
Position supplied by other agency	--	--	--	--	--
Expenditures, $	--[a]	--[a]	--[a]	$55,000	$65,000

[a]Data not available.

Table 6-20. Projected Conservation Activities and Expenditures, BMP 12. Water Conservation Coordinator

Year	2006	2007	2008	2009	2010
Full-time positions	1	1	1	1	1
Part-time staff	2	2	2	2	2
Position supplied by other agency	--	--	--	--	--
Expenditures, $	$75,000	$75,000	$75,000	$75,000	$75,000

Note: The projection of program activity from 2006 through 2010 is estimated based on requirements in the District's current Water Forum conservation agreement. The District is in the process of evaluating this BMP, and as a result actual future implementation may vary from the data provided in this table.

BMP 13. Water waste prohibition.

Description: Water waste prohibition is an ongoing component of the District's water conservation program. This District has adopted its own set of water conservation regulations. A copy of the District's regulations is provided in Appendix G. Chapter 7 of this plan provides a description of the prohibited water uses in District's water waste regulations.

The District does not include water softener checks in the home water survey program. The District does not include information about Demand Initiated Regenerating and exchange-type water softeners in education efforts to encourage replacement of less efficient timer models.

A summary of the program including annual expenditures in the past and projected is provided in Tables 6-21 and 6-22, respectively.

Schedule: The implementation of this BMP is ongoing. This program started in February 2002.

Evaluation of BMP Effectiveness: Water savings from this program cannot be directly quantified.

Table 6-21. Actual Conservation Activities and Expenditures, BMP 13. Water Waste Prohibition

Year	2001	2002	2003	2004	2005 (proj)
Waste ordinance in effect		Yes	Yes	Yes	Yes
On-site visits		--[a]	2,000	2,500	3,100
Water softener ordinance		No	No	No	No
Expenditures, $		--[a]	--[a]	$12,000	$16,000

[a]Data not available.

Table 6-22. Projected Conservation Activities and Expenditures, BMP 13. Water Waste Prohibition

Year	2006	2007	2008	2009	2010
Waste ordinance will be in effect	Yes	Yes	Yes	Yes	Yes
On-site visits	3,100	3,100	3,100	3,100	3,100
Water softener ordinance	No	No	No	No	No
Expenditures, $	$54,500	$54,500	$54,500	$54,500	$54,500

Note: The projection of program activity from 2006 through 2010 is estimated based on requirements in the District's current Water Forum conservation agreement. The District is in the process of evaluating this BMP, and as a result actual future implementation may vary from the data provided in this table.

BMP 14. Residential ULFT replacement programs.

Description: The District participates in the RWA/SRCSD ULFT rebate program. The customers must submit an application for rebate to the District. The customer is responsible for toilet installation, and the District verifies that the customers have installed the toilet at the correct property. There is not a retrofit upon resale ordinance in effect in the District's service area.

Schedule: The program began in 2004 and is conducted annually.

Evaluation of BMP Effectiveness: Effectiveness of this BMP will be evaluated by comparison of CII accounts prior water use to future water use. The activities performed in this program as well as expenditures to-date and projected in the future are provided in Tables 6-23 and 6-24, respectively.

Table 6-23. Actual Conservation Activities and Expenditures, BMP 14. Residential ULFT Replacement Program

Year	2001	2002	2003	2004	2005 (proj)
SF toilet rebates	--	--	--	96	455
MF toilet rebates	--	--	--	234	305
Expenditures, $	--	--	--	$41,200	$ 68,000
Water savings, ac-ft/yr	--	--	--	8.0	26.4

Note: Water Savings are cumulative savings based on the water savings life of this BMP.

Table 6-24. Projected Conservation Activities and Expenditures, BMP 14. Residential ULFT Replacement Program

Year	2006	2007	2008	2009	2010
SF toilet rebates	455	455	455	455	455
MF toilet rebates	305	305	305	305	305
Expenditures, $	$68,000	$68,000	$68,000	$68,000	$68,000
Water savings, ac-ft/yr	44.9	63.3	81.7	100.2	118.6

Note: The District is in the process of evaluating this BMP, and as a result actual future implementation may vary from the data provided in this table. Water Savings are cumulative savings based on the water savings life of the BMP and starting in 2006

6.2 Economic Analysis Results

Table 6-25 summarizes the results of the economic analysis in terms of the benefit/cost (B/C) ratio, total benefits, and water savings for BMP 6. Economic analyses are not provided for the remaining BMPs because they are currently being implemented. The economic analysis shows that BMP 6 yields a B/C ratio of less than one. The per ac-ft cost of water assumed for this analysis is $250/ac-ft. The detailed economic analysis for this BMP is provided in Appendix H.

Table 6-25. Results of Economic Analysis for BMP 6

Economic analysis	BMP 6: High Efficiency Washing Machine Rebate program
Total present value cost ($)	120,825
Total present value benefits ($)	118,029
Discount rate	Nominal interest rate=6.1%, Assumed interest rate=3.0%
Total water saved (acre-feet)	774
Benefit / cost ratio	0.98
Time horizon	2006-2034

The analysis was performed using the Maddaus Demand Management Decision Support System (DSS), a Microsoft® Excel 2003 spreadsheet based program. The DSS has been designed to provide a detailed planning evaluation framework for water demand management programs. The DSS analysis spreadsheet program projects on an annual basis the number of interventions, water savings, and the dollar values of the benefits and costs that would result from implementing the BMPs. Industry experience-based "common" assumptions and inputs from data provided by the District are used in the economic analysis.

6.3 Additional Issues

This section describes additional issues required to be addressed by the Urban Water Management Planning Act. Non-economic factors, including environmental, social, health, customer impacts, and technological are not thought to be significant in deciding which BMPs to implement. There are no planned water supply projects that would provide water at a higher unit cost. The District has the legal authority to implement the BMPs. In the past, the former Northridge Water District, along with the Sacramento Area Water Works Association (SAWWA), partnered with SMUD in a washing machine rebate program. The program was discontinued due to a very low participation rate. During the time this program was implemented, 5 to 10 washers out of 200 were purchased by Northridge Water District customers. The District investigated new partnering agencies for participation in the washer rebate program, but was unsuccessful.

CHAPTER 7
WATER SUPPLY VERSUS DEMAND COMPARISON

This chapter provides a comparison of projected water supplies and demand and water shortage expectations. Also described are the components of the District's Water Shortage Contingency Plan and the District's Catastrophic Supply Interruption Plan.

7.1 Current and Projected Water Supplies vs. Demand

This section provides a comparison of normal, single-dry, and multiple dry water year supply and demand for the District. Water demands are addressed in Chapter 3, water supply is addressed in Chapter 4, and recycled water supply is addressed in Chapter 5 of this Plan.

7.1.1 Current and Projected Normal Year Water Supplies vs. Demand

The normal water year current and projected water supplies are compared to the current and projected demand for the District in Table 7-1.

Table 7-1. Normal Year Water Supply and Demand Comparison, ac-ft/yr

	2005	2010	2015	2020	2025
Supply totals	63,200	81,400	85,400	85,400	85,400
Demand totals	52,027	52,536	53,697	54,647	57,869
Difference (supply minus demand)	11,173	28,864	31,703	30,753	27,531
Difference as a percent of supply	18%	35%	37%	36%	32%
Difference as a percent of demand	21%	55%	59%	56%	48%

Units of Measure: ac-ft/yr

7.1.2 Current and Projected Single-Dry Year Water Supplies vs. Demand

The current and projected water supplies are compared to the demands for a single dry year for the District in Table 7-2.

Table 7-2. Single-Dry Year Water Supply and Demand Comparison, ac-ft/yr

	2005	2010	2015	2020	2025
Supply totals	58,000	58,000	58,000	58,000	58,000
Demand totals	52,027	52,536	53,697	54,647	57,869
Difference (supply minus demand)	5,973	5,464	4,303	3,353	138
Difference as a percent of supply	10%	9%	7%	6%	0%
Difference as a percent of demand	11%	10%	8%	6%	0%

Units of Measure: ac-ft/yr

7.1.3 Projected Multiple-Dry Year Water Supplies vs. Demand

The projected water supplies are compared to the demands for multiple dry years for the District in Tables 7-3 through 7-6.

Table 7-3. Multiple-Dry Year Water Supply and Demand Comparison, ac-ft/yr, Period Ending in 2010

	2006	2007	2008	2009	2010
Supply totals	58,000	58,000	58,000	58,000	58,000
Demand totals	52,129	52,230	52,332	52,434	52,536
Difference (supply minus demand)	5,871	5,770	5,668	5,566	5,464
Difference as a percent of supply	10%	10%	10%	10%	9%
Difference as a percent of demand	11%	11%	11%	11%	10%

Units of Measure: ac-ft/yr

Table 7-4. Multiple-Dry Year Water Supply and Demand Comparison, ac-ft/yr, Period Ending in 2015

	2011	2012	2013	2014	2015
Supply totals	58,000	58,000	58,000	58,000	58,000
Demand totals	52,768	53,000	53,233	53,465	53,697
Difference (supply minus demand)	5,232	5,000	4,767	4,535	4,303
Difference as a percent of supply	9%	9%	8%	8%	7%
Difference as a percent of demand	10%	9%	9%	8%	8%

Units of Measure: ac-ft/yr

Table 7-5. Multiple-Dry Year Water Supply and Demand Comparison, ac-ft/yr, Period Ending in 2020

	2016	2017	2018	2019	2020
Supply totals	58,000	58,000	58,000	58,000	58,000
Demand totals	53,887	54,077	54,267	54,457	54,647
Difference (supply minus demand)	4,113	3,923	3,733	3,543	3,353
Difference as a percent of supply	7%	7%	6%	6%	6%
Difference as a percent of demand	8%	7%	7%	7%	6%

Units of Measure: ac-ft/yr

Table 7-6. Multiple-Dry Year Water Supply and Demand Comparison, ac-ft/yr, Period Ending in 2025

	2021	2022	2023	2024	2025
Supply totals	58,000	58,000	58,000	58,000	58,000
Demand totals	55,290	55,933	56,576	57,219	57,869
Difference (supply minus demand)	2,710	2,067	1,424	781	138
Difference as a percent of supply	5%	4%	2%	1%	0%
Difference as a percent of demand	5%	4%	3%	1%	0%

Units of Measure: ac-ft/yr

7.2 Water Shortage Expectations

Water shortages are not projected because the groundwater supply can meet demands during the dry years when minimal surface water is available. During a dry year, the District would likely receive only minimal surface water supplies. However, groundwater supplies are adequate to meet all demands. Groundwater supply shortages are not expected. With the formation of the Water Forum and SGA, and the implementation of conjunctive use practices, the groundwater supply should be maintained.

7.3 Water Shortage Contingency Plan

The Water Forum Agreement describes supply scenarios for normal, dry, and conference years. However, the Water Forum Agreement acknowledges that there may be years where surface water supply is less than even the stipulated decreased demands. The District may also experience short-term water shortages due to mechanical failures or other circumstances. For these instances, the District has developed a water shortage contingency plan. The complete plan is included in Appendix G. In addition, the District has an Emergency Response Plan (Sacramento Suburban Water District, 2005) in place to mitigate against the impact of catastrophic emergencies and inconvenience to its customers. The Emergency Response Plan is not included in this document due to security reasons.

7.3.1 Stages of Action

The District's water shortage contingency plan is based on five stages as defined in Table 7-7.

Table 7-7. Water Shortage Contingency Plan Stages

Stage	Water supply conditions	Percent shortage
Stage 1 – Normal Water Supply	Supplies available to meet all demands	0
Stage 2 – Water Alert	Probability that supplies will not meet demands	5
Stage 3 – Water Warning	Supplies will not be able to meet expected demands	15
Stage 4 – Water Crisis	Supplies not meeting current demands	30
Stage 5 – Water Emergency	Major failure of a supply, storage, or distribution system	50

7.3.2 Three-Year Minimum Water Supply

The three-year minimum water supply is presented in Chapter 4. Results are summarized below in Table 7-8.

Table 7-8. Estimated Minimum Water Supply, Ac-ft/yr

Source	2006	2007	2008	Normal
Surface Water				
Purchase - USBR (215)	0	0	0	10,000
Transfer - PCWA	0	0	0	29,000
Entitlement - City of Sacramento	0	0	0	22,400
Supplier produced groundwater	58,000[b]	58,000[b]	58,000[b]	24,000
Recycled water[c]	0	0	0	0
Water supply loss due to water quality	(0)	(0)	(0)	(0)
Desalination water	0	0	0	0
Total	58,000	58,000	58,000	85,400

7.3.3 Catastrophic Supply Interruption Plan

The District has prepared a security vulnerability assessment and maintains an Emergency Response Plan to address responding to catastrophic supply interruptions as well as other emergencies. The District also has standby power in the form of portable diesel, natural gas and propane generator units. This increases the reliability of supply. The Emergency Response Plan is not included in this document due to security reasons.

The District utilizes an emergency organizational structure and chain of command in response to all emergencies within or affecting its service area. The Emergency Response Plan defines the emergency management positions.

The organizational response is divided into two levels of emergency. The two types of emergencies are categorized as follows:

Site emergency - does not exceed the following criteria:

- Limited to one District facility AND
- Incident has no potential for serious impact on the public OR
- Incident has no potential for serious impact on water quality/delivery

District emergency - exceeds site emergency criteria:

- Incident affects multiple District facilities OR
- Incident has the potential for serious impact on the public OR
- Incident has the potential for serious impact on water quality/delivery

The roles and responsibilities of each individual in the emergency organization are defined for both levels of emergency. The following Table 7-9 summarizes the response actions to possible major catastrophes within the District. The Emergency Response Plan provides detailed response actions for each individual possible major catastrophe.

Table 7-9. Preparation Actions for a Catastrophe

Possible catastrophe	Summary of actions
• Earthquake • Fire/explosion • Medical • Flood • Tornado/severe weather • Bomb threat • Hard freeze • Loss of normal water supply • Hazardous material release • Contamination of District water supplies • Terrorist attack	Command chain is defined that dispatches crews to inspect infrastructure and critical operations. Operations response crews assigned to monitor system operations and modify as necessary. . Communication command chain is defined to coordinate with other local water agencies and emergency response officials as necessary. Criteria and procedures provided to return system to normal operations including initiating water quality testing when necessary and performing necessary emergency repairs to the system. Plan contains contact information for responsible parties and support services. Water shortage contingency plan stages will be implemented as required by the situation.

7.3.4 Prohibitions, Consumption Reduction Methods, and Penalties

Mandatory prohibition consumption reduction methods, and penalties in the District's water shortage contingency plan are presented in Appendices G and summarized below in Tables 7-10 through 7-12 to conform to the UWMP guidelines.

Table 7-10. Mandatory Prohibitions

Prohibitions	Stage when prohibition is voluntarily requested	Stage when prohibition becomes mandatory
Street/sidewalk cleaning		1
Washing cars (residential)		Restricted in 1-2 Prohibited starting in 3
Watering lawns/landscapes		Restricted in 1-4 Prohibited in 5
Uncorrected plumbing leaks		1
Gutter flooding		1
No refilling or filling of pools	1	Restricted in 1-4 Prohibited in 5
Car wash facilities (must use recycled water)		1
No new connections		5

Table 7-11. Consumption Reduction Methods

Examples of consumption reduction methods	Stage when method takes effect	Projected reduction, percent
Demand reduction program	2	5%-50%
Restrict building permits	4	Not estimated
Restrict for only priority uses	5	Not estimated
Use prohibitions	1	Not estimated
Mandatory rationing	2	5%-50%
Education Program	1	Not estimated
Irrigation allowed only during off-peak hours	1	Not estimated

Table 7-12. Penalties and Charges

Examples of penalties and charges	Stage when penalty takes effect
Penalties for not reducing consumption	2
Termination of service and reconnect fee	1

7.3.5 Analysis of Revenue Impacts of Reduced Sales During Shortages

The following Tables 7-13 through 7-16 present the District's analysis of reduced revenues during water shortages. Additional impacts on the District due to reduced revenues may also include impacts to projects such as capital improvement program projects, meters, and main replacement that are dependent on revenues for funding.

Table 7-13. Actions and Conditions that Impact Revenues

Type	Anticipated revenue reduction
Reduced sales	Because 60 percent of the District's budget is funded through a flat-rate charge to single family residential consumers, revenue impacts from decreasing supply and consumer use would be minimal. Since metered customer types only make up 40 percent of the utility's users, the revenue impacts would be minimal. Only the quantity charge portion of the bill to metered customers would experience a reduction. As the District becomes more metered, revenue impacts would become more significant. Revenues from metered customers would be reduced. Customers with meters include multi-family, commercial, industrial, irrigation, institutional, and some single family customers

Table 7-14. Actions and Conditions that Impact Expenditures

Category	Anticipated cost
Increase staff cost	Although expenditures on water purchases would decrease, administration and operations and maintenance expenses for the District would remain the same.
Increased O&M cost	Although expenditures on water purchases would decrease, administration and operations and maintenance expenses for the District would remain the same.
Increased cost of supply	The impact on water shortage expenditures would be minimal. As the quantity of sales decreases, the utility would decrease the amount of surface water purchased. During a water shortage, the District would first rely upon its groundwater supply, which is $30 to $40 less expensive per acre-ft of supply than the purchase of surface water. This includes the additional cost of electric power to pump groundwater.

Table 7-15. Proposed Measures to Overcome Revenue Impacts

Name of measures	Summary of effects
Rate adjustment	To better address revenue decreases due to demand reductions, the District is planning a new rate structure that includes increased demand charges and pipeline surcharges to cover the fixed costs of operations, capital improvements, and debt service.
Development of reserves	The District has a reserve policy (contingency fund) in place to help offset revenue impacts during times of emergency.

Table 7-16. Proposed Measures to Overcome Expenditure Impacts

Name of measures	Summary of effects
Development of reserves	The District has a reserve policy (contingency fund) in place to help offset expenditure impacts during times of emergency.

7.3.6 Reduction Measuring Mechanisms

The following Table 7-17 summarizes District's procedure for monitoring its various water shortage mechanisms for effectiveness.

Table 7-17. Reduction Measuring Mechanisms

Mechanism for determining actual reduction	Type and quality of data expected
Water production meters	Daily production will be monitored from the water production meters on a daily or weekly basis, dependant upon the severity of the water shortage.
Customer records	As customers become metered their water usage can be monitored when necessary.

CHAPTER 8
REFERENCES

A & N Technical Services, Inc. 1999. Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices. Prepared for the California Urban Water Conservation Council. Draft document dated March 31, 1999.

Brown and Caldwell. December 2000. Northridge Water District Urban Water Management Plan.

Brown and Caldwell. December 2000. Arcade Water District Urban Water Management Plan.

Brown and Caldwell. February 2003. Sacramento Suburban Water District Urban Water Management Plan.

California Urban Water Conservation Council. 1999. The Memorandum of Understanding Regarding Urban Water Conservation in California.

California Urban Water Agencies. 1992. Evaluating Urban Water Conservation Programs: A Procedures Manual.

Carollo Engineers, November 2001. Final Draft Sacramento Regional Wastewater Treatment Plant 2020 Master Plan.

Department of Water Resources (DWR). February 27, 2004. California's Groundwater Bulletin 118-Update 2003, Sacramento Valley Groundwater Basin, North American Subbasin.

EDAW/SWRI. October 1999. Executive Summary of the Water Forum Proposal Final EIR.

Luhdorff and Scalmanini. June 2002. In-Lieu Surface Water Use and Groundwater Basin Conditions, Northridge Service Area.

Luhdorff and Scalmanini. March 2000. Groundwater Basin and Well Conditions, Northridge Water District.

Montgomery Watson. 1999. Regional Water Master Plan, Phase I Final Report Executive Summary. Prepared for American River Basin Cooperating Agencies.

Nolte and Associates, Inc. 1994. Sacramento County Water Reclamation Study Summary Report. Prepared for Sacramento County Sanitary District.

Placer County Water Agency. February 1999. Placer County Water Agency and Northridge Water

District Groundwater Stabilization Project, Final Environmental Impact Report.

SACOG. December 16, 2004. Projections Update Metropolitan Transportation Plan 2027.

Sacramento City – County Office of Metropolitan Water Planning. 1999. Water Forum Action Plan.

Sacramento City – County Office of Metropolitan Water Planning. October 1999. Final Environmental Impact Report for the Water Forum Proposal.

Sacramento Suburban Water District. April 2005. Emergency Response Plan.

Western Regional Climate Center. 1999. Web-Site: Western U.S. Climate Historical Summaries, Climatogolical Data Summaries, (www.wrcc.dri.edu).

APPENDIX A

Notice of Public Hearing

SACRAMENTO SUBURBAN WATER DIST
3701 MARCONI AVE, SUITE 100
SACRAMENTO CA 95821-

DECLARATION OF PUBLICATION
(C.C.P. 2015.5)

COUNTY OF SACRAMENTO

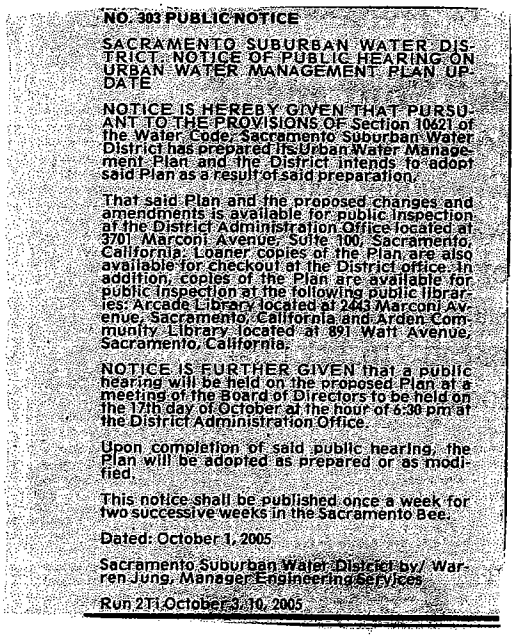
STATE OF CALIFORNIA

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the printer and principal clerk of the publisher of The Sacramento Bee, printed and published in the City of Sacramento, County of Sacramento, State of California, daily, for which said newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Sacramento, State of California, under the date of September 26, 1994, Action No. 379071; that the notice of which the annexed is a printed copy, has been published in each issue thereof and not in any supplement thereof on the following dates, to wit:

October 3, 10, 2005

I certify (or declare) under penalty of perjury that the foregoing is true and correct and that this declaration was executed at Sacramento, California, on October 10, 2005.

(Signature)



NO. 303 PUBLIC NOTICE

SACRAMENTO SUBURBAN WATER DISTRICT NOTICE OF PUBLIC HEARING ON URBAN WATER MANAGEMENT PLAN UPDATE

NOTICE IS HEREBY GIVEN THAT PURSUANT TO THE PROVISIONS OF Section 10621 of the Water Code, Sacramento Suburban Water District has prepared its Urban Water Management Plan and the District intends to adopt said Plan as a result of said preparation.

That said Plan and the proposed changes and amendments is available for public inspection at the District Administration Office located at 3701 Marconi Avenue, Suite 100, Sacramento, California. Loaner copies of the Plan are also available for checkout at the District office. In addition, copies of the Plan are available for public inspection at the following public libraries: Arcade Library located at 2443 Marconi Avenue, Sacramento, California and Arden Community Library located at 891 Watt Avenue, Sacramento, California.

NOTICE IS FURTHER GIVEN that a public hearing will be held on the proposed Plan at a meeting of the Board of Directors to be held on the 17th day of October at the hour of 6:30 pm at the District Administration Office.

Upon completion of said public hearing, the Plan will be adopted as prepared or as modified.

This notice shall be published once a week for two successive weeks in the Sacramento Bee.

Dated: October 1, 2005

Sacramento Suburban Water District by/ Warren Jung, Manager Engineering Services

Run 2T1 October 3, 10, 2005

APPENDIX B

Adoption Resolution

APPENDIX C

Detailed Intertic Information

SACRAMENTO SUBURBAN WATER DISTRICT INTERTIE INVENTORY

Revised 05/03/04

District Name: SACRAMENTO SUBURBAN WATER DISTRICT

DISTRICT INTERTIES

	Intertie Size (inches)	Estimated Flow Rate (gpm)	Meter (Yes/No)	Connected Agency	Location	Proposed Use of Interties	Comments/General Conditions
1	18"	4000	No	Citrus Heights Water District	7722 Antelope Road	Emergency Use	Connected to the SSWD system. Valve and flanged outlet connected to 48-inch pipeline and CHWD system. Flow into CHWD only.
2	30"	11000	No	Carmichael Water District	7690 Antelope Road		Not connected to the SSWD system. Valve and blind flanged outlet connected to 48-inch pipeline.
3	24"	7000	No	Citrus Heights Water District	Lauppe Lane at Antelope Road		Not connected to the SSWD system. Valve and blind flanged outlet connected to 48 inch pipeline
4	12"	1700	No	California-American Water Company	Rollingwood Blvd. at Antelope Road		Not connected to the SSWD system. Valve and blind flanged outlet connected to 48-inch pipeline.
5	12"	1700	No	Citrus Heights Water District	Navion Drive at Van Maren Drive		Not connected to the SSWD system. Valve and blind flanged outlet connected to 48-inch pipeline.
6	16"	3100	No	California-American Water Company	6408 Silk Oak Court at Navion Drive		Not connected to the SSWD system. Valve and blind flange outlet connected to 48-inch pipeline.
7	20"	4900	Yes	California-American Water Company	Roseville Road at Antelope North Road	Emergency Use	Connected to the SSWD system. Valve, meter, post indicator valve assembly.
8	18"	4000	No	California-American Water Company	Antelope Road at Antelope North Road		Not connected to the SSWD system. Valve and blind flanged outlet connected to 48-inch pipeline.
9	10"	1200	No	California-American Water Company	5109 Cherbourg Drive	Emergency Use	Connected to former Northridge distribution system. Isolation valve only.

District Name: SACRAMENTO SUBURBAN WATER DISTRICT

DISTRICT INTERTIES

	Intertie Size (inches)	Estimated Flow Rate (gpm)	Meter (Yes/No)	Connected Agency	Location	Proposed Use of Interties	Comments/General Conditions
10	6"	400	No	California-American Water Company	6029 Jeanie Drive	Emergency Use	Connected to former Northridge – Arvin System. Isolation valve only.
11	6"	400	No	California-American Water Company	Greenback Lane east of Auburn Boulevard	Emergency Use	Connected to former Northridge – Arvin System. Isolation valve only.
12	8"	800	No	California-American Water Company	Coyle Ave/Dewey Drive	Emergency Use	Connected to the former Northridge - Arvin system. Isolation valve only.
13	6"	400	Yes	Citrus Heights Water District	6613 Markley Way	Emergency Use	Connected to the SSWD system. Used to transport surface water from CHWD into SSWD. Directional flow to both agencies.
14	12"	1700	Yes	Citrus Heights Water District	6331 Rutland Drive	Emergency Use	Connected to the SSWD system. Used to transport surface water from CHWD into SSWD. Directional flow to both agencies.
15	6"	400	Yes	Citrus Heights Water District	6601 Oakcrest Avenue	Emergency Use	Connected to the SSWD system. Used to transport surface water from CHWD into SSWD. Directional flow to both agencies.
16	18"	4000	Yes	Carmichael Water District	Cypress Avenue at Manzanita Avenue	Emergency Use	Connected to the SSWD former Northridge system. Used for emergency service. Directional flow to both agencies.
17	12"	1700	No	Carmichael Water District	5507 Gibbons Drive	Unknown	Not connected to the SSWD system. Provides fire service only to one building.
18	8"	800	Yes	Carmichael Water District	250∀ feet east of Walnut Avenue on Engle Road	Emergency Use	Connected to the SSWD former Northridge system. Used for emergency service. Directional flow to both agencies.

District Name: SACRAMENTO SUBURBAN WATER DISTRICT

DISTRICT INTERTIES

	Intertie Size (inches)	Estimated Flow Rate (gpm)	Meter (Yes/No)	Connected Agency	Location	Proposed Use of Interties	Comments/General Conditions
19	6"	400	No	SSWD South Service Area North Service Area	Landolt Area at Eastern Ave.	Emergency Use	Interdistrict connection. Isolation valve only.
20	6"	400	Yes	Carmichael Water District	1548 Gregory Way	Emergency Use	Interdistrict connection. Isolation valve only.
21	8"	800	No	Sacramento County Utilities District	3604 Fair Oaks Blvd.	Emergency Use	Interdistrict connection. Isolation valve only.
22	10"	1200	Yes	Sacramento County Utilities District	Wilhaggin Dr. at San Ramon Way	Emergency Use	Used to provide supplemental water to the County of Sacramento's APV service area per a wholesale water supply agreement dated _____.
23	4"	200	No	Sacramento County Utilities District	1151 Eastern Ave	Emergency Use	
24	10"	1200	Yes	Sacramento County Utilities District	Landino Road at Arden Way		Used to provide supplemental water to the County of Sacramento's APV service area per a wholesale water supply agreement dated _____.
25	10"	1200	Yes	Sacramento County Utilities District	Devonshire Road at Arden Way		Used to provide supplemental water to the County of Sacramento's APV service area per a wholesale water supply agreement dated _____.
26	6"	400	No	Del Paso Manor Water District	4251 Annette Street	Emergency Use	
27	10"	400	No	Del Paso Manor Water District	Northwest Corner Marconi Avenue at Becerra Way	Emergency Use	Post Indicator Valve connected to former Arcade Town & Country system.
28	8"	700	No	Del Paso Manor Water District	2114 Watt Avenue	Emergency Use	Post Indicator Valve connected to former Arcade Town & Country system.

District Name: SACRAMENTO SUBURBAN WATER DISTRICT

DISTRICT INTERTIES

	Intertie Size (inches)	Estimated Flow Rate (gpm)	Meter (Yes/No)	Connected Agency	Location	Proposed Use of Interties	Comments/General Conditions
29	8"	700	No	Arden Cordova Water Service	2025 Morse Avenue	Emergency Use	Post Indicator Valve connected to former Arcade Town & Country system.
30	6"	400	No	Arden Cordova Water Service	1001 Morse Avenue	Emergency Use	Post Indicator Valve connected to former Arcade Town & Country system.
31	6"	400	No	California-American Water Company	2801 Azalea Road	Emergency Use	Post Indicator Valve connected to former Arcade Town & Country system.
32	8"	800	No	California-American Water Company	Southwest Corner Sierra Boulevard at Fulton Avenue	Emergency Use	Post Indicator Valve connected to former Arcade Town & Country system.
33	8"	800	No	Sacramento County Utilities District	701 Blackmer Circle	Emergency Use	Connected to former Arcade Town & Country System
34	6"	400	No	Sacramento County Utilities District	Howe Avenue south of Northrop Avenue (Woodside)	Emergency Use	Connected to former Arcade Town & Country System
35	8"	800	Yes	Sacramento County Utilities District	2240 Northrop Avenue	Emergency Use	Connected to former Arcade Town & Country System
36	6"	400	No	California-American Water Company	1150 Dealynn Street	Emergency Use	Connected to former Arcade Town & Country System
37	8"	800	No	California-American Water Company	1530 Fulton Avenue	Emergency Use	Connected to former Arcade Town & Country System
38	4"	200	No	California-American Water Company	1600 Fulton Avenue	Emergency Use	Connected to former Arcade Town & Country System
39	8	800	No	California-American Water Company	1935 Wright Street	Emergency Use	Connected to former Arcade Town & Country System

District Name: SACRAMENTO SUBURBAN WATER DISTRICT

DISTRICT INTERTIES

	Intertie Size (inches)	Estimated Flow Rate (gpm)	Meter (Yes/No)	Connected Agency	Location	Proposed Use of Interties	Comments/General Conditions
40	8"	800	No	California-American Water Company	Southeast Corner Ethan Way at Alta Arden Expressway	Emergency Use	Connected to former Arcade Town & Country System
41	8"	800	No	City of Sacramento	Northeast Corner Ethan Way at Alta Arden Expressway	Emergency Use	Connected to former Arcade Town & Country System
42	8"	800	No	City of Sacramento	Royale Road – Sears Parking Lot	Emergency Use	Connected to former Arcade Town & Country System
43	6"	400	No	City of Sacramento	1600 Cormorant Way	Emergency Use	Connected to former Arcade Town & Country System
44	8"	800	No	City of Sacramento	Cormoran Way at Silica Way	Emergency Use	Connected to former Arcade Town & Country System
45	6"	400	No	City of Sacramento	2255 Ray Street	Emergency Use	Connected to former Arcade Town & Country System
46	6"	400	No	City of Sacramento	Northeast Corner Albatross Way at El Camino Avenue	Emergency Use	Connected to former Arcade Town & Country System
47	6"	400	Yes	City of Sacramento	1800 Helena Way	Emergency Use	Connected to former Arcade Town & Country System
48	8"	800	Yes	SSWD North Service Area McClellan Business Park	Sacramento County Transfer Station Roseville Road	Standby Service	Supply intertie to McClellan Business Park. Single flow into Park. Backflow protected into SSWD system. Booster pump, backflow, meter
49	20"	5000	Yes	SSWD North Service Area McClellan Business Park	4700-08 Roseville Road	Standby Service	Supply intertie into McClellan Business Park. Dual flows into park. Backflow protected into SSWD system.

District Name: SACRAMENTO SUBURBAN WATER DISTRICT

DISTRICT INTERTIES

	Intertie Size (inches)	Estimated Flow Rate (gpm)	Meter (Yes/No)	Connected Agency	Location	Proposed Use of Interties	Comments/General Conditions
50	8"	800	No	SSWD Inter-district Intertie	4195-97 Cornelia Way	Emergency Use	Not connected to the SSWD system. Supplies water to two residential lots at SSWD boundary.
51	8"	800	Yes	Rio Linda Water District	6836 30th Street	Emergency Use	Connected to former Arcade North Highlands system.
52	24"	7000	Yes	SSWD Arcade Service Area (North Highlands) Northridge Service Area	Walerga Road at Bainbridge Way	Daily Use	Connected to the SSWD system. Operational as of March 2002 for emergency or daily usage. Directional flow available.
53	8"	800	No	California-American Water Company	7547 Watt Avenue	Emergency Use	
54	12"	1700	Yes	California-American Water Company	Antelope Road at Walerga Road	Emergency Use	Connected to the SSWD Northridge system. Valve Meter and post indicator valve.
55	16"	3100	Yes	The Links @ Antelope	Ottawa Way at Cree Way at The Links at Antelope	Standby Service	Supply intertie between former Northridge system and to the Link's housing complex. Valve, meter
56	12"	1700	No	SSWD North Service Area South Service Area	Whitney Avenue at Mission Avenue	Standby Use	Intertie between SSWD North and South Service Areas. Meter will be installed summer 2004.

APPENDIX D

SACOG Traffic Analysis Zones within the District Boundaries

Sacramento Suburban Water District
Percent of SACOG Traffic Analysis Zone within District

TAZ	%
230	0.00
298	0.14
299	0.02
311	0.34
313	1.00
314	1.00
315	1.00
316	1.00
317	1.00
318	1.00
319	1.00
320	0.59
321	0.97
323	0.03
324	0.45
325	0.80
326	1.00
327	0.81
328	0.09
330	1.00
331	0.99
332	1.00
333	1.00
335	0.00
336	0.00
337	1.00
342	1.00
344	0.90
345	0.00
346	0.45
347	1.00
348	0.47
349	0.68
350	1.00
351	1.00
352	0.49
353	0.49
354	1.00
355	0.92
356	0.29
357	0.96
358	0.03
360	0.03
361	0.49
362	0.57
363	1.00
364	1.00
365	0.75
366	1.00
367	1.00
368	1.00
369	0.89

Sacramento Suburban Water District
Percent of SACOG Traffic Analysis Zone within District

TAZ	%
370	0.82
372	0.02
373	1.00
374	1.00
375	1.00
376	1.00
377	1.00
378	1.00
379	1.00
380	0.96
381	0.35
382	1.00
383	1.00
384	1.00
385	1.00
386	0.97
387	0.08
388	1.00
389	0.71
390	0.09
391	1.00
393	0.00
394	0.01
397	0.01
402	0.08
404	0.70
405	0.69
407	0.00
427	0.01
433	0.43
434	0.92
435	0.04
436	0.99
437	0.95
438	0.99
439	0.05
440	0.03
442	0.03
878	0.00
879	0.87
880	0.05
881	0.55
882	0.00
883	1.00
884	0.99
885	1.00
886	1.00
887	0.97
888	0.48
1107	0.36
1108	0.73

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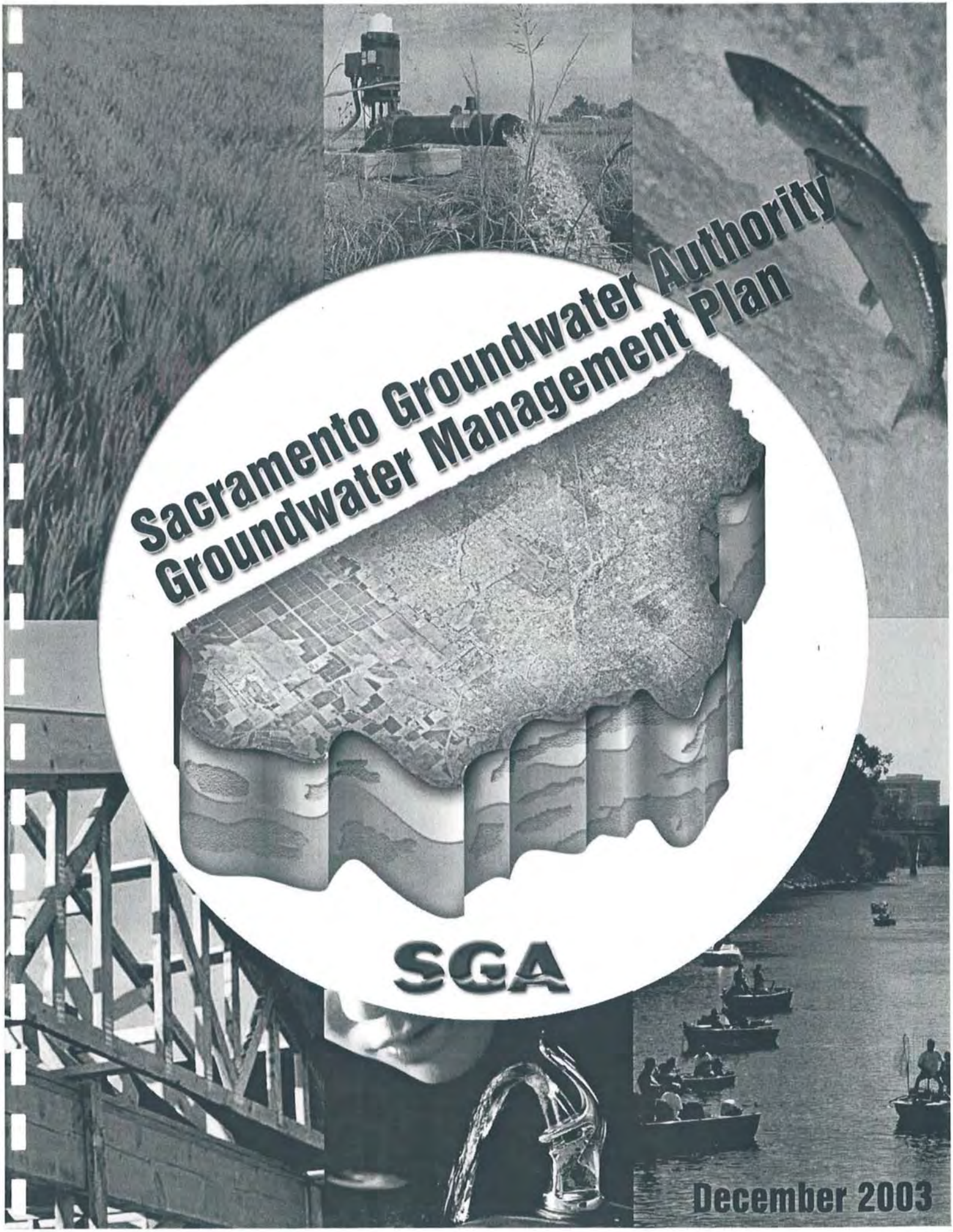
11/22/2005

APPENDIX E

Sacramento Groundwater Authority Groundwater Management Plan


Sacramento Groundwater Authority
Groundwater Management Plan
SGA
December 2003

SACRAMENTO GROUNDWATER AUTHORITY

GROUNDWATER MANAGEMENT PLAN

DECEMBER 2003

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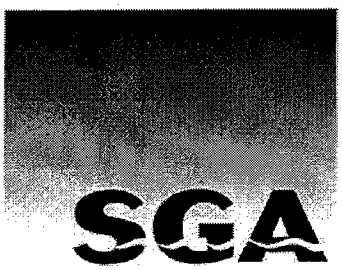

Sacramento Groundwater Authority
Managing Groundwater Resources in Northern Sacramento County

December 11, 2003

Sacramento Groundwater Authority
5620 Birdcage Street, Suite 180
Citrus Heights, CA 95610
Tel: (916) 967-7692
Fax: (916) 967-7322

Members:
California-American Water Company
Carmichael Water District
Citrus Heights Water District
Del Paso Manor Water District
Fair Oaks Water District
Folsom, city of
Natomas Central Mutual Water Company
Orange Vale Water Company
Rio Linda/Elverta Community Water District
Sacramento, city of
Sacramento, county of
Sacramento Suburban Water District
San Juan Water District
Southern California Water Company
agricultural and self-supplied representatives

To Interested Parties and Individuals:

The Sacramento Groundwater Authority (SGA) is pleased to release this Groundwater Management Plan (GMP), adopted December 11, 2003. The plan represents a critical step in establishing a framework for maintaining a sustainable groundwater resource for the various users overlying the basin in Sacramento County north of the American River. It includes specific goals, objectives and an action plan to provide a "road map" for coordination among the 14 overlying water purveyors.

SGA and its members are committed to the regional objectives established by the historic Sacramento Water Forum Agreement, and these objectives are incorporated into the plan. Since SGA's formation in 1998, SGA members have taken many steps to preserve the valuable groundwater resources underlying our region. These activities and specific future actions are described in the GMP.

The plan is the product of several months of effort, with valuable input from technical and policy review committees as well as the public. SGA is grateful for the excellent input, technical assistance and funding provided through partnerships with the U.S. Army Corps of Engineers and the California Department of Water Resources.

This plan represents a starting point for basin management; it is intended to be adaptive. Comments and suggestions to improve our management efforts in the basin are welcome.

Sincerely,

Edward D. Winkler
Executive Director

RESOLUTION NO. 2003-07

A RESOLUTION OF THE SACRAMENTO GROUNDWATER AUTHORITY ADOPTING A GROUNDWATER MANAGEMENT PLAN AND A FINDING OF EXEMPTION FROM THE CALIFORNIA ENVIRONMENTAL QUALITY ACT

The Board of Directors of the Sacramento Groundwater Authority (SGA) does hereby find that:

WHEREAS, the SGA was formed under the Joint Exercise of Powers Act (Chapter 5 of Division 7 of Title 1 of the California Government Code) on August 11, 1998 by the Cities of Citrus Heights, Folsom, and Sacramento, and the County of Sacramento; and

WHEREAS, the SGA was created for the purposes of protecting, preserving, and enhancing, for current and future beneficial uses, the groundwater resources in the North Area Groundwater Basin, in Sacramento County, north of the American River; and

WHEREAS, the SGA has prepared a Groundwater Management Plan for the North Area Groundwater Basin; and

WHEREAS, the Groundwater Management Plan will further ongoing efforts to protect groundwater and interdependent environmental resources in the North Area Groundwater Basin, will facilitate collection of information to further understand and evaluate additional policies and programs for protection of the groundwater resources in the North Area Groundwater Basin, and will assist in other ongoing efforts to study the feasibility of conjunctive use programs utilizing the North Area Groundwater Basin.

NOW, THEREFORE, be it resolved that:

1. The SGA Board hereby adopts a Groundwater Management Plan for the North Area Groundwater Basin, in Sacramento County, north of the American River, copy attached hereto as Exhibit A.

2. The SGA Board further finds that the adoption of the Groundwater Management Plan is exempt from the requirements of the California Environmental Quality Act. (CEQA Guideline §§ 15061, 15306, 15307, 15308, and 15262).

PASSED AND ADOPTED by the Board of Directors of the Sacramento Groundwater Authority, on December 11, 2003.

By: _____
Chairperson, Sacramento Groundwater Authority

Attest: _____
Nancy Egger, Administrative Services Manager/Clerk

Acknowledgments

This Groundwater Management Plan (GMP) is a direct result of the commitment that Sacramento Groundwater Authority (SGA) members made to sustain the groundwater resource for present and future uses in northern Sacramento County. SGA would like to thank the staff of Montgomery Watson Harza in preparing the critical elements of this plan. Also of great value in preparing this plan was the insight generated by public outreach studies by Lucy & Company. Preparation of this GMP was generously supported by a funding partnership with the U.S. Army Corps of Engineers. Much of the data used to generate the information in this GMP was compiled using grant funds and a funding partnership with the California Department of Water Resources. Finally, SGA would like to thank the dedication of the Policy Committee and the Technical Review Committee in guiding the preparation of this plan. The names of the committee members and alternates are listed below:

Policy Committee

Ron Bachman, chair
Tom Barandas (alternate)
Jack DeWit
Tom Gray
Lyle Hoag (alternate)
Shauna Lorance
Gary Reents
Rob Roscoe (alternate)
Mike Winn

Technical Review Committee

Marshall Davert
Bill Dendy
Warren Jung (alternate)
Mary Keller
Ed Kriz
Shauna Lorance (alternate)
Bob Niblack (alternate)
Jim Peifer (alternate)
Toni Pezzetti
Rich Plecker
Rob Roscoe
Joe Scalmanini
John Woodling

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ABBREVIATIONS AND ACRONYMS

AB	Assembly Bill
Aerojet	Aerojet-General Corporation facility
AF	Acre-feet
AF/year	Acre-feet per year
AFRPA	Air Force Real Property Agency
ARBCUP	American River Basin Regional Conjunctive Use Program
ARWRI	American River Water Resources Investigation
BMO	Basin Management Objective
Cal-Am	California-American Water Company
CALFED	CALFED Bay-Delta Program
CAS	California Aquifer Susceptibility
cfs	Cubic feet per second
CHWD	Citrus Heights Water District
CMP	Sacramento Coordinated Water Quality Monitoring Program
COC	Contaminants of concern
Cooperating Agencies	American River Basin Cooperating Agencies
CSUS	California State University, Sacramento
CTP	Cooperative Transmission Pipeline
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVRWQCB	Central Valley Regional Water Quality Control Board
CWC	California Water Code
CWD	Carmichael Water District
DCA	1,2-dichloroethane
DCE	cis-1,2-dichloroethene
Delta	Sacramento/San Joaquin River Delta
DHS	California Department of Health Services
DPMWD	Del Paso Manor Water District
DMS	Data Management System
DWR	California Department of Water Resources
DWSAP Program	Drinking Water Source Assessment and Protection Program
EMD	Sacramento County Environmental Management Department
EWA	Environmental Water Account
Folsom	City of Folsom
FOWD	Fair Oaks Water District
GMP	Groundwater Management Plan
gpm	Gallons per minute
Groundwater Forum	Central Sacramento County Groundwater Forum
IGSM	North American River and Sacramento County Combined Integrated Groundwater and Surface Water Model
InSAR	Interferometric Synthetic Aperture Radar
ISI	Integrated Storage Investigation
JPA	Joint Powers Authority
Lincoln	City of Lincoln
LSCE	Luhdorff & Scalmanini Consulting Engineers

LUST	Leaking Underground Storage Tank
M&I	Municipal and industrial
Mather AFB	Mather Air Force Base
McClellan AFB	McClellan Air Force Base
MCL	Maximum Contaminant Level
MWH	Montgomery Watson Harza
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
mg/L	Millgrams per liter
mgd	Million gallons per day
msl	Mean sea level
NAWQA	National Water Quality Assessment
NCMWC	Natomas Central Mutual Water Company
NGS	National Geodetic Survey
NTP	Northridge Transmission Pipeline
OVWC	Orange Vale Water Company
PBE	Physical Barrier Effectiveness
PCAs	Potential Contaminating Activities
PCE	Tetrachloroethene
PCWA	Placer County Water Agency
PL	Public Law
POU	Place of Use
Reclamation	U.S. Bureau of Reclamation
RLECWD	Rio Linda/Elverta Community Water District
Roseville	City of Roseville
RWA	Regional Water Authority
RWMP	Regional Water Master Plan
Sac Regional	Sacramento Regional Wastewater Treatment Plant
Sac Suburban	Sacramento Suburban Water District
SACOG	Sacramento Area Council of Governments
Sacramento	City of Sacramento
SAFCA	Sacramento Area Flood Control Agency
SCWA	Sacramento County Water Agency
SCWC	Southern California Water Company
SGA	Sacramento Groundwater Authority
SJWD	San Juan Water District
SMWA	Sacramento Metropolitan Water Authority
SOP	Standard Operating Procedure
South Sutter	South Sutter Water District
SRCSD	Sacramento Regional County Sanitation District
SWRCB	State Water Resources Control Board
TCE	Trichloroethene
TDS	Total dissolved solids
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
Water Forum	Sacramento Area Water Forum
WEP	Water Efficiency Program

WFA	Water Forum Agreement
WTP	Water treatment plant

1 INTRODUCTION

The Sacramento Groundwater Authority (SGA) is a joint powers authority (JPA) created to manage the Sacramento region's North Area Groundwater Basin. The SGA's formation in 1998[1] resulted from a coordinated effort by the Sacramento Metropolitan Water Authority (SMWA) and the Sacramento Area Water Forum (Water Forum) to establish an appropriate management entity for the basin. The SGA is recognized as one of the essential tools to implement a comprehensive program to preserve the lower American River and ensure a reliable water supply through the year 2030.

The SGA draws its authority from a joint powers agreement[2] signed by the cities of Citrus Heights, Folsom, and Sacramento and the County of Sacramento to exercise their common police powers to manage the underlying groundwater basin. The agreement is included as **Appendix A** in this document. In turn, these agencies chose to manage the basin in a cooperative fashion by allowing representatives of the 14 local water purveyors and a representative from each agricultural and self-supplied pumpers to serve as the Board of Directors of the SGA[3].

At the core of the SGA's management responsibility is a commitment to not exceed the average annual sustainable yield of the basin, which was estimated to be 131,000 acre-feet[4] in the Water Forum Agreement (WFA)[5]. To accomplish this objective and to provide a safe, reliable water supply for the rapidly growing northern Sacramento County, this groundwater management plan (GMP) is necessary to begin to identify the many actions that should be taken in the North Area Groundwater Basin. This GMP represents a starting point from which the SGA will continually assess the status of the groundwater basin and make appropriate management decisions to ensure a sustainable resource. The SGA's boundary as well as the area covered by this GMP include only the portion of Sacramento County north of the American River (**Figure 1**). Continuing effort will be made to coordinate SGA's GMP activities with adjacent areas.

1.1 OTHER REGIONAL MANAGEMENT EFFORTS

Over the past several decades, the water supplies of the region have been impacted by:

- Prolonged drought and prolonged wet periods.
- Increasing pressure to dedicate surface water for environmental purposes.
- Declining groundwater levels.
- Impacts and growing threats to surface water quality and groundwater quality.

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1 The SGA was originally formed in 1998 as the Sacramento North Area Groundwater Management Authority. In 2002, it was renamed the Sacramento Groundwater Authority.

2 The agreement is included in this report as **Appendix A**.

3 SGA Board members include representatives of California-American Water Company, Carmichael Water District, Citrus Heights Water District, City of Folsom, City of Sacramento, County of Sacramento, Del Paso Manor Water District, Fair Oaks Water District, Natomas Central Mutual Water Company, Orange Vale Water Company, Rio Linda/Elverta Community Water District, Sacramento Suburban Water District, San Juan Water District, Southern California Water Company, and individual representatives from agriculture and self-supplied groundwater users (principally parks and recreation districts).

4 This value was estimated based on water use and facilities in the basin at the time of the WFA. This value was based on a number of assumptions, and was not intended to be a fixed value that could not be modified as conditions and assumptions changed in the basin. Examples of changed conditions include new or improved water conveyance, treatment, and storage facilities or changes in water supply contracts.

5 The WFA is available online at http://www.waterforum.org or contact the Water Forum office at (916) 264-1999.

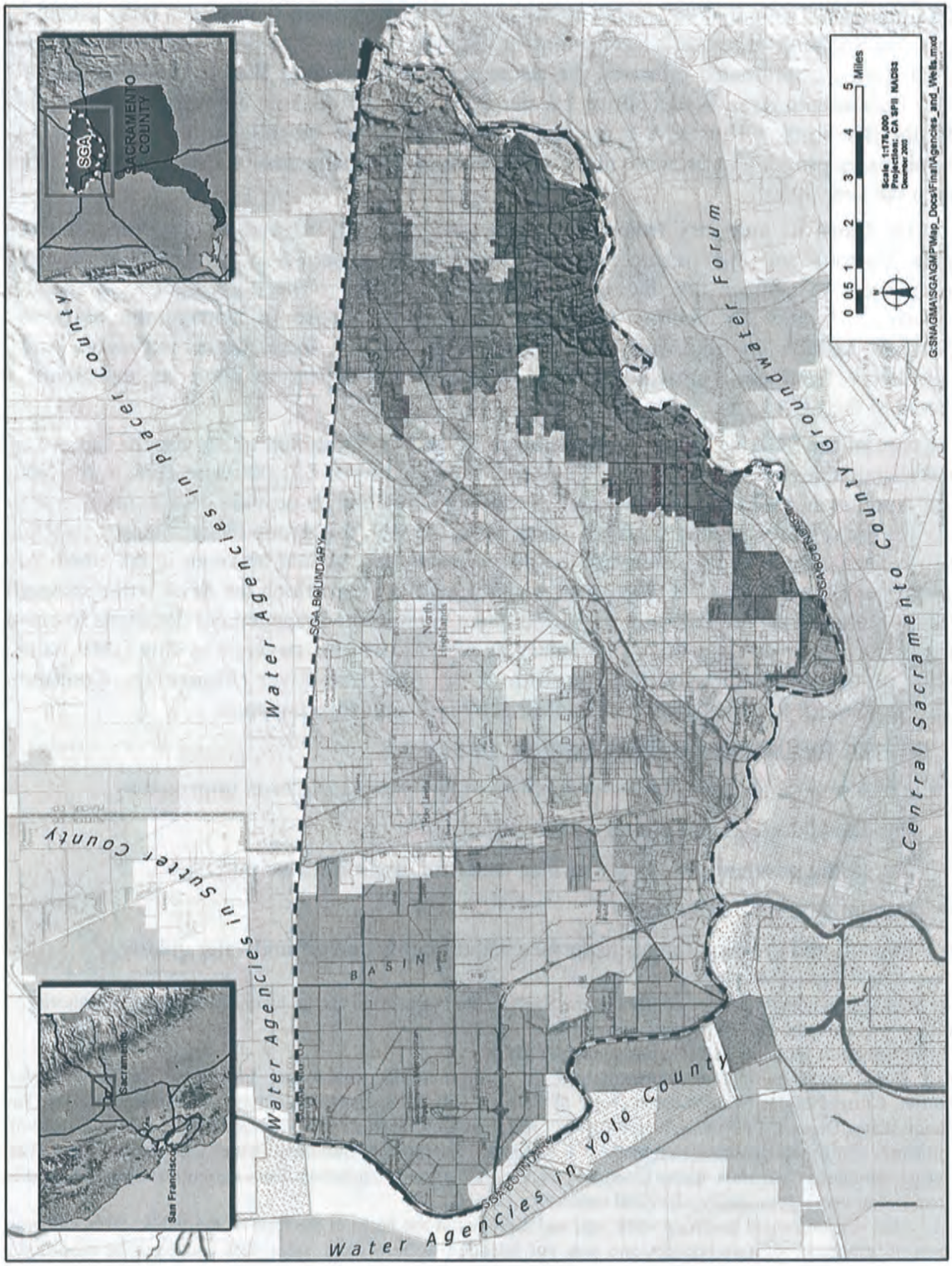


Figure 1. Boundary of the SGA and Area Covered by this Groundwater Management Plan

All the while, demand for water in the region has continued to grow.

To address these problems, water purveyors in the region have invested substantial time and resources in a progression of regional planning efforts. In particular, the planning efforts most directly related to the SGA's efforts include:

- The SMWA.
- The Water Forum process.
- The American River Basin Cooperating Agencies Regional Water Master Plan (Cooperating Agencies RWMP).
- The Regional Water Authority (RWA), successor to the SMWA.

Each of these regional planning efforts is discussed further below.

1.1.1 SMWA

Formed in 1990, the SMWA was a combined JPA and non-profit public benefit association of 17 public water suppliers within Sacramento County[6]. A primary objective of the SMWA was to facilitate actions needed to restore and maintain the quantity and the quality of the groundwater in the area. In support of that objective, the SMWA was a vital participant in the development of the WFA (see below). The SMWA also developed and adopted a GMP as authorized by Assembly Bill (AB) 3030 of 1992 (commonly referred to as AB 3030 Plans, see the California Water Code (CWC) § 10750 *et seq.*), but the plan was not fully implemented. In 2001, the SMWA was superceded by the RWA (see description below).

1.1.2 Water Forum

Begun in 1993, the Water Forum is a group comprised of business and agricultural leaders, citizens groups, environmentalists, water managers, and local governments in the Sacramento Region that joined together to fulfill two co-equal objectives:

- To provide a reliable and safe water supply for the region's economic health and planned development through the year 2030.
- To preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River.

In 2000, Water Forum members approved the WFA, which consists of seven integrated actions necessary to accomplish these objectives. The WFA prescribes a local conjunctive use program for Folsom Reservoir, the lower American River, and the adjacent groundwater basin. One of the seven elements is groundwater management. This element divides Sacramento County groundwater basins into three subunits, the North, Central, and South areas, and recommends that the SGA (then known as the Sacramento North Area Groundwater Management Authority) serve as the governing body for the North Area Groundwater Basin. The groundwater element also estimated and recommended an average annual sustainable groundwater yield for the SGA

[6] The SMWA members were located both north and south of the American River and included (note that some purveyor names have been changed and/or undergone consolidation since the formation of the SMWA): City of Folsom, City of Galt, Arden Cordova Water Service Company, Arcade Water District, Carmichael Water District, Citrus Heights Water District, Clay Water District, Del Paso Manor Water District, Elk Grove Water Works, Fair Oaks Water District, Galt Irrigation District, Northridge Water District, Omochumne-Hartnell Water District, Orange Vale Water Company, Rancho Murieta Community Services District, Rio Linda/Elverta Community Water District, and San Juan Water District.

area of 131,000 acre-feet per year (AF/year) (roughly equivalent to the 1990 groundwater pumping rate within the North Area Groundwater Basin). The Water Forum continues to function with a dedicated staff in the Water Forum Successor Effort program to coordinate with other agencies and groups, such as the SGA, to ensure that the elements of the WFA are carried out.

1.1.3 Cooperating Agencies

The Cooperating Agencies are an ad-hoc group of local water purveyors in northern Sacramento County and southern Placer County[7]. Each of the Cooperating Agencies is a signatory of the WFA. The Cooperating Agencies were formed to complete a RWMP, the objective of which is to identify the facilities and operational agreements necessary to implement the WFA for the northern Sacramento/Placer area. This plan will result in identifying opportunities to improve the availability of water supplies through additional conjunctive use of surface water and groundwater in the region. These expanded conjunctive use opportunities are a key component to assuring a sustainable groundwater resource within the SGA's area. Upon completion of the RWMP, the Cooperating Agencies have sunset as an organization with much of their function assumed by the RWA.

1.1.4 RWA

The RWA succeeded the SMWA in 2001 through a JPA to serve and represent the regional water supply interests, and assist members in protecting and enhancing the reliability, availability, affordability, and quality of water resources. One of the principal missions of the RWA is facilitating implementation of the conjunctive use program prescribed by the WFA and the RWMP. The RWA currently has eighteen members and three associate members[8] including each of the Cooperating Agencies except the Sacramento County Water Agency (SCWA). Nearly all members are signatory to the WFA.

As with the Cooperating Agencies, the success of implementing additional conjunctive use opportunities will be an important factor in the SGA's ability to ensure a reliable groundwater supply within its area. The activities of the RWA and SGA are highly coordinated as they share a common office and staff.

1.1.5 Other Ongoing Groundwater Management-Related Activities within the SGA Area

In addition to the on-going programs by individual SGA members, there are several other on-going groundwater-related activities within the SGA area. Coordination between these efforts

[7] The "Cooperating Agencies" include water purveyors in both Sacramento County and Placer County: California-American Water Company, Carmichael Water District, Citrus Heights Water District, City of Folsom, City of Roseville, City of Sacramento, Del Paso Manor Water District, Fair Oaks Water District, Placer County Water Agency, Rio Linda/Elverta Community Water District, Sacramento County Water Agency, Sacramento Suburban Water District, and San Juan Water District.

[8] The membership of the RWA encompasses water users in both Sacramento County and Placer County including: California-American Water Company, Carmichael Water District, Citrus Heights Water District, City of Folsom, City of Lincoln, City of Roseville, City of Sacramento, Del Paso Manor Water District, El Dorado Irrigation District, Fair Oaks Water District, Fruitridge Vista Water Company, Orange Vale Water Company, Placer County Water Agency, Rancho Murieta Community Services District, Rio Linda/Elverta Community Water District, Sacramento Suburban Water District, San Juan Water District, and the Southern California Water Company. Associate members do not directly retail drinking water and do not vote in RWA matters. Associate members include: El Dorado County Water Agency, Sacramento Municipal Utility District, and Sacramento Regional County Sanitation District.

and the SGA will be discussed in more detail later in this GMP. The activities closely related to the SGA's groundwater management efforts include, but are not limited to, the following:

- Groundwater contamination investigation and remediation activities at the former McClellan Air Force Base (McClellan AFB).
- Groundwater contamination investigation and remediation activities at the Aerojet-General Corporation facility (Aerojet).
- Monitoring of groundwater levels and quality by the California Department of Water Resources (DWR).
- Monitoring of groundwater levels and quality at California State University, Sacramento (CSUS).
- Monitoring of groundwater quality by the U.S. Geological Survey (USGS) as part of its National Water Quality Assessment (NAWQA) Program.
- Monitoring of site investigations and remediation efforts at known leaking underground storage tanks (LUSTs) coordinated by the Central Valley Regional Water Quality Control Board (CVRWQCB).
- In the mid-1990s, DWR conducted a study on the feasibility of conjunctive use in northwest Sacramento County and western Placer County (DWR, 1997). Natomas Central Mutual Water Company (NCMWC), an SGA member, was a cooperating agency to the study. Two multi-depth monitoring wells were constructed in the northwest Sacramento County as a result of the study and are currently monitored by DWR.

1.2 PURPOSE OF THE SGA GMP

The groundwater management goal of the SGA is to maintain a sustainable, high-quality groundwater resource for the users of groundwater basin underlying Sacramento County north of the American River consistent with the objectives of the WFA. To meet that goal, the purpose of this GMP is to serve as the initial framework for coordinating the many independent management activities into a cohesive set of management objectives and related actions necessary to meet those objectives.

1.3 AUTHORITY TO PREPARE AND IMPLEMENT A GMP

The authority of the SGA to manage the North Area Groundwater Basin is provided through the joint powers agreement. The SGA Board of Directors elected to prepare this GMP as one of the tools necessary to effectively manage the basin. The SGA is preparing this GMP consistent with the provisions of CWC § 10750 *et seq.* as amended January 1, 2003.

1.4 GMP COMPONENTS

The SGA GMP includes the following required and recommended components:

- CWC § 10750 *et seq.* (seven mandatory components). Recent amendments to the CWC § 10750 *et seq.* require GMPs to include several components to be eligible for the award of funds administered by DWR for the construction of groundwater projects or groundwater quality projects[9].
- DWR Bulletin 118 (2003) components (seven recommended components).

[9] These amendments to the CWC were included in Senate Bill 1938, effective January 1, 2003.

- CWC § 10750 *et seq.* (12 voluntary components). CWC § 10750 *et seq.* includes 12 specific technical issues that could be addressed in GMPs to manage the basin optimally and protect against adverse conditions.

Table 1 lists the section(s) in which each component is addressed.

Table 1. Location of SGA GMP Components

Description	Section(s)
A. CWC § 10750 *et seq.*, Mandatory Components	
1. Documentation of public involvement statement.	3.4.1, 6.3
2. Basin Management Objectives (BMOs).	3.2
3. Monitoring and management of groundwater elevations, groundwater quality, inelastic land surface subsidence, and changes in surface water flows and quality that directly affect groundwater levels or quality or are caused by pumping.	3.5
4. Plan to involve other agencies located within groundwater basin.	3.4.2
5. Adoption of monitoring protocols by basin stakeholders.	3.5, 6.4
6. Map of groundwater basin showing area of agency subject to GMP, other local agency boundaries, and groundwater basin boundary as defined in DWR Bulletin 118.	**Figure 2**
7. For agencies not overlying groundwater basins, prepare GMP using appropriate geologic and hydrogeologic principles.	N/A
B. DWR's Suggested Components	
1. Manage with guidance of advisory committee.	3.4.3
2. Describe area to be managed under GMP.	2.1 – 2.5
3. Create link between BMOs and goals and actions of GMP.	**Figure 10**
4. Describe GMP monitoring program.	3.5, **Figure 12, Figure 13**
5. Describe integrated water management planning efforts.	3.8
6. Report on implementation of GMP.	4.1
7. Evaluate GMP periodically.	4.2
C. CWC § 10750 *et seq.*, Voluntary Components	
1. Control of saline water intrusion.	3.6.6
2. Identification and management of wellhead protection areas and recharge areas.	3.6.3, 3.6.4
3. Regulation of the migration of contaminated groundwater.	3.6.5
4. Administration of well abandonment and well destruction program.	3.6.2
5. Mitigation of conditions of overdraft.	3.7
6. Replenishment of groundwater extracted by water producers.	3.7
7. Monitoring of groundwater levels and storage.	3.5
8. Facilitating conjunctive use operations.	3.7
9. Identification of well construction policies.	3.6.1
10. Construction and operation by local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects.	3.6.5, 3.7
11. Development of relationships with state and federal regulatory agencies.	3.4.4
12. Review of land use plans and coordination with land use planning agencies to assess activities that create reasonable risk of groundwater contamination.	3.8.1, 6.5

2 WATER RESOURCES SETTING

Locations of water purveyors within the SGA boundaries are shown in **Figure 1**. Within the SGA boundaries, water purveyors currently utilize both surface water and groundwater. Some rely exclusively on either groundwater or surface water to meet their needs; others use a combination of surface water and groundwater. The groundwater and surface water supplies available to the region are summarized below.

2.1 GROUNDWATER SUPPLIES

This section provides a regional description of the geologic and hydrogeologic conditions of the underlying groundwater basin. A map showing the area of the groundwater basin, as defined by DWR Bulletin 118 (2003), and the SGA boundaries within this basin is presented in **Figure 2**.

The North American Subbasin is defined by DWR as the area bounded on the west by the Feather and Sacramento rivers, on the north by the Bear River, on the south by the American River, and on the east by the Sierra Nevada (DWR, 2003). DWR Bulletin 118 (2003) provides additional information about the North American Subbasin on the agency's Web site[10] including:

- Surface Area: 548 square miles.
- The eastern basin boundary is a north-south line extending from the Bear River south to Folsom Reservoir. This represents the approximate edge of the alluvial basin where little or no groundwater flows into or out of the groundwater basin from the Sierra Nevada.
- The western portion of the subbasin consists of nearly flat flood basin deposits from the Bear, Feather, Sacramento and American rivers, and several small east side tributaries

The SGA area is located in the southern portion of the North American Subbasin extending as far north as the Sacramento-Placer County line. Regional and grouped data are provided in this section; water purveyor-specific data are presented in **Appendix B.**

2.1.1 Overview of Hydrogeologic Setting

The groundwater resources of Sacramento County have been extensively investigated and reported in the DWR Bulletin 118-3, Evaluation of Ground Water Resources: Sacramento County (July, 1974).

2.1.1.1 Hydrostratigraphy of SGA Area

DWR Bulletin 118-3 identifies and describes the various geologic formations that constitute the water-bearing deposits underlying Sacramento County. These formations include an upper, unconfined aquifer system consisting of the Victor, Fair Oaks, and Laguna Formations, and a lower, semi-confined aquifer system consisting primarily of the Mehrten Formation. These formations are shown on **Figure 3** and are typically composed of lenses of inter-bedded sand, silt, and clay, interlaced with coarse-grained stream channel deposits. **Figure 3** illustrates that these deposits form a wedge that generally thickens from east to west to a maximum thickness of about 2,000 feet under the Sacramento River.

[10] At: http://www.dpla2.water.ca.gov/publications/groundwater/bulletin118/basins/5-21.64_North_American.pdf.

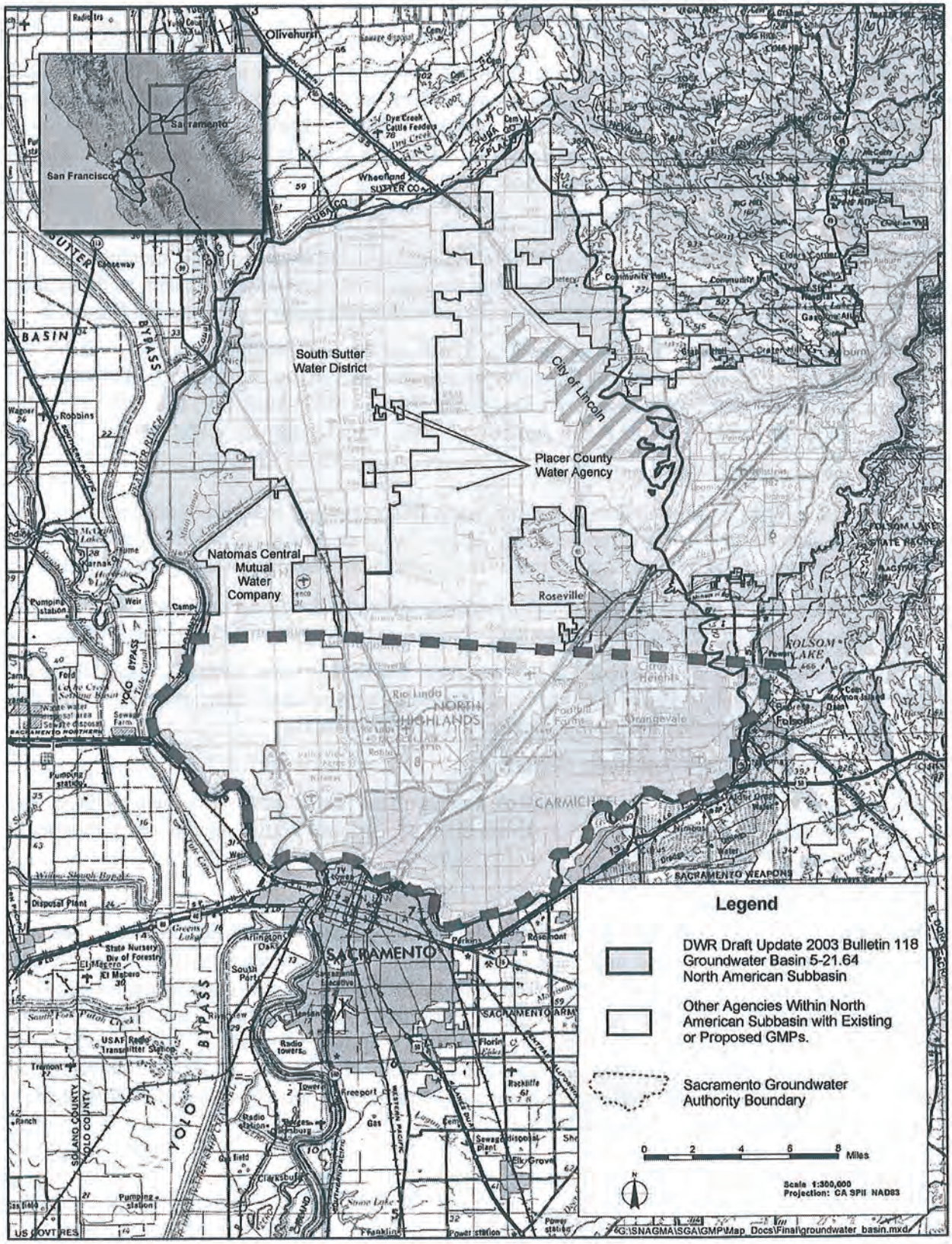


Figure 2. Location of North American Groundwater Subbasin

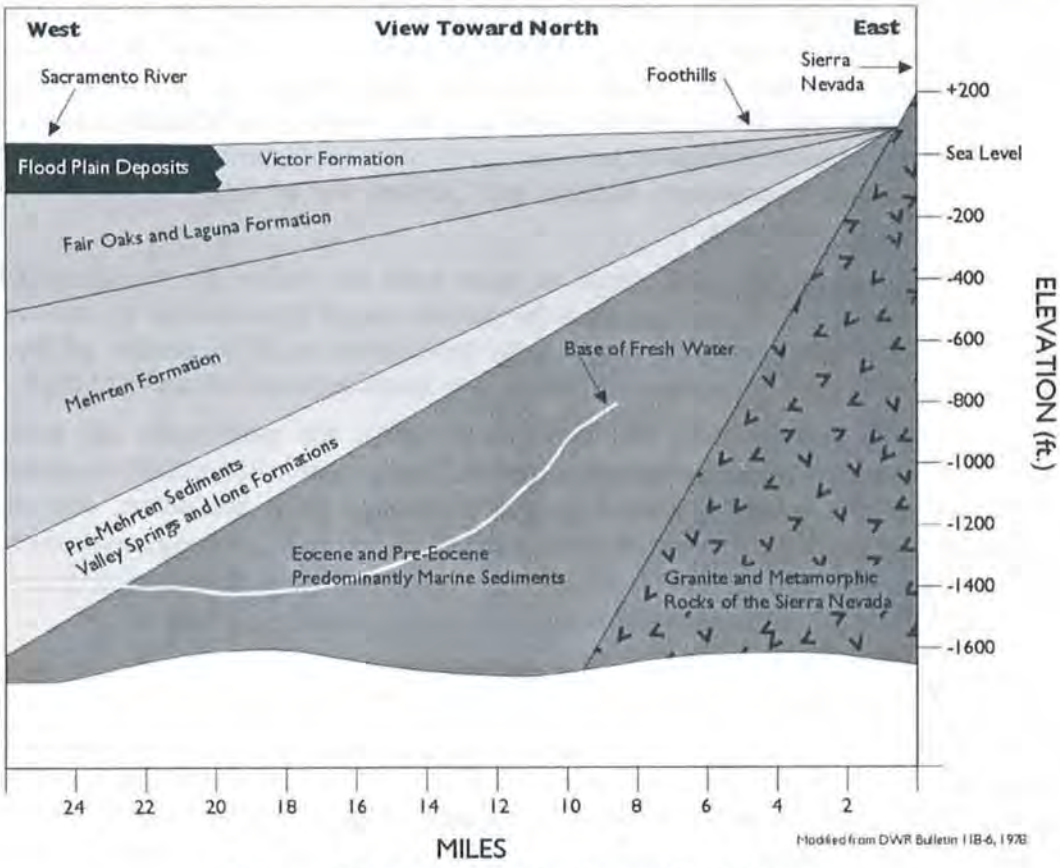


Figure 3. Regional Stratigraphic Column

Groundwater occurs in unconfined to semi-confined states throughout the North American Subbasin. Semi-confined conditions occur in localized areas; the degree of confinement typically increases with depth below the ground surface. Groundwater in the Victor, Fair Oaks, and Laguna Formations (upper aquifer) is typically unconfined. However, due to the heterogeneous nature of the alluvial depositional system, semi-confined conditions can be encountered at shallow depths in the aquifer. The deeper Mehrten Formation (lower aquifer) typically exhibits semi-confined conditions. There are no regionally-extensive fine grained layers in the subsurface to create a regionally confined aquifer such as is observed in the San Joaquin Valley from the Corcoran Clay layer.

2.1.1.2 Groundwater Quality

The water quality in the upper aquifer system is regarded as superior to that of the lower aquifer system. The upper aquifer is preferred over the lower aquifer principally because the lower aquifer system (specifically the Mehrten formation) contains higher concentrations of iron and manganese. Water from the upper aquifer generally does not require treatment (other than disinfection). The lower aquifer system also has higher concentrations of total dissolved solids (TDS, a measure of salinity) than the upper aquifer, although it typically meets standards as a potable water supply. In general, at depths of approximately 1,200 feet or greater (actual depth varies throughout the basin), the TDS concentration exceeds 2,000 milligrams per liter (mg/L). At such concentrations, the groundwater is considered non-potable without treatment.

Background Water Quality. This description of background water quality is based on data used to populate the Data Management System (DMS). Available groundwater quality data from monitoring between 1991 and 2002 for 260 wells were used to populate the DMS. The DMS was used to query data and develop statistics and graphics for the constituents included in this evaluation. Evaluations were performed for constituents of primary concern related to aesthetics, regulatory impacts, and contaminant plumes, and constituents of future concern related to aesthetics and regulatory concerns.

Total Dissolved Solids. TDS results in most wells are within the secondary drinking water standard; therefore, TDS will not limit the potable use of groundwater by the overlying agencies. The TDS levels vary quite significantly throughout the SGA portion of the basin, ranging from 34 to 657 mg/L, although most wells have levels between 140 and 320 mg/L.

Iron and Manganese. Iron and manganese results for most wells are within the secondary drinking water standards; therefore, iron and manganese will not limit the potable use of groundwater by the overlying agencies. Iron can range from non-detect, less than 10 micrograms per liter (µg/L), to very high levels such as 16,000 µg/L, although most wells have average values less than 200 µg/L. Manganese concentrations range from non-detectable, less than 2 µg/L, to 1,700 µg/L, although most wells have average values less than 50 µg/L.

Arsenic and Chromium. Arsenic and chromium results for most wells are within the current primary drinking water standards; therefore, arsenic and chromium will not limit the potable use of groundwater by the overlying agencies. Currently, there is a primary federal Maximum Contaminant Level (MCL) for arsenic of 10 µg/L, however compliance is not yet required in California below 50 µg/L. Arsenic concentrations range from non-detectable, less than 1 µg/L, to 22 µg/L, although most wells have average values less than 5 µg/L.

Currently, total chromium has a primary MCL of 50 µg/L. Chromium concentrations range from non-detectable, less than 1 µg/L, to 52 µg/L, although most wells range between 8 and 12 µg/L.

Nitrate. It appears that all wells are within the current primary nitrate drinking water standard and nitrate will not limit the potable use of groundwater by the overlying agencies. Currently, nitrate has a primary MCL of 45 mg/L. Most SGA wells have low levels (< 15 µg/L) of nitrate.

Known "Principal" Plumes. Principal groundwater contaminant plumes within or near the SGA area are known to exist from source areas at the former McClellan AFB, the former Mather Air Force Base (Mather AFB), and Aerojet and are shown on **Figure 4**. During Phase II development of the DMS, contaminant plume data were collected by SGA from the following documents:

- URS. Former McClellan Air Force Base, Installation Restoration Program, Groundwater Monitoring Program: Quarterly Report, Third Quarter 2002. January 2003.
- Montgomery Watson Harza (MWH). Mather Air Force Base Annual and Fourth Quarter 2002 Sitewide Groundwater Monitoring Report. March 2003.
- Aerojet Environmental Remediation. Aerojet Sacramento Site, American River Study Area Groundwater Monitoring Results, April – June 2002. August 2002.

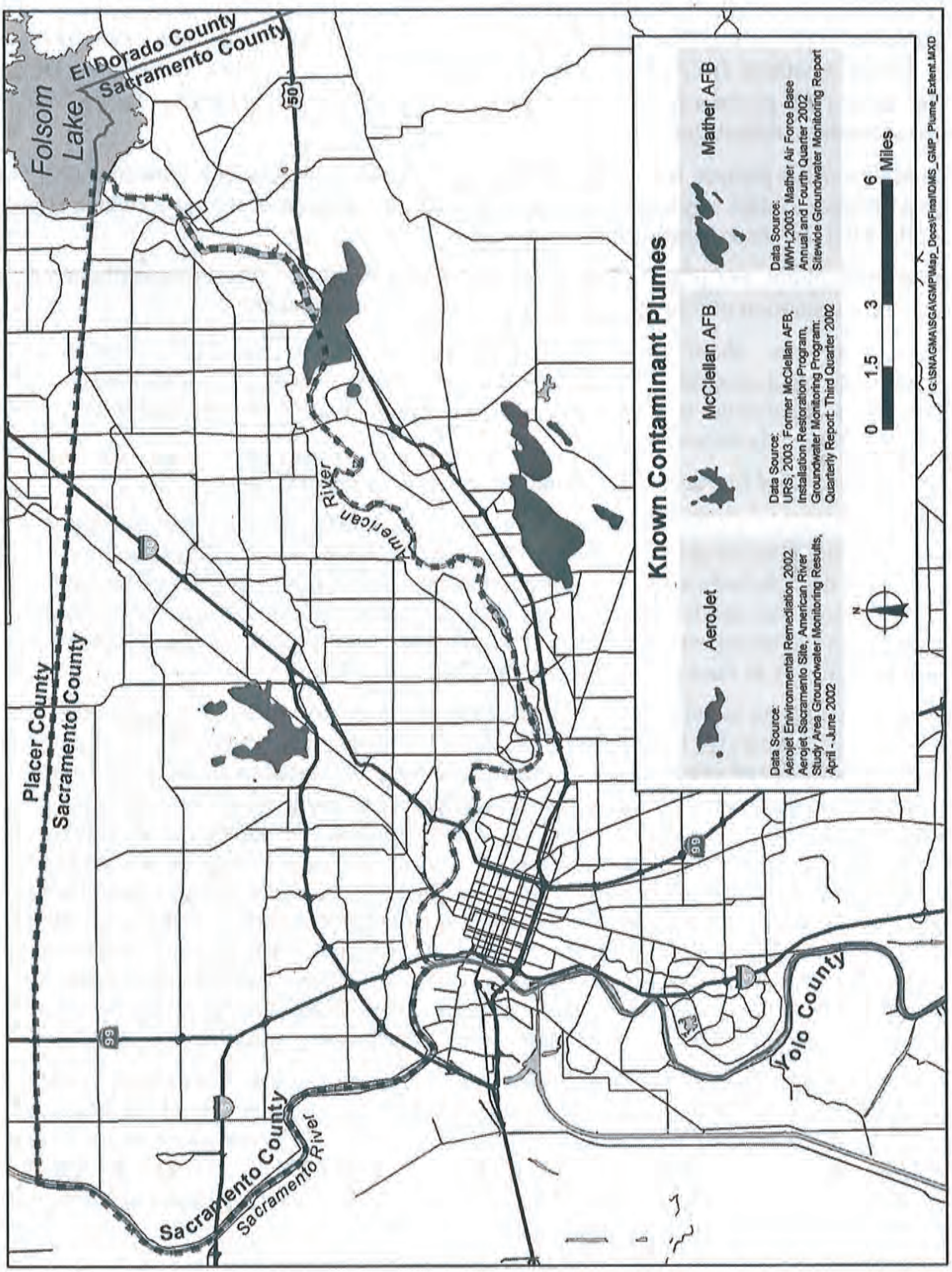


Figure 4. Principal Contaminant Plumes

Although other localized plumes exist within the SGA area, the principal plumes shown in **Figure 4** are the largest and have the greatest current impact on existing groundwater use. For the McClellan AFB plumes, the primary contaminants of concern (COC) are trichloroethene (TCE), tetrachloroethene (PCE), cis-1,2-dichloroethene (DCE), and 1,2-dichloroethane (DCA). The McClellan AFB plume edges represent the California drinking water MCL of 5 µg/L TCE, the most extensive contaminant.

For the Mather AFB plumes, the primary COCs are TCE, PCE, and carbon tetrachloride. The Mather AFB plume edges represent a composite COC concentration of 0.5 µg/L, which is one-tenth of the MCL for these constituents.

For the Aerojet plume, the primary COCs are TCE and perchlorate. The Aerojet plume edges represent a concentration of 5 µg/L TCE, the most extensive contaminant.

There are currently about 190 active LUST sites within the SGA area (source: http://geotracker.swrcb.ca.gov). While many sites can be fully remediated, the aggregate impact from undetected contamination on groundwater quality in the basin cannot be determined at this time and may ultimately be considerable.

2.1.1.3 Recharge and Extraction of Groundwater in Sacramento County

Evaluating changes in aquifer conditions requires understanding the dynamic processes and interactions taking place as extractions and recharge in the aquifer occur. Conceptual models of the aquifer that describe induced recharge, aquifer storage, and differences between localized and regional effects on the aquifer are discussed below. These conceptual models are meant to clarify concepts; not all aspects of groundwater hydraulics are described. Some of the concepts presented pertain only to the northern Sacramento County aquifers.

Recharge. Groundwater in northern Sacramento County moves from sources of recharge to areas of discharge. Recharge to the local aquifer system occurs along active river and stream channels where extensive sand and gravel deposits exist, particularly in American River and Sacramento River channels. Prior to development of the area, additional recharge would have occurred along the eastern boundary of the SGA area at the transition point from consolidated rocks of the Sierra Nevada to the alluvial deposited basin sediments. Other sources of recharge within the area include inflow of groundwater generally from the northeast; subsurface recharge from fractured geologic formations to the east; and deep percolation from applied surface water, precipitation, and small streams. An example of recharge from deep percolation can be seen in the western SGA area where extensive agricultural operations in NCMWC have redistributed surface water from the Sacramento River over a much broader area. Some of the water not used by the crops grown in the area will eventually act as a source of recharge to the groundwater basin.

Changes in the groundwater surface elevation result from changes in groundwater recharge, discharge, or extraction. In some instances within northern Sacramento County, this change in groundwater elevation can induce natural recharge at locations where rivers or streams and the aquifer are hydraulically connected. To the extent that a hydraulic connection exists, as groundwater conditions change, the slope or gradient of the groundwater surface may change as well. A steeper gradient away from the stream would induce higher recharge from surface water into the aquifer.

The rate of recharge from streams that are hydraulically disconnected from the groundwater surface is indifferent to changes in groundwater elevations or gradient. This is typically true with smaller streams where the groundwater surface is located far below the streambed. In such cases, surface water percolates through the unsaturated zone to the groundwater and is a function of the aquifer materials underlying the streambed and the water level in the surface stream. The rate of infiltration under these conditions is not controlled by the change in elevation of the underlying groundwater. There is also some evidence to suggest these conditions exist along the Sacramento River in northern Sacramento County.

Localized Impacts of Groundwater Extraction. When extractions occur from a single well, a concentrated localized cone of depression is formed around the well. The shape and depth of the localized cone of depression depend on several factors including (but not limited to): (1) the rate of extraction, (2) the presence of nearby sources of recharge and extraction, (3) aquifer transmissivity, and (4) the "confined" or "unconfined" state of the aquifer, (i.e., storage coefficient). Over a period of time, extraction from an unconfined aquifer can de-water the aquifer around the well. However, when extraction ceases, the water level within the aquifer typically rebounds to its pre-extraction condition.

A confined or semi-confined aquifer behaves differently since the water is under pressure from a recharge source. Instead of de-watering the aquifer, a change in confining pressure occurs as a result of extractions; the aquifer remains saturated. In a confined aquifer, the pressure or piezometric surface elevation decline is more dramatic than in an unconfined aquifer; however, the recovery to pre-extraction conditions is typically much faster.

Regional Impacts of Groundwater Extraction. Large regional cones of depression can form in areas where multiple groundwater extraction wells are in operation. The location and shape of a regional cone of depression is influenced by the same factors as a single well. The regional cone of depression within the SGA area is shown on **Figure 5,** a water elevation contour map for spring of 2002. This map was prepared using water elevation data from DWR's water data library available on-line at: http://wdl.water.ca.gov. The Inverse Distance to a Power gridding method was used to contour the water elevation data posted on **Figure 5**. This contouring method is a weighted average interpolator and is best used when there is a uniform distribution of data. With Inverse Distance to a Power, data are weighted during interpolation such that the influence of one point relative to another declines with distance from the grid node. Normally, Inverse Distance to a Power behaves as an exact interpolator. When calculating a grid node, the weights assigned to the data points are fractions, and the sum of all the weights are equal to 1.0.

Fluctuations in regional cones of depression are measured over years and result from: (1) changes in recharge, and (2) changes in extractions from increasing and decreasing water demands. A sequence of successive dry years can decrease the amount of natural recharge to the aquifer and often a coinciding increase in groundwater extraction, creating an imbalance between natural recharge and extractions. Consequently, groundwater elevations decrease in response to this imbalance between recharge and extraction. Over time, the shape and location of the aquifer's regional cone of depression fluctuates.

Intensive use of the groundwater basin has resulted in a general lowering of groundwater elevations near the center of the basin away from the sources of recharge. As early as 1968, pumping depressions were evident in northern Sacramento County. These depressions have grown and coalesced into a single cone of depression centered in the SGA area as shown in **Figure 5**.

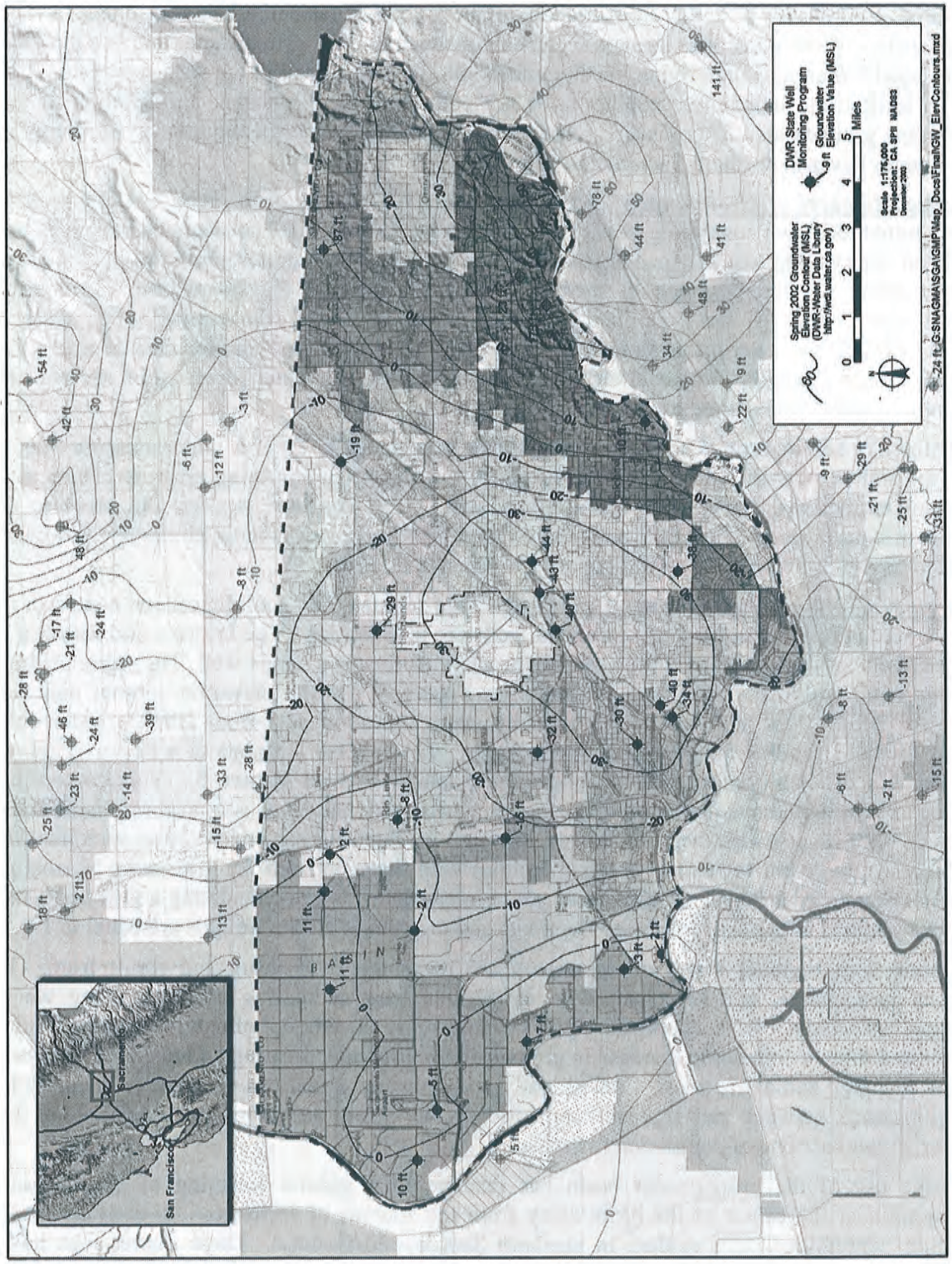


Figure 5. Spring 2002 Groundwater Elevation Contours

Groundwater Level Trends. To observe characteristic trends in groundwater elevation, selected well hydrographs have been prepared and are presented on **Figure 6.** For the purpose of this discussion, the SGA area has been divided into four sub-areas.

Western Area. The western portion of the SGA area is bounded by the Sacramento River and is relatively undeveloped compared to the rest of the SGA area. Groundwater level trends in this area can be seen in hydrographs from SWP-216 (located near the Sacramento River), and SWP-216 (also located near the Sacramento River) shown on **Figure 6**. The hydrographs for these wells show groundwater levels varying between -5 and 20 feet above mean sea level (msl) between wells. Long-term trends of increasing or decreasing groundwater levels are not evident in these wells, however, groundwater levels do fluctuate seasonally in each well.

North-Central Area. The north-central portion of the SGA area is bounded by the county line on the north. Water in the north-central portion of the SGA area is supplied entirely by groundwater sources. Furthermore, pumping of groundwater occurs at treatment extraction wells being operated at McClellan AFB, which is located in the center of this region of the SGA area. The general trend in this area is steeply declining groundwater levels until the early 1990s and then stabilized levels. For example, SWP-276 (**Figure 6**) shows a decline of about 17 feet per decade from 1950 to 1990 and then stabilization of groundwater elevation at approximately 40 feet below msl to the end of the record in 1996. Water level trends in SWP-270 show the same decline from 1955 to 1990 followed by stabilized levels (with seasonal fluctuation) at 40 feet below msl from 1990 to the present.

South-Central Area. The south-central portion of the SGA area is bordered to the south by the American River and is supplied by approximately even proportions of surface water and groundwater. The general trend in this area is gently to moderately declining groundwater levels over time **(Figure 6)**. Water level trends in this area can be seen in hydrographs from wells SWP-220 (located south of McClellan AFB away from the American River), SWP-232 (located near the river), and SWP-240 (located near the river). The hydrograph SWP-232 shows approximately 20 feet of groundwater elevation decrease over a 34-year period ending 2002.

Eastern Area. Foothills bound the eastern portion of the SGA area. The eastern portion of the SGA area has experienced rapid residential growth in recent years and extends into the Sierra Nevada foothills. The water supply in this area is approximately 80 percent from surface water sources and 20 percent from groundwater sources. The general trend in this area is stable groundwater elevations near the American River and high elevations in the foothills, with declining groundwater levels away from the river and foothills. Water level trends in this area can be seen in hydrographs from wells SWP-236 (located near the River) and SWP-283 (located high in the foothills). The hydrographs for these wells show stable groundwater levels near the river and in the foothills.

2.2 SURFACE WATER SUPPLIES

Individual water purveyors utilize both surface water and groundwater. The supply mix may include combinations of groundwater; American River water diverted pursuant to water rights, contract entitlements, or other agreements; or Sacramento River water diverted pursuant to water rights or contract entitlements. This section describes surface water supplies available to the water purveyors within the SGA. Regional and grouped data are provided in this section; water purveyor-specific data are presented in **Appendix B.**

2.2.1 Water Rights/Contract Entitlements

2.2.1.1 American River Water Rights

Four of the water purveyors within the SGA boundaries have water rights on the American River: Carmichael Water District (CWD), City of Folsom (Folsom), City of Sacramento (Sacramento), and San Juan Water District (SJWD).

The place of use (POU) for CWD's water right is coincident with the boundaries of the District.

The POU for Folsom's water right is coincident with the city limits and portions of the lands owned by Aerojet.

The POU for Sacramento's water rights on the American River extends beyond the boundaries of the city limits. The authorized POU outside the city limits includes (1) portions of California-American Water Company (Cal-Am), Arden service area; (2) Del Paso Manor Water District (DPMWD); (3) Sacramento Suburban Water District (Sac Suburban), Arcade service area (Town and Country subarea) and portions of Northridge service area; (4) SCWA, Arden Park Vista service area; (5) Southern California Water Company (SCWC), Arden Town service area; and (6) portions of CWD. In addition, a portion of Sacramento's American River POU overlaps with the place of use for the Sacramento River water rights and contract entitlements of NCMWC.

The POU for SJWD's water rights is the District's wholesale service area which encompasses SJWD retail service areas in Sacramento and Placer Counties, Citrus Heights Water District (CHWD), Fair Oaks Water District (FOWD), Orange Vale Water Company (OVWC), and that portion of Folsom that lies north of the American River.

2.2.1.2 American River Contract Entitlements

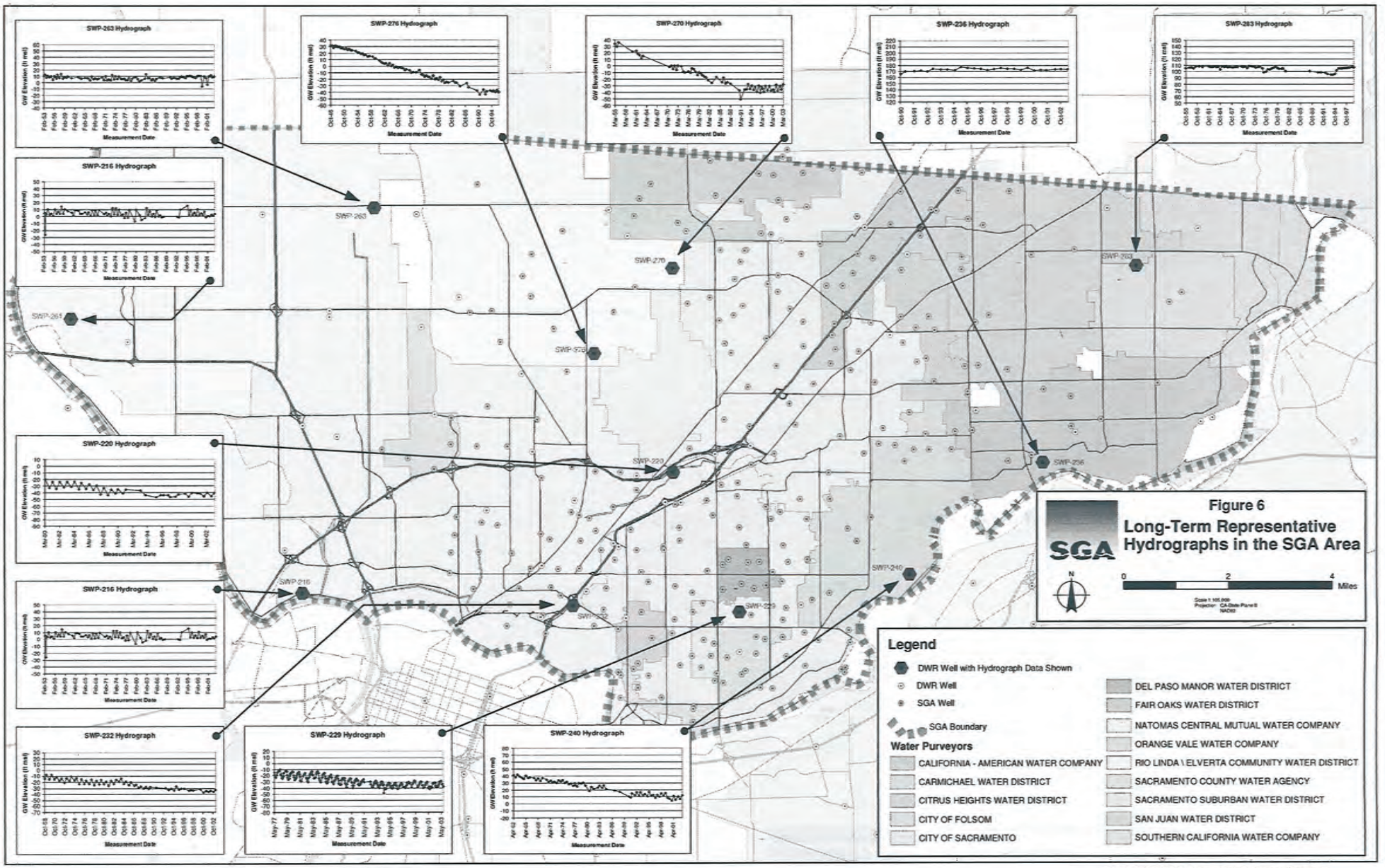
In Sacramento County, two water purveyors have existing water supply contract entitlements with the U.S. Bureau of Reclamation (Reclamation) Central Valley Project (CVP): Folsom and SJWD. SJWD provides CVP water to agencies within its wholesale service area.

In addition, SJWD and SCWA executed a water supply contract entitlement with Reclamation from Public Law (PL) 101-514 (commonly referred to as "Fazio Water") in 1999. However, the contract is currently being renegotiated under the CVP long-term contract renewals. SJWD's contract entitlement is for 13,000 AF/year, and this supply is used within SJWD's Sacramento County wholesale area. SCWA's contract entitlement is for 22,000 AF/year, and this supply is used within Zone 40 (south of the American River). Folsom has a subcontract with SCWA for 7,000 AF/year (out of the potentially available 22,000 AF/year).

Sac Suburban has a water sale agreement with Placer County Water Agency (PCWA). The POU for this water includes Sac Suburban's Northridge service area and Arcade service area (North Highlands subarea only) and the service areas of SJWD, FOWD, OVWC, CHWD, the former McClellan AFB, Cal-Am (Antelope and Lincoln Oaks\Royal Oaks service areas), and Rio Linda/Elverta Community Water District (RLECWD).

2.2.1.3 Sacramento River Water Rights

Two of the water purveyors within the SGA boundaries have water rights on the Sacramento River: Sacramento and NCMWC. The POU for NCMWC's water rights on the Sacramento River is the water company service area that includes both the Sacramento County and Sutter County areas. The POU for Sacramento's water rights on the Sacramento River is the city limits.


SWP-263 Hydrograph
SWP-276 Hydrograph
SWP-270 Hydrograph
SWP-236 Hydrograph
SWP-283 Hydrograph
SWP-216 Hydrograph
SWP-220 Hydrograph
SWP-216 Hydrograph
SWP-232 Hydrograph
SWP-229 Hydrograph
SWP-240 Hydrograph
GW Elevation (ft msl)
Measurement Date
SWP-263
SWP-276
SWP-270
SWP-236
SWP-283
SWP-261
SWP-275
SWP-220
SWP-216
SWP-229
SWP-240
SGA
Figure 6
Long-Term Representative Hydrographs in the SGA Area
N
0
2
4
Miles
Legend
DWR Well with Hydrograph Data Shown
DWR Well
SGA Well
SGA Boundary
Water Purveyors
CALIFORNIA - AMERICAN WATER COMPANY
CARMICHAEL WATER DISTRICT
CITRUS HEIGHTS WATER DISTRICT
CITY OF FOLSOM
CITY OF SACRAMENTO
DEL PASO MANOR WATER DISTRICT
FAIR OAKS WATER DISTRICT
NATOMAS CENTRAL MUTUAL WATER COMPANY
ORANGE VALE WATER COMPANY
RIO LINDA \ ELVERTA COMMUNITY WATER DISTRICT
SACRAMENTO COUNTY WATER AGENCY
SACRAMENTO SUBURBAN WATER DISTRICT
SAN JUAN WATER DISTRICT
SOUTHERN CALIFORNIA WATER COMPANY
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2.2.1.4 Sacramento River Contract Entitlements

One water purveyor within the SGA boundaries has a CVP contract entitlement on the Sacramento River: NCMWC. The POU for this water is the water company service area that includes both the Sacramento County and Sutter County areas.

2.2.1.5 Other Agreements

Sacramento has agreements with Sac Suburban (for use within the Arcade Service Area only) and DPMWD to make surface water available for use within the portions of their service areas that lie within Sacramento's POU.

Sac Suburban has a temporary contract with Reclamation for surplus water (often referred to as Section 215 water). This contract has been exercised since 1991. Sac Suburban's Section 215 supplies ranged between approximately 100 AF/year and 11,880 AF/year during the period 1991 through 2000. Section 215 water is available on an intermittent basis subject to hydrologic conditions.

2.2.2 Surface Water Quality

Based on current Update Reports to the Watershed Sanitary Surveys for the American and Sacramento Rivers, these are both excellent supplies for drinking water in the Sacramento Metropolitan Area. The source waters can be treated to meet all Title 22 drinking water standards using conventional and direct filtration processes, as well as membranes. There are no persistent constituents in the raw waters that require additional treatment processes. However, there are sometimes seasonal treatment requirements for rice herbicides on the Sacramento River, which can be addressed through chemical oxidation processes. High turbidities during storm events are sometimes a treatment challenge, which can be managed by optimizing operations including adjusting chemical types and dosing schemes and reducing plant flow (Montgomery Watson and Archibald & Wallberg, 2000).

2.2.2.1 American River

Surface water quality in the American River is a function of the mass balance of water quality from tributary streams, diversions, agricultural return flows, subsurface drainage flows, permitted discharges from municipal and industrial (M&I) sources, and urban runoff. In general, the quality of water in the American River is high from the river's headwaters to its confluence with the Sacramento River. It is low in alkalinity, low in disinfection by-product precursor materials, low in mineral content, and low in organic contamination. Limited data also indicate that the source of water is low in microbial contamination from *Giardia* and *Cryptosporidium*. Turbidity levels in the American River tend to be higher in the winter than summer because of higher flows associated with winter storms.

Folsom Reservoir. Water diverted from Folsom Reservoir is provided to the following SGA members: SJWD, CHWD, FOWD, OVWC, Folsom, and Sac Suburban[11]. Because the treatment facilities serving these areas share a common Folsom Dam intake facility, the raw water is considered to be similar with respect to quality. Characterization of Folsom Reservoir raw water quality is based on data collected by the Cities of Folsom and Roseville as well as SJWD.

Water diverted from the Folsom Dam is treated by SJWD and Folsom using conventional filtration processes with chlorine disinfection. Treated water quality varies depending on the specific type of treatment provided, but meets or exceeds all federal and state drinking water

[11] Water is also diverted, treated, and distributed by Roseville, located within Placer County.

standards for both SJWD and Folsom under current operations. Both agencies include corrosion control practices in their treatment of the water.

American River at CWD's Bajamont Way Membrane Filtration Water Treatment Plant. CWD uses American River water diverted by three Ranney Collectors for water supply, therefore this is groundwater under the direct influence of surface water. This source now supplies 80 percent of CWD's needs. The Collectors are located within the American River floodplain and adjacent to the streambed. They serve as intake and pump structures to provide pre-filtered water to the Bajamont Way Membrane Filtration (Bajamont) Water Treatment Plant (WTP). The Bajamont WTP has a design capacity of 16 million gallons per day (mgd) and can be expanded to 22 mgd. The WTP is composed of microfiltration membrane units. After filtration, the water is chlorinated with sodium hypochlorite and the pH is adjusted with caustic soda prior to distribution. The treated water meets all current Title 22 drinking water quality standards (Archibald & Wallberg and MWH, 2003).

Lower American River at Sacramento's E.A. Fairbairn Water Treatment Plant. Water is diverted by Sacramento on the lower American River just downstream of the Howe Avenue crossing at the E.A. Fairbairn WTP. This water may be used by other entities within the POU on a wholesale basis. Water diverted at the plant undergoes conventional treatment and disinfection. The treated water meets all current Title 22 drinking water quality standards (Archibald & Wallberg and MWH, 2003).

2.2.2.2 Sacramento River

Sacramento River water quality is largely influenced by a mass balance of water quality from upstream reservoir release operations, tributary flows (including the lower American River), agricultural runoff, subsurface drainage flows, and diversions, with other impacts from permitted discharges from M&I sources, urban runoff and spills. In general, the quality of the Sacramento River is high in the vicinity of the SGA boundary. There are moderate amounts of alkalinity and minerals and low levels of disinfection by-product precursors. Turbidity levels in the Sacramento River are higher during the winter and early spring months, usually associated with reservoir releases or runoff from storm events. There are very infrequent detects of organic chemicals, many of which are pesticides or herbicides from agricultural operations. Data collected to date indicate that there is a low prevalence of *Giardia* and *Crytposporidium* in the river, with protozoa only detected sporadically and at very low concentrations.

The characterization of the Sacramento River water quality in the vicinity of the SGA boundary is based on reports for the Sacramento River Water Treatment Plant (Sacramento River Watershed Sanitary Survey; 1995 Report and 2000 Update, prepared by MWH and Archibald & Wallberg).

Sacramento River at Sacramento's Sacramento River Water Treatment Plant. Water is diverted by Sacramento on the Sacramento River just downstream of the confluence with the American River. This water can be supplied to Sacramento and other entities within the place of use on a wholesale basis. Characterization of the Sacramento River raw water quality at the Sacramento River WTP is based on data collected by Sacramento (Sacramento River Water Treatment Plant – Finalization of Preliminary Design, prepared by Montgomery Watson, 1998).

Water is treated by Sacramento using conventional filtration processes with chlorine disinfection. Treated water quality meets or exceeds all federal and state drinking water standards under current operations. Sacramento includes corrosion control in their treatment of the water.

Primary drinking water standards are set for constituents that cause an adverse impact to human health. Secondary drinking water standards are set for constituents that cause an unpleasing aesthetic impact on the water quality; these are not health-based standards. There were no violations of primary or secondary drinking water standards reported for any of the characterization points discussed above.

2.3 "OTHER" SUPPLIES

Currently, limited opportunities exist for using recycled water north of the American River. In Sacramento County, the most probable recycled water opportunity exists at the Sacramento Regional Wastewater Treatment Plant (Sac Regional) located on the Sacramento River near Freeport (south of the American River and outside the SGA boundaries). At this time, however, Sac Regional does not appear to be a likely source of recycled water for the area north of the American River. The cost of pumping recycled water from Sac Regional to areas north of the American River is currently prohibitive. A more economic reclamation program might include the scalping of wastewater flows north of the American River for treatment at satellite plants.

In Placer County, Roseville has a recycled water program and is delivering recycled water for irrigation of golf courses and streetscape. Under this program, Roseville is studying potential locations for direct groundwater recharge with recycled water, in both Placer and northern Sacramento counties.

2.4 EXISTING FACILITIES AND OPERATIONS

2.4.1 Major Infrastructure

For the purposes of this GMP, the existing major infrastructure is divided into three major categories: surface water supply facilities, groundwater supply facilities, and system distribution/transmission and storage facilities. **Figure 7** presents a regional map of existing and planned principal infrastructure[12].

2.4.1.1 Surface Water Supply Facilities

There are four major diversion and treatment facilities on the American and Sacramento rivers that provide surface water within the SGA boundaries (see **Table 2**).

2.4.1.2 Groundwater Supply Facilities

The water purveyors within the SGA boundaries maintain and operate 269 groundwater wells (see **Table 3** and **Figure 6**). Most production capacities are in the range of 330 to 2,250 gallons per minute (gpm).

2.4.1.3 System Distribution/Transmission and Storage Facilities

The Cooperative Transmission Pipeline (CTP)/Northridge Transmission Pipeline (NTP) is the only existing major transmission facility capable of conveying water across the region. Major intra-agency transmission and distribution systems are also shown on **Figure 7**. Most agency-to-agency interconnections are presently used for emergency purposes only.

[12] Much of the planned infrastructure is attributable to the RWA's American River Basin Regional Conjunctive Use Program (see **Section 3** for a description). Individual agencies may be considering facilities that are not shown here.

Table 2. Treatment Capacity at WTPs Providing Surface Water within the SGA Boundaries

Source Water/Facility/Owner	Treatment Capacity (million gallons per day, mgd)
Folsom Reservoir	
Peterson WTP (SJWD)	120 [1]
Lower American River	
Bajamont WTP (CWD)	22
E.A. Fairbairn WTP (Sacramento)	200 [2]
Sacramento River	
Sacramento River WTP (Sacramento)	160 [2]

Notes:
[1] Planned improvements to solids handling system and backwash treatment will increase treatment capacity from 108 mgd (reliable capacity) to 120 mgd (design hydraulic capacity).
[2] Expansions to listed treatment capacities currently under way.

Table 3. Groundwater Wells within SGA Boundaries

Water Purveyor	Number of Groundwater Wells
Cal-Am	51
CWD	14
CHWD	11
Folsom	0
Sacramento	40
DPMWD	8
FOWD	8
NCMWC	0
OVWC	2
RLECWD	12
Sac Suburban	
Arcade Service Area	66
Northridge Service Area	32
SCWA	17
SCWC	8
SJWD	0
Individual representatives from agriculture and self-supplied groundwater users (principally parks and recreation districts)	-- [1]

Source: DMS, August 2003
NOTES:
[1] SGA does not have information on these wells.

Water purveyors that serve primarily groundwater (e.g., DPMWD) have little aboveground storage, relying instead on the groundwater basin for storage. Conversely, water purveyors that serve surface water (either partially or entirely) have made investments in aboveground storage for both raw and treated waters and associated pump stations. These purveyors include: Cal-Am, CWD, Sacramento, FOWD, Sac Suburban, and SJWD.

Figure 7. Existing Principal Infrastructure and Additional Infrastructure Resulting from American River Basin Regional Conjunctive Use Program

2.4.2 Operations

Recent (year 2002) surface water and groundwater use by the water purveyors within the SGA boundaries are shown in **Table 4** and on **Figure 8**. **Table 4** shows that Sacramento, Sac Suburban, and Cal-Am extracted the largest volumes of groundwater. These districts serve the largest, and some of the most densely populated, regions within the SGA boundaries. NCMWC, OVWC, Folsom, and SJWD extracted the least amount of groundwater. These agencies get the vast majority of their water from surface water sources, as shown in **Figure 8**. Total groundwater extraction by SGA member agencies during the last five years (1998 – 2002) is shown in **Figure 9**.

2.5 FUTURE FACILITIES AND OPERATIONS

Phase I of the RWMP identified and described a "menu" of project and program alternatives for implementing the WFA north of the American River. Phase II provided detailed hydrologic (including surface water and groundwater modeling), engineering (including conceptual design, operational analyses, and estimates of costs), and legal/institutional (including operational agreements and funding) evaluations of those projects and programs that best aligned with the goals and objectives of the individual water purveyors and the WFA. The recommendations resulting from Phase II were used to structure the SGA and RWA's regional projects and programs including: SGA-Sacramento Area Flood Control Agency (SAFCA) Pilot Study, 2002 CALFED Bay-Delta Program (CALFED) Environmental Water Account (EWA) Pilot Study, Sac Suburban's Groundwater Stabilization Project, Proposition 13 Groundwater Storage Program Construction Grant (i.e., American River Basin Regional Conjunctive Use Program or ARBCUP), and other ongoing efforts. Some of the planned infrastructure is shown in **Figure 7** and described in **Table 5**.

2.6 EFFECTS OF WFA IMPLEMENTATION

Implementation of the local conjunctive use program prescribed by the WFA will determine the year 2030 water supply scenarios for the water purveyors within the SGA's boundaries. (More detailed water purveyor-specific data are presented in **Appendix B**.) In general, the intent of the WFA is to increase the use of groundwater in dry years and reduce surface water diversions. The decrease in available dry year diversions is a consequence of the WFA objective to provide instream flows in the lower American River for environmental purposes. In wet years, when more surface water is available, diversion will be increased and groundwater extraction will be reduced, thereby promoting recharge of the basin.

2.6.1 Water Year Types

The WFA identifies three principal water year types. These year types are based on estimated March through November unimpaired inflow into Folsom Reservoir and are categorized as wet/average years, drier years, and driest years. For the water purveyors listed in **Table 4**, the specific year type criteria are stated.

Table 4. Year 2002 and Projected 2030 Water Supply Scenarios for Water Purveyors within SGA Boundaries

Water Purveyor	2002 Water Supply Scenario		Projected 2030 Water Supply Scenario [1]	
	Annual Demands [2] (AF/year)	Water Supply Mix, Surface Water/ Supplemental Supply [2], [3] (AF/year)	Annual Demands [4] (AF/year)	Water Supply Mixes by WFA Year Type, Surface Water/ Supplemental Supply [3] (AF/year)
Area "D" Agencies (within Sacramento's POU, north of American River) [5]:			**27,420**	W/A: 27,420/ 0 [7] Drier: 3,500/23,920 [7] Driest: 3,500/23,920 [7]
Cal-Am – Arden Service Area	-- [6]	-- [6]	3,340	
SCWA – Arden Park Vista Service Area	-- [6]	-- [6]	3,150	
DPMWD	1,692	0 / 1,692	1,570	
Sac Suburban – Arcade Service Area (Town & Country Sub-area)	-- [6]	-- [6]	17,990	
SCWC – Arden Town Service Area	1,317	0 / 1,317	1,370	
CWD	13,280	9,507 / 3,773	**12,000** [8]	W/A: 0/12,000 [9] Drier: 0/12,000 [9] Driest: 0/12,000 [9]
Folsom – north of American River only	1,149	1,149 / 0	-- [10]	-- [10]
Sacramento – north of American River only	51,732	26,734 /24,998 [11]	**64,110**	W/A: 64,110/ 0 [12] Drier: -- [12] Driest:42,110/22,000 [12]
NCMWC	88,028 [13]	88,028 / 0 [13]	**51,570**	W/A: 45,610/ 5,960 Drier: 45,610/ 5,960 Driest: 45,610/ 5,960
Sac Suburban and others within PCWA transfer water supply POU in Sacramento County:			**64,820**	W/A: 29,000/35,820 [15] Drier: 0/64,820 [15] Driest: 0/64,820 [15]
Cal-Am – Royal Oaks/Lincoln Oaks Service Areas	19,867 [6]	0 /19,867 [6]	19,910	
RLECWD	3,367	0 / 3,367	18,690	
Sac Suburban:				
Arcade Service Area, North Highlands Sub-area	22,711 [6]	0 /22,711 [6]	5,220	
Northridge Service Area	18,640	16,938 / 1,702 [11]	19,490	
McClellan AFB	-- [14]	-- [14]	1,510	
Sacramento International Airport	-- [16]	-- [16]	**6,260**	W/A: 0/ 6,260 [9] Drier: 0/ 6,260 [9] Driest: 0/ 6,260 [9]
SCWA – Northgate Service Area	5,279 [6]	0 / 5,279 [6]	**1,150**	W/A: 0/ 1,150 [9] Drier: 0/ 1,150 [9] Driest: 0/ 1,150 [9]
SJWD and consortium in Sacramento County			**43,920**	W/A: 43,920/ 0 [9] Drier: Ranging from [9],[18]
CHWD	19,913	17,617 / 2,296 [11]	16,420	43,920/ 0 to
FOWD	14,067	11,456 / 2,611 [11]	14,220	35,510/ 8,410
OVWC	4,377	4,377 / 0	6,750	Driest:35,510/ 8,410 [9]
SJWD	4,661	4,661 / 0	6,530 [17]	
Individual representatives from agriculture and self-supplied groundwater users	-- [16]	-- [16]	-- [16]	-- [16]

Table 4. Year 2002 and Projected 2030 Water Supply Scenarios for Water Purveyors within SGA Boundaries (continued)

NOTES:

[1] Values rounded to nearest 10 AF.

[2] Surface water/supplemental water supply mixes from SGA DMS – year 2002 values as reported by individual water purveyors. Year 2002 water demands based on surface water/supplemental water supply mixes (assumes no shortages).

[3] Supplemental supplies may include groundwater extraction, demand management, and/or recycled water.

[4] From Cooperating Agencies RWMP, Phase II, Technical Memorandum 2, Table 1.

[5] Does not include portions of CWD and Sac Suburban (Northridge Service Area) also located within the Area "D" boundaries.

[6] SGA DMS reports data by water purveyor but not by service area.

[7] Assumes:
(1) Sac Suburban PSA accepted by Water Forum Successor Effort.
(2) Surface water from Sac Suburban and DPMWD contract agreements with Sacramento may be used within Area "D".
(3) Diversions at Fairbairn WTP are dependent upon flows bypassing the WTP exceeding the Hodge Flow Condition. (Hodge Flow Condition: Parties to the litigation (*Environmental Defense Fund et al. v. East Bay Municipal Utility District*) cannot divert water from the American River unless instream flows measure at least 2,000 cubic feet per second (cfs) from October 15 through February; 3,000 cfs from March through June; and 1,750 cfs from July through October 14.)

[8] CWD will divert up to its license amount of 14,000 AF. By the year 2030, it is most likely that the water demand for CWD will be reduced to their historic baseline level of 12,000 AF by implementation of the Urban Water Conservation Best Management Practices. Signatories to the WFA acknowledge and agree that CWD shall not relinquish control of or otherwise abandon the right to any quantity it has foregone delivery and/or diversion of under this Agreement, and shall retain the right (if any) to transfer that water for the other beneficial uses, after that water has served its purpose of assisting in the implementation of the Improved Pattern of Fishery Flow Releases, for diversion or rediversion at, near or downstream of the confluence of the lower American River.

[9] Wet/Ave Years: As it applies to these diverters, years when projected March through November Unimpaired Inflow to Folsom Reservoir is greater than 950,000 AF.
Drier Years: As it applies to these diverters, years when projected March through November Unimpaired Inflow to Folsom Reservoir is less than 950,000 AF.
Driest Years (i.e. Conference Years): Years when projected March through November Unimpaired Inflow to Folsom Reservoir is less than 400,000 AF. Conference years are those years that require diverters and others to meet and confer on how best to meet demands and protect the American River.

[10] Portion of Folsom (north of American River) included in SJWD.

[11] Data reflects participation in 2002 EWA Pilot Study.

[12] Wet/Average, Drier, and Driest year diversions are estimated. Diversions at Fairbairn WTP are dependent upon the flows bypassing the WTP exceeding the Hodge Flow Condition. (Hodge Flow Condition: Parties to the litigation (*Environmental Defense Fund et al. v. East Bay Municipal Utility District*) cannot divert water from the American River unless instream flows measure at least 2,000 cfs from October 15 through February; 3,000 cfs from March through June; and 1,750 cfs from July through October 14.)

[13] SGA DMS includes surface water diversions from both Sacramento and Sutter counties.

[14] McClellan AFB included in Sac Suburban (Northridge) data.

[15] Wet/Ave Years: As it applies to these diverters, years when projected March through November Unimpaired Inflow to Folsom Reservoir is greater than 1,600,000 AF.
Drier Years: As it applies to these diverters, years when projected March through November Unimpaired Inflow to Folsom Reservoir is less than 1,600,000 AF.

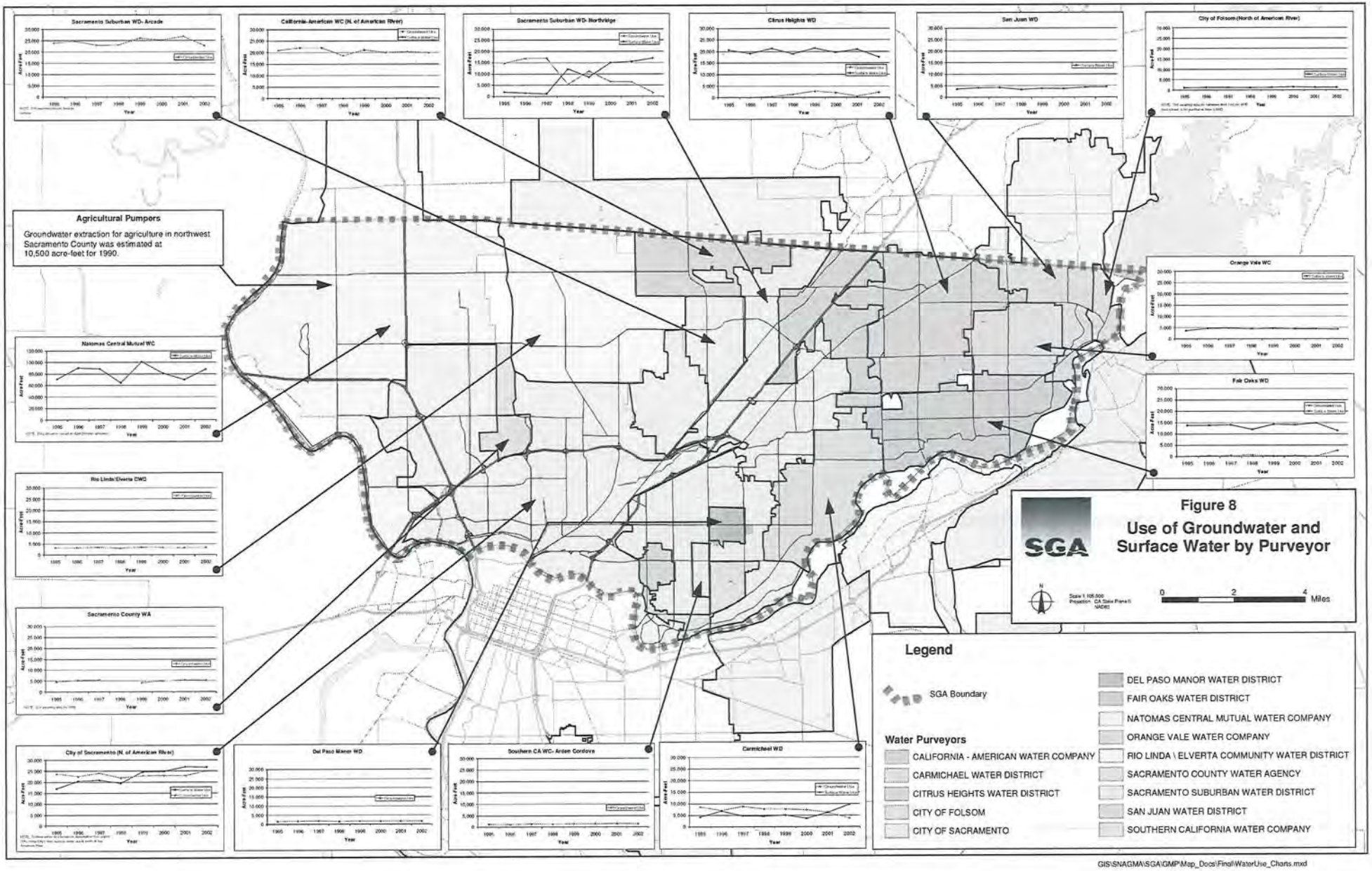
[16] Currently not tracked in the SGA DMS.

[17] Includes portion of Folsom (north of American River).

[18] Decrease in amount of surface water in proportion to the decrease in unimpaired flow from Folsom Reservoir.

2.6.1.1 Definition of Wet/Average Years

For most diverters, wet/average years are defined as those years when the projected March through November unimpaired inflow into Folsom Reservoir is equal to or greater than 950,000 acre-feet (AF). For Sac Suburban's water sale agreement with PCWA, a wet/average year is defined as a year when the March through November unimpaired inflow into Folsom Reservoir is greater than 1,600,000 AF. For Sacramento, diversions from the American River at the Fairbairn WTP are based on meeting the Hodge Flows in the lower American River.



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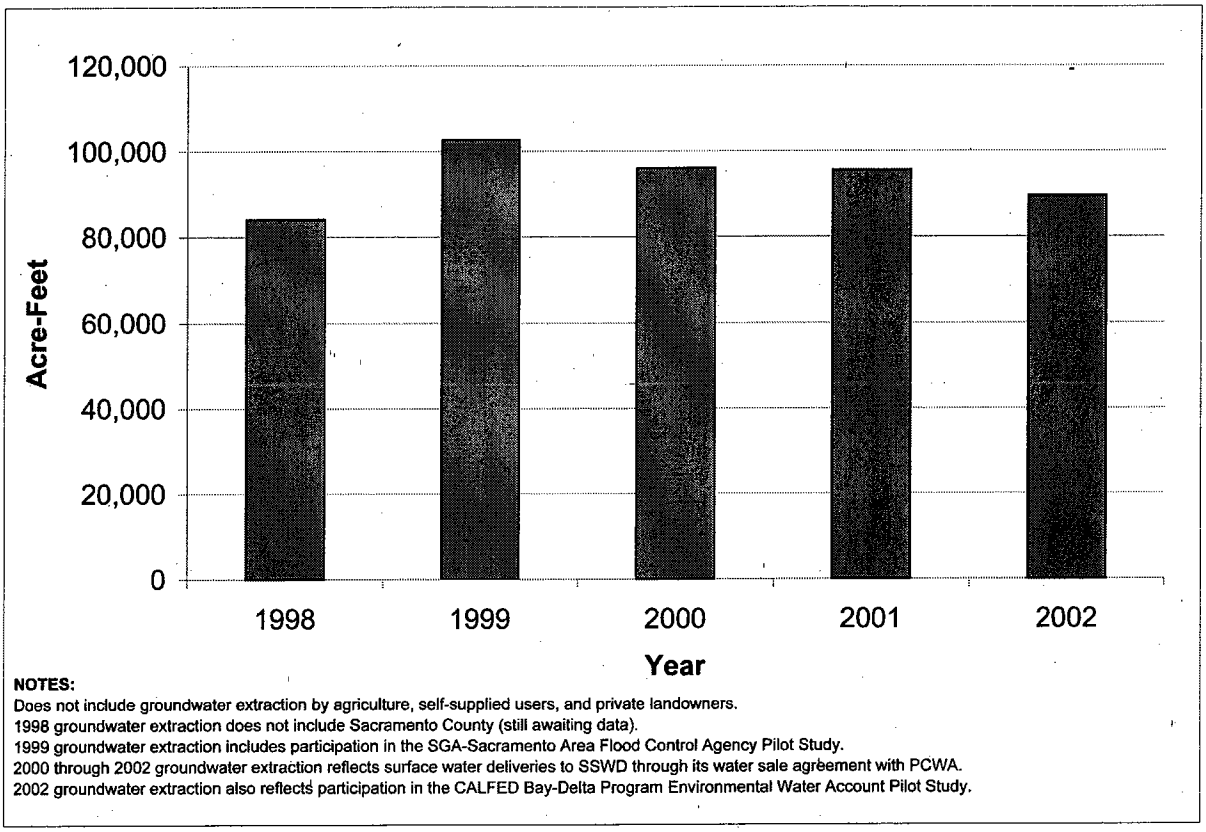

Figure 9. Total Annual Groundwater Extraction by SGA Member Agencies (1998 – 2002)

2.6.1.2 Definition of Drier Years

For most diverters, drier years are defined as those years when the projected March through November unimpaired inflow into Folsom Reservoir is less than 950,000 AF but equal to or greater than 400,000 AF.

2.6.1.3 Definition of Driest Years

The driest years, also referred to as "conference years", are defined as those year when the projected March through November unimpaired inflow into Folsom Reservoir is less than 400,000 AF.

2.6.2 WFA Water Supply Availability

Year 2030 implementation of the WFA will require increased groundwater extraction in the drier and driest years when less surface water is available from the American River. In the wet/average years, surface water diversions will be increased and groundwater pumping will be reduced. Projected year 2030 surface water and supplemental supply[13] use by the water purveyors within the SGA boundaries are shown in **Table 4**.

[13] Supplemental supplies may include groundwater extraction, demand management, and/or recycled water.

Table 5. RWA ARBCUP – Summary of Program Facilities

	Program Component	Operating Agency	Description	Grant Award Amount
1	Sidney N. Peterson WTP Reliability And Conjunctive Use Project	SJWD	WTP expansion and enhancement to increase rated capacity from 108 mgd (165 cfs) to 120 mgd (185 cfs)	$6,467,683
2	Skycrest School Well Groundwater Storage And Recovery Project	CHWD	Groundwater well (capacity up to 2,500 gpm and depth of 500 feet) to augment groundwater extraction capacity for CHWD	$506,225
3	Mitchell Farms Well Groundwater Storage And Recovery Project	CHWD	Groundwater well (capacity up to 2,500 gpm and depth of 500 feet) to augment groundwater extraction capacity for CHWD	$527,846
4	Vintage Woods Well Groundwater Storage And Recovery Project	FOWD	Groundwater well (capacity up to 2,500 gpm and depth of 600 feet) to augment groundwater extraction capacity for FOWD	$756,505
5	Upgrade Of Heather Well Groundwater Storage And Recovery Project	FOWD	Groundwater well (capacity up to 2,500 gpm and depth of 600 feet) to augment groundwater extraction capacity for FOWD	$667,371
6	Diamond Creek Well Groundwater Storage And Recovery Project	Roseville	Groundwater well (capacity of 2,000 gpm and depth of 400 feet) to augment the groundwater extraction capacity for Roseville	$786,111
7	Antelope Pipeline Supplemental Surface Water / Groundwater Storage Project (Placer County)	Roseville	Interconnection pipeline (portion within Placer County) connecting SJWD's Peterson WTP and Roseville WTP. Length is approx. 12,000 linear feet (2.3 miles) with 24-and 36-inch diameter pipeline, and capacity of 20 mgd (30 cfs)	$2,000,069
8	Antelope Pipeline Supplemental Surface Water / Groundwater Storage Project (Sacramento County)	Sac Suburban	Interconnection pipeline (portion within Sacramento County) connecting SJWD's Peterson WTP and Roseville WTP. Length is approx. 3,500 linear feet (.7 miles) with 36-inch diameter pipeline, and capacity of 20 mgd (30 cfs)	$1,294,327
9	Walerga Pipeline Supplemental Surface Water / Groundwater Storage Project	Sac Suburban	Interconnection pipeline will provide enhanced ability to deliver treated surface water to southern portion of Sac Suburban's Northridge Service Area and to McClellan AFB. Length is approx. 8,195 linear feet (1.6 miles) with 36-inch diameter pipeline, and capacity of 20 mgd (30 cfs)	$2,662,391
10	Howe Avenue Water Transmission Main Supplemental Surface Water / Groundwater Storage Project	Sacramento	Transmission main will provide additional capacity across American River for delivery to Sacramento and Sac Suburban's Arcade Service Area. Length is approx. 6,446 linear feet (1.2 miles) with 54-inch diameter pipeline, and capacity of 50 mgd (80 cfs)	$3,861,067
11	Enterprise / Northrop Reservoir And Booster Pump Station Groundwater Storage Project	Sac Suburban	Facility includes above-ground treated water storage reservoir for flow equalization and pump station for boosting treated water out of Sacramento's water transmission line into Sac Suburban's Arcade Service Area. Size of the storage tank is 5 million gallons (15 AF) and capacity of pump station is 20 mgd (30 cfs)	$2,078,266
12	Bianchi Estates Supplemental Surface Water/Groundwater Storage Project	PCWA	Project includes pipeline tie-in and individual property water meters for 46 residential customers that have historically relied on groundwater. By changing to surface water supply, 45 AF of water will be recharged annually into basin through in-lieu recharge. Additionally, project will include property owner conservation training, which in combination with meters will promote water use efficiency	$63,836
				$21,671,697

2.6.2.1 Water Use by Year Type

Water Use in Wet/Average Years. In wet/average years, surface water diversions will be maximized. In those years, surface water use by the water purveyors within the SGA boundaries will total approximately 222,060 AF/year. Estimates for each water purveyor's surface water use in wet/average years are shown in **Table 4**.

Supplemental supplies will make up the difference between demands and available surface water supplies. In wet/average years, the need for supplemental supplies is estimated to be approximately 49,190 AF/year and is generally assumed to be met with groundwater supplies. It should be noted that this is well below the 131,000 AF/year long-term sustainable yield estimate cited in the WFA. Estimates for each water purveyor's supplemental supplies in a wet/average year are shown in **Table 4**.

Water Use in Drier Years. In drier years, surface water diversions will be less than those in wet/average years, ranging from 169,140 to 138,730 AF/year. In drier years, the annual diversion amounts prescribed in the WFA are on a sliding scale based on the inflow to Folsom Reservoir. Estimates for each water purveyor's surface water use in wet/average years are shown in **Table 4**.

Supplemental supplies will make up the difference between demands and available surface water supplies. The need for supplemental supplies is estimated to range from 102,110 to 132,520 AF/year. It should be noted that in some drier years, the groundwater extraction rate will exceed the 131,000 AF/year long-term sustainable yield estimate cited in the WFA. Estimates for each water purveyor's surface water use in drier years are shown in **Table 4**.

Water Use in Driest Years. In the driest years, surface water diversions will be minimized, totaling 138,730 AF/year. As shown in **Table 4**, this is approximately an 83,330 AF/year reduction in diversions from the wet/average years. In the driest years, the need for supplemental supplies will increase to 132,520 AF/year. The majority of these supplemental supplies will be derived from groundwater extraction, exceeding the 131,000 AF/year long-term sustainable yield estimate cited in the WFA.

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3 MANAGEMENT PLAN ELEMENTS

The elements of this GMP include an overall goal, a set of management objectives, and a series of plan components that discuss and identify the actions necessary for meeting the goal and objectives (see **Figure 10**).

3.1 GROUNDWATER MANAGEMENT GOAL

The goal of this GMP is to ensure a viable groundwater resource for beneficial uses including agricultural, industrial, and municipal supplies that support the WFA's co-equal objectives of providing a reliable and safe water supply and preserving the fishery, wildlife, recreational, and aesthetic values of the lower American River.

3.2 BASIN MANAGEMENT OBJECTIVES

To meet the goal stated above, the SGA has adopted five specific basin management objectives (BMOs). These BMOs include the following:

1. **Maintain or improve groundwater quality in the SGA area for the benefit of basin groundwater users.** The groundwater supplied for public consumption meets all public health criteria. However, occurrences of large-scale groundwater contamination are documented in the basin. It is the intent of the SGA that use of groundwater by member agencies in the basin is not hindered by contamination, and that such use does not cause degradation of the quality of the resource. Where contamination is documented, or occurs in the future, the SGA will coordinate with appropriate state and federal regulatory agencies to pursue actions that result in the containment and eventual remediation of the contaminant.

2. **Maintain groundwater elevations that result in a net benefit to basin groundwater users.** Over the past several decades, the extensive groundwater pumping to support urban development has resulted in a persistent cone of depression. The lowering of groundwater elevations can have adverse impacts ranging from increased energy costs to the need to deepen existing wells or even construct new ones. Increased conjunctive use in the basin, particularly additional groundwater extraction during drier years, may result in short-term water levels being drawn down below previous historical lows. The SGA intends that the impacts during these times be minimized and that overall groundwater levels in the basin be improved over time from the present condition.

3. **Protect against any potential inelastic land surface subsidence.** Land subsidence can cause significant damage to essential infrastructure. Historic land surface subsidence within the SGA area has been minimal, with no known significant impacts to existing infrastructure. Given the historical trends, the potential for land surface subsidence from groundwater extraction in the north area basin is remote. However, the SGA intends to monitor for potential land surface subsidence. If inelastic subsidence is documented in conjunction with declining groundwater elevations, the SGA will investigate appropriate actions to avoid adverse impacts.

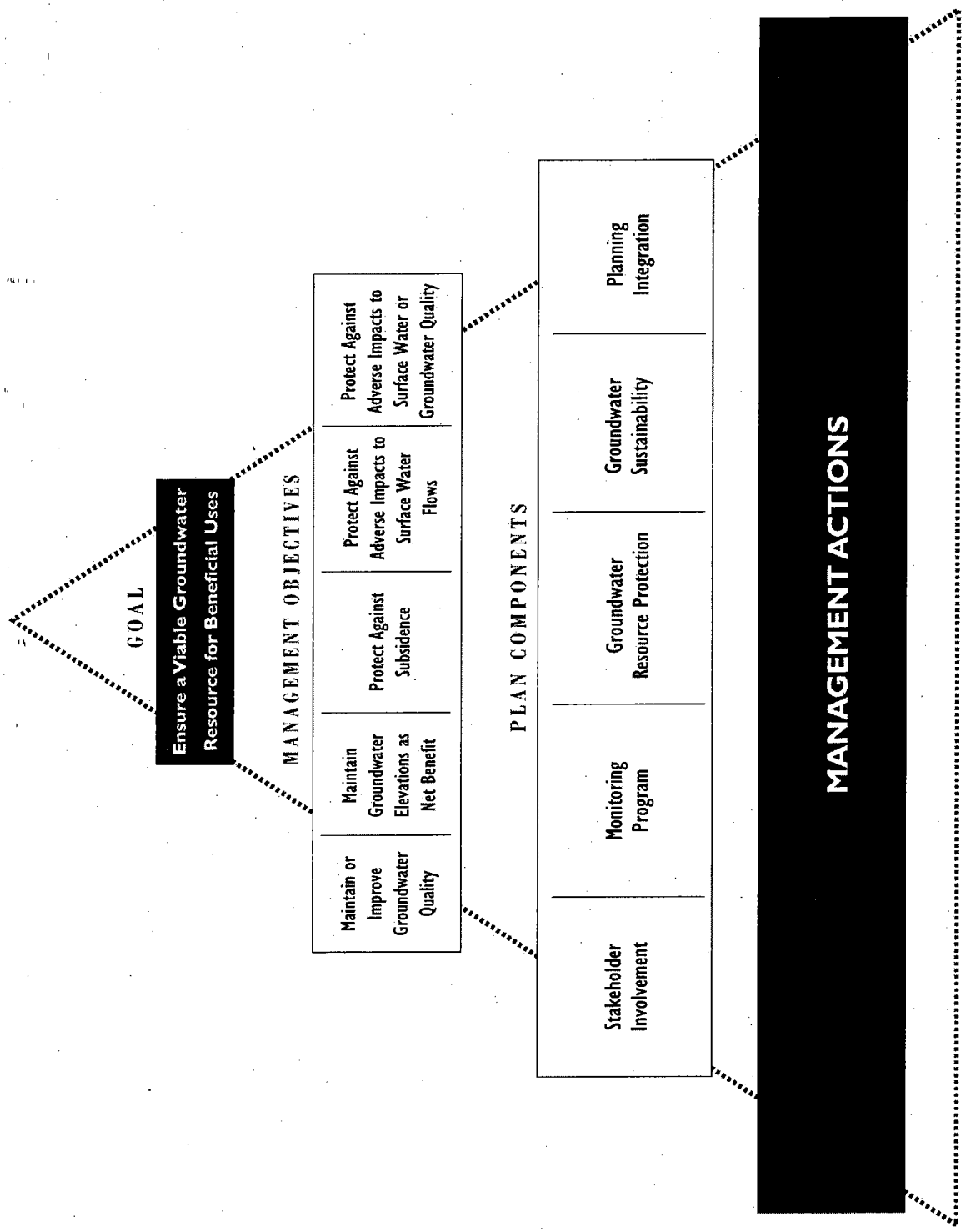

Figure 10. Organization of Management Plan Elements

4. **Protect against adverse impacts to surface water flows in the American River and Sacramento River.** Among other important uses, the American and Sacramento rivers provide habitat for a variety of fish and wildlife species. The SGA and its members are committed to the objectives of the WFA, including the objective to protect and enhance the lower American River. Important elements of the WFA include commitments to reduce lower American River diversions during dry years and to not exceed agreed upon groundwater extractions of 131,000 AF/year on average. In addition, the SGA plans to monitor and evaluate the relationship (if any) between groundwater pumping and adjacent river or stream flows.

5. **Protect against adverse impacts to water quality resulting from interaction between groundwater in the basin and surface water flows in the American River and Sacramento River.** In most natural settings, groundwater is higher in TDS and most other constituents than surface water. At the present time, the flow regime is such that groundwater is not discharging to the river systems in the SGA area. It is possible that future actions could temporarily alter that condition. It is the SGA's intent that controllable operations of the groundwater system do not negatively impact the water quality of the area's rivers and streams. The SGA will seek to gain a better understanding of potential impacts of the discharge of local-area groundwater to surface water channels.

3.3 GMP COMPONENTS

The GMP includes a variety of components that are required by CWC § 10753.7, recommended by DWR Bulletin 118 (2003), optional under CWC § 10753.8, and other components that the SGA has already begun. These components can be grouped into five general categories: (1) stakeholder involvement, (2) monitoring program, (3) groundwater resource protection, (4) groundwater replenishment, and (5) planning integration. Each category and its components are presented in this section. Under each component is a discussion, proposed actions, and identification of the objectives toward which the component is directed.

3.4 COMPONENT CATEGORY 1: STAKEHOLDER INVOLVEMENT

The management actions taken by the SGA may have a wide range of impacts on a broad range of individuals and agencies that ultimately have a stake in its successful management of the basin. The local consumer may be most concerned about water rates or assurances that each time the tap is turned a steady, safe stream of water is available. To large state and federal water resource agencies, the degree to which the SGA can achieve local supply reliability and further banking and exchange programs enhances the state and federal programs' opportunity to meet statewide needs, particularly in drier years. To address the needs of all of these stakeholders, the SGA has pursued several means of achieving broader involvement in the management of the North Area Groundwater Basin. These include: (1) involving members of the public, (2) involving other local agencies within and adjacent to the SGA area, (3) using advisory committees for development and implementation of the GMP, (4) developing relationships with state and federal water agencies, and (5) pursuing a variety of partnerships to achieve local supply sustainability. Each of these is discussed further below.

3.4.1 Involving the Public

Groundwater in California is a public resource, and the SGA is committed to involving the public in the development and implementation of its GMP. When the JPA creating the SGA was signed by the cities of Citrus Heights, Folsom, and Sacramento and the County of Sacramento,

those entities chose an inclusive governance structure consisting of Board membership from all water suppliers overlying the SGA portion of the basin. Many of these Board members are elected officials representing the various water districts and the citizens they serve.

In the preparation of this GMP, the SGA has filed four separate notices in the Sacramento Bee (**Appendix C**). In accordance with CWC § 10753.2, a notice of intent to adopt a resolution to prepare a GMP and inviting the public to the August 14, 2003 SGA Board meeting was published. Upon adoption of the resolution of intent, the resolution was also published in the Sacramento Bee. Additionally, a separate notice inviting the public to participate in developing the GMP and explaining how they could do so was published in May 2003 in the Sacramento Bee. Finally, the SGA provided a public comment period on the draft GMP and noticed and held a second meeting for the public to comment on the GMP prior to its adoption.

The SGA has also demonstrated its commitment to outreach and education. In addition to all required public notification, the SGA prepared a public outreach plan as part of a partnership with DWR. The plan includes many strategies for communicating with both internal and external audiences for various aspects of the program. The Public Outreach Plan Summary from the report by Lucy & Company (2003) is included in **Appendix C**.

In November 2003, the SGA released a Web site (www.sgah2o.org). The SGA will use its Web site to distribute information on GMP implementation activities to the public.

Actions. The SGA will take the following actions:

1. Continue efforts to encourage public participation as opportunities arise.
2. Review and take actions from the public outreach plan as necessary during implementation of various aspects of the GMP.
3. Provide briefings to the Water Forum Successor Effort on GMP implementation progress.
4. Work with members to maximize outreach on GMP activities including the use of the SGA Web site, member Web sites, or bill inserts.

3.4.2 Involving Other Agencies Within and Adjacent to the SGA Area

The SGA's legal boundary is limited to that of the JPA signatories in Sacramento County north of the American River. This includes all of Sacramento County north of the American River. All water purveyors in northern Sacramento County are SGA members and are participating in the development and implementation of this GMP. **Figure 11** shows the SGA purveyors and some of the key adjacent entities that SGA has begun coordinating with during development of the GMP. One key agency within the SGA boundary that is not a water purveyor is the Air Force Real Property Agency (AFRPA), which oversees remediation efforts of contaminated soil and groundwater at the former McClellan AFB. The SGA and the AFRPA have established a committee to meet and discuss issues related to groundwater management and remediation efforts at the former McClellan AFB, and is integrating some of the monitoring wells at McClellan AFB into the SGA monitoring network (see **Section 3.5**).

Other users in the basin not noted on **Figure 11** include agriculture and other self-supplied groundwater producers. The SGA should ensure effective outreach to these groups.

The SGA boundary covers approximately the southern one-third of the North American Subbasin as defined by DWR (**Figure 2**). The remainder of the subbasin includes portions of Sutter and Placer counties.

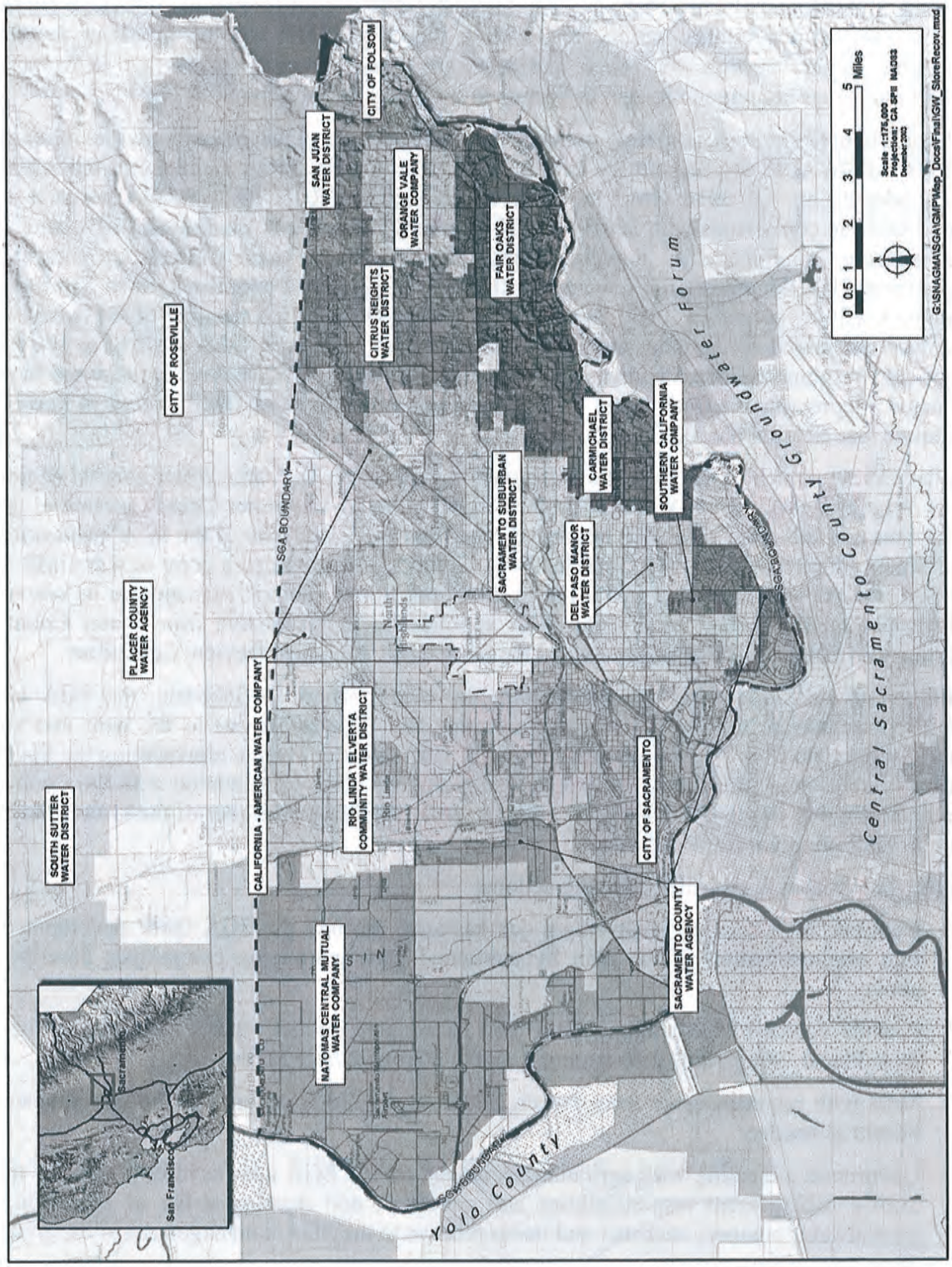

Figure 11. SGA Member Agencies and Other Adjacent Local Agencies

In 2000, NCMWC adopted a GMP for its service area in both Sacramento and Sutter counties (Luhdorff & Scalmanini Consulting Engineers (LSCE), 2000). That GMP will continue to apply to NCMWC's Sutter County service area, while the SGA GMP will be in effect for the Sacramento County portion. NCMWC and SGA are coordinating to ensure that NCMWC's management needs continue to be met in Sacramento County through the SGA GMP.

In Placer County, the SGA is closely connected to groundwater management activities through the RWA. PCWA, Roseville, and the City of Lincoln (Lincoln) are all members of the RWA. PCWA adopted an AB 3030 GMP in 1998, which includes Roseville. PCWA adopted an updated GMP in compliance with SB 1938 in November 2003. The RWA Executive Director is on a steering committee for implementation of the West Placer County Groundwater Management Plan. Lincoln is not covered by the PCWA plan, and adopted its own SB 1938-compliant GMP in November 2003. The RWA Executive Director is a member of the Advisory Committee organized to develop and implement that plan. Finally, SGA staff have briefed PCWA staff responsible for groundwater management on the SGA GMP development and have designated a representative from Placer County as a member of the SGA GMP Technical Review Committee (see **Section 3.4.3**).

In Sutter County, much of the subbasin is managed either by South Sutter Water District (South Sutter) or by NCMWC. NCMWC is an SGA member although the Sutter County portion of the district does not fall under this GMP because it is beyond the boundaries of the SGA's authority. South Sutter adopted an AB 3030 GMP in 1995. South Sutter provided a copy of that GMP to the SGA, and the SGA provided a briefing to the South Sutter General Manager on its current GMP development efforts. Finally, the SGA appointed a representative from Sutter County Department of Public Works as a member of the SGA GMP Technical Review Committee.

In addition to involving other agencies within the North American Subbasin, the SGA has briefed representatives of Yolo County (representing the Yolo Subbasin) to the west and the Central Sacramento County Groundwater Forum (or Groundwater Forum, representing the South American Subbasin) to the south. The SGA also maintains close coordination with the Central Sacramento County through the RWA by being an active associate member of the Groundwater Forum's water purveyor interest group.

Actions. The SGA will take the following actions:

1. Continue high level of involvement demonstrated through the SGA GMP development into implementation of the plan by continued participation on committees described above.
2. Provide copies of the adopted GMP and subsequent annual reports to representatives from Placer, Sutter, and Yolo counties, and the Groundwater Forum.
3. Meet with representatives from Placer, Sutter, and Yolo counties, and the Groundwater Forum as needed.
4. Coordinate a meeting with agricultural pumpers in the SGA area to inform them of the SGA's management responsibilities and activities, and develop a list of agricultural groundwater pumpers concerns and needs relative to the SGA's management of the area.
5. Coordinate a meeting with other self-supplied pumpers in the SGA area to inform them of the SGA's management responsibilities and activities, and develop a list of self-supplied groundwater pumpers concerns and needs relative to the SGA's management of the area.

3.4.3 Utilizing Advisory Committees

The SGA is committed to using advisory committees in its GMP development and implementation. Prior to beginning development of the GMP, the SGA Board appointed an ad hoc committee to make recommendations for the composition of a Policy Committee and Technical Review Committee to guide development of the GMP. The ad hoc committee recommended that the Policy Committee be composed of SGA members representing the overall composition of the groundwater users within the SGA boundaries and that the Technical Review Committee include broader membership including agencies outside the SGA boundaries to consider technical issues related to the plan. Each committee met on approximately a monthly basis during GMP development.

The primary groups represented on the Policy Committee include:

- Cal-Am
- Sacramento
- NCMWC
- Sac Suburban
- San Juan Family[14]
- Agriculture

The primary groups represented on the Technical Review Committee include:

- Sacramento
- NCMWC
- Placer County/Roseville
- Sac Suburban
- San Juan Family
- DWR
- Sutter County

Actions. The SGA will take the following action:

1. Upon adoption of the GMP, the Policy Committee will meet to discuss the continuation and composition of committees to guide implementation of the plan. Provide these recommendations to the SGA Board of Directors.

3.4.4 Developing Relationships with State and Federal Agencies

Working relationships between the SGA and the local, state, and federal regulatory agencies are critical to developing and implementing the various groundwater management strategies and actions detailed in this GMP. Examples of the SGA, RWA, Cooperating Agencies, and their member agencies working cooperatively with the regulatory agencies include:

- **Cooperating Agencies RWMP.** Both Reclamation and DWR participated in and provided funding for the RWMP effort (Phases I and II).

[14] The San Juan Family is comprised of SJWD, CHWD, FOWD, OVWC, and Folsom (north of the American River).

- **Banking and Exchange Program.** A partnership of the Cooperating Agencies and the SGA was the first signatory of a Memorandum of Understanding with DWR's Integrated Storage Investigation (ISI) in March 2000. The potential for a regional banking and exchange program was investigated through pilot studies and related activities. DWR's ISI provided funding for this effort.
- **SGA-SAFCA Pilot Study.** In 1999/2000, the SGA's first pilot study was conducted in conjunction with a local flood control agency (SAFCA) and Reclamation.
- **EWA Pilot Study.** In 2002, SGA's pilot study was the first water acquisition made by Reclamation on behalf of the EWA.
- **SGA DMS.** The U.S. Army Corps of Engineers (USACE) and DWR participated in the development of and provided funding for the SGA DMS (Phases I and II).
- **American Basin Conjunctive Use Feasibility Study.** In the mid-1990s, DWR conducted a feasibility study of conjunctive use parts of Sacramento, Sutter, and western Placer counties. NCMWC, an SGA member, was a cooperator in the study. The investigation serves as a good example of developing relationships between state and local agencies.

The SGA also coordinates and develops working relationships with other local, state, and federal regulatory agencies (e.g., Sacramento County, California Department of Health Services (DHS), U.S. Environmental Protection Agency (USEPA), etc.), as appropriate.

Actions. The SGA will take the following action:

1. Continue to develop working relationships with local, state, and federal regulatory agencies.

3.4.5 Pursuing Partnership Opportunities

The SGA is committed to facilitating partnership arrangements at the local, state, and federal levels. In the past decade, Sacramento-area water community and other local leaders have made great strides toward regional planning and collaboration on water issues. The historic WFA, which involved over 40 stakeholders and 7 years of facilitated discussions, resulted in a regional framework to balance the competing demands for increased use of surface and groundwater with the environmental needs of the lower American River through the year 2030. Several important partnerships have been formed to implement the WFA as well as provide a host of other benefits to water agencies and the customers that they serve.

The SGA itself is a unique partnership between the cities and county entering a joint powers agreement and allowing the agency to be overseen by a board of local water purveyors and self-supplied and agricultural interests. Regionally, the SGA is closely partnered with the RWA, the Water Forum Successor Effort, and the Cooperating Agencies. Together these activities define and support a conjunctive use program, which is critical to supporting the overall management goal of a safe and reliable water supply.

While the facilities necessary for local supply reliability through 2030 have been identified through the RWMP, the potential exists to expand conjunctive use operations in the basin to achieve broader regional and statewide benefits. The needed facilities, however, would require substantial resources. To investigate any further opportunities would require resources provided through partnerships from potential beneficiaries.

Actions. The SGA will take the following actions:

1. Continue to promote partnerships that achieve both local supply reliability and achieve broader regional and statewide benefits.
2. Continue to track grant opportunities to fund groundwater management activities and local water infrastructure projects.

3.5 COMPONENT CATEGORY 2: MONITORING PROGRAM

At the heart of this GMP is a monitoring program capable of assessing the status of the basin and responses in the basin to future management actions. The program includes the monitoring of groundwater elevations, monitoring of groundwater quality, monitoring and assessing the potential for land surface subsidence resulting from groundwater extraction, and developing a better understanding of the relationship between surface water and groundwater along the American and Sacramento rivers. Also important is the establishing of monitoring protocols to ensure the accuracy and consistency of data collected. Finally, the monitoring program includes a tool, the DMS, for assembling and assessing the groundwater-related data in the North Area Groundwater Basin.

3.5.1 Groundwater Elevation Monitoring

The SGA has compiled historic water level data measurements extending from prior to 1950 through 2002. Sources of historic water level data for the SGA area include:

- DWR/SCWA
- SGA Member Agencies
- USGS
- CSUS

DWR and SCWA have maintained a program of measuring more than 30 wells in the basin, from which SCWA routinely generates annual contour maps for the county. However, the wells monitored have been added to and dropped off of the network over time, so it is difficult to compare a historic contour plot to a recent one. For this reason, the SGA is establishing a standardized network of wells that combines those monitored by DWR and SCWA with wells from member water purveyors and other sources. It is the SGA's intent that these wells be maintained as a consistent long-term network that represents overall groundwater elevation conditions in the basin. **Figure 12** shows the wells currently proposed for this network.

The wells were selected to provide uniform geographic coverage throughout the 195 square mile SGA area, and in an area around the northern, western, and southern perimeter of the SGA[15]. The well network was developed by first establishing a network of sampling grids using the following method:

- Overlay a matrix of evenly spaced points over the SGA area.
- Surround matrix of points with polygons.
- Conform boundaries of polygons to the SGA boundaries and regenerate area grids.

[15] No wells were selected east of the boundary because it is in consolidated rock outside of the groundwater basin.

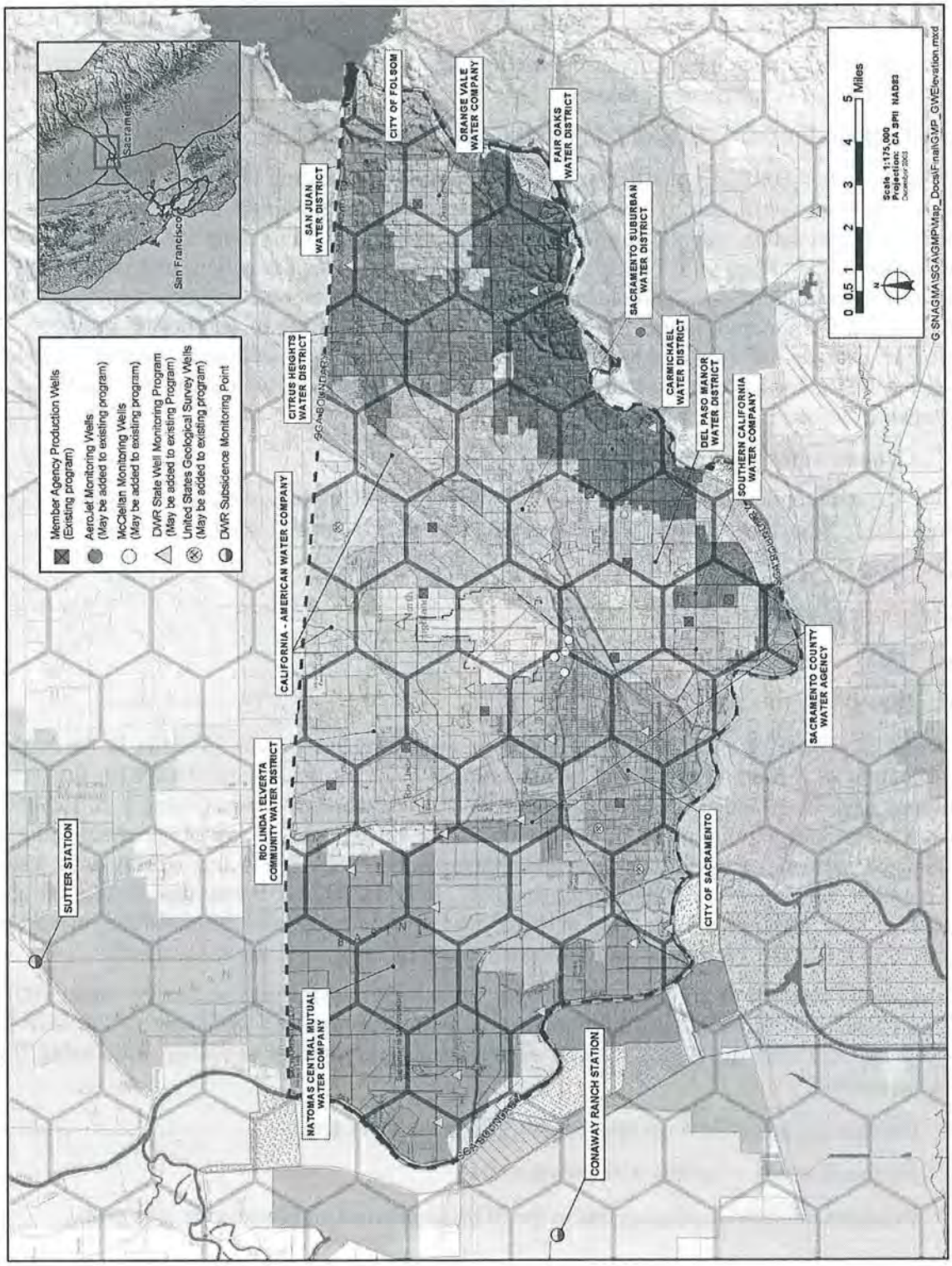

Figure 12. Initial Proposed Wells for Consideration in SGA Groundwater Elevation Monitoring Network

The resulting grid, shown on **Figure 12,** includes 44 polygons of roughly equal area of about five square miles each. The proposed set of member agency monitoring wells were selected from the DMS to represent water levels for as many polygons as possible. Individual wells were selected by:

- Giving preference to wells currently in DWR's and SCWA's monitoring program. These wells were selected because (a) they have long records of historic water level data and are useful in assessing trends within the groundwater basins, (b) uniform protocols were used in measuring and recording the water level data, and (c) these are non-producing wells, so water level readings represent relatively static levels.
- Identifying member agency wells with well construction information, long records of water level data and giving preference to those wells with the lowest recent extraction volumes.
- Plotting the location of USGS wells within the SGA area and choosing wells in those areas void of DWR or member agency wells.

Actions. Additional actions by the SGA will include:

1. Coordinate with member agencies and DWR to identify an appropriate group of wells for monitoring for a spring 2004 set of groundwater elevation measurements.
2. Coordinate with DWR and SCWA to ensure that the selected wells are maintained as part of a long-term monitoring network.
3. Coordinate with DWR and SCWA to ensure that the timing of water level data collection by member agencies coincides within one month of DWR and SCWA data collection. Currently DWR and SCWA collect water level data in the spring and fall.
4. Coordinate with member agencies to ensure that needed water level elevations are collected and verify that uniform data collection protocols are used among the agencies.
5. Coordinate with the USGS to determine the potential for integrating USGS monitoring wells constructed for the NAWQA Program into the SGA monitoring network.
6. Consider ways to fill gaps in the monitoring well network by identifying additional suitable existing wells or identifying opportunities for constructing new monitoring wells.
7. Assess groundwater elevation trends and conditions based on the network annually.
8. Assess the adequacy of the groundwater elevation monitoring well network annually.
9. Identify a subset of monitoring wells that will be monitored more frequently than twice annually to improve the SGA's understanding of aquifer responses to pumping throughout the year.

3.5.2 Groundwater Quality Monitoring

Because most of the wells in the basin are used for public water supply, an extensive record of water quality data is available for most wells dating from about 1985 to present. The SGA has compiled available historic water quality data for constituents monitored as required by DHS under Title 22. Sources of water quality data include:

- DWR
- SGA Member Agencies

- USGS
- CSUS

This level of monitoring is sufficient under existing regulatory guidelines to ensure that the public is provided with a safe, reliable drinking water supply. It would ultimately be important to have in place a network of shallow (less than 200 feet deep), dedicated monitoring wells to serve as an early warning system for contaminants that could make their way to the greater depths in the basin where SGA members primarily extract groundwater. The SGA has identified the locations of several wells associated with the USGS NAWQA program and is working with AFRPA to identify a subset of the approximately 400 monitoring wells located in and around the former McClellan AFB for integration into the SGA monitoring effort. The SGA will also coordinate with the CVRWQCB, which oversees the remediation of LUSTs, to identify existing dedicated monitoring wells in the basin.

Figure 13 shows the existing SGA member agency production wells. Title 22 water quality reporting is required by DHS for each of these public drinking water supplies. The SGA's water quality monitoring network includes these wells. The water quality monitoring well network may be expanded to include additional DWR, USGS, McClellan AFB, Aerojet, CVRWQCB, and privately owned wells, based on the outcome of coordination meetings with these agencies.

Actions. The following actions will be taken by the SGA to monitor and manage groundwater quality:

1. Coordinate with member agencies to verify that uniform protocols are used when collecting water quality data.
2. Coordinate with the USGS to obtain historic water quality data for NAWQA wells, determine timing and frequency of monitoring under USGS program, and to discuss the potential for integrating USGS monitoring resources with the SGA network.
3. Coordinate with member agencies and other local, state, and federal agencies to identify where wells may exist in areas with sparse groundwater quality data. Identify opportunities for collecting and analyzing water quality samples from those wells.
4. Assess the adequacy of the groundwater quality monitoring well network annually.

3.5.3 Land Surface Elevation Monitoring

Subsidence of the land surface resulting from compaction of underlying formations affected by head (water level) decline is a well-documented concern throughout much of the Central Valley. During a typical pumping season, changes in land surface elevation can be observed as a result of both elastic and inelastic subsidence in the underlying basin. Elastic subsidence results from the reduction of pore fluid pressures in the aquifer and typically rebounds when pumping ceases or when groundwater is otherwise recharged resulting in increased pore fluid pressure. Inelastic subsidence occurs when pore fluid pressures decline to the point that aquitard (a clay bed of an aquifer system) sediments collapse resulting in permanent compaction and reduced ability to store water in that portion of the aquifer.

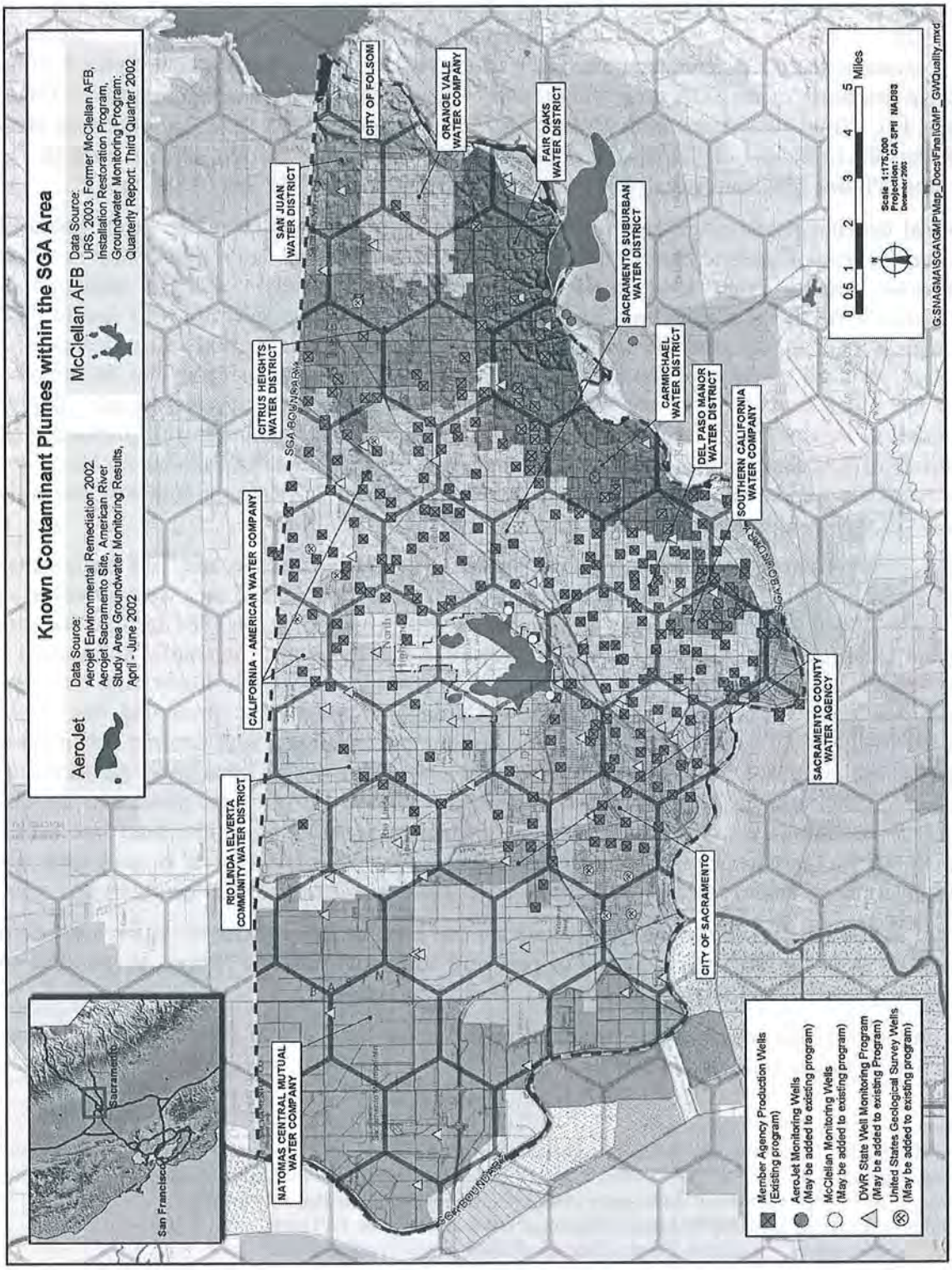

Figure 13. Existing and Proposed Wells in SGA Groundwater Quality Monitoring Network

While some land surface subsidence from compaction of water-bearing deposits caused by the removal of groundwater is known to have occurred west of the Sacramento River[16], the extent of subsidence east of the Sacramento River has been minimal. DWR maintains three subsidence monitoring stations in Sacramento Valley. The Sutter Station is located just north of the SGA area, where State Highway 99 crosses the Natomas Cross-Canal **(Figure 12)**. Total subsidence at the Sutter Station from spring 1995 to spring 2003 has been 0.026 feet (0.312 inch)[17]. Total subsidence at the Conaway Ranch Station, located west of the SGA area (**Figure 12**), from spring 1992 to spring 2003 has been 0.044 feet (0.526 inch)[18].

Historical benchmark elevation data for the period from 1912 through the late 1960s obtained from the National Geodetic Survey (NGS) were used to evaluate land subsidence in north Sacramento County. From 1947 to 1969 the magnitude of land subsidence measured at benchmarks north of the American River in Sacramento County ranged from 0.13 feet to 0.32 feet, with a general decrease in subsidence in a northeastward direction. This decrease is consistent with the geology of the area: formations along the eastern side of the Sacramento Valley are older than those on the western side and are subject to a greater degree of pre-consolidation making them less susceptible to subsidence. The maximum documented land subsidence of 0.32 feet was measured at both benchmark L846, located approximately two miles northeast of the former McClellan AFB, and benchmark G846, located approximately one mile northeast of the intersection of Greenback Lane and Elkhorn Boulevard.

Another land subsidence evaluation was performed in the Arden-Arcade area[19] of Sacramento County from 1981 to 1991. Elevations of nine wells in the Arden-Arcade area were surveyed in 1981, 1986, and 1991. The 1986 results were consistently higher than the 1981 results; this was attributed to extremely high rainfall totals in early 1986 that recharged the aquifer and caused a rise in actual land surface elevations. The 1991 results were consistently lower than the 1986 results; this was attributed to five years of drought immediately preceding the 1991 measurements, which caused depletion of the aquifer and resulting land surface subsidence. Comparison of eight[20] of the locations indicates that seven benchmarks have lower elevations in 1991 than in 1981 and one benchmark has a higher elevation in 1991. Of the seven benchmarks with lower elevations in 1991, the maximum difference is 0.073 feet (less than one inch). Whether this is inelastic subsidence is indeterminate from the data, but it is clear that the magnitude of the potential subsidence in the benchmarks during that period is negligible.

Actions. While available data and reports indicate that land surface subsidence is not a problem in the SGA area, the SGA is interested in pursuing additional possible actions to continue to monitor for potential land surface subsidence. These may include:

1. Investigate the feasibility and costs of re-surveying the wells in the Arden-Arcade area that were last measured in 1991.

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[16] From 1988-1992 cumulative net sediment compaction of 0.78 feet was measured at the extensometer in Yolo County between June 15, 1988 and October 1, 1992 (USGS data from the Woodland land subsidence monitoring station, Yolo County, California, water years 1988-1992, USGS Open File Report 94-494)

[17] Based on information provided by Central District of DWR to MWH on 12/11/03.

[18] Based on information provided by Central District of DWR to MWH on 12/17/03.

[19] The boundaries of the Arden-Arcade area are (1) Sacramento's city limits on the west, (2) Sacramento's city limits and the American River on the south, (3) CWD on the east, and (4) Sacramento's city limits and Sac Suburban (Northridge Service Area) on the north.

[20] One of the nine wells could not be compared between 1981 and 1991 because the benchmark was destroyed and replaced between 1981 and 1986.

2. Coordinate with the USGS to ascertain the suitability of the use of Interferometric Synthetic Aperture Radar (InSAR) images of the SGA and surrounding area. If the technology appears suitable, identify the costs of determining ground surface elevations and identify potential cost-sharing partners.
3. Coordinate with other agencies, particularly the City and County of Sacramento and the NGS to determine if there are other suitable benchmark locations in the SGA area to aid in the analysis of potential land surface subsidence.
4. Educate SGA member agencies of the potential for land surface subsidence and signs that could be indicators of subsidence.

3.5.4 Surface Water Groundwater Interaction Monitoring

The interaction between groundwater and surface water has not been extensively evaluated within the SGA area. The SGA is currently aware of the following:

- A recent draft decision by the State Water Resources Control Board (SWRCB, 2003) regarding the American River, the SWRCB concluded that from Nimbus Dam to about 6,000 feet below the dam, groundwater elevations and surface water elevations were similar enough to each other that groundwater could be tributary to the American River. Beyond 6,000 feet down reach from Nimbus Dam, groundwater elevations are sufficiently lower than the river channel to conclude that the American River is a losing reach down to the confluence with the Sacramento River.
- Groundwater modeling (described in **Section 3.8.1**) has been used to estimate flow volumes between surface water and groundwater for various hydrologic conditions.
- CSUS in cooperation with DWR has recently installed several monitoring wells in and adjacent to the American River to investigate groundwater interaction with the American River and how recent USACE levee reinforcement projects might have changed the surface water-groundwater flow relationships.
- In 1991, Sacramento Regional County Sanitation District (SRCSD), Sacramento County, and Sacramento established the Sacramento Coordinated Water Quality Monitoring Program (CMP). Since that time, the CMP has monitored surface water quality for a variety of constituents including trace elements at several locations on the American River and Sacramento River. Within the SGA area, the CMP monitors the Sacramento River at the Interstate 5 Veteran Memorial Bridge, and the American River at Nimbus Dam and at Discovery Park.

Actions. The SGA will pursue actions to better understand the relationship between surface and groundwater in the SGA area, including:

1. Compile available stream gage data and information on tributary inflows and diversions from the American and Sacramento rivers to quantify net groundwater recharge or discharge between gages in the SGA area.
2. Coordinate with local, state, and federal agencies to identify available surface water quality data from the American and Sacramento rivers adjacent to the SGA area.
3. Correlate groundwater level data from wells in the vicinity of river stage data to further establish whether the river and water table are in direct hydraulic connection, and if the surface water is gaining or losing at those points.

4. Continue to coordinate with local, state, and federal agencies and develop partnerships to investigate cost-effective methods that could be applied to better understand surface water-groundwater interaction along the Sacramento and American rivers.

5. Coordinate with CSUS to analyze data obtained from recently constructed monitoring wells on the CSUS campus to better understand the relationship between the groundwater basin and surface water flows at that location.

3.5.5 Protocols for the Collection of Groundwater Data

The SGA has evaluated the accuracy and reliability of groundwater data collected by member agencies (MWH, 2002). The evaluation indicated a significant range of techniques, frequencies and documentation methods, for the collection of groundwater level and groundwater quality data. Although the groundwater data collection protocol may be adequate to meet the needs of the individual water districts, the lack of consistency between districts in the past yields an incomplete picture of basin-wide groundwater conditions. Other types of groundwater data collection protocols are included in **Sections 3.5.1** and **3.5.2** above.

Actions. To improve the comparability, reliability and accuracy of groundwater data, the SGA take the following actions:

1. Use a Standard Operating Procedure (SOP) for collection of water level data by each of the member agencies. **Appendix D** includes an SOP for Manual Water Level Measurements. This SOP was prepared using guidance documents available through USEPA and was included in the SGA technical memorandum summarizing the accuracy and reliability of groundwater data (MWH, 2002).

2. Provide member agencies with guidelines on the collection of water quality data developed by DHS for the collection, pretreatment, storage, and transportation of water samples (DHS, 1995).

3. Provide training on the implementation of these SOPs to member agencies, if requested.

3.5.6 Data Management System

The SGA membership includes 14 public agency and investor-owned water purveyors. Historically, the member agencies have maintained a varying range of groundwater-related data in a wide variety of formats. In order for the SGA to achieve its primary objective of sustaining the groundwater resource of the North Area Groundwater Basin, it was essential to develop a data storage and analysis tool, the DMS. The DMS was developed by MWH under contract with the USACE. Other local sponsors included DWR and the SGA.

Development of the DMS is a two-phase project. Phase I was completed in January 2003 and included initial development of the user interface and population of the DMS to a demonstration level of approximately one-fourth of the water purveyor wells. Phase II, to be completed by January 31, 2004, will fully populate the database and add further customization of the user interface with additional analysis features. Once the DMS is fully populated and quality-control checked a summary of existing basin conditions will be prepared. From this initial summary, analyses will be performed on at least an annual basis to assess the impacts of current and future SGA management actions on the groundwater system.

The DMS is a public domain application developed in a Microsoft Visual Basic environment and is linked to a SQL database of the SGA purveyor data. The DMS provides the end-user with ready access to both enter and retrieve data in either tabular or graphical formats. Security

features in the DMS allow for access restrictions based on a variety of user permission levels. Data in the DMS include:

- Well construction details.
- Known locations of groundwater contamination and potentially contaminating activities.
- Long-term monitoring data on:
  - Monthly extraction volumes.
  - Water elevations.
  - Water quality.
- Aquifer characteristics based on well completion reports.

The DMS allows for the viewing of regional trends in water level and water quality not previously available to the SGA (see **Figure 14** for a DMS screen capture). The DMS has the capability of quickly generating well hydrographs and groundwater elevation contour maps using historic groundwater level data. The DMS also has the ability to view water quality data for Title 22 required constituents as a temporal concentration graph at a single well or any constituent can be plotted with respect to concentration throughout the SGA area. Presentation of groundwater elevation data and groundwater quality data in these ways will be useful for making groundwater basin management decisions.

The SGA is currently in the process of establishing data transfer protocols so that groundwater data within the SGA area (by member agencies, DWR, AFRPA, USGS, etc...) can be readily appended to the database and analyzed through the DMS. Annual summaries of groundwater monitoring data will be prepared using the analysis tools in the DMS and presented in the update to the State of the Basin report (see **Section 4**).

Actions. To maintain and improve the usability of the DMS, the SGA will take the following actions:

1. Continue to update the DMS with current water purveyor data.
2. Make recommendations to the DMS developer on utilities to add to the DMS to increase its functionality.

3.6 COMPONENT CATEGORY 3: GROUNDWATER RESOURCE PROTECTION

The SGA considers groundwater protection to be one of the most critical components of ensuring a sustainable groundwater resource. In this GMP, resource protection includes both prevention of contamination from entering the groundwater basin and remediation of existing contamination. Prevention measures include proper well construction and destruction practices, development of wellhead protection measures, and protection of recharge areas. Containment and remediation include measures to prevent contamination from human activities as well as contamination from natural substances such as saline water bodies.

3.6.1 Well Construction Policies

The Sacramento County Environmental Management Department (EMD) administers the well permitting program for Sacramento County. The standards for construction are identified in Sacramento County Code No. SCC-1217 as amended on April 9, 2002. In addition to general well construction standards, Sacramento County has a policy of special review by appropriate regulatory agencies for well permits within 2,000 feet of a known contaminant plume (referred to

as Consultation Zones) and prohibits the drilling of new public supply wells at the former McClellan AFB. As part of the development of the DMS, the most recent extents of known contaminant plumes associated with the former McClellan AFB, the former Mather AFB, and Aerojet were delineated for the SGA.

Actions. The SGA will take the following actions:

1. Ensure that all member agencies are provided a copy of the county well ordinance and understand the proper well construction procedures.
2. Inform member agencies of Sacramento County's Consultation Zone and provide a copy of the boundary of the former McClellan AFB prohibition zone to appropriate member agencies.
3. Provide a copy of the most recently delineated plume extents at the former McClellan AFB, the former Mather AFB, and Aerojet to the EMD and SGA members for their review and possible use.
4. Coordinate with member agencies to provide guidance as appropriate on well construction. Where feasible and appropriate, this could include the use of subsurface geophysical tools prior to construction of the well to assist in well design.

3.6.2 Well Abandonment and Well Destruction Policies

The EMD administers the well destruction program for Sacramento County. The standards for construction are identified in Sacramento County Code No. SCC-1217 as amended on April 9, 2002. One concern expressed by the EMD[21] is that many abandoned domestic wells have not been properly destroyed. Historically, the north part of Sacramento County has been served by organized water districts, so there are not many privately owned domestic wells. As part of development of the DMS, DWR well records for all known wells in the basin were reviewed for reported abandonment and destruction. The wells were rated for the confidence of proper destruction based on the information provided on the report. This information was entered into the DMS. It is the SGA's opinion that the database as it currently stands, accurately reflects documented well destruction activities within the SGA area. The actions listed below will provide improved protection of groundwater quality within the SGA area.

Actions. The SGA will take the following actions:

1. Ensure that all member agencies are provided a copy of the code and understand the proper destruction procedures and support implementation of these procedures.
2. Follow up with member agencies on the reported abandoned and destroyed wells to confirm the information collected from DWR.
3. Provide a copy of the information on abandoned and destroyed wells in northern Sacramento County to fill any gaps in their records.
4. Meet with the EMD to discuss ways to ensure that wells in the SGA area are properly abandoned or destroyed.
5. Obtain "wildcat map from California Division of Oil and Gas to ascertain the extent of historic gas well drilling operations in the area as these wells could function as conduits of contamination if not properly destroyed.

[21] Faith King, pers. comm., August 11, 2003.

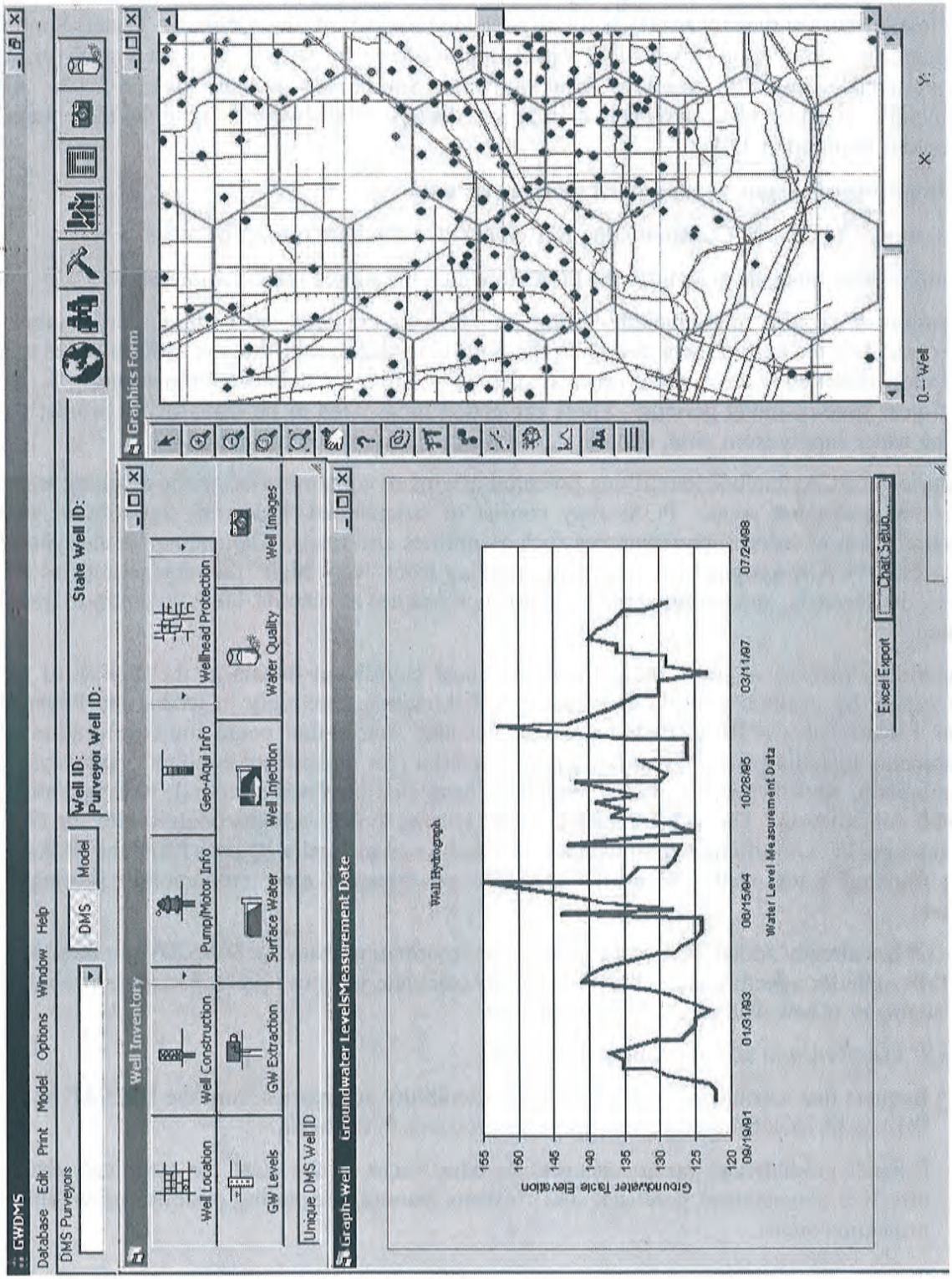

Figure 14. DMS Screen Capture

3.6.3 Wellhead Protection Measures

Identification of wellhead protection areas is a component of the Drinking Water Source Assessment and Protection (DWSAP) Program administered by DHS. DHS set a goal for all water systems statewide to complete Drinking Water Source Assessments by mid-2003. All SGA member agencies have completed their required assessments by performing the three major components required by DHS:

- Delineation of capture zones around sources (wells).
- Inventory of Potential Contaminating Activities (PCAs) within protection areas.
- Vulnerability analysis to identify the PCAs to which the source is most vulnerable.

Delineation of capture zones includes using groundwater gradient and hydraulic conductivity data to calculate the surface area overlying the portion of the aquifer that contributes water to a well within specified time-of-travel periods. Typically, areas are delineated representing 2-, 5-, and 10-year time-of-travel periods. These protection areas need to be managed to protect the drinking water supply from viral, microbial, and direct chemical contamination.

Inventories of PCAs include identifying potential origins of contamination to the drinking water source and protection areas. PCAs may consist of commercial, industrial, agricultural, and residential sites, or infrastructure sources such as utilities and roads. Depending on the type of source, each PCA is assigned a risk ranking, ranging from "very high" for such sources as gas stations, dry cleaners, and landfills, to "low" for such sources as schools, lakes, and non-irrigated cropland.

Vulnerability analysis includes determining the most significant threats to the quality of the water supply by evaluating PCAs in terms of risk rankings, proximity to wells, and Physical Barrier Effectiveness (PBE). PBE takes into account factors that could limit infiltration of contaminants including type of aquifer, aquifer material (for unconfined aquifers), pathways of contamination, static water conditions, hydraulic head (for confined aquifers), well operation, and well construction. The vulnerability analysis scoring system assigns point values for PCA risk rankings, PCA locations within wellhead protection areas, and well area PBE; the PCAs to which drinking water wells are most vulnerable are apparent once vulnerability scoring is complete.

The SGA has already added PCA and capture zone information from the DWSAP into the DMS. The DMS includes a feature that will automatically calculate wellhead protection areas if no data are available or if new well locations are proposed.

Actions. The SGA will take the following actions:

1. Request that member agencies provide vulnerability summaries from the DWSAP to the SGA to be used for guiding management decisions in the basin.
2. Contact groundwater basin managers in other areas of the state for technical advice, effective management practices, and "lessons learned," regarding establishing wellhead protection areas.

3.6.4 Protection of Recharge Areas

The SGA has also evaluated surface geology within and directly adjacent to its boundary for the purpose of delineating areas of potentially high recharge rates. Surface geology and estimates of relative recharge rates are shown on **Figure 15**. Much of the surface area considered to have the highest potential for recharge is already developed, so opportunities to ensure protection of these areas are somewhat limited.

Recently, most members of the SGA participated in the California Aquifer Susceptibility (CAS) Study administered by the SWRCB. Objectives of this study included sampling for many known contaminants at low detection levels to act as early indicators of potential problems particularly in recharge areas of aquifers. The results of this study are not yet available.

Actions. The SGA will take the following action:

1. When CAS results are available, meet with the SWRCB to discuss those results and consider follow-on actions.

3.6.5 Control of the Migration and Remediation of Contaminated Groundwater

The migration of contaminated groundwater in the SGA area is of primary concern from the McClellan AFB and Aerojet groundwater contamination plumes as shown in **Figure 4**. Also of concern is the localized contamination of groundwater by industrial point sources such as dry cleaning facilities and numerous fuel stations throughout the SGA area.

While the SGA does not have authority or the responsibility for remediation of this contamination, it is committed to coordinating with responsible parties and regulatory agencies to keep SGA members informed on the status of known contamination in the basin. For example, the SGA has requested and entered into its DMS a coverage of known LUSTs within the basin. This information is maintained by the SWRCB and CVRWQCB. Also, the SGA has been in communication with the AFRPA, which is overseeing remediation efforts at McClellan AFB (see **Section 3.4.2**).

Actions. The SGA will take the following actions:

1. Coordinate with known responsible parties to develop a network of monitoring wells to act as an early warning system for public supply wells.
2. If detections occur in these monitoring wells, facilitate meetings between the responsible parties and the potentially impacted member agency to develop strategies to minimize the further spread of contaminants. An example of a strategy would be to consider altering groundwater extraction patterns in the area to change to groundwater gradient.
3. Provide SGA members with all information on mapped contaminant plumes and LUST sites for their information in developing groundwater extraction patterns and in the siting of future production or monitoring wells.
4. Meet with representatives of the CVRWQCB to establish a mutual understanding about the SGA's groundwater management responsibilities. Identify ways to have open and expedient communication with CVRWQCB regarding any new occurrences of LUSTs, particularly when contamination is believed to have reached the water table.

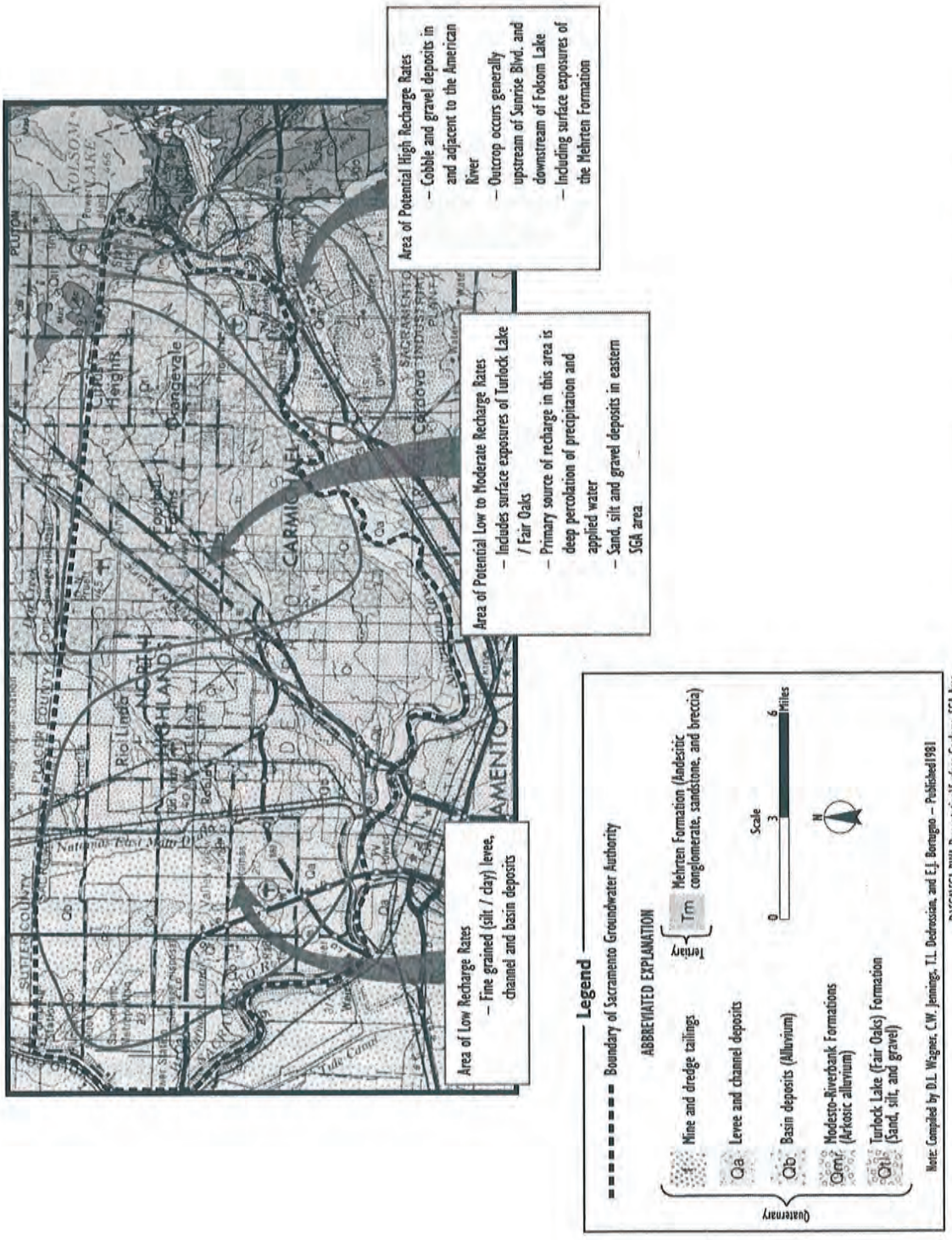

Figure 15. Surface Geology of the SGA Area – Implications for Surface Recharge Rates

3.6.6 Control of Saline Water Intrusion

Saline water intrusion from the Sacramento/San Joaquin River Delta (Delta) is not currently a problem in Sacramento County as a whole or in the North Area Groundwater Basin, and it is not expected to become a problem in the future. Higher groundwater elevations associated with recharge in the American and Sacramento rivers have maintained a historical positive gradient preventing significant migration of any saline water bodies associated with the Delta from migrating east into the Sacramento County region. These groundwater gradients will continue to serve to prevent any localized pumping depressions in the basin from inducing flow from the Delta into the North Area Groundwater Basin.

A more local source of saline water is beneath the base of fresh water in the North Area Groundwater Basin. Berkstresser (1973) mapped the base of fresh water (the point below which the specific conductivity of the water is greater than about 3,000 micromhos per centimeter (μmhos/cm)) for the Sacramento Valley. For the North Area Groundwater Basin, the minimum depth of fresh water is at an elevation of about 800 feet below mean sea level near the eastern basin margin and increases to a depth of approximately 2,000 feet below mean sea level on the western margin of the basin. The municipal suppliers in the North Area Groundwater Basin generally extract groundwater from depths of less than 500 feet, so their extractions are a substantially above the base of fresh water. Therefore, current pumping practices would not be expected to create a situation where deeper saline water is being drawn into the fresh water aquifer.

Actions. The SGA will take the following actions:

1. Track the progression, if any, of saline water bodies moving toward the east from the Delta. Because this is a highly unlikely scenario, this action will be limited to communicating with DWR's Central District Office on a biennial basis to check for significant changes to TDS concentrations in wells. DWR has a regular program of sampling water quality in select production wells throughout the adjacent Solano, San Joaquin, and Yolo counties. This will serve as an early warning system for the potential of saline water intrusion from the Delta.
2. Observe TDS concentrations in public supply wells of North Area Groundwater Basin water suppliers that are routinely sampled under the DHS Title 22 Program. These data will be readily available in the SGA's DMS and are already an on-going task for the annual review of basin conditions.
3. Inform all member water purveyor managers of the presence of the interface and the approximate depth of the interface below their service area for their reference when siting potential wells. The SGA will also ensure that the EMD, which issues well permits, is aware of the interface. The SGA will provide a map indicating the contour of the elevation of the base of fresh water in Sacramento County to the EMD for their reference when issuing well permits.

3.7 COMPONENT CATEGORY 4: GROUNDWATER SUSTAINABILITY

To ensure a long-term viable supply of groundwater, SGA members are seeking to maintain or increase the amount of groundwater stored in the basin over the long-term. The WFA's groundwater management element provides a framework by which the groundwater resource in the Sacramento County-wide area can be protected and used in a sustainable manner. It recommends an average annual sustainable groundwater yield within the SGA area of 131,000

AF/year. As documented in **Section 2** of the GMP, historic groundwater extractions have resulted in a net depletion of groundwater stored under the SGA area. To ensure a sustainable resource, SGA and RWA members have undertaken several actions toward increased conjunctive use of groundwater and surface in the basin and will continue to do so. Historically, water purveyors in the basin away from the rivers did not have access to surface water and a large cone of depression resulted in the middle of the SGA area. Recent conjunctive use activities have resulted in providing new surface water supplies to these areas. Although water purveyors in the region will rely more heavily on groundwater during dry periods, the net increase in available surface will result in a maintained or improved amount of groundwater in storage in the basin over the long term.

Two primary activities will result in an improved ability to sustain the viability of the groundwater resource for the region. Conjunctive management activities include the planning and construction of facilities to increase the available water supply to the area as well as to create opportunities for the banking and exchange of water with partners after local needs are met. These partnerships will result in some of the necessary capital improvements to help sustain the resource in a cost-effective way. Additionally, the SGA's ability to sustain the groundwater resource will be met in part through reductions in potable water demand through conservation measures and through the use of recycled water for landscape irrigation supply. These groundwater sustainability activities are discussed below.

3.7.1 Conjunctive Management Activities

The SGA and RWA members are committed to expanded conjunctive use operations and are investigating a variety of ways of recharging water into the available storage space in the basin. Opportunities for direct recharge from overlying land in the basin are limited, because much of the land is developed or is overlain by flood basin deposits. Most of the recharge occurring through current conjunctive use is from in-lieu recharge. One component of the RWA ARBCUP (see below) is an aquifer storage and recovery well, which will inject water just north of the basin. Current and potential future facilities in the basin are further described in the Cooperating Agencies RWMP Phase II Final Report (MWH, 2003).

Cooperating Agencies RWMP. As discussed in **Section 2.5**, Phase I of the RWMP identified and described a "menu" of project and program alternatives for implementing the WFA north of the American River. Phase II provided detailed hydrologic, engineering, and legal/institutional evaluations of those projects and programs that best aligned with the goals and objectives of the individual water purveyors and the WFA. The recommendations resulting from Phase II were used to structure the SGA and RWA's regional projects and programs.

Sac Suburban's Groundwater Stabilization Project. This project allows groundwater elevations underlying the SGA area to increase naturally (in-lieu recharge) by providing up to 29,000 AF of surface water per year to an area that has historically relied on groundwater. From 1998 through 2001, Sac Suburban utilized an annual average of about 12,850 AF of surface water, reducing its use of groundwater and resulting in stabilization of groundwater elevations that had been declining historically at a rate of about 1.5 feet per year (LSCE, 2002). This project is a prime example of the types of activities to be included in a conjunctive use program envisioned in the WFA.

RWA ARBCUP. The objective of the RWA ARBCUP is to implement elements of the regional conjunctive use program developed in the Cooperating Agencies RWMP. Through the RWA ARBCUP, treated surface water will be delivered to areas that have historically used

groundwater in wet years, resulting in in-lieu recharge. In dry years, the stored water will be recovered in areas that have historically used surface water, allowing forbearance of surface water diversions.

The RWA ARBCUP will provide an additional average water supply yield in the region of 21,400 AF/year. Projects such as these strongly support the goal and objectives of the SGA's GMP. The project consists of 12 program components (see **Table 5** and **Figure 7**) constructed by seven public agencies. Facilities include an expansion of surface water treatment plant capacity, water transmission system improvements (including pipelines, a pump station, and an aboveground water storage tank for flow equalization), groundwater extraction wells, and meter replacements. In 2001, the RWA submitted a grant application to DWR for a groundwater storage construction grant and was subsequently awarded $21.67 million. The RWA member agencies are matching the grant with local funds to construct the project.

SGA-SAFCA Pilot Study. In 1999/2000, a pilot study was conducted with SAFCA and Reclamation as a means of exercising the groundwater storage potential resulting form the regional cone of depression and investigating the mechanics of a large-scale conjunctive use program. In this pilot study, an on-call surface water supply was provided to SAFCA. Specifically, SAFCA diverted and stored (banked) 2,100 AF of water in the basin. The following year, surface water in the amount of 1,995 AF was made available by exchange through the extraction of groundwater in-lieu of diverting a CVP supply from Folsom Reservoir. SAFCA used this water on an as-needed basis to satisfy its refill obligations associated with flood management reservation in Folsom Reservoir.

EWA Pilot Study. In 2002, the SGA conducted an expanded pilot study. It entered into an agreement with Reclamation (on behalf of the EWA) for the one-year sale of up to 10,000 AF of surface water. A portion of this surface water (up to 5,000 AF) was made available in Folsom Reservoir through a transfer of a portion of SJWD's CVP contract entitlement. The other 5,000 AF was made available by Sacramento through forbearance of a surface water diversion right on the lower American River. In both cases, local demand was met by recovery of previously banked groundwater.

Actions. The SGA will take the following actions:

1. Continue to investigate conjunctive use opportunities within the SGA area. The SGA and its members will coordinate with the RWA and its members, as appropriate.
2. Continue to investigate opportunities for the development of direct recharge facilities in addition to in-lieu recharge (e.g. injection wells or surface spreading facilities, through constructed recharge basins or in river or streambeds).

3.7.2 Demand Reduction

Another way to stay within the sustainable yield of the basin and continue to achieve in-lieu recharge is by reducing demand on potable water supplies through conservation and by making recycled water available for irrigation of landscaping.

Water Conservation. The RWA has developed and implemented a regional Water Efficiency Program (WEP). The WEP assists members to meet their water conservation agreements with the Water Forum, the California Urban Water Conservation Council, and for some members the Central Valley Project Improvement Act (CVPIA). The water conserved as part of this effort is essential to the Water Forum's ability to meet its objectives of providing a safe, reliable water supply to 2030 and protecting the lower American River in two ways. First,

the conserved water will serve to meet increased future demands. Second, the conserved water will reduce the overall demand on the groundwater basin in drier years and can reduce the demand for water diverted from the lower American River. The goal of the WFA is to achieve system-wide conservation of slightly more than 25 percent by the year 2030.

SGA members have also implemented other conservation measures outside of the WFA. One example is in NCMWC's tailwater recovery system implemented in 1986. The program achieves conservation through the reapplication of water that runs off of agricultural fields within the NCMWC system. The system also results in reduced runoff of agricultural applied water to the Sacramento River thereby decreasing agricultural pesticides that would have been in the river.

Water Recycling. SRCSD treats wastewater for the Sacramento region at its Elk Grove Wastewater Treatment Plant and is looking for ways to increase the delivery of recycled from the plant to landscape irrigation uses. SRCSD joined the RWA as an associate member in September 2003. By joining the RWA, SRCSD can work closely with other member agencies to investigate opportunities to use recycled water throughout the area to more effectively develop the regional water supply. Currently, SRCSD is recycling 5 mgd at its Elk Grove facility and delivering it to nearby landscape irrigation users. SRCSD expects the capacity of that facility to increase to 10 mgd over the next few years. Currently, recycled water is only delivered to users south of the SGA area. SRCSD is investigating ways to deliver recycled water north of the American River in the future.

Actions. The SGA will take the following actions:

1. Coordinate with the RWA and its members that have signed specific agreements to the WFA to ensure that those conservation efforts are on track. For members that are not signatory, the SGA will ensure that they are informed of the benefits and regional importance of RWA's WEP.
2. Coordinate with SRCSD through the RWA to investigate opportunities for expanded use of recycled water throughout the county.

3.8 COMPONENT CATEGORY 5: PLANNING INTEGRATION

With the large number of autonomous water agencies and companies serving the greater Sacramento area, the need to integrate water management planning on a regional scale is a high priority and was one of the key reasons that the RWA and SGA organizations were formed. Individual members derive their supplies from the American River, the Sacramento River, the North Area Groundwater Basin, or some mix of these sources. Individual agency infrastructure systems are mostly independent; where interconnections do exist between agencies, they are typically for emergency purposes only.

The WFA provides a regional conjunctive use framework with commitments from individual agencies concerning groundwater and surface water operations, including limitations on surface water diversions from the lower American River during dry years. The SGA and RWA planning efforts seek to better integrate the individual plans of member agencies to implement various elements of the WFA in keeping with the 2030 regional framework. Such integration also promotes operational efficiency, cost savings, and in some cases generates larger statewide-system benefits. For example, the 2002 SGA partnership with Reclamation to provide water to the EWA involved integrating plans and operational actions of five SGA member agencies to produce over 7,000 AF of water in Folsom Reservoir for EWA purposes. The SGA provided the institutional and contractual mechanisms to ensure that individual agencies implemented the

operational changes necessary to produce the water and to ensure that the quality and yield of the groundwater basin was protected.

The RWA, which is better positioned to facilitate integrated planning because of its greater geographic extent (Sacramento, Placer, and El Dorado counties), is actively implementing the ARBCUP and plans to implement the follow-on program to the Cooperating Agencies RWMP. In addition, the RWA has implemented a regional WEP, a program to coordinate the development of agency drinking water source assessment and protection documents, and is actively coordinating with regional land use planning agencies regarding the availability of future water supplies to support planned growth.

3.8.1 Existing Integrated Planning Efforts

The SGA and RWA have already demonstrated implementation of integrated management in the region. Some of the integrated planning efforts to date are listed below.

Water Efficiency Program. Described in **Section 3.7.2**

Banking and Exchange. Described in **Section 3.4.4**

Urban Water Management Planning. Twelve SGA members are required to prepare Urban Water Management Plans. These plans, as defined by CWC § 10610 *et seq.*, require public water suppliers with more than 3,000 customers or that deliver more than 3,000 AF of water annually to identify conservation and efficient water use practices to help ensure a long-term, reliable water supply. To date, all 12 members have submitted plans to DWR. Ten of the plans have been approved by DWR. One additional plan has been resubmitted and is under review by DWR. One plan is currently being amended by the member agency.

Regional Sanitation. Described in **Section 3.7.2**

DWSAP Program. The DWSAP Program is administered by DHS. As a first step to a complete source protection program, DHS required water systems to conduct a preliminary assessment. The assessment includes:

> "delineation of the area around a drinking water source through which contaminants might move and reach that drinking water supply; an inventory of possible contaminating activities (PCAs) that might lead to the release of microbiological or chemical contaminants within the delineated area; and a determination of the PCAs to which the drinking water source is most vulnerable (http://www.dhs.ca.gov/ps/ddwem/dwsap/overview.htm)."

The assessments only apply to agencies that deliver groundwater for public drinking supply. All of the 11 SGA member agencies required to submit assessments have done so. Data from the assessments have been incorporated into the SGA's DMS.

Land Use Planning. In March 2002, the Water Forum Successor Effort approved a set of procedures for coordinating land use decision-making with water resources planning. As signatories to the WFA, the SGA members are committed to following the procedures outlined in **Appendix E**. In addition, the SGA will assist members in complying with these procedures. Through the RWA, better coordination and communication have been initiated with the Sacramento Area Council of Governments (SACOG) regarding meeting the water supply needs of future planned growth.

Integrated Surface Water and Groundwater Modeling. The SGA is interested in using and building upon existing groundwater models for the SGA area. In the late 1990s, a range of groundwater extraction and recharge scenarios were simulated using the North American River

and Sacramento County Combined Integrated Groundwater and Surface Water Model (IGSM[22]). This model was originally developed for the American River Water Resources Investigation (ARWRI) conducted by Reclamation and later updated by the Cooperating Agencies for their RWMP effort (see **Appendix F**).

The original version of IGSM used for the study originated from the ARWRI version of the model used for the "Draft Water Forum Solution Model" developed for the Water Forum. The purpose of the Water Forum was development of a conjunctive use strategy for the groundwater basin underlying northern Sacramento County and southern Placer County.

The SGA is interested in maintaining and updating the IGSM because it is the basis for the WFA and the Cooperating Agencies RWMP alternative analyses, and because it is the model used for regional planning by Reclamation and DWR for projects such as the ARWRI, the CVPIA, and the CALFED process.

The SGA recently completed a study in cooperation with DWR that focused on updating the Calibration Model. The objectives of this effort were to convert the existing IGSM input files to run in the most current version of IGSM (version 6.0). Historical water budgets from 1969 to 1995 were developed and a comparison of model results with actual measured values for groundwater elevations and streamflows over the calibration period were provided. The SGA is pursuing having the calibration period extended from 1995 to 2000.

Actions. The SGA will take the following actions:

1. Prepare and adopt a formal integrated water management plan in accordance with CWC § 10540 *et seq*. The plan will include, but not be limited to, the elements listed above. The SGA will form an ad hoc committee with the RWA to determine which agency would be most appropriate to prepare that plan.
2. Review the Water Forum Land Use procedures and make recommendations on what additional role, if any, the SGA should take with respect to land use decisions within the SGA area.

[22] The IGSM is a finite element, quasi three-dimensional, multi-layered model that integrates surface water and groundwater on a monthly time step. The IGSM was developed for use as a regional planning tool for large areas influenced by both surface water and groundwater. The tool is well-equipped to accommodate input and output of land use and water use data over large areas. Data input includes hydrogeologic parameters, land use, water demand, precipitation and other hydrologic parameters, boundary inflows, and historical water supply. For purposes of parameter definition and developing water budgets around physical and/or political boundaries, the IGSM divides Sacramento, Placer, Sutter, and San Joaquin counties into subregions. Each subregion is further divided into unique numbered elements varying from 200 to 800 acres in size. Overlying this grid is a coarse parametric grid utilized for specifying aquifer and other parameters.

4 PLAN IMPLEMENTATION

Table 6 summarizes the action items presented in **Section 3** and an implementation schedule. Many of these actions involve coordination by the SGA with other local, state and federal agencies and most of these will begin within 6 months, following adoption of this GMP. A few activities involve assessing trends in basin monitoring data for the purpose of determining the adequacy of the monitoring network. These assessments will be made as new monitoring data become available for review by the SGA, and results will be documented in an annual State of the Basin report (see below).

4.1 ANNUAL GMP IMPLEMENTATION REPORT

The SGA will report on progress made implementing the GMP in an annual State of the Basin report, which will summarize groundwater conditions in the SGA area and document groundwater management activities from the previous year. This report will include:

- Summary of monitoring results, including a discussion of historical trends.
- Summary of management actions during the period covered by the report.
- A discussion, supported by monitoring results, of whether management actions are achieving progress in meeting BMOs.
- Summary of any plan component changes, including addition or modification of BMOs, during the period covered by the report.

The State of the Basin report will be completed by April 1st each year and will report on conditions and activities completed through December 31st of the prior year.

4.2 FUTURE REVIEW OF GMP

This GMP is intended to be a framework for the first regionally-coordinated management efforts in the SGA area. As such, many of the identified actions will likely evolve as the SGA actively manages and learns more about the basin. Many additional actions will also be identified in the annual summary report described above. The GMP is therefore intended to be a living document, and it will be important to evaluate all of the actions and objectives over time to determine how well they are meeting the overall goal of the plan. The SGA plans to evaluate this entire plan within five years of adoption.

4.3 FINANCING

It is envisioned that implementation of the GMP, as well as many other groundwater management-related activities will be funded from a variety of sources including the SGA; in-kind services by member agencies; state or federal grant programs; and local, state, and federal partnerships. Some of the items that would likely require additional resources include:

- Monitoring for groundwater quality or elevations in non-purveyor wells.
- Customization of the DMS interface.
- Preparation of GMP annual reports.
- Updates of the overall GMP.
- Update of data sets and recalibration/improvement of existing groundwater model.

- Collection of additional subsidence data.
- Construction of monitoring wells where critical data gaps exist.
- Stream-aquifer interaction studies.
- Implementation of the GMP including:
  - Committee coordination.
  - Project management.
- Implementation of regional conjunctive use program.

During year one of plan implementation, an estimate of some of the likely costs associated with the above activities will be prepared.

Table 6. Summary of GMP Actions

Description of Action	Implementation Schedule (approximate time for commencing activity following adoption of GMP)
I. COMPONENT CATEGORY 1: STAKEHOLDER INVOLVEMENT	
Involving the Public	
1 Continue efforts to encourage public participation as opportunities arise.	on-going
2 Review and take actions from the public outreach plan as necessary during implementation of various aspects of the GMP.	on-going
3 Provide briefings to the Water Forum Successor Effort on GMP implementation progress.	on-going
4 Work with members to maximize outreach on GMP activities including the use of the SGA Web site, member Web sites, or bill inserts.	12 months
Involving Other Agencies Within and Adjacent to the SGA Area	
1 Continue high level of involvement demonstrated through the SGA GMP development into implementation of the plan by continued participation on committees described above.	on-going
2 Provide copies of the adopted GMP and subsequent annual reports to representatives from Placer, Sutter, and Yolo counties, and the Groundwater Forum.	3 months
3 Meet with representatives from Placer, Sutter, and Yolo counties, and the Groundwater Forum as needed.	6 months
4 Coordinate a meeting with the agricultural groundwater pumpers in the SGA area to inform them of SGA's management responsibilities and activities, and develop and develop a list of agricultural groundwater pumpers concerns and needs relative to SGA's management of the area.	6 months
5 Coordinate a meeting with other self-supplied pumpers in the SGA area to inform them of SGA's management responsibilities and activities, and develop a list of self-supplied groundwater pumpers concerns and needs relative to SGA's management of the area.	6 months
Utilizing Advisory Committees	
1 Upon adoption of the GMP, the Policy Committee will meet to discuss the continuation and composition of committees to guide implementation of the plan.	3 months
Developing Relationships with State and Federal Agencies	
1 Continue to develop working relationships with local, state, and federal regulatory agencies.	on-going
Pursuing Partnership Opportunities	
1 Continue to promote partnerships that achieve both local supply reliability and achieve broader regional and statewide benefits.	on-going
2 Continue to track grant opportunities to fund groundwater management activities and local water infrastructure projects.	on-going
II. COMPONENT CATEGORY 2: MONITORING PROGRAM	
Groundwater Elevation Monitoring	
1 Coordinate with member agencies and DWR to identify an appropriate group of wells for monitoring for a spring 2004 set of groundwater elevation measurements.	3 months
2 Coordinate with DWR and SCWA to ensure that the selected wells are maintained as part of a long-term monitoring network.	3 months
3 Coordinate with DWR and SCWA to ensure that the timing of water level data collection by member agencies coincides within one month of DWR and SCWA data collection.	3 months
4 Coordinate with member agencies to ensure that needed water level elevations are collected and verify that uniform data collection protocols are used among the agencies.	3 months
5 Coordinate with the USGS to determine the potential for integrating USGS monitoring wells constructed for the National Water Quality Assessment (NAWQA) Program into the SGA monitoring network.	3 months
6 Consider ways to fill gaps in the monitoring well network by identifying additional suitable existing wells or identifying opportunities for constructing new monitoring wells.	3 months
7 Assess groundwater elevation trends and conditions based on the network annually.	Results and recommendations included in State of Basin report published in April of each year
8 Assess the adequacy of the groundwater elevation monitoring well network annually.	Results and recommendations included in State of Basin report published in April of each year
9 Identify a subset of monitoring wells that will be monitored more frequently than twice annually to improve the SGA's understanding of aquifer responses to pumping throughout the year.	12 months

Table 6. Summary of GMP Actions (continued)

Description of Action	Implementation Schedule (approximate time for commencing activity following adoption of GMP)
Groundwater Quality Monitoring	
1 Coordinate with member agencies to verify that uniform protocols are used when collecting water quality data.	6 months
2 Coordinate with the USGS to obtain historic water quality data for NAWQA wells, determine timing and frequency of monitoring under USGS program, and to discuss the potential for integrating USGS monitoring resources with the SGA network.	6 months
3 Coordinate with member agencies and other local, state, and federal agencies to identify where wells may exist in areas with sparse groundwater quality data.	6 months
4 Assess the adequacy of the groundwater quality monitoring well network annually.	Results and recommendations included in State of Basin report published in April of each year
Land Surface Elevation Monitoring	
1 Investigate the feasibility and costs of re-surveying the wells in the Arden-Arcade area that were last measured in 1991.	12 months
2 Coordinate with the USGS to ascertain the suitability of the use of Interferometric Synthetic Aperture Radar (InSAR) images of the SGA and surrounding area. If the technology appears suitable, identify the costs of determining ground surface elevations and identify potential cost-sharing partners.	12 months
3 Coordinate with other agencies, particularly the City and County of Sacramento and the National Geodetic Survey to determine if there are other suitable benchmark locations in the SGA area to aid in the analysis of potential land surface subsidence.	12 months
4 Educate SGA member agencies of the potential for land surface subsidence and signs that could be indicators of subsidence.	12 months
Surface Water Groundwater Interaction Monitoring	
1 Compile available stream gage data and information on tributary inflows and diversions from the American and Sacramento rivers to quantify net groundwater recharge or discharge between gages in the SGA area.	12 months
2 Coordinate with local, state, and federal agencies to identify available surface water quality data from the American and Sacramento Rivers adjacent to the SGA area.	12 months
3 Correlate groundwater level data from wells in the vicinity of river stage data to further establish whether the river and water table are in direct hydraulic connection, and if the surface water is gaining or losing at those points.	12 months
4 Continue to coordinate with local, state, and federal agencies and develop partnerships to investigate cost-effective methods that could be applied to better understand surface water-groundwater interaction along the Sacramento River and American River.	12 months
5 Coordinate with CSUS to analyze data obtained from recently constructed monitoring wells on the CSUS campus to better understand the relationship between the groundwater basin and surface water flows at that location.	6 months
Protocols for the Collection of Groundwater Data	
1 Use a Standard Operating Procedure (SOP) for collection of water level data by each of the member agencies.	3 months
2 Provide member agencies with guidelines on the collection of water quality data developed by DHS for the collection, pretreatment, storage, and transportation of water samples (DHS, 1995).	3 months
3 3. Provide training on the implementation of these SOPs to member agencies, if requested.	3 months
Data Management System	
No Action Required	
III. COMPONENT CATEGORY 3: GROUNDWATER RESOURCE PROTECTION	
Well Construction Policies	
1 Ensure that all member agencies are provided a copy of the county well ordinance and understand the proper well construction procedures	3 months
2 Inform member agencies of Sacramento County's Consultation Zone and provide a copy of the boundary of the former McClellan AFB prohibition zone to appropriate member agencies.	6 months
3 Provide a copy of the most recently delineated plume extents at the former McClellan AFB, the former Mather AFB, and Aerojet to the EMD and SGA members for their review and possible use.	3 months
4 Coordinate with member agencies to provide guidance as appropriate on well construction. Where feasible and appropriate, this could include the use of subsurface geophysical tools prior to construction of the well to assist in well design.	3 months

Table 6. Summary of GMP Actions (continued)

Description of Action	Implementation Schedule (approximate time for commencing activity following adoption of GMP)
Well Abandonment and Well Destruction Policies	
1 Ensure that all member agencies are provided a copy of the code and understand the proper destruction procedures and support implementation of these procedures	3 months
2 Follow up with member agencies on the reported abandoned and destroyed wells to confirm the information collected from DWR	6 months
3 Provide a copy of the information on abandoned and destroyed wells in northern Sacramento County to fill any gaps in their records	12 months
4 Meet with the EMD to discuss ways to ensure that wells in the SGA area are properly abandoned or destroyed	6 months
5 Obtain "wildcat map from California Division of Oil and Gas to ascertain the extent of historic gas well drilling operations in the area as these wells could function as conduits of contamination if not properly destroyed.	12 months
Wellhead Protection Measures	
1 Request that member agencies provide vulnerability summaries from the DWSAP to the SGA to be used for guiding management decisions in the basin.	6 months
2 Contact groundwater basin managers in other areas of the state for technical advice, effective management practices, and "lessons learned," regarding establishing wellhead protection areas	12 months
Protection of Recharge Areas	
1 When CAS results are available, meet with the SWRCB to discuss those results and consider follow-on actions	6 months
Control of the Migration and Remediation of Contaminated Groundwater	
1 Coordinate with known responsible parties to develop a network of monitoring wells to act as an early warning system for public supply wells.	6 months
2 If detections occur in these monitoring wells, work with the responsible parties and the potentially impacted member agency to develop strategies to minimize the further spread of contaminants.	on-going
3 Provide SGA members with all information on mapped contaminant plumes and LUST sites for their information in developing groundwater extraction patterns and in the siting of future production or monitoring wells	6 months
4 Meet with representatives of the RWQCB to establish a mutual understanding about SGA's groundwater management responsibilities	6 months
Control of Saline Water Intrusion	
1 Track the progression, if any, of saline water bodies moving toward the east from the Delta.	on-going
2 Observe TDS concentrations in public supply wells of North Area Groundwater Basin water suppliers that are routinely sampled under the DHS Title 22 Program. These data will be readily available in the SGA's DMS and are already an on-going task for the annual review of basin conditions.	on-going
3 Inform all member water purveyor managers of the presence of the interface and the approximate depth of the interface below their service area for their reference when siting potential wells.	on-going
VI. COMPONENT CATEGORY 4: GROUNDWATER SUSTAINABILITY	
Conjunctive Management Activities	
1 Continue to investigate conjunctive use opportunities within the SGA area	on-going
2 Continue to investigate opportunities for the development of direct recharge facilities in addition to in-lieu recharge (e.g. injection wells or surface spreading facilities, through constructed recharge basins or in river or stream beds).	on-going
Demand Reduction	
1 Coordinate with the RWA and its members that have signed specific agreements to the WFA to ensure that those conservation efforts are on track. For members that are not signatory, the SGA will ensure that they are informed of the benefits and regional importance of RWA's WEP.	on-going
2 Coordinate with SRCSD through the RWA to investigate opportunities for expanded use of recycled water throughout the county.	on-going
V. COMPONENT CATEGORY 5: PLANNING INTEGRATION	
Existing Integrated Planning Efforts	
1 Prepare and adopt a formal integrated water management plan in accordance with CWC Section 10540 et seq. The SGA will form an ad hoc committee with the RWA to determine which agency would be most appropriate to prepare that plan.	12 months
2 Review the Water Forum Land Use procedures and make recommendations on what additional role, if any, SGA should take with respect to land use decisions within the SGA area	6 months

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5 REFERENCES

Aerojet Environmental Remediation. Aerojet Sacramento Site, American River Study Area Groundwater Monitoring Results, April – June 2002. August 2002.

Archibald & Wallberg and MWH. American River Watershed Sanitary Survey, 2003 Update Report. December 2003.

Berkstresser, C.F., Jr. Base of Fresh Ground-Water – Approximately 3,000 micromhos - in the Sacramento Valley and Sacramento-San Joaquin Delta, California. U.S. Geological Survey Water-Resources Investigation 40-73, map. 1973.

California Department of Health Services. Collection, Pretreatment, Storage and Transportation of Water and Wastewater Samples. Fifth Edition. May 1995.

California Department of Water Resources (DWR). Evaluation of Ground Water Resources: Sacramento County. Bulletin 118-3. July 1974.

DWR. Evaluation of Ground Water Resources: Sacramento Valley. Bulletin 118-6. August 1978.

DWR. American River Basin Conjunctive Use Project, Feasibility Report. June 1997.

DWR. California's Groundwater: Bulletin 118 – Update 2003. October 2003.

Lucy & Company. Public Outreach Plan for Groundwater Management Program. June 2003.

Luhdorff & Scalmanini Consulting Engineers (LSCE). AB 3030 Ground-Water Management Plan, Natomas Area. August 2002.

LSCE. In-Lieu Surface Water Use and Ground-Water Basin Conditions 2001, Northridge Service Area, Sacramento Suburban Water District. June 2002.

Montgomery Watson. Sacramento River Water Treatment Plant – Finalization of Preliminary Design. 1998.

Montgomery Watson. Regional Water Master Plan Phase I, Technical Memorandum 3: Summary of Existing Water Supplies. 1999.

Montgomery Watson and Archibald & Wallberg. Sacramento River Watershed Sanitary Survey, 2000 Update Report. December 2000.

Montgomery Watson Harza (MWH). Data Management System, Task 4 Summary Memorandum, Evaluate Accuracy and Reliability of Groundwater Data, January 2002.

MWH. Mather Air Force Base Annual and Fourth Quarter 2002 Sitewide Groundwater Monitoring Report. March 2003.

MWH. American River Basin Cooperating Agencies Regional Water Master Plan Phase II Final Report. December 2003.

State Water Resources Control Board (SWRCB). Draft Order Denying Petition to revise the Declaration of Fully Appropriated Streams to Allow Processing of Application to Appropriate Treated Groundwater Discharged into the Lower American River. May 2003.

URS. Former McClellan Air Force Base, Installation Restoration Program, Groundwater Monitoring Program: Quarterly Report, Third Quarter 2002. January 2003.

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APPENDIX F

Wholesale Water Supply Agreement between City of Sacramento and Sacramento Suburban Water District

WHOLESALE WATER SUPPLY AGREEMENT BETWEEN THE CITY OF SACRAMENTO AND SACRAMENTO SUBURBAN WATER DISTRICT

THIS AGREEMENT is made and entered into this 20th day of January, 2004, by the CITY OF SACRAMENTO, a charter municipal corporation (hereinafter referred to as "City") and the SACRAMENTO SUBURBAN WATER DISTRICT, a California special district (hereinafter referred to as "District").

RECITALS

A. On February 13, 1964, the City and Arcade Water District ("Arcade") entered into an agreement, a copy of which is attached to this Agreement as **Exhibit A** (the "1964 Water Supply Agreement"), under which the City granted to Arcade the right to divert up to 26,064 acre feet of water per year from the American River under the City's "Permit Supply," as that term is defined in the 1964 Water Supply Agreement, for use within the service area of Arcade that was within the portion of the authorized place of use ("POU") for the City's American River water right permits, referred to as "Area D" in the 1964 Water Supply Agreement. On September 19, 2001, the City and Arcade entered into an agreement under which the City consented to the transfer by Arcade of all rights and obligations under the 1964 Water Supply Agreement to the District, upon the consolidation of Arcade with Northridge Water District ("Northridge") to form the District. This Agreement does not involve the diversion of water by the District under the 1964 Water Supply Agreement. Except as expressly provided below, nothing in this Agreement affects the rights and obligations of the City and the District under the 1964 Water Supply Agreement.

B. The District owns and operates public utility water systems and provides public utility water service to the public located in Sacramento County, California, for residential and commercial and industrial purposes, pursuant to authority granted to it by the California Legislature.

C. The District desires to (1) obtain a wholesale supply of treated surface water under this Agreement, and (2) preserve the right of the District to divert untreated water if the District elects to do so, under the 1964 Water Supply Agreement for use within the service area described in the 1964 Water Supply Agreement. The District has capacity in its American River diversion facilities to divert and put to beneficial use within such service area approximately 3,500 acre-feet of water per year under the 1964 Water Supply Agreement.

D. The City and Arcade previously entered into agreements under which (1) Arcade reimbursed the City for a portion of the costs incurred by the City to construct City water transmission mains, and (2) Arcade acquired ownership rights in a portion of such transmission mains, for the purpose of conveying water from the City's E.A. Fairbairn Water Treatment Plant ("Fairbairn Plant") to Arcade, as shown in **Exhibit B**. The District is the successor to Arcade's ownership rights.

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E. The City is expanding the capacity of the Fairbairn Plant. Until such expansion is completed, studies conducted by the City indicate that the City's Fairbairn Plant, storage facilities and transmission mains have adequate Non-Firm Capacity (as defined below) as of the date of this Agreement to supply the District a maximum of up to ten million gallons per day ("mgd") of treated water. After the City's planned expansion of the Fairbairn Plant and improvement of transmission main capacities, the City expects to have adequate Firm Capacity (as defined below) to supply the District additional treated water, as provided herein. The maximum day flows specified herein for the use of Non-Firm and Firm Capacity are hereafter collectively referred to as the "District Water Requirements".

F. The City has completed environmental review for the expansion of the Fairbairn Plant, and the expansion project currently is under construction.

G. The City and the District are both signatories to the Sacramento Water Forum Agreement, and this Agreement is consistent with that agreement.

H. Subject to the terms and conditions contained herein, the City is willing to provide a wholesale supply of treated surface water to meet the District Water Requirements.

I. The City entered into an agreement with Northridge's predecessor, the Northridge Park County Water District, dated January 31, 1980 (the "1980 Water Supply Agreement"), under which the City granted to Northridge Park County Water District the right, subject to specified conditions, to divert up to 9,023 acre-feet per year from the American River under the City's Permit Supply for use within the service area of Northridge Park County Water District that was within that portion of the POU referred to as "Area D" in the 1980 Water Supply Agreement. The conditions specified for the 1980 Water Supply Agreement to be effective were not fulfilled. The parties agree that this Agreement does not constitute, and will not be interpreted as, an acknowledgment or admission by the City that the 1980 Water Supply Agreement remains a valid or binding agreement, nor does this Agreement involve any diversion of water by the District (as successor to Northridge) under the 1980 Water Supply Agreement.

In consideration of the foregoing and of the mutual covenants herein contained, the parties hereto agree as follows:

1. **Recitals Incorporated:**

The foregoing recitals are incorporated by reference.

2. **Purpose:**

The purpose of this Agreement is to establish the conditions under which the City will divert, treat, convey and sell surface water to the District on a wholesale basis to meet the District Water Requirements, for use within the District Service Area, both before and after expansion of the

Fairbairn Plant and the completion of improvements to the City's water transmission facilities. Nothing in this Agreement affects the right of the District to divert and put to beneficial use within the District Service Area untreated surface water under the 1964 Water Supply Agreement if the District so elects, subject to the provisions of Section 4, below.

3. Definitions:

a. *Arcade:* Arcade Water District, one of the predecessor entities of the District.

b. *Capital Costs:* Costs incurred by the City to design and construct diversion, pumping, treatment, storage and transmission facilities used to provide treated water to the District under this Agreement, including reasonable administrative costs.

c. *City:* The City of Sacramento.

d. *City Transmission Facilities:* All facilities, including transmission mains, storage facilities and all appurtenances that are owned and operated by the City to supply water from the City Treatment Facilities, as they exist today and as they may be modified and expanded in the future.

e. *City Treatment Facilities:* All facilities that are owned and operated by the City to divert and process water to meet the requirements established for drinking water by the California Department of Health Services and the United States Environmental Protection Agency, including the Fairbairn Plant, groundwater wells, and the Sacramento River Water Treatment Plant, as they exist today and as they may be modified and expanded in the future.

f. *City Water Rights and Entitlements:* The City's surface water rights and entitlements, including pre-1914 rights, five water right permits issued by the State Water Resources Control Board and a water rights settlement contract entered into in 1957 with the United States Bureau of Reclamation.

g. *Connection Fee:* The fee(s) paid by the District for its share of Capital Costs for Non-Firm and Firm Capacity used to provide treated water to the District under this Agreement, as provided in Section 9.b., below.

h. *Delivery Criteria:* The operating guidelines and criteria governing the delivery of treated water under this Agreement.

i. *District:* The Sacramento Suburban Water District.

j. *District Water Facilities:* All facilities, including transmission mains, storage facilities and all appurtenances, which are owned and operated by the District to supply water. The District Water Facilities to be used to obtain water under this Agreement are shown on **Exhibit B**.

k. *District Water Requirements:* The maximum-day flow amounts specified for the delivery to the District of treated water utilizing Non-Firm and Firm Capacity in accordance with the provisions of this Agreement.

l. *District Service Area:* Those lands served by the District, as may change from time to time, within the POU. The current District Service Area is shown on **Exhibit C** to this Agreement.

m. *Expanded Fairbairn Plant:* The City's E.A. Fairbairn Water Treatment Plant (Fairbairn Plant) after the current projects to expand the Fairbairn Plant's treatment capacity to 200 mgd and to modify the water intake to comply with current fish screening requirements are completed, and the modified water intake and expanded treatment capacity are fully operational.

n. *Fairbairn Plant:* The City's E.A. Fairbairn Water Treatment Plant located on the south bank of the Lower American River downstream of Howe Avenue.

o. *Firm Capacity*: Capacity in the City Treatment and Transmission Facilities that is available to divert, treat and deliver water to the District on an equal priority to the use of such capacity to meet the demands of the City's other water supply customers, except as provided otherwise in this Agreement.

p. *1964 Water Supply Agreement:* The February 13, 1964 agreement between the City and Arcade Water District, attached hereto as **Exhibit A**.

q. *Non-Firm Capacity*: Capacity in the City Treatment and Transmission Facilities that is available to divert, treat and deliver water to the District in accordance with the provisions of this Agreement after the capacity demands of the City's other water supply customers are fully met.

r. *Northridge:* Northridge Water District, one of the predecessor entities of the District.

s. *POU:* All lands where the City is authorized to use surface water pursuant to the City's four American River water right permits.

t. *Service Charge:* A monthly fee for fixed administrative costs billed to the District, as provided in Section 9.a., below.

u. *Service Connection:* A point of connection for delivery of treated water from the City Transmission Facilities to the District Water Facilities pursuant to this Agreement, of which there may be more than one as determined by the parties from time to time.

v. *Transmission Main Improvements*: Planned improvements to the City Transmission

Facilities that will assist in providing adequate Firm Capacity for the delivery of treated water to the District in accordance with Section 6.b., below, as shown on **Exhibit B** to this Agreement.

w. *Treated water or treated surface water:* Water that is treated to meet the requirements established for drinking water by the California Department of Health Services and the United States Environmental Protection Agency.

x. *Unit Rate*: The charge billed to the District at a cost per unit quantity of treated water delivered under this Agreement, as provided in Section 9.a., below.

y. *Water Forum Agreement*: The Sacramento Water Forum Agreement dated January 2000 and any subsequent amendments or supplements thereto, including the Purveyor Specific Agreement signed by the District on June 5, 2003.

z. *Wholesale Water Rate*: The Unit Rate and Service Charge billed to the District, as provided in Section 9.a., below.

4. Diversion of Untreated Water by the District:

Nothing in this Agreement affects the right of the District under the 1964 Water Supply Agreement to divert untreated water for use within the portion of the District Service Area located within "Area D," in accordance with the terms of the 1964 Water Supply Agreement, provided that (a) the District complies with all applicable legal, regulatory and contractual requirements, including applicable provisions of the Water Forum Agreement, and (b) notwithstanding any provision of this Agreement to the contrary, the City may deduct any amount of untreated water diverted by the District under the 1964 Water Supply Agreement from the amount of water otherwise required to be diverted, treated and delivered to the District under this Agreement.

5. Delivery Criteria for Treated Water:

The delivery of treated water under this Agreement will be governed by the operating guidelines and criteria set forth in the Delivery Criteria attached hereto as **Exhibit D.** The Delivery Criteria may be modified from time to time by the mutual written agreement of the City's Director of Utilities and the District's General Manager, provided that such modifications are consistent with the provisions of this Agreement.

6. Maximum Treated Water Diversions and Deliveries:

a. Pre-Fairbairn Plant Expansion. Prior to the completion and commencement of operation of the Fairbairn Plant Expansion and Transmission Main Improvements, only Non-Firm Capacity will be available to divert, treat and deliver water to the District in accordance with the provisions of this Agreement. The water diverted, treated and delivered to the District utilizing Non-Firm Capacity, prior to the completion and commencement of operation of the Fairbairn Plant Expansion and

Transmission Main Improvements, will not exceed a maximum amount of ten million gallons per day (mgd), and will not exceed the maximum instantaneous rate specified in the Delivery Criteria.

b. Post-Fairbairn Plant Expansion. After the completion and commencement of operation of the Fairbairn Plant Expansion and Transmission Main Improvements, Firm Capacity will be available to divert, treat and deliver water to the District in accordance with the provisions of this Agreement. The water diverted, treated and delivered to the District utilizing Firm Capacity, after the completion and commencement of operation of the Fairbairn Plant Expansion and Transmission Main Improvements, will not exceed a maximum amount of twenty mgd, and will not exceed the maximum instantaneous rate specified in the Delivery Criteria.

c. Additional Water. At any time during the term of this Agreement after the completion and commencement of operation of the Fairbairn Plant Expansion and Transmission Main Improvements, District may request that the City divert, treat and deliver additional water to the District utilizing up to ten mgd of Non-Firm and/or Firm Capacity beyond the twenty mgd maximum specified in subsection b, above (hereafter referred to as "Additional Water"). To the extent that the City determines in its sole discretion that adequate Non-Firm Capacity and/or Firm Capacity is available in the City Treatment and Transmission Facilities, up to such additional ten mgd, the City will utilize Non-Firm Capacity and/or Firm Capacity, as determined by City, to divert, treat and deliver Additional Water to District on the same terms and conditions as provided in this Agreement, including the Delivery Criteria, except that the Wholesale Water Rate and Connection Fee for Capital Costs paid by District for the diversion, treatment and delivery of Additional Water will be determined by mutual agreement of the City and District at that time. No Additional Water will be diverted, treated or delivered hereunder until the parties have agreed upon such Wholesale Water Rate and Connection Fee to be paid by the District.

d. Notwithstanding any other provision of this Agreement to the contrary, the City will not be required to divert, treat or deliver any water to the District under this Agreement if any City facility(ies) necessary to do so are shut down for maintenance or repair, provided that such shut down also prevents the use of such facilities for the City's retail water customers.

e. Water treated and delivered to the District under this Agreement may only be used by the District to provide municipal and industrial water service within the District Service Area, and will not be used by the District for any other purpose.

f. Notwithstanding any other provision of this Agreement to the contrary, no water diverted and treated at the Fairbairn Plant, utilizing either Non-Firm or Firm Capacity, will be delivered to District under this Agreement at any time when the City's diversions at the Fairbairn Plant are restricted or limited, or the diversion of water for the District would cause the City's diversions to be restricted or limited, by

the Water Forum diversion restrictions incorporated in the City's four American River water right permits, which diversion restrictions are shown on **Exhibit E** to this Agreement.

g. The limitation specified in subsection f., above, will not prevent the delivery by the City to the District of treated water diverted from the Sacramento River, utilizing Non-Firm and/or Firm Capacity, provided that facilities and capacity to divert, treat and deliver such water are available and the parties agree in writing upon, or amend this Agreement to set forth, the terms and conditions for the diversion, treatment and delivery of such water to the District, consistent with all applicable legal, regulatory and contractual requirements, including applicable provisions of the Water Forum Agreement.

h. The parties acknowledge and agree that the City (1) does not lose or otherwise forfeit or abandon its rights to any quantity of water that is not diverted at the Fairbairn Plant by operation of the Water Forum diversion restrictions shown on **Exhibit E**, and (2) retains its rights to divert or redivert such water for municipal and industrial use at or downstream of the confluence of the American River and the Sacramento River, as well as any rights City may have to transfer that water for other beneficial uses. The City and the District intend that, (1) in the event that water deliveries to the District under this Agreement are curtailed pursuant to subsection f., above, and (2) the City receives revenues for a transfer of water that would have been delivered to the District but for such curtailment, the City will consult with the District for the purpose of providing to the District a credit against payments due from the District to the City under this Agreement in an amount that reflects an equitable sharing between the City and the District of net revenues received by the City for such transfer.

7. Services Performed by the City:

The City will supply treated surface water to the District in accordance with the terms of this Agreement. The City will provide District with the City's water quality testing data on an annual basis or on such other schedule as may be agreed to by the parties.

8. Obligations of the District:

a. The District will take delivery of the treated surface water made available by the City pursuant to the Delivery Criteria.

b. The District will pay any and all costs associated with diverting, treating and delivering water to the District pursuant to this Agreement, as set forth in Sections 9 and 10 of this Agreement. In addition, the District will be wholly responsible for its pro rata share (comparing the quantities of water that the City delivers to the District and to other City retail and wholesale customers) of any and all costs reasonably incurred by the City in order to comply with all laws and regulations that may apply

to the diversion, treatment and delivery of water to the District hereunder, including but not limited to, the California Environmental Quality Act, the National Environmental Policy Act, the Federal and State Endangered Species Acts, the Federal Reclamation Laws, the Clean Water Act and the Porter-Cologne Water Quality Control Act. Further, the District will be wholly responsible for its pro rata share (comparing the quantities of water that the City delivers to the District and to other City retail and wholesale customers) of any and all costs associated with any other requirements and/or conditions that are or may be imposed on the diversion, treatment and/or delivery of water to the District by any federal, state or local agency, including but not limited to the U.S. Bureau of Reclamation, the California Department of Water Resources, the State Water Resources Control Board, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service or the California Department of Fish and Game.

c. Any deliveries of water to the District will be subject to any and all requirements and/or conditions contained in or in the future imposed on any of the City Water Rights and Entitlements.

9. Cost Allocation and Payment:

The cost allocations and payment for any water delivered pursuant to this Agreement will be governed by the following paragraphs.

a. **Operations and Maintenance**

(1) The District will be charged a Wholesale Water Rate for diversion, treatment and conveyance of water. The Wholesale Water Rate shall consist of a Unit Rate calculated on a cost-per-unit quantity basis for water actually delivered, plus a monthly Service Charge for fixed administrative costs incurred irrespective of the quantity of water delivered. The Wholesale Water Rate will be determined by the City in an equitable manner such that the District neither subsidizes nor is subsidized by any other City customer or contractor. In no event, however, will the unit cost of water delivered exceed the City's annual operating, maintenance and applicable capital improvement costs (excluding Capital Costs included in the Connection Fees described in Section 9.b., below) for surface water treatment and conveyance divided by the number of gallons produced. Operating, maintenance and capital improvement costs included in the Unit Rate will include but not be limited to costs for operating, maintenance, personnel, services and supplies, and an equitable proration of appropriate overhead distribution. Operating, maintenance and capital improvement costs included in the Unit Rate will also include any costs attributable to any limitation, requirement, modification or other condition that applies, or that may in the future be applied, to any of the City Water Rights and Entitlements, but will exclude those costs that have no relationship to diverting, treating and delivering

water to the District, such as unrelated distribution system expenses or capital improvement costs. The initial Wholesale Water Rate (consisting of a Unit Rate plus a monthly Service Charge) is shown on **Exhibit F** to this Agreement.

(2) The City may adjust the Wholesale Water Rate on an annual basis to reflect actual or anticipated cost increases.

(3) Billing procedures and payment for water will be in accordance with the City's standard practice. The Wholesale Water Rate will be in addition to the Connection Fee(s) described in subsection b., below.

(4) The Wholesale Water Rate for water diverted, treated and delivered using Non-Firm Capacity and Firm Capacity will be the same.

b. **Connection Fees for Use of Non-Firm and Firm Capacity**

(1) The District will pay a Connection Fee for its share of Capital Costs for diversion, pumping, treatment, storage and transmission facilities, which fee will include reasonable administrative costs. The initial Connection Fee for use of Non-Firm Capacity in the City's existing facilities to divert, treat and deliver water to the District up to the maximum amount and rate specified in Section 6.a., above, is shown on **Exhibit G** to this Agreement.

(2) The District will pay City the initial Connection Fee specified in **Exhibit G** in a single payment not later than thirty days after the City's completion and commencement of operation of the Fairbairn Plant Expansion, or prior to receiving any water diverted, treated and delivered under this Agreement, whichever occurs first.

(3) Although the initial Connection Fee described in subsection b(1), above, is based on the use of Non-Firm Capacity, the initial Connection Fee specified in **Exhibit G** is the same as the Connection Fee that would be charged for the use of Firm Capacity. This is because the City's preliminary studies show that adequate Non-Firm Capacity is likely to be available in the City's existing facilities for the delivery of treated water, in accordance with the provisions of this Agreement, up to the maximum amount and rate specified in Section 6.a., above, at all times. If Non-Firm Capacity is not available in the City's existing facilities for the delivery of treated water, in accordance with the provisions of this Agreement, up to the maximum amount and rate specified in Section 6.a., above, for a cumulative total amount of thirty or more days prior to the City's completion and commencement of operation of the Fairbairn Plant Expansion and Transmission Main Improvements, the City will provide the District a credit against payments due from the District to the City under this Agreement in the amount specified in **Exhibit H**.

(4) In the event that the City completes and commences operation of the Fairbairn Plant Expansion and Transmission Main Improvements, thereby making available Firm Capacity to divert, treat and deliver water to the District up to the maximum amount and rate specified in Section 6.b., above, the District will pay an additional Connection Fee for the District's share of Capital Costs for Firm Capacity in such expanded and improved diversion and treatment facilities, based on the difference between the maximum amounts specified in Section 6.b. and Section 6.a. of this Agreement. The additional Connection Fee will use the same unit cost fee that is specified for the initial Connection Fee in **Exhibit G**, except that such unit cost fee will include annual adjustments to reflect increases in the construction cost index in the same manner that the amount of the City's water system development fee is adjusted pursuant to Section 13.04.820(C) of the Sacramento City Code. The District will have the option of paying the additional Connection Fee (i) in a single payment prior to receiving any water diverted, treated and delivered using Firm Capacity as specified in Section 6.b., above, or (ii) in the form of an annual capital recovery charge payable upon such terms and conditions as may be reasonably determined by the City.

(5) The Connection Fees specified above shall be in addition to the District's payment of a portion of the City's cost to design and construct the Transmission Main Improvements, pursuant to the Agreement for Payment of Cost Share between the District and the City, dated October 1, 2003.

10. Service Connections:

a. Treated water delivered to the District under this Agreement will be provided from the City Transmission Facilities to the District at the Service Connection to be designed and constructed by the District at the location shown on **Exhibit B**. Additional Service Connections may be established by mutual written agreement of the City's Director of Utilities and the District's General Manager, provided that the City will determine whether an additional Service Connection will be designed and constructed by the District or by the City.

b. If a Service Connection is designed and constructed by the City, subject to review and comment by the District, the District will pay all direct and indirect costs incurred by the City to design, bid and construct the Service Connection, including all reasonable costs of administering design and construction contracts, as well as the cost of preparing all environmental documents and obtaining all permits, property rights or other approvals required for the installation, operation, maintenance and repair of the Service Connection in compliance with all applicable laws and regulations. Such payments will be in addition to the charges, costs and fees set forth in Section 9, above, and will be made in the following manner:

(1) After performing a preliminary design of the Service Connection, the City

Director of Utilities will estimate all costs described herein, and such preliminary design and estimate will be provided to the District for approval. Such approval will not be unreasonably withheld.

(2) During the design phase and the construction phase, the City will bill the District at regular intervals for reasonable costs incurred by the City during the billing cycle. The District will pay each invoice within six weeks.

(3) Upon completion of construction of the Service Connection, and the resolution of any claims, disputes or litigation related to its design or construction, including claims or litigation related to the acquisition of permits, property rights or other approvals, claims or litigation related to the preparation or approval of environmental documents, stop notice claims or litigation, and contract claims or litigation, the City will provide the District with a statement of any and all costs actually incurred by the City. Such statement will include any and all costs reasonably incurred by the City with regard to any of the claims, disputes or litigation described above, including any and all costs related to the settlement of any such claims, disputes or litigation. If such costs exceed the amount of money theretofore paid by the District to the City, the District will pay to the City the amount by which such actual costs exceed the amount already paid. Any payments made by the District pursuant to this provision will be made no later than six weeks after the statement of costs actually incurred by the City is provided to the District.

(4) Notwithstanding anything contained herein to the contrary, the District will reimburse the City for any and all reasonable preliminary design costs incurred by the City in connection with any proposed Service Connection, even if such preliminary design or any cost estimate based on such design is not accepted or approved by the District.

c. If a Service Connection is designed and constructed by the District, the District will be wholly responsible for designing, bidding and constructing the Service Connection, as well as preparing all environmental documents and obtaining all permits, property rights or other approvals required for the installation, operation, maintenance and repair of the Service Connection in compliance with all applicable laws and regulations. Such activities will be paid for entirely by the District, and will be subject to the following requirements:

(1) Prior to the construction of any Service Connection by the District, both the preliminary design and the final design must be approved in writing by the City Director of Utilities. Such approval will not be unreasonably withheld. If either or both the preliminary design or final design is not approved by the City Director of Utilities, the City will notify the District in writing of the reason or reasons why such design is not acceptable, and the District will perform such revisions as may be necessary to obtain the approval of the

City.

(2) In addition to paying its own costs, the District will reimburse the City for reasonable costs incurred by the City during the design and construction of the Service Connection by the District. Upon completion of construction of the Service Connection, and the resolution of any claims, disputes or litigation related to its design or construction, including claims or litigation related to the acquisition of permits, property rights or other approvals, claims or litigation related to the preparation or approval of environmental documents, stop notice claims or litigation, and contract claims or litigation, the City will provide the District with a statement of any and all costs actually incurred by the City to review, inspect or otherwise participate in the design and construction of the Service Connection. Such statement will also include any and all costs reasonably incurred by the City with regard to any of the claims, disputes or litigation described above, including any and all costs related to the settlement of any such claims, disputes or litigation, provided that any such settlement was approved in advance by the District staff, and provided further that such approval will not be unreasonably withheld. The District will pay the costs identified on such statement no later than 6 weeks after the City provides such statement to the District.

(3) Notwithstanding anything contained herein to the contrary, the District will reimburse the City for any and all reasonable costs incurred by the City in connection with the design of any proposed Service Connection by the District, even if the preliminary or final design is not approved or if such Service Connection is not constructed.

d. The City will own, operate, maintain and repair all facilities associated with the Service Connection, including flowmeter, flow transmitter, pressure transmitter, motor operated valve (M.O.V.), S.C.A.D.A. and electrical pedestal. As part of such operation, maintenance and repair, the City will calibrate instrumentation at reasonable scheduled intervals, at least annually, and will report such calibration as requested by the District. If such facilities are constructed by the District, upon the completion and City acceptance of such facilities, the District will convey to the City (1) title to such facilities, and (2) permanent access rights to operate, maintain and repair such facilities, at no cost to the City. All operation, maintenance and repair costs incurred by the City will be reimbursed by the District by including such costs in the Wholesale Water Rate paid by the District under Section 9, above. For metering errors in excess of 2 percent, Wholesale Water Rates may be adjusted upward or downward, as appropriate.

e. The District will design, construct, own, operate and maintain all facilities downstream of the Service Connection, including surge control facilities to mitigate the effects of flow stoppage. The District will submit plans for surge control facilities for review and approval of the City prior to construction, which approval

will not be unreasonably withheld.

f. Unless required by the City's Director of Utilities or otherwise required by law or regulation, backflow prevention devices will not be required at the Service Connections provided that (i) the District has a backflow prevention program meeting State regulations, and (ii) all facilities within the District Service Area meet the standards of the California Department of Health Services and U.S. EPA.

g. Delivery pressure will be a minimum of 30 pounds per square inch ("psi"), but in no event will it be greater than 80 psi. The City will not be obligated to supply water to any or all Service Connection points at an aggregate rate exceeding the maximums set forth in Section 6, above.

11. Term of Agreement:

This Agreement will become effective as of the date it is signed by the last signatory and is approved by the Board of Directors of the District and the City Council, and will continue in full force and effect unless terminated by mutual written agreement of the parties hereto or by operation of law.

12. Failure to Deliver Water:

It is understood and agreed that, while the City will make every reasonable effort to treat and convey water pursuant to the terms of this Agreement, the City is not warranting or guaranteeing that it will be able to divert, treat, store and/or deliver water, nor will the City be liable for any failure to deliver water to the District hereunder, provided such failure is caused in whole or in part by an emergency condition or other factors beyond the direct control of the City. It is further understood and agreed that City will not be liable for any failure to deliver water to the District hereunder, prior to completion of the Fairbairn Plant Expansion project and/or Fairbairn intake modification project, that is caused in whole or in part by any construction conditions or requirements or other actions or omissions occurring in the course of project construction, whether or not beyond the direct control of the City.

13. The City Water Rights and Entitlements:

This Agreement will not affect or limit in any way the City Water Rights and Entitlements. Notwithstanding anything herein to the contrary, it is understood and agreed that the District's rights hereunder will at all times be subject to, and exercised in accordance with, any limitation, requirement, modification or other condition that applies, or that may in the future be applied, to any of the City Water Rights and Entitlements.

14. Fluoridation:

The District acknowledges that treated water delivered to the District may contain fluoride, and agrees that, in the event that the City treats water with fluoride, the District will be

solely responsible for: (1) any public notification to all or any portion of the District Service Area that the water provided hereunder has been treated with fluoride; and (2) for all costs associated with or resulting from the introduction of fluoridated water into the District facilities, including monitoring and testing costs. In the event that the City treats water delivered to the District hereunder with fluoride, the District will comply, at no cost to the City, with any requirements pertaining to such fluoridation imposed by any governmental agencies with jurisdiction, including without limitation, the Department of Health Services. The District's failure to comply with any such requirements applicable to the wholesale of water hereunder will relieve the City of any responsibility to deliver water pursuant to this Agreement, until such requirements are fulfilled.

15. Notices:

Unless indicated otherwise herein, all notices, invoices, payments, statements or other writing authorized or required by this Agreement may be delivered personally, or sent in the United States mail, postage prepaid, or sent by electronic mail if the recipient confirms receipt, and addressed to the respective parties as follows:

The City:
Director, Department of Utilities
City of Sacramento
1395 35th Avenue
Sacramento, CA 95822
Electronic mail:greents@cityofsacramento.org

The District:
General Manager
Sacramento Suburban Water District
3701 Marconi Avenue, Suite 100
Sacramento, CA 95881
Electronic mail: rroscoe@sswd.org

All notices, invoices, payments or other writings will be deemed served on the day that they are personally served, deposited, postage prepaid, in the United States mail, or if served electronically, on the day that the recipient acknowledges receipt. A party may change the above designations by providing notice thereof to the other party.

16. Indemnification and Defense:

a. By The District: The District will fully indemnify, hold harmless and defend the City, its officers and employees, from any claims, actions or liability for any damages, any injury to persons or property, or any violation of any law or regulation, occurring by reason of anything done or omitted to be done by the District, its officers or employees, under this Agreement. Except as specified in subsection b., below, the District will fully indemnify, hold harmless and defend the City, its officers and employees from any claims, actions or liability for any damages, any

injury to persons or property, or any violation of any law or regulation, occurring by reason of any action taken by the City, its officers or employees, if such action is required or authorized under this Agreement, unless such damages, injury, or violation result solely from the willful or intentional acts of the City.

b. By The City: Notwithstanding anything to the contrary herein, the City will fully indemnify, hold harmless and defend the District, its officers and employees, from any claims, actions or liability for any damages, any injury to persons or property, or any violation of any law or regulation, occurring by reason of anything done or omitted to be done by the City, its officers or employees in connection with the processing, treating or conveyance of water by the City Treatment and Transmission Facilities. Such duty to indemnify, hold harmless and defend will include all claims, actions or liability occurring by reason of anything done or omitted to be done by the City in connection with any delivery by the City of water that fails to comply with the definition of Treatment contained herein.

17. Dispute Resolution:

a. Disputes: If a dispute arises concerning any controversy or claim arising out of or relating to this Agreement or the breach thereof, or relating to its application or interpretation, the aggrieved party will notify the other party of the dispute in writing within twenty days after such dispute arises. If the parties fail to resolve the dispute within thirty days after delivery of such notice, each party will promptly nominate a senior officer of its organization to meet at any mutually-agreed time and location to resolve the dispute. The parties agree to use their best efforts to reach a just and equitable solution satisfactory to both parties. Should the parties be unable to resolve the dispute to their mutual satisfaction within thirty days thereafter, the dispute will be subject to arbitration, pursuant to subsection b., below. The time periods set forth in this section are subject to extension as agreed to by the parties.

b. Arbitration: A dispute that is not resolved in accordance with subsection a., above, will be subject to arbitration by an arbitrator in Sacramento, California, provided, however, that each party reserves the right to file with a court of competent jurisdiction an application for temporary or preliminary injunctive relief on the grounds that the arbitration award to which the applicant may be entitled may be rendered ineffectual in the absence of such relief. Except as otherwise provided herein, the arbitration will be conducted under and will be subject to the provisions of the California Arbitration Act (Code of Civil Procedure sections 1280 through 1294.2). The parties in the arbitration will select a single, qualified, neutral arbitrator. If they cannot agree on an arbitrator, or an alternative selection process, the parties will request that the Presiding Judge of the Sacramento County Superior Court select an arbitrator in accordance with the provisions of section 1281.6 of the Code of Civil Procedure.

A hearing on the matter to be arbitrated will take place before the arbitrator in the

County of Sacramento at a time and place selected by the arbitrator. However, the hearing will take place no later than sixty days after selection of the arbitrator. The arbitrator will select the time and place for the hearing, and will give the parties written notice of the time and place at least twenty days before the date of the hearing. At the hearing, any relevant evidence may be presented by the parties, and the formal rules of evidence applicable to judicial proceedings will not apply. The arbitrator will hear and determine the matter. The arbitration award may include an award of damages and/or an award or decree of specific performance or declaratory or injunctive relief, will be in writing and will specify the factual and legal bases for the award. An award rendered pursuant hereto may be confirmed, corrected or vacated by a court of competent jurisdiction in accordance with the provisions of the California Arbitration Act. The arbitrator will have no authority, power or right to award punitive or other damages not measured by the prevailing party's actual damages, and will not make any ruling, finding or award that is inconsistent with or which alters, changes, amend, modifies, waives, adds to or deletes from any of the provisions of this Agreement.

The ongoing cost of the arbitration, including the arbitrator's fees, will be borne equally by the parties. Each party will also pay the costs of its own counsel, experts, witnesses and preparation and presentation of proofs. Additional incidental costs of arbitration may be allocated by the arbitration award.

c. Defense to Suit: The parties agree that the failure to comply with the provisions of this Section will be a complete defense to any suit, action or proceeding instituted in any federal or state court, or before any administrative body, with respect to any dispute that is subject to arbitration hereunder, provided, however, that this subsection c. will not apply to any application for temporary or preliminary injunctive relief authorized under this Section.

18. Records Inspection:

Each party will be entitled to inspect and photocopy the records of the other party that pertain to this Agreement, upon providing reasonable notice to such other party of its intent to do so. Each party may also appoint an auditor or auditors to examine the financial records of the other party to determine the adequacy of cost accumulation and billing information maintained by each party. After reasonable notice, each party will make available to the other party's auditor or auditors all requested records, and will assist and cooperate with such auditors. Each party will keep its accounting and financial records in accordance with generally-accepted accounting principles and any applicable laws or regulations.

19. Amendments:

No amendment or modification to this Agreement will be valid unless executed in writing and approved by the governing bodies of the parties, provided, however, that the Delivery Criteria may be modified by mutual written agreement of the City Director of Utilities and the

District General Manager without obtaining approvals from the governing bodies of the parties hereto, as specified in Section 5, above.

20. No Third-Party Beneficiary:

This Agreement is not intended to, and will not be interpreted as conferring, any benefit or right whatsoever upon any person or entity that is not a party hereto.

21. Exhibits Incorporated:

All Exhibits referred to herein and attached hereto are fully incorporated into this Agreement as if such Exhibits were set forth in their entirety at this place.

22. General Provisions:

a. This Agreement will be construed in accordance with, and governed by, the laws of the State of California. The place where this Agreement is to be performed and its situs or forum will at all times be in the County of Sacramento.

b. The headings of the sections and paragraphs in this Agreement are inserted for convenience only. They do not constitute part of this Agreement and will not be used in its construction.

c. This Agreement is the result of the joint efforts and negotiations of both parties, and both parties agree that this Agreement will be interpreted as though each of the parties participated equally in the drafting and composition of this Agreement and each and every part hereof.

d. This Agreement may not be assigned by either party without the written consent of the non-assigning party, and any purported assignment without such consent will be void.

e. The provisions of this Agreement shall bind the parties' successor entities and authorized assigns.

f. Neither party nor its agents, consultants or contractors are or shall be considered to be agents of the other party in connection with the performance of this Agreement. Nothing in this Agreement shall be construed to create a joint venture, partnership or other relationship between the parties, other than the City acting in its municipal capacity with respect to the provision of wholesale water service to the District.

g. The waiver by either party to this Agreement of a breach of any provision of this Agreement shall not be deemed a continuing waiver or a waiver of any subsequent breach of that or any other provision of the Agreement.

Attest:

By:_____
City Clerk

Approved as to Form:

By:_____
City Attorney

CITY OF SACRAMENTO

By:_____
Thomas Lee
For: Robert Thomas, City Manager

SACRAMENTO SUBURBAN WATER DISTRICT

By:_____ S. EGGERT
Board President

Attest:

By:_____
Secretary

CITY AGREEMENT NO. 2004-013

List of Exhibits:

Exhibit A: 1964 Water Supply Agreement

Exhibit B: Map Showing City and District Facilities, with Detail of Service Connection

Exhibit C: District Service Area within POU

Exhibit D: Delivery Criteria

Exhibit E: Water Forum Diversion Restrictions in City's American River Water Right Permits

Exhibit F: Initial Wholesale Water Rate

Exhibit G: Initial Connection Fee

Exhibit H: Formula for Interest on Portion of District's Initial Connection Fee Payment (Section 9.b.(3))

Exhibit A

1964 Water Supply Agreement

AGREEMENT BETWEEN CITY OF SACRAMENTO
AND ARCADE COUNTY WATER DISTRICT

City of Sacramento, a municipal corporation, hereinafter called Sacramento, and Arcade County Water District, a county water district, hereinafter called Arcade, jointly recite the following:

A. Sacramento has the right to a water supply from the American River under Permits Nos. 11358, 11359, 11360, and 11361 on Applications 12140, 12321, 12622, and 16060, as they now exist or may hereafter be amended, as such permits are supplemented by an agreement between Sacramento and the United States Bureau of Reclamation dated June 28, 1957. Such water supply is hereafter referred to as the Permit Supply; the said agreement is sometimes referred to as the Bureau Agreement.

B. The quantity of the Permit Supply was based upon serving the area shown as "Potential Water Service Areas" on Sacramento's Exhibit 3 to the State Water Rights Board introduced in the proceedings before that Board which resulted in Decision D 893. Said Exhibit 3 is attached hereto, marked Exhibit A and made a part of this agreement. Said Exhibit A also delineates the area to be served by water from Applications 12321

and 12662, above referred to, which were the applications assigned to Sacramento by the Sacramento Municipal Utility District with the express provision of such limitation in use. Only Area D of such Potential Water Service Areas as shown by said Exhibit A is involved in this agreement. The Permit Supply equals 1.133 cubic feet per second per 100 gross acres of the Potential Water Service Areas, and this figure is the basis for the water supply provided by this agreement to Arcade. The use basis shall be 50% as established before the State Water Rights Board and by the Bureau Agreement, that is to say, the annual use of such supply shall not exceed a quantity equal to 50% of the quantity which would be produced if such supply ran continuously throughout the year. Therefore, the water supply provided to Arcade by this agreement shall be 410.146 acre-feet of annual use for each 100 gross acres of the Potential Water Service Area served by Arcade.

C. Arcade now serves 5988 acres of Area D as shown on Exhibit A which is also within the boundaries of Arcade, and 373 acres of Area D which is outside Arcade's boundaries, or a total of 6361

acres, which at the rate of 1.133 cfs per 100 acres equals 72 cfs, which is the maximum diversion allowable under this agreement at its date. As is provided by Paragraph 11 of the Bureau Agreement, the City is entitled to reasonable flexibility in its demands based on maximum daily requirements and maximum peaks during such days. Arcade shall be entitled to this same flexibility with the limiting provision that during any twenty-four hour period a quantity of water at the rate set forth, maintained for the full twenty-four hour period, shall not be exceeded. The maximum quantity to be diverted in any year shall be 26,064 acre feet allowable under this agreement at its date. During the life of this agreement it shall be the intent that Arcade will be provided water to serve its customers in such parts of Area D as shown on Exhibit A that Arcade may serve and should the areas being so served vary from the figures used in this agreement at its date then the maximum diversion allowable and the maximum permissible quantity to be diverted shall be proportionately adjusted in accordance with the diversion and quantity criteria set forth in this paragraph above.

Increases in the size of Area D as shown on Exhibit A which Arcade serves shall be agreed upon in advance, provided however that nothing in this agreement shall be construed as limiting or affecting the power of Arcade to conduct and act on any annexation or inclusion proceedings which may hereafter be brought. Hereafter in this agreement the permissible quantity which Arcade may divert, as established by this paragraph, shall be sometimes referred to as Arcade's Permissible Annual Diversion.

NOW, THEREFORE, THE PARTIES AGREE AS FOLLOWS:

1. Sacramento grants to Arcade the right to divert from the American River that portion of its Permit Supply which Arcade requires for serving any portion of Area D as shown on Exhibit A which Arcade may actually serve from time to time, not to exceed the rate of diversion and annual quantity diverted as determined by Paragraph C of the recitals in this agreement. Arcade shall meter such diversions continuously and keep the original records thereof subject to inspection by Sacramento, and shall report in writing to Sacramento at least twice each year, and oftener if required, both the maximum diversion rates and the quantities of such

diversion, on a monthly basis.

2. The diversion of American River water by Arcade under this agreement shall be from a facility which serves area only within Area D as shown on Exhibit A. If Arcade wishes to construct facilities which will also divert water to serve outside of Area D as shown on Exhibit A, then Arcade must have suitable agreements with the U. S. Bureau of Reclamation for the furnishing of the additional water to be diverted by that facility and be used outside of Area D as shown on Exhibit A. Arcade shall furnish proof to Sacramento that either the diversion facility to be built will serve only area within Area D as shown on Exhibit A or that a combination diversion which may be built is the subject of separate agreement with the U. S. Bureau of Reclamation.

3. The operative date of this agreement shall be the first day of the calendar year in which Arcade diverts any water under this agreement, but in no event later than January 1, 1966.

4. Payment for water by Arcade to Sacramento under this agreement is intended to be on the same basis of actual cost of the water as represented by payments to the Bureau by Sacramento, plus

possible future additional costs as set forth in this paragraph. Definitions and methods of payment computation are as follows:

a. Arcade's Permissible Annual Diversion is as defined in recital "C" of this agreement.

b. Sacramento's Maximum Permissible Diversion shall be defined as the figure shown in Schedule "B" of the Bureau Agreement for the year 2030 or a reduced figure if such is ever established under the provisions of paragraph 13 of the Bureau Agreement.

c. Sacramento's Unit Cost of water in any year shall be the amount of money paid to the U. S. Bureau of Reclamation under the Bureau Agreement divided by the maximum quantity of water which Sacramento may divert from the American River under the Bureau Agreement for said payment.

d. Arcade's actual diversion shall be the annual quantity of water diverted by Arcade in accordance with the terms of this agreement and measured as provided by this agreement.

e. Arcade's Minimum Quantity for payment in any year shall be determined by computing the ratio between Arcade's Permissible Diversion and Sacramento's Maximum Permissible Diversion and multiplying this ratio by the Diversion permissible under

Schedule B of the Bureau Agreement as it is printed without modification by other terms of the Bureau Agreement.

f. Payment by Arcade to Sacramento in any year shall be Sacramento's Unit Cost of water multiplied by either "Arcade's actual diversion" or "Arcade's Minimum Quantity for payment", whichever shall be the greater.

g. If in the future the City of Sacramento shall be assessed taxes by any public agency on water rights or diversions which comprise any part of the Permit Supply then this shall constitute an "additional cost" and this shall be charged to Arcade on the same pro rated basis of computation as was used to charge Arcade for payments made by Sacramento under its Bureau Agreement.

5. Payments for water to Sacramento by Arcade shall be made twice annually, immediately after July 1st of any year for the payments due for the first six months of that year, and immediately after January 1st of each year for payments due for the second six months of the preceding year.

6. All diversions and deliveries by Arcade under this agreement are subject to all of the

provisions of Decision D 893 of the State Water Rights Board and the conditions of Sacramento permits, including releases and flows for fish life, including protection of fish life, and to Sacramento's "Agreement of Assignment" with Sacramento Municipal Utility District dated June 28, 1957.

7. This Agreement shall not take effect until it has been approved in writing by the U. S. Bureau of Reclamation and until the State Water Rights Board has approved Arcade's points of diversion as an addition to those specified in Sacramento's permits. The parties will cooperate to obtain such approval.

8. This Agreement shall be in effect concurrent with, and at all times consonant with, the American River diversion permits, and State regulations or State laws relating thereto, held by Sacramento and with all terms of the Bureau Agreement. For reference, the Bureau Agreement shall be considered as an appendix to this agreement.

9. Arcade shall hold Sacramento harmless and indemnify it for any loss or damage resulting from any act or occurrence in any way

related to this agreement.

Dated this 13th day of February, 1964.

CITY OF SACRAMENTO

By /s/ JAMES B. MC KINNEY
Mayor

ATTEST:

/s/ Reginald H. Boggs
City Clerk

ARCADE COUNTY WATER DISTRICT,
a county water district

(seal)

By /s/ N. B. KELLER
President

and /s/ NANCY ROSS
Secretary

Approved as to form

/s/ WILLIAM T. SWEIGERT

Attorney for Arcade County
Water District.

RESOLUTION NO. 43

Adopted by The Sacramento City Council on date of
FEB. 13 1964

BE IT RESOLVED BY THE COUNCIL OF THE CITY OF SACRAMENTO:

That the Mayor and City Clerk are hereby authorized and directed to sign and execute on behalf of the City of Sacramento that certain agreement by and between the CITY OF SACRAMENTO, a municipal corporation, therein called SACRAMENTO, and ARCADE COUNTY WATER DISTRICT, a county water district, therein called ARCADE, covering the selling of certain quantities of water under the terms of the City's agreement with the United States Bureau of Reclamation.

JAMES B. McKINNEY
MAYOR

ATTEST:

REGINALD H. BOGGS
CITY CLERK

CERTIFIED AS TRUE COPY
OF RESOLUTION NO. 43

February 14, 1964
Date Certified

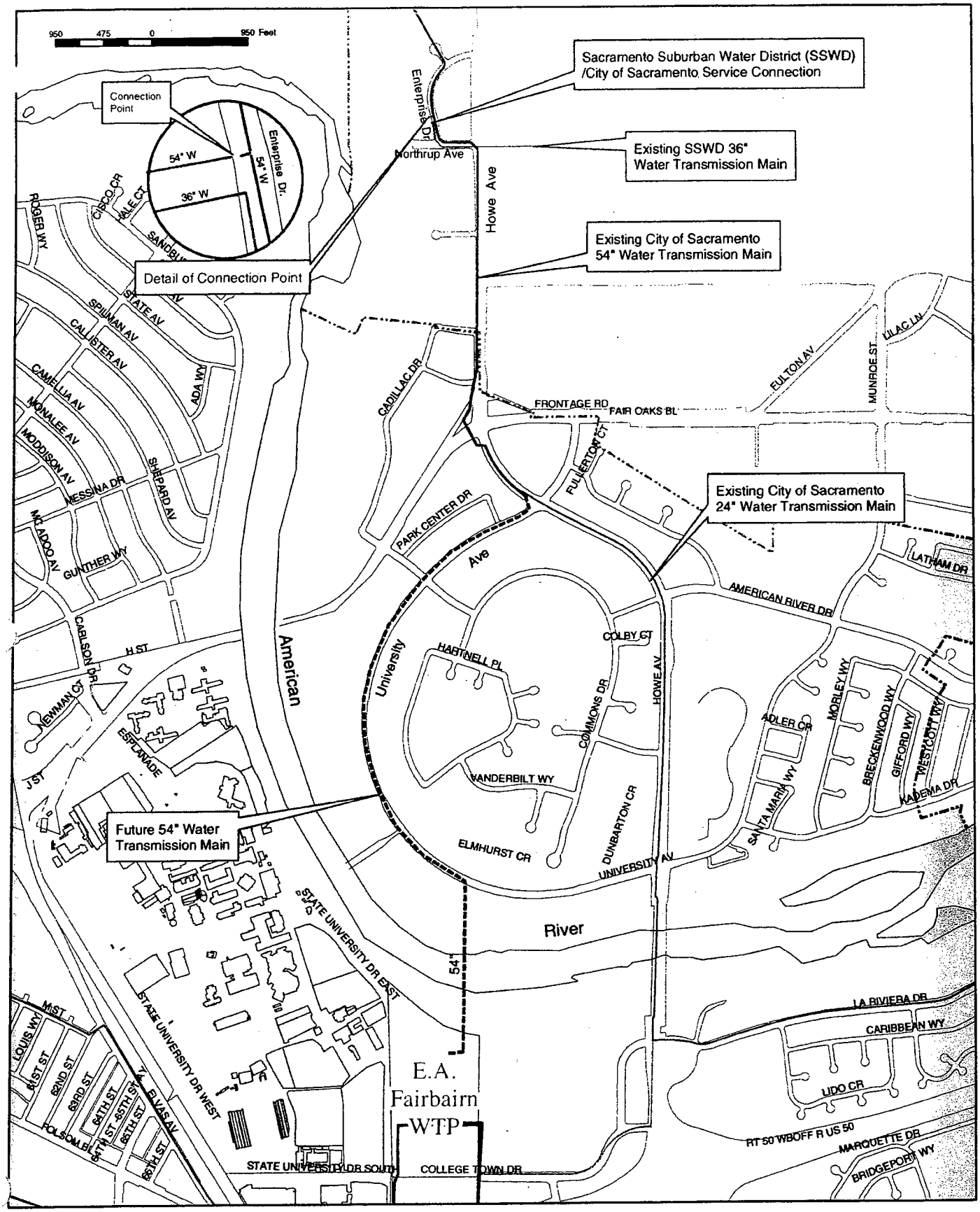
/s/ REGINALD H. BOGGS
City Clerk, City of
Sacramento

(SEAL)

Exhibit B

Map Showing City and District Facilities, with Detail of Service Connection

Exhibit "B"



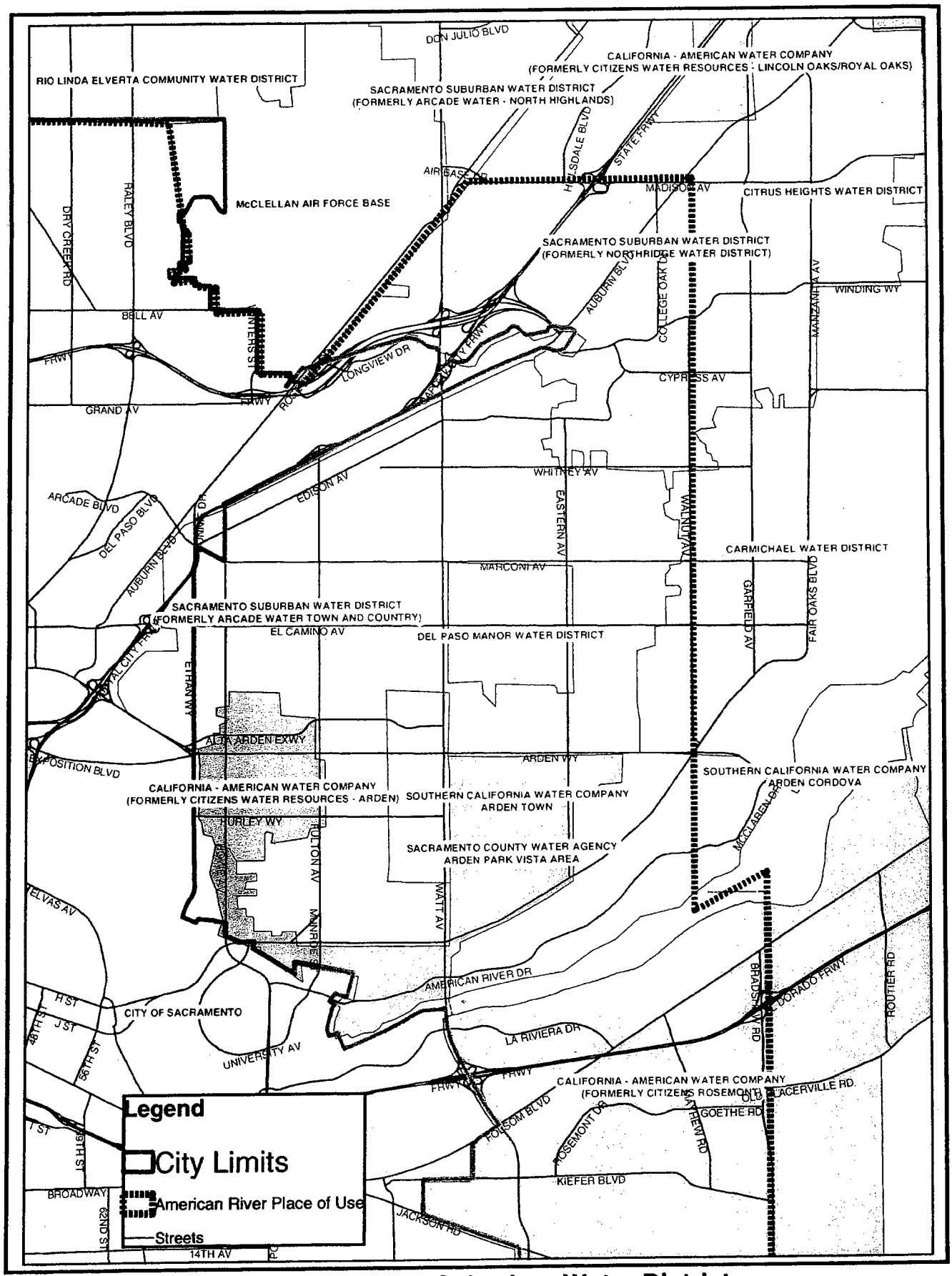
Sacramento Suburban Water District/City of Sacramento Wholesale Water Supply Service Connection

NORTH

Exhibit C

District Service Area within POU

Exhibit "C"



Sacramento Suburban Water District Within American River Place of Use

Exhibit D

Delivery Criteria

EXHIBIT D

CITY / SACRAMENTO SUBURBAN
ENTERPRISE DRIVE SERVICE CONNECTION

DELIVERY CRITERIA

This document outlines the general delivery guidelines and criteria for the operation of service connections between the City of Sacramento (City) and the Sacramento Suburban Water District (District). The initial wholesale water service connection is located on Enterprise Drive between Northrop Avenue and Venture Court.

LIST OF CONTACTS:

The following listing of City and District contact names and phone numbers is provided in order of contact priority.

District:	WORK
James Arenz, Operator on Call	679-2892 (Cell-869-7359)
*Field Operations Dispatch (for Operator on Call)	972-7171
Richard Creechley, Treatment Plant Supervisor	679-2884 (Cell-416-5468)
*Utility Emergency Number (24-hr Line)	972-7171
Dan York, Field Operations Manager	679-2880 (Cell-869-7349)
Warren Jung, District Engineer, Operations	679-3987 (Cell-416-5467)

*Daily 8am-5pm; after hours, weekends and holidays-same number to answering service.

City of Sacramento:	WORK
E.A. Fairbairn WTP Control Room	382-3106
E.A. Fairbairn WTP Hotline	383-1516
Steve Willey, Plant Operator Supervisor	382-3712
Mike Yee, Plant Service Division Manager	264-5583
Kathy Mullen, Water Superintendent	382-3105
Roland Pang, Water Superintendent	382-3119

OPERATIONAL PARAMETERS:

Per the agreement the following operational parameters shall be maintained by the City and District operators controlling the service connection.

Pre-Fairbairn Plant Expansion/Howe Avenue Transmission Main Construction
Instantaneous maximum flow rate = 10 mgd (6,950 gpm)*
Maximum daily volume = 10 mg

Post-Fairbairn Plant Expansion/Howe Avenue Transmission Main Construction
Instantaneous maximum flow rate = 20 mgd (13,900 gpm)*
Maximum daily volume = 20 mg
* A10% tolerance shall be allowed due to operational variations.

Per the operational requirements of the City supply and distribution system, the following additional operational parameters shall be maintained.

Minimum Pump Start Service Connection Pressure	= 35 psi
Minimum Service Connection Operation Pressure	= 30 psi

OPERATIONAL PROCEDURES:

1. For initial start-up, and for subsequently significant shut-down periods, District will call the E.A. Fairbairn Water Treatment Plant (FWTP) Control Room to communicate delivery status.

2. The FWTP Operator will check the system pressure at the service connection using the City's Supervisory Control and Data Acquisition (SCADA) system. If the pressure equals or exceeds 35 psi, the FWTP Operator will use the SCADA system to open the motor operated valve (MOV) located at the service connection. If the system pressure at the service connection is less than 35 psi, or the FWTP Operator has reason to suspect that the pressure shall fall to or below 35 psi within a short period from the call for delivery (based on historic demand trends), the FWTP Operator will deny District's request for delivery and not open the valve.

   The SCADA system shall enunciate visually and audibly a low pressure condition (35 psi) and a low-low pressure condition (30 psi) in the FWTP Control room, and at the District control station. Should the low-low pressure condition remain in effect for 90 seconds, the District's booster pump station control logic shall initialize booster pump station shut-down. Should the District's booster pump station control logic fail to perform shut-down of the booster pumps, the City shall be obligated to close the service connection MOV.

3. When a request for delivery is authorized by the FWTP Operator, and the service connection MOV has been opened, the District Operator shall receive a fully open valve position signal through the pump station SCADA system. The District can then start the

first pump at the pump station using the VFD to ramp up flow while the FWTP Operator and the District monitors system pressure on the City side of the service connection. If the pressure falls to or below 35 psi the District shall adjust the flow to retain suction side pressure at or above 35 psi. The District shall strive to set stabilized operation of the pump station to maintain service connection pressure at or above 35 psi. If at any time the suction side pressure should fall to or below 30 psi the District's booster pump station control logic shall initiate booster pump station shut down.

4. If the system pressure remains above 35 psi the District shall be authorized to start additional pumps while monitoring service connection pressure to ensure that pressure does not fall below 35 psi. The District shall control the booster pump station control logic to maintain the service connection pressure at or above 35 psi. At no time shall the service connection pressure drop below 30 psi.

5. The City shall be responsible for reading and recording the time and flow quantities.

6. District can take a daily flow rate of up to 6,950 gpm (within a 10% tolerance due to operational variations) as measured by the City maintained service connection flowmeter as long as service connection pressures and conditions in paragraphs 2, 3, and 4 are met prior to completion of the FWTP expansion and construction of the Howe Avenue Transmission Main.

7. District can take a daily flow rate of up to 13,900 gpm (within a 10% tolerance due to operational variations) as measured by the City maintained service connection flowmeter as long as the service connection pressures and conditions in paragraphs 2, 3, and 4 are met once expansion of the FWTP and construction of the Howe Avenue Transmission Main have been completed.

8. If the District encounters an emergency situation that requires additional water for their system for a short duration, the City may allow the District to take water even though the system pressure at the service connection is below 30 psi. In the event of an emergency, the District may request the FWTP Operator to over ride the service connection MOV.

9. If the City encounters an emergency situation that requires additional water for their system, the City may close the service connection MOV even though the system pressure at the service connection is at or above 30 psi. In the event of an emergency, the FWTP Operator shall notify the District before closing the service connection MOV.

10. The aforementioned delivery criteria can be modified at the discretion of the City.

AGREEMENT:

Both parties agree to the procedures and conditions set forth in this document to deliver City water to the Service connection, by and between the CITY OF SACRAMENTO and the District.

Dated: _____, 2003

CITY OF SACRAMENTO

By: _____
Mike Yee, Plant Services Manager

DISTRICT

By: _____
Ed Formosa, Assistant General Manager

Exhibit E

Water Forum Diversion Restrictions in City's American River Water Right Permits

The City of Sacramento's American River water right permits contain the following condition:

"At such time as the additional water treatment capacity to be provided by the City's Water Facility Expansion project (as described in the final Environmental Impact Report, SCH # 1998032046) is available for use by the City, the following terms shall go into effect.

In extremely dry years (i.e., years in which the State of California Department of Water Resources [DWR] annual projected unimpaired inflow into Folsom Reservoir would be 550,000 acre-feet annually [afa] or less; also referenced as the March through November projected unimpaired flow into Folsom Reservoir being less than 400,000 acre feet [af]) the City would limit its diversions of City water (i.e., water diverted pursuant to the City's water rights and entitlements) at the Fairbairn Water Treatment Plant (FWTP) to not greater than 155 cubic feet per second (cfs) and not greater than 50,000 afa. Any additional water needs would be met by diversions at other locations and/or other sources.

In all other years (i.e. when the DWR annual projected unimpaired runoff into Folsom Reservoir is greater than 550,000 af, or the March through November projected unimpaired inflow into Folsom Reservoir is greater than 400,000 af) the City may divert City water at the FWTP in accordance with the following criteria:

(1) Diversion up to 310 cfs (200 million gallons per day [mgd]) so long as the flow bypassing the diversion at the FWTP is greater than the Hodge Flow Criteria. (The Hodge Flow Criteria refers to the following minimum Lower American River flows established by Judge Hodge in the *EDF v. EBMUD* case: October 15 through February - 2,000 cfs; March through June - 3,000 cfs; July through October 15 - 1,750 cfs.)

(2) Whenever flow bypassing the diversion at the FWTP is less than the Hodge Flow Criteria, City of Sacramento diversions at the FWTP may not be greater than the following: January through May - 120 cfs; June through August - 155 cfs; September - 120 cfs; October through December - 100 cfs."

Exhibit F

Initial Wholesale Water Rate

SACRAMENTO SUBURBAN WATER DISTRICT
WHOLESALE WATER RATE
FISCAL YEAR 2003-2004

Exhibit F
Initial Wholesale Water Rate

SACRAMENTO SUBURBAN WATER DISTRICT
WHOLESALE WATER - UNIT COST CALCULATION
FISCAL YEAR 2003-2004

1	FY 2004 Operating/CIP Budget: (a)	$53,744,362	FY 2003 Water Production (AF): (b)	135,537	
		BUDGET	UNIT COST ELEMENTS		
	OPERATING				
	LABOR				
2	Employee Services	14,928,745		$110.15	
3	Cost Reimb-Credit	(1,887,983)		($13.93)	
4	Cost Reimb-Charge	1,897,859		$14.00	
5	CIP Reimbursement	(684,743)		($5.05)	
6		$14,253,878		$105.17	
	OPERATIONS				
7	Utilities	2,797,513		$20.64	
8	Operations Equipment	1,434,727		$10.59	
9	Direct Operations Supplies	1,524,615		$11.25	
10	Chem & Gases	803,425		$5.93	
11		$6,560,280		$48.40	
	ADMINISTRATION/OVERHEAD				
12	Office/Admin	1,239,658		$9.15	
13	Interdepartmental Allocation/Taxes	7,143,237		$52.70	
14	Comp Liability Exp	514,649		$3.80	
15	Water Rights/Supply	207,000		$1.53	
16	Professional Services	545,660		$4.03	
17		$9,650,204		$71.20	
18	**TOTAL OPERATING**	**$30,464,362**		**$224.77**	
	CAPITAL IMPROVEMENT PROGRAM				
19	CIP	$10,140,000		$74.81	
20	Debt Service	$13,140,000		$96.95	
21	**TOTAL CIP**	**$23,280,000**		**$171.76**	
22	**TOTAL OPERATING/CIP COSTS**	**$53,744,362**		**$396.53**	
	EXCLUDED COSTS (SSWD only)				
23	Unrelated Energy Costs	($1,811,581)		($13.37)	
24	Unrelated Distribution Costs	($6,307,883)		($46.54)	
25	Unrelated Dist Overhead	($2,731,704)		($20.15)	
26	Unrelated Water Rights Costs	($207,000)		($1.53)	
27	Unrelated CIPs	($7,690,000)		($56.74)	
28	Unrelated Debt Svc	($13,140,000)		($96.95)	
29	Non-operating Revenues	($6,891,000)		($50.84)	
30	**TOTAL EXCLUDED COSTS**	**($38,779,169)**		**($286.11)**	
31	**TOTAL COST**	**$14,965,193**	**UNIT RATE**	**$110.41**	**per AF**
32b				**$0.2535**	**per CCF**
33b			**SERVICE CHARGE**	**$150.00**	**per month**

Note: Unit Rate is adjusted annually to reflect current costs.

SACRAMENTO SUBURBAN WATER DISTRICT
WHOLESALE WATER - UNIT COST CALCULATION
FISCAL YEAR 2003-2004

1	FY 2004 Operating/CIP Budget: (a)	$53,744,362	FY 2003 Water Production (AF): (b)	135,537	
		BUDGET	**UNIT COST ELEMENTS**		
	OPERATING				
	LABOR				
2	Employee Services	14,928,745	$110.15		
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4	Cost Reimb-Charge	1,897,859	$14.00		
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6		$14,253,878	$105.17		
	OPERATIONS				
7	Utilities	2,797,513	$20.64		
8	Operations Equipment	1,434,727	$10.59		
9	Direct Operations Supplies	1,524,615	$11.25		
10	Chem & Gases	803,425	$5.93		
11		$6,560,280	$48.40		
	ADMINISTRATION/OVERHEAD				
12	Office/Admin	1,239,658	$9.15		
13	Interdepartmental Allocation/Taxes	7,143,237	$52.70		
14	Comp Liability Exp	514,649	$3.80		
15	Water Rights/Supply	207,000	$1.53		
16	Professional Services	545,660	$4.03		
17		$9,650,204	$71.20		
18	**TOTAL OPERATING**	**$30,464,362**	**$224.77**		
	CAPITAL IMPROVEMENT PROGRAM				
19	CIP	$10,140,000	$74.81		
20	Debt Service	$13,140,000	$96.95		
21	**TOTAL CIP**	**$23,280,000**	**$171.76**		
22	**TOTAL OPERATING/CIP COSTS**	**$53,744,362**	**$396.53**		
	EXCLUDED COSTS (SSWD only)				
23	Unrelated Energy Costs	($1,811,581)	($13.37)		
24	Unrelated Distribution Costs	($6,307,883)	($46.54)		
25	Unrelated Dist Overhead	($2,731,704)	($20.15)		
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31	**TOTAL COST**	**$14,965,193**	**UNIT RATE**	**$110.41**	**per AF**
32b				**$0.2535**	**per CCF**
33b			**SERVICE CHARGE**	**$150.00**	**per month**

Note: Unit Rate is adjusted annually to reflect current costs.

SACRAMENTO SUBURBAN WATER DISTRICT

ITEMIZED COST DESCRIPTION FOR WHOLESALE UNIT COST ALLOCATION

1A	FY2004 Operating/CIP Budget:	Total Operation Budget from line 11 below.
1B	FY03 Water Production	Total Water Production: Acre feet delivered.
2	Employee Services	Water related labor costs, including insurance and social security.
3	Cost Reimb-Credit	A reimbursement to the water fund -payments from other City departments for actual work done by Utilities staff.
4	Cost Reimb-Charge	A cost to the water fund - payments to other City departments for work done by non-Utilities staff.
5	CIP Reimbursement	A reimbursement to the water fund -Operations and maintenance (O&M) labor costs absorbed through work performed on a Capital Improvement Project (CIP).
6	**Total Labor**	**Total Labor Costs - add lines 2 thru 5.**
7	Utilities	Facility Energy costs - Smud
8	Operations Equipment	Major operating equipment costs - Vehicle/equipment purchase, rental, and maintenance.
9	Direct Operations Supplies	Standard O & M equipment costs - Mech parts, small tools, constr, elect, welding, paint, safety, misc, supplies, plumbing, hose fittings, asphalt, lube/oils, clothes, etc.
10	Chem & Gases	Primarily water treatment chemicals.
11	**Total Operations**	**Total Operations - add lines 7 thru 10.**
12	Office/Admin	Office supplies, postage, property insurance, data lines, janitorial, etc.
13	Interdepartmental Allocation & Taxes	Cost Plan which reflects use of Attorney, City Manager, and Facility Maintenance, etc., & voter approved general tax paid to general fund.
14	Comp Liability Exp	Comprehensive liability insurance on facilities.
15	Water Rights/Supply	Annual fee for water rights
16	Professional Services	Specialized legal fees, lobbing, educational consultants, etc.
17	**Total Admin/Overhead**	**Total of lines 12 thru 16.**
18	**TOTAL OPERATING**	**Total Operating - add lines 6, 11 & 17.**
19	CIP	Adopted Water Capital Improvement Plan
20	Debt Service	Principal and interest on bonded debt.
21	**TOTAL CIP**	**Total CIP - add lines 19 & 20.**
22	**TOTAL OPERATING/CIP COSTS**	**Total Operating/Cip costs - add lines 18 & 21.**
23	Unrelated Energy Costs	Remove energy charges for Wells and Sac River Water Treatment Plant.
24	Unrelated Distribution Costs	Remove operating distribution costs.
25	Unrelated Dist Overhead	Remove Admin / overhead related to distribution.
26	Unrelated Water Rights Costs	Remove Water Rights Costs
27	Unrelated CIPs	Remove CIPs associated with Distribution System: Main Replacements, Water Meter Retrofit, Automatic Meter Reading, Fire Hydrant Repl, etc. See Water Fund CIP Listing.
28	Unrelated Debt Svc	Remove debt related to financing all all facilities.
29	Non-operating Revenues	Remove non-user fee revenues: interest on investments, revenues from other agencies, water tap sales, other departmental services, misc revenues.
30	**TOTAL EXCLUDED COSTS**	**Total Excluded Costs - add lines 23 thru 29.**
31a	**TOTAL COST**	**Total Cost - add lines 22 & 30.**
31b	UNIT RATE PER AF	Unit Cost: Total cost (line 31a) divided by Water production (AF, line 1b)
32b	UNIT RATE PER CCF	Unit Rate per hundred cubic feet.
33b	SERVICE CHARGE	Monthly basic service charge for 12" meter size.

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2003/2004 WATER FUND CIP

CIP#	CIP PROJECT NAME	TYPE	FY 03/04 CIP	UNRELATED	RELATED
ZB46	WATER METER RETORFIT	G	250,000.00	250,000.00	
ZG21	AUTOMATED METER READING	G	200,000.00	200,000.00	
ZD36	WATER SUPPLY MASTER PLAN	G	100,000.00		100,000.00
ZE36	RISK MANAGEMENT PREVENTION	G	100,000.00		100,000.00
ZG06	MAINTENANCE MANAGEMENT	G	50,000.00		50,000.00
ZG86	UTILITIES ADA IMPROVEMENT	G	5,000.00		5,000.00
ZI96	WATER FACILITIES SECURITY	G	100,000.00		100,000.00
ZJ21	FIELD SERVICE BLD INTERIOR	G	400,000.00		400,000.00
	SUB-TOTAL GENERAL CIP		**$1,205,000.00**	**450,000.00**	**$755,000.00**
ZD51	FIRE HYDRANT REPLACEMENT	H	**$90,000.00**	**$90,000.00**	$0.00
ZJ36	ELKHORN 3MG RESERVOIR	S	**$1,750,000.00**	**$1,750,000.00**	$0.00
ZB71	WATER PROD MISC IMPV	T	100,000.00		100,000.00
ZE31	SACR RIVER SOURCE WATER QUALITY	T	70,000.00		70,000.00
ZF61	AMER RIVER SOURCE WATER QUALITY	T	65,000.00		65,000.00
ZH41	DRINKING WATER QUALITY	T	60,000.00		60,000.00
ZJ56	SRWTP PROP ACQ	T	400,000.00		400,000.00
	SUB-TOTAL TREATMENT CIP		**$695,000.00**	**$0.00**	**$695,000.00**
ZJ11	RESIDENTIAL WATER METERS	D	250,000.00	250,000.00	
X001	ECONOMIC DEVELOP PGM	D	400,000.00	400,000.00	
ZB31	WATER SYSTEM MISC IMPROVEMENT	D	250,000.00	250,000.00	
ZE46	BASE CIP RESERVE-WATER	D	400,000.00	400,000.00	
ZF26	BACKFLOW PREVENTION	D	250,000.00	250,000.00	
ZI71	DEEBLE/28TH STREET MAIN REPL	D	850,000.00	850,000.00	
ZJ26	WOODLAKE MAIN REPL, PH2	D	850,000.00	850,000.00	
ZJ31	FRUITRIDGE MNR STL R	D	850,000.00	850,000.00	
ZJ41	POWER INN T-MAIN RELOCATE	D	100,000.00	100,000.00	
ZJ46	JIBBOOM ST REHAB/PARK	D	250,000.00	250,000.00	
ZJ66	WOODLAKE MN RPL PH3	D	850,000.00	850,000.00	
	SUB-TOTAL DISTRIBUTION CIP		**$5,300,000.00**	**$5,300,000.00**	$0.00
ZJ51	H ST RV ST MN REPL 5-10 ST	TM	**$1,000,000.00**	0.00	**$1,000,000.00**
ZD26	WELL SYSTEM MISC IMPV	W	**$100,000.00**	100,000.00	**$0.00**
	TOTAL CIP		**$10,140,000.00**	**$7,690,000.00**	**$2,450,000.00**

LEGEND	
D	DISTRIBUTION
G	GENERAL
H	HYDRANT
P	PUMPING
S	STORAGE
T	TREATMENT
TM	TRANSMISSION
W	WELLS

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Exhibit G

Initial Connection Fee

SACRAMENTO SUBURBAN WATER DISTRICT
WHOLESALE WATER - INITIAL CONNECTION FEE

FISCAL YEAR 2003-2004

Exhibit G
Connection Fee

SACRAMENTO SUBURBAN WATER DISTRICT
WHOLESALE WATER - CONNECTION FEE

DESCRIPTION	NET REPL COST 6/30/2004	CAPACITY mgd	WHOLESALE UNIT COST FY 03/04
T & D	143,250,772	310	n/a
Hydrants	968,892	310	n/a
Storage	25,837,126	310	n/a
Wells	6,919,872	310	n/a
Treatment	190,143,487	310	$ 613,366
Pumping	23,688,189	310	76,414
General	14,371,753	310	46,360
Total	$405,180,092	310	$ 736,140

UNIT COST	MGD	TOTAL FEE
$736,140	10	$7,361,140

WHOLESALE CAPACITY CHARGE CALCULATION - 09/25/02
Extrapolation of figures developed from the
Water Utility System Development Fee Study
Completed in October, 1998 by Brown & Caldwell

SACRAMENTO SUBURBAN WATER DISTRICT

	DESCRIPTION	(a) REPL COST 6/30/2003	(b) CAPITAL ADDITIONS FY 03/04	(c) INFLATION	REPL COST 6/30/2004	OUTSTDNG DEBT FY 03/04	NET REPL COST 6/30/2004	(d) CAPACITY mgd	WHOLESALE UNIT COST FY 03/04
1	T & D	132,870,167	6,300,000	4,080,605	143,250,772		143,250,772		
2	Hydrants	851,983	90,000	26,909	968,892		968,892		
3	Storage	23,360,074	1,750,000	727,052	25,837,126		25,837,126		
4	Wells	6,619,779	100,000	200,093	6,919,872		6,919,872		
5	Treatment	271,314,574	695,000	8,149,862	280,159,436	90,015,949	190,143,487	310	613,366
6	Pumping	56,596,428	-	1,697,893	58,294,321	34,606,132	23,688,189	310	76,414
7	General	13,209,153	755,000	407,600	14,371,753		14,371,753	310	46,360
	Total	504,822,158	9,690,000	15,290,015	529,802,173	124,622,081	405,180,092	(e)	736,140

(a) Repl Cost = Water System value net of contributions and assessments.
(b) Repl cost inflated by 3% per year.
(c) Capital additions are inflated one half years interest in year they are added.
(d) 310 capacity mgd includes 90 mgd EAF existing, 110 mgd EAF new expansion & 110 mgd Sac existing.
(e) Excludes Distribution, Transmission, Hydrants, Storage & Wells.

Wholesale Capacity Calculation Description

1	T & D	Transmission & Distribution.
2	Hydrants	Fire Hydrants.
3	Storage	Storage reservoirs plus booster pump stations.
4	Wells	Potable water wells only.
5	Treatment	Two water treatment plants: EAF & Sacramento River Water Treatment Plants.
6	Pumping	Intakes at EAFWTP & SRWTP.
7	General	Includes misc. capital improvement projects, ie. Water Supply Master Plan, Risk Mgnt Prevention, Maint. Management, Utilities ADA Improvement, Water Facilities Security.

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APPENDIX G

Water Shortage Contingency Plan

Regulation No. 15
Water Conservation

A. Water Conservation Emergency Plan

The District Board of Directors has adopted a "Water Conservation Emergency Plan." Beginning on May 1st of each year, the District Board of Directors shall determine, based on data in the Department of Water Resource's (DWR) Bulletin #120 and present water conditions, the water stage applicable to the District for the coming year. The emergency plan shall cover five (5) stages of varying water conservation measures. The applicable stage determined by the District shall be effective on May lst of each year and shall remain in effect until changed by the Board of Directors based on updated data from DWR, and past water usage within the District and existing water supply and use conditions. The requirements of the stage declared by the Board of Directors shall be strictly enforced by District personnel. The following five stages, including their conservation requirements, shall be observed by all Water Users within the District:

Stage 1 – Normal conditions: The District is able to meet all immediate needs of its Customers.

Stage 2 – Water Alert: A 5% or greater reduction in water usage is required for the District to meet the immediate needs of its Customers.

Stage 3 – Water Warning: A 15% or greater reduction in water usage is required for the District to meet the immediate needs of its Customers.

Stage 4 – Water Crisis: A 30% or greater reduction in water usage is required for the District to meet the immediate needs of its Customers.

Stage 5 – Water Emergency: A 50% or greater reduction in water usage is required for the District to meet the immediate needs of its Customers.

The mandatory requirements of the various stages shall be imposed on all District Customers. The District shall notify its ratepayers whenever any stage implementation or change action occurs.

Mandatory requirements associated with each of the stages are listed as follows:

1. Enforcement

   Enforcement shall be in accordance with this Regulation No. 15 as may be amended from time to time by the District Board of Directors.

2. Stage 1 – Mandatory Requirements – Normal Conditions

All requirements of Sections B and C of this Regulation 15 shall be in effect for Stage 1.

3. Stage 2 – Mandatory Requirements – Water Alert

Upon determination by the Board of Directors that Stage 2 conditions exist, the following mandatory requirements shall apply to all Water Users:

a. All mandatory requirements of Stage 1 shall remain in effect.

b. The District shall require Water Users to reduce consumption approximately 5%.

4. Stage 3 – Mandatory Requirements – Water Warning

Upon determination by the Board of Directors that Stage 3 conditions exist, the following mandatory requirements shall apply to all Water Users:

a. All mandatory requirements of Stage 1 shall remain in effect.

b. Mandatory requirements of Stage 2 shall remain in effect except that any less-stringent Stage 2 requirements will be superseded by the more stringent requirements of a Stage 3 condition as described below.

c. The District shall require all Water Users to reduce consumption approximately 15%.

d. Outside irrigation shall be limited to two (2) days per week. Street addresses ending with odd numbers (1, 3, 5, 7 & 9) shall be allowed to water on Tuesdays and Saturdays of each week. Street addresses ending with even numbers (2, 4, 6, 8 & 0) shall be allowed to water only on Wednesdays and Sundays. No watering will be allowed on Mondays, Thursdays, and Fridays.

e. Washing of vehicles and other mobile equipment shall be conducted at commercial establishments that use fully recycled water. Alternative washing of vehicles is permitted, but only with the use of a water saver nozzle with the vehicle parked on the lawn, provided no runoff occurs on sidewalks or street, and the washing is done on a permitted watering day for that address.

f. Hydrant permits for construction water will be confined to jetting and compaction of materials. No water shall be used for street washing.

g. All Metered Services shall be subject to additional tiered rates approved by the District Board of Directors.

h. Businesses are not to serve water unless requested.

5. Stage 4 – Mandatory Requirements – Water Crisis

Upon determination by the Board of Directors that Stage 4 conditions exist, the following mandatory requirements shall apply to all Water Users:

a. All mandatory requirements of Stage 1 shall remain in effect.

b. Mandatory requirements of Stages 2 and 3 shall remain in effect except that any less stringent Stage 2 and 3 requirements will be superseded by the more stringent requirements of a Stage 4 condition as described below.

c. The District shall require Water Users to reduce consumption approximately 30%.

d. Outside irrigation will be limited to one (1) day per week. Street addresses ending with odd numbers (1, 3, 5, 7 & 9) shall water on Saturdays. Street addresses ending with even numbers (2, 4, 6, 8 & 0) shall water Sundays. There will be no watering Mondays, Tuesdays, Wednesdays, Thursdays, or Fridays.

e. Washing of sewers, storm drains, or streets with District water will be strictly prohibited except for health or emergency conditions. All health and emergency conditions shall be verified by the County or State Health Department prior to permitting the use of water for these purposes.

f. No hydrant or water permits for any use will be issued unless requested by state, local or federal agencies for emergency purposes.

g. In lieu of the penalties for a second violation of Stage 1 through 3 of this Regulation described below in Section C, the District shall install a permanent water Meter on existing Non-Metered Services and/or flow restrictors on existing Metered Service(s) in accordance with Section C.2.d. or C.2.e. at the Customer's expense, and/or additional charges approved by the District Board of Directors may be levied if a second violation occurs.

h. Washing of vehicles or equipment shall be conducted only at a commercial establishment that uses recycled or reclaimed water. All other types of washing are prohibited.

i. The use of ornamental fountains is strictly prohibited except for those fountains that are constructed with circulating pumping systems. An owner of a fountain or pond with a recirculating pump must prove to the District's satisfaction that such fountain or pond contains a recirculating pump.

j. District water permits and payment of water usage costs shall be required for filling new swimming pools and/or ponds, or refilling existing facilities. However, the replacement of water lost due to evaporation in existing filled ponds or pools is permitted.

k. All swimming pools, ponds, and fountains shall be equipped with circulation pumps. As necessary, a cover should be used to reduce evaporation.

6. Stage 5 – Mandatory Requirements – Water Emergency

Upon determination by the Board of Direction that Stage 5 conditions exist, the following mandatory requirements shall apply to all Water Users:

a. All mandatory requirements of Stage 1 shall remain in effect.

b. Mandatory requirements of Stages 2, 3 and 4 shall remain in effect except that any less stringent Stages 2, 3, and 4 requirements will be superseded by the more stringent requirements of a Stage 5 condition as described below.

c. The District will require Customers to reduce consumption approximately 50%.

d. No outside turf watering will be permitted. Outside water will be restricted to hand watering of Planters. Planter watering shall be limited to one (1) day per week. Addresses ending with odd numbers (1, 3, 5, 7 & 9) shall water on Saturdays. Street addresses ending with even numbers (2, 4, 6, 8 & 0) shall water on Sundays. There will be no watering on Mondays, Tuesdays, Wednesdays, Thursdays, or Fridays.

e. Use of District water is prohibited for filling or refilling pools, ponds, or spas. The use of automatic float assemblies shall be prohibited.

B. Stage 1 Water Conservation (Normal Conditions)

1. The use of lawn and irrigation water shall be restricted to alternate days. Residents whose addresses end with and odd number (1, 3, 5, 7 & 9) shall use water for such purposes only on Tuesdays, Thursdays, and Saturdays. Residents whose street addresses end with even numbers (2, 4, 6, 8 & 0) shall use water for

such purposes only on Wednesdays, Fridays, and Sundays. No lawn or irrigation watering shall be permitted on Mondays.

2. The use of water for washing down sidewalks and/or driveways is strictly prohibited.

3. All vehicle washing shall be restricted to the use of a bucket or pail, not exceeding three (3) gallons in capacity, and the use of a hose equipped with an automatic shutoff nozzle.

4. Water Users shall not permit water to flow into gutters or to collect in pools upon or contiguous to their Parcels.

5. No Water User shall knowingly permit leaks or waste of water. Where water is wastefully or negligently used on a Water User's Premises, so as to seriously affect general service, the District may discontinue the service to the Premises if such conditions are not corrected within twenty-four (24) hours after giving the Water User notice. Door hangers shall constitute written notice.

6. Automatic sprinkler system timers are required to be set to operate during periods of low consumption at off-peak hours between midnight and 5:00 a.m. (between 2:00 a.m. and 5:00 a.m. is recommended.)

7. In those instances of tenant occupancy, Landowners retain full responsibility for the actions of their tenants.

8. All new car-washing facilities shall be designed with recirculating systems to recycle rinse water. All remodeled car-washing facilities will be equipped with recirculating systems prior to reconnection of water service.

9. The "dump and fill" practice of pool maintenance is prohibited. Pool draining and refilling shall be allowed only for health, maintenance, or structural considerations and in accordance with all County Regulations. Customer requests must be submitted in writing by pool consultants and approved by the District. Pool covers are recommended to reduce evaporation.

C. Enforcement

1. The District may discontinue water service to any Parcel when the use of water thereon constitutes a violation of this Regulation 15 or which results in the assessment of service charges for a violation, as defined below.

2. Service charges will be assessed for a violation of the District's conservation rules in accordance with the following provisions. A Customer will be notified when violations may result in service charges.

a. Upon observation by authorized District personnel of the existence of a violation, the District shall request Customer compliance in writing by personal service, or by certified mail to the billing address of the Parcel upon which the violation occurs.

b. Upon observation by authorized District personnel of a second violation of any kind of this Regulation 15 on the same Parcel, the Customer and Landowner shall be notified in writing at the established billing address, by personal service or by certified mail, of the violation and that an additional charge for servicing the violation will be added to Customer's next bill in accordance to Regulation 3, Section L.1.

c. Upon observation by authorized District personnel of a third violation on the same Parcel of any kind of this Regulation 15, the Customer and Landowner shall be notified in writing at the established billing address, by personal service or by certified mail, of the violation and informed that an additional charge for servicing the said violation will be added to Customer's next bill in accordance to Regulation 3, Section L.2, and that a subsequent violation may result in disconnection of service.

d. On flat rate services, if violations continue upon further observations, the Landowner shall be notified (in writing, by personal service, or by certified mail of the violation) that a water Meter shall be installed on that Parcel. The Landowner shall bear the cost of installing such a Meter. The cost shall be based on the District's costs for time and materials. The installation of this Meter shall cause the billing to be changed from a flat rate to a Metered Rate. The monthly charge for a Metered Service will be computed at the current Metered Rate as more specifically set forth in Regulation No. 3. The installation of this Metered Service shall be deemed permanent.

e. On existing Metered Services, if water conservation violations continue upon further observations, the Landowner shall be notified in writing at the established billing address, by personal service, or by certified mail, of the violation and informed that an additional charge for servicing the said violation will be included in his/her next billing. The amount of said charge is as follows:

(i) 1-inch or smaller service – 25% of the amount of the water bill for the month in which the violation occurs.

(ii) 1½ inch or larger service – 50% of the amount of the water bill for the month in which the violation occurs.

3. Where a water conservation violation occurs on a Parcel improved with multiple family units, and it is not practical to determine which unit is responsible for the violation, the District will assess the stated service charge described above in

subparagraphs a, b, and c of Paragraph C.2. against each of the units included within the responsible unit or units.

4. The first violation charged to a Parcel shall mark the beginning of the District's monitoring of water waste for that Parcel. Should no further violations occur prior to April lst of the following year, then that Parcel's violations shall be expunged and counting of any new violations will begin on a clean record. Copies of all violations described above shall be kept on file by the District throughout the year.

5. Upon the fifth water conservation violation of a non-metered account and the third violation on a metered account, the District may discontinue or reduce the water supply to the Parcel responsible for the violations. To restore service or full flow capabilities, the affected Customer will be required to request a hearing of the District Board of Directors, where the Customer may present evidence to the Board concerning Customer's violations and request the restoration of water service. At its next regular meeting after the hearing, the District Board shall enter on the record its findings and decision concerning the service restoration request and each issue thereunder. The Board's decision will be final. The secretary of the Board will mail the Board's written findings and decision to the Customer within thirty (30) days after the date that the Board renders its decision.

APPENDIX H

Water Conservation Evaluation

Demand Management Least Cost Planning Decision Support System
General Measure Model

CUWCC #6 - Washer Rebates

Results Summary

Present Value of Water Utility Benefits:	$118,029
Present Value of Total Community Benefits:	$995,264
Present Value of Water Utility Costs:	$120,825
Present Value of Total Community Costs:	$120,825
Water Utility Benefit Cost Ratio:	0.98
Total Community Benefit Cost Ratio:	8.24
Average Water Savings (mgd):	0.02
Cost of Savings per Unit Volume ($/mg):	$478.81

MEASURE PARAMETER LOOKUP	1 SA RSF Laundry	1 SA RMF Laundry				
Account Category	RSF	RMF				
Affected End Uses	Laundry	Laundry				
Percent Reduction in Water Use	34%	34%				
Sign-on Year	2006	2006				
Evaluation Start Year	2006	2006				
Requirec No. of Interventions	1708	1281				
Annual Market Penetration (%)	1%	1%				
Program Length (years)	10	10				
Measure Life (years)	Permanent	Permanent				
Initial Cost	$0	$0				
Annual Base Cost	$5,000	$0				
Unit Cost	$50	$50				
Affected Units	per dwelling unit	per dwelling unit				

Measure Implementation Costs

	NPV	Year 2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Water Utility Implementation Costs by Year:	$120,825	$0	$0	$8,359	$8,359	$8,359	$8,359	$8,359	$8,359	$8,359	$8,359	$8,359	$8,359
Customer Implementation Costs by Year:	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Measure Life (years): 28 Use Measure Life? No

Calculate Hot Water Savings? Yes

Five Year Utility Cost =	$41,793
Five Year Customer Cost =	$0
Five Year Community Cost =	$41,793

Sum Water Utility Costs =	$178,587

End Use Reductions and % New Participants

Number	End Use Identifier	Consumer Category	Type of use (Internal or	% of Savings Per Account
1	RSF Laundry	Single Family	Internal	34%
2	RMF Laundry	Multi-Family	Internal	34%
3	FRR Laundry	Flat Rate Residential	Internal	34%
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

% of New Participating Accounts — Maximum saturation = 3.4%

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
		0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%
		0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%	0.4%	0.4%	0.4%
		0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%

Number of New Participants

Number	End Use Identifier	Consumer Category
1	RSF Laundry	Single Family
2	RMF Laundry	Multi-Family
3	FRR Laundry	Flat Rate Residential
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Number of New Participating Accounts

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0	0	49	49	49	49	49	49	49	49	49	49
0	0	18	18	18	18	18	18	18	18	18	18
0	0	122	122	122	122	122	122	122	122	122	122

Number of Interventions	0	0	200	200	200	200	200	200	200	200	200	200

End Use Reductions and Participants

Number	End Use Identifier	Consumer Category
1	RSF Laundry	Single Family
2	RMF Laundry	Multi-Family
3	FRR Laundry	Flat Rate Residential
4		
5		
6		
7		
8		
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15		
16		
17		
18		
19		
20		

Cumulative Number of Participating Accounts by Year

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	0	0	49	98	147	196	245	294	342	391	440	489
	0	0	18	37	55	73	91	110	128	146	164	183
	0	0	122	244	366	488	610	731	853	975	1,097	1,219
Percent Saturation (RSF):	0%	0%	0%	1%	1%	2%	2%	2%	3%	3%	3%	3%

Measure Impact Factors

Number	End Use Identifier	Consumer Category
1	RSF Laundry	Single Family
2	RMF Laundry	Multi-Family
3	FRR Laundry	Flat Rate Residential
4		
5		
6		
7		
8		
9		
10		
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12		
13		
14		
15		
16		
17		
18		
19		
20		

Measure Impact Factor by Year

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99
1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99
1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.98

Total Water Production Savings

Number	End Use Identifier	Consumer Category
1	RSF Laundry	Single Family
2	RMF Laundry	Multi-Family
3	FRR Laundry	Flat Rate Residential
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
Total Water Savings (mgd):		
% Savings of Total Baseline Production:		

Water Savings by Year (mgd)

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%

Total External Water Savings

Number	End Use Identifier	Consumer Category
1	RSF Laundry	Single Family
2	RMF Laundry	Multi-Family
3	FRR Laundry	Flat Rate Residential
4		
5		
6		
7		
8		
9		
10		
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12		
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15		
16		
17		
18		
19		
20		

External Water Savings by Year (mgd)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total External Water Savings (mgd):	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Total Internal Water Savings

Number	End Use Identifier	Consumer Category
1	RSF Laundry	Single Family
2	RMF Laundry	Multi-Family
3	FRR Laundry	Flat Rate Residential
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Wastewater Savings by Year (mgd)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
2	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
3	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Total Internal Savings (mgd):	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03

Modified Forecasts

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Water Production (mgd):	44.6	44.9	45.1	45.3	45.5	45.7	45.9	46.1	46.3	46.5	46.8	47.0
External Consumption (mgd):	22.7	22.9	23.0	23.2	23.4	23.6	23.8	24.0	24.1	24.3	24.5	24.7
Peak Day Water Production (mgd):	93.8	94.4	95.0	95.6	96.2	96.8	97.4	98.0	98.6	99.2	99.9	100.5
Dry Weather Wastewater (mgd):	17.5	17.5	17.5	17.5	17.6	17.5	17.5	17.5	17.5	17.5	17.5	17.6
Design Wet Weather Wastewater: (mgd):	52.5	52.8	53.1	53.4	53.8	54.1	54.4	54.7	55.0	55.3	55.6	56.0

Operating Cost Savings

Modified Operating Costs Per mg

Type	Baseline Year Costs		
	Transfer	Treatment	Total
Water	$767	$0	$767
Wastewater	$0	$0	$0

Modified Unit Costs by Year

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Water	$767	$767	$767	$767	$767	$767	$767	$767	$767	$767	$767	$767
Wastewater	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Modified Total Operating Costs

Item	Baseline NPV	Modified NPV	NPV Savings
Water	$274,672,703	$274,554,674	$118,029
Dry Weather Wastewater	$0	$0	$0
Total			$118,029

Modified Total Costs by Year

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Water	$12,510,983	$12,574,786	$12,634,417	$12,695,318	$12,757,914	$12,811,784	$12,866,640	$12,923,406	$12,982,121	$13,042,739	$13,105,205	$13,169,469
Dry Weather Wastewater	$0.00	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	$12,510,983	$12,574,786	$12,634,417	$12,695,318	$12,757,914	$12,811,784	$12,866,640	$12,923,406	$12,982,121	$13,042,739	$13,105,205	$13,169,469

Hot Water Savings

Number	End Use Identifier	Consumer Category	Temperature of Use (oF) (Blank if not heated)	Cost Per Degree Change Per Gallon		Hot Water Savings by Year ($)											
						2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	RSF Laundry	Single Family	100.0	$1.50E-04		$0	$0	$1,306	$2,611	$3,917	$5,113	$6,264	$7,376	$8,451	$9,494	$10,507	$11,493
2	RMF Laundry	Multi-Family	100.0	$1.50E-04		$0	$0	$2,457	$4,914	$7,370	$9,661	$11,878	$14,029	$16,116	$18,145	$20,119	$22,042
3	FRR Laundry	Flat Rate Residential	100.0	$1.50E-04		$0	$0	$3,254	$6,508	$9,761	$12,820	$15,790	$18,678	$21,488	$24,225	$26,893	$29,495
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
Total Hot Water Savings:			(NPV):		$877,235	$0	$0	$7,016	$14,033	$21,049	$27,593	$33,933	$40,082	$46,055	$51,864	$57,519	$63,030

Capital Cost Savings

APPENDIX I

DWR UWMP Checklist

2005 Urban Water Management Plan Checklist

Sacramento Suburban Water District

Coordination with Appropriate Agencies	**(Water Code § 10620 (d)(1)(2))**		
[X]	Describe the coordination of the plan preparation and anticipated benefits.	1-2	Reference & Page Number
Describe resource maximization / import minimization plan	**(Water Code §10620 (f))**		
[X]	Describe how water management tools / options maximize resources & minimize need to import water	1-3	Reference & Page Number
Plan Updated in Years Ending in Five and Zero	**(Water Code § 10621(a))**		
[X]	Date updated and adopted plan received _____ (enter date)	1-1	Reference & Page Number
City and County Notification and Participation	**(Water Code § 10621(b))**		
[X]	Notify any city or county within service area of UWMP of plan review & revision	1-2	Reference & Page Number
[X]	Consult and obtain comments from cities and counties within service area	1-2	Reference & Page Number
Service Area Information	**Water Code § 10631 (a))**		
[X]	Include current and projected population	3-3	Reference & Page Number
[X]	Population projections were based on data from state, regional or local agency	3-1	Reference & Page Number
[X]	Describe climate characteristics that affect water management	2-1	Reference & Page Number
[X]	Describe other demographic factors affecting water management	3-3	Reference & Page Number
Water Sources	**(Water Code § 10631 (b))**		
[X]	Identify existing and planned water supply sources	4-3	Reference & Page Number
[X]	Provide current water supply quantities	4-11	Reference & Page Number
[X]	Provide planned water supply quantities	4-11	Reference & Page Number
If Groundwater Identified as existing or planned source	**(Water Code §10631 (b)(1-4))**		
[X]	Has management plan	4-4	Reference & Page Number
[X]	Attached management plan (b)(1)	Appendix E	Reference & Page Number
[X]	Description of basin(s) (b)(2)	4-3	Reference & Page Number
[X]	Basin is adjudicated	4-3	Reference & Page Number
[--]	If adjudicated, attached order or decree (b)(2)	n/a	Reference & Page Number
[--]	Quantified amount of legal pumping right (b)(2)	n/a	Reference & Page Number
[X]	DWR identified, or projected to be, in overdraft (b)(2)	4-4	Reference & Page Number
[X]	Plan to eliminate overdraft (b)(2)	4-4	Reference & Page Number
[X]	Analysis of location, amount & sufficiency, last five years (b)(3)	3-6,4-3	Reference & Page Number
[X]	Analysis of location & amount projected, 20 years (b)(4)	4-3,4-11	Reference & Page Number
Reliability of Supply	**(Water Code §10631 (c) (1-3)**		
[X]	Describes the reliability of the water supply and vulnerability to seasonal or climatic shortage	4-12	Reference & Page Number
Water Sources Not Available on a Consistent Basis	**(Water Code §10631 (c))**		
[X]	Describe the reliability of the water supply due to seasonal or climatic shortages	4-12	Reference & Page Number
[X]	Describe the vulnerability of the water supply to seasonal or climatic shortages	4-12	Reference & Page Number
[--]	No unreliable sources	n/a	Reference & Page Number
[X]	Describe plans to supplement or replace inconsistent sources with alternative sources or DMMs	4-13	Reference & Page Number
[--]	No inconsistent sources	n/a	Reference & Page Number
Transfer or Exchange Opportunities	**(Water Code §10631 (d))**		
[X]	Describe short term and long term exchange or transfer opportunities	4-19	Reference & Page Number
[--]	No transfer opportunities	n/a	Reference & Page Number
Water Use Provisions	**(Water Code §10631 (e)(1)(2))**		
[X]	Quantify past water use by sector	3-7	Reference & Page Number
[X]	Quantify current water use by sector	3-7	Reference & Page Number
[X]	Project future water use by sector	3-10	Reference & Page Number
[X]	Identify and quantify sales to other agencies	3-7	Reference & Page Number
[--]	No sales to other agencies	n/a	Reference & Page Number
[X]	Identify and quantify additional water uses	3-7	Reference & Page Number
Demand Management measures	**(Water Code §10631 (f)**		
The Checklist for the Demand Management Measures (Water Code §10631 (f) & (g), is found in last part of checklist.			
Planned Water Supply Projects, Programs and non-implemented DMMs	**(Water Code §10631 (g))**		
[X]	No future water supply projects or programs	4-15	Reference & Page Number
[X]	No non-implemented / not scheduled DMMs	n/a	Reference & Page Number
[X]	Cost-Benefit includes economic and non-economic factors	Chapter 6	Reference & Page Number
[X]	Cost-Benefit analysis includes total benefits and total costs	Chapter 6	Reference & Page Number
[X]	Identifies funding available for projects with higher per-unit-cost than DMMs	Chapter 6	Reference & Page Number
[X]	Identifies Suppliers' legal authority to implement DMMs	Chapter 6	Reference & Page Number
[X]	Identifies Suppliers' efforts to implement the measures	Chapter 6	Reference & Page Number
[X]	Identifies Suppliers' efforts to identify cost share partners	Chapter 6	Reference & Page Number
Planned Water Supply Projects and Programs	**(Water Code §10631 (h))**		
[X]	No future water supply projects or programs	4-15	Reference & Page Number
[X]	Detailed description of expected future supply projects & programs	4-15	Reference & Page Number
[X]	Timeline for each proposed project	4-16	Reference & Page Number
[X]	Quantification of each projects normal yield (AFY)	4-16	Reference & Page Number
[X]	Quantification of each projects single dry-year yield (AFY)	4-16	Reference & Page Number
[X]	Quantification of each projects multiple dry-year yield (AFY)	4-16	Reference & Page Number

Opportunities for development of desalinated water **(Water Code §10631 (i))**

[X] Describes opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply — 4-9 Reference & Page Number

District is a CUWCC signatory **(Water Code § 10631 (j))**

Urban suppliers that are CUWCC members may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g). The supplier's CUWCC Best Management Practices report should be attached to the UWMP.

[n/a] Agency is a CUWCC member

[n/a] 2003-04 annual updates are attached to plan

[n/a] Both annual updates are considered completed by CUWCC website

If Supplier receives or projects receiving water from a wholesale supplier **(Water Code §10631 (k))**

[X] Agency receives or projects receiving wholesale water — 4-1 Reference & Page Number

[X] Agency provided written demand projections to wholesaler, 20 years — 1-2 Reference & Page Number

[X] ALL wholesalers provided written water availability projections, by source, to agency, 20 years — App F Reference & Page Number

[X] Reliability of wholesale supply provided in writing by ALL wholesale agencies — App F Reference & Page Number

Water Shortage Contingency Plan Section (Water Code § 10632)

Stages of Action **(Water Code § 10632 (a))**

[X] Provide stages of action — App G, Chapter 7 Reference & Page Number

[X] Provide the water supply conditions for each stage — App G, Chapter 7 Reference & Page Number

[X] Includes plan for 50 percent supply shortage — App G, Chapter 7 Reference & Page Number

Three-Year Minimum Water Supply **(Water Code §10632 (b))**

[X] Identifies driest 3-year period — 4-12 Reference & Page Number

[X] Minimum water supply available by source for the next three years — 4-12 Reference & Page Number

Preparation for catastrophic water supply interruption **(Water Code §10632 (c))**

[X] Provided catastrophic supply interruption plan - discussed in Chapter 7. Plan not included due to security reasons. — Chapter 7 Reference & Page Number

Prohibitions **(Water Code § 10632 (d))**

[X] List the mandatory prohibitions against specific water use practices during water shortages — App G, Chapter 7 Reference & Page Number

Consumption Reduction Methods **(Water Code § 10632 (e))**

[X] List consumption reduction methods ..... to reduce water use in the most restrictive stages with up to a 50% reduction. — App G, Chapter 7 Reference & Page Number

Penalties **(Water Code § 10632 (f))**

[X] List excessive use penalties or charges for excessive use — App G, Chapter 7 Reference & Page Number

Revenue and Expenditure Impacts **(Water Code § 10632 (g))**

[X] Describe how actions and conditions impact revenues — Chapter 7 Reference & Page Number

[X] Describe how actions and conditions impact expenditures — Chapter 7 Reference & Page Number

[X] Describe measures to overcome the revenue and expenditure impacts — Chapter 7 Reference & Page Number

Water Shortage Contingency Ordinance/Resolution **(Water Code § 10632 (h))**

[X] Attach a copy of the draft water shortage contingency resolution or ordinance. — Appendix G Reference & Page Number

Reduction Measuring Mechanism **(Water Code § 10632 (i))**

[X] Provided mechanisms for determining actual reductions — Chapter 7 Reference & Page Number

Recycling Plan Agency Coordination **Water Code § 10633**

[X] Describe the coordination of the recycling plan preparation information to the extent available.. — Chapter 5 Reference & Page Number

Wastewater System Description **(Water Code § 10633 (a))**

[X] Describe the wastewater collection and treatment systems in the supplier's service area — Chapter 5 Reference & Page Number

[X] Quantify the volume of wastewater collected and treated — Chapter 5 Reference & Page Number

Wastewater Disposal and Recycled Water Uses **(Water Code § 10633 (a - d))**

[X] Describes methods of wastewater disposal — Chapter 5 Reference & Page Number

[X] Describe the current type, place and use of recycled water — Chapter 5 Reference & Page Number

[X] Describe and quantify potential uses of recycled water — Chapter 5 Reference & Page Number

[X] Determination of technical and economic feasibility of serving the potential uses — Chapter 5 Reference & Page Number

[X] No opportunities for recycled water. — Chapter 5 Reference & Page Number

Projected Uses of Recycled Water **(Water Code § 10633 (e))**

[X] Projected use of recycled water, 20 years — Chapter 5 Reference & Page Number

[X] Compare UWMP 2000 projections with UWMP 2005 actual (10633(e)) — Chapter 5 Reference & Page Number

Plan to Optimize Use of Recycled Water **(Water Code § 10633 (f))**

[X] Describe actions that might be taken to encourage recycled water uses — Chapter 5 Reference & Page Number

[X] Describe projected results of these actions in terms of acre-feet of recycled water used per year — Chapter 5 Reference & Page Number

[X] Provide a recycled water use optimization plan which includes actions to facilitate the use of recycled water — Chapter 5 Reference & Page Number

Water quality impacts on availability of supply **(Water Code §10634)**

[X] Discusses water quality impacts (by source) upon water management strategies and supply reliability — 4-11 Reference & Page Number

[X] No water quality impacts projected — 4-11 Reference & Page Number

Supply and Demand Comparison to 20 Years **(Water Code § 10635 (a))**

[X] Compare the projected normal water supply to projected normal water use over the next 20 years, in 5-year increments. — 7-1 Reference & Page Number

Supply and Demand Comparison: Single-dry Year Scenario **(Water Code § 10635 (a))**

[X] Compare the projected single-dry year water supply to projected single-dry year water use over the next 20 years, in 5-year increments — 1-Jul Reference & Page Number

Supply and Demand Comparison: Multiple-dry Year Scenario **(Water Code § 10635 (a))**

X	Project a multiple-dry year period occurring between 2006-2010 and compare projected s/d during those years	7-2	Reference & Page Number
X	Project a multiple-dry year period occurring between 2011-2015 and compare projected s/d during those years	7-2	Reference & Page Number
X	Project a multiple-dry year period occurring between 2016-2020 and compare projected s/d during those years	7-2	Reference & Page Number
X	Project a multiple-dry year period occurring between 2021-2025 and compare projected s/d during those years	7-2	Reference & Page Number

Provision of Water Service Reliability section to cities/counties **(Water Code § 10635(b))**

X	Provided Water Service Reliability section of UWMP to cities and counties .... of UWMP submission to DWR	Chapter 1	Reference & Page Number

Does the Plan include Public Participation and Plan Adoption **(Water Code § 10642)**

X	Attach a copy of adoption resolution	App B	Reference & Page Number
X	Encourage involvement of social, cultural & economic community groups	Chapter 1	Reference & Page Number
X	Plan available for public inspection	1-2	Reference & Page Number
X	Provide proof of public hearing	App A	Reference & Page Number
X	Provided meeting notice to local governments	Chapter 1	Reference & Page Number

Review of implementation of 2000 UWMP **(Water Code § 10643)**

X	Reviewed implementation plan and schedule of 2000 UWMP	Chapter 1	Reference & Page Number
X	Implemented in accordance with the schedule set forth in plan	Chapter 1	Reference & Page Number
X	2000 UWMP not required	Chapter 1	Reference & Page Number

Provision of 2005 UWMP to local governments **(Water Code § 10644 (a))**

X	Provide 2005 UWMP to DWR, and cities and counties within 30 days of adoption	Chapter 1	Reference & Page Number

Proof plan is available for public review **(Water Code § 10645)**

X	Does UWMP or correspondence accompanying it show where it is available for public review	Chapter 1	Reference & Page Number

2005 Urban Water Management Plan Checklist

DMM 1 -Water Survey Programs for Single-Family and Multi-Family Residential Customers (10631 f(1)(A))

Implementation **(Section 10631 (f) & (h))**

X	Describe DMM currently being implemented or scheduled for implementation (10631 (f) (1)(2))	Chapter 6	Reference & Page Number
X	Describes steps necessary to implement measure	Chapter 6	Reference & Page Number
X	Describe the methods, if any, used to evaluate the effectiveness of this DMM (10631 (f)(3))	Chapter 6	Reference & Page Number
X	Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4))	Chapter 6	Reference & Page Number

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

n/a	Evaluate legal authority (10631(g)(4))	n/a	Reference & Page Number
n/a	Evaluate economic and non-economic factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate environmental, social, health factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate customer impact & technological factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))	n/a	Reference & Page Number
n/a	Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))	n/a	Reference & Page Number

If Another Agency Implementing

n/a	If another Agency is implementing (10631 (g)(4))	n/a	Reference & Page Number

DMM 2 - Residential Plumbing Retrofit (10631 (f)(1)(B))

Implementation **(Section 10631 (f) & (h))**

X	Describe DMM currently being implemented or scheduled for implementation (10631 (f) (1)(2))	Chapter 6	Reference & Page Number
X	Describes steps necessary to implement measure	Chapter 6	Reference & Page Number
X	Describe the methods, if any, used to evaluate the effectiveness of this DMM (10631 (f)(3))	Chapter 6	Reference & Page Number
X	Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4))	Chapter 6	Reference & Page Number

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

n/a	Evaluate legal authority (10631(g)(4))	n/a	Reference & Page Number
n/a	Evaluate economic and non-economic factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate environmental, social, health factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate customer impact & technological factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))	n/a	Reference & Page Number
n/a	Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))	n/a	Reference & Page Number

If Another Agency Implementing

n/a	If another Agency is implementing (10631 (g)(4))	n/a	Reference & Page Number

DMM 3 - System Water Audits, Leak Detection and Repair (10631 (f)(1)(C))

Implementation **(Section 10631 (f) & (h))**

X	Describe DMM currently being implemented or scheduled for implementation (10631 (f) (1)(2))	Chapter 6	Reference & Page Number
X	Describes steps necessary to implement measure	Chapter 6	Reference & Page Number
X	Describe the methods, if any, used to evaluate the effectiveness of this DMM (10631 (f)(3))	Chapter 6	Reference & Page Number
X	Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4))	Chapter 6	Reference & Page Number

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

n/a	Evaluate legal authority (10631(g)(4))	n/a	Reference & Page Number
n/a	Evaluate economic and non-economic factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate environmental, social, health factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate customer impact & technological factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))	n/a	Reference & Page Number
n/a	Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))	n/a	Reference & Page Number

If Another Agency Implementing

n/a	If another Agency is implementing (10631 (g)(4))	n/a	Reference & Page Number

DMM 4 - Metering with Commodity Rates (10631 (f)(1)(D))

		(Section 10631 (f) & (h))	
Implementation			
X	Describe DMM currently being implemented or scheduled for implementation (10631 (f) (1)(2))	Chapter 6	Reference & Page Number
X	Describes steps necessary to implement measure	Chapter 6	Reference & Page Number
X	Describe the methods, if any, used to evaluate the effectiveness of this DMM (10631 (f)(3))	Chapter 6	Reference & Page Number
X	Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4))	Chapter 6	Reference & Page Number
Provided an evaluation for this DMM if it is not implemented		(Section 10631 (g))	
n/a	Evaluate legal authority (10631(g)(4))	n/a	Reference & Page Number
n/a	Evaluate economic and non-economic factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate environmental, social, health factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate customer impact & technological factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))	n/a	Reference & Page Number
n/a	Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))	n/a	Reference & Page Number
If Another Agency Implementing			
n/a	If another Agency is implementing (10631 (g)(4))	n/a	Reference & Page Number

DMM 5 - Large Landscape Conservation Programs and Incentives (10631 (f)(1)(E))

		(Section 10631 (f) & (h))	
Implementation			
X	Describe DMM currently being implemented or scheduled for implementation (10631 (f) (1)(2))	Chapter 6	Reference & Page Number
X	Describes steps necessary to implement measure	Chapter 6	Reference & Page Number
X	Describe the methods, if any, used to evaluate the effectiveness of this DMM (10631 (f)(3))	Chapter 6	Reference & Page Number
X	Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4))	Chapter 6	Reference & Page Number
Provided an evaluation for this DMM if it is not implemented		(Section 10631 (g))	
n/a	Evaluate legal authority (10631(g)(4))	n/a	Reference & Page Number
n/a	Evaluate economic and non-economic factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate environmental, social, health factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate customer impact & technological factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))	n/a	Reference & Page Number
n/a	Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))	n/a	Reference & Page Number
If Another Agency Implementing			
n/a	If another Agency is implementing (10631 (g)(4))	n/a	Reference & Page Number

DMM 6 - High-Efficiency Washing Machine Rebate Programs (10631 (f)(1)(F))

		(Section 10631 (f) & (h))	
Implementation			
n/a	Describe DMM currently being implemented or scheduled for implementation (10631 (f) (1)(2))	n/a	Reference & Page Number
n/a	Describes steps necessary to implement measure	n/a	Reference & Page Number
n/a	Describe the methods, if any, used to evaluate the effectiveness of this DMM (10631 (f)(3))	n/a	Reference & Page Number
n/a	Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4))	n/a	Reference & Page Number
Provided an evaluation for this DMM if it is not implemented		(Section 10631 (g))	
X	Evaluate legal authority (10631(g)(4))	Chapter 6	Reference & Page Number
X	Evaluate economic and non-economic factors (10631(g)(1))	Chapter 6	Reference & Page Number
X	Evaluate environmental, social, health factors (10631(g)(1))	Chapter 6	Reference & Page Number
X	Evaluate customer impact & technological factors (10631(g)(1))	Chapter 6	Reference & Page Number
X	Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))	Chapter 6	Reference & Page Number
X	Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))	Chapter 6	Reference & Page Number
If Another Agency Implementing			
n/a	If another Agency is implementing (10631 (g)(4))	n/a	Reference & Page Number

DMM 7 - Public Information Programs (10631 (f)(1)(G))

		(Section 10631 (f) & (h))	
Implementation			
X	Describe DMM currently being implemented or scheduled for implementation (10631 (f) (1)(2))	Chapter 6	Reference & Page Number
X	Describes steps necessary to implement measure	Chapter 6	Reference & Page Number
X	Describe the methods, if any, used to evaluate the effectiveness of this DMM (10631 (f)(3))	Chapter 6	Reference & Page Number
X	Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4))	Chapter 6	Reference & Page Number
Provided an evaluation for this DMM if it is not implemented		(Section 10631 (g))	
n/a	Evaluate legal authority (10631(g)(4))	n/a	Reference & Page Number
n/a	Evaluate economic and non-economic factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate environmental, social, health factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate customer impact & technological factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))	n/a	Reference & Page Number
n/a	Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))	n/a	Reference & Page Number
If Another Agency Implementing			
n/a	If another Agency is implementing (10631 (g)(4))	n/a	Reference & Page Number

DMM 8 - School Education Programs (10631 (f)(1)(H))

		(Section 10631 (f) & (h))	
Implementation			
X	Describe DMM currently being implemented or scheduled for implementation (10631 (f) (1)(2))	Chapter 6	Reference & Page Number
X	Describes steps necessary to implement measure	Chapter 6	Reference & Page Number
X	Describe the methods, if any, used to evaluate the effectiveness of this DMM (10631 (f)(3))	Chapter 6	Reference & Page Number
X	Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4))	Chapter 6	Reference & Page Number
		(Section 10631 (g))	
Provided an evaluation for this DMM if it is not implemented			
n/a	Evaluate legal authority (10631(g)(4))	n/a	Reference & Page Number
n/a	Evaluate economic and non-economic factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate environmental, social, health factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate customer impact & technological factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))	n/a	Reference & Page Number
n/a	Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))	n/a	Reference & Page Number
If Another Agency Implementing			
n/a	If another Agency is implementing (10631 (g)(4))	n/a	Reference & Page Number

DMM 9 - Conservation Programs for Commercial, Industrial and Institutional (10631 (f)(1)(I))

		(Section 10631 (f) & (h))	
Implementation			
X	Describe DMM currently being implemented or scheduled for implementation (10631 (f) (1)(2))	Chapter 6	Reference & Page Number
X	Describes steps necessary to implement measure	Chapter 6	Reference & Page Number
X	Describe the methods, if any, used to evaluate the effectiveness of this DMM (10631 (f)(3))	Chapter 6	Reference & Page Number
X	Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4))	Chapter 6	Reference & Page Number
		(Section 10631 (g))	
Provided an evaluation for this DMM if it is not implemented			
n/a	Evaluate legal authority (10631(g)(4))	n/a	Reference & Page Number
n/a	Evaluate economic and non-economic factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate environmental, social, health factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate customer impact & technological factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))	n/a	Reference & Page Number
n/a	Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))	n/a	Reference & Page Number
If Another Agency Implementing			
n/a	If another Agency is implementing (10631 (g)(4))	n/a	Reference & Page Number

DMM 10 - Wholesale Agency Programs (10631 (f)(1)(J))

		(Section 10631 (f) & (h))	
Implementation			
X	Describe DMM currently being implemented or scheduled for implementation (10631 (f) (1)(2))	Chapter 6	Reference & Page Number
X	Describes steps necessary to implement measure	Chapter 6	Reference & Page Number
X	Describe the methods, if any, used to evaluate the effectiveness of this DMM (10631 (f)(3))	Chapter 6	Reference & Page Number
X	Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4))	Chapter 6	Reference & Page Number
		(Section 10631 (g))	
Provided an evaluation for this DMM if it is not implemented			
n/a	Evaluate legal authority (10631(g)(4))	n/a	Reference & Page Number
n/a	Evaluate economic and non-economic factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate environmental, social, health factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate customer impact & technological factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))	n/a	Reference & Page Number
n/a	Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))	n/a	Reference & Page Number
If Another Agency Implementing			
n/a	If another Agency is implementing (10631 (g)(4))	n/a	Reference & Page Number

DMM 11 - Conservation Pricing (10631 (f)(1)(K))

		(Section 10631 (f) & (h))	
Implementation			
X	Describe DMM currently being implemented or scheduled for implementation (10631 (f) (1)(2))	Chapter 6	Reference & Page Number
X	Describes steps necessary to implement measure	Chapter 6	Reference & Page Number
X	Describe the methods, if any, used to evaluate the effectiveness of this DMM (10631 (f)(3))	Chapter 6	Reference & Page Number
X	Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4))	Chapter 6	Reference & Page Number
		(Section 10631 (g))	
Provided an evaluation for this DMM if it is not implemented			
n/a	Evaluate legal authority (10631(g)(4))	n/a	Reference & Page Number
n/a	Evaluate economic and non-economic factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate environmental, social, health factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate customer impact & technological factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))	n/a	Reference & Page Number
n/a	Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))	n/a	Reference & Page Number
If Another Agency Implementing			
n/a	If another Agency is implementing (10631 (g)(4))	n/a	Reference & Page Number

DMM 12 - Water Conservation Coordinator (10631 (f)(1)(L))

Implementation (Section 10631 (f) & (h))

X	Describe DMM currently being implemented or scheduled for implementation (10631 (f) (1)(2))	Chapter 6	Reference & Page Number
X	Describes steps necessary to implement measure	Chapter 6	Reference & Page Number
X	Describe the methods, if any, used to evaluate the effectiveness of this DMM (10631 (f)(3))	Chapter 6	Reference & Page Number
X	Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4))	Chapter 6	Reference & Page Number

Provided an evaluation for this DMM if it is not implemented (Section 10631 (g))

n/a	Evaluate legal authority (10631(g)(4))	n/a	Reference & Page Number
n/a	Evaluate economic and non-economic factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate environmental, social, health factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate customer impact & technological factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))	n/a	Reference & Page Number
n/a	Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))	n/a	Reference & Page Number

If Another Agency Implementing

n/a	If another Agency is implementing (10631 (g)(4))	n/a	Reference & Page Number

DMM 13 - Waste Water Prohibition (10631 (f)(1)(M))

Implementation (Section 10631 (f) & (h))

X	Describe DMM currently being implemented or scheduled for implementation (10631 (f) (1)(2))	Chapter 6	Reference & Page Number
X	Describes steps necessary to implement measure	Chapter 6	Reference & Page Number
X	Describe the methods, if any, used to evaluate the effectiveness of this DMM (10631 (f)(3))	Chapter 6	Reference & Page Number
X	Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4))	Chapter 6	Reference & Page Number

Provided an evaluation for this DMM if it is not implemented (Section 10631 (g))

n/a	Evaluate legal authority (10631(g)(4))	n/a	Reference & Page Number
n/a	Evaluate economic and non-economic factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate environmental, social, health factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate customer impact & technological factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))	n/a	Reference & Page Number
n/a	Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))	n/a	Reference & Page Number

If Another Agency Implementing

n/a	If another Agency is implementing (10631 (g)(4))	n/a	Reference & Page Number

DMM 14 - Residential Ultra-Low-Flush Toilet Replacement Programs (10631 (f)(1)(N))

Implementation (Section 10631 (f) & (h))

X	Describe DMM currently being implemented or scheduled for implementation (10631 (f) (1)(2))	Chapter 6	Reference & Page Number
X	Describes steps necessary to implement measure	Chapter 6	Reference & Page Number
X	Describe the methods, if any, used to evaluate the effectiveness of this DMM (10631 (f)(3))	Chapter 6	Reference & Page Number
X	Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4))	Chapter 6	Reference & Page Number

Provided an evaluation for this DMM if it is not implemented (Section 10631 (g))

n/a	Evaluate legal authority (10631(g)(4))	n/a	Reference & Page Number
n/a	Evaluate economic and non-economic factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate environmental, social, health factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Evaluate customer impact & technological factors (10631(g)(1))	n/a	Reference & Page Number
n/a	Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))	n/a	Reference & Page Number
n/a	Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))	n/a	Reference & Page Number

If Another Agency Implementing

n/a	If another Agency is implementing (10631 (g)(4))	n/a	Reference & Page Number

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