APPENDIX A

ZONE 40 WATER SUPPLY MASTER PLAN

ERRATA SHEET
DRAFT ZONE 40 WATER SUPPLY MASTER PLAN
DECEMBER 31, 2002

Since publication of the Draft Zone 40 Water Supply Master Plan in December 2002, refinements have been made to projected surface water supply, groundwater supply, and facility phasing and costs. These changes were included and considered in preparation of the Draft Environmental Impact Report. These refinements, and potentially others, will be incorporated into the Final Zone 40 Water Supply Master Plan after completion of environmental review, certification, and project approval.

Table 5-1
Detail of Groundwater Supply Component

Component	Water Source	Maximum Use (AF/year)	Estimated Long Term Average Use (AF/year)	Reliability
Groundwater	Groundwater	69,900	40,900	High

Table 5-2
Detail of Surface Water Supply Components

Component	Water Source(s)	Entitlement Amount (AF/year)	Estimated Long Term Average Use (AF/year)	Reliability
Appropriative Water	American and Sacramento River	Undetermined	14,600	Low
SMUD 1 Assignment	American River	15,000	13,000	Moderate
SMUD 2 Assignment	American River	15,000	13,000	Moderate
"Fazio" Water (PL 101-514)	American River	15,000	13,600	Moderate
Other Water Supplies	American and Sacramento River	Undetermined	0	Variable (Low to Moderate)
Purchase of Water From City for Use Within the American River POU	American River	9,300	9,300	High
Total Surface Water		**87,300**	**63,500**	

Table 5-5 Detail of Alternative Surface Water Facility Components		
Facility Component Alternative	Required Facilities	Capital Costs (Millions of Dollars)
SCWA Freeport WTP	Conventional Treatment Plant w/ Intake Structure and Conveyance Piping	$257
Freeport Regional Water Project	Conventional Treatment Plant w/ Intake Structure and Conveyance Piping	$280
SCWA/City of Sacramento Joint Project	Conventional Treatment Plant w/ Intake Structure and Conveyance Piping	$274

Table 5-6 Detail of Recycled Water Facility Component		
Facility Element	Required Facilities	Capital Costs (Millions of Dollars)
Recycled Water	Transmission Storage Booster Pumps Distribution System	Phase 2 - $15.0

Colors representing construction phasing on **Figures 6-1** through **6-3** were corrected.

Table 6-3 Alternatives Cost Summary			
Capital Facility	Alternative Capital Costs ($ Million Dollars)[1]		
	SCWA Freeport[1]	Freeport Regional Water Project[2]	SCWA/City Joint Project[3]
Freeport Facilities	$76	$96	$0
SCWA Water Treatment Plant Capacity	$129	$145	$0
Sac River Water Treatment Plant Capacity	$10	$10	$169
Groundwater Production Facilities	$180	$180	$180
Regional Surface Water Conveyance Pipes	$42	$29	$105
Transmission Mains	$97	$100	$102
Conservation	$16	$16	$16
SCADA	$2	$2	$2
Recycled Water	$15	$15	$15
Surface Water Supplies	$9	$9	$9

Table 6-3 (Continued) Alternatives Cost Summary			
Capital Facility	Alternative Capital Costs ($ Million Dollars)[1]		
	SCWA Freeport[1]	Freeport Regional Water Project[2]	SCWA/City Joint Project[3]
Total Capital Cost	$576	$602	$598
Administrative Overhead	$102	$108	$106
Total Program Cost	**$678**	**$710**	**$704**

Notes:
1. Capital costs are 2002 dollars and include engineering, overhead, and construction contingency.
2. Administrative Overhead is 18 percent of the capital cost.

Table 6-4 Alternative Evaluation Summary					
Alternative	Evaluation Factors				
	Reliability	Flexibility	Implementability	Environmental Feasibility	Cost Effectiveness
Alternative 1 – SCWA Freeport	High	High	High	Medium	$576 M
Alternative 2 – Freeport Regional Water Project	High	High	High	Medium	$602 M
Alternative 3 – SCWA/City Joint Project	High	Low	Low	Medium	$598 M

Table 6-5 Surface and Recycled Water Project Phasing Summary					
Facility ID	Project	Description	Participating Agency(s)	Distance	Capacity
Phase 1 Projects (2002-2007)					
CP-01	Franklin Inter-tie to Dwight Rd Tank	Water transmission main pipe (24-inch)	City/SCWA	1.6 miles	5 MGD
CP-04	Excelsior and Florin Rds to Sunrise Blvd (Anatolia Development)	Water transmission main pipe (30-inch)	SCWA	5 miles	10 MGD
JCP-01	Freeport Intake to corner of Bradshaw Rd and Gerber Rd	Raw water transmission main pipe (96-inch)	SCWA/EBMUD	12 miles	185 MGD
Intake	Regional Intake	In-River Intake structure	SCWA/EBMUD	n.a.	185 MGD
Recycled Water	Recycled Water Phase 1 and Phase 2	Phase 1 - Pipelines 2 MGD (1,000 AF/year) Phase 2 - Pipelines, Storage, and Booster Facilities 5 MGD (4,400 AF/year)	SCWA/SRCSD	n.a.	7 MGD
Phase 2a Projects (2007-2019)					
CCP-01	JCP-01 to Central WTP	Raw water transmission main pipe	SCWA	1 mile	85 MGD
Central WTP	Central WTP Phase 1	Water Treatment Plant (30 MGD)	SCWA	n.a.	30 MGD
CCP-02	Central WTP to Elder Creek Rd and Bradshaw Rd	Water transmission main Pipe (60-inch)	SCWA	1 mile	65 MGD
Phase 2b Projects (2019-2021)					
CP-02	Bradshaw and Elder Creek Rds east along Elder Creek Rd	Water transmission main Pipe (60-inch)	SCWA	1 mile	80 MGD
CP-03	East along Elder Creek Rd to Excelsior Rd	Water transmission main Pipe (54-inch)	SCWA	1 mile	60 MGD
Phase 3 Project (2021-2030)					
CP-05	Kiefer and Eagles Nest Rds to Sunrise Blvd and Douglas Rd	Water transmission main pipe	SCWA	1 miles	10 MGD
Phase 4 Projects (2030-2035)					
Central WTP	Central WTP Phase 2	Water Treatment Plant (30 MGD)	SCWA	n.a.	60 MGD
Phase 5 Projects (2035-2040)					
CCP-03	Central WTP to Bradshaw and Calvine Rds	Water transmission main pipe (36-inch and 24-inch)	SCWA	2 miles	40 MGD
Phase 6 Project (2046-2050)					
Central WTP	Central WTP Phase 3	Water Treatment Plant (25 MGD)	SCWA	n.a.	85 MGD

SACRAMENTO COUNTY

WATER AGENCY

Zone 40 Water Supply Master Plan
December 2002

December 2002

DRAFT

MWH
MONTGOMERY WATSON HARZA

SACRAMENTO COUNTY WATER AGENCY
ZONE 40
WATER SUPPLY MASTER PLAN

December 31, 2002

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ABBREVIATIONS

Agency Act – Sacramento County Water Agency Act
Ag/res – agricultural/residential
AF – Acre Feet

BAT – Best Available Technology
BMP – Best Management Practice

Cal-Am – California-American Water Company
CEQA – California Environmental Quality Act
CVP – Central Valley Project

DHS – Department of Health Services

EBMUD – East Bay Municipal Utility District
EDU – Equivalent Dwelling Unit
EPA – United States Environmental Protection Agency

FRCD/EGWS – Florin Resource Conservation District/Elk Grove Water Service

GAC – Granulated Activated Carbon
GP – 1993 Sacramento County General Plan

IGSM – Integrated Groundwater and Surface-water Model

MCL – Maximum Contaminant Level
MCLG – Maximum Contaminant Level Goal
MGD – Million Gallons per Day

ABBREVIATIONS CON'T

M&I – Municipal and Industrial
MMM – Multimedia Mitigation

NDMA – n-nitrosodimethylamine
NEPA – National Environmental Policy Act

O&M – Operations and Maintenance

pCi/l – pico curies per liter
PSA – Purveyor Specific Agreement

RWQCB – Regional Water Quality Control Board

SCWA – Sacramento County Water Agency
SDWA – Safe Drinking Water Act
SMUD – Sacramento Municipal Utility District
SWRCB – State Water Resources Control Board
SWTR – Surface Water Treatment Rule

TDS – Total Dissolved Solids

USBR – United States Bureau of Reclamation

WFP – Water Forum Plan
WF DIER – Water Forum Draft Environmental Impact Report

SECTION 1 - INTRODUCTION

1.1 INTRODUCTION

The 2002 Zone 40 Water Supply Master Plan ("2002 Master Plan"), prepared by the Sacramento County Water Agency ("SCWA") with the Water Forum Agreement (January 2000) as its foundation, provides a flexible plan of water management alternatives which can be implemented and revised as availability and feasibility of water supply sources change in the future. The 2002 Master Plan also reflects changes from the 1987 Zone 40 Water Supply Master Plan ("1987 Master Plan"), in the pattern of water demand growth, treatment for water quality, expansion of the original service area, and in the availability of potential sources of surface water supplies.

This report describes the studies performed and presents the findings, conclusions, and recommendations to meet future water demands in the Zone 40 study area through the year 2030. It includes 8 sections, 7 appendices, and additional documents that are incorporated herein by reference and are available for review at the SCWA. **Section 1** provides background information for the study. The study's assessment of future water needs, including projected demand, demand management and availability of supply is presented in **Sections 2** and **3**. **Sections 4** through **6** define and evaluate alternative water management options, including treatment requirements, the component supply components and capital facilities, and the evaluation and selection of the recommended alternative. **Sections 7** and **8** discuss financing methods and an implementation plan, including program management recommendations.

1.2 OBJECTIVES OF THE MASTER PLAN UPDATE

The principal goal of the 2002 Master Plan is to provide a flexible program of water management options for the Zone 40 study area that can be implemented and revised as various water supply sources become available in the future. Particular objectives of the studies undertaken to accomplish that goal are described below:

- Identify the assumptions and recommendations from the 1987 Master Plan that are no longer appropriate.

- Develop a set of water supply alternatives that provide a long-term balance between water demands and supplies, that include conservation, groundwater, surface water, and recycled water as the building blocks for water management alternatives.

- Evaluate the engineering, institutional, social, financial, and environmental aspects associated with implementing each of the potential water management alternatives.

- Recommend a water management alternative that is flexible and can be modified as situations change and additional information becomes available.

- Identify an appropriate and flexible means of financing the recommended water management alternative.

- Provide a foundation on which to base future decisions regarding the acquisition, construction, operation and maintenance of facilities required for the production, conservation, transmission, distribution, and sale of water.

1.3 BACKGROUND

This section describes Zone 40 study area, provides a summary of the 1987 Master Plan, discusses the Water Forum Agreement, notes changed conditions that have contributed to the need for this 2002 Master Plan, and briefly discusses the institutional framework that was recognized in the study.

Zone 40 Study Area

The study area for the 2002 Master Plan is located in the central portion of Sacramento County as shown in **Figure 1-1**. Historically, this area has relied on the underlying groundwater basin for agricultural, industrial, and residential water supplies. Much of Zone 40 still consists of rural land uses, including agricultural (i.e., grazing, vineyards, row crops, etc.), agricultural/residential ("ag/res"), and conservation reserve. Urbanization has been occurring primarily in the City of Elk Grove, Vineyard, and Mather/Sunrise areas. A study area ("2030 study area") has been identified within Zone 40 which consists of existing and developing industrial, commercial, office and residential land uses. The 2030 study area is approximately 46,620 acres and is shown as the shaded area in **Figure 1-1**. It includes portions of the Cities of Elk Grove and Rancho Cordova and the 1993 Sacramento County General Plan Urban Policy Area.

Water demand is expected to be concentrated within the projected 2030 service areas shown in **Figure 1-1**; however developments can be proposed and approved anywhere within Zone 40 where they are consistent with the framework and requirements provided in the various General Plans, Community Plans, Comprehensive Plans, Specific Plans, and zoning and subdivision ordinances. **Figure 1-2** shows all approved and pending specific plan and community plan areas within Zone 40. Development patterns may occur somewhat differently than assumed for estimating water demand; however the total demand and the water facility infrastructure needed to support it will not vary substantially from what is projected in this 2002 Master Plan. Any significant variations due to changes in supplies, General Plan amendments, annexations, incorporations, or major programs contemplated in this plan will be treated through formal updates or amendments of the 2002 Master Plan.

Figure 1-1. 2002 Zone 40 Master Plan 2030 Study Area

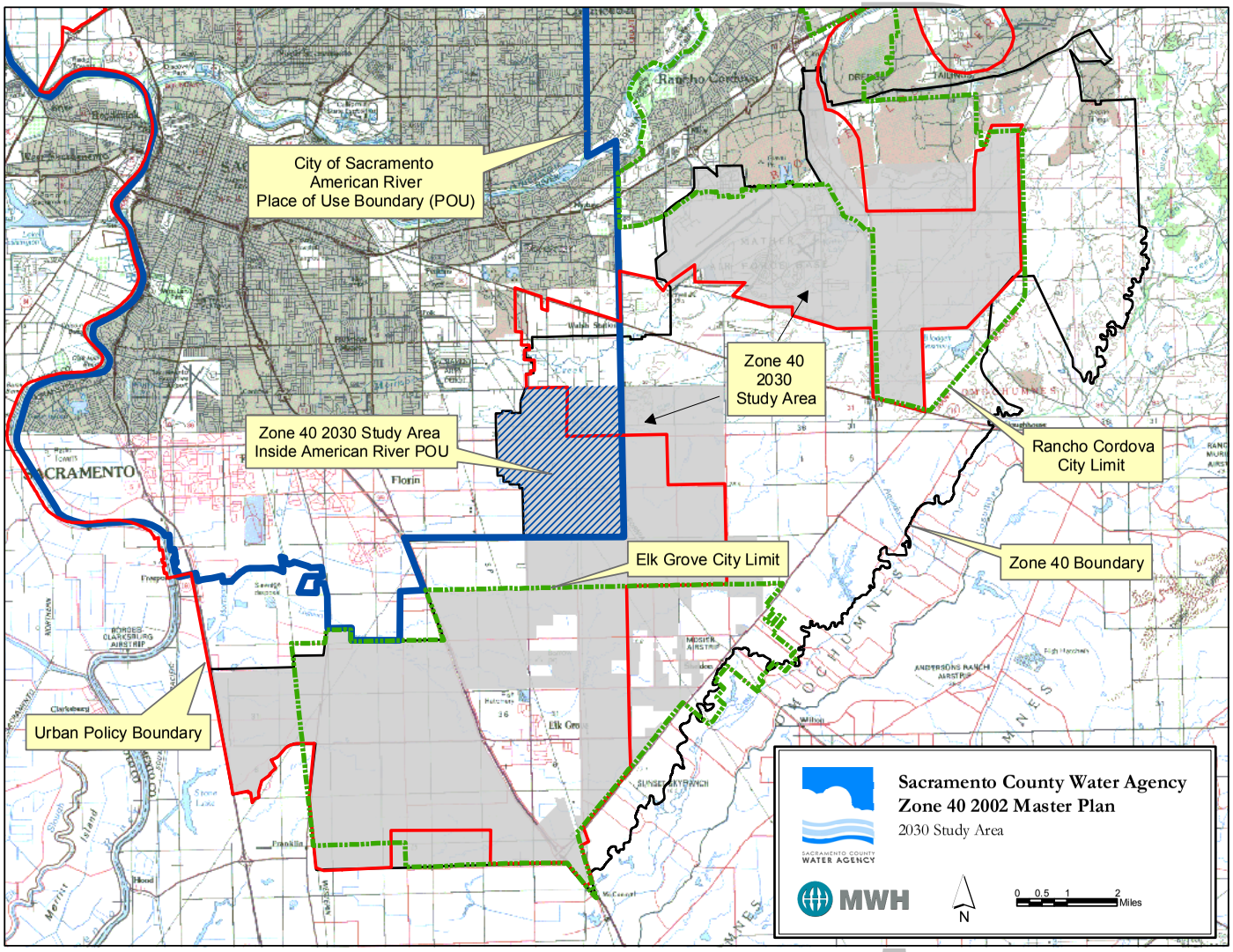
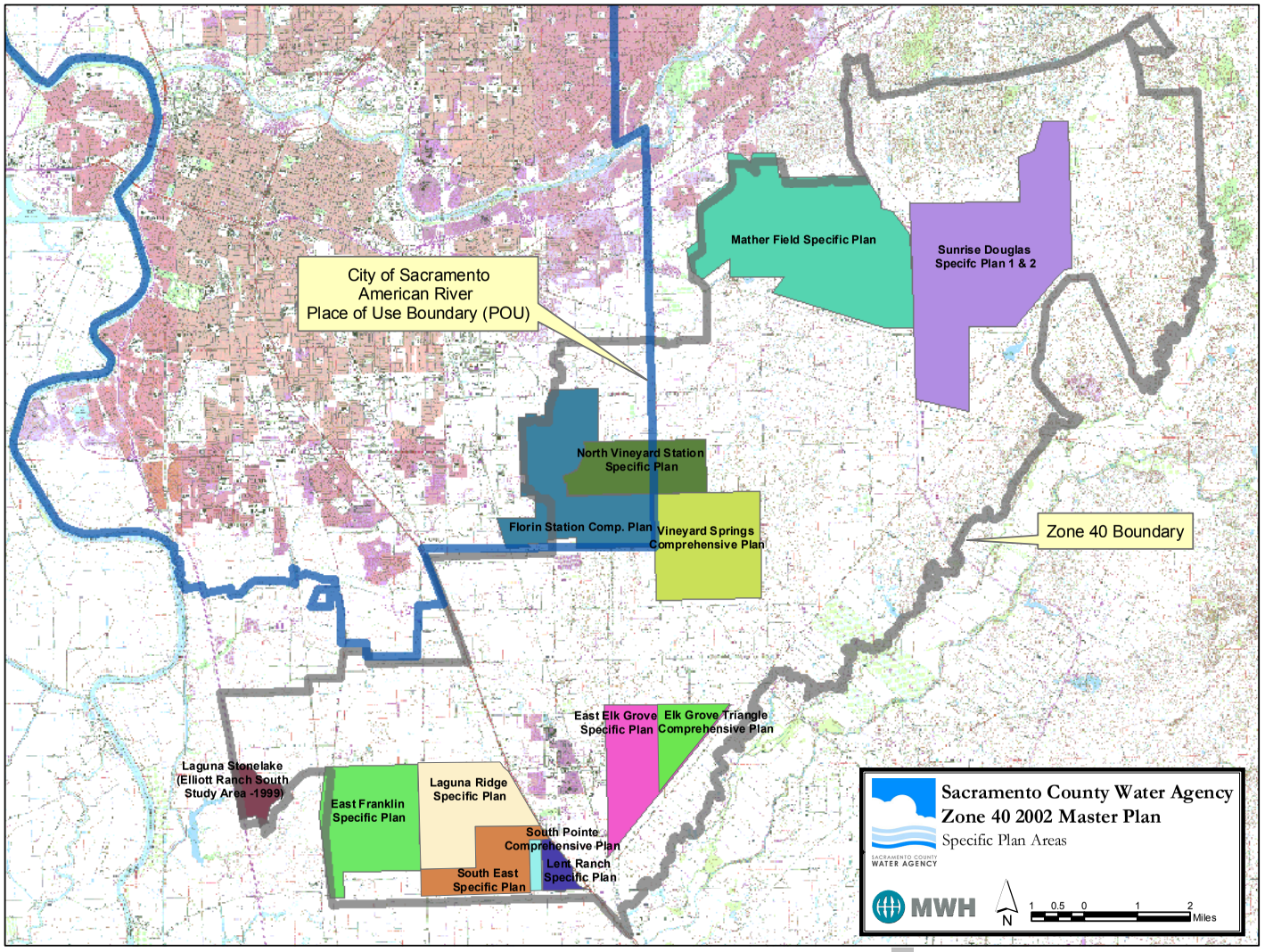


Figure 1-2. Specific Plan and Community Plan Areas



Three retail water purveyors provide service within Zone 40: SCWA Zone 41 (formerly Sacramento County Water Maintenance District), Florin Resource Conservation District/Elk Grove Water Service ("FRCD/EGWS"), and the California-American Water Company ("Cal-Am"). SCWA currently provides wholesale water to a portion of the FRCD/EGWS service area under the terms of the *First Amended and Restated Master Water Agreement* (**Appendix A**). It has been assumed that Cal-Am will purchase wholesale water supplies from SCWA to serve its Security Park franchise area. The current service areas of these purveyors are shown on **Figure 1-3**.

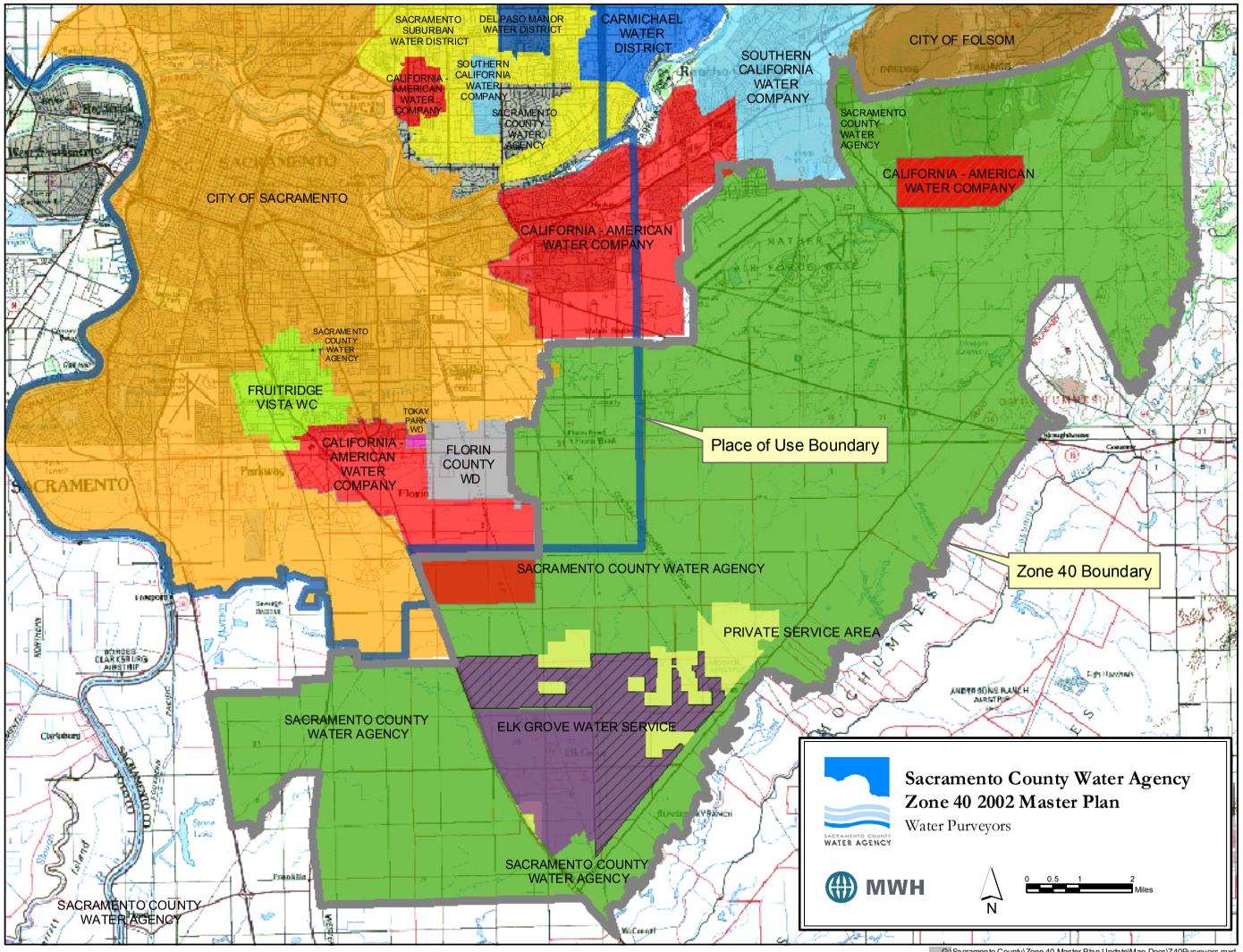
Summary of 1987 Master Plan

The 1987 Master Plan described a conjunctive use water plan to meet 2005 water supply needs (100 mgd) consisting of groundwater (20 mgd) and surface water (80 mgd). The 1987 Master Plan assumed that the surface water supply would be obtained from the Central Valley Project ("CVP") through a contract with the U.S. Bureau of Reclamation ("USBR"). The 1987 Master Plan identified the preferred treatment and conveyance method as the purchase of treatment capacity at the City of Sacramento's ("City") E.A. Fairbairn Water Treatment Plant and recommended that SCWA enter into an agreement with the City for "wheeling" this surface water to Zone 40.

Water Forum Agreement

The Water Forum process brought together a diverse group of stakeholders that included water managers, business and agricultural leaders, environmentalists, citizen groups, and local governments to evaluate water resources and future water needs of the Sacramento metropolitan region. The coequal objectives of the Water Forum are to: 1) provide a reliable and safe water supply for the region's economic health and planned development through the year 2030; and 2) preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River. The first objective will be met by additional diversions of surface water, increased conjunctive use of surface water and groundwater, expanded water conservation programs, and water reclamation. The second objective will be met by the development of feasible alternatives that modify American River flow patterns in order to improve in-stream fish habitat.

Figure 1-3. Water Purveyor Service Areas



Development of the Water Forum Plan ("WFP") to meet the coequal objectives involved substantial scientific study, environmental analysis, and consensus-building with various stakeholders. The WFP includes a comprehensive package of linked actions which, when implemented, are intended to successfully achieve the coequal objectives. These linked actions will require the support of each stakeholder in the public policy decision making process and through implementation in order to successfully achieve the coequal objectives.

These linked actions include adherence to an agreed upon long-term average annual limit (sustainable yield) for each of the three geographic sub-areas of the groundwater basin within Sacramento County: 131,000 acre-feet ("AF") for the North Area (north of the American River); 273,000 AF for the Central Area (between the American and Cosumnes rivers); and 115,000 AF for the Galt Area (south of the Cosumnes River). Any proposed water supply project must satisfy the groundwater conditions specified in the *Water Forum Agreement* for the 2030 projected level of development.

Need for A Master Plan Update

The 1987 Master Plan preferred alternative was based on a set of assumptions regarding urban development patterns, water use demand patterns, groundwater availability, and surface water availability that are now obsolete. The most significant changes to those assumptions are discussed in greater detail in the following sections.

1.4 PLANNING ENVIRONMENT

The institutional framework recognized in preparing this Master Plan is discussed in this section.

SCWA and Zone 40

SCWA was formed in 1952 by a special legislative act of the State of California (the *Sacramento County Water Agency Act* - ("Agency Act")). SCWA's purposes include:

- make water available for any beneficial use of lands and inhabitants; and
- produce, store, transmit, and distribute groundwater.

SCWA is governed by a Board of Directors (*ex officio*, the Sacramento County Board of Supervisors). Under the Agency Act, the Board may contract with the federal government under reclamation laws with the same powers as irrigation districts, and with the State of California and federal government with respect to the purchase, sale, and acquisition of water. SCWA may also construct and operate any required facilities.

Zone 40 was created by SCWA Resolution No. 663 in May 1985, which describes the exact boundaries of the zone, and defines the projects to be undertaken as "... the acquisition, construction, maintenance and operation of facilities for the production, conservation, transmittal, distribution and sale of ground or surface water or both for the present and future beneficial use of the lands or inhabitants within the zone."

SCWA Ordinance No. 18, adopted in 1986, empowered SCWA to establish fees, charges, credits, and regulations for the wholesale supply of water to zones within SCWA. A master plan is required by this ordinance.

The boundaries and scope of Zone 40's activities were expanded in April 1999 by Resolution WA-2331 (See **Figure 1-1**). Zone 40's scope now includes the use of recycled water in conjunction with surface and groundwater, "for the present or future beneficial use or uses of the lands or inhabitants within the Zone."

Water Forum – Purveyor Specific Agreement

The *Water Forum Agreement* (January 2000) includes purveyor specific agreements which define the benefits each water purveyor will receive as a stakeholder and actions each must take to receive these benefits. Purveyor specific agreements for the City of Sacramento and the Sacramento Municipal Utility District ("SMUD") also describe commitments by the City, SMUD, and SCWA to address issues related to wheeling and wholesaling of surface water, CVP water transfers, and dry year water supply. The Sacramento County/SCWA Purveyor Specific Agreement ("PSA") is included as Appendix B. A brief summary of SCWA's PSA follows.

SCWA is responsible for providing wholesale water to Zone 40, an area that includes the Laguna, Vineyard, Elk Grove and Rancho Cordova communities. The 2002 Master Plan is a program for meeting present and future (2030) water needs through the conjunctive use of groundwater and surface water, water conservation, and use of treated wastewater ("recycled water").

SCWA will divert firm[1] and intermittent surface water (up to 78,000 AF per year ("AF/year")) from near the mouth of the American River or from the Sacramento River. SCWA will also use groundwater on a conjunctive use basis with surface water to meet the balance of its need.

All signatories to the Water Forum Agreement endorse SCWA's PSA that provides for the construction of SCWA's water supply facilities. These include a diversion structure at or near the mouth of the American River or from the Sacramento River, treatment plants, pumping stations, wells, storage facilities, and transmission pipelines.

Stakeholder support is contingent on project specific compliance with California Environmental Quality Act ("CEQA"), and where applicable, the National Environmental Policy Act ("NEPA"), federal Endangered Species Act, and California Endangered Species Act.

1.5 SCOPE OF 2002 MASTER PLAN

- Define the 2002 Master Plan's objectives and the activities;
- Define the programs and authorities of other agencies relevant to Zone 40's water supply;
- Analyze existing conditions including existing land and water use in and adjacent to Zone 40, existing groundwater yield, and source water quality;
- Estimate future water demands, including daily, seasonal, and hydrological variations, and associated supply capacity requirements;
- Identify and evaluate future water sources, including conservation, recycled water, groundwater, and surface water sources;
- Identify and evaluate water quality and treatment needs, including a review of existing and anticipated drinking water standards and their potential impact on treatment needs and costs;

[1] The term "firm" is used for surface water supply contracts or water rights that yield significant quantities of water in dry and critical years.

- Identify and evaluate water supply alternatives that will provide a sufficient quantity of water to meet the ultimate demand of the study area, including definition of evaluation criteria;
- Recommend a preferred alternative; and
- Develop a financing plan and water management program to support implementation of the preferred alternative water supply program.

SECTION 2 - WATER DEMANDS

2.1 INTRODUCTION

The projection of future water demands is an important component of the 2002 Master Plan because water demand will determine the quantity of water needed to serve the Zone 40 study area.

2.2 1987 ZONE 40 WATER SUPPLY MASTER PLAN DEMAND PROJECTION

The 1987 Master Plan used a planning period extending from 1986 to 2005, which was the estimated build-out period for the original 17,195 acre Zone 40 2005 study area. Land use projections were based on Sacramento County community plans, zoning maps and new land development proposals. Growth rates were estimated from Sacramento County Planning Department five year increment population projections. Total service area demand was estimated by applying a unit demand factor of 3.3 acre feet/acre/year (340 gallons per capita per day) to all projected land uses in the Zone 40 service area - agricultural, municipal and industrial. This demand factor was recommended for long-range water supply planning by the State of California Department of Water Resources in *DWR Bulletin No. 104 -71*. The 1987 Master Plan estimated the *maximum day* water demand at 100 million gallons per day ("mgd") for build-out of the Zone 40 near term service area and 112.8 mgd for ultimate Zone 40 build-out.

2.3 WATER FORUM DEMAND PROJECTION

The WFP projection of future water demands is based on Boyle Engineering Corporation's 1995 report, *Estimate of Annual Water Demand Within The Sacramento County-Wide Area* ("Boyle Report"). A discussion of the methodology used to determine Water Forum demands is included in the January 1999 *Draft Environmental Impact Report for the Water Forum Proposal* ("WF DEIR"). These documents are incorporated herein by reference and are available for review at the SCWA.

The 1993 *Sacramento County General Plan* ("GP") defines an Urban Policy Area that represents near term (2024, est.) build out and an Urban Services Area that represents ultimate (2050, est.) build out (see **Figure 1-1**). The Water Forum estimates water demands for the year 2030, i.e., water demands for a projected level of development equal to build-out of the Urban Policy area plus an increment of development in the Urban Services Area. The WF DEIR defines a number of "sub-regions" within Sacramento County, and year 2030 water demands for each are estimated on the basis of projected land use. One such sub-region is the *South County M&I (Municipal & Industrial – "M&I") Users Group*, which includes approximately 42,600 acres of Zone 40 (**Figure 2-1**). Another sub-region is a 4,300 acre portion of the City of Sacramento's American River Place of Use.

2.4 2002 ZONE 40 WATER SUPPLY MASTER PLAN DEMAND PROJECTION

The WFP projected urban water demand for the South County M&I Users Group sub-basin is based on unit water demand estimates from the Boyle Report. The 2002 Master Plan projections for water demands are based on the Boyle Report methodology. For areas within the Zone 41 retail areas the Boyle Report factors were improved based on more recent water use data. Existing land use data, based on the 2000 Land Use Survey conducted by the State Department of Water Resources (**Figure 2-2**), is used to estimate existing water demands as shown in **Table 2-1**. Existing unit water demand factors assume a 12 percent level of water conservation. Existing water demands are estimated at 24,900 AF/year.

Water demands are projected to increase linearly from current levels to build-out of the GP in 2024 and at a slightly reduced rate to 2030 as shown in **Figure 2-4**. The 2030 water demand projections are based on land uses identified in the GP (**Figure 2-3**) and include a conservation demand reduction factor of 25.6 percent applied to the revised Boyle Report estimates. The increment of water demand from 2024 to 2030 is calculated based on extrapolating urban land use areas based on the expected population growth from 2024 to 2030. Those areas of the *South County M&I Users Group* that are outside Zone 40 are not included in the water demand estimates and amendments made to the GP have been factored into the projection of future land uses. The resulting inventory of land use types, acreage, unit water demand factors and projected water demands is shown in **Table 2-2**. The projected year 2030 Zone 40 annual water demand is 113,100 AF/year.

Figure 2-1. Water Forum South County M&I Users Group

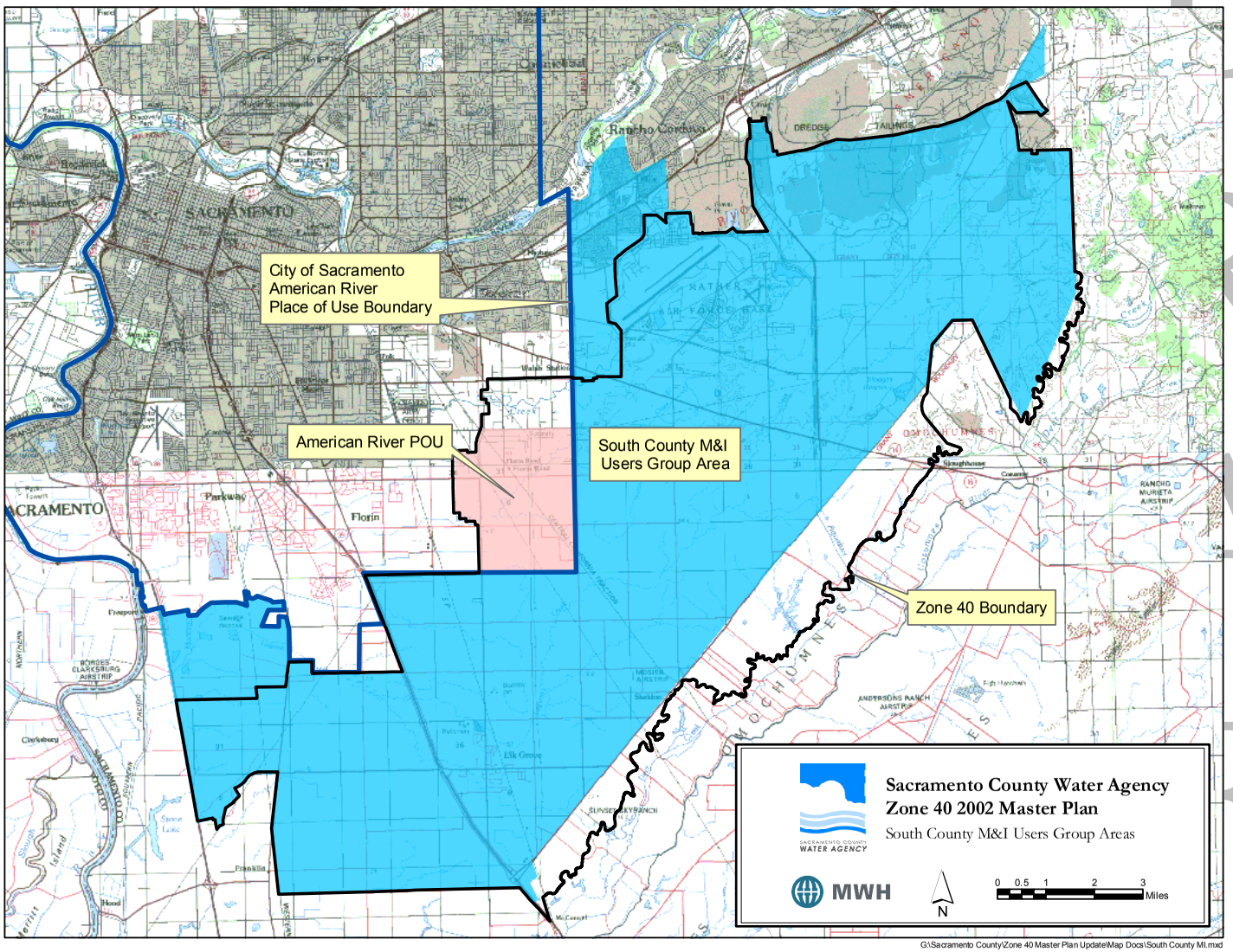


Table 2-1. Zone 40 Existing Water Demands

Land Use Category	Year 2000[1]		
	Unit Water Demand Factors [2] (AF/Acre/ Year)	Land Use (Acres)	Water Demand (AF/year)
Rural Estates	1.57	304	477
Single Family	3.4	3,387	11,515
Multi-Family - Low Density	4.36	285	1,242
Multi-Family - High Density	4.85	0	0
Commercial	3.24	254	821
Industrial	3.19	1,257	4,010
Industrial - Unutilized	0	0	0
Public	1.22	692	844
Public Recreation	4.08	400	1,630
Mixed Land Use	2.95	840	2,479
DEVELOPED LAND USE		**7,418**	**23,020**
Right-of-Way	0.25	726	181
WATER USE SUBTOTAL			**23,201**
Water System Losses			1,740
ZONE 40 WATER PRODUCTION			**24,941**
Urban and rural areas not currently being served by Zone 40		**5,127**	
Vacant		**27,583**	
Agriculture		**5,766**	
TOTAL LAND AND WATER USE		**46,620**	**24,941**

Notes:
1. Source of Year 2000 land use data is the California State Department of Water Resources Land Use Survey. Urban land uses only reflect areas currently being served by Zone 40.
2. Boyle unit water demand factors have been adjusted to reflect more recent water use data.
3. Unit water demand factors are normalized to account for hydrologic year differences, and reflect a 12 percent level of water conservation.

Table 2-2. Zone 40 Future Water Demands

Land Use Category	Water Forum Build-out		
	Unit Water Demand Factors (AF/Acre/ Year)	Land Use (Acres)	Water Demand (AF/year)
Rural Estates	1.33	718	955
Single Family	2.89	14,867	42,966
Multi-Family - Low Density	3.7	1,173	4,340
Multi-Family - High Density	4.12	0	0
Commercial	2.75	1,042	2,866
Industrial	2.71	2,395	6,490
Industrial - Unutilized	0	1,463	0
Public	1.04	4,349	4,523
Public Recreation	3.46	2,865	9,913
Mixed Land Use	2.51	12,985	32,591
DEVELOPED LAND USE		**41,857**	**104,645**
Right-of-Way	0.21	2,526	530
WATER USE SUBTOTAL			**105,175**
Water System Losses			7,888
WATER PRODUCTION			**113,064**
Vacant		2,225	
Agriculture		12	
TOTAL LAND AND WATER USE		**46,620**	**113,064**

Notes:
1. Source of Water Forum Build-out land use data is the 1993 General Plan plus General Plan Amendments as of 2002.
2. Boyle unit water demand factors have been adjusted to reflect more recent water use data.
3. Unit water demand factors are normalized to account for hydrologic year differences, and reflect a 25.6 percent level of water conservation.

Figure 2-2. Current (2000) Zone 40 Land Uses

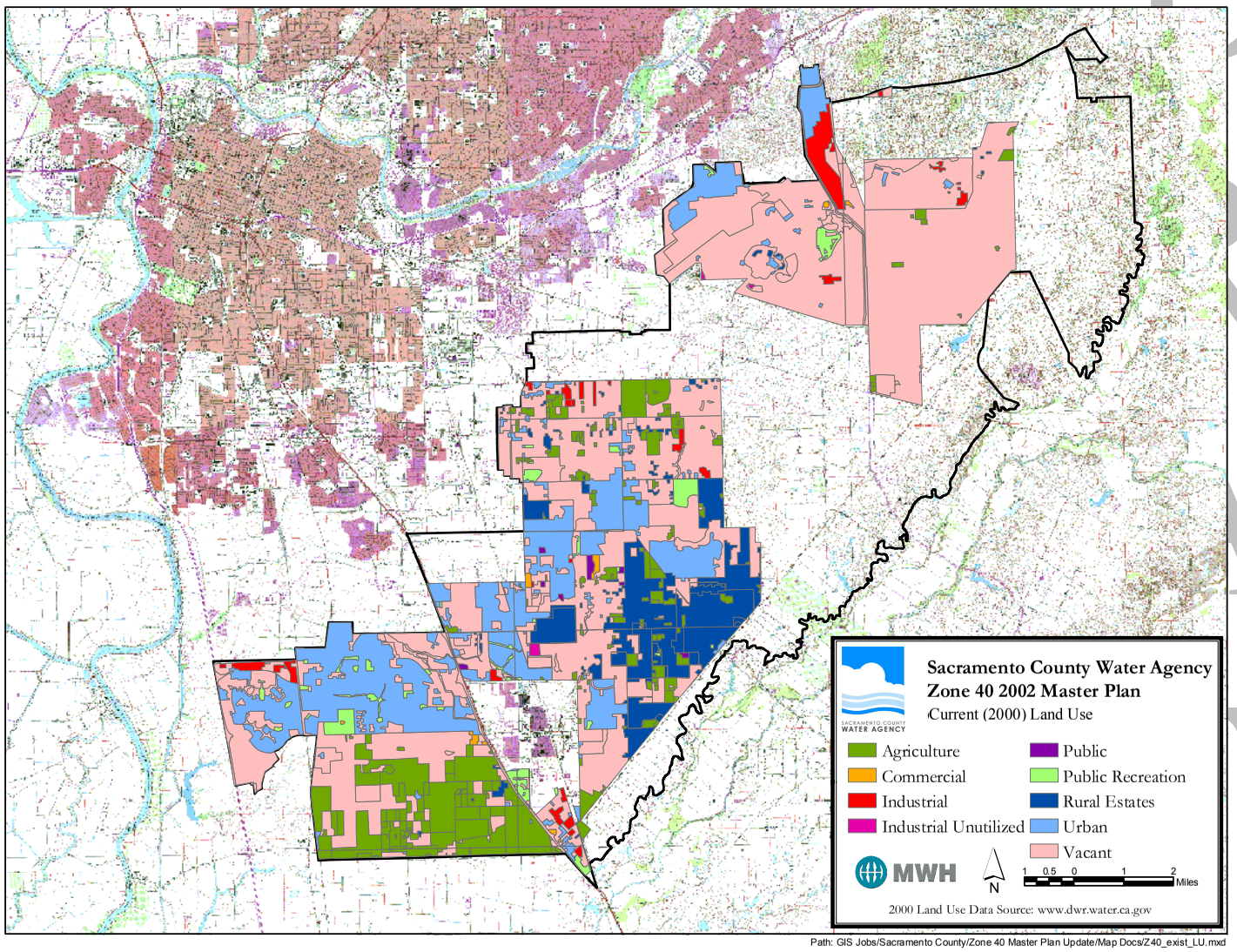


Figure 2-3. Sacramento County General Plan Land Uses

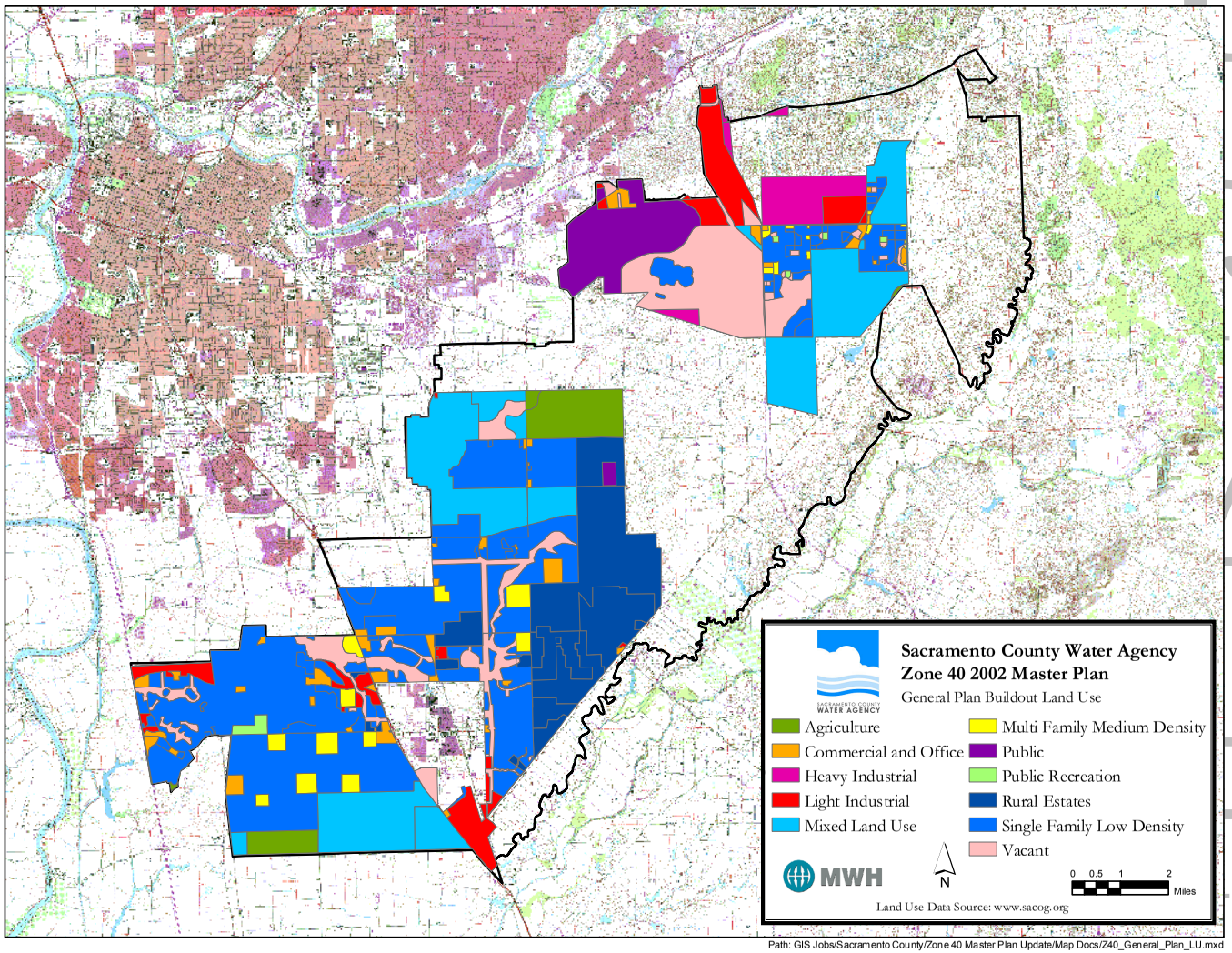
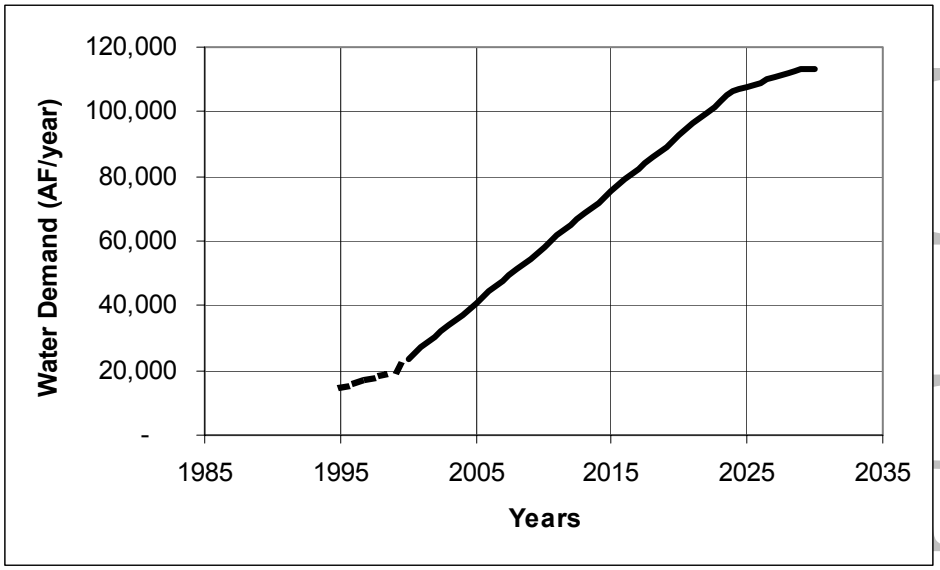


Figure 2-4. Water Demand Projection over Planning Period



2.5 WATER CONSERVATION

As a signatory to the *Water Forum Agreement* and as a USBR CVP water contractor, SCWA is committed to implementation of the sixteen Water Conservation Best Management Practices ("BMP's") that are defined in the *County of Sacramento Water Forum Water Conservation Plan*, pages 118 - 129 of Appendix J of the *Water Forum Agreement* (included in this document as **Appendix C**). The Boyle Report assumed that implementation of the BMP's justified a water demand reduction factor of 8 percent at General Plan build-out (2024) and 11.9 percent at ultimate build-out (2050). Boyle re-examined these factors for the Water Forum (**Appendix D**) in light of an expanded list of BMP's (most notably the provision for meter retrofit and conservation pricing) and determined that a year 2030 demand reduction factor of 25.6 percent relative to the baseline water demand was appropriate.

SECTION 3 - GROUNDWATER AVAILABILITY

3.1 INTRODUCTION

This section describes groundwater availability in Zone 40. Technical studies completed for the Water Forum by SCWA are compiled in the *Baseline Conditions for Groundwater Yield Analysis* ("Baseline Report"), (Montgomery Watson, May 1997). The Water Forum PSAs and the Baseline Report are used as guiding documents in the discussion of Zone 40 groundwater supplies and are incorporated herein by reference.

3.2 DESCRIPTION OF AQUIFER SYSTEM

The aquifer underlying Zone 40 is part of a regional aquifer system that extends beyond Sacramento County. Within Sacramento County, recharge of the aquifer occurs from several sources: streambed percolation (primarily from the American, Cosumnes and Sacramento Rivers), subsurface inflows from adjacent counties, and percolation of rainfall and applied water.

The Water Forum has defined three groundwater sub-basins underlying Sacramento County based on the hydraulic boundaries resulting from each of the river sources. **Figure 3-1** presents the groundwater elevation contours for fall 1998 and illustrates the three sub-basins and their respective cones of depression. Zone 40 falls entirely within the Central Sacramento County Groundwater Basin ("Central Basin").

Groundwater in the Central Basin is generally classified as occurring in a shallow aquifer zone (Laguna Formation) or in an underlying deeper aquifer zone (Mehrten Formation). Within Zone 40 the shallow aquifer extends approximately 200 to 300 feet below ground surface and, in general, the water quality in this zone is considered to be good except for the presence of arsenic in some parts of the study area. The deep aquifer is separated from the shallow aquifer by a discontinuous clay layer which serves as a semi-confining layer for the deep aquifer. The thickness of the deep aquifer averages approximately 1,600 feet in the Zone 40 study area. Water in the deep aquifer typically has higher concentrations of total dissolved solids ("TDS"), iron, and manganese. Groundwater in Zone 40 is supplied from both the shallow and deeper aquifer systems.

3.3 SUSTAINABLE GROUNDWATER YIELD

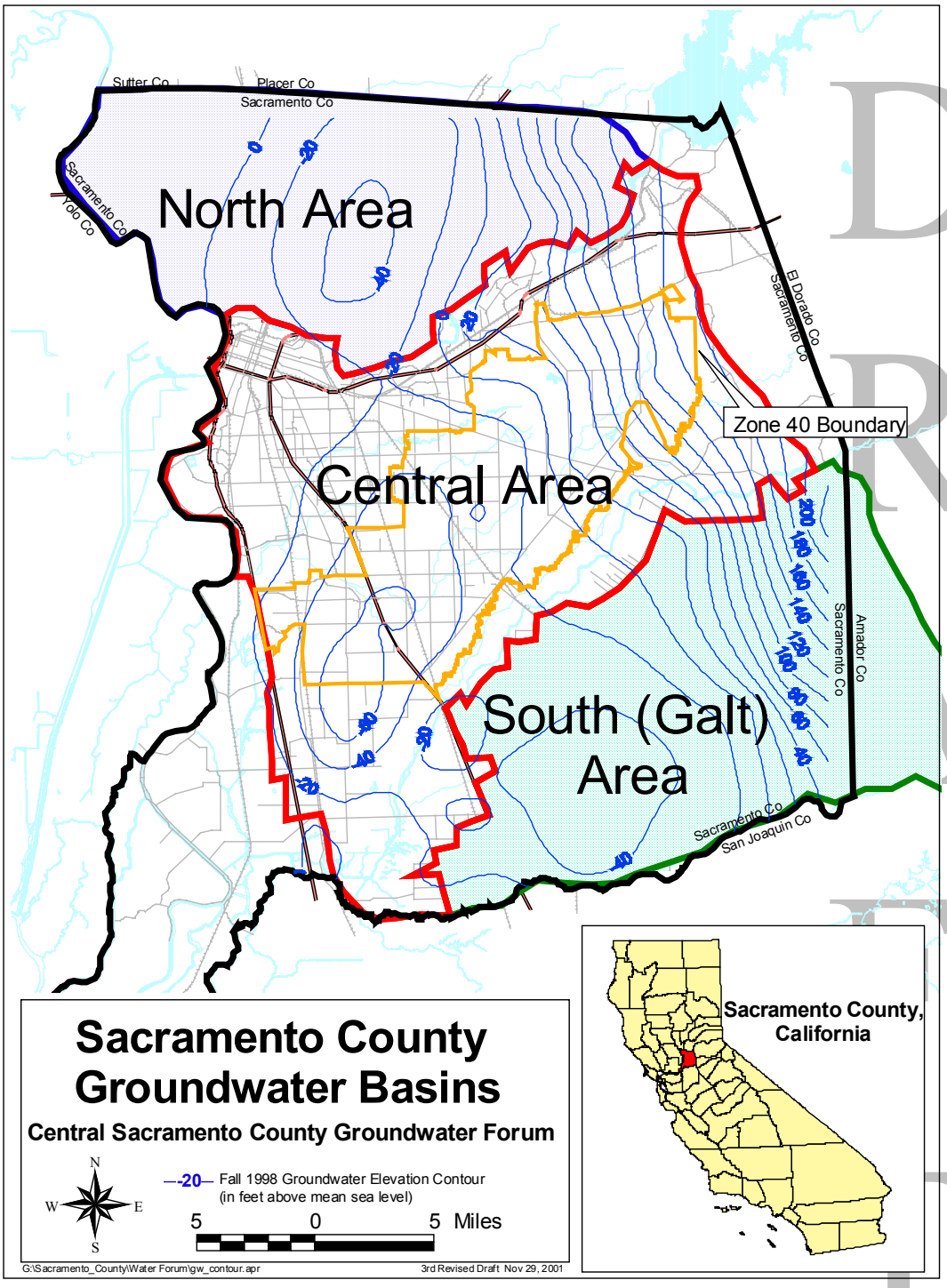
The determination of the sustainable yield of the groundwater system in Zone 40 is dependent on numerous factors including the desired groundwater levels to be maintained. The impacts associated with maintaining groundwater at lower levels may include:

- Increased pumping costs,
- In-migration of lower-quality water from the deep aquifer system or adjacent areas,
- Dewatering existing wells,
- Land subsidence,
- Increased rate of migration from localized sources of groundwater contamination.

Lower groundwater levels may also impact stream flows and groundwater elevations in adjacent areas.

The Baseline Report provided a basis for the Water Forum definition of a sustainable yield for each of the three Sacramento County groundwater basins. Based on negotiated levels of acceptable impacts associated with operating the basin at a specified extraction amount, the Water Forum defined a Central Basin sustainable average yield of 273,000 AF/year. At this level of groundwater production, IGSM modeling performed for the Water Forum predicted that the groundwater elevation at the Elk Grove cone of depression would stabilize at approximately 50 feet below existing levels.

Figure 3-1. Groundwater Elevation Contours (Fall 1998)



SCWA's Water Forum Water Purveyor Specific Agreement

Section D of SCWA's PSA states:

> ***"GROUNDWATER WILL BE USED IN A CONJUNCTIVE USE BASIS BY THE SOUTH COUNTY M&I USERS GROUP WITH A TOTAL 2030 DEMAND OF 117,600 AF. THE SOUTH COUNTY M&I USERS GROUP ALSO INCLUDES A PORTION OF CITIZENS UTILITIES COMPANY [CURRENTLY KNOWN AS CALIFORNIAN-AMERICAN WATER COMPANY] AND THE ELK GROVE WATER WORKS [CURRENTLY KNOWN AS THE FLORIN RESOURCE CONSERVATION DISTRICT/ELK GROVE WATER SERVICE]."***
>
> ***"THE AMOUNT OF GROUNDWATER USED [BY THE SOUTH COUNTY M&I USERS GROUP] WILL VARY FROM APPROXIMATELY 95,100 AF IN THE DRIEST YEARS DECREASING TO APPROXIMATELY 34,000 AF IN THE WET YEARS."***

The South County M&I Users Group (see **Figure 2-1**) includes a large portion of the Zone 40 service area, a portion of Cal-Am's service area, and FRCD/EGWS's service area.

SCWA's PSA assumes that in the critically dry years, the PL 101-514 and SMUD 1 CVP surface water contracts (30,000 AF) are in-place and subject to a 25% cut back to 22,500 AF and intermittent water is cutback 100%. The total demand for the South County M&I Users Group is stated in the agreement as 117,600 AF. The difference between the demand and the amount of available surface water is assumed to be the total groundwater need. In the critically dry years, the maximum groundwater need is estimated to be 95,100 AF (117,600 AF–22,500 AF = 95,100 AF).

If the water supplies for purveyors of the South County M&I Users Group that are not located within the Zone 40 near term study area are assumed to remain on groundwater and do not receive any Zone 40 surface water supplies, the maximum groundwater use of 95,100 AF is reduced by 18,445 AF (FRCD/EGWS and portions of Cal-Am) leaving a maximum of 76,655 AF for use by Zone 40 in the dry years. The average of wet and dry years should not exceed the 40,900 AF identified as Zone 40's long term average operational groundwater yield.

Conjunctive Use

SCWA's PSA states that groundwater will be used on a conjunctive use basis by the South County M&I Users. The Water Forum defines conjunctive use as, "the planned joint use of surface and groundwater to improve overall water supply reliability." SCWA is in the initial phase of implementing a conjunctive use program within Zone 40 that will meet projected water needs through the year 2030. A more complete description of the operational parameters of Zone 40's conjunctive use program can be found in **Appendix E**.

Potential Groundwater Extraction Expansion

The Water Forum Agreement defines an allowable volume of groundwater pumping equal to the sustainable yield. The extraction area, for the most part, is located throughout the western portion of Zone 40 east of Interstate 5 to south of Elder Creek Road and west of Excelsior Road in the Laguna-Vineyard area. Although groundwater extraction for Zone 40 does occur north of Elder Creek Road, groundwater contamination and the potential for movement of contaminant plumes in the Aerojet and Mather areas severely limits the opportunity for additional extractions.

Historical methods of chemical disposal at the Aerojet and McDonnell-Douglas (now Boeing) facilities have resulted in extensive contamination of local groundwater supplies. Of particular concern are the chemicals ammonium perchlorate ("perchlorate") and N-nitrosodimethylamine ("NDMA"); though currently unregulated, an "action level" for each has been defined by the appropriate regulatory agencies, essentially prohibiting the use of groundwater from the contaminated zone for drinking water.

This situation will have several significant effects on Zone 40 groundwater supply:

1. Wells can not be constructed in developing areas located near the contaminant plume. While the sustainable yield of the basin will remain the same, groundwater production will be somewhat more concentrated in the central and western portion of the zone than initially assumed.

2. Regulating agencies have directed the responsible parties to pump and treat the contaminated groundwater. More than 20,000 AF/yr may be extracted for treatment over decades.

SECTION 4 - WATER QUALITY

4.1 INTRODUCTION

The quality of existing and potential water supply sources will affect treatment costs. The following discussion provides a review of current and anticipated drinking water regulations and a discussion of the resulting treatment needs. The discussion concludes with recommended treatment process for both surface water and groundwater.

4.2 DRINKING WATER REGULATIONS

The following is a summary of current drinking water regulations promulgated by the United States Environmental Protection Agency ("EPA") and enforced by the California Department of Health Services ("DHS"). Also included is a brief description of drinking water regulations which are anticipated to be promulgated over the next several years. This information is provided to evaluate the impact existing and future regulations have on water supply for the Zone 40 study area.

Background

The Safe Drinking Water Act ("SDWA") was enacted by Congress in 1974. Through the SDWA, EPA has authority to set maximum allowable levels of contaminants in drinking water supplies. Historically, the first step EPA takes in establishing regulations for contaminants is to establish a maximum contaminant level goal ("MCLG"). An MCLG is the estimated level at which no adverse health risks are expected. EPA then attempts to establish either a maximum contaminant level ("MCL") or a treatment technique which will reduce the presence of the contaminant in drinking water to a level which is as close to the MCLG as is technically and economically feasible. Once an MCL has been established, EPA is then required to designate a Best Available Technology ("BAT") to meet the new MCL.

Existing Regulations

With respect to SDWA regulations, California is a primacy state which means the state is responsible for implementing these regulations within California. DHS has been designated by the state to enforce SDWA regulations. Under primacy rules, DHS must enforce regulations which are at least as stringent as those promulgated by EPA and may also promulgate and enforce additional regulations not mandated by the EPA.

The categories of regulated contaminants (primary MCLs) include microorganisms, disinfection byproducts, disinfectants, inorganic chemicals, organic chemicals, and radionuclides. Primary MCLs protect public health by limiting the levels of contaminants in drinking water.

DHS has also established secondary MCLs for a number of contaminants. Secondary MCLs were established to protect the aesthetic quality of drinking water and are generally unrelated to human health. Secondary MCLs are enforceable standards in California, although not under Federal regulations.

Title 22 of the California Code of Regulations ("CCR") lists all regulated contaminants for drinking water in the state.

Anticipated Regulations

EPA is currently formulating several new regulations needed to maintain compliance with the SDWA and the SDWA Amendments. These are briefly described below.

Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)

The purposes of LT2ESWTR are to improve control of microbial pathogens, including specifically the protozoan *Cryptosporidium,* in drinking water and to address risk trade-offs with disinfection byproducts. This could have a significant impact on existing surface water treatment plants and the design of future plants.

Radon

At present, EPA has proposed standards for radon which include a multimedia framework for implementation of the rule. This includes two options:

- States can choose to develop enhanced state programs to address the health risks from radon in indoor air – known as Multimedia Mitigation ("MMM") programs – while individual water systems reduce radon levels in drinking water to 4,000 pico curies per liter ("pCi/l") or lower.

- If a state chooses not to develop an MMM program, individual water systems in that state would be required to either reduce radon in their system's drinking water to 300 pCi/l or develop individual local MMM programs and reduce levels in drinking water to 4,000 pCi/l.

The California radon program is awaiting action by EPA on the proposed radon rule. Should EPA finalize the radon rule for drinking water, California's radon program will be making decisions on program development driven by the rule. The measured radon levels in municipal wells in the Zone 40 study area range from 100 pCi/l to 670 pCi/l.

Potential Contaminants for Future Regulation

EPA is required, under the SDWA, to establish standards for 25 additional contaminants every three years. It is expected that the majority of contaminants to be added to the regulations will be extracted from the 1991 Drinking Water Priority List.

4.3 SURFACE WATER QUALITY

The purpose of this section is to provide an overview of the water quality of the Sacramento River. The availability, reliability and yield of the various surface water supply components is discussed in Section 5 -*Water Supply Sources and Facilities*.

Water quality parameters of interest in evaluating surface water for use as a drinking water source are generally divided into three categories: physical, chemical, and bacteriological. Physical parameters include temperature, color, turbidity, and odor. Chemical parameters include both inorganic constituents such as pH, TDS, and trace metals, and organic parameters such as total organic carbon ("TOC") and pesticides. Bacteriological parameters of interest include coliform, viruses, *Giardia,* and *Cryptosporidium*.

Water quality parameters in the Sacramento River were evaluated based on data collected in the *Sacramento River Watershed Sanitary Survey – Cities of Sacramento and West Sacramento,* (Montgomery Watson/Archibald & Wallberg, December 2000) and *Technical Memorandum 3 – Sacramento River Sanitary Survey 2000 Update,* (Montgomery Watson/Archibald & Wallberg, May 2001). The sanitary survey update indicates that the Lower Sacramento River, upstream of Freeport, is a good source of drinking water. The water can easily be treated to meet all CCR Title 22 MCLs using conventional filtration processes. From the analysis, there appear to be low levels of protozoan contamination, low organic carbon levels, and isolated taste and odor incidents from thiobencarb. A review of each constituent evaluated is provided in **Appendix F**.

4.4 SURFACE WATER TREATMENT

Treated surface water alternatives for Zone 40 include existing City water treatment facilities or constructing a new water treatment facility. An important consideration in the evaluation of a surface water source for a new treatment facility or for expansion of an existing facility is the treatment processes and requirements.

The use of the City's Sacramento River Water Treatment Plant ("SRWTP") for treating surface water for Zone 40 would require SCWA to purchase dedicated capacity in the treatment plant. Under its water supply permit, the City diverts and processes water that meets all drinking water requirements established by DHS and EPA.

Based on the evaluation of surface water quality and treatment process capabilities in **Appendix F**, it is recommended that conventional treatment be utilized for water diverted at the Freeport intake site.

4.5 GROUNDWATER QUALITY

Zone 40 source groundwater quality meets all CCR Title 22 drinking water quality standards, with the exception of iron, manganese, and arsenic. At several wells in the study area, iron and manganese concentrations exceed secondary drinking water standards. These secondary standards are for aesthetic concerns, and the elevated levels of iron and manganese do not pose a health hazard. Arsenic concentrations in six wells have been measured at levels that exceed recently implemented federal drinking water standards (January 2001); these regulations require compliance by January 2006. Radon has also been measured in the groundwater in the study area, although not at levels exceeding the current drinking water standards. However, as discussed in Section 4.2 - *Drinking Water Regulations,* EPA is considering new standards for radon which could result in the need for treatment.

4.6 GROUNDWATER TREATMENT

The following discusses the treatment processes required for the removal of iron, manganese, and potentially arsenic and radon from groundwater. SCWA operates seven groundwater treatment facilities for iron and manganese removal in Zone 40 (Mather Housing, Calvine Meadows, Waterman, East Park, Dwight, East Elk Grove, and Lakeside). Eight more facilities are in various stages of planning (Poppy Ridge, Franklin, Big Horn, Laguna Ridge, Wildhawk, North Vineyard Station, Excelsior, and Eagles Nest).

Iron and Manganese Treatment

Iron and manganese in groundwater are typically removed as precipitates through sedimentation and/or filtration processes. Treatment processes for iron and manganese include oxidation and filtration, manganese zeolite, and sequestering. SCWA uses oxidation and filtration with a manganese zeolite ("greensand") filter media.

Arsenic Removal

USEPA published the final rule for arsenic in January 2001 and identified the following BATs for achieving compliance with the new regulation:

- Ion Exchange
- Activated Alumina
- Oxidation/Filtration
- Reverse Osmosis
- Electrodialysis Reversal
- Enhanced Coagulation/Filtration
- Enhanced Lime Softening

All of the newer treatment facilities provide for future treatment for arsenic should it be necessary. Older wells which will not meet the new standards may have to be abandoned because of site restrictions that prevent the installation of treatment facilities.

Radon Removal

Treatment processes for removing radon from water include air stripping and activated carbon adsorption. Air stripping transfers radon from water to the atmosphere. At a stand alone well, water is depressurized for treatment and then re-pumped to the distribution system. At a treatment facility, the water passes through an air stripping unit, or the facility's storage tank intake manifold is modified to increase water contact with air.

An alternative technology for removing radon from water is adsorption on granular activated carbon ("GAC"). This treatment process involves passing the water through a pressure vessel containing GAC media. The radon adsorbs to the surfaces of the media which must be replaced periodically after its adsorptive capacity diminishes. It is likely that GAC would have to be disposed of in a Class 1 disposal site. A backwash system may be required to periodically clean the bed of particulate matter.

Process Recommendation

Depending on future regulatory standards, most Zone 40 wells will contain unacceptable levels of arsenic, iron, or manganese, or a combination of these. No single treatment process addresses all of these constituents effectively.

For planning and cost estimating purposes, it is recommended that a combination of treatment processes be used that will address all of the parameters of concern. The recommended process consists of oxidant and/or chemical addition, filtration, and disinfection.

To take advantage of economies of scale and to minimize operations and maintenance costs, treatment plants will be designed to serve a group of wells equipped with low-head pumps and connected to a single dedicated delivery pipeline. After treatment, water will then be pumped into the distribution system.

Aeration at a facility's storage tank would be added to the recommended process train in the event that the state does not implement a MMM program for radon in order to avoid the need to de-pressurize the water and re-pump after treatment.

Arsenic removal will be achieved through the same process which removes iron and manganese (oxidant and/or chemical addition, filtration, and disinfection). The amount and type of chemicals necessary to provide for arsenic treatment will be determined through either bench- or pilot-scale testing.

SECTION 5 - WATER SUPPLY SOURCES AND FACILITIES

5.1 INTRODUCTION

This section describes sources of water supply and the facilities required for treatment, storage, and conveyance. The sources and quantities of water supply identified within this Section are consistent with SCWA's PSA as described in the *Water Forum Agreement – January 2000*.

5.2 WATER SUPPLY SOURCES

The following identifies and characterizes eight water sources to meet projected demands within Zone 40. Key to the availability of these water supply sources is the Water Forum PSAs (see **Section 1.4 - *Planning Environment*** and **Appendix A**). Based on Water Forum Build-out Data (Table 2-1), SCWA's water demand is projected to be 113,100 AF by the year 2030. The facility alternatives required to utilize these sources are described separately in **Section 5.2 -*Water Supply Capital Facilities***.

Identification of Water Supply Components

The water supply sources described in this Master Plan are grouped into three categories: (1) groundwater, (2) surface water, and (3) recycled water. Groundwater refers to groundwater pumped from the Central Sacramento County Groundwater Basin. Surface water is defined as water from the American and/or Sacramento rivers. Recycled water is defined as recycled wastewater that will be used for non-potable purposes.

Groundwater Component

This component (G1) provides for Zone 40's groundwater production capacity. The component is described briefly below and in **Table 5-1** and discussed in greater detail in **Section 3 – *Groundwater Availability***.

> **G1. Groundwater.** Groundwater pumping capacity is developed to: (1) provide peaking capacity to meet projected maximum day demands; and (2) meet conjunctive use objectives as outlined in the *Water Forum Agreement*.

Component	Water Source	Maximum Yield (AF/year)	Average Yield (AF/year)	Reliability
G1. Groundwater	Groundwater	76,655	40,900	High

As a condition of the second assignment of SMUD CVP surface water entitlements, SCWA is obligated to construct groundwater facilities necessary for SMUD to meet increased demands in the drier and conference years as defined in SMUD's PSA.

Surface Water Components

The surface water supply for Zone 40's water supply will come from the Sacramento and American Rivers. All surface water supplies will require conventional treatment prior to distribution within Zone 40 (see **Section 4.4 – *Surface Water Treatment***). Each of the six surface water components is described briefly below. Key aspects of each component are detailed in **Table 5-2**.

Table 5-2. Detail of Surface Water Supply Components

Component	Water Source(s)	Entitlement Amount (AF/year)	Dry Year Supply (AF/year)	Estimated Long Term Average Use (AF/year)	Reliability
S1. Appropriative Water	American and Sacramento River	Undetermined	0	22,000	Low
S2. SMUD 1 Assignment	American River	15,000	11,250	13,000	Moderate
S3. SMUD 2 Assignment	American River	15,000	11,250	13,000	Moderate
S4. "Fazio" Water (PL 101-514)	American River	15,000	11,250	13,000	Moderate
S5. Other Water Supplies	American and Sacramento River	Undetermined	12,000	6,000	Variable (Low to Moderate)
S6. Purchase of Water From City for American River POU	American River	9,300	9,300	9,300	High
Total Surface Water		**87,300**	**55,050**	**76,300**	

S1. Appropriative Water. SCWA has submitted an application to the State Water Resources Control Board ("SWRQB") for the appropriation of water from the American and Sacramento Rivers. This water is considered intermittent water that would be typically available during winter months of normal or wet years. This water may also be used for groundwater recharge.

S2. SMUD 1 Surface Water Assignment. Under the terms of a three party agreement (SCWA, SMUD, and the City) and in accordance with SMUD's PSA, the City provides water to SMUD for use at two of SMUD's cogeneration facilities. SMUD, in turn, will assign 15,000 AF/year of its USBR CVP contract water to SCWA for M&I use. As the cogeneration facilities are located within the City's American River POU, authorization by the SWRCB is not required. A CVP contract amendment is currently in the environmental review process.

S3. SMUD 2 Surface Water Assignment. SMUD's PSA directs SMUD to assign a second 15,000 AF/year to SCWA and Zone 40 to construct groundwater facilities necessary to meet SMUD's dry year water shortages of up to 10,000 AF/year.

S4. CVP Water Public Law 101-514 ("Fazio Water"). In April 1999, SCWA obtained a CVP water service contract pursuant to PL 101-514 that provides a permanent water supply to Zone 40 of 15,000 AF/year.

S5. Other Water Supplies. SCWA enters into purchase and transfer agreements with other entities that currently hold surface water rights in the north Sacramento River basin.

S6. Purchase of City of Sacramento Water for use in City POU. SCWA's PSA directs SCWA to enter into an agreement with the City whereby the City will sell surface water to SCWA for use in the portion of the Zone 41 service area within Zone 40 that lies within the City's American River POU (see **Figure 1-1**).

Recycled Water Component

The recycled component is a supply of treated "recycled" wastewater for non-potable use; primarily, landscape irrigation at parks, schools, and rights-of-way. The recycled component is described briefly below. Key aspects are detailed in **Table 5-3.**

Table 5-3 Detail of Recycled Water Supply Component

Component	Water Source	Maximum Yield (AF/year)	Average Yield (AF/year)	Reliability
R1. Recycled Water	Sacramento Regional Wastewater Treatment Plant Tertiary Facility	4,400	4,400	High

R1. Recycled Water for Urban Landscaping in Zone 40 using Sacramento Regional Wastewater Treatment Plant Source. Recycled water is provided to Zone 40 from the Sacramento Regional Wastewater Treatment Plant, for non-potable uses. The expected maximum day use is approximately 9 mgd.

5.3 WATER SUPPLY CAPITAL FACILITIES

The following describes the capital facility components required for treatment, storage, and conveyance of the water supply components identified above. As of 2000, Zone 40 facilities include a transmission and distribution system with approximately 35 mgd of groundwater production facilities, and 6 mgd (expandable to 11 mgd) of non-dedicated surface water capacity from the City's SRWTP. Additional groundwater facilities and use of recycled water are considered to be required components of the master plan. There are three alternatives considered for new surface water treatment and conveyance facilities. Cost estimates have been developed for each of the facility components described below.

Categories of Water Supply Capital Facility Components

Water supply capital facility components have been grouped into the same three general categories as the water supply sources: (1) groundwater, (2) surface water, and (3) recycled water. All the facilities necessary to develop a particular supply component (i.e., wells and conveyance systems) have been grouped together under these categories.

Groundwater Facility Component

The facility component for groundwater is detailed in Table 5-4 and below. The facility component is also discussed in Appendix G.

Table 5-4. Detail of Groundwater Facility Component

Facility Component	Required Facilities	Capital Costs (Millions of Dollars)
GF1. Groundwater Capacity	• Wells • Treatment • Conjunctive Use Facilities (Storage & Pumping) • Emergency Power • Conveyance	10 mgd – with iron & manganese treatment $15.0 - $17.0

GF1. Groundwater Capacity. The facilities necessary for providing groundwater production capacity include wells, treatment, conjunctive use facilities (storage and pumping), and conveyance to the distribution system. It is assumed that treatment will occur at treatment facilities with maximum day capacities of approximately 10 mgd per facility. The treatment plants will be developed for iron, manganese, and possible arsenic removal.

A groundwater recharge component may be considered in the future as a way of enhancing conjunctive use within the groundwater basin. This component could utilize injection wells or spreading basins to recharge the aquifers underlying Zone 40. Water could potentially be obtained from either Appropriative or Other surface water sources. Treatment of surface water and approval by the Regional Water Quality Control Board ("RWQCB") would be required prior to injection into the aquifer.

Surface Water Facility Component

This component includes the existing 7 mgd (expandable to 11 mgd) of non-dedicated capacity at the City's Sacramento River Water Treatment Plant and three alternatives for treating and conveying additional surface water: (1) a new Freeport Treatment Plant constructed by SCWA, (2) a new surface water treatment plant in conjunction with the Freeport Regional Diversion Project, or (3) an expansion of the City's Sacramento River Water Treatment Plant.

The alternative surface water facility components are detailed in **Table 5-5** and discussed below and in **Appendix G**.

Table 5-5. Detail of Alternative Surface Water Facility Components

Facility Component Alternative	Required Facilities	Capital Costs (Millions of Dollars)
SF1. SCWA Freeport WTP	Conventional Treatment Plant w/ Intake Structure and Conveyance Piping	$281
SF2. Freeport Regional Diversion Project	Conventional Treatment Plant w/ Intake Structure and Conveyance Piping	$342
SF3. Sacramento River WTP Joint Project	Conventional Treatment Plant w/ Intake Structure and Conveyance Piping	$273

SF1. SCWA Freeport WTP. This alternative consists of the construction of a diversion structure on the Sacramento River near the community of Freeport, raw water conveyance pipeline, an 85 mgd (ultimate capacity) surface water treatment facility to be located on or near the Regional Sanitation District's wastewater treatment plant's "buffer lands," and treated water conveyance pipelines.

SF2. Freeport Regional Diversion Project. In this alternative SCWA and East Bay Municipal Utility District ("EBMUD") construct a diversion structure on the Sacramento River near the community of Freeport and a raw water conveyance pipeline to the central portion of Zone 40, SCWA constructs an 85 mgd (ultimate capacity) surface water treatment facility in the central portion of Zone 40 and treated water conveyance pipelines.

SF3. Sacramento River Water Treatment Plant Joint Project. SCWA purchases 70 mgd of dedicated treatment plant capacity from the City and construct treated water conveyance pipelines through the City to deliver treated water to Zone 40.

Recycled Water Facility Component

The recycled water component consists of the purchase of tertiary treated wastewater from the Sacramento Regional Wastewater Treatment Plant and construction of pipelines and storage to deliver the water to Zone 40. The recycled water component requires a distribution system separate from the potable water distribution system. The recycled water facility component is summarized **in Table 5-6** and discussed in greater detail in *SCWA Analysis of Phase I and Phase II Recycled Water Distribution Systems,* (HydroScience).

Table 5-6. Detail of Recycled Water Facility Component

Facility Element	Required Facilities	Capital Costs (Millions of Dollars)
RF1. Recycled Water	• Transmission • Storage • Booster Pumps • Distribution System	Phase 1 (2 mgd) - $6.6 Phase 2 (5 mgd) - $7.8

SECTION 6 - EVALUATION OF WATER SUPPLY ALTERNATIVES

6.1 INTRODUCTION

The purpose of this section is to combine the water supply sources and capital facilities discussed in Section 5 -*Water Supply Sources and Facilities* into water supply program alternatives. These alternatives will then be evaluated and, based on this evaluation; an alternative will be selected for implementation.

6.2 ALTERNATIVE FORMULATION

The Zone 40 water supply alternatives consist of a combination of water supply sources and facilities that provide a yield sufficient to meet SCWA's Water Forum build-out demands. Each alternative is comprised of water sources and facilities that are implemented over the planning period. The criteria used are described below.

Alternatives Formulation Criteria

One of the two objectives of the *Water Forum Agreement* is to, "Provide a reliable and safe water supply for the region's economic health and planned development to the year 2030." Accordingly, the Zone 40 alternatives were developed to meet the water supply objectives defined in SCWA's PSA. The criteria listed below are based on the provisions of the Water Forum to provide sufficient water for the needs of water users, to provide for the maximum beneficial use of the water, and to ensure that long-term depletion of groundwater does not occur.

Criterion 1 - Meet Water Demands. This criterion requires that each alternative meet projected water demands in Zone 40 under build-out conditions. As described in the *Water Forum Agreement* and Section 2 - *Water Demands,* build-out conditions occur in the year 2030 with projected annual demands of approximately 113,100 AF/year (see **Table 2-1**).

The 113,100 AF/year represents average annual conditions. Application of average annual demands to the design of a water system requires modifying the average demands to reflect seasonal and daily variations. July and August are typically the hottest months of the year due to increased demands for landscape irrigation. SCWA has conducted studies and tracked average month, maximum day, and peak water demands over a period of time to determine appropriate multipliers to increase estimated average annual demands. These water demand scenarios are discussed in more detail below:

Average Annual Demand. Average annual demands are generally used to evaluate the adequacy of existing water supplies over the range of hydrologic conditions. These demands are determined by applying the land use water demand factors.

Average Monthly Demand. This demand scenario is generally used to evaluate surface water diversions that are subject to a range of conditions that constrain diversion amounts on a monthly basis. In addition, this demand scenario is used in the design of a true surface water-groundwater conjunctive use water system in which more expensive surface water facilities are designed to accommodate the more sustained average monthly demands and groundwater facilities (or other supplemental supplies) are used to meet the shorter duration maximum day demands as described below. These demands are determined by multiplying the Average Annual Water Demand by a monthly multiplier. July is the maximum water demand month, with a multiplier of 1.56.

Maximum Day Demand. This demand scenario typically occurs during the hottest month of the year and represents the hottest days within that month. Water Treatment facilities and designed to accommodate these demands by delivering water to storage reservoirs when demands are below maximum day. This water is used, along with directly treated water, to meet maximum day demands. Regional treated water conveyance systems (i.e., large pipelines) may also be designed using this demand scenario. The maximum day demand multiplier is 2.0.

Peak Hour Demand. This demand scenario occurs during a maximum day event and represents the maximum hour within that day. This demand scenario is used for the design of storage and local water and conveyance pipelines. Peak hour demands are 2.0 times maximum day demands.

Criterion 2 -Provide for Beneficial Water Use. This criterion requires that alternatives ensure that water is used beneficially and efficiently. *Beneficial Use* is a key requirement of California water rights law. As such, a base level of recycled water and conservation are included as common components in all alternatives.

Recycled Water - As discussed in Section 5 -*Water Supply Sources and Facilities*, 4,400 AF/year of recycled water will be used to meet non-potable demands by 2030. Sacramento Regional County Sanitation District ("SRCSD") has constructed a 5 mgd tertiary treatment facility at the Sacramento River Wastewater Treatment Plant and will wholesale recycled water to SCWA for use in the southwest portion of Zone 40. It is expected that this facility will begin operations in 2003. A 5 mgd expansion to the tertiary treatment facility is contemplated in the next several years.

Conservation - SCWA is committed to a comprehensive water conservation plan based on USBR guidelines and the *Water Forum Agreement*. The plan provides for full implementation of 16 conservation BMPs by 2010. As a result, water conservation is expected to reduce unit demand by 25.6 percent relative to 1990 use patterns (**Appendix D**).

Criterion 3 -No Long-Term Depletion In Groundwater Storage. As part of the Water Forum process, various stakeholder groups (agriculture, municipal and industrial, self-supplied pumpers, and environmental groups) negotiated sustainable yields for each of the three groundwater sub-basins within Sacramento County. The negotiated long-term average annual pumping yield for the Central Sacramento Groundwater Basin was set at 273,000 AF/year. Of the 273,000 AF/year, an estimated 40,900 AF/year is available for M&I pumping by Zone 40 (see **Section 3.3 *Sustainable Groundwater Yield*** for details).

Water Supply Alternatives

Three water supply alternatives were formulated based on the above criteria and the water supply sources and facilities identified in Section 5. Each alternative (and corresponding surface water facility components) is listed and discussed below (water supply sources, groundwater facilities, and recycled water facilities are identical in each alternative). Facility capacities presented are based on the capacity requirements to meet maximum day demands. All alternatives include redundant capacity for emergency use.

Alternative No. 1 - SCWA Freeport. In this alternative, SCWA would construct a surface water treatment facility on or near the Sacramento Regional County Sanitation District's Regional Wastewater Treatment Plant site's "buffer lands." A diversion structure would be constructed near the community of Freeport on the Sacramento River and connect to the proposed treatment facility.

Treated water pipelines would be constructed to connect the proposed surface water treatment facility to the Zone 41 service area at three locations: Franklin Boulevard (Freeport Conveyance Pipeline – "FCP") (FCP-01), Power Inn Road (FCP-02), and at Bruceville Road (FCP-03).

Enhanced surface water deliveries to the Laguna area are through a pipeline on Franklin Boulevard (CP-01). Delivery of surface water to the Vineyard area would require additional pipeline along Calvine Road (FCP-04) and along Elk Grove-Florin Road (FCP-05 and FCP-06). Deliveries to the northern portion of the service area would require pipelines along Elder Creek Road (Conveyance Pipeline – "CP") (CP-02 and CP-03), along Excelsior Road to Eagles Nest Road via Kiefer Road (CP-04), and to Sunrise Boulevard (CP-05). See **Figure 6-1** for a schematic layout of these pipelines.

Alternative No. 2 - Freeport Regional Diversion Project. In this alternative, SCWA and EBMUD would jointly construct a diversion structure near the community of Freeport on the Sacramento River and a raw water pipeline (Joint Conveyance Pipeline – "JCP") (JCP-01) from the diversion structure to the vicinity of Bradshaw and Gerber Road. EBMUD would continue their pipeline on to the Folsom South Canal.

SCWA would construct a surface water treatment facility in the vicinity of Bradshaw Road and Gerber Road. This facility would be supplied with surface water via a turnout from the aforementioned raw water pipeline (Central Conveyance Pipeline – "CCP") (CCP-01).

Enhanced surface water deliveries to the Laguna area are through a pipeline on Franklin Boulevard (CP-01). Delivery of surface water to the Vineyard area would require additional pipeline along Bradshaw Road (CCP-02 and CCP-03). Deliveries to the northern portion of the service area would require pipelines along Elder Creek Road (CP-02 and CP-03), along Excelsior Road to Eagles Nest Road via Kiefer Road (CP-04), and to Sunrise Boulevard (CP-05). See **Figure 6-2** for a schematic layout of these pipelines.

Alternative No.3 - SCWA/City of Sacramento Joint Project. In this alternative SCWA would purchase 70 mgd of dedicated capacity at the City's SRWTP. A treated water pipeline would be constructed from the plant to the Zone 41 service area at Power Inn Road (Sacramento Conveyance Pipeline – "SCP") (SCP-01 and SCP-02), at Bruceville Road (SCP-03), at Elder Creek Road (SCP-04), and at Franklin Boulevard (SCP-05).

Deliveries to the northern portion of the service area would require pipelines along Elder Creek Road (CP-02 and CP-03), along Excelsior Road to Eagles Nest Road via Kiefer Road (CP-04), and to Sunrise Boulevard (CP-05). See **Figure 6-3** for a schematic layout of these pipelines.

Figure 6-1. Alternative No. 1- SCWA Freeport

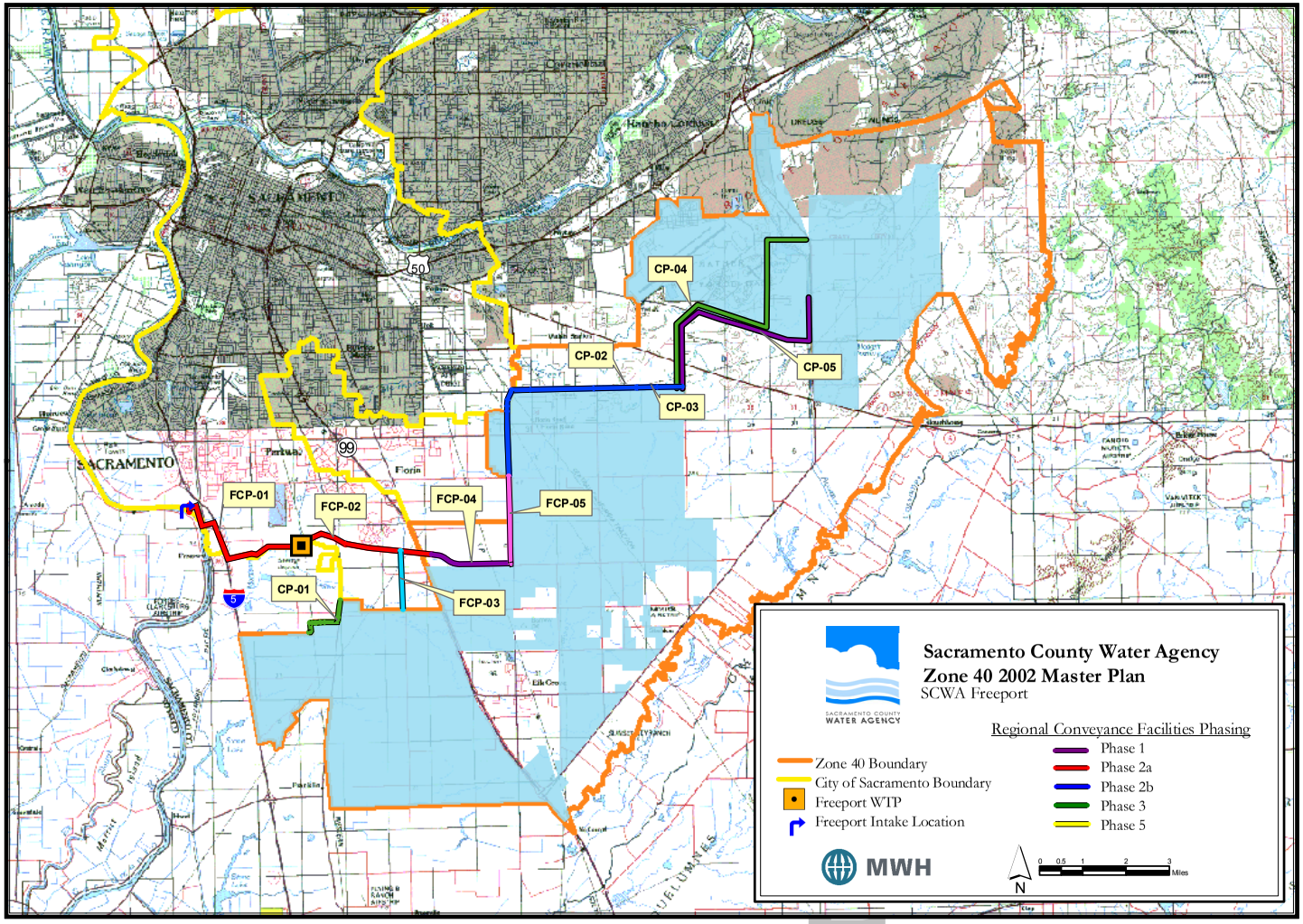


Figure 6-2. Alternative No. 2- Freeport Regional Diversion Project

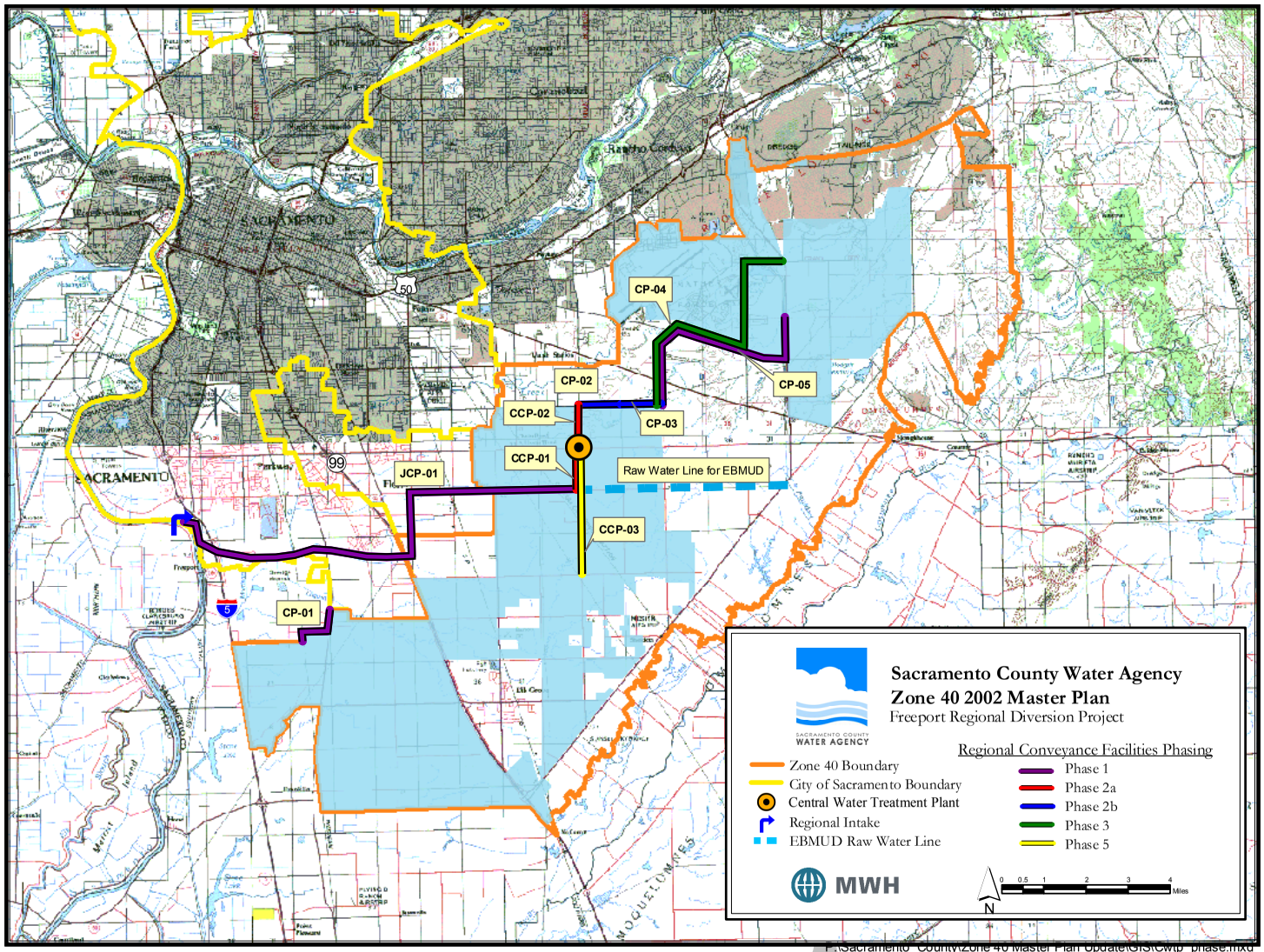
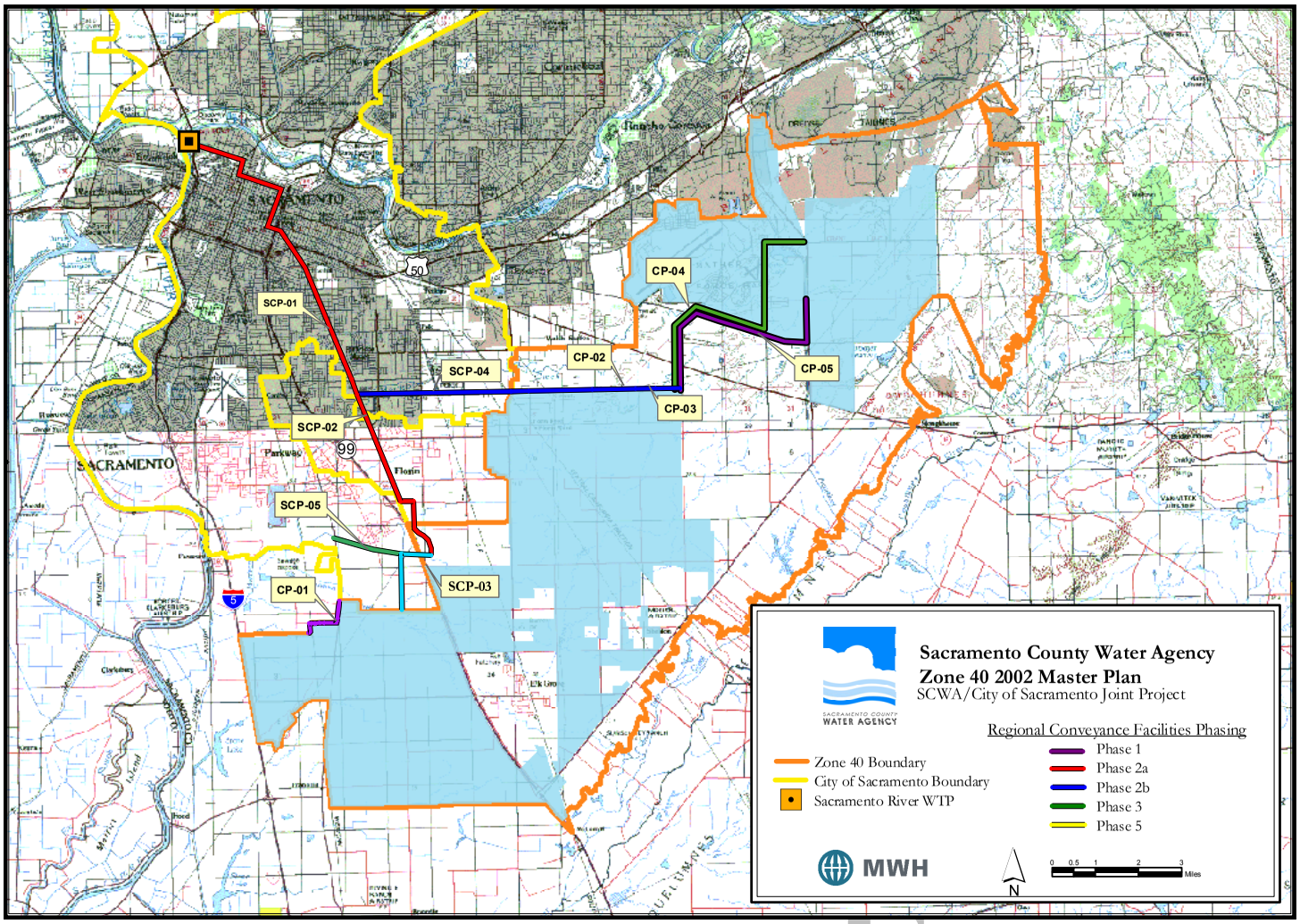


Figure 6-3. Alternative No. 3- SCWA/City of Sacramento Joint Project



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6.3 ALTERNATIVE EVALUATION

An evaluation of the three alternatives is described below. Each alternative satisfies the formulation criteria: (1) provides sufficient yield to meet ultimate build-out demands; (2) utilizes a base level of reclamation and conservation; and (3) maintains the long-term average groundwater pumping at 40,900 AF/year. In order to determine a preferred alternative, each is further evaluated based on a second set of evaluation factors.

Evaluation Factors

The evaluation factors have been grouped into the following categories:

- Reliability
- Flexibility
- Implementability
- Environmental Feasibility
- Cost

The following provides an overview of these categories and how they apply in the evaluation of the water supply alternatives.

Reliability. Service interruption may be caused by a number of factors: natural catastrophic events; man-made hazards, such as toxic spills; interruptions of service due to mechanical or electrical failure, and operational error. Although these events are unpredictable, the susceptibility to such events can be assessed.

Flexibility. Because of the complex water planning environment that affects the development of any long-term water management program, the configuration of alternatives should be adjustable. The ability to adjust the size and timing of component elements within an alternative to respond to changes in water requirements, economic conditions, governmental regulations, and the activities of other water supply agencies, is a desirable feature of any alternative.

The ability to implement an alternative in phases greatly enhances flexibility and is more amenable to optimization based on economic and financial considerations. Some elements, such as those involving wells and water treatment, can be relatively easily constructed in increments; whereas, staging of tanks and major pipelines are more difficult.

Implementability. The ease with which a component of an alternative can be brought on line at the time required is a function of (1) the extent of participation of other agencies, (2) the technical certainty associated with it, (3) the number of permits required, (4) the environmental impacts, and (5) public perceptions.

The level of difficulty encountered by SCWA is directly related to the required involvement by other agencies and institutions. Any alternative consisting of well-defined elements avoids time delays devoted to establishing element configuration.

Permits to construct, implement, and operate management elements may be required from numerous local, regional, state, and federal governmental agencies: the City and County of Sacramento, utility companies, RWQCB, SWRCB, the California Division of Safety of Dams, Caltrans, Department of Fish and Game, DHS, Fish and Wildlife Service, the Army Corps of Engineers, USBR, and others. The effort required for numerous permits increases the difficulty of implementing an alternative.

Environmental Feasibility. Acceptable alternatives should not have any major environmental impacts or significant mitigation costs. Environmental impacts that require significant environmental mitigation will have economic impacts and will require adequate lead time to develop acceptable mitigation measures. Such measures must be negotiated with governmental agencies and concerned environmental organizations.

Cost. A commitment to use SCWA funds or bond will require the water supply alternative to be cost effective. Such funds could be required to implement additional water conservation; purchase lands; construct treatment, storage and conveyance facilities; operate and maintain these facilities; and rehabilitate facilities periodically to achieve a required life. In order to compare the economic efficiency of the three alternatives, planning level estimates of the total capital costs and unit costs (i.e., cost per acre-foot of water supplied) were developed. The capital cost for each alternative was based largely on costs developed for the water supply elements and facility elements, as described in Section 5 -*Water Supply Sources and Facilities*. (Unit construction costs for facilities are detailed in **Appendix G**.) All capital costs include 35 percent for engineering, administration, and contingency.

The unit costs developed for each alternative include annual operations and maintenance costs, raw water acquisition costs and capital recovery costs. Raw water acquisition costs include the annual cost of purchasing the raw water from the City of Sacramento, USBR, SMUD, or others as appropriate.

Capital recovery costs are based on an assumed average facility life of 40 years with a five percent discount rate. Although the facilities in the alternatives may have different life spans and the discount rate does not include an inflation rate, these variables should provide adequate information for comparison of alternatives. Once a preferred alternative is selected, a detailed financial analysis will be performed and the unit cost developed in this analysis will be refined during the financial analysis.

Alternative Evaluation

Each alternative was evaluated based on the factors described above and a "low," "medium," or "high" rating was given to each alternative for each of the non-economic evaluation factors. A high rating represented a very favorable situation, a medium rating represented a moderately favorable situation and a low rating describes a generally unfavorable situation. A low, medium, or high rating was then assigned to each of the overall non-economic evaluation categories (reliability, flexibility, implementability, and environmental feasibility).

Each alternative was also evaluated on cost effectiveness (total capital cost and unit cost). A common component to each alternative is groundwater capacity, which includes both new wells and treatment facilities, and recycled water. Each alternative also requires surface water treatment and conveyance, but there are three surface water treatment facility options: Freeport, Central, and Sacramento River. Costs have been developed for each of the treatment/conveyance options for each of the alternatives and a preferred alternative selected.

Capital and unit costs for each alternative are summarized in **Table 6-3**. The evaluation of each of the alternatives is described below and summarized in **Table 6-4**.

Table 6-3. Alternatives Cost Summary

Capital Facility	Alternative Capital Costs ($ Million Dollars)[1]		
	1 SCWA Freeport	**2 Freeport Regional Diversion Project**	**3 SCWA/City Joint Project**
SCWA Z40 Water Treatment Plant Capacity	$242	$316	$162
Groundwater Production Facilities	$215	$215	$215
Regional Surface Water Conveyance Pipes	$40	$26	$111
Transmission Mains	$116	$119	$117
Conservation	$19	$19	$19
SCADA	$3	$3	$3
Recycled Water	$18	$18	$18
Surface Water Supplies	$11	$11	$11
Total Capital Cost	**$662**	**$726**	**$655**

Notes: 1. Capital costs are 2002 dollars and include engineering, overhead, and construction contingency.

Alternative No. 1 - SCWA Freeport. Because of potential shortages in surface water supplies, the overall reliability of this alternative is rated as medium. However, because of the relative ease in phasing each of the facility components, and the potential for expansion of the facility components, the flexibility of this element is considered to be high. The overall implementability of this element is also rated as high, primarily due to the high level of control that SCWA has over implementation. No significant environmental constraints were identified for this alternative.

Alternative No. 2 - Freeport Regional Diversion Project. The overall reliability of this alternative is rated as medium, primarily due to the potential for cutbacks in the surface water supplies. The overall flexibility of this alternative is rated as high. While portions of this alternative are completed in conjunction with EBMUD, the overall implementability of this element is rated as high due to the high level of control that SCWA will retain over implementation. No significant environmental constraints were identified for this alternative.

Alternative No. 3 - SCWA/City of Sacramento Joint Project. The overall reliability of this alternative is rated as medium, primarily due to the potential for cutbacks in surface water supplies. The overall flexibility of the alternative was rated low, because many aspects of the project will be dictated by the needs of the City (i.e., plant expansion/phasing constraints, pipeline routing constraints, etc.). The implementability of this alternative was rated as low, primarily due to the many unknowns and constraints associated with routing and constructing large diameter pipelines through downtown Sacramento. No significant environmental constraints were identified for this alternative.

Table 6-4. Alternative Evaluation Summary

Alternative	Evaluation Factors				
	Reliability	**Flexibility**	**Implementability**	**Environmental Feasibility**	**Cost Effectiveness**
Alternative 1 – SCWA Freeport	Medium	High	High	Medium	$662 M
Alternative 2 – Freeport Regional Diversion Project	Medium	High	High	Medium	$726 M
Alternative 3 – SCWA/City Joint Project	Medium	Low	Low	Medium	$655 M

6.4 SELECTED ALTERNATIVE

Based on the alternative evaluation summarized in **Table 6-4**, Alternative 2 – *Freeport Regional Diversion Project* is selected as the preferred alternative for the purpose of preparing a financial analysis and defining a water management program for the Master Plan.

6.5 PHASING OF WATER SUPPLY FACILITIES

The discussion below describes the phasing of the specific components of the preferred alternative. In general, the phasing of these components have been developed to match (or exceed) projected water demands. The projected demands are documented in **Section 2 -*Water Demands*** and are assumed to increase linearly from the present (2002) to GP build-out (2024), and at a slightly lesser linear rate from GP build-out to Water Forum build-out (2030). The projected buildup of maximum day demands in Zone 40 is presented in **Figure 2-4**.

Implementation of some of the recycled and surface water components is constrained by the timing of availability of either the water sources or the facilities to treat and convey the water. In addition, because of the potential deficiencies in the surface water supplies in dry and critically dry years (up to 25 percent for SMUD and "Fazio" water, and up to 100 percent for Appropriative and Other surface water), groundwater production facilities are phased to provide for adequate production capacity under minimum surface water delivery conditions. A recommended implementation schedule of surface water facilities for the selected alternative is presented in **Table 6-5** and discussed below.

Surface Water

The preferred alternative calls for SCWA to ultimately secure 87,300 AF/year of surface water entitlements from a variety of supply sources including, SMUD 1 and 2 water, "Fazio" water, American River POU water, Appropriative water, and Other Water Supplies. Surface water will be treated at a new surface water treatment facility constructed by SCWA with an ultimate treatment capacity of 85 mgd.

The surface water supply component of the selected alternative will also require the installation of a number of water transmission lines necessary to maximize the use of surface water throughout Zone 41. Phasing for these pipelines can be found in **Table 6-5**.

Groundwater

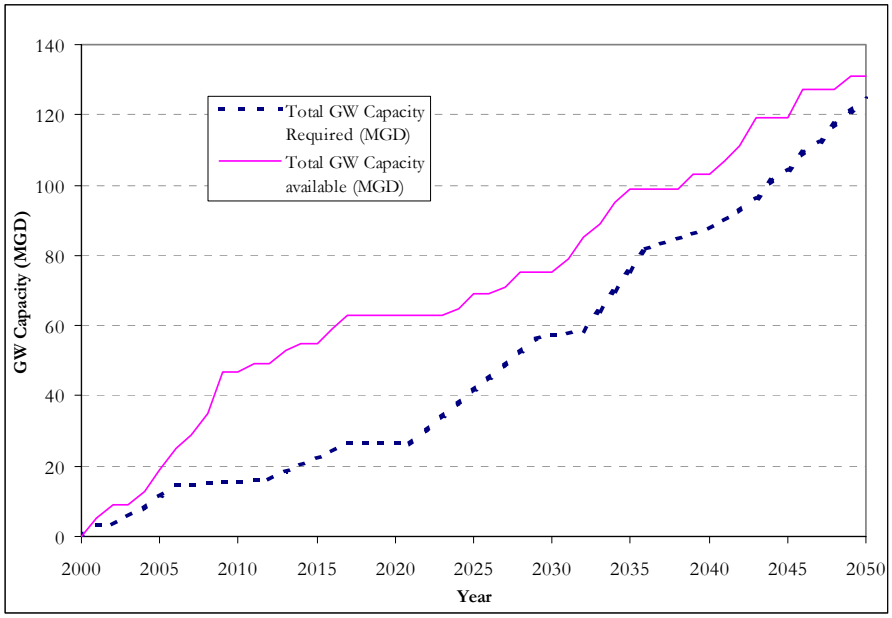
Groundwater production capacity of approximately 126 mgd is required to meet 2030 maximum day demands and to provide adequate water supplies in periods of surface water reductions in dry years. This is based on a total 2030 maximum day need of approximately 193 mgd and 15 percent (29 mgd) of backup production. A total of approximately 75 new wells will ultimately be constructed in Zone 40. Groundwater will also require treatment for iron, and manganese (and possibly radon and arsenic depending on future drinking water regulations). Typically, groundwater treatment is provided at 10 mgd treatment plants served by approximately six wells.

Table 6-5. Facility Phasing Summary

Facility ID	Project	Description	Participating Agency(s)	Distance	Capacity
Phase 1 Projects (2002-2007)					
CP-01	Franklin Inter-tie to Dwight Rd Tank	Water transmission main pipe (24-inch)	City/SCWA	1.6 miles	10 MGD
CP-04	Excelsior and Florin Rds to Sunrise Blvd (Anatolia Development)	Water transmission main pipe (30-inch)	SCWA	5 miles	10 MGD
JCP-01	Freeport Intake to corner of Bradshaw Rd and Gerber Rd	Raw water transmission main pipe (96-inch)	EBMUD/SCWA	12 miles	185 MGD
Intake	Regional Intake	In-River Intake structure	EBMUD/SCWA	n.a.	185 MGD
Recycled Water	Recycled Water Phase 1 and Phase 2	Phase 1 - Pipelines 2 MGD (1,000 AF/year) Phase 2 - Pipelines, Storage, and Booster Facilities 5 MGD (4,400 AF/year)	SRCSD/SCWA	n.a.	2 MGD
Phase 2a Projects (2007-2019)					
CCP-01	JCP-01 to Central WTP	Raw water transmission main pipe	SCWA	1 mile	85 MGD
Central WTP	Central WTP and Forebay Phase 1	Water Treatment Plant (20 MGD)	SCWA	n.a.	20 MGD
CCP-02	Central WTP to Elder Creek Rd and Bradshaw Rd	Water transmission main Pipe (60-inch)	SCWA	1 mile	65 MGD
Phase 2b Projects (2019-2021)					
CP-02	Bradshaw and Elder Creek Rds east along Elder Creek Rd	Water transmission main Pipe (60-inch)	SCWA	1 mile	80 MGD
CP-03	East along Elder Creek Rd to Excelsior Rd	Water transmission main Pipe (54-inch)	SCWA	1 mile	60 MGD
Central WTP	Central WTP Phase 2	Water Treatment Plant (20 MGD)	SCWA	n.a.	40 MGD
Phase 3 Project (2021-2030)					
CP-05	Kiefer and Eagles Nest Rds to Sunrise Blvd and Douglas Rd	Water transmission main pipe	SCWA	1 miles	10 MGD
Phase 4 Projects (2030-2035)					
Central WTP	Central WTP Phase 3	Water Treatment Plant (15 MGD)	SCWA	n.a.	55 MGD
Phase 5 Projects (2035-2040)					
CCP-03	Central WTP to Bradshaw and Calvine Rds	Water transmission main pipe (36-inch and 24-inch)	SCWA	2 miles	40 MGD
Central WTP	Central WTP Phase 4	Water Treatment Plant (15 MGD)	SCWA	n.a.	70 MGD
Phase 6 Project (2046-2050)					
Central WTP	Central WTP Phase 5	Water Treatment Plant (15 MGD)	SCWA	n.a.	85 MGD

There is more flexibility in implementing groundwater facilities than surface water or recycled water facilities. SCWA controls the design and construction of wells and treatment plants and these facilities can be phased in on an "as needed" basis. For planning purposes, the phasing of groundwater production facilities has been developed in 2 mgd increments to match increases in system demand. Based on the projected increase in maximum day demands and the construction of recycled and surface water treatment facilities (in the years 2003 and 2010, respectively), additional groundwater treatment production facilities (with 10 mgd capacities) will be required throughout the planning period as shown in **Figure 6-4**. The phasing of these facilities is based on providing for maximum day demands under minimum surface water availability conditions (i.e., 25 percent deficiency for SMUD and "Fazio Water," and 100 percent deficiency for water transfers and intermittent flows). The phasing provides for a two year lead time between when the facilities are to come on-line and when they will actually be required.

Figure 6-4. Future Phasing of Groundwater Production Facilities



Recycled Water

The preferred alternative includes approximately 4,400 AF/Year of recycled water from a wastewater reclamation project for landscape irrigation in the Laguna, East Franklin, and Laguna Ridge areas of Zone 40. This project is part of a 10 mgd Urban Use project being implemented by the SRCSD. The first phase of this project (2 mgd) will come on-line in 2003.

Transmission and Storage System

Zone 40's 2030 transmission and storage system requirements are based on a computerized system model (Cybernet) and have been developed separately from this Master Plan. Because water supply for Zone 40 is a combination of groundwater and surface water supplies, the transmission system has been sized to accommodate supplies from both sources and includes over 250,000 feet of pipe.

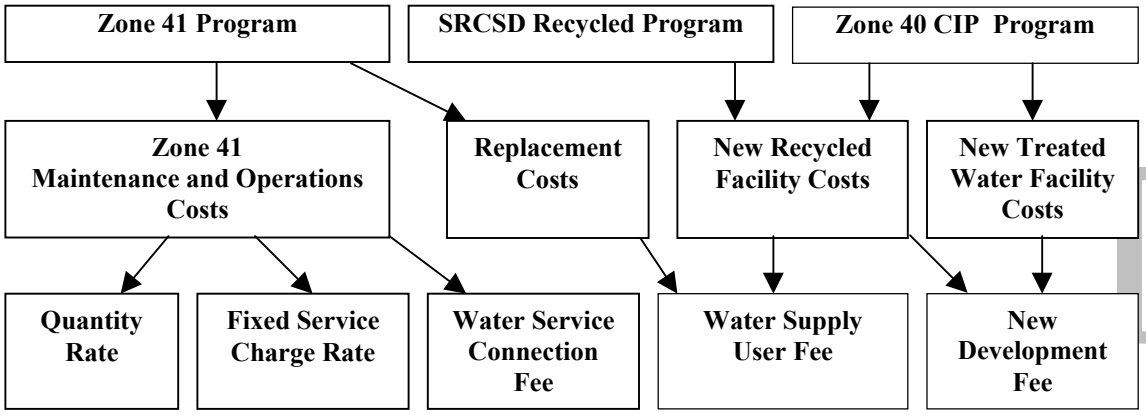
In addition, storage facilities are sized to meet peak hour and emergency demands. Based on modeling results, 24 additional storage facilities will be required in Zone 40. These facilities will have storage capabilities of approximately 0.35 to 7 million gallons for a total storage capacity of approximately 70 million gallons.

SECTION 7 - FINANCIAL ANALYSIS

A critical element of the Master Plan is the ability to pay for facilities as they are needed. Historically, Zone 40 has paid for water facilities using a "pay-as-you-go" system where facilities are constructed by SCWA or by a developer (and reimbursed by SCWA). With developer constructed facilities, payment (reimbursement) is made through fee credits where the reimbursement amount is deducted from the amount of fees owed, or through direct reimbursement upon acceptance of the facilities by SCWA. SCWA constructed facilities, such as groundwater treatment plants, have historically been paid for through accumulated reserves.

Revenue for SCWA is authorized through Water Agency Ordinance No. 18 ("Ordinance 18") that provides for the collection of new development fees and monthly user fees. New development fees are based on equivalent dwelling units ("EDUs") and, for commercial users, acreage of developed land area. All residential and commercial developers pay a portion of the development fee upon approval of improvement plans and the remaining portion at the time a water connection permit is issued. In addition to the development fee, all retail customers pay a monthly user fee. Per the terms of a Recycled Water Agreement between SRCSD and SCWA, part of the user fee collected from recycled water customers is transferred to SRCSD for funding of the tertiary treatment facilities. **Figure 7-1** illustrates the revenue stream for construction of new capital facilities.

Figure 7-1. Conceptual Financial Model



7.1 FINANCIAL BACKGROUND

Per Ordinance 18, the Zone 40 development fee is adjusted annually for inflation; the index is the average Engineering News Record Construction Cost Index ("ENR/CCI") for San Francisco and the 20 Cities as published in the January edition of the Engineering News Record each year. The development fee has also been increased in response to new programs or design standards that increase the total capital cost of system facilities. A plot of development fees vs. time is shown in **Figure 7-2**. The monthly user fee had not been adjusted until 2002 when the SCWA Board approved the first of three planned 10 percent increases.

Figure 7-2. Development Fee History

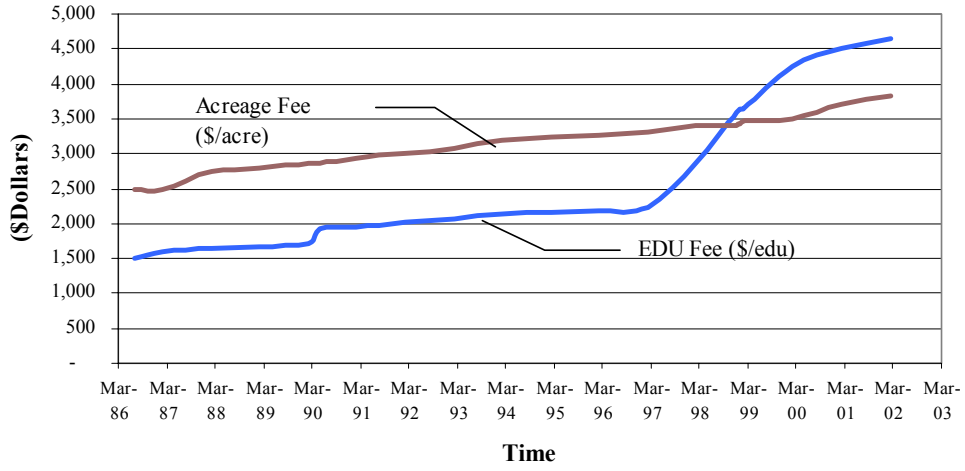


Figure 7-2 illustrates the gradual increase in fees with inflation. The acreage fee has incurred only inflationary increases. In March of 1990, the EDU development fee increased to account for groundwater treatment requirements. Then, from 1998 through 2000, the EDU development fee underwent significant increases to pay for costs related to: 1) land acquisition; 2) deep well construction; 3) surface water acquisition; 4) outside services related to billing and mapping; 5) changed assumptions in revenue sources; 6) water conservation; 7) System Control and Data Acquisition ("SCADA") systems used to automate operations of water facilities; 8) recycled water systems; and 9) lost revenues from the Sacramento County Fee Deferral and Waiver Program.

The EDU development fee is calculated for each connection based on the size of the water meter and funds construction for all Zone 40 water facilities necessary to deliver water. The acreage development fee portion is paid only by commercial connections to fund facility capacity required for higher levels of commercial fire protection.

7.2 ZONE 40 FINANCIAL PLANNING

Financial planning for the future must consider many variables, some within the control of SCWA and others that are not. New development within Zone 40 requires new water facilities to meet increasing water demands. SCWA must also secure and deliver surface water as part of a conjunctive use program. Planning for new growth and planning to optimize surface water affects the timing of facility construction relative to the revenue. The revenue stream that is generated as growth occurs is inadequate to fund the construction of larger surface water projects and therefore debt financing is required for this element of the planned water supply system.

In order to assist in the comparative evaluation of the various options, estimates of probable capital cost have been developed for the preferred water supply alternative. Capital cost is examined in three different ways: 1) total capital cost in today's dollars, 2) total development fee per equivalent dwelling unit, and 3) total cost over the planning period including the cost of bonded debt.

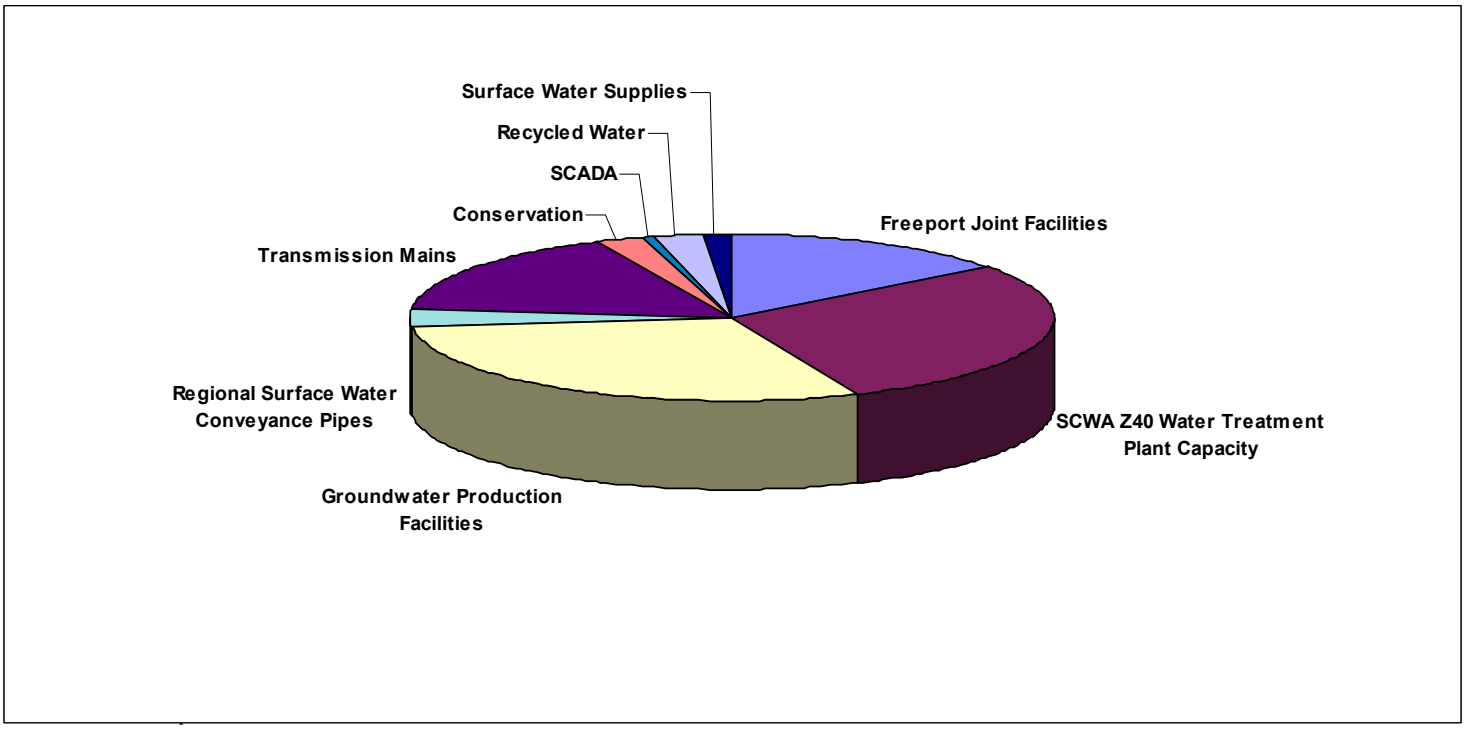
Capital Cost Estimates

An estimate of cost for each of the Zone 40 facilities is based on similar facilities constructed in the Sacramento area during the last five years. Costs are adjusted to account for inflation from the time of construction to present. The costs presented in **Table 7-1** are total capital costs in 2002 dollars and include a percentage breakdown of costs (see **Figure 7-3**) to illustrate how costs are split between the major capital elements of Zone 40.

Table 7-1. Total Capital Cost Estimates for Water Supply Alternative 2

Cost Item	Total Capital Cost (2002 Dollars)	Percentage Breakdown
Freeport Joint Facilities	$ 106,858,000	14.7%
SCWA Z40 Water Treatment Plant Capacity	$ 209,555,000	28.8%
Groundwater Production Facilities	$ 214,555,000	29.5%
Regional Surface Water Conveyance Pipes	$ 25,639,000	3.5%
Transmission Mains	$ 119,347,000	16.4%
Conservation	$ 18,656,000	2.6%
SCADA	$ 2,953,000	0.4%
Recycled Water Facilities	$ 17,896,000	2.5%
Acquisition of Surface Water Supplies	$ 11,075,000	1.5%
Total Capital Cost	**$ 726,534,000**	**100%**

Figure 7-3. Breakdown of Zone 40 Capital Costs



The funding implications of the preferred alternative are identified by spreading the proposed capital projects over a 50-year timeline, phased according to need. The 50-year timeline is used only for financial purposes to model a slower growth scenario than the planned 2030 build-out. A slower growth rate is considered to be more conservative as it relates to paying for facilities and bonded indebtedness. The facilities constructed over the 50-year timeline are identical to 2030 facilities described in **Section 5**.

The phasing of water facilities is commensurate with increased water demands. Required groundwater capacity fluctuates in response to added increments of surface water capacity and increased water demand. The timing of surface water projects reflects the following goals: 1) not exceed SCWA's Zone 40 sustainable groundwater yield; 2) meet development needs for water supply in a timely manner; and 3) achieve SCWA's desire to stabilize rates and minimize development fees.

The financial model used in this analysis spreads the capital costs presented in **Table 7-1** over the 50-year planning period according to the phase diagram. Inputs to the financial model include: growth rates, inflation, cost of debt, bond amounts, development fees, and user fees. Each input is set according to current planning assumptions.

Use of debt financing allows for timely construction of needed facilities and spreads the cost over the entire planning period. For larger facilities, such as the surface water treatment plant or major conveyance pipelines, SCWA can not collect sufficient revenues in the timeframe needed without charging excessively high development fees. The financial model is used to run various debt financing alternatives to spread the capital costs over the planning period.

Figure 7-4 provides an example of expenditures and revenues with the large revenue spikes depicting the issuance of bonds for debt financing of large capital projects. **Figure 7-5** depicts SCWA's Zone 40 reserve balance over the same period illustrating the cycling of the fund balance with the larger projects, and an end fund balance close to zero representing that monies collected over the planning period are spent.

Figure 7-4. Zone 40 Expenditures and Revenues Over 50-year Planning Period
(Actual Year Dollars)

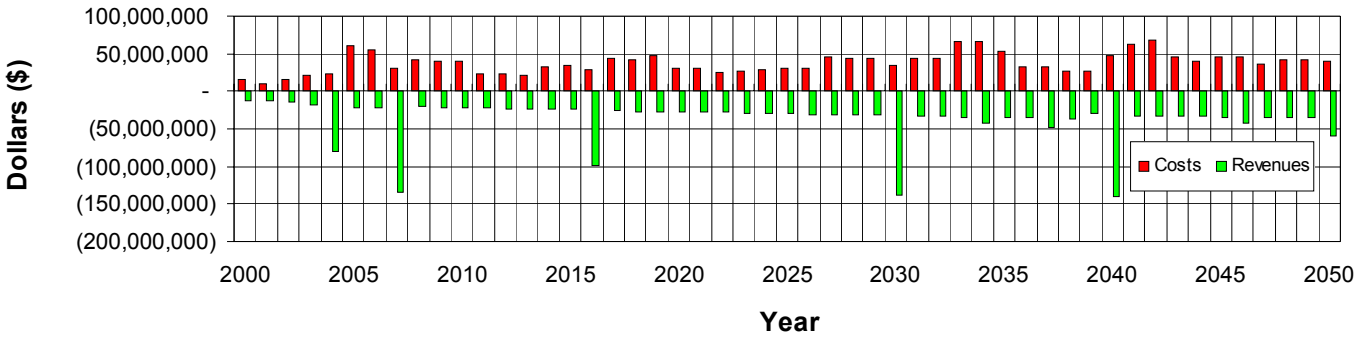
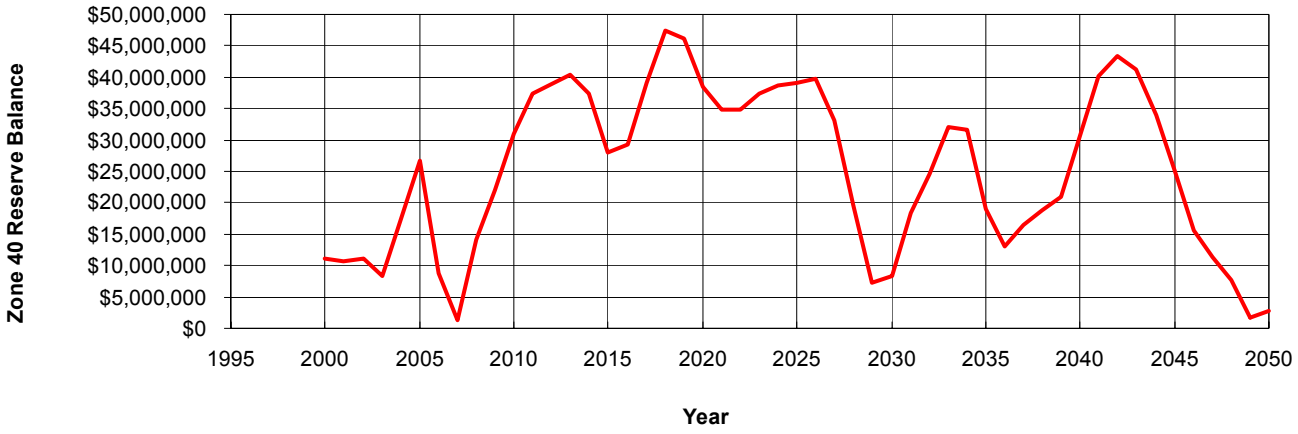


Figure 7-5. Zone 40 Reserve Balance Over 50-year Planning Period
(Actual Year Dollars)



Development Fees

The development fee is one indicator of an acceptable capital program. The fee should be comparable with the cost of developing water supplies in other communities. The planning assumptions used in this analysis are presented in **Table 7-2**. Growth rates are consistent with the level of growth seen in SCWA's service area over the period from 1998 to present and projected build-out at year 2050. The fee needed for three different Bond/Fee scenarios is presented in **Table 7-3**.

- Scenario 1 includes a two phased increase in the Development Fee resulting in 48% increase in fees over the next two years.
- Scenario 2 assesses the Development Fee if a one time increase is made next year.
- Scenario 3 considers a one time increase in the Development Fee and includes an inflationary increase in the user fee after 2004.

Table 7-2. Financial Planning Assumptions

Financial Assumptions	
Bond Payment Interest	6.00%
Bond Issue Costs	1.25%
Inflation	2.00%
Z40 Reserve & Bond Reserve Interest Earning	5.00%
Growth Assumptions	
EDU Growth Rate (edu/year) From 2000 to 2007	2,500
From 2008 to 2050	2,000
Commercial Acreage Growth Rate (acres/year)	60

Table 7-3. Development Fee Comparison (2002 Dollars)

	Bond/Fee Scenario 1			Bond/Fee Scenario 2			Bond/Fee Scenario 3		
	Amount ($)	Issuance Year	Term (Years)	Amount ($)	Issuance Year	Term (Years)	Amount ($)	Issuance Year	Term (Years)
Bonded Debt									
Bond 1	$60,000,000	2003	30	$100,000,000	2005	30	$60,000,000	2004	30
Bond 2	$110,000,000	2005	30	$110,000,000	2008	30	$100,000,000	2006	30
Bond 3	$60,000,000	2010	30	$60,000,000	2018	30	$100,000,000	2011	30
Bond 4	$100,000,000	2017	20	$66,000,000	2030	20	$100,000,000	2025	25
Bond 5	$100,000,000	2029	10	$55,000,000	2034	15	$100,000,000	2036	14
Development Fee									
Current Fee	$4,642			$4,642			$4,642		
Needed Fee (Phase 1)	$6,034	2003		$7,886	2003		$7,520	2003	
Needed Fee (Phase 2)	$8,539	2004		$0	0		$0	0	
Overall Fee Increase (%)	84%			70%			62%		
User Fee									
Current Fee	$5.50	2002		$5.50	2002		$5.50	2002	
Needed Fee	$6.05	2003		$6.05	2003		$6.05	2003	
Needed Fee	**$6.66**	**2004**		**$6.66**	2004		**$6.66**	2004	
User Fee Inflated After 2004	No			No			Yes		

SECTION 8 - ZONE 40 IMPLEMENTATION PLAN

This section reviews the key steps in the implementation process of Zone 40's surface water and groundwater capital program. The projects projected for construction by SCWA over the next 10 years include: a surface water diversion structure on the Sacramento River; a raw water conveyance pipeline from the diversion structure to the surface water treatment plant; the first phase of a surface water treatment plant; large treated water conveyance pipelines from the treatment plant to the transmission grid; groundwater treatment and storage facilities; and various transmission pipelines.

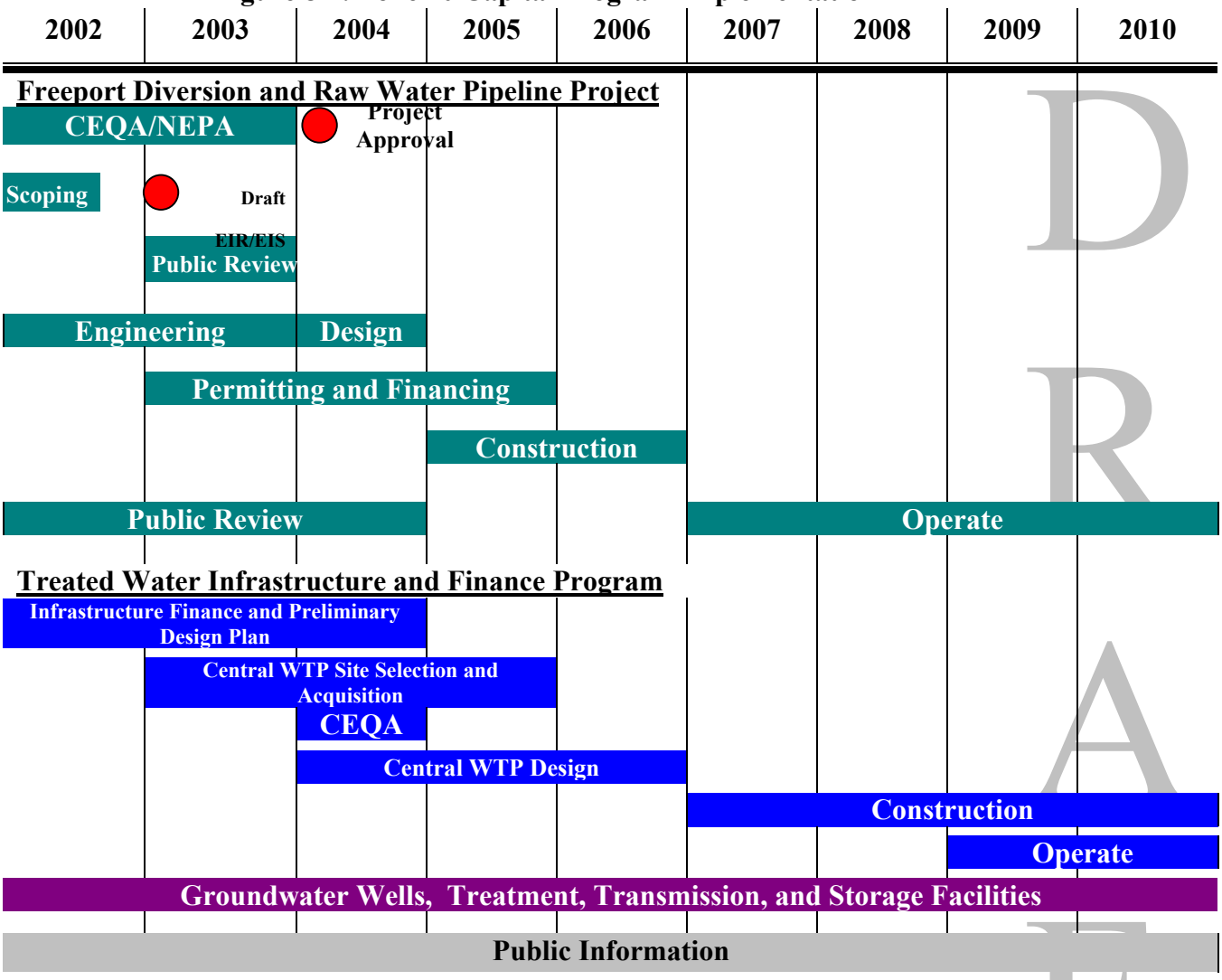
The implementation process for the Master Plan over the next 10 years includes several steps as shown in **Figure 8-1**. The Freeport Regional Water Authority (FRWA) developed between SCWA and EBMUD is currently underway to construct the Sacramento River diversion structure and raw water pipeline. FRWA's efforts are in five main areas: (1) formal state and federal environmental review; (2) public information and outreach; (3) detailed engineering studies and project design; (4) permitting and land acquisition; and (5) construction. As shown on **Figure 8-1**, the implementation process is expected to take up to four to five years to begin construction in 2005 with a target date of 2006 for project operation.

While planning, design, and construction activities occur on surface water facilities, groundwater wells, treatment, transmission, and storage facilities will also need to continue being built to serve areas where large surface water conveyance pipelines are not constructed.

8.1 CEQA/NEPA COMPLIANCE

Because the Zone 40 Master Plan is a long-term water supply program that will be implemented in phases over several years, a programmatic-level of environmental review is appropriate with SCWA as the lead agency. The various aspects of the SCWA projects, such as future plant expansion phases, groundwater systems, and conveyance pipelines will be described to a planning level of detail. Project specific environmental review will take place at the appropriate time to include a comprehensive environmental analysis of all aspects of any proposed project. The results of these analyses will be presented to allow decision-makers, stakeholders, and other interested parties the opportunity to fully understand and comment on the environmental consequences of the proposed projects and alternatives.

Figure 8-1. Zone 40 Capital Program Implementation



SCWA's completion and approval of this Master Plan sets the stage for various facility construction programs to move forward. The FRWA project is currently in the project level environmental review process and will look to the Zone 40 Master Plan for identification of potential impacts. Also, the Master Plan, once adopted, will support an appropriate funding program through Zone 40 development fees.

FRWA will be ready in 2003 to initiate formal environmental review of the proposed Freeport project in compliance with CEQA and NEPA. The FRWA will be lead agency for the CEQA and NEPA process and will direct preparation of an Environmental Impact Report (EIR). The FRWA will prepare, circulate for agency and public review and then complete and certify the EIR in accordance with the CEQA requirements. The FRWA will consider the EIR findings in its consideration of project approval and will adopt the appropriate mitigation requirements from the Final EIR if it elects to approve the project.

The Zone 40 Master Plan also provides the basis for submitting an application to the SWRCB for water rights to divert excess Sacramento River water. The SWRCB is therefore a CEQA Responsible Agency for this project and will rely on the FRWA and the SCWA Zone 40 Master Plan EIRs in making its decision on SCWA's water rights application.

Projects identified in the capital program will require project level review from other state, regional, and/or local agencies that have regulatory authority over aspects of the project. **Table 8-1** summarizes the other agencies that have approval or permit authority over aspects of any proposed capital program.

8.2 NEXT STEPS…

The next phase of work to be completed by SCWA is the development and approval of a finance program that allows for timely implementation of planned water facilities. A detailed capital improvement program will result from this effort.

Table 8-1. Regulatory Agencies and Potential Permit Requirements

AGENCY	ASPECT OF ZONE 40 PROGRAM REQUIRING PERMIT	PERMIT
US Army Corps of Engineers	Discharge of fill in wetlands or waters of the US: construction of the diversion structure in the Sacramento River and pipeline installation.	Clean Water Act 404 permit
	Construction in navigable waters: proposed new diversion structure in Sacramento River	Rivers and Harbors Act - Section 10 permit
US Fish and Wildlife Service	Impact to federally listed endangered species from project construction or operation.	Federal ESA compliance – no jeopardy BO
National Marine Fisheries Service	Impact to federally listed marine endangered species from project construction or operation: construction of the river diversion structure or operation of diversion intake.	Federal ESA compliance – no jeopardy BO
California Department of Fish and Game	Impact to state listed endangered species from project construction or operation.	State ESA – Section 2081 MOU
	Impact or alteration to any stream bed or bank: diversion structure and pipeline construction.	1601 Streambed Alteration Agreement
State Water Resources Control Board	Excess Sacramento River water diversion rights.	State water right
California Reclamation Board	Construction across state levees.	Encroachment permit
Regional Water Quality Control Board – Central Valley Region	Impact to state water quality standards due to impacts to wetlands.	Clean Water Act 401 Water Quality Certification
	Water quality impacts of construction.	NPDES Permit for Construction - Storm Water Pollution Prevention Plan (SWPPP)
Department of Health Services	Drinking water quality	Drinking Water Treatment Plant Permits

AGENCY	ASPECT OF ZONE 40 PROGRAM REQUIRING PERMIT	PERMIT
State Lands Commission	Construction on state-owned land – including beds of navigable waterways: diversion structure and pipeline construction.	
Sacramento County	Construction on County land (e.g., in roads).	Encroachment permit
City of Sacramento	Construction on City land (e.g., in streets).	Encroachment permit
California Air Resources Control Board	Stationary air emissions – new treatment plant	Permit to operate

8.3 PUBLIC INFORMATION AND OUTREACH

The SCWA will conduct public information and outreach throughout implementation of the Zone 40 capital program. During the CEQA/NEPA process this outreach will comply with the environmental review process requirements and include: public scoping sessions; public workshops and hearings on the Draft EIR/EIS; and formal hearings on the Final EIR/EIS. A minimum 60-day review period will be provided for public review of the Draft EIR/EIS document. Following the review period, the lead agency will prepare and publish written responses to all comments received on the EIR/EIS to address public and agency comments.

8.4 ENGINEERING STUDIES / PROJECT DESIGN

Detailed engineering studies will be conducted during the environmental process of each project to sufficiently define project facilities, construction, operations, and project cost financing.

8.5 PERMITTING

Following the formal CEQA/NEPA environmental process, the SCWA will obtain specific environmental and other permits for the construction and operation of the proposed facilities. The list of regulatory agencies potentially involved with the project and the permits required will be further developed during the environmental review process as agencies are asked to clarify their areas of authority over the proposed project. The environmental studies conducted during preparation of the EIR/EIS will be designed to also address the information requirements for these specific permits to the extent possible. The permitting process will be integrated into the environmental review process where appropriate.

APPENDIX A

FIRST AMENDED AND RESTATED MASTER WATER AGREEMENT WITH FLORIN RESOURCE CONSERVATION DISTRICT/ELK GROVE WATER SERVICE

FIRST AMENDED AND RESTATED MASTER WATER AGREEMENT BETWEEN SACRAMENTO COUNTY WATER AGENCY AND FLORIN RESOURCE CONSERVATION DISTRICT/ELK GROVE WATER SERVICE, SUCCESSORS-IN-INTEREST TO ELK GROVE WATER WORKS

THIS FIRST AMENDED AND RESTATED MASTER WATER AGREEMENT is made and entered into this 28th day of June, 2002, by and between the Sacramento County Water Agency ("SCWA"), a political subdivision of the State of California and Florin Resource Conservation District, an independent special district, d.b.a., Elk Grove Water Service ("FRCD"), successors-in-interest to Elk Grove Water Works ("EGWW").

RECITALS

WHEREAS, the SCWA and the Elk Grove Water Works have previously entered into an agreement entitled "County of Sacramento Elk Grove Water Works Master Water Agreement" dated February 28, 1995 to establish the terms and conditions under which the SCWA would provide for a permanent supply of wholesale treated groundwater and/or surface water to the Elk Grove Water Works for use within EGWW's Expanded Franchise Area (hereinafter "Master Water Agreement"); and

WHEREAS, a major purpose of entering the Master Water Agreement was that SCWA and EGWW had as a common goal the stabilization of the groundwater table by managing the conjunctive use of surface water and groundwater in their respective areas; and

WHEREAS, the Master Water Agreement has three key elements: (1) the EGWW was to provide retail water service to the Expanded Franchise Area and in that capacity owns, operates and maintains all retail water distribution facilities; (2) the SCWA was to provide the wholesale water within the Expanded Franchise Area, and in that capacity owns, operates and maintains all wholesale water production, treatment and transmission facilities; and (3) the SCWA continues to collect Zone 40 fees from those portions of Zone 40 lying within the boundaries of the Expanded Franchise Area; and

WHEREAS, each of the parties to this Agreement is a local water purveyor functioning within Sacramento County; and

WHEREAS, SCWA has available potable groundwater production capacity and/or surface water to meet the needs of the Expanded Franchise Area as hereinafter defined; and

WHEREAS, FRCD is desirous of purchasing a permanent supply of potable ground and/or surface water from SCWA; and

WHEREAS, on December 8, 1999 FRCD acquired the assets of EGWW; and

WHEREAS, on August 20, 2001 SCWA filed a Complaint for Declaratory and Injunctive Relief against FRCD (*Sacramento County Water Agency, et al. v. Florin Resources Conservation District, et al.* Sacramento Superior Court Case No. 01AS05044, transferred to San Joaquin Superior Court and re-numbered San Joaquin Superior Court Case No. 01CV16036) seeking, among other things, a determination that FRCD was bound as a successor-in-interest to EGWW by the terms and conditions of the Master Water Agreement; and

WHEREAS, FRCD has acknowledged that it is a successor-in-interest to EGWW under the Master Water Agreement; and

WHEREAS, SCWA and FRCD desire to formally amend the Master Water Agreement to formally name FRCD as a successor-in-interest to EGWW and to address certain procedural issues associated with the Master Water Agreement.

NOW, THEREFORE, the Agreement is amended as follows:

I. PURPOSE

The parties are entering into this Agreement in order to establish the terms under which a permanent supply of wholesale treated groundwater and/or surface water will be provided by SCWA to FRCD, as successor-in-interest to EGWW, for use within its expanded franchise area.

II. DEFINITIONS

a. FRCD Water Facilities. All facilities, including distribution mains, services, meters, hydrants and all associated appurtenances, which are owned and operated by FRCD to supply water to its customers.

b. SCWA Water Facilities. All facilities, including wells, transmission mains, storage facilities and all associated appurtenances, which are owned and operated by SCWA to supply water to its customers.

c. Points of Connection. A point or points of connection for delivery of treated water from SCWA's Water Facilities to the FRCD Water Facilities, including land, meters, and associated appurtenances.

d. Zone 40. A zone of the Sacramento County Water Agency established by the Agency Board of Directors on May 14, 1985, the boundaries of which are shown on attached Exhibit "A", and as it may change from time to time.

e. Zone 41. A zone of the Sacramento County Water Agency established by the Agency Board of Directors on June 13, 2000, the boundaries of which are shown on attached Exhibit "C", and as it may change from time to time.

f. Expanded Franchise Area. The area which the Sacramento County Board of Supervisors on June 30, 1987 granted to Elk Grove Water Works, Inc., FRCD's predecessor in interest, a non-exclusive franchise for the construction, operation and maintenance of Elk Grove Water Works facilities as said area is shown on attached Exhibit "B".

g. Potable Water. Ground or surface water that meets the State Department of Health Services Drinking Water Standards.

h. Ordinance No. 18. An Ordinance of the Sacramento County Water Agency establishing fees, charges, credits and regulations for the wholesale supply of water to zones within the Agency, adopted by the Board of Directors on August 26, 1986.

i. Title 3. A section of the Sacramento County Water Agency Code establishing fees, charges, and regulations for the sale of water within said Zone, adopted by the Agency Board of Directors on June 20, 2000

III. WATER DELIVERY

a. SCWA shall deliver all potable water necessary for FRCD's retail customers in the Expanded Franchise Area , including water for fire protection consistent with SCWA design and operations standards in effect at the time a facility is constructed.

b. SCWA shall plan, construct, operate and maintain water facilities so as to provide FRCD with the quantity of potable water required to be delivered by this Agreement. SCWA may substitute treated surface water for the groundwater provided to FRCD.

c. SCWA shall be responsible for compliance with all applicable laws and regulations related to extraction, diversion, treatment and delivery of potable water to FRCD pursuant to this Agreement, such as the California Environmental Quality Act, the Federal and State Endangered Species Acts, Clean Water Act, the Porter-Cologne Water Quality Act and any other requirements of any federal, state or local agency.

d. FRCD shall pay SCWA for any and all costs associated with diverting, pumping, processing and delivering such water to FRCD pursuant to this Agreement. The amount to be paid by FRCD pursuant to this subparagraph shall be calculated in the manner described in paragraph 5 of this Agreement.

e. FRCD shall be responsible for compliance with all applicable laws and regulations related to delivery of potable water for use within the Expanded Franchise Area, such as the California Environmental Quality Act, the Federal

and State Endangered Species Acts, Clean Water Act, the Porter-Cologne Water Quality Act and any other requirements of any federal, state or local agency.

f. FRCD shall accept treated surface water, in lieu of groundwater, at the option of SCWA.

IV. POINTS OF CONNECTION AND DELIVERY STRUCTURES

a. Potable water shall be provided from SCWA facilities through Points of Connection to be located as determined by SCWA in coordination with FRCD.

b. All Points of Connection shall be designed and constructed or caused to be designed and constructed by and at the expense of SCWA, including land, meters, and associated appurtenances as described in subsequent paragraphs of this Agreement, and shall be the property of SCWA.

c. SCWA shall be responsible for the maintenance and operation of all Points of Connection.

d. With the exception of SCWA funded transmission mains, or other facilities as may be mutually agreed upon, FRCD shall design, construct, own, operate and maintain all facilities downstream of the Points of Connection.

e. SCWA shall calibrate Points of Connection metering devices at its discretion. Service charges shall be adjusted upward or downward, as appropriate, for metering errors in excess of two percent (2%), covering the known or estimated period of duration of such error, but in no event exceeding six months.

V. COST ALLOCATION AND PAYMENT

a. Operations and Maintenance Component. FRCD will pay for all costs incurred by SCWA for the procurement, extraction, diversion, treatment and conveyance of potable water on a cost-per-unit quantity basis for potable water actually delivered to FRCD. The cost will be determined by SCWA in an equitable manner such that FRCD neither subsidizes, nor is subsidized by another SCWA customer. In no event, however, shall the unit cost of water exceed SCWA's annual operating and maintenance costs for groundwater and/or surface water extraction, diversion, treatment and conveyance divided by the number of gallons produced allowing for a water loss factor mutually agreeable to both parties. Operating and maintenance costs shall include but not be limited to operating and maintenance personnel, services, supplies, capital replacement and improvement projects not funded by Zone 40 development fees, and an equitable proration of appropriate overhead. Operating and maintenance costs shall exclude those costs that are not related to the production and delivery of wholesale water to FRCD.

b. Capital Component. In addition to the operation and maintenance charge described in subparagraph (a) above, FRCD shall pay to SCWA user charges pursuant to Section 3.50.140, Special Capital Development Fee, Title 3 of SCWA Code. Said costs will be determined bi-monthly on the basis of the number and type of users being served SCWA wholesale water by FRCD in the Expanded Franchise Area and will be added to the charges determined per subparagraph (a), above.

c. Nothing in this Agreement shall preclude SCWA from adjusting unit costs for wholesale water to reflect actual cost increases in operation and maintenance.

d. On or before April 1 of each year SCWA shall provide FRCD an (1) an estimate of the unit cost of wholesale water for the ensuing twelve-month period beginning July 1; (2) a five-year projection of estimated wholesale water costs and (3) notice of SCWA's intent to deliver treated surface water to FRCD, if applicable. SCWA will make a reasonable effort to keep wholesale water costs equal to or less than those contained in the five-year estimate. At the end of every bi-monthly period, the quantities of water delivered during the previous two months will be determined by FRCD from its retail customer water meters or by an equivalent method acceptable to both parties until water meters are in place, and service charges for that bi-monthly period will be based on the quantity of water delivered times the unit rate. Until the parties agree upon a more efficient method for determining the amount of wholesale water delivered by SCWA to FRCD, FRCD shall be responsible for submitting to SCWA within ten (10) days of the end of each period the quantity of water delivered during that bi-monthly period. A bill shall be submitted to FRCD within 30 days of the end of each bi-monthly period and payment shall be made by FRCD within 30 days following receipt of the bill.

VI. TERM OF THE AGREEMENT

This Agreement shall become effective as of the date of execution by all parties. The term of this Agreement is fifty (50) years. This agreement shall be automatically extended for one additional fifty year term at the end of fifty (50) years, unless the party desiring not to extend the Agreement provides five (5) years advanced written notice of that party's intent not to extend the agreement. This Agreement may be terminated prior to the expiration of its term for cause or by mutual agreement of the parties.

VII. FAILURE TO DELIVER WATER

SCWA shall not be liable for failure to deliver potable water to FRCD hereunder in the amounts hereinabove, provided that such failure is caused by reasons beyond the reasonable control of SCWA.

VIII. RIGHTS TO CONSTRUCT FACILITIES

As between the parties to this Agreement, SCWA shall have the sole right to construct, operate and maintain public water production, treatment, storage and transmission facilities within the Expanded Franchise Area. SCWA may grant FRCD permission by separate written agreement to construct, operate and maintain such facilities in the Expanded Franchise Area for the sole purpose of providing water to the original certificated service area granted to EGWW by the California Public Utilities Commission (hereinafter "PUC Certificated Area"), as shown on Exhibit C. In the event SCWA is unable to provide potable water pursuant to this Agreement, FRCD shall have the right to construct, operate and maintain any new facilities necessary to provide the amount of water supply needed to correct deficiencies of the SCWA wholesale supply capacity in the Expanded Franchise Area; provided, however, that FRCD shall provide written notice to SCWA identifying such deficiencies and SCWA shall be provided fifteen (15) days to correct said deficiencies.

IX. RIGHT TO PROVIDE RETAIL WATER SERVICE

As between the parties to this Agreement, FRCD shall have the sole right to provide retail water service within the Expanded Franchise Area, which includes all activities necessary to deliver potable water from the Points of Connection to the end user. In the event FRCD is unable to provide such retail service, SCWA shall have the right to provide the same.

X. CAMDENS & SUPERBLOCK AREAS

The areas identified on the attached Exhibit "C" identified as "Camdens" and "Superblock" are excluded from the terms and conditions of this Agreement, however, the parties agree to negotiate in good faith to attempt to include said areas within the Agreement. In the interim, SCWA agrees to provide peaking water to the Camdens at the Sheldon Road Point of Connection, as such water is available.

XI. WATER MANAGEMENT/CONSERVATION

FRCD agrees to support and promote "Best Management Practices" for water conservation as required by contracts between SCWA and the United States Bureau of Reclamation, and to implement water management and conservation practices as may be imposed on SCWA or the County by other agencies. SCWA shall have the right to meet the non-potable demands in the Expanded Franchise Area with reclaimed water, pursuant to the policies and practices that are applicable to the SCWA service area for provision of reclaimed water.

XII. GROUNDWATER MANAGEMENT

SCWA and FRCD shall support and cooperate with each other regarding groundwater management.

XIII. FEES

FRCD agrees that SCWA may collect any and all assessments, fees and charges levied pursuant to sections 4.4 or 10.5 of the Sacramento County Water Agency Act within the Expanded Franchise Area for the provision of water in the Expanded Franchise Area.

XIV. NOTICE

Unless indicated otherwise herein, all notices, invoices, payments, statements or other writing authorized or required by this Agreement shall be deposited in the United States mail, postage prepaid and addressed to the respective parties as follows:

SCWA:
Chief of Water Resources
Sacramento County Dept.
Of Water Resources
827 7th Street, Room 301
Sacramento, CA 95814

FRCD:
General Manager
Florin Resources Conservation
District, dba Elk Grove Water Service
9257 Elk Grove Boulevard
Elk Grove, CA 95624

All notices, invoices, payments or other writings shall be deemed served on the day that they are deposited, postage prepaid, in the United States mail. Nothing in this paragraph shall preclude the service of any notice, invoices, payments, statements or other writings by personal delivery to the parties indicated above.

XV. INDEMNIFICATION & DEFENSE

a. By FRCD: FRCD shall fully indemnify and hold harmless SCWA 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 failed to be done by FRCD, its officers or employees, under this Agreement.

b. By SCWA: SCWA shall fully indemnify and hold harmless FRCD 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 failed to be done by SCWA, its officers or employees, under this Agreement.

XVI. RECORDS INSPECTION

Each party shall be entitled to inspect and photocopy the records of any other party which 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 any other party to determine the adequacy of cost and billing information maintained by each party. After reasonable notice, each party shall make available to the other party's auditor or auditors all requested records and shall assist and cooperate with such auditors. Each party shall keep its accounting and financial records in accordance with generally accepted accounting principals.

XVII. AMENDMENTS

No amendment or modification to this Agreement shall be valid unless executed in writing and approved by the governing bodies or authorized individuals of each party; provided, however, the annual schedule may be modified by mutual written agreement of SCWA and FRCD staff without obtaining approvals from the governing bodies of the parties hereto.

XVIII. NO THIRD PARTY BENEFICIARY

This Agreement is not intended to, and shall not be interpreted as conferring any benefits or rights whatsoever upon any person or entity which is not a party hereto.

XIX. ASSIGNMENT

This Agreement shall inure to the benefit and bind the successors and assigns of the parties including any successor water company or public agency which is obligated to serve water in the Expanded Franchise Area. FRCD is hereby specifically named as a successor-in-interest to the EGWW in the Master Water Agreement.

XX. RIGHT TO MATCH OFFER

FRCD shall provide SCWA with notice of any bona-fide offer to purchase or acquire the assets of FRCD within thirty (30) days of the date of said offer. SCWA shall have thirty (30) days beyond the date of said notice to match any offer to purchase the assets of FRCD.

XXI. EXHIBITS INCORPORATED

All Exhibits referred to herein are fully incorporated into this Agreement as if such Exhibits were set forth in their entirety at this place.

XXII. REAFFIRMATION

In all other respects, the above original Master Water Agreement, as amended, remains in full force and effect.

XXIII. ENTIRE AGREEMENT

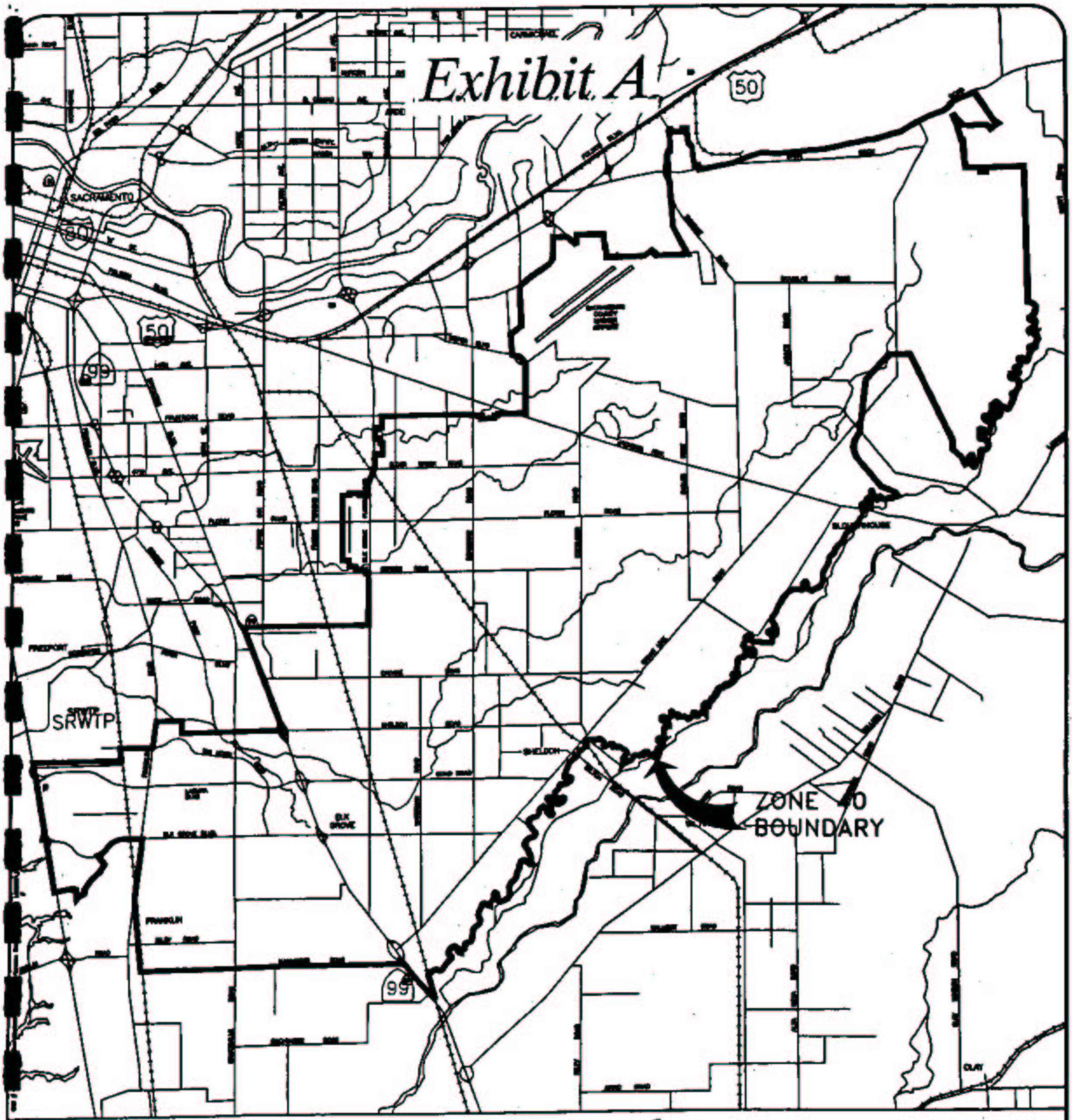
This Agreement, as amended, and any attachments hereto, constitute the entire understanding between the COUNTY and FRCD concerning the subject matter contained herein.

XXIV. EFFECTIVE DATE

This First Amended and Restated Master Water Agreement shall be deemed effective as of the date and date first written above.

(SIGNATURE PAGE FOLLOWS)

Exhibit A



Zone 40 Boundary

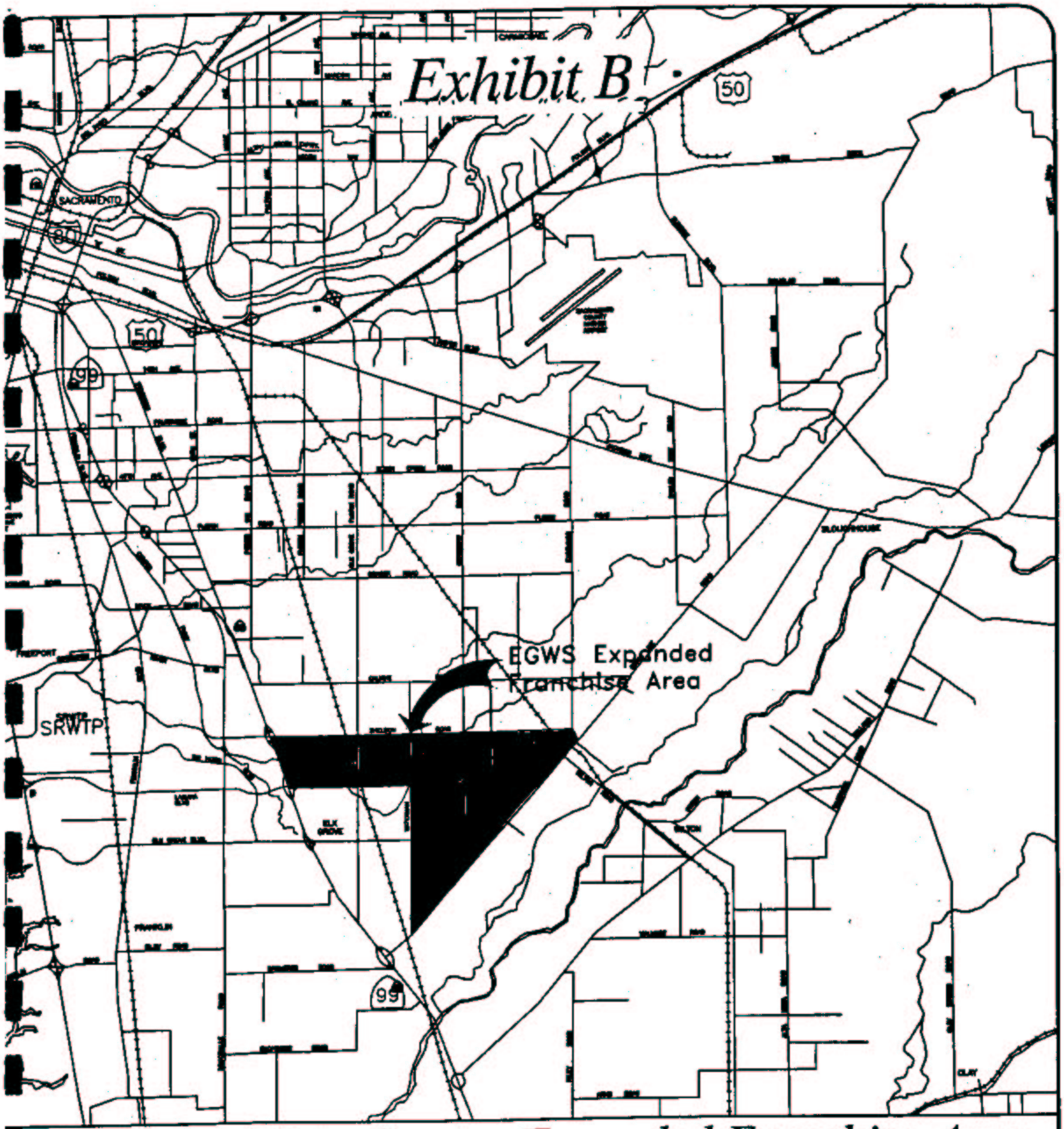
Sacramento County Water Agency (SCWA)

0 1/2 1
SCALE IN MILES

SCWA Zone 40 Boundary

Date: May 20, 2002
By: SCWA (R. Steeg)
Scale: 1" = 2.5 Miles

Exhibit B



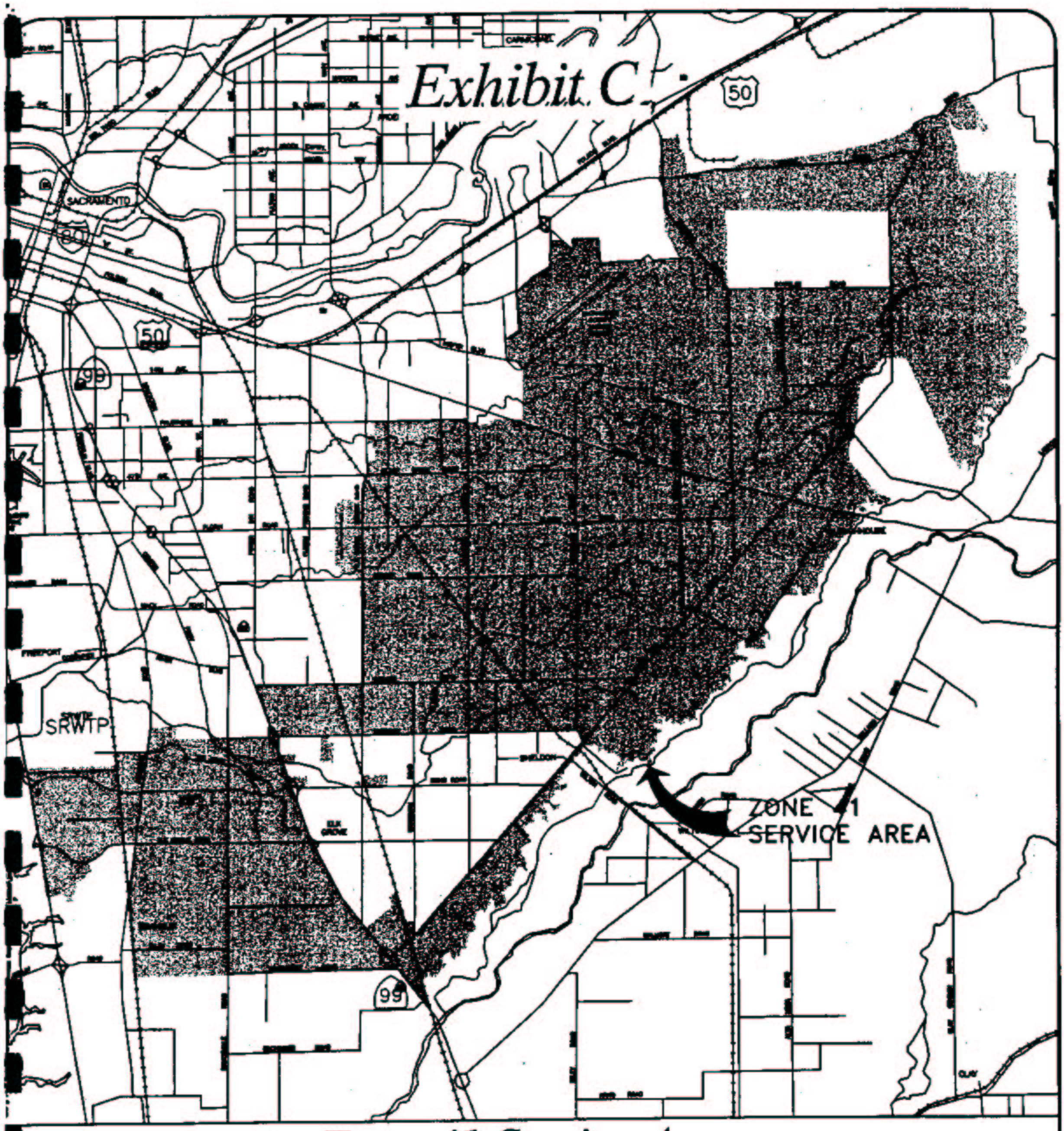
Elk Grove Water Service Expanded Franchise Area
Sacramento County Water Agency (SCWA)

EGWS Expanded Franchise Area

SCALE IN MILES

Date: May 20, 2002
By: SCWA (R. Steeg)
Scale: 1" = 2.5 Miles

Exhibit C



Zone 41 Service Area

Sacramento County Water Agency (SCWA)

SCWA Zone 41 Service Area

0 1/2 1
SCALE IN MILES

Date: May 20, 2002
By: SCWA (R. Steag)
Scale: 1" = 2.5 Miles

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be duly executed as of the day and year first written above.

SACRAMENTO COUNTY WATER AGENCY, a political subdivision of the State of California

By _____
Vice Chairman of the Board of Directors of Sacramento County Water Agency

COUNTY OF SACRAMENTO SEAL CALIFORNIA

_____
Clerk of the Board of Sacramento County Water Agency

REVIEWED AND APPROVED BY COUNTY COUNSEL:

_____
Deputy County Counsel

Attest:

_____
Secretary,
Florin Resource Conservation District

FLORIN RESOURCES CONSERVATION DISTRICT

By _____
Gail A. Woodson, Chairperson
Board of Directors

Reviewed and Approved by District Counsel

6/21/02
_____
District Counsel

[illegible]

APPENDIX B

WATER FORUM SACRAMENTO COUNTY/SCWA'S PURVEYOR SPECIFIC AGREEMENT

COUNTY OF SACRAMENTO\SACRAMENTO COUNTY WATER AGENCY

A. INTRODUCTION

The County of Sacramento (County) purveys water in seven separate retail service areas within the unincorporated area. County retail service areas vary in size from as few as 30 connections in the smallest service area to more than 17,000 connections in the Laguna/Vineyard service area. There is a total of approximately 20,000 connections in the County retail service areas, of which about 19,000 are residential customers.

The Sacramento County Water Agency (SCWA) is responsible for providing wholesale water supply to an area of the Laguna, Vineyard, and Elk Grove communities commonly referred to as "Zone 40". The long-term Master Water Plan for Zone 40 is based on meeting present and future water needs through a program of conjunctive use of groundwater and surface water.

It is anticipated that Zone 40 will be expanded to include large areas in the southern part of Sacramento county which may be developed that are presently unorganized as far as water supply. Both supply and demands for these new growth areas are included in this County/SCWA Purveyor Specific Agreement.

Neither the County nor SCWA presently has long-term surface water entitlements. However, SCWA has entered into a contract with USBR for 22,000 AF of American River water, authorized by Public Law 101-514. Seven thousand AF of the 22,000 AF of water will be subcontracted to the City of Folsom. The remaining 15,000 AF of the PL 101-514 water for SCWA use will be diverted at or near the mouth of the American River or from the Sacramento River. SCWA has also entered into a three party agreement-in-principle with SMUD and the City of Sacramento for the assignment to SCWA of 15,000 AF of SMUD's existing contract with the USBR, to be diverted at or near the mouth of the American River or from the Sacramento River. SCWA and SMUD have also begun negotiations for purchase by the SCWA and assignment from SMUD of a second 15,000 AF block of SMUD's USBR contract. A portion of the payments to SMUD from the County would be used to construct groundwater facilities which may be operated and maintained by the County. Groundwater from these wells would be available as an alternative supply for SMUD to meet increased demands in the drier and conference years as defined in the Purveyor Specific Agreement for SMUD.

In addition to the 15,000 AF of PL 101-514 contract and pursuing 30,000 AF of SMUD surface water, SCWA has applied to the SWRCB for excess flows on the American and Sacramento Rivers. That application is pending and is subject to negotiated terms through the Water Forum for delivery. To reduce reliance on intermittent surface water, SCWA intends to pursue upstream water transfers which would be diverted at or near the mouth of the American River or from the Sacramento River.

Delivery of surface water to Zone 40 requires wholesale and wheeling contracts between the City of Sacramento and SCWA. This includes construction of facilities, including treatment plant capacity within the City of Sacramento.

A portion of the expanded Zone 40 area is situated within the Place of Use for the City of Sacramento's American River water entitlements. It is assumed that these entitlements would be used to serve this expanded Zone 40 area. Conditions for use of this entitlement would be

consistent with the conditions outlined in the City of Sacramento's Purveyor Specific Agreement.

All of the County's retail service areas are supplied groundwater with the exception of the Laguna/Vineyard service area (Zone 40), which is supplied groundwater in combination with interim surface water. County/SCWA has an agreement with the City of Sacramento for treatment and delivery of interim surface water to Zone 40.

A portion of the Elk Grove Water Works (EGWW) retail service area is located within the boundary of Zone 40. Water used in this area is made up of groundwater pumped by EGWW and groundwater and surface water served to EGWW through a wholesale water purchase agreement with SCWA. The contract between the SCWA and the USBR for water available through PL 101-514 requires that EGWW meet the terms and conditions of the PL 101-514 contract including a comprehensive water conservation plan and meter retrofit program to receive CVP contract surface water.

B. SEVEN ELEMENTS OF THE *WATER FORUM AGREEMENT*: INTEGRATED PACKAGE

In order to achieve the Water Forum's two coequal objectives, providing a safe reliable water supply and preserving the values of the Lower American River, all signatories to the *Water Forum Agreement* need to endorse and, where appropriate, participate in each of seven complementary actions.

Increased Surface Water Diversions

Actions to Meet Customers' Needs While Reducing Diversion Impacts in Drier Years

Support for an Improved Pattern of Fishery Flow Releases from Folsom Reservoir

Lower American River Habitat Management Element

Water Conservation Element

Groundwater Management Element

Water Forum Successor Effort

For each interest to get its needs met, it has to endorse all seven elements. Based on this linkage, signatories agree to endorse and, where appropriate, participate in all seven of these elements.

C. BASELINE DIVERSIONS

Baseline diversions represent the historic maximum amount of water diverted annually from the American River through the year 1995.

No American River diversions were included in the baseline for County/SCWA.

D. AGREEMENT FOR MEETING THE COUNTY OF SACRAMENTO'S AND THE SACRAMENTO COUNTY WATER AGENCY'S WATER SUPPLY NEEDS TO THE YEAR 2030

The County/SCWA surface water needs are included in the South County M&I users group. The County/SCWA portion of the demand, 87,000 AF, includes both existing and expanded Zone 40

areas. It is anticipated that Zone 40 will be expanded to include large areas in the southern part of Sacramento County which may be developed that are presently unorganized.

To meet these demands, the firm surface water supply of 45,000 AF (15,000 AF of USBR contract water under PL 101-514 and 30,000 AF of SMUD entitlement transfer), an intermittent surface water supply of 33,000 AF, and groundwater will be necessary. The PL 101-514 and SMUD water will be subject to shortages imposed on all CVP M&I contractors. Intermittent surface water is available only when the water is surplus to the needs of the San Joaquin-Sacramento River and Delta. Upstream water transfers will be pursued to reduce reliance on intermittent surface water. All of the surface water for the County/SCWA is assumed to be diverted at or near the mouth of the American River or from the Sacramento River.

Groundwater will be used in a conjunctive use basis by the South County M&I users group with a total 2030 demand of 117,600 AF. The South County M&I users group also includes a portion of Citizens Utilities Company and the Elk Grove Water Works. The amount of groundwater used will vary from approximately 95,100 AF in the driest years decreasing to approximately 34,000 AF in the wet years.

E. SPECIFIC AGREEMENTS FOR COMPLYING WITH THE SEVEN ELEMENTS

(Agreements in italics are common in all Specific Agreements.)

1. All signatories to the *Water Forum Agreement* will endorse water entitlements needed in this Purveyor Specific Agreement as follows:

    a. All signatories to the *Water Forum Agreement* agree to continue their support for SCWA's contract for 22,000 acre feet of water authorized by Public Law 101-514.

    b. All signatories to the *Water Forum Agreement* will support transfers of 30,000 acre feet of Sacramento Municipal Utility District's Central Valley Project entitlement to be used for planned growth within the Urban Service Boundary.

    c. All signatories agree to support a conjunctive use program to meet SCWA's water needs for planned growth within the Urban Service boundary.

    d. All signatories to the *Water Forum Agreement* agree to support additional transfers of existing entitlements or new entitlements needed to support such a conjunctive use program. However environmental signatory organizations' support for specific additional transfers or new entitlements is subject to: their review of the specifics of the additional transfers or entitlements; their concurrence on the adequacy of conditions that will be included as part of such additional transfers or new entitlements; and full compliance with all applicable environmental laws and requirements.

    e. All signatories anticipate that SCWA's water conservation program, contributions to the Successor Effort and contributions to the Lower American River Habitat Management Element would not have to be renegotiated in the context of additional transfers or new entitlements diverted from the Sacramento River.

2. *All signatories will endorse construction of facilities to divert, treat and distribute water consistent with this Purveyor Specific Agreement and the Water Forum Agreement*

including diversion structures, treatment plants, pumping stations, wells, storage facilities, and major transmission piping. Endorsement is also to be provided for necessary rights-of-ways, permits, and other endorsements which may be needed, in the context of the following five points:

a. All signatories agree that implementation of the Water Forum Agreement including an Improved Pattern of Fishery Flow Releases, the Updated Lower American River flow standard, the Lower American River Habitat Management Element, Actions to Meet Customers' Needs While Reducing Diversion Impacts in Drier Years, and the Water Conservation Element constitute reasonable and feasible mitigation for any cumulative impacts on the Lower American River caused by diversions included in the Water Forum Agreement.

b. Environmental impacts of facilities to divert, treat and distribute water will be subject to site-specific environmental review. It is understood that signatories may provide comments on site specific impacts. All signatories will work in good faith to agree on reasonable and feasible mitigation for any site-specific impacts.

c. To the extent that the water facilities are consistent with the Water Forum Agreement, signatories agree that they will not object to those water facilities based on the cumulative impacts to the Lower American River. Nor will signatories object to water facilities consistent with the Water Forum Agreement based on the planned growth to be served by those water facilities. (See Section Four IV, Relationship of Water Forum Agreement to Land Use Decision Making.)

d. d. In the planning for new water diversion, treatment, and distribution facilities identified in the Water Forum Agreement, water purveyors signatory to the Agreement will either provide for a public participation process, such as meeting with already established citizen advisory committees, or other appropriate means to help design and implement these projects.

e. e. All signatories retain their existing ability to provide input on specific details of facility design, financing, and construction.

3. Endorsement of the water entitlements and related facilities in the Water Forum Agreement means that signatories will expend reasonable efforts to:

a. Speak before stakeholder boards and regulatory bodies,

b. Provide letters of endorsement,

c. Provide supportive comments to the media,

d. Advocate the Water Forum Agreement to other organizations, including environmental organizations that are not signatory to the Water Forum Agreement, and

e. Otherwise respond to requests from other signatories to make public their endorsement of the seven elements of the Water Forum Agreement.

4. All signatories agree that participation in the Water Forum, and any successor effort is in the best interests of water consumers and the region as a whole. Participation in the Water Forum is the most economically feasible method of ensuring that water demands

of the future will be met. Furthermore, provisions for groundwater management, conjunctive use, conservation programs, improved pattern of fishery flow releases from Folsom Reservoir, habitat management, and a reliable dry year supply are in the public interest, and represent reasonable and beneficial use of the water resource.

5. *All signatories will not oppose and will endorse where appropriate needed rates and fees applied equitably. This includes endorsement at the California Public Utilities Commission for investor owned utilities' ability to recover all costs of conservation programs, including residential meter retrofit, through rates.*

6. *All signatories will endorse an Improved Pattern of Fishery Flow Releases from Folsom Reservoir and reduced daily flow fluctuations for the Lower American River. (Reference Section Three, III.)*

7. *All signatories will endorse formal assurances that the diversions will be consistent with the conditions in the Water Forum Agreement and that an Improved Pattern of Fishery Flow Releases from Folsom Reservoir will be implemented.*

All signatories will endorse and participate where appropriate in all provisions of the Water Forum Agreement, including all agreements pertaining to other signatories and executed as part of this Agreement.

8. *All signatories will participate in education efforts and advocate the Water Forum Agreement to regulatory bodies and signatory stakeholder boards as appropriate.*

9. *All signatories will participate in the Water Forum Successor Effort to oversee, monitor and report on the implementation of the Water Forum Agreement. (Reference Section Three, VII., Water Forum Successor Effort). This includes participating with other signatories in carrying out procedural agreements as identified in the Water Forum Agreement. To the extent that conditions change in the future, all signatories will work together in good faith to identify ways to ensure that the two coequal goals of the Water Forum will still be met.*

10. *All signatories will endorse and, where appropriate, financially participate in the Lower American River Habitat Management Element (Reference Section Three, IV.,Lower American River Habitat Management Element).*

11. *All signatories will endorse and, where appropriate, implement the Water Conservation Element of the Agreement (Reference Section Three, V., Water Conservation Element). This purveyor's implementation of water conservation will be as specified in its Water Conservation Plan which is incorporated as Appendix J to the Water Forum Agreement.*

12. *All signatories will endorse and, where appropriate, participate in implementation of the Sacramento North Area Groundwater Management Authority to maintain a North Area estimated average annual sustainable yield of 131,000 acre feet.*

13. *All signatories will endorse development of a groundwater management arrangement for the South Area and where appropriate participate in its development, to maintain a South Area estimated average annual sustainable yield of 273,000 acre feet.*

14. *All signatories will endorse development of a groundwater management arrangement for the Galt Area and where appropriate participate in its development, to maintain a Galt Area estimated average annual sustainable yield of 115,000 acre feet.*

15. *Signatories authorizing individuals to represent them in matters included within the Water Forum Agreement will ensure that representations made by those individuals are consistent with the Water Forum Agreement and are upheld by the signatories.*

16. *This Agreement is in force and effect for all signatories for the term of the Memorandum of Understanding, December 31, 2030.*

17. *Any solution that provides for future needs will have costs. New diversion, treatment, and distribution facilities, wells, conservation programs, and required environmental mitigation will be needed. This Agreement identifies that these solutions must be equitable, fiscally responsible, and make the most efficient use of the public's money.*

Water suppliers have both capital costs for facilities and operations and maintenance costs. This Agreement recommends that charges imposed to recover capital costs associated with water acquisition, treatment, or delivery be equitable. Any costs for facilities funded through bonds will be recovered as provided by law. In addition, signatories to the Water Forum agree that operational, maintenance and replacement costs should be recovered from beneficiaries of th system in accordance with California Government Code Sections 53720 to 53730 (Proposition 62) and California Constitution, Articles XIII, C and XIII, D (Proposition 218) and other laws to the extent they are applicable.

18. *All signatories to the Agreement will endorse County/SCWA for completion of PL 101-514 water contracts.*

19. *All signatories to the Agreement will endorse County/SCWA for completion of the assignments of portions of SMUD's Central Valley Project water contract.*

20. *All signatories to the Agreement will endorse construction of County/SCWA's water supply facilities (this may include joint facilities constructed by the City of Sacramento) which include diversion at or near the mouth of the American River or from the Sacramento River, treatment plants, pumping stations, wells, storage facilities, and transmission piping. Endorsement is also needed for right of ways, permits, environmental documentation, and other endorsement which may be identified for County/SCWA to meet needs to the year 2030.*

21. *All signatories to the Agreement will endorse County/SCWA agreements with the City of Sacramento for wheeling and wholesaling of surface water prior to and after completion of the City's capacity expansion.*

22. *All signatories agree to endorse, and where appropriate, participate in Sacramento River Supply for North Sacramento County and Placer County (Reference Section Four, III).*

23. *All signatories will endorse, and where appropriate, participate in the section of the Water Forum Agreement entitled "Relationship of Water Forum Agreement to Land Use Decision Making" (Reference Four, IV).*

24. *All signatories will endorse, and where appropriate, participate in the Folsom Reservoir Recreation Program (Reference Section Four, V).*

25. *Purveyors signatory to the Water Forum Agreement will reference the Water Forum Agreement, including agreed upon estimated average annual sustainable yields of each of the three subareas of the groundwater basin in Sacramento County and limits to diversions from the American River in their water master plans and urban water*

management plans, which are used in providing information to cities and counties as required under Chapter 881 of the Statutes of 1995.

26. *Any transfers of American River water by signatories will be delivered in a manner consistent with an Improved Pattern of Fishery Flow Releases as referenced in the Water Forum Agreement.*

F. ASSURANCES AND CAVEATS

Because the *Water Forum Agreement* is a comprehensive set of linked elements, it is absolutely essential that adequate assurances be secured for every element. In an agreement that will extend over three decades, the timing of these assurances is critical. Full implementation of all seven elements cannot occur simultaneously. Therefore all signatories agree with the provisions in the Assurances and Caveats Section of this *Water Forum Agreement*.

Two particularly important assurances are the updated Lower American River Flow Standard and Upstream American River Diversion Agreements. All signatories agree they will recommend to the State Water Resources Control Board an updated American River flow standard and updated Declaration of Full Appropriation to protect the fishery, wildlife, recreational and aesthetic values of the Lower American River. The recommendation will include requirements for U.S. Bureau of Reclamation releases to the Lower American River. In addition, the City of Sacramento's Fairbairn diversion will be required to comply with the diversion limitations of the City's Purveyor Specific Agreement. The *Water Forum Agreement* also includes agreed upon dry year reductions by purveyors upstream of Nimbus Dam. The recommendation for an updated Lower American River standard will be consistent with:

Water Forum Agreement provisions on water diversions including dry year diversions,

and

Implementation of the Improved Pattern of Fishery Flow Releases which optimizes the release of water for the fisheries.

The recommendation will also address related issues such as principles to guide water management in the driest years, flexibility in the standard to allow adaptive management, and amending the existing "Declaration of Full Appropriation for the American River."

Purveyors signatory to the *Water Forum Agreement* who divert from upstream of Nimbus Dam agree they will enter into contract with the Bureau that will provide assurances that the upstream diverters will divert only the agreed upon amounts, which include provisions for reductions in dry year and/or other equivalent measures.

In order to have a durable agreement it is necessary to include the following caveats. These are statements describing actions or conditions that must exist for the *Agreement* to be operative.

1. As specified below, each purveyor's commitment to implementing all provisions of the *Water Forum Agreement* is contingent on it successfully obtaining its water supply entitlements and facilities.

    a. If a purveyor receives support from the other signatories to the Agreement for all of its facilities and entitlements as shown on the chart in Section Three, I., of the Water Forum Agreement, "Major Water Supply Projects that Will Receive Support Upon Signing the Water Forum Agreement" and if it receives all

necessary approvals for some or all of those facilities and entitlements, then the purveyor will fully support and participate in the following provisions of the Water Forum Agreement:

(1) Support for the Improved Pattern of Fishery Flow Releases

(2) Water Forum Successor Effort

(3) Water Conservation Element

(4) Lower American River Habitat Management Element

(5) Support for the Updated Lower American River flow standard

(6) Restriction of diversions or implementation of other actions to reduce diversion impacts in drier years as specified in its Purveyor Specific Agreement.

and

b. If a purveyor is not successful in obtaining all necessary approvals for all of its facilities and entitlements as shown on the chart in Section Three, I., of the Water Forum Agreement, "Major Water Supply Projects that will Receive Support Upon Signing the Water Forum Agreement," that would constitute a changed condition that would be considered by the Water Forum Successor Effort.

2. All signatories agree that business, citizens, and environmental signatories' obligation to support, and where specified, implement all provisions of the Water Forum Agreement is contingent on implementation of those provisions of the Agreement that meet their interests.

3. A stakeholder's support for water supply entitlements and facilities is contingent on:

   a. Project-specific compliance with the California Environmental Quality Act, and where applicable, the National Environmental Policy Act, federal Endangered Species Act and California Endangered Species Act.

   b. Purveyors' commitment in their project-specific EIRs and CEQA findings to: all seven elements of the Water Forum Agreement; support for updating the Lower American River flow standard; commitment by those purveyors that divert from upstream of Nimbus Dam to entering into signed diversion agreements with the U.S. Bureau of Reclamation; commitment by the City of Sacramento to inclusion of the terms of the diversion provisions of its Purveyor Specific Agreement into its water rights.

   c. Signed diversion agreements between purveyors that divert upstream of Nimbus Dam and the U.S. Bureau of Reclamation. Other signatories to the Water Forum Agreement shall be third party beneficiaries to the diversion agreements solely for the purpose of seeking specific performance of the diversion agreements relating to reductions in surface water deliveries and/or diversions if Reclamation fails to enforce any of those provisions. The status of a signatory to the Water Forum Agreement as a third party beneficiary to the diversion agreements is dependent on that signatory complying with all the terms of the Water Forum Agreement, including support for the purveyor specific agreement for the purveyor's project.

This is not to intend to create any other third party beneficiaries to the diversion agreements, and expressly denies the creation of any third party beneficiary rights hereunder for any other person or entity.

d. Adequate progress on the updated Lower American River standard. The schedule for obtaining the updated standard is in Section Four, I., of the *Water Forum Agreement*.

e. Adequate progress in construction of the Temperature Control Device.

f. Adequate progress in addressing the Sacramento River and Bay-Delta conditions associated with implementation of the Water Forum Agreement.

4. Environmental stakeholders' support for facilities and entitlements is dependent upon the future environmental conditions in the Lower American River being substantially equivalent to or better than the conditions projected in the Water Forum EIR. If the future environmental conditions in Lower American River environment are significantly worse than the conditions projected in the EIR, this would constitute a changed condition that would be considered by the Water Forum Successor Effort. Significant new information on the needs of the Lower American River fisheries, which was not known at the time of execution of the Water Forum Agreement, would also constitute a changed condition that would be considered by the Water Forum Successor Effort.

G. REMAINING ISSUES

Development of a groundwater management arrangement for the South Area.

APPENDIX C
WATER FORUM SACRAMENTO COUNTY/SCWA'S WATER CONSERVATION PLAN

COUNTY OF SACRAMENTO WATER FORUM WATER CONSERVATION PLAN

BMP 1 INTERIOR AND EXTERIOR WATER AUDITS AND INCENTIVE PROGRAMS FOR SINGLE FAMILY RESIDENTIAL, MULTI-FAMILY RESIDENTIAL, AND INSTITUTIONAL CUSTOMERS

A. Within three years of agreement signing, the County of Sacramento will have:
   1. Trained water auditors on staff or available through cooperative agreements with other purveyors.
   2. Prepared and made available, as needed, multi-lingual interior and exterior water audit materials for customers.
   3. Prepared and made available to customers seasonal climate-appropriate irrigation information.
   4. Investigated opportunities for community based organizations (CBOs) to receive the training and financial incentives necessary for them to implement this BMP for their constituents.

B. The County of Sacramento will annually:
   1. Actively market an interior and exterior, including landscape, water audit program which targets customers when they are most likely to be receptive to participation and which continues to target the top 20% water users.
      a. During conversion to complete service area meter reading, offer water use reviews to all SF, MF and Institutional customers which receive a meter and continue to offer these reviews to customers whose meter readings indicate they are in the top 20% of water users.
   2. After complete service area meter reading, continue to actively market the water audit program to the top 20% of water users.
   3. 2. Offer, through bill inserts or other means, water-use reviews to all customers.
   4. 3. Survey past program participants to determine if audit recommendations were implemented.

C. The water-use review program will:
   1. Provide audits conducted by trained auditors.
   2. Provide audits that may include device installation by the County of Sacramento or customer (showerheads, faucet aerators, etc.), identification of water-use problems, recommend repairs, instruction in landscape principles (hydrozones, ET, etc.), irrigation timer use and, when appropriate, meter reading.
   3. Provide program participants with seasonal irrigation schedules by hydrozone and/or station.

D. The County of Sacramento will be fully implementing the program described above no later that the beginning of the fourth year after agreement signing.

BMP 2 PLUMBING RETROFIT OF EXISTING RESIDENTIAL ACCOUNTS

A. Within three years of agreement signing, the County of Sacramento will:
   1. Have SAWWA offer to all customers with home built between 1987 and 1992 retrofit kits that include high quality low-flow showerheads, faucet aerators and toilet leak detection tablets.
   2. Offer toilet leak test kits to all change of account customers who visit the signatory's office.
   3. Work with the local "Welcome Wagon" or equivalent organization to provide water conservation materials to new residents.
   4. Work with local hardware/home stores to offer free water conservation information and toilet leak test kits at the check-out counters.
   5. Investigate partnership programs with local energy utilities to provide water conservation audits, materials and devices.

B. The County of Sacramento will be fully implementing the program described above no later than the beginning of the fourth year after agreement signing.

BMP 3 DISTRIBUTION SYSTEM WATER AUDITS, LEAK DETECTION AND REPAIR

A. Within three years of agreement signing, the County of Sacramento will complete and maintain, in the unmetered areas:
   1. An annually updated "system map" of type, size and age of pipes; pressures; and leak history.
   2. Installation of devices (such as pressure recorders) or use of other methods designed to identify area with greater than 10% losses.
   3. An ongoing meter calibration and replacement program for all production and distribution meters.
   4. An ongoing leak detection and repair program (as defined in the manual) focused on high probability leak areas identified by the system map.
   5. A complete system-wide leak detection program repeated no less often than every ten years; unless there are special circumstances, such as age of system or planned main replacement.

B. Within three years of agreement signing, the County of Sacramento will complete and maintain, in the metered areas:
   1. An annual system water audit, determining the difference between production and sales.
   2. An annually updated "system map" of: type, size and age of pipes; pressures; record of leaks, etc.; with historic data.
   3. An ongoing meter calibration and replacement program.
   4. An ongoing leak detection/repair program focused on high probability leak areas identified by map.
   5. A complete system wide leak detection program, repeated: when the system water audit determines losses to be greater than 10%; when the losses are less than 10% if the program is determined to be cost effective.

C. The County of Sacramento will be fully implementing the program described above no later than the beginning of the fourth year after agreement signing.

BMP 4 NON-RESIDENTIAL METER RETROFIT

A. Within three years of agreement signing, the County of Sacramento will:
   1. Identify all non-residential unmetered customers.
   2. Provisionally identify any non-residential unmetered customer accounts that may be very difficult and expensive to retrofit.
   3. Meter unmetered non-residential accounts so that within two years all are metered.
   4. Begin installation of meters at non-residential unmetered customer locations, with consideration of separate landscape meters.

B. Within ten years of meter installation, the County of Sacramento will provide newly metered non-residential customers with:
   1. Information on how to read their meter and a consumption-based water bill.
   2. Information on the County-provided water conservation programs and services.

C. The County of Sacramento will be fully implementing the program described above no later than the beginning of the fourth year after agreement signing.

BMP4 RESIDENTIAL METER RETROFIT

A. The agreement related to the implementation of a residential meter retrofit program is described in the Water Forum Agreement, Section Three, V., 3., C., 1. b, page XXX.

BMP 5 LARGE LANDSCAPE WATER AUDITS AND INCENTIVES FOR COMMERCIAL, INDUSTRIAL, INSTITUTIONAL (CII), AND IRRIGATION ACCOUNTS

A. Within three years of agreement signing, the County of Sacramento will:
   1. Identify all Irrigation accounts and CII accounts with landscapes of one acre and larger and record that information in the customer database.
   2. Have certified and/or trained landscape water auditors on staff or available through agreements.

3. Prepare and distribute multi-lingual (as appropriate) irrigation system materials, seasonal climate-appropriate information on irrigation scheduling and offer training for customers/landscape workers.
4. Develop seasonal climate-appropriate information to determine irrigation schedules, for the three basic hydrozones identified in the DWR Landscape Water Management Handbook, and provided that information to the customers with one acre or larger landscapes.
5. Begin installation of climate appropriate water efficient landscaping at landscaped the County of Sacramento facilities, phased in over the five years following agreement signing.

B. The County of Sacramento will annually:
1. Directly contact all Irrigation accounts and CII accounts with one acre and larger landscapes, not previously audited, and offer them landscape water-use reviews (audits).
2. Offer, through bill inserts or other means, landscape water-use reviews to all customers.
3. Survey past program participants to determine if audit recommendations were implemented.
4. Offer program participants with separate irrigation meters information showing the relationship between actual consumption and their ET-based water demand.

C. The County of Sacramento's landscape water-use review program will:
1. Provide audits conducted by certified landscape water auditors.
2. Provide audits that consist of a system review, to identify necessary irrigation system repairs, and, once repairs have been completed, a water-use review including measurement of landscaped area.
3. Provide program participants with seasonal irrigation schedules by hydrozone and/or station.
4. Provide program participants with regular reminders to adjust irrigation timer settings.
5. Provide incentives to achieve at least 12% annual participation of targeted customers.

D. The County of Sacramento will be fully implementing the program described above no later than the beginning of the fourth year after agreement signing.

BMP 6 LANDSCAPE WATER CONSERVATION REQUIREMENTS FOR NEW AND EXISTING COMMERCIAL, INDUSTRIAL, INSTITUTIONAL AND MULTIFAMILY DEVELOPMENTS

A. The County of Sacramento will enact and implement a landscape water efficiency ordinance pursuant to the "Water Conservation in Landscaping Act" (California Code of Regulations, Chapter 2.7), that is at least as effective as the Model Water Efficient Landscape Ordinance described in Chapter 2.7, Sections 490-495. The County of Sacramento will:
1. Participate in and support a regional landscape task force established by the Forum Successor Effort. The Taskforce will include other local governments and water purveyors, the building and green industries and environmental / public interest groups. It will review the existing local ordinances to determine if it is at least as effective as the Model Water Efficient Landscape Ordinance. The Taskforce may suggest revisions to the existing landscape ordinances.
2. As part of the Taskforce, participate in a review of the implementation of the local ordinances, including builder compliance, landscape plan review, final inspection/certification process and actual water use to determine their effectiveness.
3. As part of the Taskforce, determine if program effectiveness is diminished by city/county staff time constraints, budget or lack of landscape knowledge/expertise, and, if so, recommend and support corrective action.

B. The County of Sacramento will be fully implementing the program described above no later than the beginning of the fourth year after agreement signing.

BMP 7 PUBLIC INFORMATION

A. Within three years of agreement signing, the County of Sacramento program will include:
A combination of a County specific program in conjunction with full participation by the County in the Sacramento Area Water Works Association (SAWWA) Conservation Committee's Public Outreach

Program or other equivalent regional program. This program includes programs such as: media advertising campaigns, commercial consumer outreach, promotional materials, community events and fairs, evapotranspiration data availability, a Web site, and allied organizations outreach.

B. Elements implemented directly by the County of Sacramento will include:
   1. Using utility bill inserts or messages on payment notices.
   2. Providing information on residential metered customers' bills showing use in gallons per day for the last billing period compared to the same period the year before.

BMP 8 SCHOOL EDUCATION

A. Within three years of agreement signing, the County of Sacramento program will include: A combination of a County specific program in conjunction with full participation by the County in the Sacramento Area Water Works Association (SAWWA) Conservation Committee's Public Outreach Program or other equivalent regional program. This program includes programs such as: school outreach, promotional materials, community events and fairs, and a Web site.

B. Elements implemented directly by the County of Sacramento include:
   1. Offering tours of County facilities to elementary schools in the County's service area.
   2. Working with schools served by the County to promote school audits, reduced water bills, and innovative funding for equipment upgrades.

BMP 9 COMMERCIAL AND INDUSTRIAL (CI) WATER CONSERVATION

A. Within three years of agreement signing, the County of Sacramento will have:
   1. Trained commercial/industrial water auditors on staff or available through cooperative agreements.
   2. The DWR Commercial / Industrial (CI) water-use materials available for CI customers.
   3. Established, if possible, cooperative CI audit programs with other utilities.
   4. A list of available CI water-use consultants.

B. The County of Sacramento or their representative will annually:
   1. Identify the top 10% of commercial water users and top 10% of industrial water users, not previously audited, and directly contact them or the appropriate customer's representative and offer them water-use reviews (audits). Provide these customers with data on their current water-related costs (supply, wastewater, energy, on-site treatment, etc.).
      a. (For metered customers) annually determine the top 10% of commercial customers and of industrial customers based on water use, and when appropriate, special water use factors (high water use, high wastewater flows, poor quality wastewater, high energy use, etc.).
      b. (For unmetered customers) annually determine the top 10% of commercial customers and of industrial customers based on special water-use factors such as wastewater flows, poor quality wastewater, or high-energy use, etc.
   2. Offer, through bill inserts or other means, CI water-use reviews to all CI customers.
   3. Survey past program participants to determine if audit recommendations were implemented.

C. The County of Sacramento's water-use review program will:
   1. Provide audits conducted by trained commercial/industrial water auditors.
   2. Provide incentives to achieve at least 20% annual participation of the targeted 10% of customers.
   3. Contact past program participants for a follow-up audit at least every fifth year.

D. The County of Sacramento will establish policies requiring water intensive commercial and industrial building permit applicants (new, modified or change-of-water-use) to conduct a water-use efficiency review and submit the findings in required environmental documentation for the commercial or industrial project.

E. Within three years of agreement signing, the County of Sacramento will:
   1. Promote the use of efficient water-use technologies by commercial and industrial customers by offering incentives related to the benefits gained by the water and sewer service providers.

2. Consider separate landscape water meter(s) when combined service would require a 1½" meter.
3. Require efficient cooling systems, recirculating pumps for fountains and ponds, and water recycling systems for vehicle washing as a condition of service.

F. The County of Sacramento will be fully implementing the program described above no later than the beginning of the fourth year after agreement signing.

BMP 11 CONSERVATION PRICING FOR METERED ACCOUNTS

A. Within three years of agreement signing, the County of Sacramento will:
1. Identify all metered customers by account type (single family, multi-residential, commercial, industrial, institutional, landscape irrigation, reclaimed, wholesale).
2. Establish quantity-based rates for each account type.
3. Begin educating all customers about the quantity-based rate structure.
4. Provide metered customers with monthly or bi-monthly information which shows current flat-rate charges, actual water use in gallons, and what charges would have been if based on actual use.

B. The County of Sacramento will, within ten years of agreement signing, bill all metered customers utilizing rates designed to recover the cost of providing service as well as on quantity of water used.

BMP 12 LANDSCAPE WATER CONSERVATION FOR NEW/EXISTING SINGLE FAMILY HOMES

A. The County of Sacramento will implement a program that includes:
1. Information on climate-appropriate landscape design, plants and efficient irrigation equipment/management provided to change-of-customer accounts and, in cooperation with the Building Industry Association of Superior California, to new customers. The availability of this information will be publicized to all existing Single Family Homes in the County of Sacramento's service area on an annual basis.
2. Landscape audit program offered to all SF and MF accounts that receive a meter or interior audit. and
3. Annual pre-irrigation season notification to Single Family Homes served by the County of Sacramento of the County of Sacramento-provided landscape assistance.

B. The County of Sacramento's ongoing program, in cooperation with the California Landscape Contractors Association, Sacramento Area Water Works Association, other purveyors, etc., will include:
1. Participation in the development/maintenance of a local demonstration garden within five years following agreement signing (does not have to be located within the County of Sacramento's service area but should be convenient to the County of Sacramento's customers).
2. Annual participation at local and regional landscape fairs and garden shows.
3. Annual cooperative education and marketing campaigns with local nurseries.
4. Annual irrigation season landscape media campaign.
5. Annual post-irrigation season notification, to all customers, of the importance of timer resets/ sprinkler shut-offs.

C. The County of Sacramento will:
1. Participate in and support a regional landscape task force established by the Forum Successor Effort. The Taskforce will include other local governments and water purveyors, the building and green industries and environmental / public interest groups. It will review the existing local ordinances to determine if it is at least as effective as the Model Water Efficient Landscape Ordinance. The Taskforce may suggest revisions to the existing landscape ordinances.
2. As part of the Taskforce, participate in a review of the implementation of the local ordinances, including builder compliance, landscape plan review, final inspection/certification process and actual water use to determine their effectiveness.
3. As part of the Taskforce, determine if program effectiveness is diminished by city/county staff time constraints, budget or lack of landscape knowledge/expertise, and, if so,

County of Sacramento will be fully implementing the program described above no later than the beginning of the fourth year after agreement signing.

BMP 13 WATER WASTE PROHIBITION

Within three years of agreement signing, the County of Sacramento will enact a water waste prohibition ordinance that includes measures and enforcement mechanisms.

A. The water waste prohibition measures will include:
   1. Irrigation water shall not be allowed to run off to adjoining property or to a roadside ditch or gutter.
   2. Leaking pipes, fixtures, or sprinklers shall be repaired promptly.
   3. Open hoses not permitted - automatic shut-off nozzles are required. and
   4. Swimming pools, ponds and fountains shall be equipped with recirculating pumps. Pool draining and refilling only for health, maintenance or structural reasons - requires agency approval.

B. Other measures, such as the following, may be permanent, seasonal or related to water shortage:
   1. Restricting irrigation hours or days.
   2. Use of a hose to clean sidewalks, driveways, patios, streets and commercial parking lots is not permitted, except for health and safety.
   3. Restaurants serving water only on request.
   4. Restricting the use of potable water for compaction, dust control or other construction purposes when non-potable water is available. and
   5. Limiting the flushing of sewers or fire hydrants, except for health and safety (may be permanent, seasonal or related to water shortage).

C. The waste prohibitions will include as enforcement mechanisms a graduated series of responses to water wasting customers. Enforcement typically includes: personal notification and an offer of a water-use review / repair service, monetary fees, service termination and, in some unmetered service areas, and mandatory water meter installation / reading.

D. Within three years of agreement signing the County of Sacramento will:
   1. Notify all customers at least annually of the waste prohibitions (by newspaper, public notice, mailings, utility billings or a combination of such) prior to the irrigation season.
   2. Have staff will respond to reports of water waste in a timely manner.
   3. Will have water waste patrols at least during water shortages.
   4. Will cooperate with the city or county in their program enforcement efforts.

BMP 14 WATER CONSERVATION COORDINATOR

The County of Sacramento's water conservation coordinator is XXXXXXXX and she/he is responsible for preparing, implementing and monitoring the Plan.

Within three years of agreement signing, at least one staff member at the County of Sacramento will be an AWWA Certified Water Conservation Practitioner (Level II) or pass equivalent training.

BMP 16 ULTRA-LOW FLUSH TOILET REPLACEMENT PROGRAM FOR NONRESIDENTIAL CUSTOMERS

A. Within three years of agreement signing, the County of Sacramento will:
   1. Identify all non-residential customers, estimate the approximate number of non-ULF toilets at each account, and rank them by high, medium or low use (e.g., restaurant toilets are high use, warehouse toilets are low use).
   2. If possible, established a cooperative district / sanitation district ULF rebate program.

B. The County of Sacramento will annually:
   1. Offer, through direct mail or other direct communication, ULF rebates to all nonresidential accounts, which do not yet have ULF toilets, with special focus on those with the highest number of high-use non ULF-toilets.

C. The retrofit program will:
   1. Offer the necessary incentive (which may include rebates, no interest loans, vouchers, billing surcharges/rebates, etc.) to insure that at least 10% of non-residential non-ULF toilets are replaced with ULF toilets each year, with a final installation target of 90% of all non-residential toilets being ULFs within ten years.

2. Consider larger rebates for the more expensive high-use flushometer-type ULF installations.
3. Investigate opportunities for community based organizations (CBOs) to receive the training and financial incentives necessary for them to implement this BMP for their constituents. and
4. Consider monitoring the change in water use at metered-accounts that install ULF toilets.

D. The County of Sacramento will be fully implementing the program described above no later than the beginning of the fourth year after agreement signing.

CITIZEN INVOLVEMENT PROGRAM

County will invite the existing Community Planning Advisory Committees to designate a representative(s) to provide input to the proposed residential metering implementation plan. It is intended that this informal group will serve to provide valuable citizens' input on the overall approach to implementation of residential metering.

APPENDIX D

BOYLE REFORMULATION OF WATER DEMANDS WITH WATER CONSERVATION

MEMORANDUM

TO: Susan Davidson and Grant Werschkull, CCOMWP May 23, 1995

FROM: Gary Meyer, Boyle

SUBJECT: **Year 2030 Water Demand Projections Including Conservation**

Based upon water demand projections at buildout and ultimate buildout of the general plans and applying urban water conservation factors totaling 25.6 percent, water demand projections were determined for all areas within the Sacramento county-wide area. As a comparison, the urban water conservation factor of 25.6 percent is quite similar to the 25 percent factor utilized for the municipal and industrial (M&I) component of total demand by the American River Water Resources Investigation.

The urban water conservation factor was determined and defined in the November 17 memorandum to the Demand/Conservation Negotiating Team, entitled *Possible Modifications to the Boyle Report*. The various BMPs comprising the total urban water conservation factor of 25.6 percent (which is over and above the conservation that was achieved in the base year 1990) are categorized and presented below.

- Metering:
  - Existing: 2.2 percent
  - New: 6.7 percent
  - Total: 8.9 percent
- Landscape:
  - Large Landscape Water Audits: 0.4 percent
  - Landscape Requirements - New Comm/Industrial/Public/Multi-Family: 0.2 percent
  - Landscape Requirements of AB 325: 7.4 percent
  - Total: 8.0 percent
- Distribution System Water Audits/Leak Detection/Repair Program; Total: 4.5 percent
- Enforcement of New California Plumbing Code (ULV toilets); Total: 3.7 percent
- Others:
  - Single Family and Multi-Family Water Audits: 0.1 percent
  - Indoor Plumbing Retrofit: 0.4 percent
  - Total: 0.5 percent

Grand Total: 25.6 percent

The total urban water conservation factor was applied to water demand projections determined at buildout and ultimate buildout in the *Estimate of Annual Water Demand Within the Sacramento county-wide Area* report, May 1995 (the "Boyle Report"). A population based methodology was developed for interpolating the demand projections at buildout and ultimate buildout to determine projections in the Year 2030. Assumptions utilized with the interpolation methodology are presented in the Boyle *Estimation of Total Study Area Demand Projections in the Year 2030* December 1, 1994 memorandum, which is attached. Totals presented in this memorandum assumed only 8.0 and 11.9 percent urban water conservation at buildout and ultimate buildout, respectively.

SACRAMENTO CCOMWP
YEAR 2030 WATER DEMAND SUMMARY
All units in acre-feet

Area Name	1990 Usage*	Boyle G.P. Buildout 8% Conservation Year 2024	Conservation Estimated at 25.6%		
			Total Buildout Demand Year 2024	Total Demand Year 2030	Total Ultimate Buildout Demand Beyond 2050
URBAN WATER DISTRICTS					
Arcade WD	24,322	28,195	23,087	23,209	23,680
Arden Cordova WS	13,977	18,845	15,498	15,723	16,587
Carmichael WD	12,851	13,386	10,884	10,884	10,884
Citizens Utilities CC	49,977	69,933	57,762	59,160	64,513
Citrus Heights ID	18,336	20,083	16,284	16,419	16,936
Del Paso Manor WD	1,605	1,920	1,565	1,565	1,565
Elk Grove WW	11,666	20,001	16,284	16,662	18,112
Fair Oaks WD	15,201	17,159	14,222	14,222	14,222
Florin County WD	2,273	2,565	2,104	2,150	2,327
City of Folsom	17,873	38,661	31,825	32,365	34,434
Fruitridge Vista WD	4,477	5,477	4,511	4,574	4,813
City of Galt	3,924	8,743	7,208	7,233	7,329
Northridge WD	18,675	23,164	19,065	19,081	19,143
Orange Vale WC	7,093	8,205	6,747	6,747	6,747
Rancho Murieta CSD	2,958	8,643	7,298	7,296	7,289
Rio Linda WD	17,206	20,178	17,035	18,688	25,021
Sacramento County WMD	11,327	22,912	18,858	19,051	19,793
San Juan Suburban WD	4,944	5,701	4,712	5,016	6,179
Tokay Park WC	134	146	120	120	120
AGRICULTURAL DISTRICT					
Clay WD	16,248	15,479	15,379	15,352	15,251
Galt ID	72,523	69,725	68,988	68,860	68,367
Natomas Central MWC	53,234	51,064	50,419	50,455	50,591
Omochumne-Hartnell WD	54,873	44,125	43,644	44,026	45,487
UNORGANIZED AREAS					
Zone 40 Expansion	25,684	45,027	37,648	40,045	49,227
Sunrise A	14,967	29,099	25,274	28,401	40,377
Sunrise B	9,083	22,460	18,836	20,026	24,585
Southwest	77,334	80,221	80,031	79,860	79,206
OFSCU	26,905	20,967	20,597	20,567	20,452
Eastern Foothills	4,110	5,120	4,206	7,167	18,510
OTHER AREAS					
American River Parkway	72	72	60	60	60
Folsom Lake and Prison	1,735	1,753	1,440	1,474	1,603
McClellan AFB	1,821	1,851	1,509	1,512	1,522
North Ridge CC	480	485	399	399	399
Miscellaneous A	87	87	71	147	436
Miscellaneous B	353	357	294	294	294
Rancho Seco	15,952	45,342	37,319	37,319	37,319
Sacramento Metro Air	14,628	6,350	6,180	6,262	6,578
CITY					
City	127,339	183,509	151,187	152,622	158,121
TOTAL COUNTY-WIDE	756,248	957,010	838,548	855,014	918,079
POPULATION	1,046,000	1,939,000	1,939,000	2,092,000	2,678,000

* with existing level of conservation

APPENDIX E

OPERATIONAL PARAMETERS – ZONE 40 CONJUNCTIVE USE PROGRAM

Conjunctive Water Management Operations Model

A computer operations model was developed for Zone 40 that compares available water supplies with system demand on an hourly basis. In making this comparison, the model prioritizes the use of surface water supplies based on availability of supply and capacity of facilities. Each source of surface water is given a priority. After those sources have been fully utilized, the model then uses groundwater to meet demands. Storage provides for peak hour demands. Model runs were made for each of the critical demand periods in conjunction with the phasing of surface water facilities. For each demand period, the model simulates the system based on 70 years of historical hydrology keeping the demands, facilities, and supply conditions constant. The model assumes that the water distribution system capacity is sufficient to convey available surface water to the demand. Model results are expressed in terms of average, maximum, and minimum groundwater use for the level of surface water capacity in place.

Surface Water Facility Assumptions

For the purpose of this analysis, it is assumed that SCWA will construct the surface water facilities described in Alternative 2 – Freeport Regional Diversion Project as presented in **Table 6-5** of the master plan report. The phasing of surface water facilities will occur so as not to exceed the Water Forum sustainable groundwater yield.

Surface water treatment and delivery to Zone 40 includes 11 mgd of City of Sacramento WTP capacity (non-dedicated) and the Central WTP. The design and operation of the Central WTP is assumed to minimize the impact of scheduled maintenance and higher turbidity in the raw water supply during wet months of the wet years on treatment plant output. Issues related to flow reversal in the Sacramento River will be addressed in the engineering of the Freeport project.

Groundwater Facility Assumptions

Groundwater extraction capacity is sized to meet a certain level of redundancy during maximum day demands in the event that little or no surface water is available in dry and critical years. While the computer model is capable of modeling recharge facilities, no injection or storage component is used in this analysis.

Surface Water Supply Assumptions

The timing and amount of surface water available from each source is based on estimates of their reliable yield. CVP sources are assumed to be on a deficiency pattern that is based on hydrologic year type. Much of the information related to surface water availability was taken from the latest CALSIM runs as described below. Availability of excess flows under SCWA's water right application is based on several criteria as discussed below. Water right transfers are considered to be the most reliable of supplies but will likely cost more than other supplies and are subject to other types of conditions. The priority of use of water supplies in the model are such that excess flows are used first, CVP supplies second, and water right transfers last.

Projected Availability of Excess Flows

The occurrence of Delta outflow in excess of regulatory requirements in the future is uncertain. Delta outflow depends on water demand growth, the degree to which additional storage is constructed in California, and future regulatory requirements. Computer modeling has been performed under the CALFED Bay Delta Program to simulate future water supply conditions and estimate future Delta outflow. The use of excess flows may be limited by conditions similar to those contained in Water Right Standard Permit Term 91[2].

[2] Term 91 Inbasin Entitlements Delta and Tributary Rivers

No diversion is authorized by this license when satisfaction of inbasin entitlements requires release of supplemental Project water by the Central Valley Project or the State Water Project.

A. Inbasin entitlements are defined as all rights to divert water from streams tributary to the Sacramento-San Joaquin Delta or the Delta for use within the respective basins of origin or the Legal Delta, unavoidable natural requirements for riparian habitat and conveyance losses, and flows required by the State Water Resources Control Board (SWRCB) for maintenance of water quality and fish and wildlife. Export diversions and Project carriage water are specifically excluded from the definition of inbasin entitlements.

B. Supplemental Project water is defined as water imported to the basin by the projects, and water released from Project storage, which is in excess of export diversions, Project carriage water, and Project inbasin deliveries.

The SWRCB shall notify the licensee of curtailment of diversion under this term after it finds that supplemental Project water has been released or will be released. The SWRCB will advise the licensee of the probability of imminent curtailment of diversion as far in advance as practicable based on anticipated requirements for supplemental Project water provided by the Project operators.

Various computer models have been developed to simulate the operations of the State Water Project ("SWP") and CVP; they are PROSIM, DWRSIM and CALSIM. PROSIM, developed by the USBR, simulates the CVP operations in detail and contains simplified SWP operations. DWRSIM, developed by California Department of Water Resources ("DWR"), contains detailed SWP operations and simplified CVP operations. CALSIM, however, developed through a collaborative effort of DWR and USBR, simulates both SWP and CVP operations.

No Delta outflow can be diverted when Term 91 is in effect. The result of a CALSIM Benchmark Study (G Model, 2020 level of demand) dated September 30, 2002 is used to evaluate the availability of excess Delta outflow. Post-processing of CALSIM output is necessary to obtain this value.

Three criteria are applied to determine the availability of monthly excess Delta outflow. If any one criterion is satisfied, no excess Delta outflow can be diverted during that month. These criteria are:

1. Excess Delta outflow below minimum Delta outflow requirements to protect the estuarine habitat for anadromous fishes and other estuarine-dependent species. The 1995 Bay-Delta Plan sets the minimum monthly Delta Outflow rate for each Sacramento Valley water year type.

2. Export inflow ratio is above maximum allowable limit necessary to protect the habitat of estuarine-dependent species by reducing the entrainment of various life stages by the major export pumps in the southern Delta. This is the combined project export rate in terms of the percentage of the Delta inflow in the 1995 Bay-Delta Plan.

3. CVP/SWP storage withdrawals are occurring for in-basin uses. CVP storage includes Folsom Lake, Lake Shasta, Keswick Reservoir, Whiskeytown Lake, and imports from Trinity Lake. SWP storage includes Lake Oroville. When the total CVP/SWP storage is decreasing, excess water is unavailable because supplemental Project water is being released.

Figure E-2 shows the projected occurrence and average volume of excess Delta outflow based on the most current modeling using CALSIM. The majority of available water occurs in the months of January through March when water is in excess to the Delta and the State and Federal water projects. **Figure E-3** illustrates the availability of supplies over the 73 years of historical hydrology used in the CALSIM model runs. Each line on the graph is a month when excess flows may be diverted by SCWA.

Figure E-2. Predicted Average Delta Excess Under Term 91 Conditions

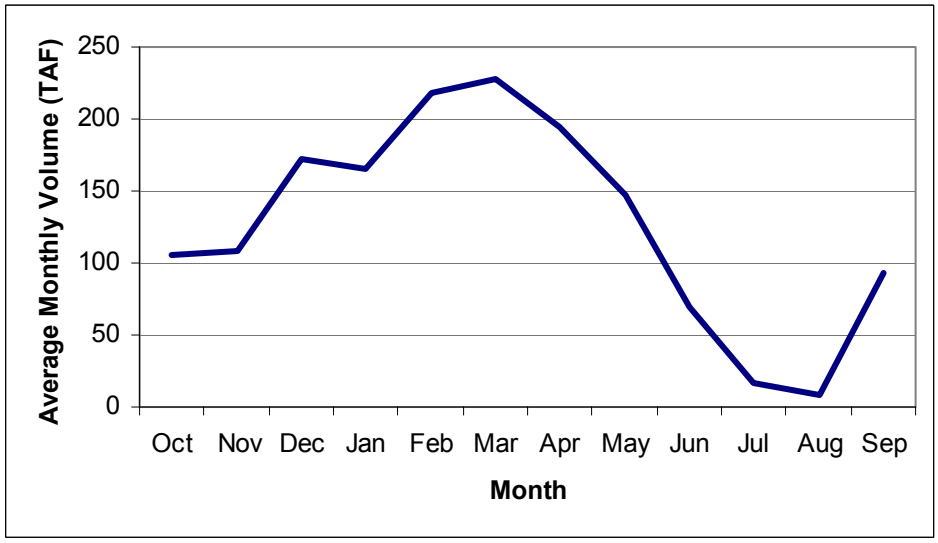
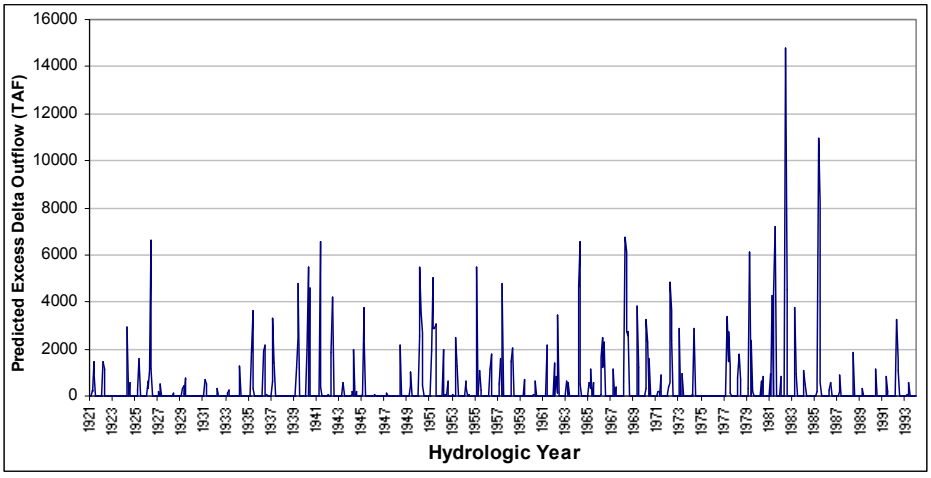


Figure E-3. Monthly Availability of Section 11460 Water over 73 Hydrologic Years



Groundwater Yield

The sustainable yield of the groundwater basin is stated in the Water Forum Agreement and discussed in **Section 3**. It is assumed that SCWA has access to 40,900 AF/year annually of groundwater that can be either used directly to meet water demands or, if surface water is available, the groundwater can be "banked" as in-lieu storage. The sustainable yield objectives of the groundwater basin are met when the average long term yield over the 70-year hydrologic period does not exceed the 40,900 AF/year.

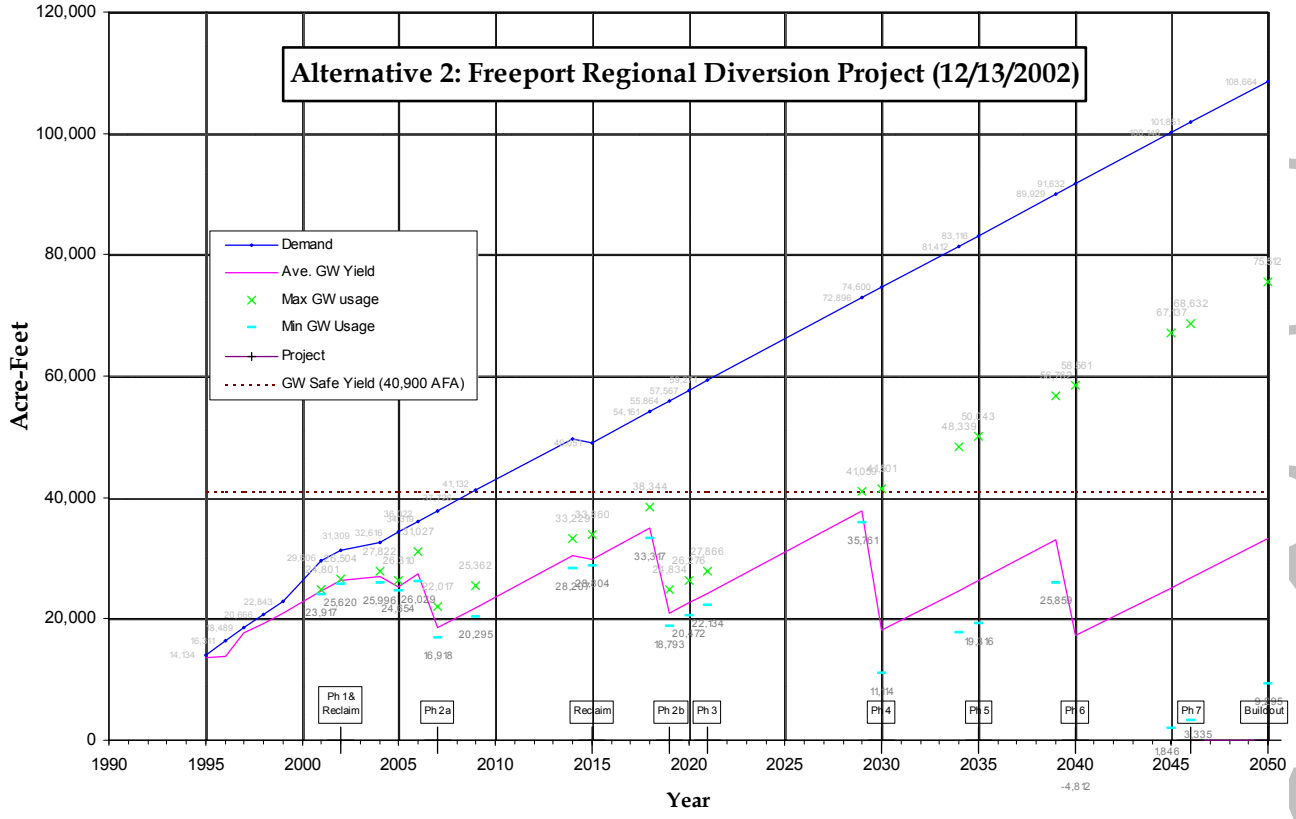
Operations Model Findings

The size of surface water and groundwater facilities for the capital program have been optimized to make optimal use of available wet year water. Surface water facility capacity could be increased in size to use more of the available wet year water. However, there is a point at which the full capacity of the treatment plant and conveyance system would only be used during peak months of extremely wet years (i.e., when surface water is available in sufficient quantity). This study limited treatment plant capacity by comparing the water treatment plant capacity with the average use of the treatment plant capacity over the 70-year hydrologic period. If the average use became less than 50 percent of the total water treatment plant capacity, no additional capacity was assumed and other sources of water supply were sought.

Figure E-4 provides a summary of model results for the planning period. The three curves-lines on the figure represent (from top to bottom) the water demand, the sustainable groundwater yield objective, and the average use of groundwater. The demand line begins with historical demands from 1995 to 1999 and, beginning in 2000, demands are projected linearly to 2050 based on **Table 2-1** and **Table 2-2**. Steps in the demand curve occur when portions of the demand are taken over with recycled water.

The dashed line represents Zone 40's sustainable groundwater yield objective of 40,900 AF/year. The bottom line represents the average use of groundwater over the 70-year hydrologic period based on the availability of surface water over time. This line presents the timing of needed surface water projects and does this by not exceeding the groundwater yield. The maximum and minimum points at every facility phase reflect the dry year and wet year events when groundwater capacity is at its highest and lowest points, respectively.

Figure E-4. Facility Phasing Diagram



APPENDIX F

SURFACE WATER QUALITY CONSTITUENTS AND TREATMENT TECHNOLOGIES

The selection of the appropriate treatment process for Sacramento River water diverted at the Freeport intake site (as at the SRWTP site) depends on general water quality factors such as turbidity, color, total organic carbon (TOC), bacteriological contamination, and other upstream contamination. Below is a brief discussion of the water quality constituents evaluated.

Coliform:

- The total coliform values are below 1,000 MPN/100 mL at Freeport and the City of West Sacramento's Bryte Bend Water Treatment Plant ("BBWTP") for 9 months out of the year. The total coliform value is below 1,000 MPN/100 mL at the City of Sacramento's Sacramento River Water Treatment Plant ("SRWTP") for 4 months out of the year.

- The fecal coliform and *E. Coli* levels are significantly lower than the total coliform levels at each monitoring site, and are relatively similar between monitoring sites.

- There are elevated levels of coliform in the Sacramento River during the winter months.

Giardia/Cryptosporidium:

- Based on samples collected to date, there is not a high concentration of *Giardia* or *Cryptosporidium* in the Sacramento River during any particular season. The moderate frequency of presumed detections and the infrequency of confirmed detections, at very low levels, indicate that the presence of these protozoa is probably low.

Turbidity:

- The average raw water turbidity level at BBWTP is 34 NTU. The average raw water turbidity level at SRWTP is 12 NTU. The turbidity levels at SRWTP are generally lower than BBWTP due to the influence of the American River.

- The water at the Freeport Regional Diversion site will likely be a blend of the two sources.

- Both WTPs are capable of achieving 99% removal of solids with conventional filtration processes.

Disinfection By-Product Precursors:

- Raw water TOC levels at the BBWTP have an average value of 2 parts per million ("ppm"). Raw water TOC levels at the SRWTP have a running annual average of less than 2.0 mg/L. Neither City will be required to implement enhanced coagulation based on either distribution system TTHM and HAA5 levels or raw or treated water TOC levels.

- Raw water TOC levels at Freeport are slightly higher than upstream, based on very limited data, and enhanced coagulation may be required.

- TOC levels are greatest during the fall and winter months.

Molinate and Thiobencarb:

- Molinate and thiobencarb are detected at low levels during the spring months on the Sacramento River.

- There has been an increased number of positive detections in the raw water of both molinate and thiobencarb along the Sacramento River over the past five years.

- Molinate and thiobencarb concentrations are well below primary drinking water standards, but thiobencarb concentrations are sometimes detected in the raw water at levels that can result in taste problems in the treated water.

Overview:

- Based on the evaluation of water quality data available at Freeport, it appears that treatment requirements for this source water would be 2-log reduction of *Cryptosporidium*, 3-log reduction of *Giardia*, and 4-log reduction of viruses. The overall water quality appears good and similar in nature to the raw water at the BBWTP and the SRWTP.

- It is recommended that additional raw water quality data be collected from the potential Freeport Regional Diversion site to confirm treatment requirements as follows:

- Monthly *Giardia, Cryptosporidium* and *E.Coli,*
- Monthly TOC,
- Monthly or more frequent turbidity, and
- Molinate and thiobencarb through the DPR Rice Pesticide Program.
- Sampling at Freeport should be coordinated with sampling events for *Giardia* and *Cryptosporidium* by the Regional Plant to increase the frequency of sample collection.
- It may also be advantageous to perform bench or pilot testing to review the TOC removal capabilities of the source water and alternative treatment processes.

General guidelines have been established in the industry for applicability of basic treatment process alternatives of conventional treatment, direct filtration, in-line filtration, two-stage filtration, and membrane filtration based on basic water quality parameters. **Table F-1** presents these guidelines. Other criteria such as reliability, flexibility, ease of implementation, level of operator expertise, and waste solids handling also enter into the evaluation process.

Table F-1. Treatment Process Capabilities for Raw Water Quality

Quality Parameter	Conventional Treatment	Direct Filtration	In-Line Filtration	Two-Stage Filtration	Membrane Filtration
Turbidity (NTU)	<1,000	<15	<2	<30	<100
Color (CU)	<100	<20	<5	<40	<20
Total Coliforms (MPN/100 ml)	$<10^5$	$<10^3$	$<10^2$	$<10^4$	$<10^5$
Taste and Odor (TON)	<20	<5	<3	<10	<5
Algae (cells/mL)	$<10^3$	$<10^2$	<10	$<5 \times 10^2$	$<10^2$
Total Organic Carbon (mg/L)	<10	<5	<2	<5	<5

As discussed earlier, the overall quality of the Sacramento River at Freeport is relatively high. However, the raw water quality is generally not applicable for direct filtration, in-line filtration, two-stage filtration and membrane filtration; turbidity episodes in excess of 200 NTU can occur on the Sacramento River. As demonstrated by the performance of the existing SRWTP under such conditions, the conventional process train has no difficulty in treating such water if adequate chemical feed, flocculation, and sedimentation time is provided. A second disadvantage for membrane filtration is the lack of operating facilities in the size range needed to treat the water diverted at the Freeport intake site. Due to the seasonal and sporadic nature of the raw water quality, and due to the experience limitation with membrane filtration, it is recommended that conventional treatment be utilized for water diverted at the Freeport intake site.

APPENDIX G

WATER FACILITY COMPONENTS AND UNIT COSTS

ELEMENT:	**GF1. GROUNDWATER CAPACITY**
ELEMENT SUMMARY	
Corresp. Supply Elements:	G1. Groundwater Pumping Capacity
Required Facilities:	Wells, Conjunctive Use Facilities (Storage & Pumping), Treatment, Conveyance, Emergency Power
Capacities Evaluated:	10 mgd (maximum day)
Capital Costs ($ Million):	**$15.0 - $17.0**

ELEMENT DESCRIPTION

General Description of Facilities

The facilities necessary for providing groundwater production capacity include wells, treatment, conjunctive use facilities (storage and pumping), emergency power and conveyance to the distribution system. It is assumed that treatment will occur at treatment facilities with maximum day capacities of approximately 10 mgd per facility. Each treatment facility will serve anywhere from two to approximately six wells with capacities of approximately 1,500 gpm each. One of the five six will provide redundancy.

Participating/Coordinating Agencies

The installation of new wells, treatment and conveyance facilities within 2030 study area of Zone 40 will not require participation or coordination with outside agencies. Installation of wells outside the 2030 study area of Zone 40 will require coordination to minimize interference with existing wells.

Needed Environmental Documentation

Compliance with the CEQA will likely be required for the construction of the conveyance and treatment facilities. It is not anticipated that any additional environmental documentation will be required unless the facilities are placed in environmentally sensitive areas such as streambeds or wetlands. The crossing of a streambed with conveyance facilities will require a Streambed Alteration permit from the California Department of Fish and Game and perhaps a 404 permit from the U.S. Army Corps of Engineers.

Institutional/Environmental Constraints

There are no other readily identifiable institutional or environmental constraints associated with this project that cannot be readily mitigated.

Useful Life

It is anticipated that the wells will have a useful life of approximately 30 years. The treatment and conveyance facilities will have a useful life of approximately 40 years.

Costs

The costs and facilities required for a 10 mgd groundwater production and treatment are detailed below. Costs have been developed for treatment of iron and manganese. Because well production and storage capacity varies depending on the location within Zone 40 relative to surface water supplies, costs are estimated to range from $15.0M to $17.0M.

Facility	Costs (10 mgd: Iron, Mang.) ($ Million)
Wells [1] ($600,000/well)	3.6
Treatment [2]	6.5
Conveyance [3]	1.0
Subtotal	**11.0**
Engr., Admin., & Cont. (35%)	3.9
Total	**$15.0**

Notes:
(1) Well costs based on 6 wells (18 inch-diameter, 1000 feet deep) with casing and pumps.
(2) Treatment facilities costs based on treatment, treated water reservoir (3.5 million gallons), treated water pump station and land (6 acres).
(3) Conveyance includes pipeline from wells to treatment plant (5000 feet, 12 inch-diameter) and conveyance from treatment plant to distribution system (200 feet, 30 inch-diameter)

ELEMENT:	**SF1. SCWA FREEPORT WATER TREATMENT PLANT**
ELEMENT SUMMARY	
Corresp. Supply Elements:	S1. Appropriative Water S2. SMUD 1 Assignment S3. SMUD 2 Water Assignment S4. "Fazio" Water (PL-101-514) S5. Other Water Supplies S6. Purchase of City of Sacramento Water
Required Facilities:	Conventional treatment plant w/ intake structure and conveyance pipelines
Capacities Evaluated:	85 mgd
Capital Costs ($ Million):	$281.0

ELEMENT DESCRIPTION

General Description of Facilities

This alternative consists of the construction of a diversion structure on the Sacramento River near the community of Freeport. Other facilities include: raw water conveyance pipelines, an 85 mgd (ultimate capacity) surface water treatment facility to be located on or near the Sacramento Regional County Sanitation District's wastewater treatment plant's "buffer lands," and treated water conveyance pipelines to the distribution system.

Participating/Coordinating Agencies

The construction of this treatment plant and diversion facilities will require coordination with SRCSD and the City of Sacramento.

Needed Environmental Documentation

Compliance with CEQA will be required for the construction of the conveyance and treatment facilities. In addition, an EIS will likely be required for the diversion from the Sacramento River to comply with NEPA. The diversion structure in the Sacramento River and the crossing of a streambed with conveyance facilities will require a Streambed Alteration permit from the California Department of Fish and Game and a 404 permit from the U.S. Army Corps of Engineers.

Institutional/Environmental Constraints

Based on Federal Emergency Management Agency (FEMA) data, the Sacramento Regional County Sanitation District site is protected by levees from the 100-year flood. However, failure of the levee system would result in inundation of the site by approximately 13 feet during a 100-year flood event. Studies are presently underway by local and federal agencies aimed at providing improved flood protection for this and other areas of the Sacramento region.

A concern with the diversion location is the possibility of flow reversals in the Sacramento River caused by the combination of low river flows and tidal effects in the Delta. Flow reversals increase the possibility of treated wastewater effluent moving upstream to the Freeport diversion structure. Studies are currently being conducted to evaluate the effect of flow reversals on the location of the Freeport diversion structure. Findings may indicate the need to stop diversions during flow reversal events.

Useful Life

It is anticipated that the water treatment plant and all associated facilities would have a minimum useful life of 40 years. The plant could be built in phases such that additional capacity could be added, as needed. However, the quantity of land and sizing of the diversion structures should be based on the ultimate size of the treatment plant.

Cost

The estimated cost for the 85 mgd SCWA Freeport WTP including the diversion structure and raw water conveyance is based on recent feasibility and preliminary design studies completed for the Freeport Regional Diversion Project. The estimated cost is $281M (includes admin, engineering, and contingency).

ELEMENT:	**SF2. FREEPORT REGIONAL DIVERSION PROJECT**
ELEMENT SUMMARY	
Corresp. Supply Elements:	S1. Appropriative Water S2. SMUD 1 Assignment S3. SMUD 2 Assignment S4. "Fazio" Water (PL-101-514) S5. Other Water Supplies S6. Purchase of Water from City for American River POU
Required Facilities:	Conventional treatment plant w/ intake structure and conveyance pipelines
Capacities Evaluated:	85 mgd
Capital Costs ($ Million):	$342.0

ELEMENT DESCRIPTION

General Description of Facilities

This alternative consists of the construction of a joint SCWA and EBMUD diversion structure on the Sacramento River near the community of Freeport. Other facilities include: a joint SCWA and EBMUD raw water conveyance pipeline to the central portion of Zone 40, a SCWA 85 mgd (ultimate capacity) surface water treatment facility in the central portion of Zone 40 and associated raw and treated water conveyance pipelines.

Participating/Coordinating Agencies

The construction of this treatment plant and diversion facilities will require coordination with SRCSD and the City of Sacramento.

Needed Environmental Documentation

Compliance with CEQA will be required for the construction of the conveyance and treatment facilities. In addition, an EIS will likely be required for the diversion from the Sacramento River to comply with NEPA. The diversion structure in the Sacramento River and the crossing of a streambed with conveyance facilities will require a Streambed Alteration permit from the California Department of Fish and Game and a 404 permit from the U.S. Army Corps of Engineers.

Institutional/Environmental Constraints

There are no other readily identifiable institutional or environmental constraints associated with this project that cannot be readily mitigated.

A concern with the diversion location is the possibility of flow reversals in the Sacramento River caused by the combination of low river flows and tidal effects in the Delta. Flow reversals increase the possibility of treated wastewater effluent moving upstream to the Freeport diversion structure. Studies are currently being conducted to evaluate the effect of flow reversals on the location of the Freeport diversion structure. Findings may indicate the need to stop diversions during flow reversal events.

Useful Life

It is anticipated that the water treatment plant and all associated facilities would have a minimum useful life of 40 years. The plant could be built in phases such that additional capacity could be added, as needed. However, the quantity of land and sizing of the diversion structures should be based on the ultimate size of the treatment plant.

Cost

The estimated cost for the 85 mgd SCWA Freeport WTP including the diversion structure and raw water conveyance is based on recent feasibility and preliminary design studies completed for the Freeport Regional Diversion Project. The estimated cost is $342M (includes admin, engineering, and contingency).

ELEMENT:	**SF3. SACRAMENTO RIVER WATER TREATMENT PLANT JOINT PROJECT**
ELEMENT SUMMARY	
Corresp. Supply Elements:	S1. Appropriative Water S2. SMUD 1 Assignment S3. SMUD 2 Assignment S4. "Fazio" Water (PL-101-514) S5. Other Water Supplies S6. Purchase of Water from City for American River POU
Required Facilities:	Conventional treatment plant w/ intake structure and conveyance pipelines
Capacities Evaluated:	70 mgd
Capital Costs ($ Million):	$273.0

ELEMENT DESCRIPTION

General Description of Facilities

This alternative for supplying treated surface water requires purchasing 70 mgd of dedicated treatment plant capacity from the City and constructing treated water conveyance pipelines through the City for delivery to Zone 40.

Participating/Coordinating Agencies

The alternative will require close coordination with the City of Sacramento because the City owns and operates the Sacramento River Water Treatment Plant. It is not anticipated that participation and coordination with agencies other than the City of Sacramento will be required.

Needed Environmental Documentation

Compliance with CEQA will be required for the construction of the conveyance and treatment facilities. In addition, an EIS will likely be required for the diversion from the Sacramento River to comply with NEPA. The diversion structure in the Sacramento River and the crossing of a streambed with conveyance facilities will require a Streambed Alteration permit from the California Department of Fish and Game and a 404 permit from the U.S. Army Corps of Engineers.

Institutional/Environmental Constraints

A potential constraint is the limited control SCWA has on the project. At present the City of Sacramento is expanding their surface water treatment capacity to meet both the City's growing demands as well as other purveyors demands (including Zone 40). The City is currently pursuing (1) expansion of Fairbairn WTP, (2) expansion of the Sacramento River WTP, and (3) construction of a new North Natomas WTP. The ultimate decision on when and where additional treatment capacity becomes available will rest primarily with the City of Sacramento and it is anticipated that SCWA will have limited input into the decision process.

Useful Life

It is anticipated that the water treatment plant and all associated facilities would have a minimum useful life of 40 years.

Cost

Costs for purchasing up to 70 mgd of treatment plant capacity from the City of Sacramento is based on a methodology consistent with the current wheeling agreement between SCWA and the City for water treated and delivered to the Franklin Blvd connection. The total cost is estimated to be $273M (includes admin, engineering, and contingency).

ELEMENT:	**RF1. RECYCLED WATER**
	ELEMENT SUMMARY
Corresp. Supply Elements:	Rl. Recycled Water
Required Facilities:	Tertiary treatment at Sacramento Regional Wastewater Treatment plant storage Zone 40 storage and distribution
Capacities Evaluated:	**7 mgd**
Capital Costs ($ Million):	Phase 1 (2 mgd) - $6.6 Phase 2 (5 mgd) - $7.8

ELEMENT DESCRIPTION

General Description of Required Facilities

The primary facilities associated with this element include treatment at the Sacramento Regional Wastewater Treatment Plant (conventional secondary treatment followed by filtration and disinfection), conveyance to Zone 40, and storage and distribution within Zone 40. Providing recycled water to currently developed areas will require retrofitting existing irrigation systems that are presently connected to potable water supplies. The development of a tertiary treatment facility at the Sacramento Regional County Sanitation District for urban landscaping has previously been analyzed by the Sacramento Regional County Sanitation District as part of the Sacramento County Water Reclamation Study (Nolte and Associates, 1994). Urban Use Phase 1 (5 mgd recycled water program that will produce 2 mgd for Zone 40) is presently under construction and will be completed in 2003. This project will deliver recycled water from the wastewater treatment plant to areas adjacent to the plant. This includes approximately 1000 AF/Yr to be delivered to the Laguna area of Zone 40. Phase 2 is planned to increase the tertiary treatment plant capacity from 5 mgd to 10 mgd (7 mgd total for Zone 40). Associated Zone 40 facilities include additional conveyance pipeline, storage facilities, and booster pumps.

Participating/Coordinating Agencies

This element will require the participation and coordination with the Sacramento Regional County Sanitation District who operates the tertiary treatment plant at the Sacramento Regional Wastewater Treatment Plant site.

Needed Environmental Documentation

Compliance with the CEQA will likely be required for the construction of the conveyance and treatment facilities. The pipeline route will cross a creek and therefore may require a Streambed Alteration permit from the California Department of Fish and Game and a 404 permit from the U.S. Army Corps of Engineers.

Institutional/Environmental Constraints

It is not anticipated that the installation or operation of these facilities will be subject to institutional or environmental constraints that cannot be readily mitigated.

Useful Life

The conveyance facilities are anticipated to have a minimum useful life of 40 years.

Cost

The estimated capital cost for conveying recycled water to Zone 40 from the Sacramento Regional County Sanitation District is estimated to be $6.6M for phase 1 facilities and $7.8M for phase 2 facilities (includes admin, engineering, and contingency).