Alameda County
Water District

URBAN WATER MANAGEMENT PLAN 2006-2010

ACWD
ALAMEDA COUNTY WATER DISTRICT

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF TABLES
(Continued)

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

ABAG	Association of Bay Area Governments
ACWD	Alameda County Water District
ADWF	average dry-weather flow
AF	acre-foot (325,900 gallons)
AF/Yr	acre-feet per year
AHF	above the Hayward Fault (aquifer)
ARP	Aquifer Reclamation Program
BHF	below the Hayward Fault (aquifer)
BMP	Water Conservation Best Management Practices
ccf	hundred cubic feet (748 gallons)
cfs	cubic foot (feet) per second
CII	Commercial, Industrial and Institutional
CUWA	California Urban Water Agencies
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
DWR	(California) Department of Water Resources
EBDA	East Bay Dischargers Authority
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
FERC	Federal Energy Regulatory Committee
GIS	Geographic Information System
gpd	gallons per day
gpm	gallons per minute
IRP	integrated resources planning
IRPM	(District's) Integrated Resources Planning Model
MCL	Maximum Contaminant Level
mg/l	milligrams per liter
mgd	million gallons per day
MOU	Memorandum of Understanding on Urban Water Conservation
MSJWTP	(District's) Mission San Jose Water Treatment Plant
MFR	multi-family residential
NUMMI	New United Motors Manufacturing, Inc.
ppm	part per million
RWQCB	Regional Water Quality Control Board
SBA	South Bay Aqueduct
SBP	Salinity Barrier Program
SDWA	Safe Drinking Water Act
SEP	Salt Evaporator Pond
SFPUC	San Francisco Public Utilities Commission
SFR	single-family residential
SFWD	San Francisco Water Department
sq. ft.	square foot (feet)
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAF	1,000 acre-feet
TDS	total dissolved solids
ULFT	ultra low flow toilet
USBR	U.S. Bureau of Reclamation
USD	Union Sanitary District
USGS	U.S. Geological Survey
UWMP	Urban Water Management Plan
WTP	water treatment plant
WTP 2	(District's) Water Treatment Plant Number 2
WWTP	Wastewater Treatment Plant
Zone 7	Zone 7 of the Alameda County Flood Control and Water Conservation District

CHAPTER 1
INTRODUCTION

1.1 PURPOSE

This update to Alameda County Water District's (ACWD or District) Urban Water Management Plan (UWMP or Plan) has been prepared in response to the State of California's Urban Water Management Planning Act, Water Code Sections 10610 through 10657. The Act requires that every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare and adopt an urban water management plan. The Act also requires that water suppliers provide updates to their Plan every five years.

1.2 PLAN PREPARATION

This UWMP Update covers the period from 2006 through 2010, and is the fifth plan adopted by the ACWD Board of Directors (the four prior plans covered the periods from 1986-1990, 1991-1995, 1996-2000 and 2001-2005). Several changes have occurred since ACWD's first UWMP was adopted in 1985, which have resulted in the need for a broader, more sophisticated representation of the District's water supply, demand management and operational alternatives. Accordingly, in 1992, the District began implementation of a planning effort that would apply the approaches and techniques of integrated resources planning (IRP) to ensure that appropriate facility and resource decisions are made. IRP is an inclusive process that begins with the premise that a wide range of traditional and innovative supply-side and demand-side (conservation) resources must be considered. The process also provides information on potential consequences and aids in judging the value of trade-offs among resource strategies.

In August 1995, the ACWD Board of Directors adopted the recommendations of ACWD's Integrated Resources Planning Study as its road-map for both supply and demand-side planning through the year 2030. Because this planning process involves assessment and treatment of conservation as a resource that is evaluated as rigorously as supply-side options, the IRP process and results form the foundation for this and future urban water management plans. In addition, because the process applied is inclusive of both supply and demand-side options, it generally goes beyond the statutory requirements outlined the Urban Water Management Planning Act in its analysis of resource management options. ACWD is currently in the process of updating the assumptions and implementation status of the 1995 IRP and the IRP water supply strategy recommendations. As such, the District's adopted 1995 Integrated Resources Plan and the on-going 2005 update to the IRP form the core of this report. Table 1-1 provides a comparison of the key components of the District's IRP and 2006-2010 UWMP Update.

A key policy criterion used in the formulation and evaluation of water supply strategies in the IRP process is to maximize local control of resources while maintaining a high level of service reliability. This is especially important for ACWD because of the reliance on imported water supplies from the State Water Project and San Francisco Regional Water Supply System for approximately half of the District's total supplies. As described in this UWMP, ACWD's water supply strategy includes maximizing the use of local water supplies (local groundwater and surface water, brackish groundwater desalination and recycled water), together with off-site groundwater banking of SWP supplies and a strong demand management program to minimize dependency on imported supplies.

Table 1-1
Comparison of UWMP and
ACWD's Integrated Resources Plan (IRP)

Item	*UWMP*	*IRP*
Planning Horizon	2025 (20 Years)	2030
Planning Criteria	* Reliability * Water Quality * Environmental Impacts	*Reliability *Water Quality *Cost *Environmental Impacts *Local Control
Demand Projections	Yes	Yes
Existing Water Supply Availability	Yes	Yes
Supply Opportunities: -Demand Management -Recycled Water -Water Transfers	Yes	Yes
Long-Term Water Supply Strategy	Yes	Yes
Water Quality Considerations	Yes	Yes
Treatment & Production Facilities	No	Yes
Shortage Contingency Plan	Yes	No

ACWD has coordinated with all appropriate agencies in the development of the District's IRP and this Urban Water Management Plan Update. Table 1-2 below provides a summary of the agencies that ACWD has coordinated with and the relevant information incorporated in this UWMP.

Table 1-2
Agency Coordination

Agency ACWD has coordinated with...	***Relevant information incorporated in the UWMP***
California Department of Water Resources	Estimated future reliability of State Water Project supplies
San Francisco Public Utilities Commission	Estimated future reliability of San Francisco Regional Water System supplies
Bay Area Water Supply and Conservation Agency	Estimated future reliability of San Francisco Regional Water System supplies
Union Sanitary District	Potential future recycled water supplies and projects
City of Fremont	Projected future land use conditions (City General Plan) in Fremont
City of Union City	Projected future land use conditions (City General Plan) in Union City
City of Newark	Projected future land use conditions (City General Plan) in Newark

As per section 10621 (b) of the Urban Water Management Planning Act, all cities within the District's service area were notified of ACWD's UWMP planning process. The Cities of Fremont, Newark and Union City were notified, as was the County of Alameda.

1.3 PUBLIC REVIEW AND ADOPTION OF PLAN

Section 10642 of the Urban Water Management Planning Act requires urban water suppliers to make the Plan available for public review and hold a public hearing prior to adopting the Plan. The Draft Plan was distributed for review and comment beginning on October 27, 2005. In order to encourage the involvement of ACWD's customers, including both residential and non-residential customers, ACWD made copies of the Draft Plan available on the District's web-site, as well as provided copies for review at the District's headquarters and city libraries. Copies of the Draft Plan were also provided to the Cities of Newark, Union City and Fremont, as well as the San Francisco Public Utilities Commission, California Department of Water Resources and Union Sanitary District. A public hearing was also held on the Plan on November 10, 2005 and comments were received through December 15, 2005.

This Plan was adopted on December 15, 2005 by ACWD Board of Directors Resolution No. 05-055.

As per the requirements in Water Code Section 10644 (a) a copy of ACWD's Urban Water Management Plan was provided to the following agencies: the California Department of Water Resources, the California State Library, the City of Fremont, the City of Newark and Union City, California on or before January 15, 2006, within 30 days of the Plan's adoption.

ACWD will periodically review its Urban Water Management Plan to ensure that it accurately reflects the District's management activities. Changes will be adopted and incorporated into the plan via amendments or other appropriate means as set forth in Water Code sections 10640 through 10645.

1.4 REPORT FORMAT AND ORGANIZATION

This UWMP provides an update of the elements contained in the District's Integrated Resources Planning Study, and discusses the status of projects, programs, and studies in water supply planning, water conservation and recycled water that were recommended as part of the IRP. This Plan also meets the requirements of the Urban Water Management Planning Act. Table 1-3 provides an index of the required components of the UWMP, and their location within this ACWD 2006-2010 UWMP Update, respectively.

Chapter 1: Introduction - This chapter provides an overview of the Urban Water Management Planning Act requirements, the preparation and organization of this report, and background information on ACWD.

Chapter 2: Past, Current & Future Water Use - This chapter provides an overview of historical and current water use in the District, as well as a summary of future projected water demands.

Chapter 3: Sources of Supply - This chapter provides a summary of the District's sources of supply and their availability, as well as an overview of the management of these supplies.

Chapter 4: Groundwater - This chapter describes the Niles Cone Groundwater Basin, the District's reliance on it as a source of water supply, and the District's policy and activities for managing it.

Chapter 5: Desalination – This chapter describes the Newark Desalination Facility and the District's plans for expanding capacity to augment this source of water supply.

Chapter 6: Water Recycling - This chapter describes the Union Sanitary District's wastewater system (which serves the ACWD service area), and the opportunities for the use of recycled water in the ACWD service area.

Table 1-3
2005 Urban Water Management Plan Checklist

Section of Water Code	*Section in Plan*	*Items to Address*
§ 10620 (d)(1) (2)	1.2	Coordination with Appropriate Agencies
§ 10620 (e)	1.2	Urban Water Management Plan Preparation
§ 10620 (f)	8.1,8.2	Describe resource maximization/import minimization plan
§ 10621 (a)	1.3	Plan Updated in Years Ending in Five and Zero
§ 10621 (b)	1.2	City and County Notification and Participation
§ 10621 (c)	1.3	Periodic Review, Adoption of Changes or Amendments
§ 10630	1.2	Appropriate Level of Planning for Size of Agency
§ 10631 (a)	1.6	Service Area Information
§ 10631 (b)	3.1,8.2	Water Sources
§ 10631 (b) (1-4)	4.1-4.4, 8.3	Groundwater as an Existing or Planned Source (see Appendix A)
§ 10631 (c) (1-3)	3.1,8.2, 8.3	Reliability of Supply
§ 10631 (c)	3.1	Water Sources Not Available on a Consistent Basis
§ 10631 (d)	3.1, 8.2	Transfer or Exchange Opportunities
§ 10631 (e) (1) (2)	2.2, 2.3	Water Use Provisions
§ 10631 (f)	7.1, 7.2	Description of Water Demand Management Measures (DMMs)
§ 10631 (g)	7.2	Non-Implemented DMMs
§ 10631 (h)	8.2, 8.3	Planned Water Supply Projects and Programs
§ 10631 (i)	5.2,5.3	Opportunities for Desalinated Water
§ 10631 (j)	7.1	District is a CUWCC Signatory and submits the bi-annual BMP status reports (see Appendix B)
§ 10631 (k)	3.1	Wholesale supplier agencies information
§ 10631.5	7.1, 7.2	Determination of DMM Implementation
§ 10632	9.1-9.5	Water Shortage Contingency Plan
§ 10632 (a)	9.3	Water Shortage Contingency Plan - Stages of Action
§ 10632 (b)	9.2	Three-Year Minimum Water Supply
§ 10632 (c)	9.5	Preparation for catastrophic water supply interruption
§ 10632 (d)	9.3	Prohibitions
§ 10632 (e)	9.3	Consumption Reduction Methods
§ 10632 (f)	9.3	Penalties
§ 10632 (g)	9.4	Revenue and Expenditure Impacts
§ 10632 (h)	9.3, 9.4	Water Shortage Contingency Ordinance/Resolution
§ 10632 (i)	9.3, 9.4	Reduction Measuring Mechanism
§ 10633	6.1	Recycling Plan Agency Coordination
§ 10633 (a-b)	6.2	Wastewater System Description
§ 10633 (d)	6.4	Recycled Water – Potential Uses
§ 10633 (e) (f)	6.4	Projected use of Recycled Water/Incentives to Use
§ 10633 (f-g)	6.5	Plan to Optimize Use of Recycled Water (with Incentives)
§ 10634	3.3	Water Quality Impacts on Availability of Supply
§ 10635 (a)	8.3	Supply and Demand Comparison to 20 Years
§ 10635 (a)	8.3	Supply and Demand Comparison: Single Dry Year Scenario
§ 10635 (a)	8.3	Supply and Demand Comparison: Multiple Dry Year Scenario
§ 10635 (b)	1.2	Provision of Water Service Reliability to Cities/Counties within Service Area
§ 10642	1.3	Public Participation and Plan Adoption
§ 10643	8.2	Review of Implementation of 2000 UWMP
§ 10644 (a)	1.3	Provision of 2005 UWMP to Local Governments
§ 10645	1.3	Availability for Public Review

Chapter 7: Demand Management - This chapter provides an overview of the District's demand management strategy (adopted as part of the IRP process) and a summary of the implementation of the District's water conservation programs.

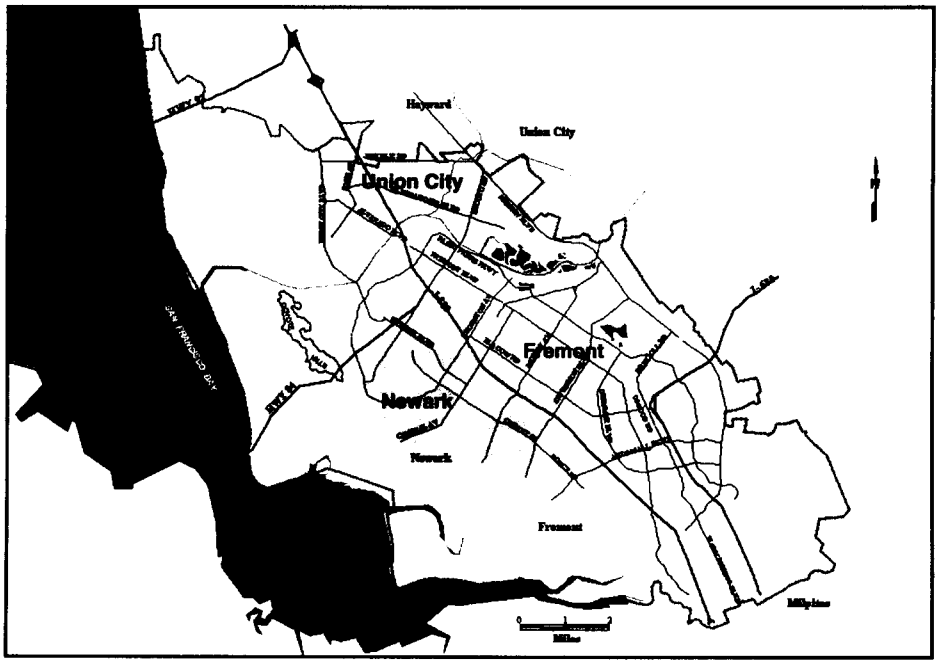
Chapter 8: Water Supply Strategy - This chapter summarizes the planning criteria utilized by the District in developing the District's water supply strategy (as part of the IRP process), followed by a summary of the recommended water supply strategy for the District and the implementation status of key IRP programs.

Chapter 9 - Water Shortage Contingency Plan - This chapter provides the District's water shortage contingency plan, as required under the Urban Water Management Planning Act. This contingency plan includes scenarios for shortages of up to 50%.

1.5 ACWD BACKGROUND

The Alameda County Water District is a retail water purveyor with a service area of approximately 100 square miles encompassing the Cities of Fremont, Newark and Union City (Figure 1-1). The District was established in 1914 under the California County Water District Act and is governed by a five-member Board of Directors. It was originally created to protect the groundwater basin, conserve the waters of the Alameda Creek Watershed and develop supplemental water supplies, primarily for agricultural use. In 1930, urban distribution became an added function of the District. Today, the District provides water primarily to urban customers: approximately 70% of supplies are used by residential customers, with the balance (approximately 30%) utilized by commercial, industrial, institutional and large landscape customers. Total distribution system water use (excluding system losses) was approximately 48,400 Acre-Feet (43 million gallons per day, mgd) in fiscal year 2004-2005.

Figure 1-1
ACWD Service Area



The Niles Cone Groundwater Basin was the principal source of water supply for the District until 1962. Up to that time, groundwater use by the District and numerous private pumpers exceeded recharge, and this imbalance permitted salt water from the Bay to intrude into the basin, severely limiting its use. In 1962, the District was the first state contractor to receive water from the State Water Project (SWP). State water was used to recharge the groundwater basin. As a result, groundwater levels rose and prevented additional saltwater intrusion. However, certain areas within the groundwater basin remain brackish due to past years of seawater intrusion.

Today, the District's primary sources of supply come from the Bay-Delta (via the SWP); the San Francisco Regional Water System; and local supplies including groundwater from the Niles Cone Groundwater Basin.

1.6 SERVICE AREA DESCRIPTION AND POPULATION PROJECTIONS

As part of the San Francisco Bay Area, the District's service area of Fremont, Newark and Union City ("Tri-Cities") is home to a population of over 324,000, and over 7,500 businesses. As indicated in Table 1-4, the projections provided by the Association of Bay Area Governments indicate that the population in the service area may grow to over 400,000 by the year 2030 (see Table 1-4).

Table 1-4
Projected Population in the ACWD Service Area
(source: ABAG, 2003)

City	*Year*				
	2010	*2015*	*2020*	*2025*	*2030*
Fremont	221,600	228,700	236,700	245,500	257,100
Newark	47,000	48,500	50,000	51,700	53,500
Union City	77,200	81,500	86,000	91,100	95,300
Total	345,800	358,700	372,700	388,300	405,900

California's only automobile manufacturing plant (New United Motor Manufacturing Incorporated) is located in the District's service area, as well as numerous high-tech, bio-tech and other industries. The Tri-Cities is also home to numerous retail and commercial businesses that support the Tri-Cities and surrounding communities. The 2003-04 assessed valuation (land, improvements and personal property) of the Tri-Cities area was over $36 billion.

The District's service area is located approximately 20 miles southeast of San Francisco on the southeastern shores of the San Francisco Bay. The District is bounded by San Francisco Bay on the west, by the hills of the Diablo Range on the east, by the Hayward Plain to the north and by Coyote Creek Slough to the south. The western portion of the District area consists primarily of salt evaporation ponds and saltwater marshes. These ponds and marshes extend from one to four miles inland and cover an area of approximately 35 square miles.

Most of the District area is relatively flat with an average elevation of approximately 20-50 feet above mean-sea-level (MSL). The highest elevations (1,500 feet MSL) occur on the eastern boundary of the District, along the easterly slopes of the Diablo Range. In addition, elevations in the Coyote Hills, located adjacent to the salt evaporation ponds are up to 300 feet MSL.

The mean annual precipitation within the District is geographically variable due to the Diablo Range on the eastern boundary of the District. Along the Diablo Range the mean annual precipitation is the highest with approximately 20 inches. However, along the western boundary, adjacent to San Francisco Bay, the mean annual precipitation is approximately 13 to 15 inches. The mean annual precipitation at the Niles precipitation gauging station is approximately 19 inches. The precipitation in the area is highly seasonal with over 75% of the rainfall occurring in the winter months between November and March. Climate data for the ACWD service area is provided in Table 1-5.

Table 1-5
Climate Data for ACWD Service Area

Climate Data (monthly average)	*November - March*	*April-June*	*July – Aug*	*Sept-October*	*Annual*
Evapotranspiration (in)	1.9"	5.4"	6.0"	3.9"	41.5"
Rainfall (in)	3.6"	1.3"	0.2"	0.7"	20.2"
Temperature (°F)	51.0° F	59.1° F	64.8° F	61.9° F	57.7° F
Maximum Daily Temperature (°F)	62.4° F	69.3° F	74.8° F	75.1° F	68.6° F

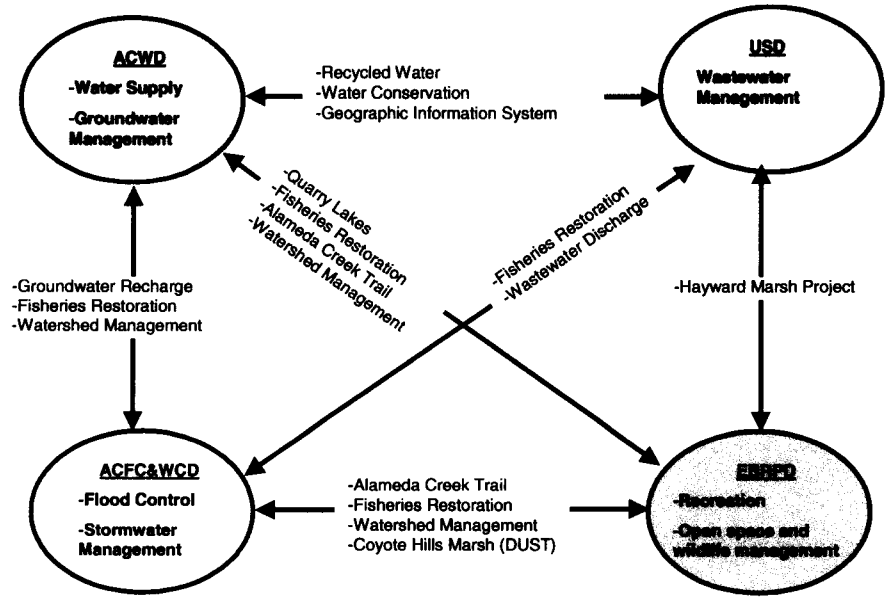
Note: Data represents period of record for CIMIS Station #171 (Union City), Feb 2001 to July 2005.

1.7 REGIONAL INTEGRATED PLANNING

ACWD water supply planning is coordinated with other agencies throughout the Bay Area region. Examples of ACWD's participation in regional integrated planning include the following:

Integrated Regional Water Management Planning in the Niles Cone Groundwater Basin: In June 2005, ACWD, together with the Union Sanitary District (USD), East Bay Regional Park District (EBRPD), and Alameda County Flood Control and Water Conservation District (ACFC&WCD) completed an integrated regional plan which documents the coordinated planning efforts of these agencies in the Niles Cone Groundwater Basin (contiguous with the ACWD service area). This report included the numerous existing and planned water management activities that are closely coordinated to provide for water supply, wastewater treatment and disposal, stormwater management, flood control, recreation and habitat protection and enhancement in the region. An example of the coordination among the agencies in the Niles Cone Groundwater Basin is shown in Figure 1-2.

Figure 1-2
Integrated Regional Planning in the Niles Cone Groundwater Basin



Bay Area Integrated Regional Water Management Plan: Water Quality and Water Supply Element: ACWD is participating with ten other Bay Area water agencies (serving a combined population of over 5 million) to develop a Bay Area integrated regional water management plan. The purpose of this Bay Area planning effort is to (1) facilitate regional cooperation in water management planning and (2) foster coordination, collaboration, and communication among the participating agencies to achieve greater efficiencies, enhance public services and build public support for vital plans and projects.

Alameda Creek Watershed Planning: ACWD participates in several stakeholder-based Alameda Creek Watershed management planning efforts including: (1) a watershed management planning effort to develop a comprehensive management plan for the watershed; and (2) the Alameda Creek Fisheries Restoration Workgroup, which is focused on restoring steelhead trout, a federally listed threatened species, to the Alameda Creek Watershed.

CHAPTER 2
PAST, CURRENT AND FUTURE WATER USE

This chapter provides an overview of historical and current water use in the District, as well as a summary of future projected water demands.

2.1 WATER USE CATEGORIES

Water use in the ACWD service area is divided into two categories: 1) distribution system use, and 2) groundwater system use. The distribution system use includes all water uses supplied by ACWD's treatment and production facilities, and this use is further subdivided into the categories of single family residential (SFR), multi-family residential (MFR), commercial, industrial, institutional, landscape and other use.

Groundwater system use includes private (non-ACWD) groundwater pumping (primarily for industrial, agricultural and municipal landscape irrigation uses), ACWD's Aquifer Reclamation Program pumping, and saline groundwater outflow to San Francisco Bay. The Aquifer Reclamation Program (ARP) pumping is an ongoing ACWD program to pump saline groundwater out of the aquifer system and replace it with fresh water recharged at the District's groundwater recharge facilities. Saline groundwater outflow to San Francisco Bay represents the groundwater outflow required to maintain a bayward groundwater flow direction to prevent seawater intrusion into the local aquifer system and to flush saline groundwater back to San Francisco Bay.

The District's groundwater system use is not anticipated to change significantly in the future. Therefore, the following discussions of water use are focused on the District's distribution system water use.

2.2 HISTORICAL AND CURRENT WATER USE

Table 2-1 provides a summary of the last ten years of water use within the District. Table 2-2 provides a summary of the active water accounts by customer classification in the ACWD service area. Figure 2-1 provides a summary of water consumption by customer classification. As indicated in Figure 2-1, residential water use comprises approximately 70% of District water use, with the remaining 30% used by commercial, industrial and institutional customers.

Water consumption patterns are a function of many independent factors including growth, weather conditions, economic conditions and water conservation behaviors. The District saw dramatic declines in consumption during the 1987-1992 drought due to voluntary and District-sponsored demand management efforts. However, during the drought recovery period since 1992, several significant consumption-influencing factors have occurred. From 1993-2001 accelerated growth of both residential and business customers (including the high technology industry) occurred due to a strong economy. During this period, vacancy rates decreased and water consumption rose. From 2001 to 2005 the overall consumption in the District has been relatively flat, attributed primarily to weak local economic conditions and mild weather.

As indicated in Figure 2-2, average residential water use from 1993 - 2005 has not rebounded to pre-drought conditions (1986-87), indicating that a water efficiency "ethic" has been retained by the District's residential customers. In addition, beginning in January 1992, California legislation required all new construction to be done with low-flow plumbing devices. Also, starting in 1994 all new toilets sold in the State of California were required to be low-flow models. Therefore, the District anticipates water savings will continue to occur via "natural conservation" (as older plumbing fixtures are replaced with water efficient fixtures).

Table 2-1
ACWD Past and Current Water Use (Acre-Feet)

Water Use Category	*Fiscal Year*										
	94-95	*95-96*	*96-97*	*97-98*	*98-99*	*99-00*	*00-01*	*01-02*	*02-03*	*03-04*	*04-05*
Distribution System											
Single Family Residential	21,000	23,100	24,700	22,900	24,100	25,000	25,700	25,200	25,300	26,000	23,700
Multi-Family Residential	7,700	8,300	8,600	8,300	8,500	8,600	8,900	8,200	8,500	8,100	8,200
Commercial	4,400	4,900	5,100	5,300	5,600	5,800	5,600	5,200	5,000	5,200	5,300
Industrial	4,000	4,800	5,200	4,700	4,600	4,700	4,600	4,300	4,100	4,100	3,400
Institutional	1,700	1,900	2,200	2,000	2,000	2,100	2,300	2,200	2,200	2,300	2,000
Landscape	3,200	3,800	4,600	3,900	4,500	5,200	5,300	5,600	5,600	6,300	5,700
Other	200	200	300	300	200	200	200	200	200	200	100
Total Consumption	42,300	46,900	50,900	47,400	49,400	51,700	52,600	50,800	50,700	52,300	48,400
System Losses	2,900	4,100	4,200	4,100	4,200	4,200	3,600	4,300	3,700	4,100	3,200
Distribution System Total	45,200	51,000	55,100	51,500	53,600	55,900	56,200	55,100	54,400	56,400	51,600
Groundwater System											
Private Groundwater	4,200	5,700	5,000	3,900	3,200	3,100	3,800	3,100	3,400	3,600	--
Groundwater Reclamation											
-ARP Pumping	9,400	17,000	7,800	3,800	10,600	6,300	4,300	7,400	7,700	11,100	--
-Saline Outflow	7,800	2,400	2,300	3,900	6,100	7,400	6,600	6,300	5,800	7,200	--
Groundwater System Total	21,400	25,100	15,100	11,600	19,900	16,800	14,700	16,800	16,900	21,900	--
Grand Total	66,600	76,100	70,200	63,100	73,500	72,700	70,900	71,900	71,300	78,300	--

Notes:
1. Annual consumption is based on units billed during the Fiscal Year (July 1 to June 30). ACWD uses a bi-monthly billing cycle.
2. All values rounded to the nearest 100.
3. Total Consumption values may not equal sum of individual components due to rounding.
4. Multi-Family Residential, Commercial, Industrial, and Institutional categories do not include dedicated landscape irrigation water use within these categories.
5. Landscape water use includes all dedicated landscape accounts for Multi-Family Residential, Commercial, Industrial and Institutional customers.
6. Distribution System Total represents total water production, as reported in ACWD's Annual Groundwater Survey Reports.
7. System Losses are calculated as the difference between Distribution System Total (total production) and Total Measured Consumption.
8. Groundwater System demands are based on annual reported values in ACWD's Annual Survey Report on Groundwater Conditions.
9. Groundwater Reclamation demands represents groundwater system demands to protect and reclaim the groundwater system from seawater intrusion.
10. Groundwater System demands do not include "Other Outflows" as reported in ACWD's Annual Survey Report on Groundwater Conditions.
11. Groundwater System demand for FY2004/05 was not available at the time of preparation of this UWMP Update.

Table 2-2
ACWD Water Accounts by Customer Classification
(Number of Accounts)

Water Use Category	*Fiscal Year*										
	94-95	*95-96*	*96-97*	*97-98*	*98-99*	*99-00*	*00-01*	*01-02*	*02-03*	*03-04*	*04-05*
Single Family Residential	62,981	63,588	64,267	65,441	66,628	67,528	68,291	68,531	68,808	68,954	69,224
Multi-Family Residential	2,036	2,037	2,046	2,060	2,090	2,096	2,112	2,116	2,111	2,117	2,133
Commercial	2,828	2,878	2,951	3,117	3,098	3,142	3,190	3,317	3,218	3,220	3,254
Industrial	986	976	1,001	1,012	1,024	1,072	1,107	1,177	1,138	1,146	1,166
Institutional	592	558	553	557	539	544	560	586	584	591	595
Landscape	1,242	1,342	1,406	1,504	1,597	1,682	1,737	1,801	1,811	1,822	1,858
Other	150	158	233	206	224	220	201	190	183	172	159
Grand Total	**70,815**	**71,537**	**72,457**	**73,897**	**75,200**	**76,284**	**77,198**	**77,718**	**77,853**	**78,022**	**78,389**

Notes:
1. Multi-Family Residential, Commercial, Industrial, and Institutional categories do not include dedicated landscape irrigation accounts within these categories
2. Landscape includes all dedicated landscape accounts for Multi-Family Residential, Commercial, Industrial and Institutional customers.

Figure 2-1
Relative Water Consumption by Customer Classification, FY04/05

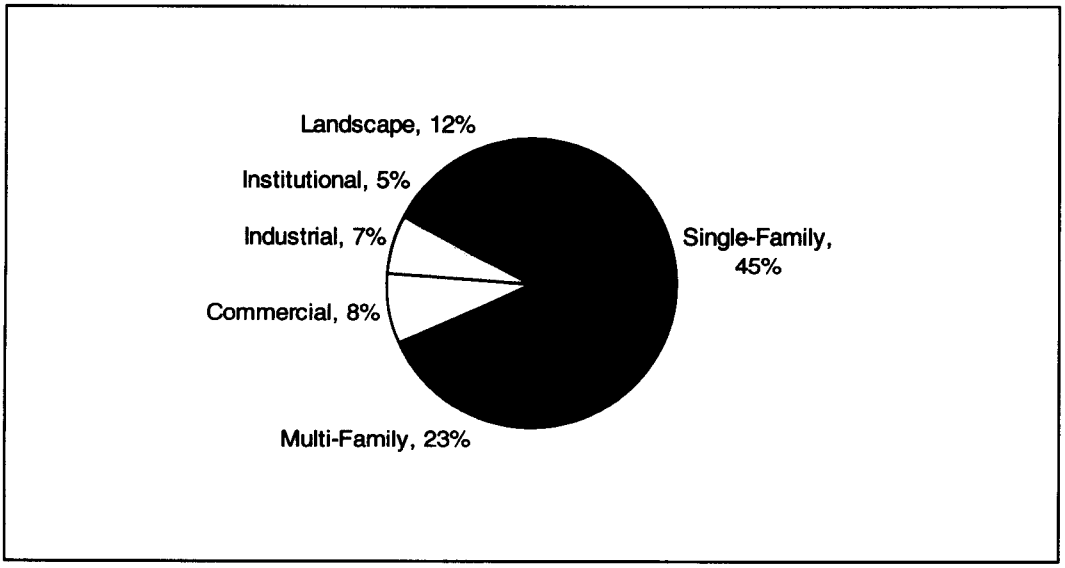
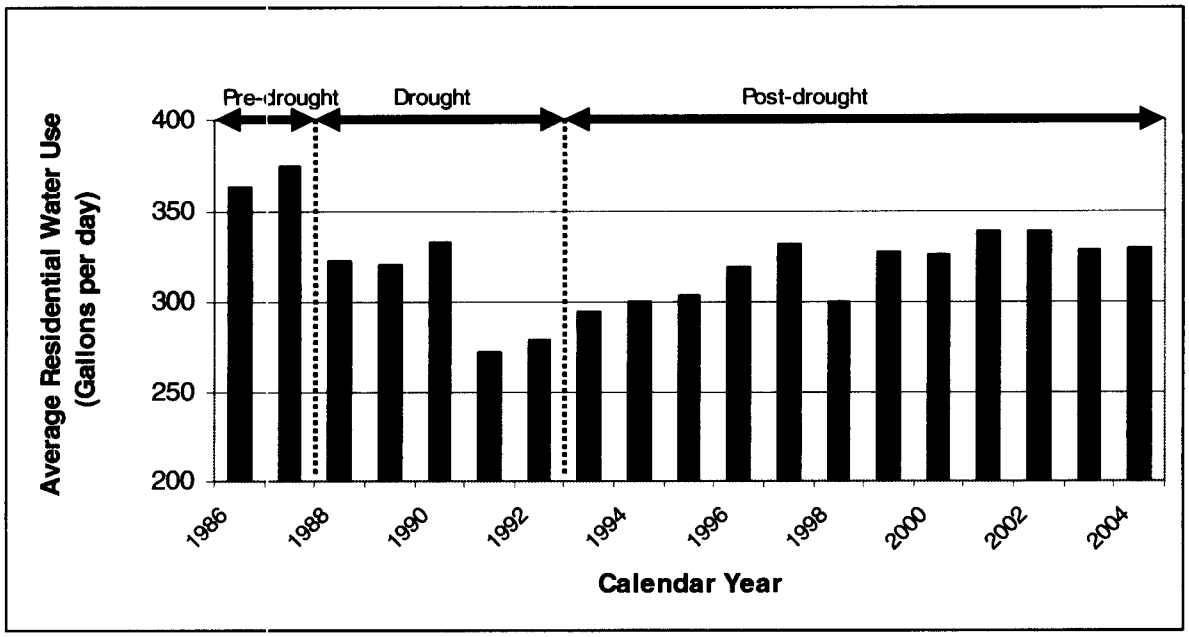


Figure 2-2
Water Use Trends - Single Family Residential



2.3 PROJECTED FUTURE WATER DEMANDS

The forecast of future water demands is an integral part of ACWD planning for water supplies and water production facilities. In 1993, ACWD completed a comprehensive investigation of projected water demands to the year 2030 (1993 Forecast). The water demand projections from this investigation served as the basis for the District's Integrated Resources Plan which was completed in 1995. In 1999, District staff refined the 1993 Forecast with updated information on land use and water use trends (1999 Forecast).

The 1999 Forecast utilized a similar methodology to develop demand projections as was developed in the 1993 Forecast. These water demand forecasts were developed by first analyzing and relating current and historical land and water use trends. From this analysis, unit water use equations were developed that relate water use to the specific land use (i.e., gallons per day per housing unit for residential land use, and gallons per day per building square footage for commercial and industrial land uses). Unit water use equations were developed for each of the District's customer classifications. The demand forecast was then developed by relating these unit water use equations to the projected buildout conditions for each of the cities in ACWD's service area - Newark, Union City and Fremont. Buildout conditions were based on each of the three cities' General Plans.

2004 Demand Forecast

The Tri-City area is rapidly approaching build-out of existing undeveloped land. State level and regional planning objectives are now influencing local government general plans through the implementation of Smart Growth policies. These policies are expected to result in reclassification of some undeveloped land from non-residential to residential uses. More significantly, Smart Growth will likely see the reclassification and redevelopment of existing developed lands to create more housing. This will result in replacing an existing water demand (typically non-residential) with a new demand (residential) as existing developed areas are replaced with new residential housing. Smart Growth projections anticipate accelerated growth in housing beyond city planning levels beginning in around the year 2015.

To address these issues as well as to develop a means of serving ACWD's engineering and financial planning needs, ACWD again updated the demand forecast analysis in 2004 (2004 Demand Forecast). A new forecast method was developed for the 2004 Demand Forecast that uses an additive approach, one that considers future demand on-top of existing demands. This approach utilized a GIS database of available and developable lands as well as direct input of city-planned development. Through the GIS, this model allows tracking of development and more frequent revision to the demand forecast as needed.

The 2004 Demand Forecast projected future water use is based on planned future land usage in the service area. This future land use is based on vacant, undeveloped lands which are zoned for development. Additional potential future land use was also included in the 2004 Demand Forecast and is based on city-approved plans for redevelopment and/or intensification of specific areas. Future water demands associated with proposed, but not city-approved, development projects on lands currently zoned for agriculture and open space, such as Patterson Ranch in Fremont, are not included in this 2004 Demand Forecast.

For all three cities, general plans, amendments and planned redevelopments were reviewed, including:

City of Union City
- 2002 General Plan Policy Document
- 2002 DEIR for the General Plan Update

Newark City
- General Plan Update 1992 (governing planning document)
- Area Two Specific Plan, 1999
- Redevelopment Plan for the Newark 2001 Redevelopment Project
- Housing Element of the General Plan 2002

City of Fremont
- General Plan, 1991
- Housing Element 2001-2006

Close coordination with city planning staff from Fremont, Newark, and Union City was maintained throughout this process including an initial and final meeting to review all potential areas for development and new water demands. Details for all large new and redevelopment plans (e.g. Area Two in Newark, Pacific States Steel in Union City, and Pacific Commons in Fremont) were provided during these meetings in order to capture the most up-to-date planning information available. Additional details on land use assumptions provided by the cities are included in ACWD's documentation of the 2004 Demand Forecast (ACWD, 2004).

The 2004 Demand Forecast also considers future demands associated with the Association of Bay Area Government Smart Growth projections (ABAG, 2003). These ABAG projections are based on appreciably higher new development than is currently included in the cities' existing plans. The ABAG projections begin to diverge from city projections between the years 2015 and 2020. The 2004 Demand Forecast assumes that 50% of the difference between city and ABAG projections will occur in housing, starting in

the year 2015. It is assumed that this new housing is only multi-family residential and thus adds a relatively small incremental water demand. It is also assumed that, given the limited availability of land, this additional housing will be more in the form of redevelopment and will thus replace a portion of existing water demands.

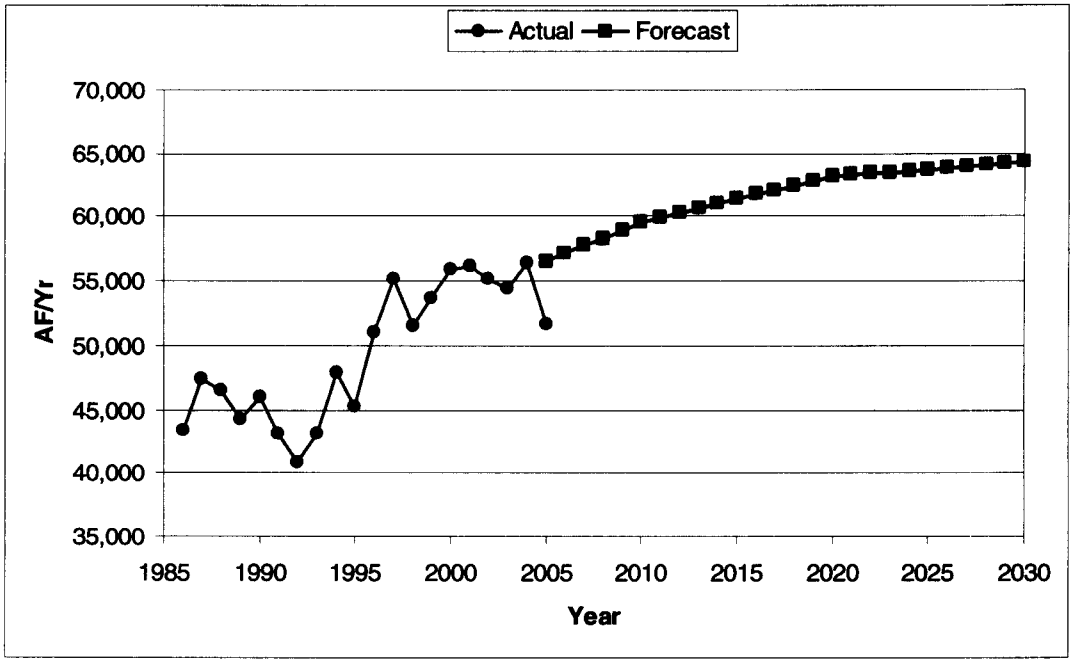
Results of the 2004 Demand Forecast form the basis for this Urban Water Management Plan Update, and are summarized in Table 2-3 (for the years 2010, 2015, 2020, 2025 and 2030) and in Figure 2-3. This forecast is provided for the single-family residential, multi-family residential, commercial, industrial, institutional and other water use categories. Landscape water use is included within the multifamily, commercial, industrial and institutional categories, and is not estimated separately. The water demand forecast also includes projected savings due to "natural" water conservation (i.e., savings due to the replacement of non-conserving plumbing fixtures with low flow fixtures). Water savings attributed to new, District-sponsored conservation programs are considered separately in Chapter 8 of this report.

Table 2-3
ACWD Estimated Future Water Demands from the 2004 Demand Forecast (AF/Yr)

Water Use Category	*Year*				
	2010	*2015*	*2020*	*2025*	*2030*
Distribution System					
Single Family Residential	27,300	28,300	28,600	28,600	28,600
Multi-Family Residential	9,800	10,100	10,500	10,900	11,200
Commercial	6,500	6,600	6,800	6,900	7,000
Industrial	7,700	8,400	8,700	9,000	9,200
Institutional	3,800	3,900	4,700	4,700	4,700
Other	300	300	300	300	300
Sub-Total	***55,400***	***57,600***	***59,600***	***60,400***	***61,000***
Adjustment for natural conservation	(700)	(1,100)	(1,500)	(1,700)	(1,900)
Total Distribution System Demand (without losses)	**54,800**	**56,500**	**58,100**	**58,600**	**59,100**
Total Distribution Sytem Demand (with losses)	**59,500**	**61,400**	**63,200**	**63,700**	**64,300**
Groundwater System Demand	**14,800**	**14,800**	**14,800**	**14,800**	**14,800**
Grand Total	**74,300**	**76,200**	**78,000**	**78,500**	**79,100**

Notes:
1. All values rounded to the nearest 100.
2. Total values may not equal sum of individual components due to rounding errors.
3. Landscape Irrigation included within Multi-Family Residential, Commercial, Industrial, and Institutional categories.
4. Adjustment for natural conservation represents estimated savings due to retrofit of pre-1994 plumbing fixtures (showerheads, toilets) with water efficient models.
5. Total Distribution System Demand (with losses) includes estimated system losses of 8%.
6. Groundwater System demands include: (1) private pumping, (2) ARP pumping and (3) saline groundwater outflows.

Figure 2-3
Historical and Projected Distribution System Demands (with System Losses)



SFPUC Wholesale Customer Water Demand Projections

In addition to the 2004 Demand Forecast prepared by ACWD, water demand projections for the ACWD service area were also developed as part of a series of technical studies performed in support of the Capital Improvement Program for the SFPUC Regional Water System: SFPUC Wholesale Customer Water Demand Projections (URS 2004); SFPUC Wholesale Customer Water Conservation Potential (URS 2004); SFPUC Wholesale Customer Recycled Water Potential (RMC 2004); and SFPUC 2030 Purchase Estimates (URS 2004).

The SFPUC's water demand projections ("SFPUC Projections") for the ACWD service area were developed independently of, and prior to, ACWD's 2004 Demand Forecast. The SFPUC Projections are based on the development and use of an "End Use" model to forecast future demands. Two main steps are involved in developing an End Use model: (1) establishing base-year water demand at the end-use level (such as toilets, showers) and calibrating the model to initial conditions; and (2) forecasting future water demand based on future demands of existing water service accounts and future growth in the number of water service accounts.

Establishing the base-year water demand at the end-use level was accomplished by breaking down total historical water use for each type of water service account (single family, multifamily, commercial, irrigation, etc.) to specific end uses (such as toilets, faucets, showers, and irrigation).

Forecasting future water demand was accomplished by determining the growth in the number of water service accounts in the ACWD service area. Once these rates of change were determined, they were incorporated into the model and applied to those accounts and their end water uses. The SFPUC forecast also incorporates the effects of the plumbing and appliance codes on fixtures and appliances including toilets (1.6 gal/flush), showerheads (2.5 gal/minute), and washing machines (lower water use) on existing and future accounts.

A comparison of the 2004 Demand Forecast and SFPUC Projections is provided in Table 2-4. In general, the two approaches provided similar results. For instance, the ACWD 2004 Demand Forecast is within 3% of the SFPUC's projections under 2030 conditions. The differences are attributed to the differences in methodologies and assumptions regarding the implementation of ABAG's "Smart Growth" projections. However, for the purpose of this UWMP, ACWD's 2004 Demand Forecast results are utilized for all supply/demand comparisons (see Chapter 8).

Table 2-4
Comparison of ACWD's 2004 Demand Forecast and SFPUC Forecast for ACWD service area (Distribution Demands only)

Water Demand Forecast (Distribution System Demands)	*Year*				
	2010	*2015*	*2020*	*2025*	*2030*
ACWD 2004 Demand Forecast	**59,500**	**61,400**	**63,200**	**63,700**	**64,300**
SFPUC Forecast for ACWD Service Area	61,000	62,100	63,300	64,400	66,400
Difference (%)	(2.5%)	(1.1%)	0%	(1.1%)	(3.2%)

CHAPTER 3
SOURCES OF SUPPLY

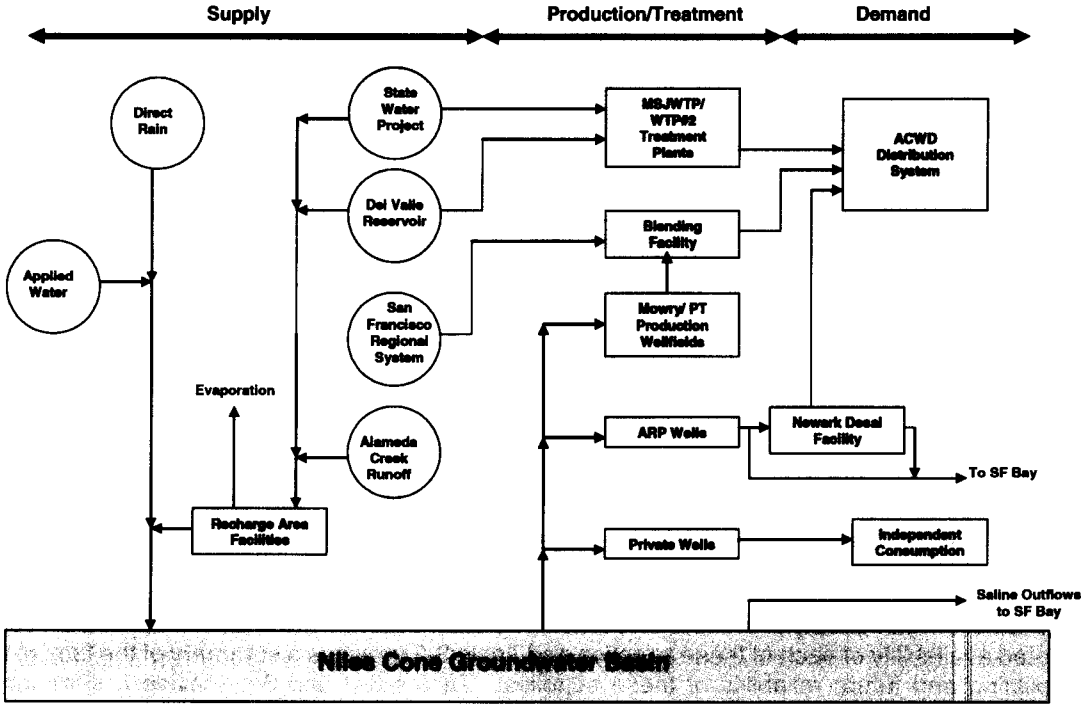
This chapter provides a summary of the District's sources of supply and their availability, as well as an overview of the management of these supplies and how water quality may impact future water supply reliability. A summary of ACWD's water supply strategy is provided in Chapter 8 – Water Supply Strategy.

3.1 SOURCES OF SUPPLY AND SUPPLY AVAILABILITY

ACWD currently has three primary sources of water supply: (1) the State Water Project (SWP), (2) San Francisco's Regional Water System and (3) local supplies. The SWP and San Francisco Regional Water Supplies are imported into the District service area through the South Bay Aqueduct and Hetch-Hetchy Aqueduct, respectively. Local supplies include fresh groundwater from the Niles Cone Groundwater Basin (underlying the District service area), desalinated brackish groundwater from portions of the groundwater basin previously impacted by seawater intrusion, and surface water from the Del Valle Reservoir. The primary source of recharge for the Niles Cone Groundwater Basin is from percolation of runoff from the Alameda Creek watershed. To a lesser degree, a portion of ACWD's SWP supplies are also used for local groundwater percolation. Infiltration of rainfall and applied water also contribute to local groundwater recharge.

Before being supplied to ACWD's customers, the source water supplies are treated to meet and surpass all state and federal drinking water standards. ACWD operates two surface water treatment plants that treat SWP and local surface water from Del Valle Reservoir. The Newark Desalination Facility treats brackish groundwater to remove salts and other impurities, and the Blending Facility blends high quality San Francisco water with local fresh groundwater (with higher hardness) to provide a blended supply with lower overall hardness. Figure 3-1 provides a schematic of the District's sources of supply and production facilities.

Figure 3-1
ACWD Water Supply and Production Schematic



Over the 1994-2004 period, 27% of the total in-District water demands (distribution system and groundwater system demands) have been met by State Water Project supplies, 19% from San Francisco Regional supplies and 54% from local supplies (Del Valle Reservoir and groundwater recharge from local runoff and infiltration of rainfall and applied water). When considering only the distribution system demands (potable water), over the same time period, about 36% of the District's distribution system water supply was from the State Water Project. This water was either purified at one of ACWD's two water treatment plants or used to recharge local aquifers. Water from the San Francisco Regional System provided approximately 25% of the distribution system water supply and local supplies from Del Valle Reservoir and groundwater (recharged from runoff from the Alameda Creek Watershed and infiltration of rainfall and applied water) accounted for the balance (about 39%) of the distribution system supplies. Figures 3-2 and 3-3 provide a summary of the District's sources of supply.

Figure 3-2
Average Sources of Supply (1994-2004)
for Combined Distribution System and Groundwater System Demands

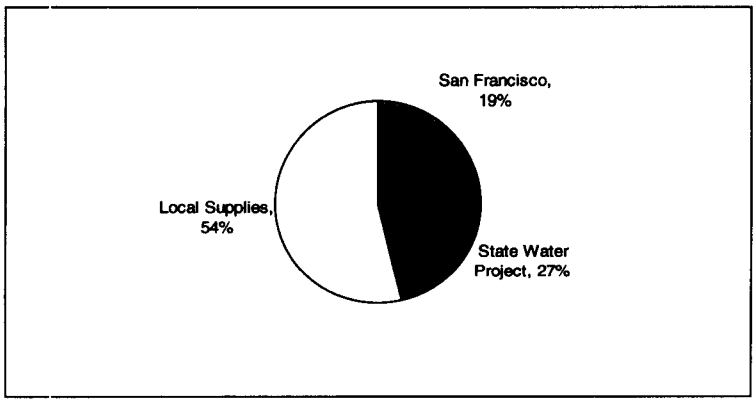
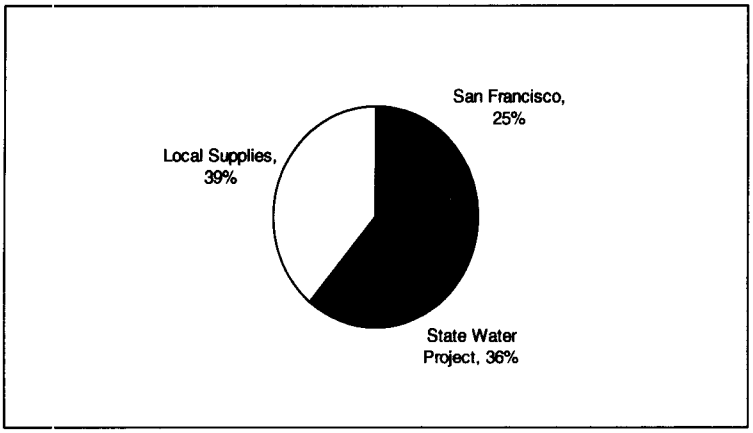


Figure 3-3
Average Sources of Supply (1994-2004)
for Distribution System Demands Only



Each of the District's water supply sources is discussed in greater detail below. Table 3-1 provides a summary of the estimated availability of each of these supplies and Table 3-2 provides a summary of the factors that may affect the existing and future reliability of these supplies. Tables 3-3 and 3-4 provide a summary of the availability of wholesale water supplies from the SWP and San Francisco Regional System.

Table 3-1
Summary of Water Supply Availability for Existing Supplies (AF/Yr)

SUPPLY COMPONENT	Estimated Water Supply Availability			
	Median Year[1] (1944 Conditions)	Long-Term Average[2]	Maximum Availability[3]	Minimum Availability[4]
Imported Supplies				
State Water Project	31,600	28,800	42,000	1,600
San Francisco Regional	15,300	15,000	15,300	11,700
Local Supplies				
Groundwater Recharge[5]	23,200	21,400	40,000	7,600
Groundwater Storage	N/A	N/A	10,000	0
Del Valle Release	3,500	7,100	20,200	0
Desalination[6]	5,100	5,100	5,600	5,100
Banking/Transfers				
Semitropic Banking	N/A	N/A	33,450	13,500
TOTAL SUPPLY	***78,700***	***77,400***	***N/A***	***N/A***

N/A Not Applicable

Notes:

1. Median Year values represent the median projected supply availability considering the sum of all of ACWD existing supplies and are based on the 1922-1994 historical hydrologic conditions (assuming 2005 operating conditions). The water supply availability under the year 1944 hydrologic conditions is utilized for the Median Year. Local Groundwater Storage and Semitropic Banking are not included in the Median Year because these supply components are used solely for dry year supplies and not under Median Year conditions.

2. Long-term Average values represent the average water supply availability based on the 1922-94 historical hydrologic conditions. Local Groundwater Storage and Semitropic Banking are not included in the Long-term Average because these supply components only provide dry year supplies and are based on a balanced "put" and "take" over the long-term.

3. Maximum Availability represents the maximum quantity of supply from each supply component. For the imported supplies, these quantities represent the maximum contractual amount that ACWD can receive from these sources. For local supplies, the maximum quantities represent the maximum amount projected to be available based on the 1922-94 historical hydrologic conditions. For Groundwater Storage, the maximum assumes that the groundwater basin is within normal operating levels in the beginning of the year. For Semitropic Banking, the maximum amount is based on maximum contractual return capacity to ACWD assuming 100% SWP allocation. The Maximum supply quantities listed above are not additive because the availability of these individual supplies may not occur under the same year/hydrologic condition.

4. Minimum Availability represents the minimum quantity of supply from each supply component. These quantities represent the minimum projected supply availability based on the 1922-94 historical hydrologic conditions. For Groundwater Storage, the minimum quantity assumes that the groundwater basin was at the minimum operating groundwater elevation in the beginning of the year and there is no usable groundwater storage available. For Semitropic Banking, the minimum quantity assumes that only Semitropic "pumpback" capacity is available to return banked water to ACWD. The Minimum Availability quantities are not additive because the availability of these individual supplies may not occur under the same year/hydrologic condition.

5. Groundwater Recharge is calculated as recharge from deep percolation of rainfall and applied water plus recharge at ACWD's groundwater percolation facilities (with local runoff from the Alameda Creek Watershed) less "Other Outflows" (as described in ACWD's annual Groundwater Survey Reports). Groundwater Recharge values in Table 3-1 do not include recharge from State Water Project or Del Valle Reservoir supplies.

6. Maximum Availability of Desalination based on Phase 1 Newark Desalination Facility capacity of 5 mgd operated year-round. Median Year availability based on 10% outage. Minimum Availability based on modeling analyses with 2005 supply/demand conditions and long-term hydrologic conditions (1922-1994). Minimum Availability under future demand conditions may be less due to Aquifer Reclamation Program pumping limitations if groundwater elevations are lowered during extended dry periods.

Table 3-2
Summary of Potential Future Factors that may Influence ACWD Water Supply Reliability

SUPPLY	*Factor*			
	Legal	*Environmental*	*Water Quality*	*Climatic*
Imported Supplies				
-State Water Project	None anticipated	ESA* requirements may constrain Delta pumping	Potential seawater intrusion impacts if Delta Levees fail.	Supply is dependent on hydrologic conditions
- San Francisco Regional Supply	None anticipated	ESA requirements may require additional reservoir releases	None anticipated	Supply is dependent on hydrologic conditions
Local Supplies				
- Groundwater Recharge	Potential constraints on future groundwater management operations	ESA requirements may impact groundwater recharge operations	None anticipated	Supply is dependent on hydrologic conditions
- Groundwater Storage	Potential constraints on future groundwater management operations	None anticipated	None anticipated	Supply is dependent on availability of water to store in wet years
- Del Valle Release	None anticipated	ESA requirements may require downstream flow releases	None anticipated	Supply is dependent on hydrologic conditions
- Desalination	None anticipated	None anticipated	None anticipated	Supply is dependent on local groundwater conditions
- Recycled Water	None anticipated	None anticipated	None anticipated	None anticipated
Banking/Transfers				
- Semitropic Banking	None anticipated	None anticipated	Banked groundwater may require treatment	Supply is dependent on availability of water to store in wet years

* Endangered Species Act

Table 3-3
ACWD Supply Request and Projected Availability of SWP Supplies (AF/Yr)

Supply Request and Projected Availability	*Year*					
	2005	*2010*	*2015*	*2020*	*2025*	*2030*
ACWD Forecast Delivery Request	42,000	42,000	42,000	42,000	42,000	42,000
DWR Projected Supply Availability						
Maximum	42,000	42,000	42,000	42,000	42,000	42,000
Median Year	31,600	32,700	33,800	34,900	36,000	36,000
Single Dry Year	1,600	1,700	1,800	1,800	1,900	1,900
Multiple Dry Year						
-Year 1	11,300	11,300	11,400	11,400	11,400	11,400
-Year 2	29,200	28,900	28,500	28,200	27,800	27,800
-Year 3	10,400	10,500	10,700	10,800	10,900	10,900
-Year 4	14,400	14,800	15,200	15,600	16,000	16,000
-Year 5	13,600	13,600	13,600	13,600	13,600	13,600

Source: California Department of Water Resources, Notice to State Water Project Contractors, May 25, 2005

Table 3-4
ACWD Supply Request and Projected Availability of San Francisco Regional Supplies (AF/Yr)

Supply Request and Projected Availability	*Year*					
	2005	*2010*	*2015*	*2020*	*2025*	*2030*
ACWD Forecast Delivery Request	15,300	15,300	15,300	15,300	15,300	15,300
SFPUC Projected Supply Availability						
Maximum	15,300	15,300	15,300	15,300	15,300	15,300
Median Year	15,300	15,300	15,300	15,300	15,300	15,300
Single Dry Year	11,700	11,700	13,700	14,100	12,700	13,100
Multiple Dry Year						
-Year 1	15,300	15,300	15,300	15,300	15,300	15,300
-Year 2	15,300	15,300	15,300	15,300	15,300	15,300
-Year 3	13,500	13,500	13,700	14,100	14,600	13,100
-Year 4	15,300	15,300	15,300	15,300	15,300	15,300
-Year 5	15,300	15,300	15,300	15,300	15,300	15,300

Source: San Francisco Public Utilities Commission, Transmittal Letter to ACWD, June 1, 2005

State Water Project

In 1961, the District signed a contract with the State Department of Water Resources (DWR) for a maximum annual amount of 42,000 acre-feet from the State Water Project (SWP). The SWP, managed by the DWR, is the largest state-built, multi-purpose water project in the country. The SWP facilities include 28 dams and reservoirs, 26 pumping and generating plants, and approximately 660 miles of aqueducts. The water stored in the SWP storage facilities originates from rainfall and snowmelt runoff in Northern and Central California watersheds. The SWP's primary storage facility is Lake Oroville in the Feather River Watershed. Releases from Lake Oroville flow down the Feather River to the Sacramento River, which subsequently flows to the Sacramento-San Joaquin Delta. The SWP diverts water from the Delta through the Banks Pumping Plant which lifts water from the Clifton Court Forebay (in the Delta) to the California Aqueduct and Bethany Reservoir. From Bethany Reservoir, the South Bay Pumping Plant lifts water into the South Bay Aqueduct, which delivers State Water Project supplies to ACWD and other Bay Area water agencies in Alameda and Santa Clara Counties.

State Water Project Availability

DWR planning studies provide data for the projected supply availability for the District's State Water Project supply. The DWR has developed a State Water Project Delivery Reliability Report which provides an analysis of the projected availability of SWP supplies. The DWR is responsible for updating this report every two years. At the time of the preparation of this Urban Water Management Plan, the DWR was in the process of developing the 2005 Delivery Reliability Report, and therefore a final version of the 2005 report was not available for use in the preparation of this UWMP. However, in a May 25, 2005 Notice to State Water Project Contractors, the DWR provided relevant sections from the working draft of the 2005 Reliability Report for use in the preparation of the UWMP, including the most recent modeling analyses of SWP availability under current and future demand conditions. For purposes of the preparation of the ACWD's UWMP, DWR scenarios 6 and 7 have been utilized by ACWD. Both of these scenarios assume the 2004 Long Term Central Valley Project Operations and Criteria Plan (OCAP) is in place. Scenario 6 is projected deliveries under 2005 conditions and Scenario 7 is based on 2025 conditions. As provided by the DWR, supply availability for the intervening years is interpolated from the 2005 and 2025 conditions. A summary of the projected supply availability is provided in Table 3-3.

In order to assist the DWR in its water supply planning, on an annual basis ACWD submits its forecasted use (through the year 2035) of its SWP supplies to the DWR. For planning purposes, ACWD requests the full delivery of its maximum contractual amount of 42,000 acre-feet. Currently, SWP water that is not directly used by ACWD within the service area (to meet distribution and/or groundwater system demands) is stored within the local groundwater basin or at the Semitropic Groundwater Bank for later dry year use (see discussion below).

Semitropic Banking of ACWD's SWP Supplies

Because of the variability in the SWP supply availability, ACWD's 1995 IRP identified the need to secure storage to improve the dry year reliability of the District's SWP supplies. Based on this IRP recommendation, ACWD has contracted with Semitropic Water Storage District for participation in the Semitropic Groundwater Banking Program. ACWD has secured 150,000 AF of groundwater storage capacity at Semitropic under this program. In wet years, ACWD delivers its unused (excess) SWP supplies to Semitropic for storage in their groundwater basin. In dry years, ACWD can recover these supplies through: (1) an "in-lieu" exchange whereby ACWD will receive a portion of Semitropic's SWP supplies (and Semitropic will utilize groundwater previously stored by ACWD in its basin); and (2) a "pumpback" program where Semitropic directly pumps stored groundwater into the California Aqueduct. As with local groundwater storage in the Niles Cone Groundwater Basin, the Semitropic Groundwater Banking Program does not provide a new source of supply for the District. Rather, it provides a means to store the District's unused SWP supplies in wet years for use during dry years when the delivery of SWP supplies may be significantly curtailed.

San Francisco's Regional Water System

ACWD also receives water from the San Francisco Regional Water System, operated by the San Francisco Public Utilities Commission (SFPUC). This supply is predominantly from the Sierra Nevada, delivered through the Hetch-Hetchy aqueducts, but also includes treated water produced by the SFPUC from its local watersheds and facilities in Alameda and San Mateo Counties. The amount of imported water available to the SFPUC's retail and wholesale customers is constrained by hydrology, physical facilities, and the institutional parameters that allocate the water supply of the Tuolumne River. Due to these constraints, the SFPUC is very dependent on reservoir storage to firm-up its water supplies.

In 1984, ACWD along with 29 other Bay Area water suppliers signed a Settlement Agreement and Master Water Sales Contract (Master Contract) with San Francisco, supplemented by an individual Water Supply Contract. These contracts, which expire in June 2009, provide for a 184 mgd Supply Assurance to the SFPUC's wholesale customers collectively. ACWD's individual Supply Assurance is 12 mgd (or approximately 13,400 acre feet per year). In 1994, the District and SFPUC executed an amendment to the contract which provides an additional supply of 1.76 mgd (approximately 2,000 AF), effectively increasing the maximum annual delivery of San Francisco Regional Water System supplies to ACWD to 13.76 mgd (approximately 15,300 AF/Yr). Although the Master Contract and accompanying Water Supply Contract expire in 2009, the Supply Assurance (which quantified San Francisco's obligation to supply water to its individual wholesale customers) survives their expiration and continues indefinitely.

In order to enhance the ability of the SFPUC water supply system to meet identified service goals for water quality, seismic reliability, delivery reliability, and water supply, the SFPUC is undertaking a Water System Improvement Program (WSIP). The goal of the WSIP is to deliver capital improvements aimed at enhancing the SFPUC's ability to meet its water service mission of providing high quality water to its customers in a reliable, affordable and environmentally sustainable manner.

The origins of the WSIP are rooted in the SFPUC's "Water Supply Master Plan" (April 2000). Planning efforts for the WSIP gained momentum in 2002 with the passage of San Francisco ballot measures Propositions A and E, which approved the financing for the water system improvements. Also in 2002, Governor Davis signed Assembly Bill No. 1823, the Wholesale Regional Water System Security and Reliability Act. The WSIP is expected to be completed in 2016.

A Program Environmental Impact Report (PEIR) is being prepared by San Francisco under the California Environmental Quality Act (CEQA) for the Water Supply Improvement Program. A PEIR is a special kind of Environmental Impact Report under CEQA that is prepared for an agency program or series of actions that can be characterized as one large project. PEIRs generally analyze broad environmental effects of the program with the acknowledgment that site-specific environmental review may be required at a later date.

Projects included in the WSIP will undergo individual project specific environmental review as required. Under CEQA, project specific environmental review would result in preparation of a Categorical Exemption, Negative Declaration or Environmental Impact Report. Each project will also be reviewed for compliance with the National Environmental Policy Act and local, state and federal permitting requirements as necessary.

San Francisco Regional Water System Supply Availability

Table 3-4 provides a summary of the projected supply availability of San Francisco Regional Water System supplies under median (normal), and dry year conditions. These projections are based on the delivery requests of the SFPUC's wholesale customers, including ACWD's supply requests of its full contractual amounts from the SFPUC through the year 2030. Water supply reliability information provided by the SFPUC indicates that the SFPUC can meet the demands of its retail and wholesale customers, including ACWD, in years of average and above average precipitation. However, the Master Contract allows the SFPUC to reduce water deliveries during droughts, emergencies and for scheduled maintenance activities. The SFPUC and all wholesale customers adopted an Interim Water Shortage Allocation Plan in 2000 to address the allocation of water between San

Francisco and wholesale customers in aggregate and among individual wholesale customers during water shortages of up to 20% of system-wide use. This plan also expires in June 2009. Under the Master Contract, reductions to wholesale customers are to be based on each agency's proportional purchases of water from the SFPUC during the year immediately preceding the onset of shortage, unless this formula is supplanted by a water conservation plan agreed to by all parties. The Master Contract's default formula discouraged SFPUC's wholesale customers from reducing purchases from SFPUC during periods of normal water supply through demand management programs or development of alternative supplies. To overcome this problem, SFPUC and its wholesale customers adopted an Interim Water Shortage Allocation Plan (IWSAP) in calendar 2000. This IWSAP applies to water shortages up to 20% on a system-wide basis and will remain in effect through June 2009.

The IWSAP has two components. The Tier One component of the IWSAP allocates water between San Francisco and the wholesale customer agencies collectively. The IWSAP distributes water between two customer classes based on the level of shortage:

Level of System Wide Reduction in Water Use Required	Share of Available Water	
	SFPUC Share	Suburban Purchasers Share
5% or less	35.5%	64.5%
6% through 10%	36.0%	64.0%
11% through 15%	37.0%	63.0%
16% through 20%	37.5%	62.5%

The Tier Two component of the IWSAP allocates the collective wholesale customer share among each of the 28 wholesale customers. This allocation is based on a formula that takes three factors into account, the first two of which are fixed: (1) each agency's Supply Assurance from SFPUC, with certain exceptions, and (2) each agency's purchases from SFPUC during the three years preceding adoption of the Plan. The third factor is the agency's rolling average of purchases of water from SFPUC during the three years immediately preceding the onset of shortage.

The IWSAP allows for voluntary transfers of shortage allocations between SFPUC and any wholesale customer and between wholesale customer agencies. Also, water "banked" by a wholesale customer, through reductions in usage greater than required, may also be transferred.

The IWSAP will expire in June 2009 unless extended by San Francisco and the wholesale customers. The projected amount of water which ACWD expects to receive from SFPUC (as shown in Table 3-4) has been calculated by SFPUC on the assumption that the Plan will in fact be extended.

Local Sources

As described above, ACWD's local sources include fresh groundwater from the Niles Cone Groundwater Basin, brackish groundwater desalination, and surface water supplies from the Del Valle Reservoir. Each of these supplies is described in greater detail below.

Niles Cone Groundwater Basin: The principal source of local supply for the District is the local aquifer system known as the Niles Cone Groundwater Basin. The primary source of recharge for the Niles Cone Groundwater Basin is local runoff from the Alameda Creek Watershed, which is captured, diverted and recharged at the District's groundwater recharge facilities. Alameda Creek annual runoff at the USGS Alameda Creek near Niles stream gage (located near ACWD's recharge facilities) has varied from a recorded minimum of 650 AF/Yr in 1960-1961, to a recorded maximum in 1982-1983 of 360,000 AF/Yr. Typically, ACWD diverts only a small portion of the local runoff flowing in Alameda Creek. The majority of local runoff flows downstream through the

Alameda Creek Flood Control Channel to San Francisco Bay. To a lesser extent, infiltration of rainfall and applied water also provide a local source of recharge for the groundwater basin. ACWD also uses a portion of its imported State Water Project supplies for groundwater recharge.

The water quality in the groundwater system is characterized by fresh groundwater in the eastern portion of the groundwater basin transitioning into brackish groundwater in the western portion of the basin. The brackish groundwater is a result of historical seawater intrusion from the adjacent San Francisco Bay. Since the 1960's ACWD has managed the groundwater basin to prevent any additional seawater intrusion and has pumped the trapped brackish groundwater back to San Francisco Bay through the District's Aquifer Reclamation Program wells.

The Niles Cone Groundwater Basin has capacity to store water from year to year ("local groundwater storage"). However, the usable storage capacity of the groundwater basin is significantly limited by the potential for seawater intrusion if groundwater levels are maintained too low. Although local groundwater storage (i.e. groundwater supplies in excess of recharge) provides a short term source of supply during dry years, it is not a supply that is available every year because the groundwater system will require replenishment from freshwater sources, without which seawater intrusion would occur.

Brackish Groundwater Desalination: In 2003 ACWD commissioned the Newark Desalination Facility. This 5-mgd facility utilizes the reverse osmosis process to remove salts and other impurities from the brackish groundwater pumped at ACWD's Aquifer Reclamation Program wells. Treated water from the Newark Desalination Facility is blended with untreated local groundwater and provided as a supply for the distribution system demands. Chapter 6 provides additional information on ACWD's existing and planned desalination facilities.

Del Valle Reservoir: The District and Zone 7 Water Agency of the Alameda County Flood Control and Water Conservation District (hereafter referred to as "Zone 7"), have equal rights on Arroyo Del Valle to divert water to storage. When the California Department of Water Resources (DWR) constructed Del Valle Dam in the upper Alameda Creek Watershed, those rights were recognized in an agreement between DWR, the District, and Zone 7. Consequently, DWR typically makes a total of 15,000 AF of storage available annually in Del Valle Reservoir for use by ACWD and Zone 7. ACWD and Zone 7 equally share this storage capacity, thereby providing up to 7,500 AF of storage capacity annually to ACWD.

Local Water Supply Availability

A summary of the estimated water supply availability from ACWD's local supplies is provided in Tables 3-1 and 3-2. As indicated in these tables, the amount of local water supplies available to ACWD from Del Valle Reservoir and fresh groundwater sources varies widely from year to year, depending primarily on hydrologic conditions and availability of local runoff. In general, desalination of brackish groundwater provides a more reliable water source than other local supplies. However, there may be limitations to this source if groundwater levels are lowered to the extent that a reduction in Aquifer Reclamation Program pumping is required to prevent new seawater intrusion. Other potential factors that may affect local supply availability include: (1) competition for local water supplies with environmental needs, such as the on-going efforts to restore a steelhead fishery to the Alameda Creek Watershed and (2) concerns regarding groundwater levels and land development in the western service area. ACWD is currently working to address both of these issues. However, it is not clear whether or not these issues will ultimately impact ACWD's local supplies. Any future changes to ACWD's local water supplies due to these or other currently unforeseen factors will be reflected in future updates to this Urban Water Management Plan.

3.2 MANAGEMENT AND DISTRIBUTION OF WATER SUPPLIES

With local water and two sources of imported water, the District has the flexibility to change the timing and use of supplies to best meet its water management objectives, which include:

- Maximizing total usable supply
- Maximizing water quality/providing uniform water quality
- Protecting groundwater resources from degradation due to previously intruded seawater
- Protecting groundwater resources from further seawater intrusion

District customers receive water from one or more production sources: the San Francisco Regional Water System, the District's Mission San Jose Water Treatment Plant (MSWTP), the District's Water Treatment Plant Number 2 (WTP 2), the District's Blending Facility which blends local groundwater (from the Mowry and Peralta-Tyson Wellfields) with San Francisco Regional supplies, and the Newark Desalination Facility.

Flow from the SBA and releases from Del Valle Reservoir may be diverted into either of the two treatment plants, diverted into Alameda Creek, or both. Depending on the water quality and flow in Alameda Creek, water can also be diverted into percolation ponds for groundwater recharge. San Francisco Regional Water System supplies are either routed to the Blending Facility for blending with local groundwater supplies or, under certain conditions, directly supplied to users.

Groundwater Management and Protection

Groundwater is an important component of the District's supply, as demonstrated in Tables 3-1 and 3-2. ACWD has had a Groundwater Management Policy in place since 1989. This management policy outlines the District's protection and management activities for the Niles Cone Groundwater Basin to ensure a reliable supply of high quality water that satisfies current and future water needs in the ACWD service area. Chapter 4 in this UWMP describes the District's groundwater management and protection policy in more detail.

Groundwater Recharge

During wet periods, local runoff from the Alameda Creek Watershed is diverted into the groundwater percolation ponds. When local runoff is not available, water may be released from either Del Valle Reservoir or from the SBA for groundwater recharge. Currently, the District operates three inflatable dams to capture and divert Alameda Creek flow into the percolation ponds. Diversions typically take place when Alameda Creek flow at the diversion point is less than about 700 cubic feet per second (cfs). The dams are deflated for protection from debris when creek flow is above 700 cfs and no off-stream diversions occur during these high flow conditions.

The District is currently pursuing fish passage improvement projects that will eliminate the need for some of these groundwater recharge structures; however, these projects are not anticipated to adversely affect the District's groundwater recharge capability.

Del Valle Supplies

Typically, all stored Del Valle water is used by the fall to maximize the capture of local runoff during the winter and spring seasons. In decreasing order of priority, Del Valle water is delivered to ACWD:

- Via the SBA to the District's treatment facilities (MSJWTP and WTP2).
- Via the SBA and released into Alameda Creek at Vallecitos Takeoff for groundwater recharge.
- Into Arroyo Del Valle Creek, where it flows to Arroyo de la Laguna and eventually into Alameda Creek for groundwater recharge.

State Water Project Water

Water from the SWP (delivered via the SBA) can either be taken at Vallecitos Takeoff and discharged to Alameda Creek for groundwater basin recharge or taken at the Alameda-Bayside Takeoffs for delivery to the treatment plants. By October 1 of every year, the District must submit its anticipated requests for monthly water deliveries for the upcoming year. The State confirms the District's request or provides the District with the anticipated percentage allocation by December 1. The estimated percentage delivery is then adjusted during the spring based on estimated runoff.

Blending of San Francisco Regional System Water with Groundwater

San Francisco Regional Water System supplies can be taken at any of nine takeoffs throughout the District's distribution system. This water supply is significantly lower in hardness than ACWD's local groundwater supplies. The District blends the San Francisco Regional water with higher hardness groundwater at ACWD's Blending Facility with the objective of providing a uniform water quality with hardness levels similar to those of other sources of supply. Since the Blending Facility has come on-line, most of the San Francisco Regional System water has been taken at the Fremont connection for direct delivery to the Blending Facility. The New United Motors Manufacturing, Inc. (NUMMI) plant and a few industrial, business and residential customers receive San Francisco Regional water directly.

3.3 SOURCE WATER QUALITY

As required by law, Drinking Water Source Assessments are conducted to determine the vulnerability of ACWD's drinking water sources to contamination. As described below, assessments have been completed for all of ACWD's water sources:

- The San Francisco Public Utilities Commission, which administers the San Francisco Regional Water System, completed its assessment in 2000. It was found that the SFPUC's watersheds are vulnerable to contaminants associated with wildlife and, to a limited extent, human recreational activity. Historically, the levels of contamination have been very low in the watersheds.

- The South Bay Aqueduct Source Assessment was completed in 2002 to evaluate potential vulnerabilities to ACWD's State Water Project supplies. This source is most vulnerable to agricultural drainage, wastewater treatment plant discharges, urban runoff, recreational usage of the water, and cattle grazing. In addition, seawater intrusion in the Delta contributes salt and bromide to the water supply.

- ACWD's assessment of local groundwater sources was also completed in 2002. This assessment concluded that local groundwater is most vulnerable to gas stations, known contaminant plumes, confirmed leaking underground storage tanks, dry cleaners, metal plate/finishing/fabricating, and sewer collection. The potential for saltwater intrusion into the aquifer system is also of concern to ACWD.

Although ACWD raw water sources are vulnerable to potentially contaminating activities, ACWD treatment and blending facilities ensure that all potable water delivered by ACWD meets the strict standards set by state and federal regulatory agencies. In addition, ACWD's groundwater management program (see Chapter 4) has been developed to protect the local groundwater supplies from contamination. As such, under most future scenarios, it is not anticipated that future changes to source water quality will adversely impact the long-term availability or reliability of these supplies. However, catastrophic events (i.e. levee failures in the Delta resulting in seawater intrusion impacts on Delta supplies) or other unforeseen circumstances may impact ACWD supplies and their reliability, resulting in water supply shortages. Chapter 9 (Water Shortage Contingency Plan) addresses potential future shortages.

CHAPTER 4
GROUNDWATER

This chapter describes the Niles Cone Groundwater Basin, the District's reliance on it as a source of water supply and the District's policy and activities for managing it.

4.1 BACKGROUND

As described in Chapter 3 (Sources of Supply), the Niles Cone Groundwater Basin provides a significant source of water supply for the ACWD service area. ACWD manages the basin both in conjunctive use mode (most recharge of surface water occurs in the wet season, with most groundwater extraction occurring during the dry season) as well as in a groundwater banking mode (excess water is stored in the basin during wet years for recovery during dry years when local and imported supplies may be significantly cut back). Because of its importance as a local supply, the protection of this valuable local resource has long been a high priority for ACWD.

Niles Cone Groundwater Basin Hydrogeology

The Niles Cone Groundwater Basin, as delineated by the Department of Water Resources (DWR), exists almost exclusively within the District's boundaries. The groundwater basin is an alluvial aquifer system consisting of unconsolidated gravel, and, silt, and clay. The groundwater basin is divided by the Hayward Fault which is an active fault with low permeability that impedes the lateral flow of groundwater. Large differences in water levels on either side of the fault demonstrate the relatively impermeable nature of the fault. ACWD manages both the Above Hayward Fault (AHF) and the Below Hayward Fault (BHF) sub-basins. The AHF sub-basin on the east side of the Hayward Fault is composed of highly permeable sediments referred to as the AHF Aquifer. The BHF sub-basin is composed of a series of relatively flat lying aquifers separated by extensive clay aquitards. The location of the Hayward Fault is shown in Figure 4-1. Figure 4-2 provides a cross-section based on a DWR conceptual figure (DWR, 1968).

Figure 4-1
ACWD Groundwater Management Facilities

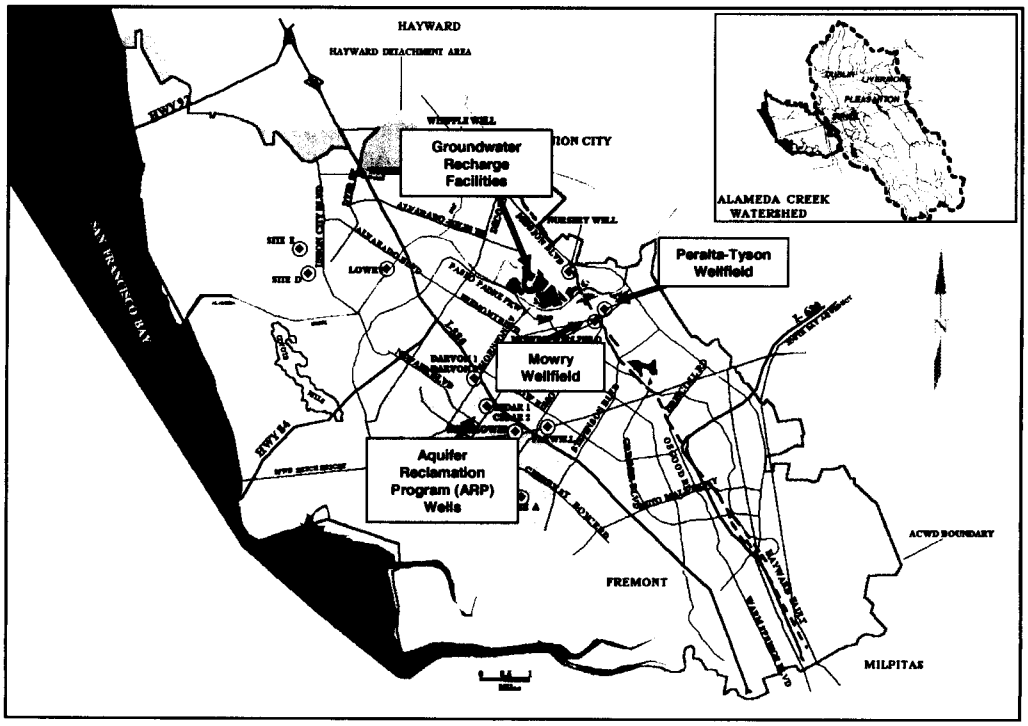
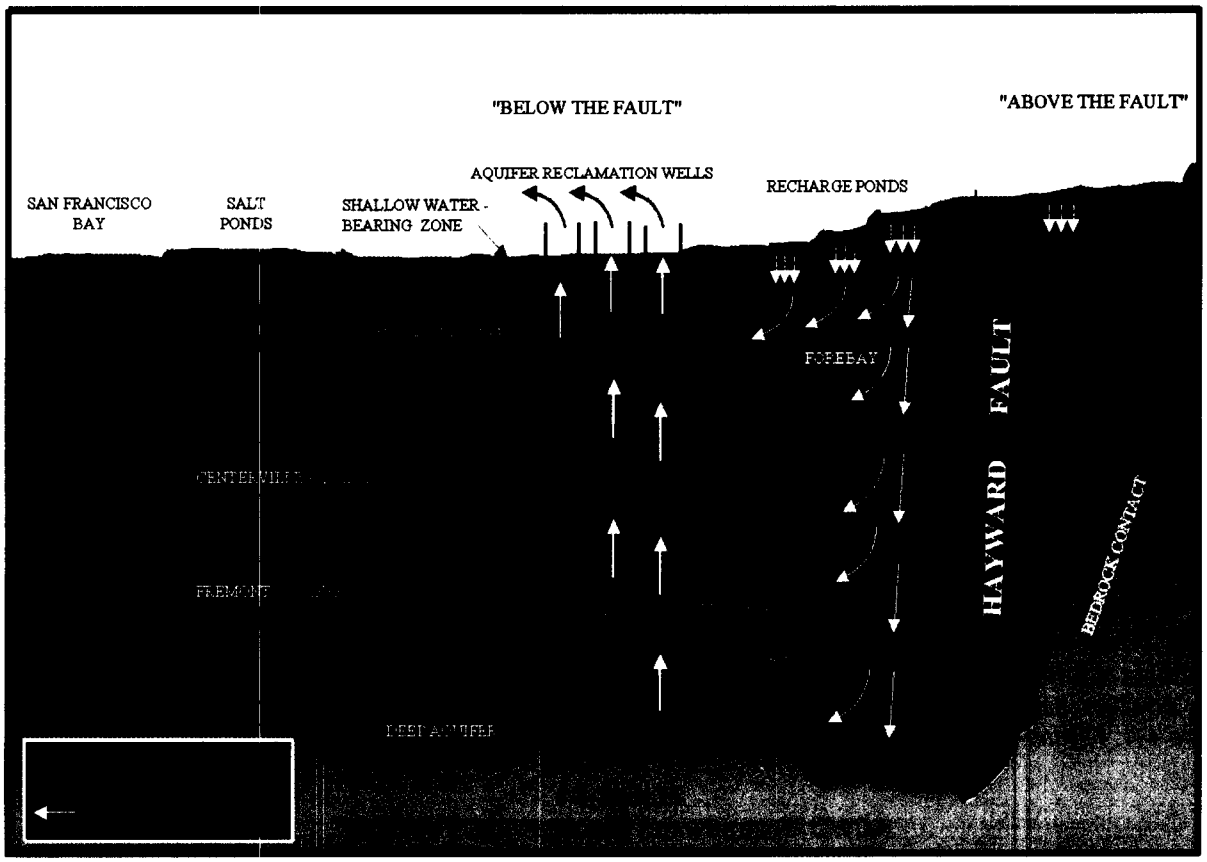


Figure 4-2
Niles Cone Groundwater Basin Schematic



The shallowest regional aquifer in the BHF sub-basin, the Newark Aquifer, is an extensive permeable gravel and sand layer between 40 and 140 feet below ground surface (bgs), except in the forebay (inland) area where it begins at the surface. The thickness of the Newark Aquifer ranges from less than 20 feet at the western edge of the basin to more than 140 feet at the Hayward Fault (DWR, 1968). The Newark Aquifer is overlain in most of the sub-basin by a thick layer of silt and clay called the Newark Aquiclude (DWR, 1968). The Newark Aquiclude is absent in the forebay area, allowing direct recharge to the Newark Aquifer from Alameda Creek and the recharge ponds. Within the Newark Aquiclude, discontinuous layers of sand and silt comprise a non-regional hydrogeologic unit known commonly as the shallow water-bearing zone.

An extensive thick clay aquitard separates the Newark Aquifer from the Centerville Aquifer. The Centerville Aquifer, the top of which lies at an average depth of 180 to 200 feet bgs, overlies a thick clay aquitard, which in turn overlies the Fremont Aquifer which exists in the interval of 300 to 390 feet bgs. The Centerville and Fremont Aquifers are considered as one combined aquifer (Centerville-Fremont Aquifer) in some parts of the basin based on lithology and water level data that indicate that they are in good hydrogeologic connection. However, water level and water chemistry results from recently installed wells indicate that, in some areas of the basin, these two aquifers are isolated from each other.

The deepest water-bearing units, referred to collectively as the Deep Aquifers, are present at approximately 400 and 500 feet bgs (and possibly deeper) and are separated from the overlying Fremont Aquifer by a competent regional aquitard. Also, based on ACWD's lithologic data and DWR (1967), these deep aquifers are both hydraulically separated and connected by the presence or absence of intervening clays dependent on the location in the basin, and extend beyond the limits of the Niles Cone Groundwater Basin to act as conductive layers for the migration of groundwater out of the basin.

Groundwater Quality

Groundwater quality in the AHF Aquifer is acceptable for potable use; however, groundwater quality in certain areas of the BHF aquifers has been degraded by salt water intrusion. The salt water intrusion was first noticed in the 1920's and occurred due to historical pumping from the basin that was in excess of recharge (i.e. overdraft). Many years of this chronic overdraft caused the groundwater levels in the Newark Aquifer to drop below sea level. This relative elevation difference between the groundwater in the basin and the saline water from San Francisco Bay caused a landward direction of groundwater flow through the Newark Aquifer and intrusion of salt water into the groundwater basin. Several decades of salt water intrusion occurred and saline water migrated as far as the forebay area. The piezometric heads in the deeper aquifers are generally lower than that of the Newark Aquifer, and the aquitards separating the aquifers are thin to absent in the Forebay area. As a result, saline water in the forebay area migrated downward from the Newark Aquifer and into the lower aquifers. Also, saline water may have migrated downward from the Newark Aquifer to the deeper aquifers through abandoned and improperly sealed water wells.

Since 1962, ACWD has purchased State Water Project water supplies to supplement local recharge and raise groundwater levels. This has resulted in bringing the water table above sea level and returning the hydraulic gradient to its natural bayward direction in the Newark Aquifer. Although there has been substantial improvement in the basin, a considerable volume of saline water still remains in the aquifers. As described below, ACWD has also implemented an Aquifer Reclamation Program (ARP) to pump out brackish groundwater from the impacted areas of the aquifer system. Historically, this brackish water has been discharged back to San Francisco Bay through local flood control channels. However, a portion of it is now treated at the Newark Desalination Facility for potable use.

In order to protect the Basin from further seawater intrusion the District's operational goals are to maintain groundwater levels above sea-level in the Newark Aquifer system. During critically dry periods the District may temporarily reduce groundwater levels slightly below sea-level (no lower than -5 feet mean sea-level), in the Newark Aquifer in the Forebay area. Groundwater modeling analysis has indicated that temporarily drawing the aquifer down in this inland area can provide additional supply in critically dry years without impacting the integrity of the Basin.

Groundwater Facilities

ACWD's groundwater management activities include groundwater recharge as well as production. As shown on Figure 4-1, ACWD groundwater facilities include production wellfields and groundwater recharge facilities. Currently, 16 wells are available for production in the Forebay area. Eight of the wells are located in the Peralta-Tyson Wellfield in the AHF sub-basin. The remaining eight wells are located in the Mowry Wellfield in the BHF sub-basin.

The Niles Cone Groundwater Basin is recharged through (1) deep percolation of rainfall and applied water, and (2) percolation of water in Alameda Creek received at ACWD's groundwater recharge facilities. Most of the water for this artificial recharge program is from Alameda Creek Watershed runoff and the remainder is imported supplies released to tributaries of Alameda Creek. Water percolates into the groundwater basin through the stream channel bed and through the District's off-stream recharge ponds. The District utilizes inflatable rubber dams in the channel to divert water from the creek into the ponds.

As described below, ACWD's Aquifer Reclamation Program, which is designed to remove and control the movement of intruded saline water, has been in operation since 1974. The program facilities consist of nine wells. These wells also provide the source water for the Newark Desalination Facility. This facility removes salts and other impurities from the brackish groundwater and provides the treated water as a source for the District's distribution system.

Aquifer Reclamation

High volume pumping in the 1920's through the early 1960's without adequate recharge for replenishment of the basin led to lower water levels in the Newark Aquifer and salt water intrusion. The District, concerned with this salt water intrusion, began importing water from the SWP to artificially recharge the groundwater basin. The District's aggressive artificial recharge program and its use of imported water in lieu of groundwater have caused water levels to slowly rise above sea-level. Thus, further seawater intrusion has been prevented and saline water in the Newark Aquifer is now flushed towards San Francisco Bay. However, because the Centerville-Fremont and Deep Aquifers are not in direct hydraulic connection with San Francisco Bay, saline water in those deep aquifers cannot be easily flushed back by simply raising groundwater levels. Consequently, there are trapped pockets of saline water in these deeper aquifers.

In 1974, the District initiated its Aquifer Reclamation Program (ARP) to restore water quality in the groundwater basin by removing the saline water trapped in the aquifer system. Nine wells are utilized for reclamation pumping: three in the Newark Aquifer, five in the Centerville-Fremont Aquifer, and one in the Deep Aquifer. This brackish groundwater is the source water for ACWD's Newark Desalination Facility, with any excess pumped brackish groundwater discharged to San Francisco Bay through flood control channels. The quality of groundwater in the basin is improved as recharge water replaces the pumped brackish groundwater. ARP pumping also prevents the plume of brackish water in the Centerville-Fremont and Deep Aquifers from further migrating toward ACWD's Mowry Wellfield.

Groundwater Elevations

ACWD actively manages the Niles Cone Groundwater Basin to prevent groundwater overdraft conditions that could lead to future seawater intrusion and groundwater overdraft. In order to monitor the groundwater basin conditions, since 1961 ACWD has conducted the Spring/Fall Groundwater Monitoring Program to visit wells, obtain water level measurements and collect water samples. The data collected is summarized in an annual groundwater monitoring report prepared by ACWD.

The groundwater elevations throughout the basin fluctuate seasonally due to seasonal changes in groundwater pumping and recharge. In general, the groundwater elevations are the highest in the late winter and early spring (in response to high recharge and lower groundwater pumping) and are the lowest in the fall months (in response to peak groundwater pumping during the warmer summer and fall months). However, throughout the year groundwater elevations in the Newark Aquifer are maintained above sea-level with a positive groundwater gradient from the inland area (at the recharge ponds) towards San Francisco Bay. The groundwater elevations in the Centerville/Fremont and Deep Aquifers are generally lower than that of the Newark Aquifer, thereby allowing percolation from the Newark Aquifer to these deeper aquifers. Because ACWD operates the groundwater basin in a balanced "put and take" mode, groundwater elevations over the past thirty years have remained fairly consistent (within a typical operating range), and there have been no long-term trends that suggest the basin is in overdraft condition.

4.2 GROUNDWATER MANAGEMENT AND PROTECTION POLICY

In 1989 ACWD adopted a Groundwater Management Policy to protect and manage the Niles Cone Groundwater Basin. This Groundwater Management Policy was last updated in 2001, and effectively serves as ACWD's groundwater management plan for the Niles Cone Groundwater Basin. This Groundwater Management Policy is based on the statutory authority granted to ACWD under the County Water District Law (commencing with Section 30000 of the Water Code); the Replenishment Assessment Act of the Alameda County Water District (Chapter 1942 of the Statutes of 1961, as amended in 1970 and 1973), which grants additional powers to ACWD to prevent pollution, contamination, or diminution in quality of the groundwater supply; local well ordinances (Fremont No. 950, as amended; Newark No. 136; and Union City No. 109-73); agreements with other agencies; and local hazardous materials ordinances.

A copy of ACWD's Groundwater Management Policy is provided in Appendix A.

Groundwater Management Policy Statement

ACWD's groundwater management policy statement is as follows:

> *"It is the policy of the Alameda County Water District to efficiently protect and manage the Niles Cone Groundwater Basin to ensure a reliable supply of high quality water that satisfies present and future municipal, industrial, recreational, and agricultural water needs in the ACWD service area. ACWD will develop and implement appropriate programs within the ACWD service area to protect and manage the groundwater basin as a long-term source of water supply for ACWD. ACWD will also actively protect the groundwater basin from activities outside the ACWD service area that may negatively impact the water quality and/or water supply of the basin.*
>
> *This Policy is intended to serve as a guide to ACWD management in the continued development and implementation of programs to manage and protect ACWD water resources and as a nontechnical document to explain ACWD groundwater programs to members of the public. This Policy is not intended to create legal rights in any person or organization, or to impose legal obligations on ACWD. It may be amended or repealed by the Board of Directors at any time."*

Policy Objectives

The purpose of the Groundwater Management Policy is to protect and improve ACWD's groundwater resources for the benefit of both ACWD's customers and private well owners by taking actions designed to meet the following objectives:

- Increase groundwater replenishment capability.
- Increase the usable storage capacity of the groundwater basin.
- Operate the basin to provide:
  - A reliable water supply to meet baseload and peak distribution system demands,
  - An emergency source of supply, and
  - Reserve storage to augment dry year supplies.
- Protect groundwater quality from degradation from any and all sources including: saline water intrusion, wastewater discharges, recycled water use, urban and agricultural runoff, or chemical contamination.
- Improve groundwater quality by:
  - Removing salts and other contaminants from affected areas of the basin, and
  - Improving the water quality of source water used for groundwater recharge.

4.3 GROUNDWATER MANAGEMENT PROGRAMS

The following eight major groundwater management programs have been developed and implemented by ACWD to achieve ACWD's Groundwater Management Policy objectives:

- Water Supply Management
- Groundwater Replenishment
- Watershed Protection and Monitoring
- Basin Monitoring
- Wellhead Protection Program
- Aquifer Reclamation Program
- Groundwater Protection Program
- Well Ordinance Administration

A brief summary of each of these programs is provided in Table 4-1. A detailed description of each program is included in the Groundwater Management Policy which is attached in Appendix A.

4.4 GROUNDWATER RECHARGE AND PRODUCTION

The primary components of the groundwater budget for the Niles Cone Groundwater Basin are: (1) pumping; (2) recharge; and (3) saline groundwater outflows. Groundwater pumping includes pumping at ACWD's Peralta-Tyson and Mowry Wellfields), private (non-District) pumping; and pumping from the District's Aquifer Reclamation Program (ARP) wells. Groundwater recharge occurs primarily through percolation at ACWD's recharge facilities and natural percolation of rainfall and applied water. Saline groundwater outflows represent the groundwater outflows from the Newark Aquifer to San Francisco. As is typical in coastal groundwater basins, groundwater outflows are required to prevent seawater intrusion from occurring.

As required by the District's Replenishment Assessment Act, the District meters all active wells in the District, and prepares an annual Groundwater Survey Report which summarizes the total well production, estimated recharge, and changes in groundwater storage. A summary of groundwater pumping, recharge and change in storage is provided in Table 4-2. As indicated in the table, annual groundwater supply from ACWD's production wells has ranged from 17,800 AF/Yr to 20,900 AF/Yr over the past eight years. Over the same period aquifer reclamation pumping has ranged from 4,300 to 11,100 AF/Yr and private groundwater pumping has ranged from 3,100 to 5,000 AF/Yr. Annual groundwater recharge has ranged from 34,000 AF to 52,500 AF/Yr.

Future Use of Groundwater

As described in ACWD's Integrated Resources Planning Study, ACWD will continue to rely on the Niles Cone Groundwater Basin as a source of supply for the service area. ACWD's plans are to continue to manage the groundwater basin in a balanced "put and take" mode whereby groundwater pumping and saline outflows are balanced with groundwater recharge. Year to year variations in recharge, pumping and saline outflows will occur due to variations in local hydrologic condition and other factors. Therefore, in some years recharge may exceed the sum of pumping and saline outflows resulting in a temporary imbalance. Similarly, in some years pumping and saline outflows may exceed groundwater recharge, also resulting in a temporary imbalance. However, over the long-term, the operation of the basin will be balanced to ensure that the basin is protected from seawater intrusion and that reclamation of the basin from previous seawater intrusion continues. It is anticipated that ACWD's future groundwater pumping will continue to occur at the Mowry Wellfield, Peralta-Tyson Wellfield, and the Aquifer Reclamation Program wells. ACWD's projected future use of groundwater under normal and dry year conditions is summarized in Chapter 8 – Water Supply Strategy.

Table 4-1
Summary of ACWD Groundwater Management Programs

Groundwater Program	*Description*
Water Supply Management	Planning, managing, and optimizing ACWD's sources of supply: watershed runoff, SWP water for recharge, SWP water for treatment, SFPUC water for blending, and water banking.
Groundwater Replenishment	Operation of ACWD groundwater recharge facilities to optimize 1) capture of local runoff, 2) replacement of water extracted from production and ARP wells, and 3) maintenance of groundwater levels to prevent salt water intrusion.
Watershed Protection and Monitoring	Assisting in the protection and monitoring of the watershed to optimize the quality of runoff water available for ACWD water supply.
Basin Monitoring	Sampling and measuring wells to assess and evaluate 1) groundwater quality, 2) water pressures within the basin, and 3) the direction of groundwater flow.
Wellhead Protection Program	Identify sensitive recharge and groundwater areas, maintain an inventory of potential threats within these areas, assess the vulnerability of source water, and develop management strategies to minimize the potential for groundwater quality impacts.
Aquifer Reclamation Program	Pump brackish water from degraded aquifers in order to 1) increase useable basin storage, 2) improve overall water quality, 3) prevent movement of brackish water toward ACWD production wells, and 4) provide (future) supply augmentation through treatment to potable water standards.
Groundwater Protection Program	Maintain an active role in 1) assisting with the identification of potential groundwater contamination, 2) implementing monitoring systems at hazardous materials storage sites, and 3) providing technical oversight for investigations and cleanups at hazardous materials spill sites.
Well Ordinance Administration	As enforcing agency for municipal ordinances governing construction, repair, or destruction of wells, ACWD provides inspection services, collects fees, and performs field searches for abandoned wells which could act as a conduit for contamination of groundwater.

Table 4-2
Groundwater Budget for the Niles Cone Groundwater Basin (AF/Yr)
(source: ACWD Annual Groundwater Survey Reports)

Groundwater Budget Item	*Fiscal Year*							
	1996/97	*1997/98*	*1998/99*	*1999/00*	*2000/01*	*2001/02*	*2002/03*	*2003/04*
Total Net Recharge[1]	34,500	52,500	38,300	34,000	35,200	35,200	36,900	35,900
Pumping								
Production Wells	19,300	17,800	19,000	20,200	20,800	18,200	20,900	20,100
ARP Wells	7,800	3,800	10,600	6,300	4,300	7,400	7,700	11,100
Other Pumping[2]	6,700	1,000	0	0	0	0	0	0
Private (non-ACWD) Wells	5,000	3,900	3,200	3,100	3,800	3,100	3,400	3,600
Total Pumping	38,800	26,500	32,800	29,600	28,900	28,700	32,000	34,800
Saline Groundwater Outflows	2,300	3,900	6,100	7,400	6,600	6,300	5,800	7,200
Change in Storage	-6,600	22,100	-600	-3,000	-300	200	-900	-6,100

Notes:

(1) Total Net Recharge is calculated as recharge from deep percolation of rainfall and applied water plus recharge at ACWD's groundwater percolation facilities less the sum of evaporation losses and "Other Outflows" (as described in ACWD's annual Groundwater Survey Reports).

(2) Other Pumping represents Quarry Pits dewatering that took place as part of the recharge ponds' rehabilitation project from 1996-1998.

CHAPTER 5
DESALINATION

This chapter describes local opportunities for desalination, including ACWD's Newark Desalination Facility and the District's plans for expanding capacity to augment this source of water supply.

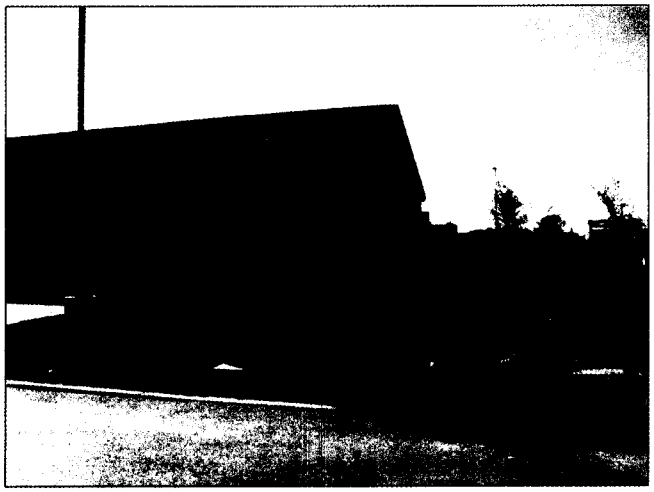
5.1 DESALINATION FACILITY PLANNING AND BACKGROUND

As part of the development of the District's 1995 Integrated Resources Plan, the District evaluated an extensive list of potential water supply alternatives. This included supply-side alternatives (i.e. supplemental sources, facilities, and operational modifications) and demand-side (i.e. conservation) alternatives. ACWD's goal was to end up with a manageable number of the most effective resource options. Included within the potential supply-side alternatives was brackish groundwater desalination and seawater desalination. However, because of the high costs of seawater desalination and potential issues with concentrate disposal, the seawater desalination alternative was eliminated from further consideration during the screening process of the IRP alternatives.

After careful consideration, ACWD adopted an IRP strategy that consists of a mix of conservation, operational alternatives, new supplies and facilities. This included implementation of a Phase 1 (5 mgd) and Phase 2 (increase to 10 mgd) brackish groundwater desalination facility.

5.2 CURRENT DESALINATION CAPACITY AND USE

On September 19, 2003, the Alameda County Water District dedicated the first brackish water desalination facility in northern California (Figure 5-1). The Newark Desalination Facility (Desal Facility) produces potable water by removing salts and other minerals from brackish groundwater. The Newark Desalination Facility has an existing capacity of 5 mgd, and provides up to 10% of the District's water supply.



The source of water for the Newark Desalination Facility is from portions of the Niles Cone Groundwater Basin that contain brackish groundwater due to previous years of seawater intrusion (see Figure 5-2). The District operates a series of wells that remove brackish water (approximate TDS range of 1,100 to 2,400 mg/l from the groundwater basin).

This program, called the Aquifer Reclamation Program (ARP), was developed to stop the spread of saltwater already in the groundwater basin and to reclaim the aquifers of the basin for future potable use. Brackish water from some of these wells is treated at the Newark Desalination Facility rather than being allowed to flow back into San Francisco Bay. The Newark Desalination Facility utilizes reverse osmosis to convert brackish water to potable water.

The soft water produced by the Desalination Facility is blended with the harder groundwater to maintain a more uniform water hardness throughout the year. So in addition to being a relatively new local source of water, the Desalination Facility improves both the quality and reliability of the ACWD water supply.

Figure 5-1
Newark Desalination Facility and Associated Facilities

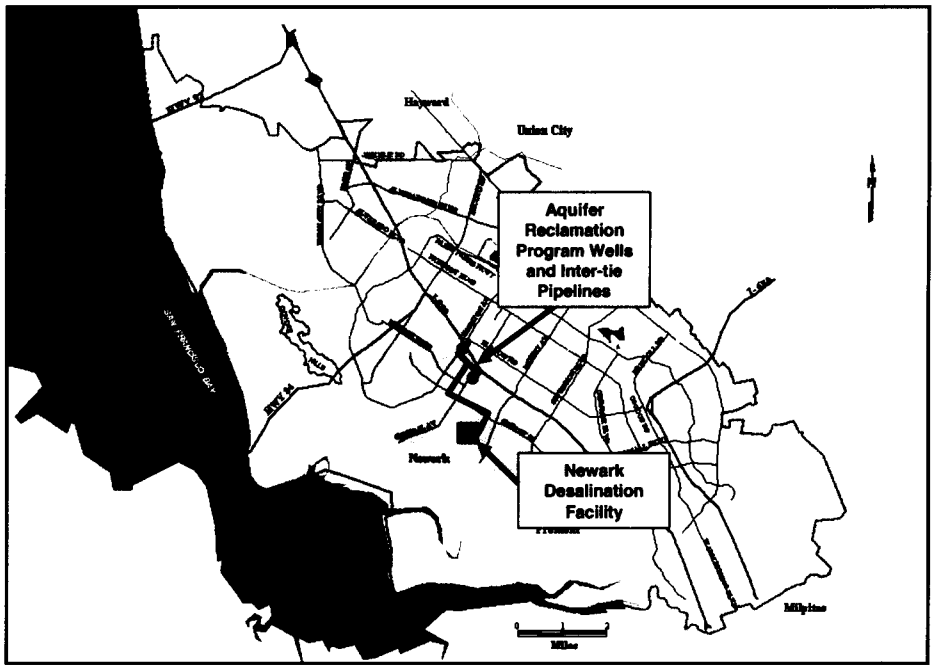
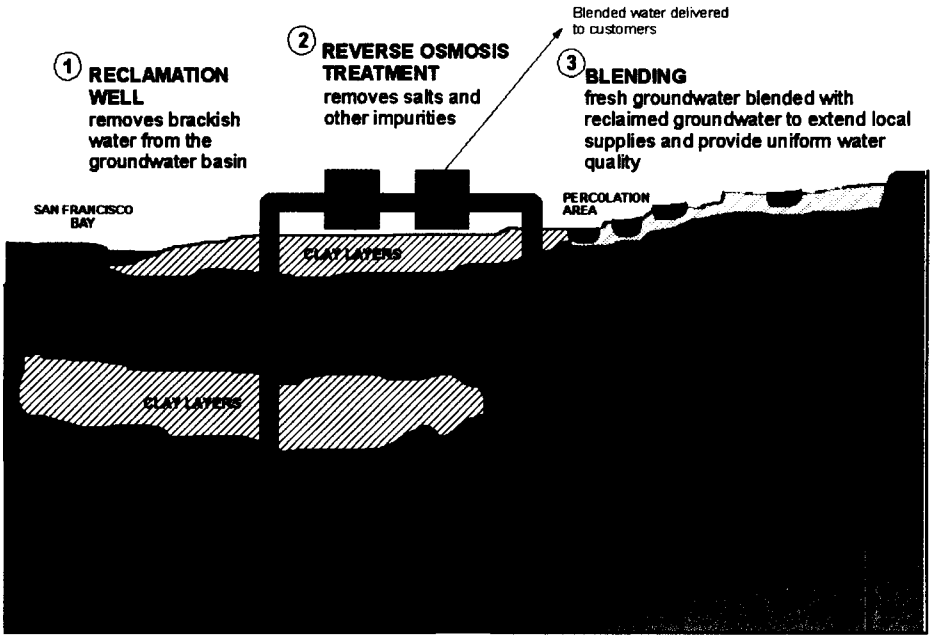


Figure 5-2
Newark Desalination Facility and Aquifer Reclamation Program Schematic



The Newark Desalination Facility provides the following water supply and water quality benefits:

- **Improved dry year water supply reliability:** The District's IRP identified potential dry year water supply shortages of up to 53% (37,400 AF) in 2030 without further action. To improve dry year supply reliability, the District-adopted water management strategy includes conservation, reclamation, off-site groundwater banking and desalination. The desalination facility improves ACWD's dry year supply reliability by providing a new source of potable supply for the service area.

- **Improved water system reliability and security:** The Newark Desalination Facility improves the overall reliability and security of the District's supplies by providing a source of supply west of the Hayward Fault and Calaveras Fault. ACWD's imported water supplies are conveyed via aqueducts (South Bay Aqueduct and Hetch-Hetchy Aqueduct) that are susceptible to failure due to earthquakes along these faults. The Newark Desalination Facility provides ACWD with increased local production capacity, which is key for the District in the event of temporary loss of imported water supplies or production facilities east of the Hayward Fault due to a seismic event.

- **Increased water production capacity:** In addition to the District's dry year reliability needs, the District's IRP also identified the need for additional water production capacity to meet peak summer demands. Although water conservation (targeting outdoor use) and recycled water programs identified in the IRP will help to reduce some of the additional peak demands, additional production capacity in the service area is also needed. The Newark Desalination Facility helps meet the existing and future peak summer demands by providing additional production capacity.

- **Improved water quality:** Because the District's existing potable groundwater supplies are relatively high in hardness, the District blends these groundwater supplies with San Francisco Regional Water System supplies to reduce the overall hardness and improve water quality. Implementation of the desalination facility has allowed the District to further improve water quality for its customers and to provide a supply that meets the District-adopted hardness goals.

- **Reduced future reliance on imported supplies:** The Newark Desalination Facility allows ACWD to reclaim local, brackish groundwater for potable use, reducing the District's need for additional reliance on imported water supplies from the Delta to meet increasing demands in the service area.

- **Groundwater basin protection and reclamation:** The source of the brackish groundwater comes from ACWD's Aquifer Reclamation Program (ARP) in the local Niles Cone Groundwater Basin. The ARP program is an on-going program in which ACWD has been reclaiming to freshwater conditions the portions of the local groundwater basin that have previously been impacted by seawater intrusion from San Francisco Bay. Historically, ACWD has pumped the brackish groundwater out of the basin and disposed of it back to San Francisco Bay. However, the desalination facility now treats this brackish water and allows it to be used as a potable supply.

5.3 PLANNED INCREASED CAPACITY AND USE

ACWD's current plans are to expand the capacity of the desalination facility from 5 mgd to 10 mgd. The expansion is planned to be completed by 2009. This Phase 2 Desalination Project will utilize the most advanced reverse osmosis technology currently available to treat brackish groundwater. Given the high quality of the treated water, the expanded Desal Project treated water will be blended with harder groundwater to improve the overall quality of the water delivered to customers and to the extent possible, extend the local supplies.

CHAPTER 6
WATER RECYCLING

This chapter describes the Union Sanitary District's wastewater system (which serves the ACWD's service area), and the opportunities for the use of recycled water in the ACWD service area.

6.1 AGENCY COORDINATION

As described below, Union Sanitary District (USD) provides wastewater transport, treatment and effluent disposal for the Cities of Fremont, Newark and Union City (encompassing the ACWD service area). ACWD has coordinated with USD in the development of a recycled water master plan (1993) which served as the basis for ACWD's recommended recycled water use plans, as outlined in the District's Integrated Resources Plan. Since 1993, ACWD and USD have jointly updated the master plan, most recently in 2003 with a feasibility study of a satellite recycled water treatment facility in southern Fremont.

6.2 WASTEWATER SYSTEM DESCRIPTION

The following provides a description of USD's facilities and operations, as previously summarized in USD's District-Wide Master Plan.

Wastewater Transport

Wastewater generated within the USD service area is collected and conveyed by gravity sewers to three major pump stations. The Irvington Pump Station serves the southern portion of the service area, the Newark Pump Station serves the central portion and the Alvarado Pump Station serves the northern portion. Wastewater collected in the southern and central areas is transported to the Alvarado Wastewater Treatment Plant (Alvarado WWTP) in Union City via dual 33-inch and 39-inch force mains. The northern drainage area wastewater is pumped directly to the WWTP headworks from the Alvarado Pump Station.

Wastewater Treatment

The Alvarado WWTP uses activated sludge as the biological liquid treatment process to meet the National Pollutant Discharge Elimination System (NPDES) permit requirements for secondary treatment. Additional treatment processes include primary and secondary clarification, and chlorination. The capacity of the WWTP is 33 mgd.

Solids handling at the WWTP includes: sludge thickening, digestion and dewatering. Sludge thickening is accomplished by gravity thickeners that are equipped with odor scrubbers. After thickening, the sludge is stabilized by anaerobic digestion and dewatered to about 20 percent solids using belt filter presses. Dewatered sludge is then transported by truck to approved agricultural fields in Sacramento County, (also Solano and Alameda Counties) where biosolids are surface applied and incorporated into the soil.

Effluent Disposal

All wastewater generated within the USD service area, including peak wet weather flows, receives full secondary treatment and is discharged to the East Bay Dischargers Authority's (EBDA) system for disposal in San Francisco Bay. Currently, there are no wet weather bypasses or overflows from the District's facilities. The EBDA system conveys treated effluent for discharge to the Bay from several local agencies. The facilities consist of approximately 58,000 feet of pipeline ranging in diameter from 60 inches, where USD discharges into the system, to 96 inches at the outfall. USD's contractual discharge capacity is about 43 mgd.

A portion of the USD's effluent is diverted from the EBDA pipeline to supply fresh water to the Hayward Marsh, a constructed wetland located just north of the San Mateo Bridge. In 1991, USD assumed responsibility for the Hayward Marsh Project. Located just north of the San Mateo Bridge, the marsh consists of 145 acres of fresh and brackish wetland, with wide-ranging environmental benefits. Before the marsh was restored from abandoned salt ponds, there was no wildlife habitat at the site. Now the marsh is a popular stop for migratory waterfowl and includes a preserve for the endangered Salt Marsh Harvest Mouse. High quality treated effluent supplied by USD is the fresh water source for this marsh ecosystem.

Existing and Projected Dry Weather Flows

The current average dry weather flows treated at the Alvarado WWTP is approximately 29 mgd. As part of its 1993 District-Wide Master Plan, USD developed dry weather flow projections of 31.8 mgd and 34.3 mgd for the years 2010 and 2020, respectively. These dry weather flow projections were based on a review of existing and planned growth in the service area (based on the cities' General Plans) and were used for the sizing and phasing of future planned wastewater conveyance and treatment facilities.

6.3 CURRENT USES OF RECYCLED WATER

As described above, as part of USD's effluent disposal program, a portion of USD's effluent is provided to the Hayward Marsh Project (located within the ACWD service area) as a fresh water source for the marsh ecosystem. Approximately 3.5 mgd (approximately 3,900 AF/Yr) of high quality, treated effluent are provided to the marsh annually from USD's Alvarado WWTP. However, currently there are no uses of recycled water in the ACWD service area that are off-setting potable water demands. ACWD's water supply strategy, documented in the District's 2001-2005 Urban Water Management Plan and Integrated Resources Plan (IRP), includes plans for a recycled water project in the service area by the year 2020. As described in the IRP, a brackish groundwater desalination facility was implemented prior to a recycled water project because the desalination project was determined to be more cost-effective while also providing a high-quality potable source of supply (as opposed to a non-potable recycled water supply).

6.4 FUTURE RECYCLED WATER OPPORTUNITIES

The use of recycled water to offset the distribution system demand is included as part of ACWD's long-term water supply strategy in the District's Integrated Resources Plan. Recycled water in the service area is planned solely for non-potable use, primarily for landscape irrigation and industrial use. The District is not considering the use of recycled water as a potable water supply. ACWD's IRP strategy includes a phased approach to developing a recycled water supply with the first phase providing up to 1,600 AF/Yr by the year 2020. A potential second phase providing up to an additional 1,000 AF/Yr is also considered in the District's IRP (see Chapter 8 for ACWD's planned use of recycled water in 5-year increments).

ACWD and USD have evaluated several opportunities for recycled water use as a non-potable water supply in the service area. Potential sources of recycled water include treated wastewater from either the USD Alvarado Wastewater Treatment Plant or from a satellite treatment facility located in the southern service area. Each of these opportunities is described in greater detail below.

Recycled Water Treatment at USD's Alavarado Waste Water Treatment Plant

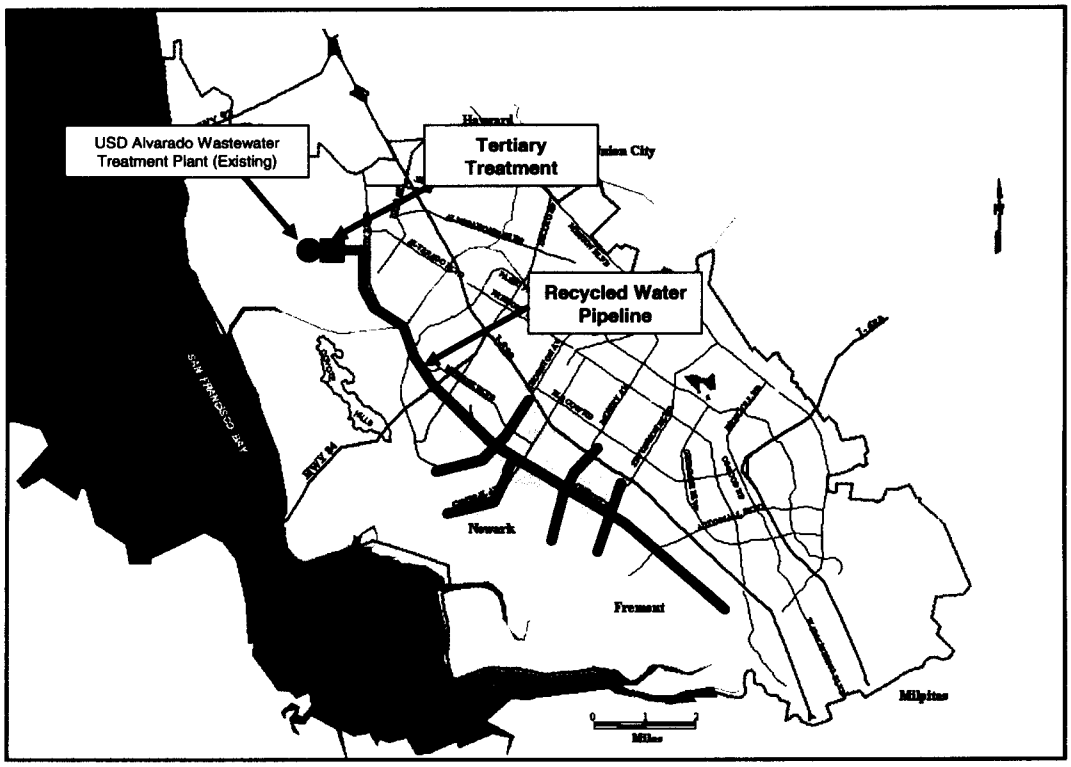
In 1993 ACWD and USD completed a Nonpotable Recycled Water Master Plan (1993 Master Plan) for the development of a recycled water program within the ACWD/USD service area. The 1993 Master Plan identified a total non-potable recycled water demand (primarily for landscape irrigation purposes) of approximately 4,000 AF/Yr. The recycled water source would be from a new tertiary treatment facility at USD's existing Alvarado WWTP in Union City. The 1993 Master Plan recommended a three phase implementation plan which allows for the most cost-effective users (i.e. those in the northern service and

central service areas, known as the Phase 1 and Phase 2 service areas, respectively) to be connected to the system first.

Since 1993, a number of changes have occurred which prompted a Recycled Water Master Plan Update in 1999, including potential new demands and new regulatory requirements. The 1999 Master Plan Update identified potential demands in the Phase 1 and 2 service areas of 2.4 mgd or approximately 2,700 AF/Yr. Because of the large landscape irrigation component, the demand peaks during the summer irrigation season and is minimal during the winter. The maximum day demand during the summer is projected to be 6.8 mgd compared to a typical winter demand of about 0.3 mgd.

The recycled water would originate at the Alvarado WWTP, located at the north end of the service area (Figure 6-1). For a system such as that proposed for ACWD and USD, the recycled water must be suitable for application on unrestricted use sites such as schoolyards, parks, playgrounds and food crops. This requires a high level of treatment that Title 22 designates as "disinfected tertiary recycled water." Following secondary treatment of the wastewater, this treatment level requires chemical addition, flocculation/coagulation, filtration and disinfection.

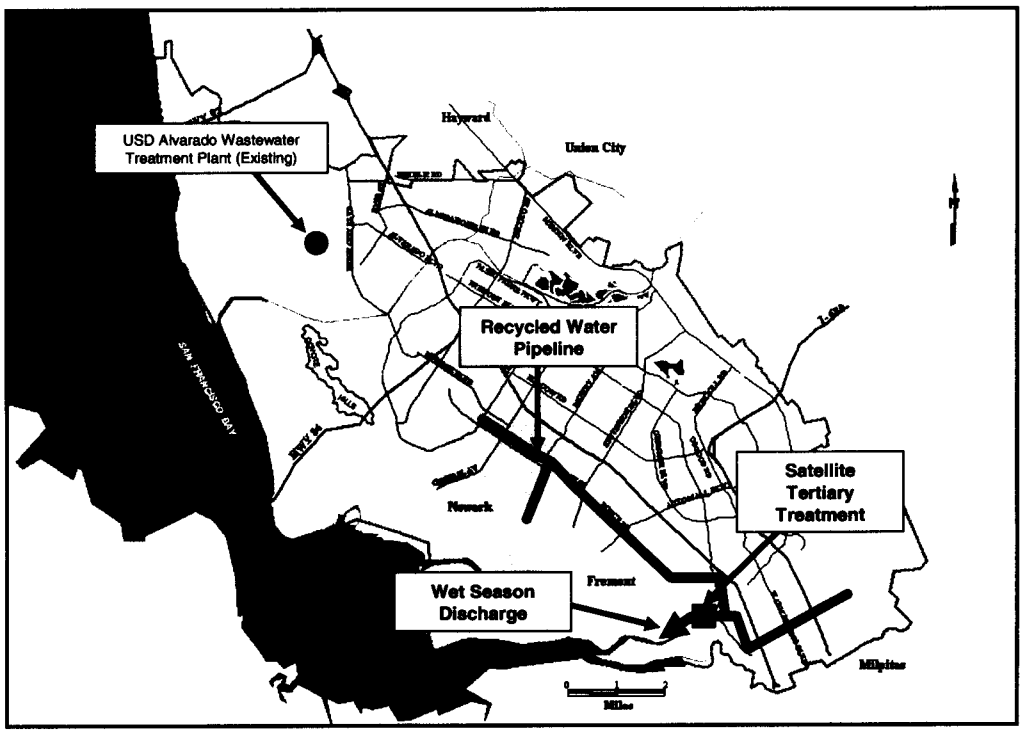
Figure 6-1
1993 & 1999 Recycled Water Master Plan - Proposed Recycled Water Facilities



Recycled Water Treatment at a Satellite Treatment Facility

As an alternative to constructing a recycled water treatment facility at the Alvarado WWTP, in 2003 ACWD and USD completed an evaluation of the feasibility of constructing a satellite recycled water treatment facility in southern Fremont at USD's Irvington Pump Station (Figure 6-2). This satellite facility would benefit ACWD by providing a recycled water source for customers in southern and central Fremont, and would benefit USD by providing advanced treatment for a potential new wet-season outfall, thereby addressing some of the wet-weather disposal issues facing USD. This feasibility study identified a potential future recycled water demand of approximately 1,600 AF/Yr in ACWD's southern service area. However, much of this projected demand is for two planned golf courses, which have not yet been constructed. Therefore, prior to moving forward with this project, primary customers' (i.e. golf courses) demands must be in place.

Figure 6-2
2003 Recycled Water Satellite Treatment Feasibility Study - Proposed Recycled Water Facilities



6.5 OPTIMIZATION OF RECYCLED WATER SUPPLIES

As described above, ACWD has plans to develop a recycled water project with USD to provide up to 1,600 AF/Yr of recycled water supply by the year 2020. Because the planned implementation of a recycled water project in the ACWD service area is still at least ten years away, ACWD has not developed a detailed recycled water optimization plan. Future updates to this Urban Water Management Plan will include the documentation of an optimization plan as the recycled water project planning continues. However, potential actions that may be taken by ACWD and USD to encourage customers to accept the use of recycled water include the following:

- Financial Incentives: This would provide an incentive by offering customers a lower rate for recycled water than for potable supplies from the distribution system. Other financial incentives may include reduced connection charges and service charges.

- Guarantee of Firm Supply: This would provide an incentive for recycled water use by guaranteeing that the recycled water supplies would not be subject to voluntary or mandatory cutbacks during droughts and/or water supply shortages.

- Requirements for New Developments: As a condition for ACWD service, the District may require that developers install separate distribution systems for the use of recycled water for landscape irrigation purposes. Requirements may also be put in place for these new developments to accept the recycled water for landscape irrigation in-lieu of potable water.

The actions described above have not been formally adopted by ACWD or USD but represent potential actions that may be taken in the future as recycled water becomes available. In addition, projections of the quantities of recycled water that may be utilized as a result of these potential actions have not yet been developed. As with the recycled water optimization plan discussed above, these projections will be developed as recycled water planning in the service area progresses and will be included in future updates to this Urban Water Management Plan. However, based on discussion with many of the potential recycled water customers, including city parks, schools, planned golf courses and industrial parks, there is a high degree of acceptance for the use of recycled water in the service area, and no significant obstacles to the full utilization of the planned recycled water quantities is anticipated.

CHAPTER 7
DEMAND MANAGEMENT

Demand management is an integral part of ACWD's long term water management strategy. As part of ACWD's IRP process, potential demand management programs were evaluated at the same level of detail as other supply-side options. In some instances, it may be more cost-effective to implement demand management programs than it would be to secure additional supplies and production/treatment facilities to meet existing and growing demands. A discussion of the District's water supply strategy and how demand management plays a key role in this strategy is provided in Chapter 8.

In addition to implementing demand management measures as part of its IRP program, ACWD is a signatory to the Memorandum of Understanding (MOU) on Urban Water Conservation, and as such, is committed to implementing those water conservation Best Management Practices (BMPs) which are cost effective for the District. As a signatory to the MOU, ACWD is also committed to providing bi-annual reports to the California Urban Water Conservation Council (CUWCC) on the status of the District's BMP implementation. A copy of the most recent report (submitted to the CUWCC in December 2004) covering FY02/03 - FY03/04 is presented in Appendix B.

The following is a summary of ACWD's demand management strategy developed as part of the District's IRP process, followed by a summary of the implementation status of the District's demand management program.

7.1 ACWD DEMAND MANAGEMENT STRATEGY

As is the case with supply-side options, a systematic approach was applied to develop the conservation options as part of the District's IRP process. The conservation analysis included the following steps:

- Disaggregate demand data to determine water-use patterns in the District;
- Carefully screen conservation measures to determine the ones that are appropriate for use in the District;
- Target specific water uses with cost effective conservation measures;
- Design appropriate delivery mechanisms, including incentives and marketing approaches;
- Characterize the programs, including participation levels, program costs, water savings, revenue impacts, demand hardening impacts (a term used to describe the diminished ability or willingness of customers to reduce demand during a supply shortage), and staffing requirements; and
- Package conservation programs into logical groups for integration with supply options.

The IRP recommended a water conservation program that focuses on reducing seasonal (outdoor) demands (thereby reducing the need for additional production and storage facilities to meet peak summer demands) while still addressing indoor water demands. Specific conservation programs included under the recommended conservation program include: residential audits, conservation kit distribution, business/industrial audits and incentives, water efficiency workshops, and large landscape audits and incentives.

7.2 IMPLEMENTATION STATUS OF DEMAND MANAGEMENT PROGRAM

Based on IRP recommendations and commitments to implementing BMPs, ACWD has a multi-faceted demand management program that includes a variety of activities that reach out to residential, business, industrial and landscape customers. A summary of the BMP requirements, and ACWD's progress in meeting our commitments to the MOU, is also provided in Table 7-1. In general, the District is on track in meeting both our IRP demand management recommendations and BMP implementation commitments. The following describes each of ACWD's key water conservation activities and their implementation status; these programs are also summarized in Table 7-2.

Residential Conservation Kit Distribution Program

In 1997, the District initiated an aggressive program to market and distribute free water conservation kits to its residential customers in pre-1992 homes (i.e., homes built prior to the implementation of laws requiring the use of low flow plumbing fixtures). Free conservation kits (including high quality low-flow showerheads) were offered through bill inserts and direct mailings. To date, over 21,400 conservation kits have been provided to SFR customers. The District continues to offer free kits to customers through our web site and periodic advertisements in the District's newsletter.

In addition, free water conserving fixtures have also been provided to qualifying multi-family complexes that have participated in the District's survey program. To date, the District has provided over 2,100 showerheads and over 1,700 faucet aerators to 24 apartment complexes. ACWD has also developed a program to market and distribute free water conservation kits to townhouse and condominium owners in the Tri-Cities area. Over 2,700 kits have been distributed through this program.

Residential Surveys

The District initiated a pilot residential survey program in 1995. The purpose of the program is for a trained water auditor to conduct an onsite review of water use practices and fixtures, check for leaks, and provide recommendations for improving water efficiency (both indoor and outdoor). To date, the District has conducted surveys for over 850 single-family residences (SFR) and 49 multi-family (MFR) apartment complexes (representing over 7,100 apartment units). Free water conservation kits are also provided on an as-needed basis. In 1997 the District evaluated the cost-effectiveness of continuing a large-scale SFR survey program. Based on actual water savings and costs of the program, it was determined to not be cost-effective. However, the MFR survey program was continued. The District continues to offer MFR surveys through its commercial survey program (see below).

Residential Clothes Washer Rebate Program

Since 1997, the District has participated in a rebate program for water and energy efficient clothes washers. These water conserving washers are estimated to save over 5,000 gallons per year, compared with non-conserving washers. This program is conducted in partnership with other local water agencies. To date, ACWD has provided over 9,800 rebates to District residential customers who purchased new water efficient washers.

Table 7-1
Summary of District Water Conservation BMP Implementation

BMP	*District Progress*
1. Residential Water Surveys	· Surveys covering more than 7,900 residential units completed since 1996 · Multi-family program exceeds 10-year BMP targets · Single-family program cost-effectiveness exemption · ***Meets BMP Requirements***
2. Residential Plumbing Retrofit	· Distributed over 21,400 kits to residential units since 1991. · ***Meets BMP Requirements***
3. System Water Audits	· Annual system audits indicated unaccounted for flows at less than 9% (below industry average) · Over 100 miles of distribution system checked for leaks annually · ***Meets BMP Requirements***
4. Metering	· All accounts are metered · ***Meets BMP Requirements***
5. Large Landscape Programs	· Landscape budget program implemented for dedicated landscape accounts · Landscape survey program for mixed use accounts meets BMP targets · ***Partially Meets BMP Requirements***
6. Washing Machine Rebates	· Over 9,800 rebates provided since 1996. · ***Meets BMP Requirements***
7. Public Information Programs	· Program includes billing newsletters, newspaper ads, postcard reminders, press releases, web-site, and participation at community events. · ***Meets BMP Requirements***
8. School Education Programs	· Program includes classroom presentations, free resource material, teacher training/workshops, grants, and field trips. · ***Meets BMP Requirements***
9. Commercial, Industrial, Institutional Programs	· Over 300 accounts surveyed since 1998 · Commercial ULFT and washing machine rebate programs offered in conjunction with Union Sanitary District · ***Meets BMP Requirements***
10. Wholesale Assistance	· Not applicable to ACWD
11. Conservation Pricing	· Currently using uniform rate structure · Implemented inverted block rate structure during drought · ***Meets BMP Requirements***
12. Conservation Coordinator	· Conservation Coordinator position is staffed · ***Meets BMP Requirements***
13. Water Waste Prohibition	· Implemented ordinance during drought · ***Meets BMP Requirements***
14. Residential ULFT Replacement	· Program in place for low-income multi-family · Large scale rebate program cost-effectiveness exemption · ***Meets BMP Requirements***

Table 7-2
Summary of District Water Conservation Programs

Program Name	*Program Description*
Residential Programs	
Conservation Kit Distribution Program	Distribute water efficient plumbing fixtures to SF/MF residents whose homes were built prior to 1992.
Residential Clothes Washer Program	Provide a rebate to individuals who install a qualifying Energy Star clothes washer in the ACWD service territory.
Seasonal Irrigation Postcard Program	Postcards are sent on a seasonal basis to SF residents to update them on current landscape irrigation requirements; all SF residents, three times a year since 1998.
Residential Leak Detection Program	Customer Service notifies customers of non-typical water usage at their address with suggested remedies for the problem. Approximately 1,200 customers are contacted annually.
Residential High Water Use Notification Program	Utilizing GIS, letters are sent to a residence where water consumption is significantly higher than average compared to others in their area with similar lot sizes. Analysis is conducted and letters are mailed out once per year.
Bay Friendly Garden Tour	ACWD's Drought Tolerant Garden is a lecture stop on a tour of Bay Area residential landscape gardens that meet and exceed Bay-Friendly Gardening standards. During the tour conservation staff spends time discussing water conservation and the use of drought tolerant plants with visitors.
Commercial, Industrial, Institutional (CII) Programs	
CII Water Use Efficiency Survey Program	Conduct on-site visits to service area businesses to evaluate water use practices and fixtures. A written report of findings and recommendations is sent out to the customer after the site visit.
Commercial ULFT Rebate Program	Conduct outreach to CII and low-income MF markets to accelerate the rate of toilet replacement. Currently a $150 rebate is being offered in partnership with USD.
Commercial Clothes Washer Rebate Program	A statewide program providing tiered rebates for qualifying commercial clothes washing machines of up to $450. Current funding includes matching funds from USD and a grant from the California PUC. Over 160 rebates have been approved since program inception.
Alameda County Green Business Program	A partnership program for conducting CII surveys that qualify Alameda County businesses as 'green' or environmentally friendly. ACWD uses these survey opportunities to conduct more comprehensive CII surveys.
Spray and Rinse Valve Installation Program	A statewide grant program that partners water agencies with their energy providers to install water and energy efficient spray valve nozzles in service area restaurants at no cost to the restaurant. The program is co-funded by the California PUC and local water agencies. To date over 440 nozzles have been installed at restaurants throughout ACWD's service area.
Alameda County Stop Waste Program	An in-kind partnership between the Bay Area utilities, government agencies and non-profit organizations to promote resource conservation. Sponsored by the Alameda County Waste Management Authority.

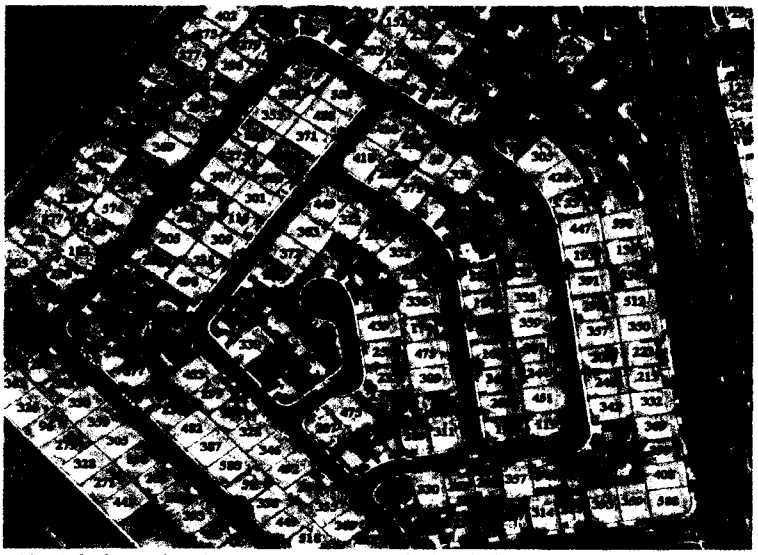
Table 7-2 (continued)
Summary of District Water Conservation Programs

Large Landscape Programs	
Dedicated Landscape Partnership (DLP)	A large landscape survey and water budget program offered to CII and MF customers with dedicated landscape accounts. Through a site survey or GIS analysis turf and non-turf areas are measured to establish an irrigation budget based on square footage and climate conditions. Water use reports are issued to customer and their landscape contractor three times a year.
Irrigation System Audits	Irrigation audits are provided as a component of the DLP. DLP participants that are over-budget are provided with an irrigation system walk-through to determine the efficiency of the system. Recommendations to improve system efficiency and a suggested irrigation schedule are provided to the customer at the end of the audit.
Conservation Business of the Year Recognition Program	Those DLP Participants that remain within their water budget for the previous year are recognized. Participants and their landscape contractors receive an award certificate and their business name and landscape contractor are placed on a list and published in Argus one Sunday in May during Water Awareness Month.
Weather-based Irrigation Controller Grant	Installation of weather-based irrigation controllers at pre-selected large landscape sites within the service area.
Public Information & School Education Programs	
Avenues for Public Outreach	ACWD website, Aqueduct newsletter, newspaper advertisements, public appearances, brochures, etc.
School Education Programs	Program to work with children in the service area to better equip them for understanding and practicing water conservation techniques. ACWD's classroom programs reach over 7,000 students annually, and the ACWD sponsored assembly program reaches approximately 18,000 students annually.
Customer Service and Conservation Material Distribution	Addressing customer questions about water conservation whether in person, via phone or email. Mailing print materials to assist customers in achieving conservation goals.
Other Conservation Activities at ACWD	
Leak Detection and Repair	ACWD's on-going program for evaluating the distribution system for leaks and implementation of necessary repairs to the system. ACWD surveys approx. 165 miles of pipeline each year (five year cycle).
Metering	All ACWD accounts are metered to account for actual water usage by customers.
Billing	Each of ACWD's accounts is billed to the customer based on amount of water used.

Residential Seasonal Irrigation Reminders

Residential landscape irrigation represents one of the single largest uses of water in the District's service area, and also provides an opportunity for one of the largest sources of water savings through improved efficiency. In 1998, the District implemented a program to provide residential customers with landscape irrigation guidelines. As part of this program, the District provides seasonal notices through postcards and/or our web site for adjusting irrigation rates depending on the season. These seasonal notices have been sent to all single-family customers in the fall (to indicate that watering times can be reduced in half from summer schedules), in the winter (to indicate that sprinkler systems can be turned off) and in the spring (to provide efficient watering tips).

Single Family High Water Use Notification



(Aerial photo showing water use at single family homes, in gallons per day)

Utilizing GIS data linked with our customer service database, customer water use is compared to similar households' water use (based on parcel size and location). Those customers in the top 0.5 % for water consumption are sent high water use alert letters. A list of possible reasons for their much higher than average water use are suggested, along with conservation tips, and they are encouraged to call to discuss their water use practices with a conservation staff member. On-site surveys are also offered to customers through this program. The program has been run three times since early 2004. Consumption is monitored annually to confirm program effectiveness.

Residential Ultra Low Flow Toilet Replacement

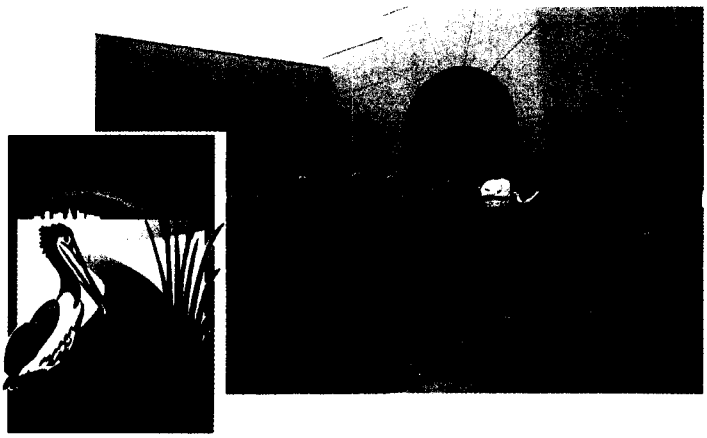
The District has completed a comprehensive evaluation of a large scale residential ultra low flow toilet (ULFT) rebate program. This analysis indicated that such a program would not be cost-effective for the District because 1) legislation enacted in 1992 requires that all new toilets sold in the State be ULFTs (therefore, older toilets are "naturally" replaced with ULFTs even without a rebate program), and 2) the ACWD service area does not face the wastewater disposal restrictions that other areas in the State face. As such, ACWD has submitted a cost-effectiveness exemption for a large scale ULFT rebate program to the CUWCC. However, as described below, ACWD does offer rebates for ULFTs to multi-family residential facilities through the District's CII ULFT Rebate Program.

Residential Leak Detection and Notification Program

Leak detection is an on-going part of ACWD's bi-monthly meter reading program. If an abnormally high water consumption is detected, the meter reader is alerted (through their handheld devices) to check for a leak – and an abnormal read is noted on a report. The meter reader looks at the meter to see if the instruments are spinning. If they are, the meter reader will knock on the door to check and see if anyone is home. If no one answers they assume there is no one home (and thus no one using water) so they leave a door hanger that states there might be a leak and the customer should contact customer service with any questions. If someone is home they have them turn off all water in the house, look at the meter again, and if it is still moving they inform the owner in person that they most likely have a leak.

For billing purposes, the meter reader enters a leak report code indicating whether or not the abnormal read may be the result of a leak at that residence. Two weeks later a re-check is performed. If there is still an indication of a leak, a leak letter is sent to the customer. Another check is performed 2 weeks later, followed by a second leak letter if needed.

Residential Landscape Workshops

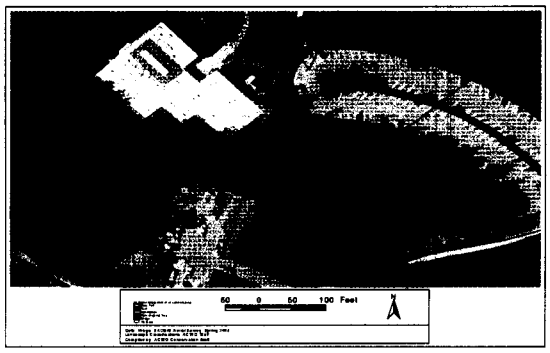


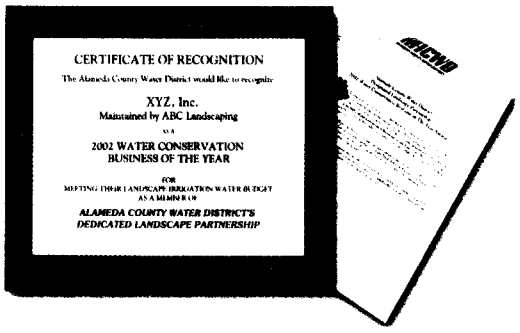
ACWD regularly hosts and co-sponsors garden tours and workshop series for service area residents through a partnership with Alameda County Waste Management Authorities' StopWaste Program and the Bay-Friendly Gardening Program. ACWD's Drought Tolerant Garden is a lecture stop on a tour of Bay Area residential landscape gardens that meet and exceed Bay-Friendly Gardening standards. During the tour, conservation staff spends time discussing water conservation and the use of drought tolerant plants with visitors.

Large Landscape Program: Dedicated Landscape Partnership (DLP)

The District has over 1,800 dedicated irrigation accounts at multi-family, commercial, industrial and institutional sites. In order to ensure that these sites are being irrigated efficiently, the District initiated a survey and water budget program in 1999. As part of this program, the District offers all customers with designated landscape accounts a free survey to determine the landscaped area (turf and non-turf). After the survey is completed, an individual report comparing actual water use with calculated landscape water needs is issued every four months to the customer and their landscape contractor.

ACWD has also utilized GIS to identify turf and non-turf areas and to match parcels to meter numbers to create water budgets for customers with dedicated landscape accounts and for large municipal parks in the service area. To date, 532 large landscape sites are participating in the DLP program (representing over 90% of the total landscape water consumption).





ACWD also recognizes those Dedicated Landscape Partners that remain within their annual water budget through a "Water Conservation Business of the Year" awards program. In 2004, 126 DLP participants qualified to receive the award. These recipients were listed in a Sunday edition of the local newspaper during May, Water Awareness Month.

Future plans include expanding the DLP program to all large landscape customers and continuing to offer detailed irrigation audits to over-budget participants to identify efficiency issues and to make ET-based and site-specific scheduling recommendations. ACWD will also be offering financial incentives for the installation of weather-based irrigation controllers through a DWR funded grant program.

Commercial, Industrial, and Institutional Surveys

The District's commercial, industrial and institutional survey program is tailored to meet the specific needs of our customers. The commercial survey program is targeted at hotels, restaurants and other commercial customers with high indoor use from facilities such as restrooms, laundry, and food preparation/clean up. Some of the surveys are coordinated through a partnership with the Alameda County Green Business program and the statewide Rinse & Save spray valve replacement program. The industrial survey program is tailored towards industrial customers such as high-tech and other manufacturing facilities that utilize large quantities of process water and water for cooling towers. Approximately 300 CII surveys have been conducted to date. Some surveys have been conducted by staff while the larger commercial and industrial surveys have been conducted by consultants. On-site surveys include a comprehensive review of existing water use, identification of areas for improvement, and water use efficiency recommendations outlined in a report provided to the customer. These recommendations include an analysis of potential water and cost savings, as well as a payback analysis. Free conservation devices and follow-up assistance are offered to participating CII customers.

Spray Valve Replacement Program

ACWD participates in this statewide grant program that partners water agencies and their energy providers (i.e. PG&E) to install water and energy efficient spray valve nozzles in service area restaurants. These spray valves are water and energy efficient and are installed at no cost to the restaurant. The program is co-funded by the California Public Utilities Commission and local water agencies. To date over 440 nozzles have been installed at restaurants throughout ACWD's service area.

Commercial Ultra Low Flow Toilet Rebate Program

In 2000, ACWD together with Union Sanitary District initiated a pilot program to provide rebates of up to $150 to commercial and low-income homes for the replacement of non-conserving toilets with water conserving ULFTs. The purpose of this program is to target District customers that have the highest potential water savings when older, non-conserving toilets are replaced with ULFTs. Analysis by the CUWCC and others has indicated that commercial customers such as restaurants and gas stations, as well as multi-family residential units have the highest potential water savings. To date over 360 non-conserving toilets have been replaced with ULFTs within the ACWD service area. The program is marketed through the CII survey program.

Commercial Clothes Washer Rebate Program

ACWD participates in a statewide program which provides tiered rebates for qualifying commercial clothes washing machines of up to $450. Current funding includes matching funds from Union Sanitary District and a grant from the California Public Utilities Commission. Over 160 rebates have been approved since the program inception. Participants have included laundromats and apartment complexes with on-site laundry facilities.

School Education Program

ACWD's school education program was established prior to 1991. The school education program includes the following:

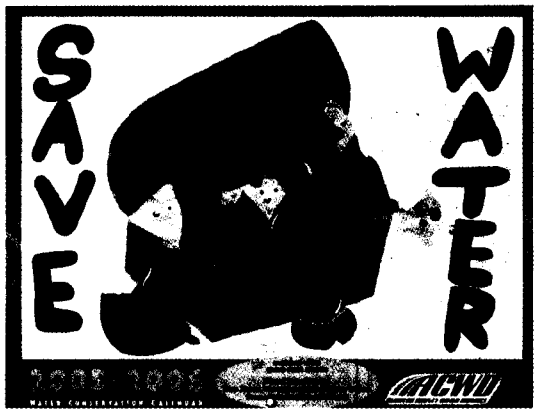
Classroom Instruction: ACWD provides trained staff to conduct water supply and conservation programs at public and private schools in ACWD's service area. Programs are available for kindergarten through 12th grade and are aligned with California education content standards. They are taught as special classes (in which an ACWD instructor substitutes for the regular teacher) and are activity-based. ACWD provides all of the necessary resource materials required for these programs (see below for description). Each year, ACWD reaches approximately 7,000 students through these classroom presentations.

School Assembly Program: Each year, ACWD sponsors a water conservation school assembly program for 40 schools in its service area. The program stresses the various facets of water conservation through the use of music, storytelling, and drama and is appropriate for kindergarten through 6th grade. The school assembly program reaches approximately 18,000 students each year.

Educational Resource Materials: ACWD provides resource materials for teachers to use in teaching about water supply and water conservation. These materials include workbooks, lesson plans, curriculum guides, brochures, pamphlets, videos, posters, maps, games, stickers, pencils, rulers, and magnets. All materials are provided to schools and teachers upon request. Each year, approximately 70,000 pieces of material are distributed to local schools.

Tours: ACWD offers tours of the District's facilities to local schools. These tours include visits to our water treatment and groundwater recharge facilities. All tours are led by District staff.

Water Conservation Poster and Slogan Contest: Each year, ACWD sponsors its extremely popular Water Conservation Poster and Slogan Contest. First through 6th grade students are invited to enter posters and slogans that encourage water conservation. Winning entries are included in a Water Conservation Calendar that is distributed to the over 1,200 teachers in the District's service area. Approximately 1,800 students enter the contest each year.

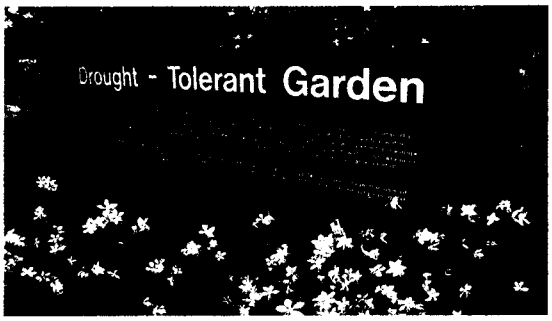


Other: Students who participate in ACWD sponsored activities are encouraged to visit our home page (http://www.acwd.org) which includes educational material and water conservation material. In addition, ACWD participates in Water Awareness Month by providing teachers with free water conservation lesson plans developed by the California Water Awareness Campaign. ACWD also sponsors a mini-grant program for local teachers and conducts free educational workshops (Project WET, etc.).

Public Information Program

ACWD's public information program was also established prior to 1991. The public information program includes the following:

Demonstration garden: ACWD maintains a drought resistant demonstration garden and provides brochures of the garden and irrigation system for our customers. ACWD has also assisted Union City with the development of a demonstration garden at their City offices.



Bill inserts: Bill inserts for ACWD customers are included approximately every two months. These inserts include information about water conservation, leak detection, water quality, water rates and other District related information.

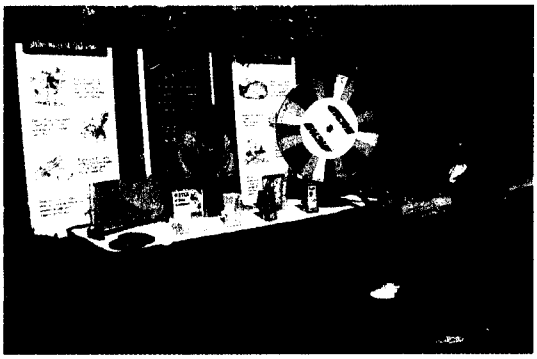
New customer packet: All new ACWD customers receive a packet from ACWD that includes information on water conservation and leak detection.

Brochures: ACWD has a wide variety of water conservation brochures on such topics as leak detection, water conservation devices and measures, irrigation guidelines and drought resistant landscaping

Previous use shown on bill: The customer's consumption from the previous year is provided on all customer billing statements.

Community Events: ACWD routinely participates in a wide variety of community events and other local events.

Internet home page: ACWD maintains a home page on the Internet (http://www.acwd.org), which provides a wide variety of information on water conservation measures such as leak detection, water saving fixtures and drought resistant landscaping.



Conservation Accomplishments and Future Plans

ACWD has successfully worked with other water agencies on large scale conservation programs and has actively pursued conservation grant opportunities. The District has developed the in-house capacity to conduct commercial and landscape water use efficiency surveys and has creatively utilized new technologies, such as GIS, to advance conservation programming.

In addition to the programs detailed above, ACWD conservation staff will continue to seek grant funding to maintain, identify, develop and implement projects that contribute toward meeting the District's demand management goals. ACWD will continue to creatively use new technologies to maximize program effectiveness (e.g. weather-based irrigation (ET) controllers, the use of GIS and other applications, higher efficiency appliances), work with other agencies and participate in regional and statewide conservation programming.

CHAPTER 8
WATER SUPPLY STRATEGY

ACWD's Integrated Resources Plan recommended a water supply strategy to meet the District's planning objectives for water supply reliability, costs, water quality, environmental protection and risk. Included in the District's water supply strategy are programs for additional conservation, recycled water, brackish groundwater desalination and water banking/transfers. This chapter summarizes the planning criteria utilized by ACWD in developing the District's water supply strategy as part of the IRP process, followed by a summary of the recommended water supply strategy for the District and the implementation status of key IRP recommended programs.

8.1 PLANNING CRITERIA

The IRP utilized the following planning criteria in the formulation and evaluation of potential water supply strategies:

Costs: In addition to avoiding rate shocks, key IRP objectives related to costs are to 1) minimize resource costs, and 2) maintain low average customer bills. The District believes that keeping costs, and therefore customer bills, low is a paramount objective.

Reliability: The District intends to maintain a high level of service reliability for its current and future customers. The IRPs' primary focus was long-term water supply reliability because the District has contingency plans and internal standards (e.g., storage standards and peak-day spare capacity for pumps and tanks) to address short-term reliability issues. Through public and stakeholder input during the IRP process, the District determined that a shortage of greater than 10% in 1 out of every 30 years is unacceptable. Likewise, frequent small shortages have also been deemed unacceptable. Hence, resource strategies that result in shortages of greater than 10% or chronic shortages were not considered.

Water Quality: In addition to maximizing the health-related treated water quality, the District's IRP objectives also included avoiding sudden changes in water taste or appearance. Aesthetics, especially taste, are extremely important to District customers. Major fluctuations in aesthetics are noticeable to customers and may generate customer inquiries. One determinant of taste is hardness, expressed as mg/L, or parts per million (ppm) as $CaCO_3$. A key criterion used in the IRP process was to provide uniform hardness levels and limit the maximum monthly hardness.

Environmental Impacts: The District's planning objective was to avoid or mitigate environmental impacts. For a resource option to be considered viable, appropriate mitigation needs to be provided such that any significant environmental impacts are reduced to levels that are less than significant.

Local Control: In light of the current uncertainties associated with the District's imported supplies, the District determined that local control of future resources is desirable. Factors considered in evaluating local control include:

1. The number of entities involved in developing or acquiring the supply options;
2. The firmness of the District's water rights or contractual allocations;
3. The amount of water that the District would have to share with other contractors; and
4. Whether state or federal agencies are involved in allocating water deliveries.

Risk: The last key planning objective was to minimize risks due to future uncertainty. These risks include:

- ***Financial risk:*** The likelihood of spending more money than expected or spending money unnecessarily. This rating is affected by factors such as the ratio of fixed to variable cost, construction and permitting lead times and resource size. For example, resources with high capital cost are more financially risky than resources characterized by variable costs.

- ***Water quality regulatory risk:*** The likelihood of being unable to comply with future health-related water quality regulations. Even though the cost of treatment needed to comply with current standards is included for all source options, some sources have an inherently higher risk of not meeting future standards with existing treatment facilities.

- ***Availability risk:*** The likelihood that a supply source is not available due to external legal or regulatory changes or uncertainties in the quantity of supply provided or saved. For example, agricultural transfers may be risky because of contractual and through-Delta delivery issues.

8.2 WATER SUPPLY STRATEGY AND IMPLEMENTATION STATUS

As part of ACWD IRP process, the District evaluated a wide range of water supply and water conservation options. These options were packaged into nine alternative water supply strategies, each of which was evaluated against the District's planning objectives (described above). The recommended water supply strategy, chosen because it best met the District's objectives, included desalination, recycled water, conservation, groundwater management and off-site banking/transfers. Table 8-1 provides a summary of the key projects incorporated in the District's water supply strategy and their current implementation status.

Table 8-1
Recommended IRP Strategy and Implementation Status

IRP Component	*2000*	*2010*	*2020*	*2030*	*Implementation Status*
Conservation	Package 2 (IRP)	Package 2 (IRP)	Package 2 (IRP)	Package 2 (IRP)	All cost-effective BMPs are being implemented. New programs focused on landscape irrigation in place.
Desalination (mgd)	5	10	10	10	Phase 1 Desal (5 mgd) completed and in operation. Grant funding secured for Phase 2 (10 mgd).
Off-Site Storage/Banking Capacity (1,000 AF)	65	95	100	140	Secured 150,000 AF of off-site banking storage capacity at Semitropic Groundwater Banking Program.
Groundwater Management (Min. Inland GW Elev., ft mean sea-level)	1	-5	-5	-5	Completed the Quarry Lakes rehabilitation project to enhance groundwater recharge capacity.
Treatment Plant Upgrades (mgd)	---	---	---	4	Added 2 mgd of treatment capacity to MSJWTP during plant upgrade and conversion to ultra-filtration.
Recycled Water	---	---	Phase 1 (1,600 AF/Yr)	Phase 2 (1,000 AF/Yr)	ACWD/USD Recycled Water Master Plan updated and satellite treatment plant feasibility study completed.

ACWD's previous Urban Water Management Plan (2000-2005) was based on the same IRP water supply strategy that is included in this 2006-2010 Plan. Since the 2000-2005 Plan was adopted by the ACWD Board in 2001, ACWD has made significant progress in the implementation of this strategy. This progress includes: (1) on-going implementation of the District's water conservation program; (2) securing of an additional 100,000 AF of off-site storage capacity at the Semitropic Groundwater Banking Program (2001); (3) completion of the Phase 1 (5 mgd) Newark Desalination Facility (2003); (4) completion of upgrades to the District's Mission San Jose Water Treatment Plant (2005); and (5) completion of a joint ACWD/USD feasibility study for a recycled water satellite treatment facility (2003).

Each of the key components of ACWD water supply strategy are discussed in greater detail below:

Desalination

As described in Chapter 5, the IRP recommended developing a brackish groundwater desalination facility which would provide a new local source of water supply for the District. The desalination facility would produce potable water by removing salts and other minerals from brackish (slightly salty) groundwater in the local aquifer system.

ACWD completed construction of the first phase of the Newark Desalination Facility in 2003. This desalination facility has a capacity of 5 mgd, and was constructed to allow for future expansion to 10 mgd. The Newark Desalination Facility utilizes state-of-the-art reverse osmosis technology to convert brackish water to potable water. This process forces water under pressure across a semi-permeable membrane. The membrane allows water molecules to pass through but stops dissolved minerals such as salts and iron. The soft water produced by the Desalination Facility is blended with the harder groundwater to provide a supply with lower overall hardness.

The source water for the desalination facility comes from a series of wells that remove brackish water from the Niles Cone Groundwater Basin. This program, called the Aquifer Reclamation Program, was developed to stop the spread of saltwater already in the groundwater basin and to reclaim the aquifers of the basin for future potable use. With the start-up of the Newark Desalination Facility in 2003, a portion of the brackish groundwater pumped from these wells has been treated for subsequent potable use rather than being allowed to flow to San Francisco Bay, as was previously the case. This represents a new source of supply to the extent that this brackish groundwater would be pumped regardless (through the District's Aquifer Reclamation Program) in order to improve water quality in the basin and to protect the District's Mowry Wellfield.

ACWD plans on expanding the capacity of this desalination facility to 10 mgd by the year 2010. ACWD was recently awarded a $2.8 million grant from the California Department of Water Resources for this expansion. ACWD is currently evaluating various operational strategies for this expanded facility as part of the update to the District's IRP. Alternative strategies include the use of this expanded facility to meet peak summer production needs during normal and dry years (i.e. providing 5,100 AF/Yr supply), and base-loading the facility (10 mgd year-round) during above-normal and wet years. For the purpose of this UWMP, it is assumed that the expanded desalination facility will provide 5,100 AF/Yr of treated water supplies under normal year conditions. This assumption will be reviewed in future updates to this Urban Water Management Plan.

Recycled Water

The District's long-term supply strategy includes a recycled water program to be implemented by 2020, which will provide up to 1,600 AF/yr of non-potable supply (e.g. landscape irrigation and industrial process water). As described in Chapter 6 of this report, the source of recycled water will be from a joint project with ACWD and Union Sanitary District (USD). Reclaimed water distribution pipelines will be separate from the District's existing potable distribution system and, therefore, would not adversely affect existing potable supply operations. The volume of reclaimed water produced would be the same in drought years as in normal years, thus providing a firm source of supply. Demand for reclaimed water for irrigation purposes is highest in the summer months. Therefore, in addition to increasing water supply, use of reclaimed water would help meet peak monthly and daily production capacity needs.

In 2003 ACWD and USD completed an evaluation of the feasibility of constructing a satellite recycled water treatment facility in southern Fremont at USD's Irvington Pump Station. This satellite facility would benefit ACWD by providing a recycled water source for customers in southern and central Fremont, and would benefit USD by providing advanced treatment for a potential new wet-season outfall, thereby addressing some of the wet-weather disposal issues facing USD. As described in Chapter 6, prior to moving forward with this project, primary customers (i.e. golf courses) demands must be in place.

Demand Management

As discussed in Chapter 7, demand management is a key component of ACWD's long-term water supply and management strategy. The IRP recommended program ("Package 2") includes components to reduce both indoor and outdoor use for all customer groups within the District's service area. However, the focus of the recommended program is to reduce peak summer demands in order to reduce the need for additional production and storage facilities. In addition, as a signatory to the MOU on Urban Water Conservation, ACWD is committed to implementing locally cost-effective water conservation best management practices ("BMPs"), as developed by the California Urban Water Conservation Council (CUWCC). A summary of ACWD's water conservation program is presented in Chapter 7 and Appendix B (BMP Implementation Report).

As part of the IRP process, the District estimated that the total long-term savings from District sponsored conservation measures would range from approximately 1,600 AF/Yr to 4,900 AF/Yr. A range in potential savings was developed due to the uncertainties in actual savings associated with water conservation programs. For planning purposes, an average annual projected savings of 2,900 AF/Yr by the year 2020 is utilized. This quantity of savings is based on year 2000 base conditions. Of this total quantity of savings, it is estimated that approximately 700 AF/Yr of savings has occurred to date (i.e. from the 2000 baseline conditions through 2005) due to conservation measures already implemented, and another 2,200 AF/Yr of annual savings will be achieved by the year 2020. It should be noted that these projected conservation savings do not include savings that would occur due to "natural conservation" (i.e., savings due to the retrofit of non-conserving plumbing fixtures with low flow fixtures). Rather, savings from natural conservation are accounted for in the District's water demand projections as are savings from pre-2005 District sponsored conservation programs.

Groundwater Management

As stipulated in the District's Groundwater Management Policy (adopted on January 26, 1989, and amended on March 22, 2001), it is the policy of the District to efficiently protect and manage the Niles Cone Groundwater Basin to ensure a reliable supply of high quality water that satisfies present and future municipal, industrial, recreational and agricultural water needs in the ACWD service area (see Chapter 4 for a more detailed discussion of local groundwater management). In order to protect the Basin from seawater intrusion, the District's operational goals are to maintain groundwater levels above sea-level in the Newark Aquifer system (the upper aquifer which is hydraulically connected to San Francisco Bay). However, during critically dry periods the District may temporarily reduce groundwater levels slightly below sea-level (-5 feet mean sea-level minimum level), in the Newark Aquifer in the Forebay (inland) area. Detailed modeling analysis has indicated that temporarily drawing the aquifer down in this inland area could provide additional supply in critically dry years without impacting the integrity of the Basin. This analysis assumes that (1) there are no new parties pumping from the Basin, and (2) that groundwater outflows from the Basin are not increased due to increased pumping in adjacent groundwater basins that are hydraulically connected with the Niles Cone Groundwater Basin.

A key component of ACWD's management of the Niles Cone Groundwater Basin is the capability to recharge the groundwater system through the District's groundwater percolation ponds. In order to maintain the recharge capacity at these ponds, the District completed a rehabilitation of these percolation ponds in 1997. Under an agreement with the East Bay Regional Park District, the Quarry Lakes rehabilitation project also allowed for joint use of these percolation ponds for recreation and wildlife purposes.

Off-Site Banking and Transfers/Exchanges

Even with new programs for water conservation, recycled water and desalination, the District identified the need for additional supplies during dry and critically dry years. Analyses performed during the development of the IRP indicated that the District will require up to 20,000 AF/Yr in critically dry years and up to 100,000 AF over an extended 7-year drought. In 1999, the District completed an evaluation of a wide-range of alternatives to meet our dry year water needs. The report identified the potential methods to secure dry year supplies through both off-site banking and transfers/exchanges.

Off-site storage involves storing excess ACWD SWP supplies during wet and above normal years, for use during dry years. Since ACWD has limited local storage in the Niles Cone Groundwater Basin, storage needs to take place at off-site surface reservoirs or groundwater basins. The IRP shows a total need of 100,000 AF of off-site storage capacity by the year 2020, and 140,000 AF by the year 2030. To meet these goals, in 1997 ACWD secured 50,000 AF of storage capacity at the Semitropic Groundwater Banking Program and in 2001 secured an additional 100,000 AF, for a total combined storage capacity of 150,000 AF. As of December 2005, ACWD has stored approximately 100,000 AF at the Semitropic Groundwater Bank

A key limitation to the Semitropic Banking Program is the capacity to return water to ACWD during dry years. Under ACWD's water banking agreements with Semitropic, the amount of return (or "take" capacity) from the program is based on the total amount of storage capacity. Because of this limitation, the amount of storage capacity ACWD has secured at Semitropic has exceeded the IRP recommended quantity. ACWD water supply analyses has indicated that in most dry years this groundwater banking capacity, in combination with the District's other water supplies, will be sufficient to meet the District's water needs. However, during the most critical droughts (e.g. 1977 conditions), ACWD may still not have adequate take capacity from the Semitropic Banking Program to meet all in-District water demands.

Another option to meet dry year water supply needs is for ACWD to enter into exchange agreements for dry year supplies or to purchase raw water supplies in dry years. Typically, these options would involve purchasing Delta water supplies from an entity which could temporarily use a local groundwater supply in-lieu of surface water supplies provided to ACWD. ACWD currently participates with the Department of Water Resources and State Water Contractors on an annual basis to evaluate potential water transfer opportunities.

Treatment Plant Upgrades

The District's IRP recommended that, by the year 2030, an additional 4 mgd of treatment plant capacity should be added to help meet peak summer day demands and to ensure that ACWD water quality goals could be met. In 2003 ACWD began construction at the District's Mission San Jose Water Treatment Plant (MSJWTP) to convert the treatment plant to ultrafiltration. In this process, water is forced through porous membranes. Due to the small size of the membrane pores, ultrafiltration provides a very effective barrier against the passage of particulate matter, protozoan cysts, bacteria and viruses. An advantage of this technology is that it reduces the amount of chemical disinfection that is required to kill disease-causing agents. As part of this upgrade, the overall peak summer capacity of the treatment plant was also increased by 2 mgd.

8.3 WATER SUPPLY AND DEMAND COMPARISONS

A key recommendation in the District's 1995 Integrated Resources Planning Study was that the implementation status and planning assumptions be reviewed every ten years. As of December 2005, ACWD is in the process of completing this update to the IRP. As part of the update process, ACWD has completed its analysis of the projected water supply availability and demands under average year, single dry year, and multiple dry year conditions. These analyses are based on the most recent water supply availability projections (as described in Chapter 3) provided by the DWR and the SFPUC for ACWD's imported water supplies. Projections of local water supply reliability are based on modeling analyses under long-term local hydrologic conditions (1922-1994 historical rainfall and runoff in the Alameda Creek Watershed). These analyses also assume implementation of the ACWD water supply strategy as detailed in the IRP and ACWD's Capital Improvement Plan.

The results of these analyses are presented in Table 8-2 and indicate that under normal year water supply conditions (representing median-year water supply availability based on 1922-1994 historical hydrologic conditions) ACWD will have sufficient supplies to meet projected future water demands, as adjusted for estimated future water conservation savings. As indicated in Table 8-2, this analysis also indicates that during these hydrologic conditions, ACWD would have sufficient supplies available (in excess of the projected demands) for placing into groundwater storage (locally or at the off-site Semitropic Groundwater Bank) for later use in the service area in dry years.

Table 8-2
Projected Normal Year Water Supply and Demand Comparison (AF/Yr)

SUPPLY/DEMAND	*Year*				
	2010	*2015*	*2020*	*2025*	*2030*
SUPPLY COMPONENT					
Imported Supplies					
-State Water Project	32,700	33,800	34,900	36,000	36,000
- San Francisco Regional	15,300	15,300	15,300	15,300	15,300
Total Imported Supplies	**48,000**	**49,100**	**50,200**	**51,300**	**51,300**
Local Supplies					
- Groundwater Recharge	25,700	25,700	25,700	25,700	25,700
- Groundwater Storage	0	0	0	0	0
- Del Valle Release	3,400	3,400	3,400	3,400	3,400
- Desalination	5,100	5,100	5,100	5,100	5,100
- Recycled Water	0		1,600	1,600	1,600
Total Local Supplies	**34,200**	**34,200**	**35,800**	**35,800**	**35,800**
Banking/Transfers					
- Semitropic Banking	**0**	**0**	**0**	**0**	
TOTAL SUPPLY	***82,200***	***83,300***	***86,000***	***87,100***	***87,100***
DEMAND COMPONENT					
- Distribution System Demand	59,500	61,400	63,200	63,700	64,300
- Estimated Conservation Savings	(700)	(1,500)	(2,200)	(2,200)	(2,200)
- Groundwater System Demands	14,800	14,800	14,800	14,800	14,800
TOTAL DEMAND	***73,600***	***74,700***	***75,800***	***76,300***	***76,900***
SUPPY & DEMAND COMPARISON					
- Supply Totals	82,200	83,300	86,000	87,100	87,100
- Demand Totals	73,600	74,700	75,800	76,300	76,900
- Difference	8,600	8,600	10,200	10,800	10,200
- Difference as % of Supply	10%	10%	12%	12%	12%
- Difference as % of Demand	12%	12%	13%	14%	13%

Notes:

1. Normal Year conditions are based on the median supply availability based on a review of 1922-1994 historical hydrologic conditions. The year 1944 was selected as it is the closest year to the statistical median for current and future total water supply availability.

2. Groundwater System Demands include: (1) ARP groundwater production, (2) private groundwater pumping, and (3) saline groundwater outflows.

3. ACWD anticipates expanding the Newark Desalination Facility from 5 mgd to 10 mgd by the year 2010. Depending on groundwater conditions, the expanded desalination facility may provide up to 11,200 AF/Yr of supply.

4. Under Normal Year conditions, ACWD does not anticipate utilizing Groundwater Storage (groundwater use in excess of recharge) or Semitropic Groundwater Banking. These supplies would be used under dry year conditions when imported and local supply availability would be reduced.

5. As documented in ACWD's 2001-2005 UWMP, ACWD's long-term planning is based on conservation savings of 2,900 AF/Yr to be achieved by the year 2020. Of the 2,900 AF/Yr estimated savings, it is estimated that 700 AF/Yr of savings has already been achieved due to conservation program implementation between the years 2000 and 2005. This existing level of conservation savings (700 AF/Yr) is already accounted for in the demand projections. Therefore, this 2006-2010 Urban Water Management Plan assumes that the remaining balance of 2,200 AF/Yr savings (or 2,900 AF/Yr minus 700 AF/Yr) will be achieved by the year 2020.

Table 8-3 provides a summary of the supply availability under the most severe single-year drought on record (1977). This drought year represents the projected minimum water supply availability considering all of ACWD's water supplies (i.e. State Water Project, San Francisco Regional and local supplies). This analysis indicates that ACWD would experience a shortage of approximately 15% during a similar critical drought under all future demand conditions (2010, 2015, 2020, 2025 and 2030). Under this dry year scenario, ACWD's SWP supplies would be cutback by approximately 95%, and ACWD would need to rely on local and off-site groundwater storage for approximately 24,000 acre-feet to help make up for this shortfall. Under such severe critical drought conditions (1 in 70 year occurrence), ACWD would look to secure additional supplies through a DWR drought water bank or similar water purchase/transfer program. In addition, ACWD would also likely implement the drought contingency plan described in Chapter 9 of this Plan.

Tables 8-4 through 8-8 provide summaries of the projected supply availabilities under a long-term (5 year) drought for 2006-2010, 2011-2015, 2016-2020, 2021-2025, and 2026-2030 demand conditions. This multiple year drought sequence is based on the 1929-1933 historical hydrologic conditions, which represents the most severe 5-year drought on record (based on projected availability of ACWD's supplies over the 1922-94 hydrologic period). The results from these analyses indicate that ACWD will have sufficient supplies to withstand a similar long-term drought. The maximum shortage projected (4% in the third year of the drought sequence) is well within the District's reliability goals of no more than a 10% shortage on a one in thirty year basis. As with the single dry year condition, both local groundwater storage and off-site groundwater storage in Semitropic will play key roles in offsetting shortfalls in the District's other local and imported supplies.

Table 8-3
Projected Single Dry Year Water Supply and Demand Comparison (AF/Yr)

SUPPLY/DEMAND	*Year*				
	2010	*2015*	*2020*	*2025*	*2030*
SUPPLY COMPONENT					
Imported Supplies					
-State Water Project	1,700	1,800	1,800	1,900	1,900
- San Francisco Regional	11,700	13,700	14,100	12,700	13,100
Total Imported Supplies	**13,400**	**15,500**	**15,900**	**14,600**	**15,000**
Local Supplies					
- Groundwater Recharge	15,600	15,600	15,600	15,600	15,600
- Groundwater Storage	10,000	10,000	10,000	10,000	10,000
- Del Valle Release	100	100	100	100	100
- Desalination	5,600	5,600	5,600	5,600	5,600
- Recycled Water	0	0	1,600	1,600	1,600
Total Local Supplies	**31,300**	**31,300**	**32,900**	**32,900**	**32,900**
Banking/Transfers					
- Semitropic Banking	**13,500**	**13,500**	**13,500**	**13,500**	**13,500**
TOTAL SUPPLY	***58,200***	***60,300***	***62,300***	***61,000***	***61,400***
DEMAND COMPONENT					
- Distribution System Demand	59,500	61,400	63,200	63,700	64,300
- Estimated Conservation Savings	(700)	(1,500)	(2,200)	(2,200)	(2,200)
- Groundwater System Demands	10,500	10,500	10,500	10,500	10,500
TOTAL DEMAND	***69,300***	***70,400***	***71,500***	***72,000***	***72,600***
SUPPY & DEMAND COMPARISON					
- Supply Totals	58,200	60,300	62,300	61,000	61,400
- Demand Totals	69,300	70,400	71,500	72,000	72,600
- Difference	(11,100)	(10,100)	(9,200)	(11,000)	(11,200)
- Difference as % of Supply	-19%	-17%	-15%	-18%	-18%
- Difference as % of Demand	-16%	-14%	-13%	-15%	-15%

Notes:

1. Single Dry Year conditions are based on the projected supply availability under 1977 drought conditions.

2. Groundwater system demands include: (1) ARP groundwater production, (2) private groundwater pumping, and (3) saline groundwater outflows. Under dry year conditions ACWD's groundwater system demands may be reduced from Normal Year conditions due to a reduction in saline groundwater outflows as local groundwater elevations are temporarily lowered.

3. ACWD anticipates expanding the Newark Desalination Facility from 5 mgd to 10 mgd by the year 2010. Depending on groundwater conditions, the expanded desalination facility may provide up to 11,200 AF/Yr of supply.

4. As documented in ACWD's 2001-2005 UWMP, ACWD's long-term planning is based on conservation savings of 2,900 AF/Yr to be achieved by the year 2020. Of the 2,900 AF/Yr estimated savings, it is estimated that 700 AF/Yr of savings has already been achieved due to conservation program implementation between the years 2000 and 2005. This existing level of conservation savings (700 AF/Yr) is already accounted for in the demand projections. Therefore, this 2006-2010 Urban Water Management Plan assumes that the remaining balance of 2,200 AF/Yr savings (or 2,900 AF/Yr minus 700 AF/Yr) will be achieved by the year 2020.

Table 8-4
Projected Multiple Dry Year Period Water Supply and Demand Comparison for 2006-2010 (AF/Yr)

SUPPLY/DEMAND	*Year*				
	2006	*2007*	*2008*	*2009*	*2010*
SUPPLY COMPONENT					
Imported Supplies					
-State Water Project	11,300	28,900	10,500	14,800	13,600
- San Francisco Regional	15,300	15,300	13,500	15,300	15,300
Total Imported Supplies	**26,600**	**44,200**	**24,000**	**30,100**	**28,900**
Local Supplies					
- Groundwater Recharge	12,900	13,000	9,000	20,900	13,700
- Groundwater Storage	8,800	0	10,000	0	4,100
- Del Valle Release	900	5,100	1,000	3,400	1,000
- Desalination	5,000	5,000	4,500	5,600	4,500
- Recycled Water	0	0	0	0	0
Total Local Supplies	**27,600**	**23,100**	**24,500**	**29,900**	**23,300**
Banking/Transfers					
- Semitropic Banking	**16,100**	**2,300**	**15,600**	**17,900**	**17,400**
TOTAL SUPPLY	***70,300***	***69,600***	***64,100***	***77,900***	***69,600***
DEMAND COMPONENT					
- Distribution System Demand	57,300	57,800	58,300	58,900	59,500
- Estimated Conservation Savings	(100)	(300)	(400)	(600)	(700)
- Groundwater System Demands	11,900	10,400	8,800	13,800	8,700
TOTAL DEMAND	***69,100***	***67,900***	***66,700***	***72,100***	***67,500***
SUPPY & DEMAND COMPARISON					
- Supply Totals	70,300	69,600	64,100	77,900	69,600
- Demand Totals	69,100	67,900	66,700	72,100	67,500
- Difference	1,200	1,700	(2,600)	5,800	2,100
- Difference as % of Supply	2%	2%	-4%	7%	3%
- Difference as % of Demand	2%	3%	-4%	8%	3%

Notes:

1. Multiple Dry Year conditions are based on the projected supply availability under 1929-33 drought conditions.

2. Groundwater system demands include: (1) ARP groundwater production, (2) private groundwater pumping, and (3) saline groundwater outflows. Under dry year conditions ACWD's groundwater system demands may be reduced from Normal Year conditions due to a reduction in saline groundwater outflows as local groundwater elevations are temporarily lowered.

3. ACWD anticipates expanding the Newark Desalination Facility from 5 mgd to 10 mgd by the year 2010. Depending on groundwater conditions, the expanded desalination facility may provide up to 11,200 AF/Yr of supply.

4. As documented in ACWD's 2001-2005 UWMP, ACWD's long-term planning is based on conservation savings of 2,900 AF/Yr to be achieved by the year 2020. Of the 2,900 AF/Yr estimated savings, it is estimated that 700 AF/Yr of savings has already been achieved due to conservation program implementation between the years 2000 and 2005. This existing level of conservation savings (700 AF/Yr) is already accounted for in the demand projections. Therefore, this 2006-2010 Urban Water Management Plan assumes that the remaining balance of 2,200 AF/Yr savings (or 2,900 AF/Yr minus 700 AF/Yr) will be achieved by the year 2020.

Table 8-5
Projected Multiple Dry Year Period Water Supply and Demand Comparison for 2011-2015 (AF/Yr)

SUPPLY/DEMAND	*Year*				
	2011	*2012*	*2013*	*2014*	*2015*
SUPPLY COMPONENT					
Imported Supplies					
-State Water Project	11,400	28,500	10,700	15,200	13,600
- San Francisco Regional	15,300	15,300	13,700	15,300	15,300
Total Imported Supplies	**26,700**	**43,800**	**24,400**	**30,500**	**28,900**
Local Supplies					
- Groundwater Recharge	12,800	12,300	9,800	19,800	14,100
- Groundwater Storage	9,300	0	10,000	0	3,100
- Del Valle Release	900	5,200	1,000	3,400	1,000
- Desalination	5,000	5,000	4,500	5,500	4,500
- Recycled Water	0	0	0	0	0
Total Local Supplies	**28,000**	**22,500**	**25,300**	**28,700**	**22,700**
Banking/Transfers					
- Semitropic Banking	**16,100**	**5,400**	**15,900**	**18,700**	**17,400**
TOTAL SUPPLY	***70,800***	***71,700***	***65,600***	***77,900***	***69,000***
DEMAND COMPONENT					
- Distribution System Demand	59,800	60,200	60,500	60,900	61,400
- Estimated Conservation Savings	(900)	(1,000)	(1,200)	(1,300)	(1,500)
- Groundwater System Demands	11,300	10,000	8,700	10,100	8,700
TOTAL DEMAND	***70,200***	***69,200***	***68,000***	***69,700***	***68,600***
SUPPY & DEMAND COMPARISON					
- Supply Totals	70,800	71,700	65,600	77,900	69,000
- Demand Totals	70,200	69,200	68,000	69,700	68,600
- Difference	600	2,500	(2,400)	8,200	400
- Difference as % of Supply	1%	3%	-4%	11%	1%
- Difference as % of Demand	1%	4%	-4%	12%	1%

Notes:

1. Multiple Dry Year conditions are based on the projected supply availability under 1929-33 drought conditions.

2. Groundwater system demands include: (1) ARP groundwater production, (2) private groundwater pumping, and (3) saline groundwater outflows. Under dry year conditions ACWD's groundwater system demands may be reduced from Normal Year conditions due to a reduction in saline groundwater outflows as local groundwater elevations are temporarily lowered.

3. ACWD anticipates expanding the Newark Desalination Facility from 5 mgd to 10 mgd by the year 2010. Depending on groundwater conditions, the expanded desalination facility may provide up to 11,200 AF/Yr of supply.

4. As documented in ACWD's 2001-2005 UWMP, ACWD's long-term planning is based on conservation savings of 2,900 AF/Yr to be achieved by the year 2020. Of the 2,900 AF/Yr estimated savings, it is estimated that 700 AF/Yr of savings has already been achieved due to conservation program implementation between the years 2000 and 2005. This existing level of conservation savings (700 AF/Yr) is already accounted for in the demand projections. Therefore, this 2006-2010 Urban Water Management Plan assumes that the remaining balance of 2,200 AF/Yr savings (or 2,900 AF/Yr minus 700 AF/Yr) will be achieved by the year 2020.

Table 8-6
Projected Multiple Dry Year Period Water Supply and Demand Comparison for 2016-2020 (AF/Yr)

SUPPLY/DEMAND	*Year*				
	2016	*2017*	*2018*	*2019*	*2020*
SUPPLY COMPONENT					
Imported Supplies					
-State Water Project	11,400	28,200	10,800	15,600	13,600
- San Francisco Regional	15,300	15,300	14,100	15,300	15,300
Total Imported Supplies	**26,700**	**43,500**	**24,900**	**30,900**	**28,900**
Local Supplies					
- Groundwater Recharge	12,600	12,100	9,700	19,600	14,100
- Groundwater Storage	8,100	0	10,000	0	2,600
- Del Valle Release	900	5,200	1,000	3,400	1,000
- Desalination	5,000	5,000	4,500	5,500	4,500
- Recycled Water	0	0	0	0	1,600
Total Local Supplies	**26,600**	**22,300**	**25,200**	**28,500**	**23,800**
Banking/Transfers					
- Semitropic Banking	**16,100**	**5,400**	**15,900**	**18,700**	**17,400**
TOTAL SUPPLY	***69,400***	***71,200***	***66,000***	***78,100***	***70,100***
DEMAND COMPONENT					
- Distribution System Demand	61,600	61,900	62,200	62,400	63,200
- Estimated Conservation Savings	(1,600)	(1,700)	(1,900)	(2,000)	(2,200)
- Groundwater System Demands	10,900	10,000	8,700	10,200	8,700
TOTAL DEMAND	***70,900***	***70,200***	***69,000***	***70,600***	***69,700***
SUPPY & DEMAND COMPARISON					
- Supply Totals	69,400	71,200	66,000	78,100	70,100
- Demand Totals	70,900	70,200	69,000	70,600	69,700
- Difference	(1,500)	1,000	(3,000)	7,500	400
- Difference as % of Supply	-2%	1%	-5%	10%	1%
- Difference as % of Demand	-2%	1%	-4%	11%	1%

Notes:

1. Multiple Dry Year conditions are based on the projected supply availability under 1929-33 drought conditions.

2. Groundwater system demands include: (1) ARP groundwater production, (2) private groundwater pumping, and (3) saline groundwater outflows. Under dry year conditions ACWD's groundwater system demands may be reduced from Normal Year conditions due to a reduction in saline groundwater outflows as local groundwater elevations are temporarily lowered.

3. ACWD anticipates expanding the Newark Desalination Facility from 5 mgd to 10 mgd by the year 2010. Depending on groundwater conditions, the expanded desalination facility may provide up to 11,200 AF/Yr of supply.

4. As documented in ACWD's 2001-2005 UWMP, ACWD's long-term planning is based on conservation savings of 2,900 AF/Yr to be achieved by the year 2020. Of the 2,900 AF/Yr estimated savings, it is estimated that 700 AF/Yr of savings has already been achieved due to conservation program implementation between the years 2000 and 2005. This existing level of conservation savings (700 AF/Yr) is already accounted for in the demand projections. Therefore, this 2006-2010 Urban Water Management Plan assumes that the remaining balance of 2,200 AF/Yr savings (or 2,900 AF/Yr minus 700 AF/Yr) will be achieved by the year 2020.

Table 8-7
Projected Multiple Dry Year Period Water Supply and Demand Comparison for 2021-2025 (AF/Yr)

SUPPLY/DEMAND	*Year*				
	2021	*2022*	*2023*	*2024*	*2025*
SUPPLY COMPONENT					
Imported Supplies					
-State Water Project	11,400	27,800	10,900	16,000	13,600
- San Francisco Regional	15,300	15,300	14,600	15,300	15,300
Total Imported Supplies	**26,700**	**43,100**	**25,500**	**31,300**	**28,900**
Local Supplies					
- Groundwater Recharge	12,600	12,000	9,700	19,700	14,100
- Groundwater Storage	6,900	0	10,000	0	3,100
- Del Valle Release	900	5,200	1,000	3,400	1,000
- Desalination	5,000	5,000	4,500	5,500	4,500
- Recycled Water	1,600	1,600	1,600	1,600	1,600
Total Local Supplies	**27,000**	**23,800**	**26,800**	**30,200**	**24,300**
Banking/Transfers					
- Semitropic Banking	**16,200**	**5,400**	**15,900**	**18,700**	**17,400**
TOTAL SUPPLY	***69,900***	***72,300***	***68,200***	***80,200***	***70,600***
DEMAND COMPONENT					
- Distribution System Demand	63,300	63,400	63,500	63,600	63,700
- Estimated Conservation Savings	(2,200)	(2,200)	(2,200)	(2,200)	(2,200)
- Groundwater System Demands	10,700	9,900	8,700	10,200	8,700
TOTAL DEMAND	***71,800***	***71,100***	***70,000***	***71,600***	***70,200***
SUPPY & DEMAND COMPARISON					
- Supply Totals	69,900	72,300	68,200	80,200	70,600
- Demand Totals	71,800	71,100	70,000	71,600	70,200
- Difference	(1,900)	1,200	(1,800)	8,600	400
- Difference as % of Supply	-3%	2%	-3%	11%	1%
- Difference as % of Demand	-3%	2%	-3%	12%	1%

Notes:

1. Multiple Dry Year conditions are based on the projected supply availability under 1929-33 drought conditions.

2. Groundwater system demands include: (1) ARP groundwater production, (2) private groundwater pumping, and (3) saline groundwater outflows. Under dry year conditions ACWD's groundwater system demands may be reduced from Normal Year conditions due to a reduction in saline groundwater outflows as local groundwater elevations are temporarily lowered.

3. ACWD anticipates expanding the Newark Desalination Facility from 5 mgd to 10 mgd by the year 2010. Depending on groundwater conditions, the expanded desalination facility may provide up to 11,200 AF/Yr of supply.

4. As documented in ACWD's 2001-2005 UWMP, ACWD's long-term planning is based on conservation savings of 2,900 AF/Yr to be achieved by the year 2020. Of the 2,900 AF/Yr estimated savings, it is estimated that 700 AF/Yr of savings has already been achieved due to conservation program implementation between the years 2000 and 2005. This existing level of conservation savings (700 AF/Yr) is already accounted for in the demand projections. Therefore, this 2006-2010 Urban Water Management Plan assumes that the remaining balance of 2,200 AF/Yr savings (or 2,900 AF/Yr minus 700 AF/Yr) will be achieved by the year 2020.

Table 8-8
Projected Multiple Dry Year Period Water Supply and Demand Comparison for 2026-2030 (AF/Yr)

SUPPLY/DEMAND	*Year*				
	2026	*2027*	*2028*	*2029*	*2030*
SUPPLY COMPONENT					
Imported Supplies					
-State Water Project	11,400	27,800	10,900	16,000	13,600
- San Francisco Regional	15,300	15,300	13,100	15,300	15,300
Total Imported Supplies	**26,700**	**43,100**	**24,000**	**31,300**	**28,900**
Local Supplies					
- Groundwater Recharge	12,700	12,100	9,900	19,800	14,000
- Groundwater Storage	9,100	0	10,000	0	3,300
- Del Valle Release	900	5,200	1,000	3,400	1,000
- Desalination	5,000	5,000	2,000	1,900	2,600
- Recycled Water	1,600	1,600	1,600	1,600	1,600
Total Local Supplies	**29,300**	**23,900**	**24,500**	**26,700**	**22,500**
Banking/Transfers					
- Semitropic Banking	**16,200**	**6,200**	**15,900**	**18,700**	**17,400**
TOTAL SUPPLY	***72,200***	***73,200***	***64,400***	***76,700***	***68,800***
DEMAND COMPONENT					
- Distribution System Demand	63,800	63,900	64,000	64,100	64,300
- Estimated Conservation Savings	(2,200)	(2,200)	(2,200)	(2,200)	(2,200)
- Groundwater System Demands	10,800	9,900	5,600	5,500	6,400
TOTAL DEMAND	***72,400***	***71,600***	***67,400***	***67,400***	***68,500***
SUPPY & DEMAND COMPARISON					
- Supply Totals	72,200	73,200	64,400	76,700	68,800
- Demand Totals	72,400	71,600	67,400	67,400	68,500
- Difference	(200)	1,600	(3,000)	9,300	300
- Difference as % of Supply	0%	2%	-5%	12%	0%
- Difference as % of Demand	0%	2%	-4%	14%	0%

Notes:

1. Multiple Dry Year conditions are based on the projected supply availability under 1929-33 drought conditions.

2. Groundwater system demands include: (1) ARP groundwater production, (2) private groundwater pumping, and (3) saline groundwater outflows. Under dry year conditions ACWD's groundwater system demands may be reduced from Normal Year conditions due to a reduction in saline groundwater outflows as local groundwater elevations are temporarily lowered.

3. ACWD anticipates expanding the Newark Desalination Facility from 5 mgd to 10 mgd by the year 2010. Depending on groundwater conditions, the expanded desalination facility may provide up to 11,200 AF/Yr of supply.

4. As documented in ACWD's 2001-2005 UWMP, ACWD's long-term planning is based on conservation savings of 2,900 AF/Yr to be achieved by the year 2020. Of the 2,900 AF/Yr estimated savings, it is estimated that 700 AF/Yr of savings has already been achieved due to conservation program implementation between the years 2000 and 2005. This existing level of conservation savings (700 AF/Yr) is already accounted for in the demand projections. Therefore, this 2006-2010 Urban Water Management Plan assumes that the remaining balance of 2,200 AF/Yr savings (or 2,900 AF/Yr minus 700 AF/Yr) will be achieved by the year 2020.

CHAPTER 9
WATER SHORTAGE CONTINGENCY PLAN

This chapter provides the District's water shortage contingency plan, as required under the Urban Water Management Planning Act. Although it is the District's water supply reliability goal to sustain a shortage of no more than 10% during dry and critically dry conditions, the potential exists for interruptions to either our imported or local water supplies (due to earthquakes, etc.) that may result in significantly greater shortages. As such, this contingency plan includes scenarios for shortages of up to 50%.

9.1 CONTINGENCY PLAN OVERVIEW

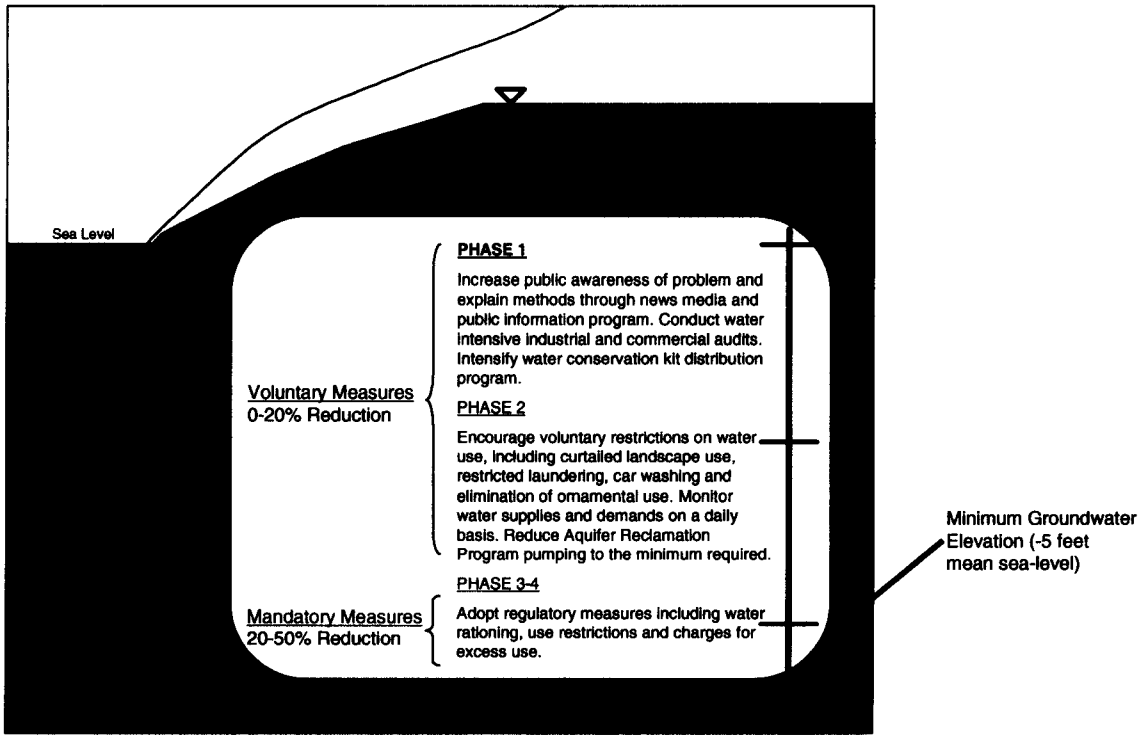
The District has sufficient water supplies to meet demands in most years, but deficiencies can occur as a result of dry winter weather or through extended interruption of imported supplies. Under normal circumstances the Niles Cone Groundwater Basin provides the storage capacity needed to protect against short-term water supply deficiencies or disruptions. ACWD will also utilize off-site storage at the Semitropic Water Storage District's Groundwater Banking Program to help meet dry year water supply needs. However, long-term shortfall between available water supply and demand will eventually appear in the form of lower water levels in the upper aquifer (Newark Aquifer) of the Niles Cone Groundwater Basin.

The Newark Aquifer is subject to saltwater intrusion particularly if inland groundwater levels remain at or near sea-level for a protracted period of time, or if inland groundwater levels drop further than five feet below sea level for any period of time. For this reason the District has been operating the basin to maintain a water level in the Newark Aquifer of at least five feet above sea level. ACWD has an ongoing program to assess water supply and demand imbalances. Each year during the months of December, January and February, the impacts of demand and supply balance are assessed, including the effects of potential reductions in imported San Francisco Regional supplies and State Water Project supplies, (*Annual Survey Report on Groundwater Conditions*). On the basis of this assessment, the groundwater levels in the Niles Cone Groundwater Basin for the following September can be estimated. These September levels are generally the lowest of the year due to high summer consumption and low rainfall. As such, they are key indicators of the presence of potential shortage. A change in the water level of five feet represents about 5,000 acre-feet of water or roughly one average month of District water supplies at current consumption levels. Figure 9-1 summarizes the management measures that go into effect at the various levels of projected reduction. Based on the anticipated September groundwater levels, Figure 9-2 summarizes the steps the District would take to implement a Water Deficiency Action Plan in response to determining that a water supply shortfall exists.

9.2 THREE YEAR DROUGHT ANALYSIS

An estimate of the minimum water supply available to ACWD over the next three years (2006-2008) was developed based on the driest three year sequence that is incorporated in ACWD's planning model, and is summarized in Table 9-1. The planning model utilizes the 72-year historical hydrologic conditions of 1922-94 for projections of local and imported supply availability. A review of the projected local and imported supply availability over the 72-year planning period indicates that the minimum cumulative imported and local water supply available to ACWD over a three-year sequence occurs under the 1931-1933 drought conditions. Modeling analysis indicates that this three year drought, if it occurred in the next three years would not result in significant shortages to ACWD. ACWD's ability to withstand a severe, three year drought without shortages is a result of: (1) the recent completion of the Newark Desalination Facility which provides up to 5,600 AF/Yr of supply; (2) the investment in off-site groundwater banking at Semitropic which could provide a total estimated supply of over 50,000 AF during the three-year drought sequence; and (3) the use of local groundwater storage in the Niles Cone Groundwater Basin which could provide over 14,000 AF of total supply over the three year drought scenario.

Figure 9-1
District Water Deficiency Response



9.3 WATER SHORTAGE MITIGATION OPTIONS

The following is a discussion of options that ACWD can utilize to offset the impacts of water supply shortages:

Augmentation of Supply

In any given year ACWD strives to achieve a balance between basin supply and overall demand requirements. The goal of this effort is to maintain a basin level that is either at or above sea level, to prevent overdraft and/or saltwater intrusion. In order to meet ACWD's water supply reliability goals, the District's water supply strategy includes the development of desalination, recycled water, and off-site groundwater banking programs. In addition, the temporary drawdown of the groundwater basin to below sea-level (-5 feet, minimum level) may be allowed to meet short term demands. All aspects of supply management are discussed in Chapter 8.

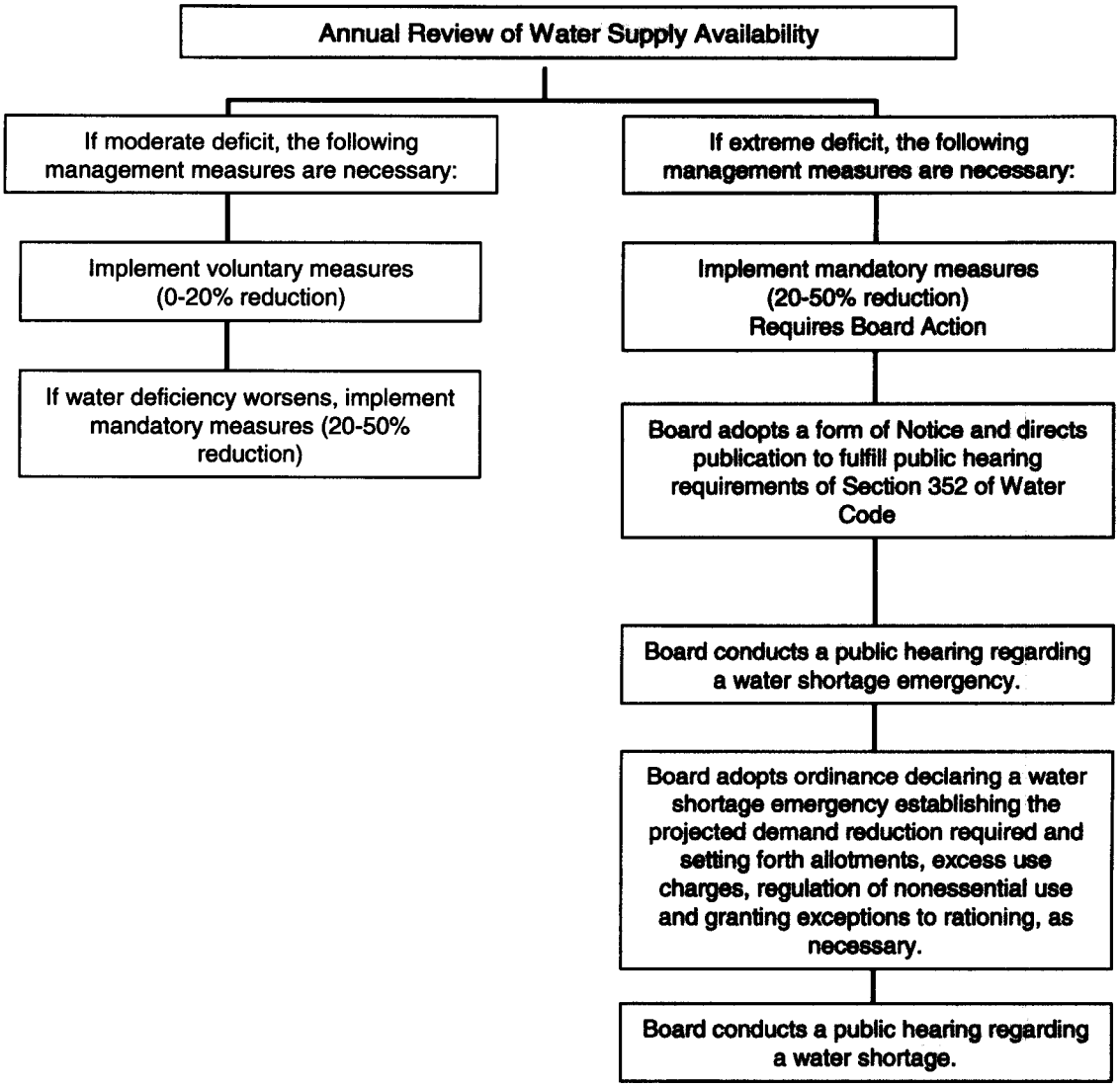
Evaporation

All District distribution reservoirs are covered to minimize evaporation while protecting the water from contamination.

Percolation

ACWD has percolation ponds which are necessary for the replenishment of its groundwater supply. Since the District's service area covers roughly the same area as the Niles Cone Groundwater Basin, recharge through the District's percolation facilities is an important District supply.

Figure 9-2
District Water Deficiency Action Plan



System Audits

The District has conducted an annual leak detection and repair program since 1987. This program will continue as a regular part of our operations.

Modifications to Operations

A blending facility which blends softer San Francisco Regional Water System supplies with harder groundwater has been in operation since 1992. This facility, along with other planned facilities, will help to meet ACWD's hardness goals and to help insure an equalized level of taste and hardness for all ACWD customers. However, under severe drought or emergency situations when sufficient San Francisco supplies are not available, the hardness criteria may be relaxed and additional, higher hardness groundwater may be utilized.

Table 9-1
Estimated Worst Case Three Year Drought Scenario

SUPPLY/DEMAND	*Drought Year 1 - 2006*	*Drought Year 2 - 2007*	*Drought Year 3 - 2008*
Supply			
Imported Supplies			
-State Water Project	10,400	14,400	13,600
-San Francisco Regional	13,500	15,300	15,300
Local Supplies			
- Groundwater Recharge	9,000	20,900	13,700
- Local Groundwater Storage	10,000	0	4,100
- Del Valle Release	1,000	3,400	1,000
- Desalination	5,600	5,600	5,600
Banking/Transfers			
- Semitropic Banking Program	15,600	17,900	17,400
Total Supplies	***65,100***	***77,500***	***70,700***
Demand			
Distribution System Demand	57,300	57,800	58,300
Estimated Conservation Savings	(100)	(300)	(400)
Groundwater System Demand	8,800	13,800	8,700
Total Demand	***66,000***	***71,300***	***66,600***
% Short to Meet Demand	**1%**	**0%**	**0%**

Notes:

1. Under critically dry conditions, the groundwater system demands may be reduced from Normal Year conditions, which would occur as a result of temporarily lowering groundwater levels in the Newark Aquifer (in the Forebay area) to slightly below sea-level (minimum elevation of –5 feet mean sea-level). This temporary drawdown of the Newark Aquifer may subsequently reduce the quantity of saline groundwater outflows to San Francisco Bay, thereby reducing the overall groundwater system demands.

Emergency Inter-ties

ACWD also has water distribution system pipeline interconnections with the City of Hayward and the City of Milpitas. These have been planned to be used during emergencies such as earthquakes. If appropriate, these interconnections could be used during a water supply emergency. In addition, as a SFPUC wholesale customer, ACWD may also receive emergency supply benefits from a recent inter-tie between the EBMUD system and the San Francisco Regional System,

Drawing from Reserve Supplies

ACWD is participating in the Semitropic Groundwater Banking Program. ACWD has 150,000 AF of storage capacity reserved at Semitropic, with over 100,000 AF currently in storage. In a drought situation, ACWD can retrieve water previously stored at Semitropic to help meet service area demands.

In addition, groundwater modeling of the Niles Cone Groundwater Basin has indicated that the basin groundwater levels may be temporarily drawn down to below sea-level without causing long-term water quality impacts to the Basin. In a severe drought or water shortage emergency, as documented in ACWD's Integrated Resources Planning Study, ACWD may allow the Basin groundwater elevation to be temporarily drawn down as low as 5 feet below sea-level.

Reduction of Demand

ACWD is committed to providing a reliable supply of water to its customers. The District strives to provide the highest standard of service possible to all customers within its service area. During a time of water supply shortage, first priority is given to meeting health, safety and human consumption requirements.

Since the options for supply augmentation are limited, the District's need to reduce demand during the drought emergency is very important. By adhering to the BMPs in the water conservation MOU, we are working to reduce demand in all customer categories. Chapter 7 provides a detailed description of these programs.

It is also important that business and industry be allowed to continue to operate, therefore, some consideration is made for these customer classes when demand reduction levels are developed. These levels extend to a potential 50 percent shortfall, in compliance with the requirements of Water Code Section 10631. However, it should be noted that if this level of reduction were to actually occur, there is a potential for major economic impacts among the more water intensive industries in the District's service area. Table 9-2 shows billed water consumption by customer class for FY 2003/04. Using these figures as a base, Table 9-3 shows a typical sensitivity analysis for demand reduction by customer category.

Once the demand reduction level has been determined, ACWD will enact a program that will include actions required by each customer group. The Drought Management Action Plan for various levels of supply shortage is described in Tables 9-4a through 9-4d.

Table 9-2
FY 2003/04 Consumption by Customer Class

Customer Class	*Consumption (AF)*
Residential	34,100
Industry	4,100
Business	5,200
Institutional	2,300
Landscape	6,300
Total	***52,000***

Table 9-3
Example Sensitivity Analysis for Reduction in Levels of Consumption

Water Consumption	*No Deficiency*		*10% Deficiency*		*20% Deficiency*		*30% Deficiency*		*50% Deficiency*	
	%	*Amt. (AF)*	*%*	*Amt. (AF)*	*%*	*Amt. (AF)*	*%*	*Amt. (AF)*	*%*	*Amt. (AF)*
1. Total FY03/04 consumption *(excludes hydrants/firelines)*		52,000		52,000		52,000		52,000		52,000
2. Required overall reduction	0	0	10	5,200	20	10,400	30	15,600	50	26,000
3. Required level of consumption		52,000		46,800		41,600		36,400		26,000
4. Example level of reduced consumption:										
Residential[1]	100	34,100	90	30,690	80	27,280	68	23,188	57	19,437
Industrial[1]	100	4,100	90	3,690	85	3,485	85	3,485	70	2,870
Business[1]	100	5,200	90	4,680	85	4,420	85	4,420	50	2,600
Institutional[1]	100	2,300	90	2,070	85	1,955	85	1,955	50	1,150
Landscape	100	6,300	90	5,670	70	4,410	54	3,402	0	0
Total		***52,000***		***46,800***		***41,550***		***36,450***		***26,057***
5. Residential level of consumption-										
Avg. gpd per units served[2]		293		264		234		199		167
Avg. gpd per capita[3]		94		84		75		Lifeline 64		Lifeline 53

Notes:
[1] Does not include water use for dedicated landscape accounts (i.e. residential, industrial, business and institutional landscape accounts). This water use is listed separately under the "Landscape" category.
[2] Based on a total of 103,970 single-family and multi-family residential units in 2005 (source: ABAG).
[3] Based on January 2005 Department of Finance population estimate of 324,838 for Fremont, Union City and Newark.

Table 9-4a
Drought Management Action Plan
Minimal Shortage (5-10%)

ACWD Action • Initiate public information campaign. • Explain drought situation to the public and governmental bodies. • Explain other stages and forecast future actions. • Request voluntary water conservation. • Prepare and disseminate educational brochures, bills inserts, etc. • Send technical information to specific customer types on ways to save water. • Display information at Public Programs. • Notify media. • Begin advertising campaign.
Requested Customer Actions **Residential** • Implement voluntary water use reductions. • Adhere to water waste ordinance. **Business/Industrial** • Research reuse options. • Improve cooling tower efficiency. **Cities/Schools** • Request water conservation measures be instituted.
Enforcement 1. Educational letter, call or visit. 2. Educational visit and warning.

Table 9-4b
Drought Management Action Plan
Moderate Shortage (10-20%)

ACWD Actions

- Adopt ordinance banning water waste such as: hosing of paved surfaces, irrigation during daylight hours, unrepaired leaks water running into the street, fountains, except those using recirculated water.
- Set Allocations by customer type.
- Accelerate public information program.
- Disseminate technical information.
- Institute rate program to support conservation.
- Ask consumers for water use reductions at proscribed levels.
- Lobby for passage of drought ordinances by cities in service area.
- Encourage use of ET rate for landscape watering.
- Train staff for more interaction with the public especially leak detection and irrigation problems.
- Increase efficiency of ACWD operation to ensure supply.
- Increase advertising.
- Minimize hydrant flushing.
- Conduct water audit program.

Requested Customer Actions

Residential

- Adhere to water waste ordinance.
- Remain within water allocation or request an exception.
- Urge use of water saving plumbing devices in the home.

Commercial/Industrial

- Adhere to ordinance.
- Stay within allocation, or request an exception.
- Recycle wherever possible.
- Water served to restaurant customers on request only.
- Use of ET for watering of landscaping.

Cities/Schools

- Reduce landscape watering.

Enforcement

1. Educational letter, call or visit.

Table 9-4c
Drought Management Action Plan
Severe Shortage (20-30%)

ACWD Actions

- Adopt Base Consumption Allowance for each customer class and establish use charges.
- Advise area planning staffs of possible short-term inability to supply new developments/ annexations due to shortages to existing customers.
- Continue public information program at accelerated pace.
- Implement rate program to include fines for water wasters.
- Require all homes and businesses to adhere to mandatory regulations.
- Main flushing for emergencies only.
- Water audit program expanded.

Customer Actions

Residential

- Adhere to allocations, and restrictions as stated in ordinance.
- Use of ET for landscape watering needs.
- Use of greywater encouraged for landscape.

Business/Industrial

- Limit landscape watering.
- Submit audit of company water use demonstrating conservation efforts.

Cities/Schools

- Limit landscape watering.
- Cover pools.
- All fountains turned off.

Enforcement

1. Educational letter and visit. Fine for overuse/waste.
2. Final warning. Fine for overuse/waste.
3. Installation of flow restrictor. Fine for overuse/waste.
4. Shutoff, and reconnection fee.

Table 9-4d
Drought Management Action Plan
Critical Shortage (30-50%)

ACWD Actions

- All steps intensified.
- No potable water used by landscape meters.
- Reassess allocation plan for possible per capita residential allowance.

Customer Actions

Residential

- Adhere to ordinance.
- Remain within allocation.
- Car washing prohibited.
- Suggest monitoring water meter.
- Pools filled with water from tank truck services.
- Drip irrigation, greywater or reclaimed water used for landscaping.

Business/Industry

- Landscape watering limited to tank truck services or reclaimed water.
- Recycling of water required wherever feasible in process.
- Fountains turned off.

Cities/Schools

- Landscape watering limited to tank truck services or reclaimed water for playing fields.
- Pools filled with tank truck water only.
- All public water not required for health or safety prohibited, except if tank truck water can be used.

Enforcement

1. Educational letter and visit. Fine for overuse/waste.
2. Final Notice. Fine for overuse/waste.
3. Flow restrictor. Fine for overuse/waste.
4. Shutoff and reconnection fee.

9.4 ADMINISTRATION OF PROGRAM

In keeping with ACWD's Water Deficiency Action Plan, after comprehensive study the Board will enact, and staff will implement, a water demand management plan based on actual conditions. As done in 1991, a drought rate structure would be developed to augment and support the demand reduction program. Shown in Table 9-5 is an example of drought rate structures based on the four levels of supply deficit.

Table 9-5
Example Rate Structures Based on Deficit

Residential				
Cutback	***10%***	***20%***	***30%***	***50%***
Base Consumption Allowance (gpd)	N/A	350	250	200
Base Rate ("BR")	BR	Up to 350	Up to 250	Up to 200
2 x Base Rate		351 to 475	251 to 350	201 to 300
3 x Base Rate		476 to 600	351 to 500	310 to 400
4 x Base Rate		601+	501+	400+
Greater than 4 x Base Rate			*Flow restrictor Threat to shut off*	
Business/Industrial Governmental/Multi-Family Residential				
Base Consumption Allowance (BCA)			Base Rate	
20% above BCA			2x Base Rate	
30% above BCA			3x Base Rate	
40% above BCA			4x Base Rate	
Above 40%, full audit and possible flow restrictors or shut off.				

Note: Actual rate structure and base consumption allowance to be set by ACWD Board at the time the water demand management plan is implemented.

Impacts on Revenues/Expenditures

In 1987, the District's Board of Directors established a Dry Year Contingency Reserve that was designed to minimize the impacts of future short-term demand reduction on rates. The reserve was based on the assumption that two out of every ten years could be expected to require demand reduction efforts due to drought. When fully funded, it would be able to maintain the District in a revenue-neutral position through two successive years of 25 percent reductions below normal demand levels. The reserve was applied during fiscal year 1991-92 to offset the effects of the drought emergency, and rates did not have to be raised to offset revenue losses caused by the demand reduction.

In 1996 the District replaced the Dry Year Contingency Fund with a Dry Year Water Supply component in the District's Capital Improvement Program. The purpose of this CIP component is to provide funding for the District's dry year water supply program, including the costs of the Semitropic Banking Program, and other potential programs such as purchases from a Drought Water Bank. This CIP component is currently funded at approximately $2.8 million per year, with a provision for unused funds being carried over from year to year. This fund will help to reduce impacts on rates during dry years that occur as a result of reduced revenue due to reduced water sales, and additional costs of securing supplies during shortages.

In addition, the adoption of the District's water supply emergency plan (Ordinance #30, see below) would also include the implementation of excess use charges. The revenue from the excess use charges would help to offset impacts from reductions in revenues due to cutbacks in water supplies.

Adoption of Plan

During a water supply shortage, the ACWD Board would take action to declare a water supply emergency and enact appropriate ordinances as required by California Water Code Section 350-358. In May of 1991, Ordinance #30 (Appendix C) was put into effect. This Drought Emergency Ordinance delineated the elements of the mandatory conservation program for the ACWD service including waste restrictions and excess use charges. The ordinance is updated as base rates change.

Impact on the Billing System

In order to implement a comprehensive billing program that could include differing rate levels for the drought, a new computerized system was installed. This system is capable of making changes in billing, and allows maximum flexibility for data retrieval.

Monitoring Use

The District monitors water use in two ways: total water production at each of the District's production facilities is monitored daily and monthly by the Operations Department, and billed consumption is monitored monthly through the Finance Department. The District reads each customer's water meter, and provides a water bill (with consumption information) on a bi-monthly basis.

Coordination with Other Agencies

ACWD serves the Cities of Fremont, Newark, and Union City. During the 1991 Drought Emergency, Union City enacted an ordinance that supported ACWD's restrictions, and the City of Fremont set forth a Resolution that supported the District's actions. During a future water emergency, ACWD will coordinate with the three cities to help resolve the situation. The District also has developed emergency inter-ties with the City of Hayward and the City of Milpitas.

Customer Notification and Assistance

ACWD has an active Public Information Program that shares information with the public in a variety of forms. The District's web-site, bill insertions, direct mailings, newspaper articles, a speaker's bureau, school materials, and purchased brochures are examples of this program. All District departments assist customers in need of help. Leak detection, service verification, bill adjustments, and engineering support are all offered to our customers at no extra charge.

9.5 CATASTROPHIC INTERRUPTION OF WATER SUPPLIES

Emergency Response Planning

In addition to preparation for water supply shortages due to droughts, ACWD's planning also includes preparation for catastrophic loss of supplies due to earthquakes, power outages, hazardous material spills, fire emergencies, water quality emergencies and malevolent acts and events. ACWD has in place an emergency response procedure that documents the responsibilities and response procedures for these types of events. These procedures are documented in detail in the District's Emergency Response Manual, and the key actions are summarized below:

- Mobilize using the Standardized Emergency Management System/Incident Command System.
- Assess damage to water system and its infrastructure.
- Evaluate damage and develop remedial action plan.
- Initiate repair and restore water service.
- Monitor progress of repairs and restoration.
- Communicate with health officials, the media, and water users on supply status.
- Coordinate with local, county and State in accordance with established emergency management guidelines.
- Document damage and repairs.

Evaluation of Catastrophic Loss of SWP Water Supplies

In 2004 ACWD completed an analysis of the potential water supply impacts of the loss of SWP supplies due to a catastrophic failure of Delta levees. This evaluation focused on the District's SWP supplies because the SWP provides the greatest quantity of imported supplies to the District service area. The emergency supply scenario evaluated by ACWD was based on concerns surrounding the 2004 Jones Tract levee failure that threatened use of the Harvey O. Banks Pumping Plant to provide ACWD its SWP supplies. Under the scenario evaluated, it is assumed the South Bay Aqueduct is functional with its sole supply coming from Del Valle Reservoir (i.e. no supplies from the Delta are available). Thus, the analysis evaluated ACWD's ability to provide water to its customers considering no State Water Project or Semitropic/transfer water supply available and all applicable production and hydraulic constraints. The analysis assumes the current (2005) distribution system demands and no emergency conservation benefit.

The analysis assumed existing conditions from May 2004, specifically average groundwater levels, median SFPUC allocation, and 6,000 AF of emergency storage from Del Valle with no additional ACWD storage. The following rain year replenishment of local supplies assumed 2003 conditions for ground water and available diversions as well as 3,000 AF of inflow to Del Valle with no additional emergency storage. Median SFPUC supply is assumed for the following year as well.

Findings from the analysis show that ACWD could continue to provide full water deliveries to its customers for over 12 months, including the projected annual increase in water demand, before supply and production constraints limit further deliveries. ACWD's estimates of its ability to withstand an extended outage of its SWP supplies is attributed to the projected availability of its local supplies (groundwater, desalination), emergency storage from Del Valle Reservoir in the Alameda Creek Watershed, and continued purchases of San Francisco Regional Water System supplies.