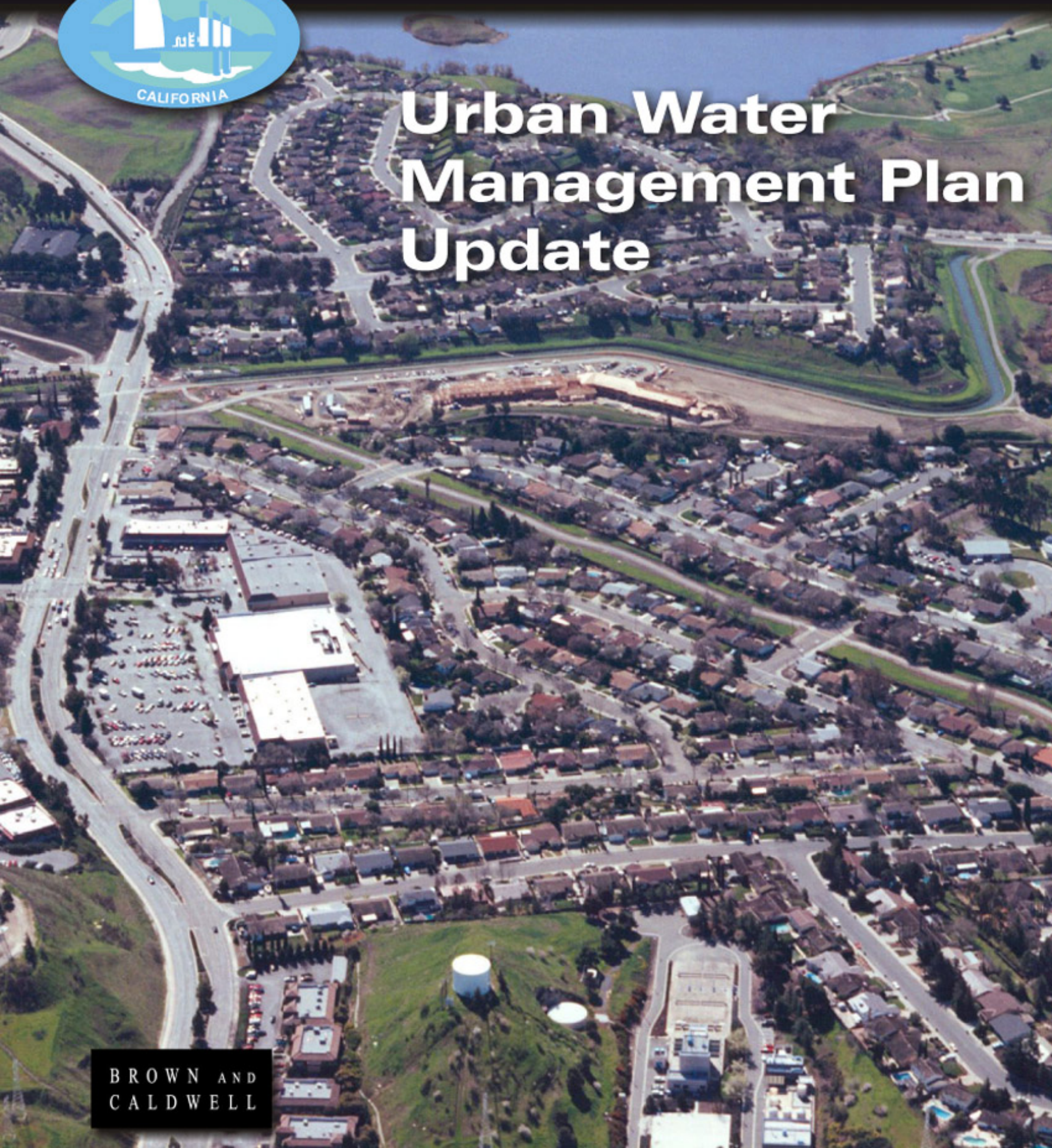
JANUARY 2006

FINAL REPORT

CITY OF ANTIOCH
CALIFORNIA

Urban Water Management Plan Update



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City of Antioch
Urban Water Management Plan Update
FINAL REPORT

January 2006

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SECTION 1
INTRODUCTION

This Urban Water Management Plan (Plan) addresses the City of Antioch's (City's) water system, which currently serves about 101,049 people within a 28.8 square mile area located in eastern Contra Costa County. Annually the City provides approximately 7,100 million gallons of water to 28,860 connections. The City currently relies entirely on surface water. Its primary sources are the San Joaquin River and the Delta through water purchased from Contra Costa Water District (CCWD).

This Plan fulfills several purposes: (1) it is the year 2005 Urban Water Management Plan Update as required by the Urban Water Management Planning Act; (2) it provides the analysis of water conservation measures in accordance with the guidelines of the California Urban Water Conservation Council (CUWCC), and (3) it serves as the long-term water supply plan for the City of Antioch Water System.

1.1 Urban Water Management Planning Act

One purpose of this Plan is to ensure the efficient use of available water supplies, as required by the Urban Water Management Act (Act). The Act became part of the California Water Code with the passage of Assembly Bill 797 during the 1983–1984 regular session of the California legislature. The Act requires every urban water supplier providing water for municipal purposes to more than 3,000 connections or supplying more than 3,000 acre-feet of water annually to adopt and submit a Plan every five years to the California Department of Water Resources (DWR). Subsequently, assembly bills have amended the Act.

1.2 California Urban Water Conservation Council

Addressing the efficient use of water supplies in accordance with CUWCC guidelines is another purpose of this Plan. The CUWCC is a voluntary organization comprised of water utilities, and environmental organizations, and other interested groups that is responsible for administering the implementation of water conservation measures in California. The Memorandum of Understanding Regarding Urban Water Conservation in California (MOU) (CUWCC, 1999) defines the water conservation measures or demand management measures (DMMs). The signatories of the CUWCC submit a semi-annual report regarding their implementation of DMMs. The City is not currently a MOU signatory. However, the City implements the water conservation program collaboratively with CCWD and CCWD is a signatory. This Plan provides a description of the City's water conservation program.

1.3 Previous Reports

Several reports have been prepared in the past decade, which address water supply and demand for the City of Antioch water system and for the Contra Costa Water District which supplies some of Antioch's water supply. An understanding of the results of these previous studies provides a broader context for preparing an updated water supply plan for the future. This section provides a summary of these recent planning reports.

Investigation of Ground-Water Resources in the East Contra Costa Area was prepared in March 1999 (Luhdorff, 1999). This investigation was a joint effort by five east county public agencies. The purpose of the study is to better define the aerial and vertical extent of the aquifer system, characterize the water quantity and quality, define how groundwater is recharged, how it is discharged out of the area, and define the reliable supply and whether conjunctive use plans should be developed.

The Urban Water Management Plan 2000 Update was prepared in October 2001 (Brown and Caldwell, 2001). This document provided a comprehensive summary of the existing water system, historical and projected water use, water supply (sources), water conservation best management practices, water supply versus demand comparison, and recommendations.

A Water System Master Plan Update was prepared in September 1999 (Brown and Caldwell, 1999). This document included long-term demand forecasts and water supply capital improvement recommendations to meet future water supply needs for the City of Antioch.

The Contra Costa Water District Urban Water Management Plan was prepared in December 2005 to forecast supplies and demands and describes the District's water demand management and recycled water opportunities to the year 2025. It also presents a water shortage contingency analysis and a description of the plan adoption, public coordination and planning coordination activities.

A Water System Master Plan: Updated Executive Summary was prepared in October 2001 (Brown and Caldwell, 2001). This document summarizes changes in water use characteristics and study area demographics and presents significant findings, conclusions and recommendations for existing and future facilities through the year 2028.

The Antioch/DDSD Recycled Water Project Facilities Plan was prepared in August 2005 to describe the project currently being pursued by Delta Diablo Sanitation District (DDSD) and the City to expand recycled water use within the City.

1.4 Public Agency Coordination

This Plan has been prepared with the cooperation and assistance of the City of Antioch, the Contra Costa Water District, and the Delta Diablo Sanitation District. Table 1-1 summarizes the efforts the City has taken to include additional agencies and citizens in its planning and preparation process.

Table 1-1. Coordination with Appropriate Agencies (DWR Table 1)

Check at least one box on each row	CCWD	DWR	DDSD	General Public	County Planning Department	City of Antioch
Participated in developing the plan	✓		✓			✓
Commented on the draft	✓		✓			✓
Attended public meetings						
Was contacted for assistance	✓		✓			✓
Was sent a copy of the draft plan	✓					✓
Was sent a notice of intention to adopt						
Not involved / No Information						

1.5 Public Participation

The Act requires the encouragement of public participation and a public hearing regarding the Urban Water Management Plan. This hearing provides an opportunity for the City of Antioch's residents and employees to learn about the water supply situation and the plans for providing a reliable, safe, high-quality water supply for the future. The hearing also allows people to ask questions regarding the current situation and the viability of future plans.

1.6 Plan Organization

This report is divided into eight sections and eight appendices. Following this introductory section, Section 2 describes the existing water system. Information about historical and projected water use is presented in Section 3. Section 4 describes the water sources used for water supply. Section 5 provides information on recycled wastewater and its potential for use as a water resource in the City. An analysis of the water conservation demand management measures (DMMs) is presented in Section 6. A comparison of water supply and water demand is presented in Section 7. Section 8 provides recommendations.

Appendix A contains a list of abbreviations used in the report. Appendix B contains a checklist of the California Department of Water Resources requirements for Urban Water Management Plans. Appendix C contains the Department of Water Resources requirements for Demand Management Measures. The City's past water conservation ordinance is included in Appendix D. Appendix E contains the City's landscaping and irrigation regulations. The City's landscape guidelines for planned developments are included in Appendix F. Appendix G contains the resolution to adopt the plan. A list of references used in the report is provided in Appendix H.

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SECTION 2
DESCRIPTION OF EXISTING WATER SYSTEM

This section describes the City of Antioch's (City's) existing water system. This section includes a description of the service area and its climate, existing and proposed water system facilities, including the surface water supply and treatment, the booster pump stations, the reservoirs, and the piping system.

2.1 Description of Service Area

The Antioch water system serves about 29,860 connections within Contra Costa County. Figure 2-1 shows the service area and its surroundings. The existing service area covers 28.8 square miles and includes the area within the city limits and some adjacent land to the northeast and the west, as shown on Figure 2-1. This Urban Water Management Plan (Plan) also addresses the land which may be developed through build-out and for which the City is likely to be relied on for water service.

The service area is primarily residential, with small areas of commercial and industrial land use. Figure 2-2 provides an overview of existing land use planning, based on the current Antioch General Plan and Use Element Map (City of Antioch). For this Plan, we assume that marginal agricultural lands in the southern portion of the planning area will be converted to residential or commercial use by the year 2030. Historical and projected population levels are addressed in detail in Section 3.

2.2 Topography

The area extends from steep hilly terrain in the south and west portions of the service area to flat with a gentle slope in the northeast portion of the service area. Elevations in this area range from sea level to over 700 feet. Generally, the service area is limited to elevations less than 560 feet. Four pressure zones are currently required to distribute water and eventually six to seven may be necessary depending on future land development.

2.3 Climate

Antioch has cool and humid winters, and hot and dry summers. Based on the historical data obtained from the Western Regional Climate Center (http://www.wrcc.dri.edu/), Antioch's average monthly temperature ranges from 45 to 74 degrees fahrenheit (Table 2-1), but the extreme low and high temperatures have been 18 and 117 degrees Fahrenheit, respectively. Also shown in Table 2-1, the historical annual average precipitation is approximately 13 inches. The rainy season begins in November and ends in March. Average monthly precipitation during the winter months is about 2 to 3 inches, but records show that the monthly precipitation has been as high as 9 inches and as low as 0 inches. Winter water demands are relatively low. Low humidity usually occurs in the summer months, from May to September. The combination of hot and dry weather during the summer results in high water demands. Landscape irrigation, including lawn watering, in the summer is a major contributor to the higher summer demands.

Table 2-1. Climate (DWR Table 3)

Month	Standard Average ETo (in.)[a,b]	Average Rainfall (in.)[a,b]	Average Temperature (F)[c]
January	0.95	2.74	45.3
February	1.75	2.41	50.5
March	3.48	1.91	54.3
April	5.37	0.88	58.8
May	6.88	.38	64.9
June	7.79	0.10	71.0
July	8.29	0.02	74.1
August	7.24	0.05	73.3
September	5.33	0.21	70.7
October	3.63	0.70	63.8
November	1.76	1.66	53.5
December	1.01	2.12	46.0
Annual	53.48	13.18	60.5

[a]Source: Western Regional Climate Center website http://www.wrcc.dri.edu/COMPARATIVE.html
[b]Period of Record: 1955-2004
[c]Source: California Irrigation Management Information System (CIMIS) website http://www.cimis.water.ca.gov/cimis/data.jsp

2.4 Water Supply Facilities

The principal sources of raw water supply are the San Joaquin River and the Contra Costa Canal (Canal), which can be stored in the Antioch Municipal Reservoir. Canal water, purchased from the Contra Costa Water District (CCWD) is pumped from Rock Slough and Old River in the western Delta. The pipelines from the Contra Costa Canal to the water treatment plant (WTP) have a capacity over 60 million gallons per day (mgd), well above the maximum predicted future water demand. Water from the Canal can be pumped into the municipal reservoir or directly to the WTP. The California Department of Health Services (CDHS) requires that river water must be first pumped to the municipal reservoir before going to the WTP. The WTP has a maximum capacity of about 28 mgd. The City will soon construct improvements to increase the maximum capacity to 36-38 mgd. Treated water flows into two 1.0-million-gallon (mg) clear wells before entering the distribution system. Figure 2-3 is a schematic diagram of the existing and proposed water system. Table 2-2 summarizes existing storage facilities and booster pumping stations (BPSs) by zone. Table 2-3 presents characteristics of existing and proposed reservoirs through 2028, as recommended in the Water System Master Plan (1999).

The existing WTP has a design capacity of 28 mgd. There is ample room to expand the WTP for a total of 48 mgd of water treatment capacity. The former two connections are operating; the latter planned as part of future water system expansion. In addition to expansion, the City improved water source reliability by purchasing treated water from CCWD produced at the Randall-Bold Plant (RBP), using a connection to the CCWD multipurpose pipeline at Hillcrest Avenue, the DWD conveyance system or a new BPS at the RBP and a new pipeline. The City plans to begin construction on a 10-mgd expansion to Plant B in 2006.

Table 2-2. Existing Reservoir Storage and Booster Pumping Station Capacity[a]

Zone	Booster Pumping Station				Reservoir			
	Name	Configuration, number and gpm	TDH, ft	Firm Capacity, mgd	Name	Capacity mg	Key Elevations overflow/base,ft	Service Elevation Range, ft
I	Zone I [b]	3 @ 3,300 1 extra slot	120	9.5	"D" Street 2A 2B	1.0 1.0 1.0	133.5/120 133.5/118.5 133.5/118.5	0 to 50
II	Zone II	5 @ 2,400 2 @ 4,800 1 @ 1,200 2 extra slots	125	24.2	Central 3 mg Donlon Larkspur	0.5 3.0 2.0 2.0	264/229 256/230 248/200 248/216	0 to 170
III East	Hillcrest Lone Tree	3 @ 1,500 1 extra slot 3 @ 1,800 1 extra slot	94 105	4.3 5.2	Hillcrest Lone Tree	2.5 2.5	340/292 340/308	70 to 240
III West	Donlon	2 @ 1,200 1 @ 600 + 1 slot @ 1,200	160	2.6	Cambridge	2.5	355/320	130 to 255
IV East	Dallas Ranch	3 @ 1,400 + 1 extra slot	220	4.0	Empire Mine	3.5	510/485	175 to 410
IV West	Cambridge	2 @ 340 1 extra slot	131	0.5	Mira Vista Hills	0.5	455/420	200 to 355

[a]These facilities are existing in 2005.
[b]The Zone 1 booster pumping station is currently inoperable.

Table 2-3. Characteristics of Existing and Proposed Reservoirs through Year 2028

Pressure Zone Served	Name or Location	Volume, mg	Overflow elevation, feet	Base elevation, feet
I	Clearwell storage	2.0[a,b]	133.5	118.5
I	D street reservoir	1.0[b]	133.5	120
	Subtotal	3.0		
II	Water treatment plant	0.5[b,c]	264	229
II	3 mgd (East of Lone Tree Way near Dandridge Court)	3.0[b]	256	230
II	Donlon reservoir	2.0[b]	248	200
II	Larkspur reservoir I	2.0[b]	248	216
II	Larkspur reservoir II	2.0[d,e]	248	216
	Subtotal	9.5		
III	Cambridge reservoir (West)	2.5[b]	355	320
III	Lone Tree reservoir (East)	2.5[b]	340	308
III	Hillcrest & Lone Tree reservoir (East)	2.5[b]	340	292
III	Southern Zone III west of Deer Valley Road (East)	1.7[d]	330	295
	Subtotal	9.2		
IV	Mira Vista Hills reservoir (West)	0.5[b]	455	420
IV	Empire Mine reservoir I (East)	3.5[b]	510	485
	Subtotal	4.0		
	Total	25.7[f]		

[a]Part of this (1.0 mg) storage is allocated for pumping equalization in the WTP and for WTP filter backwashes.
[b]Existing or under construction.
[c]Not counted as part of Zone II storage since the overflow is above normal Zone II operating hydraulic gradeline.
[d]Proposed.
[e]Located in Zone II but provides some Zone I storage.
[f]Net storage available to the distribution system is 24.7 mg.

2.5 Distribution System

The Antioch distribution system consists of four primary pressure zones. Water pressure typically is maintained between 40 and 100 pounds per square inch gage (psig).

2.5.1 Pressure Zone I

Pressure Zone I distribution system serves the older residential sections of the City, the original central business district and some major industrial users. Ground elevations range from sea level to 50 feet. Zone I is served by gravity principally through a 24-inch-diameter main from the WTP. The BPS to service Zone I is out of service and is no longer needed because the installation of pressure reducing valves (PRV) between Zones I and II allows water to flow down to Zone I from Zone II. Three of these exist and five more PRVs are recommended.

2.5.2 Pressure Zone II

Pressure Zone II serves primarily residential and commercial users and has ground elevations ranging from sea level to 170 feet. One area above 170 feet in elevation is supplied by the small Sunset BPS. The principal water mains in Zone II are 10, 12, 16, 20, 24 and 30 inches in diameter. The system is supplied by

two Zone II BPS, one built in 1967 and one built in 1988, which take suction from the WTP clearwells. There is emergency WTP generator capacity available to operate all Zone II booster pumps should there be a power outage. Four water storage reservoirs are located in Zone II.

2.5.3 Pressure Zone III East

Pressure Zone III East will encompass much of the new residential and commercial growth in the City. Zone III East generally extends south from the Canal, with some development north of the canal in the eastern portion of the City. It is bounded on the west by Contra Loma Regional Park and on the east by a Southern Pacific Railroad right-of-way. The zone border extends south to the city limits but excludes most of the area south of Lone Tree Way and west of Deer Valley Road. Currently, Zone III East is about 65 percent developed. Three BPSs, Hillcrest and Lone Tree 1 and 2, and two reservoirs, Hillcrest and Lone Tree, serve Zone III East. Zone III East is served with 12, 16, 20 and 24 inches in diameter water mains. Future development in the southeast in Lone Tree Valley will eventually require additional Zone III East reservoir storage, probably located on the south side of Lone Tree Valley. The Dallas Ranch BPS possibly will need expansion or the City will construct a new BPS in Lone Tree Valley. The Bear Ridge BPS serves as an isolated high area west of Hillcrest Avenue. Isolated higher lots may require individual booster pumps.

2.5.4 Zone III West

Zone III West is a partially developed residential area on the west side of the City. Most existing development is residential but some commercial development will occur in the western portion of this zone. After the completion of the planned developments at Meadowlands and Black Diamond Ranch, this zone will encompass about 1.25 square miles. It is bound by the Canal, Black Diamond Mines, Contra Loma Regional Park, and the city limits. Zone III West is served by the Donlon BPS which fills the Cambridge Reservoir. Water mains of 8, 10, 12 and 16 inches in diameters serve the Zone III West development. Additional transmission facilities will be needed to accommodate planned development within this zone.

2.5.5 Zone IV West

The Zone IV West facilities serve to the higher elevations of the Mira Vista Hills Subdivision and the higher elevations in Black Diamond Ranch. The Cambridge BPS will have emergency power facilities to convey water into Zone IV West and the Mira Vista Hills Reservoir. In 2006/2007 Zone IV West will be used to convey water to the south to the proposed higher elevation Sierra Vista Development. New 8, 10 and 12 inches in diameter mains will serve the Zone IV West development.

2.5.6 Zone IV East

Zone IV East is under construction. It includes, or will include all of the Black Diamond Estates; all of the Higgins Ranch; and parts of the Dallas Ranch, Black Diamond Knolls, and Diablo West developments. Zone IV East is bound by Contra Loma Regional Park on the west, Zone III East on the north and east, and the proposed new Urban Limit Line on the south. The Dallas Ranch BPS serves Zone IV East. It initially included three 1,400-gpm pumps (a firm capacity of 4.0 mgd), supported with emergency power facilities. There is space for a fourth pump to raise the future firm capacity to 6.0 mgd. The BPS conveys water to Zone IV East and to the Empire Mine Reservoir. The reservoir has a capacity of 3.5 mg and an overflow elevation of 510 feet.

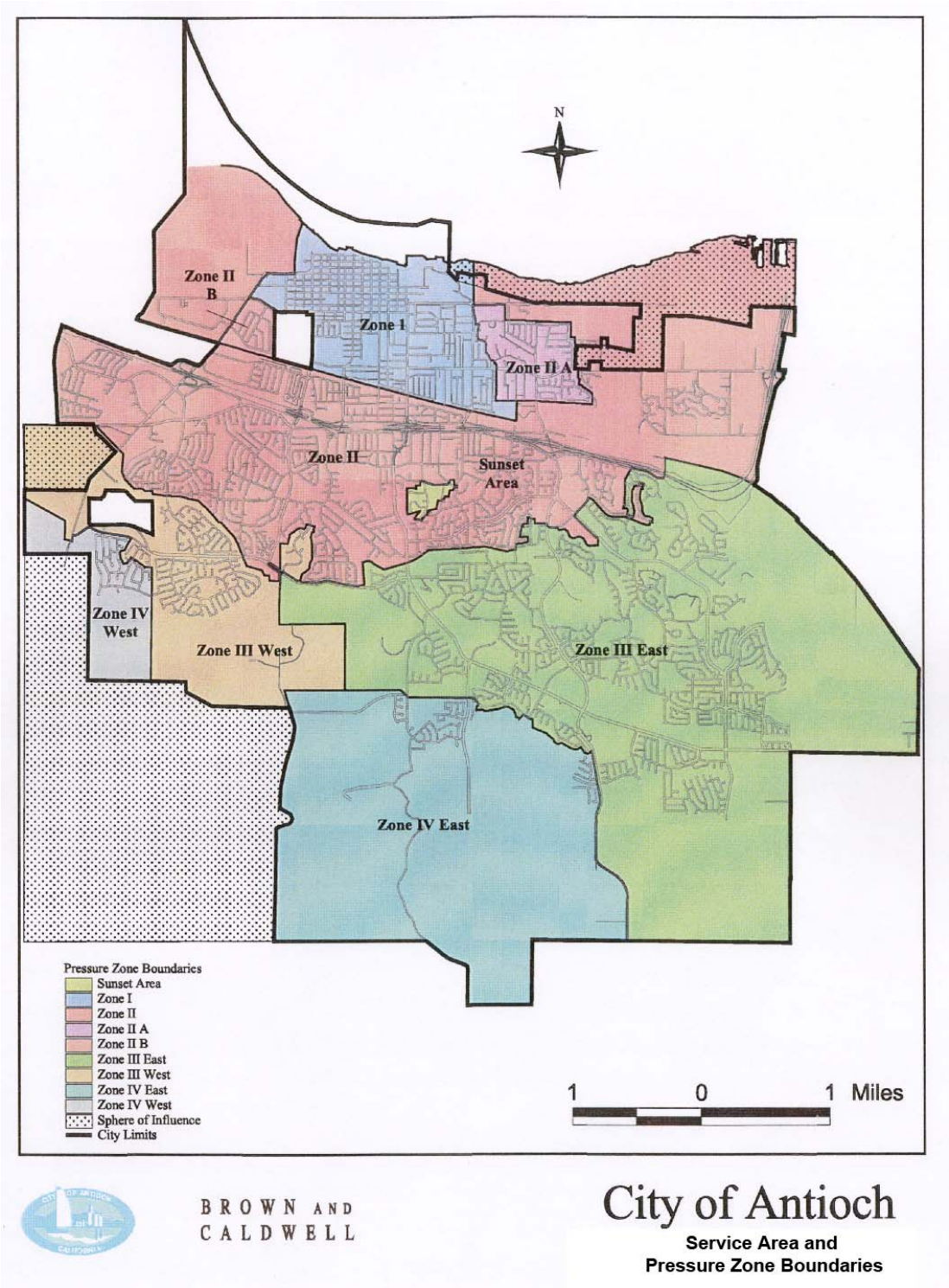

Figure 2-1. Service Area and Pressure Boundaries

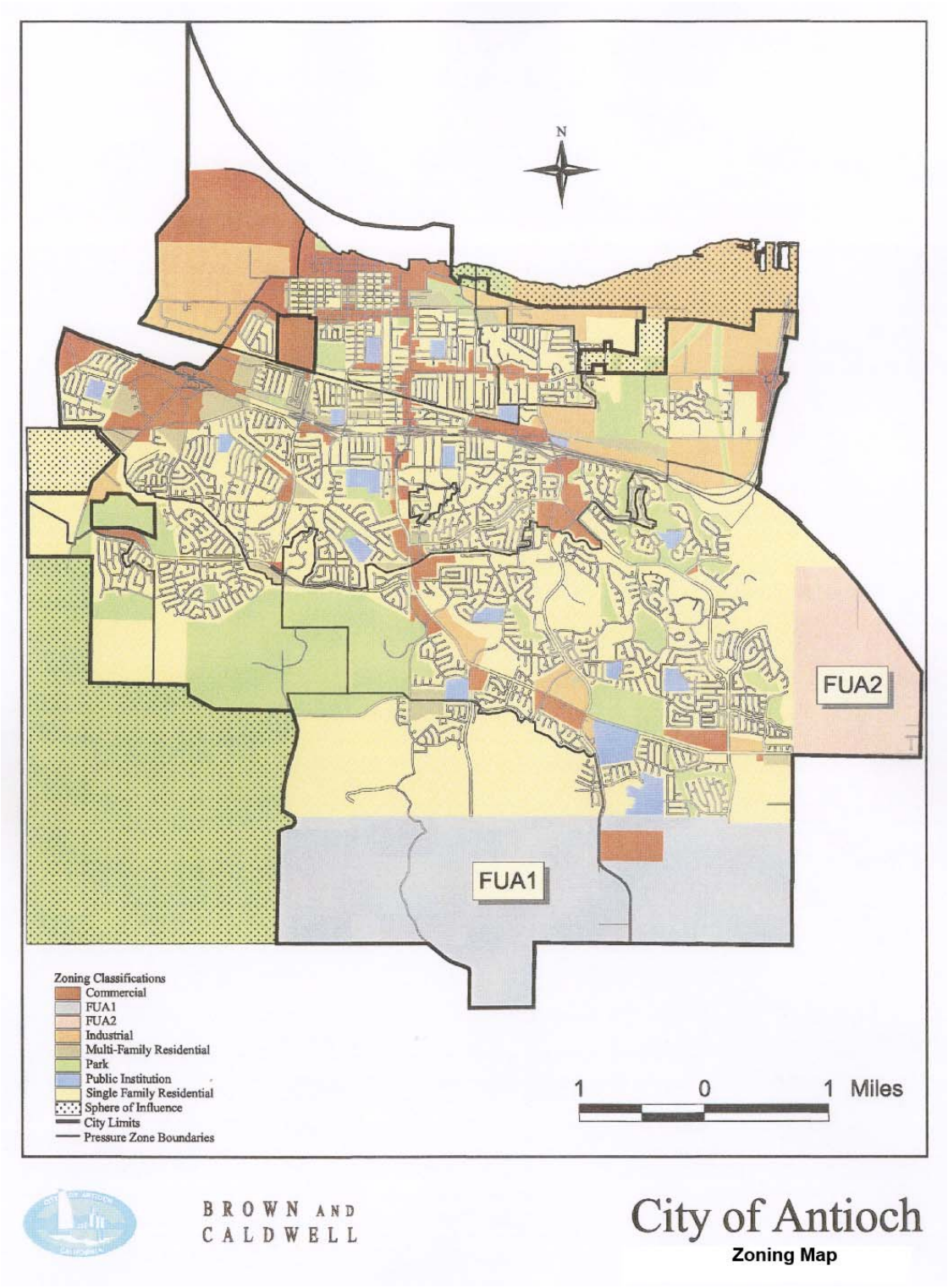

Figure 2-2. Zoning Map

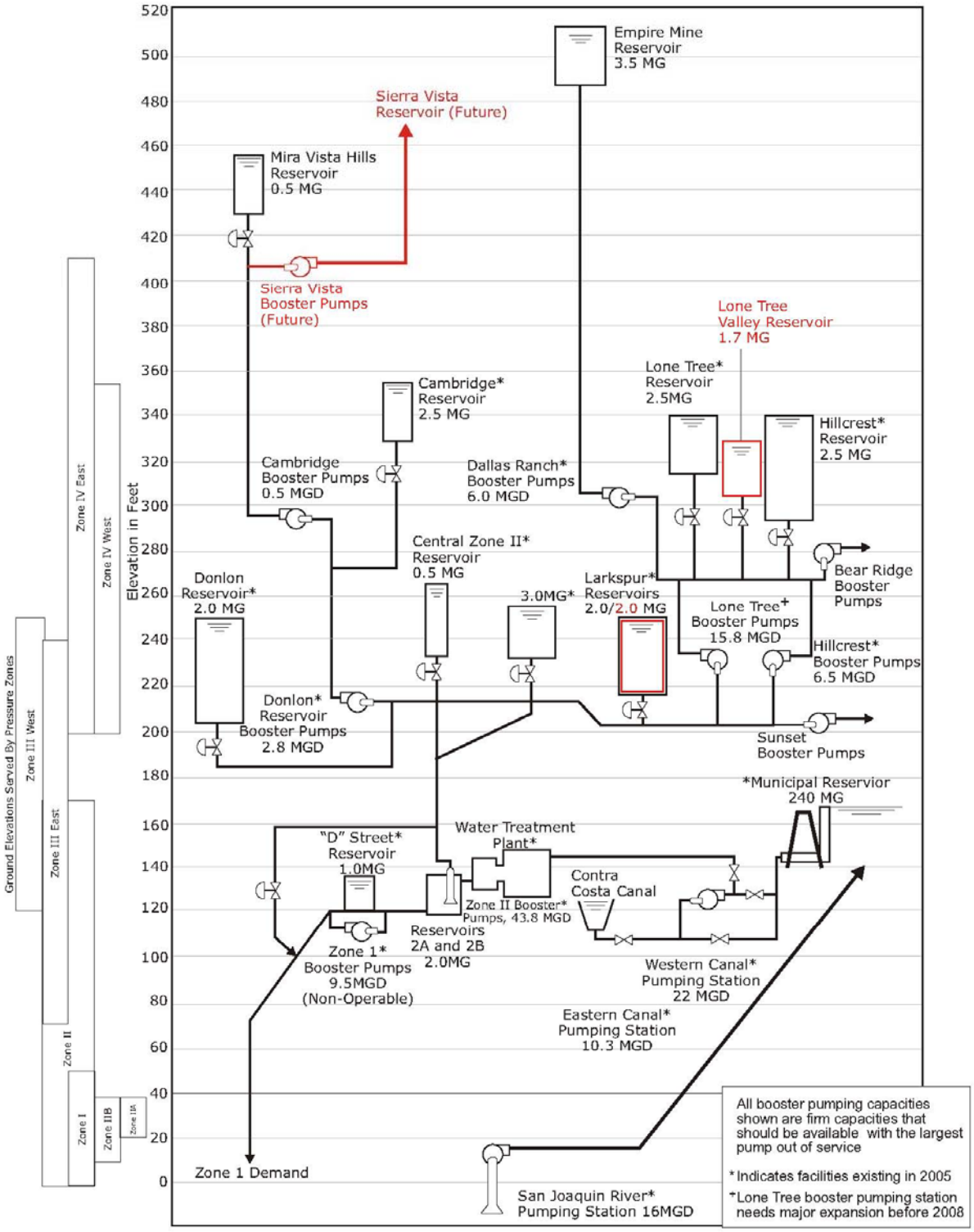

Figure 2-3. Existing and Proposed Water System Schematic

SECTION 3
HISTORICAL AND PROJECTED WATER USE

Water demand projections provide the basis for sizing and staging future water facilities. Water use and production records, combined with projections of population, employment, and urban development, provide the information necessary for estimating future water requirements. This section presents an analysis of available demographic and water use data and the resulting projections for future water needs in the Antioch water system.

3.1 Population, Employment, and Housing

Population, housing, and employment data from the City of Antioch, the 2000 U.S. Census, and the Association of Bay Area Governments (ABAG) Projections 2002 were used to develop estimates of future Antioch water use. Additionally, we consulted the current Antioch General Plan and Use Element Map (1989) for future development that would impact water use.

ABAG population, housing and employment estimates were used through 2025. The employment data for 2005 and 2015 were interpolated from the 2000 and 2010 data because the data were not included in the 2002 ABAG report. The 2005 population and housing data are based on current estimates from the California Department of Finance. This Plan only shows projections through 2025.

Future industrial development will probably occur in Zones I and II along the major transportation routes. There are also small areas zoned as industrial in Zone III East. The remainder of the study area is likely to develop to residential and commercial uses. Residential water requirements vary on a per-acre basis, depending on the density of dwelling units and the number of persons per dwelling unit. Based on data from California Department of Finance, the average number of persons per household is approximately 3.1.

Peak-hour water requirements are greater for residential uses than for industrial and commercial areas on a per-acre basis. Areas identified in the Antioch General Plan as suitable for either residential or commercial/industrial development have been treated as residential areas, providing a conservative basis for projecting water demands.

A summary of the historic and projected population, housing, and employment within the Antioch water system is presented in Table 3-1 and illustrated in Figure 3-1.

Table 3-1. Population, Housing, and Employment Estimates and Projections (DWR Table 2)

Year	Households	Population	Employed Residents
1990[a]	21,729	63,062	30,130
2000[a]	29,656	91,293	43,811
2005[b]	32,560	101,049	47,756
2010[a]	34,660	102,900	51,700
2015[c]	35,274	109,350	55,750
2020[a]	39,330	115,800	59,800
2025[a]	40,870	118,800	62,500

Note: Dashed line represents division between historical and projected data.
[a]Based on ABAG Projections 2002: Forecasts for the San Francisco Bay Area.
[b]Population and number of households is based on City/County Population and Housing Estimates, California Department of Finance, Jan 2005. Employed Residents is interpolated based on ABAG Projections 2002.
[c]Population and Employed Residents are interpolated based on ABAG Projections 2002. Number of households assumes 3.1 persons per household.

As shown in the above table, a large increase in the number of employees over the next 20 years is expected. The highest job growth in Antioch is projected to be in service employment. The past, current and projected number of connections and deliveries by classification are shown in Table 3-2 (Haas-Wajdowicz Julie, 2005).

Table 3-2. Past, Current and Projected Water Deliveries (DWR Table 12)

Year	Water Use Sectors		Single-family	Multi-family	Commercial	Industrial	Institutional / School	Irrigation	Other	Total
2000	Metered	# of Accounts	24,847	697	603	18	94	938	152	27,349
		Deliveries AF/Y	11,448	1,558	1,490	924	447	1,915	120	17,902
	Unmetered	# of Accounts	0	0	0	0	0	0	0	0
		Deliveries AF/Y	0	0	0	0	0	0	0	0
2004	Metered	# of Accounts	27,181	694	632	19	78	1,067	187	29,858
		Deliveries AF/Y	14,872	1,617	1,204	979	274	2,699	193	21,838
	Unmetered	# of Accounts	0	0	0	0	0	0	0	0
		Deliveries AF/Y	0	0	0	0	0	0	0	0
2010	Metered	# of Accounts	28,740	770	683	20	96	1,107	187	31,602
		Deliveries AF/Y	14,483	1,758	1,494	1,052	395	2,529	170	21,900
	Unmetered	# of Accounts	0	0	0	0	0	0	0	0
		Deliveries AF/Y	0	0	0	0	0	0	0	0
2015	Metered	# of Accounts	30,577	819	727	22	102	1,177	199	33,623
		Deliveries AF/Y	15,409	1,870	1,590	1,119	420	2,691	181	23,300
	Unmetered	# of Accounts	0	0	0	0	0	0	0	0
		Deliveries AF/Y	0	0	0	0	0	0	0	0
2020	Metered	# of Accounts	32,349	867	769	23	108	1,246	210	35,571
		Deliveries AF/Y	16,302	1,978	1,682	1,184	445	2,847	191	24,650
	Unmetered	# of Accounts	0	0	0	0	0	0	0	0
		Deliveries AF/Y	0	0	0	0	0	0	0	0
2025	Metered	# of Accounts	33,202	890	789	24	110	1,278	216	36,509
		Deliveries AF/Y	16,732	2,030	1,726	1,215	457	2,922	197	25,300
	Unmetered	# of Accounts	0	0	0	0	0	0	0	0
		Deliveries AF/Y	0	0	0	0	0	0	0	0

In summary, from 1990 to 2000 the Antioch population increased 44.8 percent, which is a growth rate of approximately 4.5 percent per year. From 2000 to 2005, the Antioch population increased 10.7 percent, which is a growth rate of approximately 2.1 percent per year. By 2025, population is expected to increase 17.6 percent, from 101,049 in 2005 to 118,800 in 2025, which is an average of 0.9 percent growth rate per year (ABAG, 2002). Employment is expected to grow 31 percent during the same period, which equates to an annual employment growth rate of 1.5 percent (ABAG, 2002).

3.2 Historical Water Use

Records of historical water production serve as the basis for developing unit water demands for the Antioch Water System. Water production is the volume of water measured as it leaves the Antioch water treatment plant (WTP), which includes all water delivered to residential, commercial, and public authority connections, as well as unaccounted-for water. The historical data included average daily water production and total average annual water production. Historical water production from 1975 to 2004 is shown in Table 3-3. There currently is water loss between the points of Antioch's water diversion (the San Joaquin River and the Contra Costa Canal) and flow leaving the WTP. Average daily use has gradually increased after the severe drought of 1976 to 1977 with a dip in the early 1990s corresponding to a second drought. There was a slight decrease in 1998, probably in response to the heavy El Niño rainfall.

Table 3-3. Historical Water Use

Year	Annual Average, AF/Y	Average Daily, mgd
1975	7,695	6.87
1976	6,698	5.98
1977	3,439	3.07
1978	5,522	4.93
1979	6,362	5.68
1980	6,564	5.86
1981	8,098	7.23
1982	7,437	6.64
1983	7,818	6.98
1984	8,961	8
1985	9,442	8.43
1986	10,137	9.05
1987	11,033	9.85
1988	11,145	9.95
1989	11,335	10.12
1990	12,993	11.6
1991	10,439	9.32
1992	12,041	10.75
1993	12,970	11.58
1994	14,348	12.81
1995	14,483	12.93
1996	15,983	14.27
1997	16,924	15.11
1998	15,278	13.64
1999	17,249	15.4
2000	19,327	17.21
2001	20,044	17.89

Year	Annual Average, AF/Y	Average Daily, mgd
2002	20,906	18.66
2003	20,686	18.46
2004	21,576	19.21
Average 2000 to 2004	20,508	18.29

Source: City of Antioch Water Production (treated water).

3.2.1 Unaccounted-for Water

Unaccounted-for water is the difference between the actual volume of water treated and the actual metered consumption. Such apparent losses are always present in a water system due to pipe leaks, unauthorized connections or use; faulty meters; unmetered services such as fire protection and training, and system and street flushing. Table 3-4 summarizes the unaccounted-for water from 2000 to 2004 as the difference between the annual production and annual sales. The average unaccounted-for water comprised 2.7 percent of the total water produced. This percentage is very low compared to other California utilities. This lower percentage may be partly due to the addition of meters to parks, medians, and school sites, regular meter maintenance, stringent construction standards applied to new facilities, replacement of deteriorated older pipes, and the relatively large portion of the system served by more modern facilities. The City's maintenance staff also actively pursues and corrects leaks. The low loss rate may, however, be due in part to a discrepancy between production data and meter readings.

Table 3-4. Historical Unaccounted-for Water

Year	Water Production[a], AF/Y	Water Sales, AF/Y	Unaccounted-for water AF/Y	Unaccounted-for water, percent of annual water production
2000	19,327	17,901	1,426	7.4
2001	20,044	19,698	346	1.7
2002	20,906	20,244	662	3.2
2003	20,686	20,153	533	2.6
2004[b]	21,576	21,837	-261	-1.2
Average 2000 to 2004	20,508	19,967	541	2.7

[a]Water production (treated water).
[b]Raw water sent to Lone Tree Golf Course, included in water sales data but not in water production data, will contribute to erroneous (negative) data.

3.2.2 Annual Water Supplied

Historical records of the annual amount of water purchased from CCWD and pumped from the San Joaquin River are shown in Table 3-5. As was mentioned previously, there is some water loss between the point of water pumping and the flow leaving the WTP including filter backwash water and water in water treatment sludge. Within two years, the City will bring online new facilities that will virtually eliminate such losses at the WTP. Additionally, evaporation from the municipal reservoir results in further minor losses.

Table 3-5. Water Supplied at Antioch's Diversion Points

Year	Purchased from CCWD, AF/Y	Pumped from San Joaquin River, AF/Y	Total, AF/Y
2000	13,000	6,327	19,327
2001	15,489	4,555	20,044
2002	13,852	7,054	20,906
2003	11,916	8,743	20,686
2004	15,501	5,511	21,576

3.3 Unit Water Use

Unit water use factors were developed to estimate future water needs based on housing projections discussed previously. Residential future water needs are determined using the projections for single-family and multi-family dwelling units within the City, coupled with a unit water use factor per dwelling unit type. The unit water use factors are established by comparing historical data for numbers of single-family and multi-family residential units to total water production for the years 2000, 2001, 2002, 2003, and 2004. These years were used to establish the unit water use factors because these are the years for which historical housing data is available (DOF, 2000-2004). The current water consumption per dwelling unit is estimated at 454 gallons per single-family dwelling unit per day and 252 gallons per multi-family dwelling unit per day. The water consumption is estimated at 190 gallons per person per day, including unaccounted for water and 186 gallons per person per day, not including unaccounted for water. These factors do not take into account future water conservation within the City. The unit water use factors used in this current study are shown in Table 3-6.

Table 3-6. Unit Water Use Factors

Classification	Unit Water Use Factor	
	gpd/household	AF/Y / household
Single-family residential	454[a]	.5090
Multi-family residential	252[a]	.2820
Population	190[ab]	.2129
	186[a]	.2082

[a]Gallons per day
[b]Includes unaccounted for water and water losses between diversion and flow leaving the WTP.

3.4 Projected Water Demands

Water demands through the year 2025 were estimated based on the unit water use factors (see Table 3-6) and the population projections (see Table 3-1). These projections are shown in Table 3-7. By 2025, water demands are expected to increase by 16 percent, from about 19.2 mgd (21,837) AF/yr) in 2004 to 22.0 mgd (25,284 AF/yr), in 2025. Impacts to water use due to any conservation measures taken in the future are not reflected in the projected water demands. In summary, from 1994 to 2004, Antioch system water demands increased by approximately 504 percent, with a growth rate of approximately 5 percent per year. The projected water demand growth rate between 2004 and 2025 is 16 percent or approximately .8 percent per year, which is less than what has historically occurred.

Table 3-7. Total Projected Water Demands

Year	Annual Average	
	AF/Y	mgd
2010	21,900	19.55
2015	23,273	20.78
2020	24,645	22.00
2025	25,284	22.57

3.5 Water Sales to Other Agencies

There are no existing or projected sales of water from the City to other agencies (Table 3-8)

Table 3-8. Sales to Other Agencies, AF/Y (DWR Table 13)

Water Distributed	2000	2005	2010	2020	2025
Name of Agency	0	0	0	0	0
Total	0	0	0	0	0

3.6 Additional Water Use

Sources of additional water uses and losses are list in Table 3-9 below. There are no existing or projected uses/loses of saline barriers, groundwater recharge, conjunctive use, raw water, or recycled water within the City. Unaccounted for system losses have been discussed in the previous section.

Table 3-9. Additional Water Uses and Losses, AF/Y (DWR Table 14)

Water Use	2000	2004	2010	2015	2020	2025
Saline barriers	0	0	0	0	0	0
Groundwater recharge	0	0	0	0	0	0
Conjunctive use	0	0	0	0	0	0
Raw water	0	0	0	0	0	0
Recycled	0	0	0	0	0	0
Other (define)	0	0	0	0	0	0
Unaccounted-for system losses	353	407	461	490	520	532
Total	353	407[a]	461	490	520	532

[a]Due to erroneous data, the unaccounted for system losses could not be directly calculated and instead were interpolated.

3.7 Total Water Use

Total Water Use is the sum of water use by customer categories, sales to other agencies and additional water uses (Table 3-10).

Table 3-10. Total Water Use, AF/Y (DWR Table 15)

Water Use	2000	2004	2010	2015	2020	2025
Total of Tables 12, 13, 14	18,253	22,245	22,371	23,770	25,170	25,822

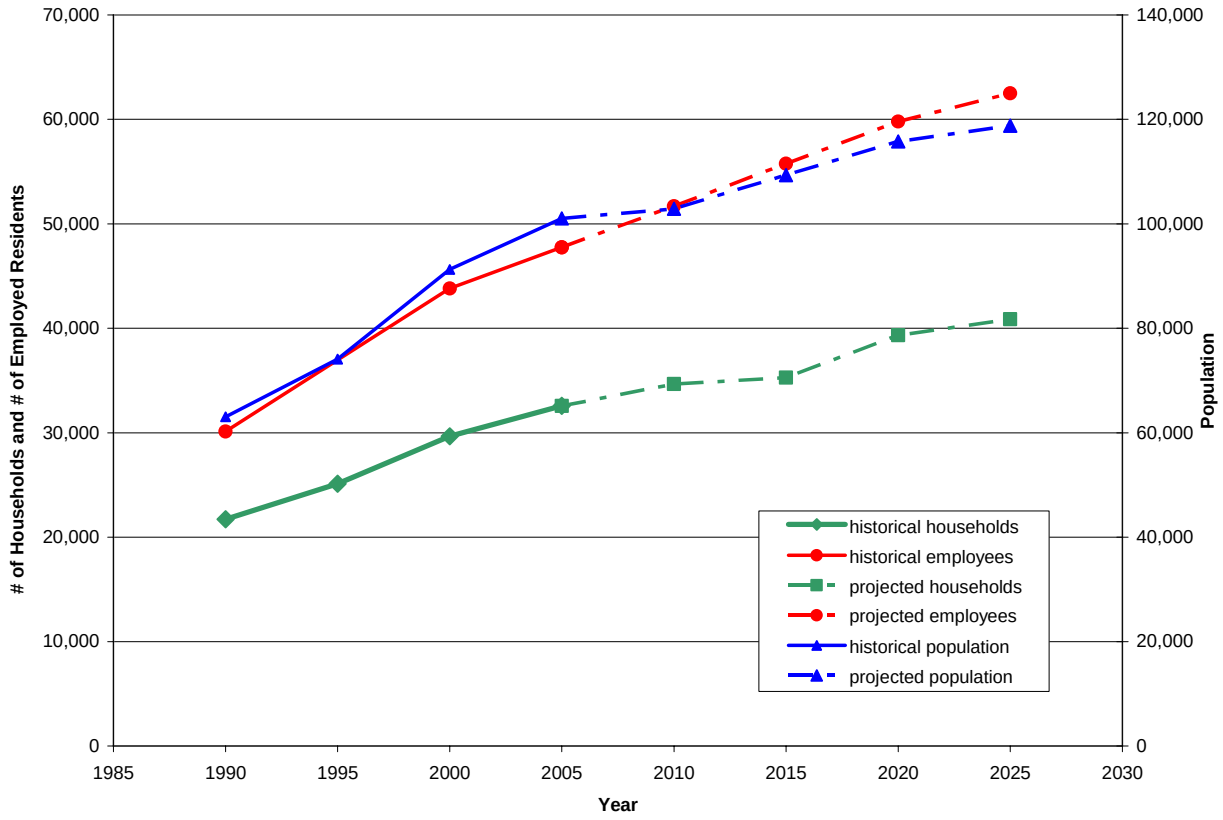

Figure 3-1. Historical and Projected Population, Housing, and Employed Residents

SECTION 4
WATER SUPPLY QUANTITY AND QUALITY

Water sources include the Contra Costa Canal (Canal), San Joaquin River, municipal reservoir, and wells located within the City limits. This section describes the surface water and groundwater sources, quantities, supply constraints, and the water quality of the water supply sources. In addition, this section describes current and projected water supplies, water supply reliability and vulnerability, water shortage expectations, and water shortage revenue and expenditure impacts.

4.1 Surface Water

This section provides a description of the City's surface water supply as well as the physical and legal constraints of this supply. Currently, the City receives surface water from the Canal, the San Joaquin River, and the municipal reservoir.

4.1.1 Contra Costa Canal

The Contra Costa Water District (CCWD) supplies water to Antioch from diversions at Rock Slough and Old River in the Sacramento-San Joaquin Delta through the Contra Costa Canal, operated by CCWD for the United States Bureau of Reclamation (Bureau). The Raw Water Division of CCWD wholesales water to Antioch for about $1,500 per million gallons (mg) ($500 per acre-foot). The cost for pumping from the Canal to the municipal reservoir or the WTP is about $30 per mg. Antioch's current annual agreement is for a peak demand of 25,000 gpm (36.0 mgd). CCWD presently draws only 67 percent of its annual 195,000 acre-feet (63,500 million gallons) allotment from the Delta. Unless constrained by drought conditions, CCWD is prepared to sell to Antioch all the City's projected water needs through the year 2028. Based on recent studies, the existing canal does not have sufficient capacity to carry Antioch's increased future flow together with those required by other customers, but CCWD has installed a pipeline parallel (multipurpose pipeline) to the canal to satisfy such demands.

Historically, the quality of the water in the Canal has been beyond the direct control of CCWD. It depends on overall Delta water quality which is, in turn, affected by a multitude of factors including upstream reservoir releases, tidal changes, discharge of nearby agricultural users, export rates of the pumps for the State Water Project and Central Valley Project, and standards and objectives set by the State Water Resources Control Board (SWRCB) and the United States EPA. The Canal was one of the first units in the Central Valley Project, and the Bureau has a contract to deliver the water to the Canal, but quality requirements are not included. According to the contract, the Bureau is "…to maintain the quality of the raw water to be delivered hereunder at the highest level reasonably attainable and consistent with municipal and industrial use." The Bureau is not required to deliver any specific water quality level for the Canal. The future water quality depends, primarily, on two factors:

- Operation of the Los Vaqueros Project
- Outcome of the Bay-Delta proceedings (See Section 4.2.3)

The Los Vaqueros Project, approved by the voters in November 1988, has resulted in a new 100,000-acre-foot storage reservoir located southwest of Brentwood. This project allows CCWD to draw low salinity (as measured by total dissolved solids [TDS] or chlorides) water from the Delta during high runoff periods. This water is now available for blending with normal withdrawals from Rock Slough. Los Vaqueros

Reservoir also serves as emergency storage in the event of a chemical spill in the Delta or other disruption such as a levee failure.

4.1.2 San Joaquin River

The City and earlier local inhabitants have drawn water from the San Joaquin River as a primary source for over 140 years. Before the growth of the irrigated rice industry around World War I, there was sufficient fresh water. However, as this major summer diversion began and the flows into the Delta decreased, saline bay waters moved further upstream replacing the fresh water. The City sought judicial relief, filing a suit asking the court to restrain the upstream Williams Irrigation District from diverting Sacramento River waters. The court granted an injunction in January 1921, but the California Supreme Court reversed it in March 1922. The Supreme Court also pointed out that a physical solution, moving the City's diversion point upstream, was available. Since that time, the City has been able to pump from the San Joaquin River for varying periods up to more than 300 days per year. No pumping occurred during the drought period of 1976 to 1977. Similarly, from 1986 to March 1991, the City was only able to pump seven days a year. The City generally stops pumping if the mean chloride concentration in the river water exceeds 250 milligrams per liter (mg/L). If the chloride concentration in the municipal reservoir water is particularly low, the City may continue limited pumping to the municipal reservoir when the chloride concentration exceeds 250 mg/L in the river.

The State of California Department of Water Resources (DWR) and the City have an existing agreement, which specifies that the City will be able to pump water with a chloride content less than 250 mg/L at least 208 days per year. If the long-term average days of river pumping are less than 208 days per year, DWR will pay for one-third of the incremental difference in cost to the City between using river water and Canal water. This contract runs until 2008. When there is a pumping shortfall, DWR now pays the City for one-third the incremental costs, including those added raw water costs associated with the Los Vaqueros Project.

In coming years, river water quality will continue to be impacted by decisions outside the City's control. State plans call for increased water diversions from the Delta to satisfy water demands in the San Joaquin Valley and areas south and west. Any decrease in the net flow from east to west in the San Joaquin River at Antioch will tend to reduce the availability of low chloride waters. As indicated previously, the SWRCB has established water quality standards for the Delta, including a provision of 150 mg/L maximum concentration of chloride at Antioch's River pumping station for a minimum duration depending on net Delta outflow (see Table 4-1). If these standards are maintained, the river can continue as an intermittent, but important, water source for the City.

Table 4-1. Water Quality Standards for Chloride

Location	Maximum Concentration, mg/L	Frequency days/yr	Water Year Classification
Contra Costa Canal intake at Rock Slough	250[a]	All	--
Contra Costa Canal intake at Rock Slough or Antioch intake on San Joaquin River	150[b]	240	Wet
		190	Above Normal
		175	Normal
		165	Dry
		155	Critically Dry

Source: State Water Resources Control Board, Water Quality Control Plan for the Sacramento San Joaquin Delta.
[a]Maximum mean daily concentration.
[b]Maximum mean daily concentration at intervals of not less than 2 weeks' duration.
[c]Number of days that chloride level has been less than 150 mg/L.

The City can presently draw no more than 16.0 mgd from the San Joaquin River when water quality permits any withdrawal because of the limited capacity of the river pumping station and the raw water pipeline from the river to the municipal reservoir. Our inquiries with the Water Rights Division of SWRCB identified

no quantity limitation on the City's appropriation from the San Joaquin River provided that diverted water is used beneficially.

Historically, in the last five years the City has pumped an average of 6,438 AF/year from the San Joaquin River. For planning purposes, in normal years, it is assumed that this amount will be available. This is more conservative than the existing agreement of 208 days per year at 16 mgd or about 10,200 AF/year. In 1998, a very wet year, the quality of the water was sufficient to allow the City to pump 12,614 AF. In comparison, over the last five years the City has taken an average of 13,951 AF/year from the CCWD.

4.1.3 Impacts of Regulatory Processes

There are currently two parallel ongoing regulatory processes, which may affect the City's withdrawals from the San Joaquin River, the CALFED Bay-Delta Program and the SWRCB Bay-Delta Hearings.

The CALFED Bay-Delta Program is intended to develop a long-term plan that will improve the comprehensive water management for the Bay-Delta System and the ecological health of the Bay-Delta. The CALFED program has four primary objectives:

- To provide high-quality raw water for the various uses in the Bay-Delta System.
- To increase the quality of the Bay-Delta ecosystem and to increase its biodiversity.
- To optimize the use of Bay-Delta water supply so maximum water quantities are available in periods of maximum demand.
- To reduce system vulnerability to natural disasters.

CALFED's long-term plan is to be governed by several principles: (1) the system should be affordable, (2) the distribution of beneficial use should be equitable, (3) the plan should be possible to implement, (4) the system should be durable, (5) the plan should reduce demand conflicts within the system, and (6) the negative impacts should not be redirected to create negative impacts for other regions. Currently, there are several proposed alternatives which are under debate and are subject to change, so the impact on the City is unclear at the present time. However, certain results are likely.

It is likely that the program will work to reduce saltwater intrusion into the Delta by matching releases and withdrawals upstream of the Delta. This change would likely increase the number of days per year that the City would be able to depend on the intake on the San Joaquin River, making the City less dependent on the CCWD and lowering the unit cost of the water. However, there is a possibility that a charge may be levied upon withdrawals from the Bay-Delta in order to complete the big picture for CALFED, and an outside funding source would have to be considered, which would increase costs. The CALFED process will also likely include mandatory requirements for effective water management. These requirements will build on the demand management practices (DMMs), formerly referred to as best management practices, addressed in Section 6 of this Urban Water Management Plan.

The SWRCB hearings are primarily concerned with equitably reforming water rights for allocating responsibility in the 1995 Water Quality Control Plan among post-1914 water rights holders for the Bay-Delta watershed. The process is proceeding concurrently to the CALFED program, although not necessarily linked with it. Under all the planned alternatives proposed by the SWRCB, users with post-1914 riparian water rights (those who are in-basin) have priority over appropriative water rights holders (those who export water from the basin). As a pre-1914 riparian user, the City should have no difficulties with this process, as it would have the highest water right priority category. One of the stated objectives of the SWRCB Bay-Delta hearings is to mitigate salinity problems within the Bay-Delta. Like the CALFED program, such improvements would lead to the City of Antioch having increased ability to draw on its San Joaquin River intake. The outcome of both sets of hearings remains unclear now. The best outcome for the City would be the improvement in

water quality at the City's intake on the San Joaquin River without diminishing the City's ability to draw water from the San Joaquin River.

Until the Bay-Delta proceedings are completed, water quality will depend on past actions. In August 1978, the SWRCB issued Water Right Decision 1485, setting water quality standards in the Delta to be maintained by the State Water Project and Central Valley Project as a condition of their permit to store above and divert from the Delta. Table 4-1 presents the chloride standard for the Contra Costa Canal intake and the river diversion point for Antioch. Review of historical water quality data indicate that if the maximum daily mean for chloride is kept below 250 mg/L, the other drinking water standards should not be exceeded, with the possible exception of trihalomethanes (THMs). During disinfection of source water, organic carbon can react with chlorine to form carcinogenic compounds such as THMs and haloacetic acids (HAAs). The City is currently meeting all standards including those for THMs. We foresee no problems that will prevent the City from meeting future standards. There may, however, be a need for some treatment modifications to respond to changing regulations.

4.1.4 Municipal Reservoir

The 735-acre-foot (240-mg) municipal reservoir provides supply reliability and volume for equalization storage for water pumped from the Contra Costa Canal. The reservoir also serves the secondary purposes of flood control and impoundment of local runoff. Water production from the small (1,300-acre) tributary watershed, however, is of negligible importance particularly since stormwater runoff from residential areas is now diverted around the reservoir.

The reservoir will continue to provide supply reliability and sufficient volume for equalizing the City's demand for raw water from the Canal. Use of equalizing volume, for example, permits purchase of raw water at a constant rate for periods of a month or more, depending on the season of the year. Raw water is delivered at a constant rate to the reservoir and the WTP, and is withdrawn from the reservoir at varying rates to meet fluctuating demand conditions. In the past, the ability to purchase water at uniform rates has been of significant economic value to the City. Raw water reservoir equalization may also be of value in the future. The storage volume which will be needed for equalization purposes will therefore depend upon the rate schedule and service rules which will be promulgated in coming years. It is likely, however, that the 240-mg available in the municipal reservoir will be sufficient for this purpose.

4.2 Groundwater

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

4.2.1 Local Wells

The City does not currently use groundwater nor does it plan to use groundwater by the year 2025.

Table 4-2. Amount of Groundwater Pumped, AF/Y (DWR Table 6)

Basin Name (s)	2000	2001	2002	2003	2004
None	0	0	0	0	0
Percent of total water supply	0	0	0	0	0

Table 4-3. Amount of Groundwater Projected to be Pumped, AF/Y (DWR Table 7)

Basin Name (s)	2010	2015	2020	2025
None	0	0	0	0
Percent of total water supply	0	0	0	0

4.3 Desalination

As part of the San Francisco Public Utility Commission's (SFPUCs) Capital Improvement Plan (CIP), desalinization has been identified as a potentially viable additional source of water. The following description of the SF Bay Area Desalinization Plant study is provided on the SFPUC website (http://www.sfwatwer.org):

> This project, entered into jointly by the four regional water systems, San Francisco Public Utilities Water Department (SFPUC), East Bay Municipal Utilities District (EBMUD), Santa Clara Valley Water District (SCVWD) and Contra Costa Water District (CCWD), will study the feasibility of constructing a seawater desalination plant. The cost of initial feasibility study will be shared equally between the parties. MOUs will be prepared for initial and subsequent phases that will address cost sharing of those phases. Parties will also look for Federal and State funding that may be available for design and construction. Phase 1 of the Prefeasibility Study has been completed. It evaluated the different sites and recommended three sites for further study. Phase II of the Prefeasibility Study will further evaluate these sites in greater detail and will look at environmental factors, transmission capability, institutional arrangements and grant funding. Funding for additional phases will be requested as the project progresses and based on recommendations of each phase of the project.
>
> A site located just northwest of Antioch, the East Contra Costa Power Plant site, ranked as one of the top three (http://www.sfwatwer.org).

Table 4-4. Opportunities for Desalinated Water (DWR Table 18)

Source of Water	Yield AF/Y	Start Date	Type of Use	Other
Ocean water	0	0	0	0
Brackish ocean water	0	0	0	0
Brackish groundwater	0	0	0	0
Other (such as impaired groundwater)	0	0	0	0
Total				

4.4 Transfer and Exchange Opportunities

There are no current or future planned agreements for short-term or long-term transfer and exchange within the City's service area.

Table 4-5. Transfer and Exchange Opportunities, AF/Y (DWR Table 11)

Transfer Agency	Transfer or Exchange	Short-term	Proposed Quantities	Long-term	Proposed Quantities
	0	0	0	0	0
Total	0	0	0	0	0

4.5 Current and Projected Water Supplies

Table 4-6 summarizes the current and projected annual water supply for normal climate years. There are no expected future supply projects or programs within the City's service area. This is due to the fact that the current water supply sources more than adequately meet the projected water use identified in the water supply and demand assessment (Table 7-3).

Table 4-6. Current and Planned Water Supplies, AF/Y (DWR Table 4)

Water Supply Sources	2004	2010	2015	2020	2025
Surface water purchased from CCWD	40,320	40,320	40,320	40,320	40,32
San Joaquin River	7,550	7,550	7,550	7,550	7,550
Municipal Reservoir	740	740	740	740	740
Transfers in or out	0	0	0	0	0
Exchanges in or out	0	0	0	0	0
Recycled water from DDSD[a]	0	530	530	530	530
Desalination	0	0	0	0	0
Groundwater wells	0	0	0	0	0
Other	0	0	0	0	0
Total	48,610	49,140	49,140	49,140	49,140

[a]Developed from recycled water projections in the Antioch/DDSD Recycled Water Project Facilities Plan, August 2005.

Table 4-7. Projected Normal Water Supply, AF/Y (DWR Table 40)

	2010	2015	2020	2025
Supply	49,140	49,140	49,140	49,140
Percent of year 2005*	101.1	101.1	101.1	101.1

*From Table 4 Base year for Normal water year.

4.6 Water Supply Reliability and Vulnerability

The surface water supply to Antioch could be reduced during a multiple dry-year scenario. The draft year 2005 Urban Water Management Plan for CCWD states that 85 percent of demand can be met in a second or third dry year. CCWD expects that the remaining 15 percent of demand can be met by a combination of short-term water purchases and a voluntary short-term conservation program. Note that near-term demands can be met under all supply conditions. However beginning in 2010, during the second and third years of a multi-year drought, short-term water purchases in conjunction with a request from 5 to 15 percent voluntary short-term conservation would be considered to meet demands. The maximum amount of short-term conservation expected to be necessary is 15 percent of demand.

Table 4-8 summarizes the projected year 2025 water supply for normal, single, and multiple dry-water years. It is assumed that a single dry-water year would not result in a reduction of normal year supply. For the second year of a multiple dry-year scenario, it is assumed that a 10 percent reduction in water supply from CCWD may occur and water supply from San Joaquin River will be reduced to zero due to increased salinity level. For the third and fourth year of a multiple dry-year scenario, it assumed that a reduction to 85 percent of normal year surface water supply would occur and pumping from the San Joaquin River would remain prohibited due to salinity levels. Recycled water is assumed to be unaffected by drought conditions.

Table 4-10 summarizes factors that result in inconsistent water supply. Surface water from CCWD is affected by climate. As shown in Table 4-8, years of multiple dry-weather will result in a reduction of water supply. Similar, results are shown for water supply from the San Joaquin River. However in that case, water quality is the bigger issue. Diminishing water quality levels from the San Joaquin River will occur during dry water years but can also occur if over pumping causes a significant decrease in net water flow. This is described in more detail in Section 4.2.2. If there is a need, these inconsistent sources can be supplemented by alternative sources, such as recycled water, as well as water-use efficiency measures, such as DMM/BMP and water shortage contingency plan.

Table 4-8. Supply Reliability, AF/Y (DWR Table 8)

Water Supply	Average / Normal Water Year	Single Dry Water Year	Multiple Dry Water Years			
			Year 1	Year 2	Year 3	Year 4
CCWD	40,320	40,320	40,320	36,290	34,270	34,270
San Joaquin River	7,550	7,550	7,550	0	0	0
Municipal Reservoir	740	740	740	0	0	0
Recycled water from DDSD	530	530	530	530	530	530
Groundwater wells	0	0	0	0	0	0
Total	49,140	49,140	49,140	36,820	34,800	34,800
Percent of Normal	100.0	100.0	100.0	76.4	72.3	72.3

Table 4-9. Basis of Water Year Data (DWR Table 9)[a]

Water Year Type	Base Year (s)
Average water year	2000 to 2004
Single dry water year	1994
Multiple dry water year	1987 to 1992

[a]Table 4-9 lists the years upon which the data in Table 4-8 is based.

Table 4-10. Factors Resulting in Inconsistency of Supply (DWR Table 10)

Name of Supply	Legal	Environmental	Water Quality	Climatic
Surface water	None	None	👍	👍
Groundwater	None	None	None	None
Recycled water	None	None	None	None

4.7 Wholesaler (Agency) Water Supply Projections

The following Table 4-11 presents the amount of wholesale water the City projects receiving. In this case, the planned and existing sources of water available to the City are the same. As mentioned in the previous section, CCWD expected supply during multiple-dry years is 100, 90, 85 and 85 percent for the first, second, third and fourth years, respectively (Table 4-12). Expected supply from San Joaquin River during multiple-dry years is 100, 0, 0, and 0 for the first, second, third and fourth years, respectively, due to salinity level restrictions (Table 4-12).

Table 4-11. Wholesaler Identified & Quantified the Existing and Planned Sources of Water, AF/Y (DWR Table 20)

Wholesaler Sources	2010	2015	2020	2025
CCWD	40,320	40,320	40,320	40,320
San Joaquin River	7,550	7,550	7,550	7,550

Table 4-12. Wholesale Supply Reliability, Percent of Normal AF/Y (DWR Table 21)

Wholesaler	Multiple Dry Water Years				
	Single Dry	Year 1	Year 2	Year 3	Year 4
CCWD	100	100	90	85	85
San Joaquin River	100	100	0	0	0
Municipal Reservoir	100	100	0	0	0

Table 4-13. Factors Resulting in Inconsistency of Wholesaler's Supply (DWR Table 22)

Name of Supply	Legal	Environmental	Water Quality	Climatic
CCWD	None	None	None	✓
San Joaquin River	None	None	✓	✓

4.8 Water Quality of Existing Water Supply Sources

There are no anticipated affects to water supply due to water quality issues.

Table 4-14. Current & Projected Water Supply Changes Due to Water Quality–Percentage (DWR Table 39)

Water Source	2005	2010	2015	2020	2025
CCWD	N/A	N/A	N/A	N/A	N/A
San Joaquin River	N/A	N/A	N/A	N/A	N/A
Recycled water	N/A	N/A	N/A	N/A	N/A

4.9 Water Shortage Contingency Plan

This section outlines the estimated three-year minimum water supply, the actions and stages described in the Water Conservation Ordinance that will be implemented in the event of a water supply shortage, and the emergency preparedness and plans for catastrophic events.

4.9.1 Estimate of Minimum Supply for Next Three Years

Table 4-15. Three-Years Estimated Minimum Water Supply, AF/Y (DWR Table 24)

Source	Normal	Year 1	Year 2	Year 3
CCWD	40,320	40,320	36,290	34,270
San Joaquin River	7,550	7,550	0	0
Municipal Reservoir	740	740	0	0
Recycled water	530	530	530	530
Total	49,140	49,140	36,820	34,800

4.9.2 Stages of Actions and Conditions

This section describes the stages of action to be undertaken in response to water supply shortages. Included is an outline of specific water supply conditions that are applicable to each stage. Per California Water Code Section 10632 (a), the City has developed four stages of action to be undertaken in response to water supply shortages, including up to a 50 percent reduction in water supply and an outline of specific water supply conditions which are applicable to each stage.

Four stages of action to be taken during a water supply shortage have been developed. The stages will be implemented during water supply shortages according to shortage level, ranging from 5 percent shortage in Stage I to 50 percent shortage in Stage IV. The stage determination and declaration during a water supply shortage will be made by the Public Works Director. Table 4-16 describes the water supply shortage levels and stages.

- During Stage I, water alert conditions are declared and voluntary water conservation is encouraged.
  - The City maintains an ongoing public information campaign consisting of distribution of literature, speaking engagements, bill inserts, and conservation messages printed in local newspapers and on the City's internet web page.
  - The drought situation is explained to the public and governmental bodies.

  - The City explains other stages and forecasts future actions.
  - Educational programs in area schools are ongoing.
  - Educational information is also available from the City's Customer Service desk.
- During Stage II of a water supply shortage, the shortage is moderate, 10 to 20 percent, and conservation may be voluntary, consist of allotments, and or include mandatory conservation rules.
  - The severity of actions depends upon the percent shortage.
  - The City aggressively continues it public information and education programs.
  - The City asks for 10 to 20 percent voluntary or mandatory water use reductions.
  - If necessary, the City also supports passage of drought ordinances.
- During Stage III of a water supply shortage, the shortage is severe, 20 to 35 percent, and conservation consists of allotments and mandatory conservation rules.
  - This phase becomes effective upon notification by the City that water usage is to be reduced by a mandatory percentage.
  - The City would adopt drought ordinances and implements mandatory reductions.
  - Rate changes are implemented to penalize excess usage.
  - Water use restriction is put into effect; i.e., prohibited uses can include restrictions on daytime hours for watering, excessive watering resulting in gutter flooding, using hoses without a shutoff device, non-recycling fountains, washing down sidewalks or patios, unrepaired leaks, etc.
  - The City monitors production weekly for compliance with necessary reductions. As a result of a customer consistently abusing use, the City would install a flow restrictor at the water meter.
- During Stage IV of a water supply shortage, the shortage is critical, 35 to 50 percent.
  - Conservation consists of allotments and mandatory conservation rules.
  - All steps taken in prior stages are intensified and production is monitored daily for compliance with necessary reductions.

Table 4-16. Water Supply Shortage Stages and Conditions (DWR Table 23)

Stage	Water Supply Conditions	Percent Shortage
I – Voluntary	Minimum – voluntary	5 to 10
II – Mandatory Conservation Phase	Moderate – voluntary allotments and/or mandatory conservation rules	10 to 20
III – Rationing Phase	Severe – allotments and mandatory conservation rules	20 to 35
IV – Intense Rationing Phase	Critical – allotments and mandatory conservation rules	35 to 50

4.9.3 Prohibitions

California Water Code Section 10632 (d) requires mandatory prohibitions against specific water use practices that may be considered excessive during water shortages. The City has Landscaping and Irrigation Regulations, included as Appendix E. This regulation addresses landscape and irrigation plans. In addition, the City has adopted Resolution 89-263, which addresses landscape guidelines for public open space areas within planned developments. This document is included in Appendix F. Both documents are a proactive

means of reducing the water demand in the City of Antioch. Should drought conditions warrant mandatory reductions, during Stage II of a water supply shortage, the City may adopt and implement an ordinance for mandatory conservation and water restriction plan. This ordinance may require additional tariffs for the City to enforce the plan.

The ordinance may address prohibitions on various wasteful water uses, including, but not limited to, the hose washing of sidewalks and driveways using potable water, cleaning or filling decorative fountains, and allowing plumbing leaks to go uncorrected for more than 72 hours. Table 4-17 identifies potential prohibitions and the stages during which the prohibition would be voluntary and mandatory.

Table 4-17. Voluntary and Mandatory Prohibitions (DWR Table 26)

Prohibitions	Stage When Prohibition is Voluntarily Requested	Stage When Prohibition Becomes Mandatory
Cleaning of Streets/sidewalks/walkways/parking areas/patios/porches or verandas	I	II, III, IV
Washing cars	I	II, III, IV
Watering lawns/landscapes	I	II, III, IV
Non-permanent agriculture	I	II, III, IV
Uncorrected plumbing leaks	I	II, III, IV
Cleaning/filling/operating/maintaining levels in non-recycling decorative fountains	I	II, III, IV

4.9.4 Consumption Reduction Methods

Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply. California Water Code Section 10632 (e) requires the water supplier to provide consumption reduction methods in the most restrictive stages of a water shortage. The City will use the consumption reduction methods proposed in Table 4-18.

Table 4-18. Consumption Reduction Methods (DWR Table 27)

Consumption Reduction Methods	Stage When Method Takes Effect	Projected Reduction, Percent
Demand reduction program	All Stages	5 to 50
Flow restriction	III, IV	20 to 50
Restrict for only priority uses	II, III, IV	10 to 50
Use prohibitions	II, III, IV	10 to 50
Per capita allotment by customer type	III, IV	20 to 50
Plumbing fixture replacement	All Stages	5 to 50
Voluntary rationing	II	10 to 50
Mandatory rationing	III, IV	20 to 50
Excess use penalty	III, IV	20 to 50
Water conservation kits	All Stages	5 to 50
Education program	All Stages	5 to 50
Percentage reduction by customer type	III, IV	20 to 50

4.9.5 Penalties

Section 10632 (f) of the California Water Code requires a water supplier to penalize or charge for excessive water use, where applicable. The City, after one written warning, shall install a flow-restricting device on the service line of any customer observed by City personnel to be using water for any non-essential or unauthorized use defined in a City ordinance.

An excess use penalty per 100 cubic feet of water used in excess of the applicable allocation during each billing period shall be charged by the City for all service rendered on and after the effective date of an ordinance. Repeated violations of unauthorized water use will result in discontinuance of water service. Penalties and charges and the stage during which they take effect are displayed in Table 4-19.

Table 4-19. Penalties and Charges (DWR Table 28)

Penalties or Charges	Stage When Penalty Takes Effect
Penalty for excess use	III, IV
Charge for excess use	III, IV
Charge per unit over allotment	III, IV
Flow restriction	III, IV
Termination of service	III, IV

4.9.6 Mechanisms for Determining Actual Reductions

California Water Code Section 10632 (i) requires the water supplier to develop a mechanism for determining actual reductions in water use in the course of carrying out the urban water supply shortage contingency analysis. Under normal water supply conditions, water production figures are recorded daily within and monitored by the Superintendent. Totals are reported monthly and are incorporated into water supply reports. The City maintains extensive water use records on individual customer accounts. Exceptionally high usage is identified at meter reading time by the City's electronic meter reading management system. These accounts are investigated for potential water loss or abuse problems. During all stages of water shortages, daily production figures are reported to and monitored by the Superintendent.

Table 4-20. Water Use Monitoring Mechanisms (DWR Table 31)

Mechanisms for Determining Actual Reductions	Type Data Expected
Water production meters	Water production meters are monitored on a monthly basis.
Customer records	Provides information on consumers exceeding maximum consumption limits and tracks abnormal increases and decreases in consumption.

4.9.7 Revenue and Expenditure Impacts During Shortages

Section 10632 (g) of the California Water Code requires an analysis of the impacts of each of the actions taken for conservation and water restriction on the revenues and expenditures of the water supplier. The City will establish memorandum accounts to track expenses and revenue shortfalls caused by both mandatory rationing and voluntary conservation efforts. The City will implement a surcharge to recover revenue shortfalls recorded in their drought memorandum accounts. Tables 4-21 and 4-22 display the Components of Revenue and Expenditure Impacts and summary of effects.

Table 4-21. Proposed Measures to Overcome Revenue Impacts (DWR Table 29)

Names of Measures	Summary of Effects
Development of reserves	There is a reserve policy (contingency fund) in place to help offset expenditure impacts during times of emergency.

Table 4-22. Proposed Measures to Overcome Expenditure Impacts (DWR Table 30)

Names of Measures	Summary of Effects
Development of reserves	There is a reserve policy (contingency fund) in place to help offset expenditure impacts during times of emergency.

4.9.8 Catastrophic Supply Interruption Plan

The Water Code Section 10632 (c) requires actions to be undertaken by the water supplier to prepare for and implement during a catastrophic interruption of water supplies. A catastrophic event that constitutes a proclamation of a water shortage would be any event, either natural or manmade, that causes a severe shortage of water, synonymous with or with greater severity than the Stage III or Stage IV water supply shortage conditions. Facilities are inspected annually for earthquake safety. Auxiliary generators and improvements to the water storage facilities to prevent loss of these facilities during an earthquake or any disaster causing an electric power outage have been budgeted for and installed as part of the annual construction process. Table 4-23 is a summary of items discussed regarding the preparation actions for a catastrophe.

Table 4-23. Preparation Actions for a Catastrophe

Summary of Actions
• Determine what constitutes a proclamation of a water shortage
• Stretch existing water storage
• Obtain additional water supplies
• Determine where the funding will come from
• Contact and coordinate with other agencies
• Create an Emergency Response Team/Coordinator
• Create a catastrophe preparedness plan
• Put employees/contractors on-call
• Develop methods to communicate with the public
• Develop methods to prepare for water quality interruptions

SECTION 5
RECYCLED WATER

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

5.1 Recycled Water Plan Coordination

Delta Diablo Sanitation District (DDSD) is the agency responsible for treating and discharging treated wastewater for the Cities of Antioch and Pittsburg and the unincorporated community of Bay Point located in Contra Costa County. The City owns and maintains a collection system that delivers raw sewage to DDSD pumping station. In 1999, DDSD, in cooperation with Calpine Corporation, initiated a project to deliver recycled water from the wastewater treatment plant to two power plants and some park areas within the City of Pittsburg. DDSD has been providing approximately 7 mgd of recycled water on average since completing construction of a 12.8-mgd Recycled Water Facility (RWF) in 2001. Currently, no recycled water is used within the City. Recently, there has been increased interest in expanding recycled water use within DDSD's service area in order to:

- **Reduce Dependence on Delta Supplies.** Delta supplies represent the bulk of water used within DDSD's service area. Expanded use of recycled water within the area would lessen the amount of Delta water diverted by the Contra Costa Water District and the City of Antioch, making water not used available for other purposes.
- **Improve Water Supply Reliability.** Since recycled water is not affected by hydrologic variability, it provides additional dry-year reliability for irrigation customers and other users.
- **Preserve Potable Water Supplies.** Using recycled water to serve non-potable demands such as irrigation will preserve high-quality drinking water supplies for potable needs.
- **Reduce Wastewater Discharges.** DDSD currently discharges its wastewater effluent into the New York Slough. With the advent of Total Maximum Daily Load (TMDL) requirements for mercury and other constituents of concern, wastewater dischargers are facing increasingly stringent regulations. Increasing the production of recycled water will help DDSD to comply with these future regulations by reducing the volume of effluent and associated trace constituents discharged directly to the receiving waters.
- **Better Utilize Existing Recycled Water Facilities.** Currently, DDSD's existing recycled water facilities are underutilized. Currently sized to deliver a peak flow of 12.8 mgd, the average demand for power plants and existing irrigation users has been approximately 7 mgd with peak flows of up to 12 mgd occurring less than 10 percent of the year (DDSD, 2004). Expanded recycled water use would make use of available capacity.

In addition, DDSD recently negotiated an agreement with the local water agency, Contra Costa Water District (CCWD), to allow for the development of an additional 1,654 AF/Y of recycled water for urban landscape and golf course irrigation projects within the DDSD service area. DDSD has asked the City, through Phil Harrington, to adopt an ordinance to modify the City of Antioch Municipal Code to require purple-colored landscaping and irrigation materials on all installations. This has two purposes: 1) to indicate

the water is not intended for drinking, and 2) to readily accommodate future recycled water connection. Given the aforementioned interest in expanding recycled water use, the City and DDSD have formed a partnership to assess the full potential of the recycled water market within the City and evaluate various alternatives for expanding the existing recycled water facilities to include additional irrigation customers.

5.2 Wastewater Quantity, Quality, and Current Uses

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

5.2.1 Wastewater Facilities

DDSD's Water Pollution Control Facility (WPCF) is a secondary treatment plant with a rated average dry weather flow (ADWF) capacity of 16.5 mgd. As shown in Figure 5-1, the major treatment processes include screening and grit removal, primary clarification, tower trickling filters, aeration in an activated sludge system, secondary clarification, and disinfection/chlorination. Treated and disinfected secondary effluent is discharged to New York Slough in the San Joaquin Delta (RMC, 1999). A portion of the effluent is diverted to the Recycled Water Facility prior to chlorination at a varying rate depending on recycled water demands.

The Recycled Water Facility at DDSD was constructed in 2000 as part of a collaborative effort between DDSD and Calpine Corporation. It is designed to treat up to 12.8 mgd of secondary effluent from the WPCF. As shown in Figure 5-2, secondary effluent is diverted upstream of the WPCF disinfection, and undergoes flocculation, clarification, sedimentation, filtration and disinfection before being distributed to recycled water users (DDSD, 2000). Effluent quality meets or exceeds the California Department of Health Services (DHS) Title 22 water quality requirements for "unrestricted" use of recycled water.

5.2.2 Wastewater Generation

Municipal wastewater is generated in the City from a combination of residential, commercial and industrial sources. The quantities of wastewater generated are proportional to the population and the water use in the service area. Estimates of the wastewater flows generated within the City for the present and future conditions are presented in Table 5-1(DDSD 2004). Table 5-1 also lists the projected quantity of treated water that meets the recycled water standards and is being discharged.

Table 5-1. Wastewater Collected in the City of Antioch and Treated, AF/Y (DWR Table 33)

	2003	2005	2010	2015	2020	2025
Wastewater collected in service area[a]	8,048	9,277	9,166	10,060	11,178	12,407
Quantity that meets recycled water standard and is discharged.	0	0	0	0	0	0

Source: DDSD Conveyance System Master Plan Update - February 20, 2004.
Note: Per capita projections and water conservation based on historically recorded values (and do not reflect any new or planned water conservation measures.)
[a]Wastewater is only collected in service area. There is not treatment in the City's service area.

5.2.3 Wastewater Collection and Disposal

In 2003, the annual average flow was 14.2 mgd, of which about half comes from the City. Average annual flow is expected to approach 24 mgd by the year 2025 (HDR, 2004). These flow projections are used to estimate the timing for future expansion projects scheduled at the various pump stations, the diversion facility, and the wastewater treatment plant. Planned improvements scheduled to begin as early as 2005

include new and extended force mains, a new gravity sewer, the Ultimate Pump Station facility, new pumps, emergency facilities, and security improvements (HDR, 2004).

The wastewater influent to the WPCF is primarily domestic, with approximately eight percent of the flow contributed by industrial and commercial sources. DDSD currently has an EPA-approved Pre-treatment Program. The treated effluent water quality meets the secondary standards required by DDSD's National Pollutant Discharge Elimination System (NPDES) permit. Current and planned disposal methods and quantities are presented in Table 5-2.

Table 5-2. Disposal of Wastewater (Non-Recycled), AF/Y (DWR Table 34)

Method of Disposal	Treatment Level	2005	2010	2015	2020	2025
Discharged to New York Slough through the District's deep water outfall (mgd)	Secondary effluent	9.28	6.3	8.3	9.9	11.6

Source: E-mail communication with Meg Herston of DDSD – August 31, 2005.

5.3 Water Recycling Current Uses

Currently, there are no recycled water uses within the City. The RWF currently delivers approximately 7 mgd of recycled water on average for use at two nearby power plants, the Delta Energy Center (DEC) and Los Medanos Energy Center (LMEC) and irrigation of two parks owned by the City of Pittsburg. The power plants are located in an industrial area along the northern border of Pittsburg. DEC is located immediately adjacent to the RWF, while LMEC receives recycled water via a pipeline extending three miles from the RWF. The two parks being irrigated with recycled water are located along this route (DDSD, 2004). DDSD recently negotiated an agreement with CCWD to allow for the development of an additional 1,654 AF of recycled water for urban landscape and golf course irrigation projects located in the City of Pittsburg. Now, in partnership with the City, DDSD is exploring the potential to expand recycled water deliveries to users in Antioch. Together the City and DDSD have developed an assessment of the recycled water market within Antioch and have evaluated potential alternatives to expand recycled water use to City parks, golf courses, and other irrigation customers. These efforts are documented in the following sections. Current recycled water uses within the City are presented in Table 5-3.

Table 5-3. Existing Recycled Water Uses (DWR Table 35a)

Type of Use	Treatment Level	2005 ac-ft
Agriculture	--	0
Landscape	--	0
Wildlife habitat	--	0
Wetlands	--	0
Industrial	--	0
Groundwater recharge	--	0
Total	--	0

5.4 Potential and Projected Use of Reclaimed Water

Currently, no recycled water is used in the City's service area. This section presents the development and analysis of alternatives for the recycled water projects within the City.

5.4.1 Potential Use for Reclaimed Water

The potential for landscape irrigation with recycle water within the City is evaluated as listed in the August 2005 Recycled Water Project Facilities Plan. This plan is still in draft form and has not yet been formally adopted. The existing irrigation reclaimed water demands identified are 1520 ac-ft/year, with future

potential being an additional 652 ac-ft/year for a total of 2,172 ac-ft/year. The potential recycled water use included parks, golf courses, highway medians, and schoolyards for landscape irrigation. This would account for approximately ten percent of the total year 2004 water demand in the combined City area.

In addition to demand from irrigation sources, the 2005 Facilities Plan found that there is a total industrial demand of 1210 ac-ft/year. This assessment is comprised of two existing GWF Power System plants (806 ac-ft/year demand) and a future peaker power plant (403 ac-ft/year demand). This accounted for approximately five percent of the total year 2004 water demand in the combined City area.

Although not evaluated as part of the 2005 Facilities Plan due to limited demands comparison to irrigation and industrial uses, other potential recycled water uses exist within the City of Antioch including: dual plumbing, car washes, and commercial laundries.

The potential recycled water demand is assumed to be constant in the future recognizing that the amount of landscaping area within the City is constant throughout the planning period. Table 5-4 shows the projected recycled water demand for the planning period.

Table 5-4. Potential Recycled Water Demand, AF/Y (DWR Table 35b)

Type of Use	Treatment Level	2010	2015	2020	2025
Agriculture	--	0	0	0	0
Landscape	Tertiary	2,172	2,172	2,172	2,172
Wildlife habitat	--	0	0	0	0
Wetlands	--	0	0	0	0
Industrial	Tertiary	1,210	1,210	1,210	1,210
Groundwater recharge	--	0	0	0	0
Total		3,382	3,382	3,382	3,382
Percent of Projected Demand		15.1	14.2	13.4	13.1

5.4.2 Projected Future Use of Reclaimed Water

Conceptual alternatives for recycled water projects in the City of Antioch were developed based on identifying locations of larger irrigation users (or "anchor" users) within similar geographic areas in order to receive optimal benefit with respect to cost. Table 5-5 presents a summary of the alternatives developed for the Antioch/DDSD Recycled Water Master Plan. As shown in this table, alternatives were classified by:

- **Recycled Water Source.** Each of the project alternatives receives recycled water from one or both of the following sources: (1) the DDSD RWF, and (2) a future satellite treatment plant in southeastern Antioch. Project alternatives served exclusively by the RWF are labeled with a "C", denoting conventional treatment. Projects served by the future satellite treatment plant or combination of satellite treatment and the RWF are labeled with an "S", denoting satellite treatment. The "C" alternatives serve existing users exclusively, while the "S" alternatives serve a combination of existing and future users.
- **Anchor Users Served.** The project alternatives were also classified by the main irrigation users served. These users provide the major end points of the distribution system, thereby dictating the backbone pipeline alignment needed to serve them.
- **Lateral Users Served.** Two project alternatives were further broken down based on the extent to which additional smaller users are served recycled water by laterals along the pipeline alignment.

Table 5-5. Project Alternatives Summary

Alternative	Recycled Water Source	Anchor Users	Number of Lateral Users	Demand Served (AF/Y)
Conventional Alternative				
C1a	RWF	Lone Tree Golf Course	8	531
C1b	RWF	Lone Tree Golf Course	15	713
C2	RWF	Lone Tree Golf Course Contra Loma Regional Park	15	818
C3	RWF	Lone Tree Golf Course Deer Valley High School	18	850
C4	RWF	Lone Tree Golf Course Contra Loma Regional Park Deer Valley High School	18	955
Satellite Treatment Alternatives				
S1a	RWF Satellite Treatment	Lone Tree Golf Course Sand Creek Golf Course Deer Valley High School	10	1,128
S1b	RWF Satellite Treatment	Lone Tree Golf Course Sand Creek Golf Course Deer Valley High School	20	1,364
S2	Satellite Treatment	Lone Tree Golf Course Sand Creek Golf Course Deer Valley High School	5	1,097
S3	RWF Satellite Treatment	Lone Tree Golf Course Sand Creek Golf Course Deer Valley High School FUA-2 Users	24	1,437

Although this plan is not yet formally adopted, the 2005 Facilities Plan recommended Alternative C1a. This project was selected as the most feasible alternative for the following reasons:

- **Cost Effectiveness.** Although Alternative C1a did not have the lowest unit cost of the other "C" alternatives, it did have lowest capital ($6.7 M) and O&M costs.
- **Timing of Demand.** All of the users served are existing irrigation customers, which allows the City to capitalize on the benefits of recycled water use as soon as infrastructure is designed and constructed.
- **Users Served.** Alternative C1a serves only municipal customers within the City. This arrangement avoids any delays associated with negotiating agreements with new users or developing public outreach programs to make users more aware of recycled water.
- **Minimal Impacts.** It involves use of existing infrastructure, thereby reducing potential environmental impacts and traffic impacts relating to new construction.
- **Multiple Benefits.** It will reduce dependence on Delta water supplies, improve water supply reliability, reduce wastewater discharges, and utilize existing recycled water facilities.

Future phases of the Antioch/DDSD Recycled water project will expand upon Phase I (Alternative C1a) to maximize potential use of recycled water in the City of Antioch. Phase II (Alternative C1b) and Phase III (expansion of Phase II) target existing irrigation customers but do not yet have a schedule for implementa-

tion. Additional phases may be implemented to serve future demands from new developments. Table 5-6 presents the projected possible reuse water demands in the City's service area, based on Alternative C1a.

Table 5-6. Projected Future Use of Recycled Water (DWR Table 36)

Type of Use	2010	2015	2020	2025
Agriculture	0	0	0	0
Landscape	531	531	531	531
Wildlife habitat	0	0	0	0
Wetlands	0	0	0	0
Industrial	0	0	0	0
Groundwater recharge	0	0	0	0
Total	531	531	531	531

As Table 5-7 indicates, the City's 2000 UWMP projected no reclaimed water use, and none was provided.

Table 5-7. Recycled Water Uses–2005 Projection Versus Actual (DWR Table 37)

Method of Disposal	2000 Projection for 2005	2005 Actual Use
Agriculture	0	0
Landscape	0	0
Wildlife habitat	0	0
Wetlands	0	0
Industrial	0	0
Groundwater recharge	0	0
Total	0	0

The City does not have future plans to use financial incentives to encourage reclaimed water use. However, the City does plan on promoting reclaimed water use by means of public outreach, such as newsletters, public meetings, recycled water school curriculum development, media relations, and advertisement. As shown in Table 5-8, the projected water savings for this public outreach program have not yet been developed.

Table 5-8. Methods to Encourage Recycled Water Uses (DWR Table 38)

Actions	AF/Y of use projected to result from this action			
	2010	2015	2020	2025
Financial incentives	0	0	0	0
Public outreach	N/A	N/A	N/A	N/A
Total	0	0	0	0

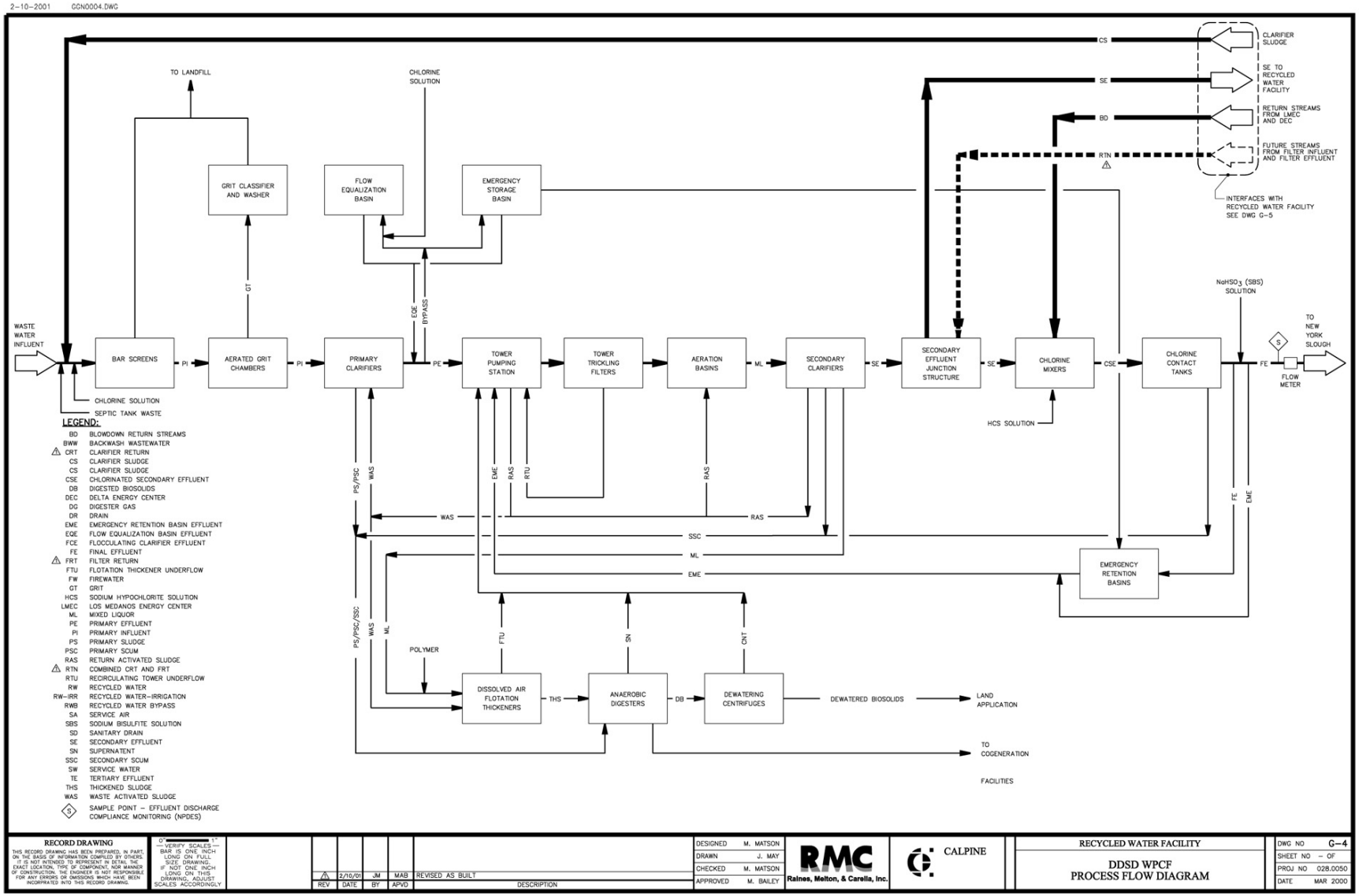

Figure 5-1. DDSS WPCF Process Flow Diagram

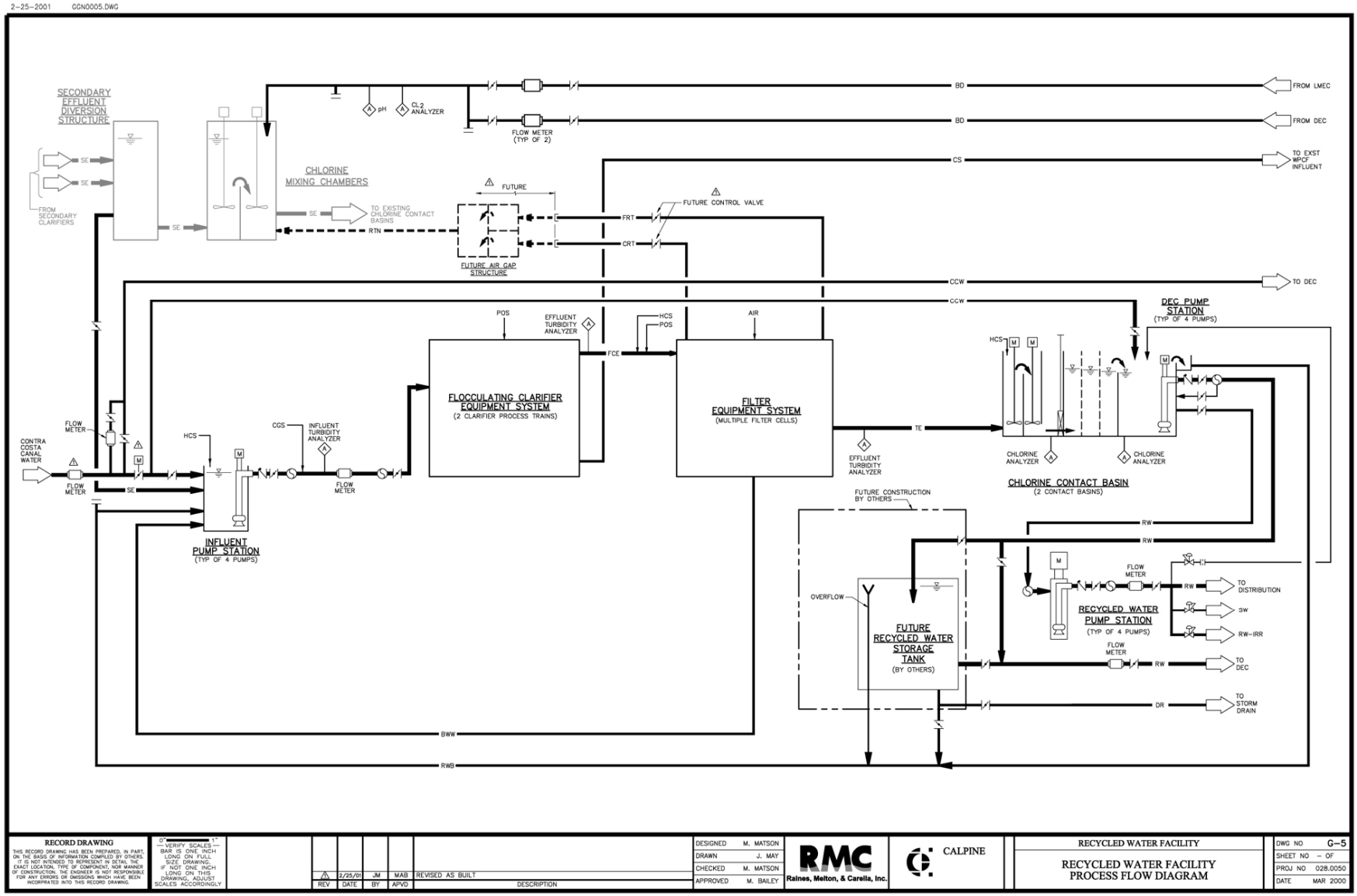

Figure 5-2. Recycled Water Facility Process Flow Diagram

SECTION 6
WATER CONSERVATION DEMAND MANAGEMENT MEASURES

Water conservation is a method available to reduce water demands, thereby reducing water supply needs for the City. Water conservation implementation can also decrease costs for wastewater treatment and disposal. This section presents a description of the City's water conservation program.

The unpredictable water supply and ever increasing demand on California's complex water resources have resulted in a coordinated effort by the State of California Department of Water Resources (DWR), water utilities, environmental organizations, and other interested groups to develop a list of urban Demand Management Measures DMMs for conserving water. This consensus-building effort resulted in a Memorandum of Understanding Regarding Urban Water Conservation in California (MOU), as amended September 16, 1999, among parties, which formalizes an agreement to implement these DMMs and makes a cooperative effort to reduce the consumption of California's water resources. The DMMs as defined by the MOU are presented in Table 6-1. The DMMs as defined in the MOU are generally recognized as standard definitions of water conservation measures. The MOU is administered by the California Urban Water Conservation Council (CUWCC). The City is not currently an MOU signatory.

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

Table 6-1. Water Conservation Demand Management Measures

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

6.1 Current Water Conservation Program

The City conducts an ongoing water conservation program. As a raw water customer of Contra Costa Water District (CCWD), all Antioch customers are eligible for conservation programs provided by CCWD. These services were not regularly marketed to Antioch customers until 2000. All DMMs are implemented by CCWD, so most expenses and savings are tracked by them. The City assists in the marketing of the programs and provides staffing assistance for some DMMs. A description of each DMM that is currently being implemented or scheduled for implementation, a schedule of implementation, and a method to evaluate effectiveness is provided in this section. The existing conservation savings are also discussed.

6.1.1 DMM 1—Water survey programs for single-family residential and multi-family residential connections

Description: Water survey programs for single and multi-family residential connections were implemented in 2000. The Single-Family (SF) Residential Survey Program offers free on-site evaluations of home water use. The survey takes between one to two hours to complete, and includes a thorough review of both interior and landscape water uses; however, the primary focus of the survey is landscape water use. The surveyor inspects each irrigation station, and notes specific problems and suggested repairs or improvements. Precipitation tests are conducted on individual sprinkler stations, and a site-specific monthly irrigation schedule is prepared. The schedule is programmed into the controller and the customer is taught how to adjust the timer. After participating in the program, customers are sent four (4) post cards each year to remind them to adjust their watering schedules and to check their irrigation systems. The Multi-Family (MF) Residential Survey Program targets apartment complexes and other multi-family customers. The program is marketed to the highest water-using customers and is implemented in conjunction with the MF ULFT Replacement Program. During the survey, plumbing fixtures are flow tested and high-efficiency fixtures are installed or provided to replace high-volume fixtures, such as showerheads, faucet aerators and toilet flappers. A report is provided to the customer, which lists the number and location of leaks found, an inventory of toilets by flush volume, and a list of showerheads, aerators or flappers installed. The customer is also provided information about other CCWD programs, such as the ULFT Distribution Program, Large Landscape Survey Program and Commercial Clothes Washer Program.

Schedule: The implementation of this DMM is ongoing. The program started in year 2000.

Evaluation of DMM Effectiveness: This program is implemented by CCWD; the City is responsible for marketing and conducts some of the single family surveys. Marketing costs and City staff time for this program are not separately tracked but instead, are included in the conservation coordinator expenditures (DMM 12). Expenditures, other than marketing costs, accrued by CCWD are provided in Table 6-2. The tabulated expenditures consist of the total cost of CCWD's implementation and not the costs related specifically to implementation within the City (Table 6-2). The number of surveys conducted in Antioch from 2001 to 2005 for single-family and multi-family units, is shown in Table 6-2.

Table 6-2. Actual Conservation Activities, Expenditures, and Water Savings (DMM 1)

Year	2001*	2002*	2003*	2004*	2005*
Single family surveys	5	64	91	94	82
Multi family surveys	153	385	43	660	113
Expenditures [a], dollars	N/A	N/A	154,573	145,307	N/A
Water savings, ac-ft/yr	2	7	10	19	21

[a]Source: CCWD Retail DMM Report, 2003 and CCWD Retail DMM Report, 2004.
*Data recorded for fiscal year from July 1 to June 30.

6.1.2 DMM 2—Residential plumbing retrofit

Description: Plumbing retrofit of existing residential accounts consists of providing low flow showerheads, faucet aerators, and toilet leak detection tablets to customers. There is not an enforceable ordinance in effect in the service area requiring the replacement of high-flow showerheads and other water use fixtures with their low-flow counterparts. The 75 percent saturation requirement for single-family and multi-family housing units has not yet been satisfied. From 2001 to 2005, approximately 79 and 284 low flow showerheads were installed or distributed to single-family and multi-family units, respectively. It is estimated that the percent of single-family units with low flow showerheads is 32, while 41 percent of multi-family housing units possess low flow showerheads. CCWD, not the City, tracks the distribution and cost of low-flow devices using MS Access.

The City markets the retrofit program in conjunction with the residential survey program. Marketing letters are sent out in batches by meter reading routes. Neighborhoods are selected to receive the marketing letters if there is a history of over irrigation in the neighborhood or if participation in the retrofit program needs to be increased; routes with pre-1992 homes are targeted. Marketing letters are sent out to all households in the selected route that have a monthly consumption of over 750 gpd or 30 units or more per month. This has been effective in targeting the City's larger consumers where the most water can be conserved. Marketing efforts are tracked so that each route is marketed at least once every two to three years. Routes where there are problems with over consumption are sent letters every one to two years. The City currently realizes close to a five percent response rate to marketing letters on average since 2001.

Schedule: The implementation of this DMM is ongoing. The program started in 1991.

Evaluation of DMM Effectiveness: This program is implemented by CCWD; the City is only responsible for marketing. Marketing costs for this program are not separately tracked but instead, are included in the conservation coordinator expenditures (DMM 12). Program expenditures, other than marketing, accrued by CCWD are included in DMM 1 expenditure data (Table 6-2). There are an estimated 18,621 pre-1992 single-family accounts and 3,787 pre-1992 multi-family accounts. The number of devices distributed, which includes showerheads, faucet aerators and flappers, are provided in Table 6-3.

Table 6-3. Actual Conservation Activities, Expenditures, and Water Savings (DMM 2)

Year	2001*	2002*	2003*	2004*	2005*
Single-family devices	2	N/A	69	56	61
Multi-family devices	31	N/A	79	975	122
Expenditures, dollars	N/A	N/A	N/A	N/A	N/A
Water savings, ac-ft/yr	0.5	0.5	2.6	17.2	19.4

*Data recorded for fiscal year from July 1 to June 30.

6.1.3 DMM 3—System water audits, leak detection and repair

Description: Because its unaccounted–for water percentage is so low (see Section 3.2.1) the City has no ongoing program for leak detection. Through City staff investigations, when leaks are found, repairs are made (Phil Barlow, personal communication, November 2005.)

The City also has an ongoing water main replacement program. On a yearly basis it budgets for removing and replacing older mains and valves. This activity helps substantially to reduce leakage potential.

Schedule: Leaks repaired when found.

Evaluation of DMM Effectiveness: Expenditures for leak repair is included in the overall Operations and Maintenance Budget (Table 6-4).

Table 6-4. Actual Conservation Activities, Expenditures and Water Savings (DMM 3)

Year	2001*	2002*	2003*	2004*	2005*
Percent unaccounted-for water	N/A	N/A	N/A	N/A	N/A
Miles of distribution lines survey[a]	N/A	N/A	N/A	N/A	N/A
Miles of distribution lines repaired	N/A	N/A	N/A	N/A	N/A
Expenditures[a], dollars	N/A	N/A	N/A	N/A	N/A
Water savings, ac-ft/yr	N/A	N/A	N/A	N/A	N/A

[a]Source: CCWD Retail DMM Report, 2003 and CCWD Retail DMM Report, 2004.
*Data recorded for fiscal year from July 1 to June 30.

6.1.4 DMM 4—Metering with commodity rates for all new connections and retrofit of existing connections

Description: The City has fully implemented this program. Meters are required by the City for all new connections and are billed by volume-of-use. There are no unmetered accounts. The City has not conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters. The number of CII accounts with mixed-use meters and the number of CII accounts with mixed-use meters retrofitted with dedicated irrigation meters has not been tracked by the City and, therefore, is not available.

Schedule: This program has been fully implemented.

Evaluation of DMM Effectiveness: There are no unmetered accounts in existence from 2001 to 2005 (Table 6-5). An estimate of water saved as a result of meter retrofits, the number of accounts without commodity rates, and expenditures to-date are not available.

Table 6-5. Actual Conservation Activities, Expenditures, and Water Savings (DMM 4)

Year	2001	2002	2003	2004	2005 (projected)
Unmetered accounts	0	0	0	0	0
Retrofit meters installed	N/A	N/A	N/A	N/A	N/A
Accounts without commodity rates	N/A	N/A	N/A	N/A	N/A
Expenditures, dollars	N/A	N/A	N/A	N/A	N/A
Water savings, ac-ft/yr	N/A	N/A	N/A	N/A	N/A

6.1.5 DMM 5—Large landscape conservation programs and incentives

Description: The Landscape Water Budget Program is directed at those commercial and multi-family sites with dedicated irrigation water accounts. Water budgets are prepared using real-time local evapotranspiration (eTo) data and actual landscape area measurements obtained through an aerial photo. The data is integrated into a detailed water budget equation, which integrates monthly landscape coefficients, irrigation efficiency, and real-time eTo. Water budget site reports are prepared comparing the water budget to actual water use. The program provides participating customers with water budget site reports tailored specifically to their properties. These reports enable the customer to adjust their water use to reflect seasonal weather changes and, therefore, control the costs of their water bills. This program is implemented by CCWD; the city is only responsible for marketing. Marketing costs for this program are not separately tracked but instead, are included in the conservation coordinator expenditures (DMM 12). Currently, the City does not provide water

use notices to accounts with budgets each billing cycle nor has it developed a marketing/targeting strategy for landscape surveys. Elements of the current Landscape Surveys are as follows:

- Irrigation system check
- Distribution uniformity analysis
- Review/develop irrigation schedules
- Measure landscape area
- Measure total irrigable area
- Provide customer report/information
- CCWD also tracks survey offers and results as well as provides follow-up surveys for previously completed surveys.

Schedule: The implementation of this DMM is ongoing. The program started in 2003.

Evaluation of DMM Effectiveness: This program is implemented by CCWD; program expenditures accrued by CCWD are provided in Table 6-6. The tabulated expenditures consist of the total cost of CCWD's implementation and not the costs related specifically to implementation within the City. This information, as well as the number of landscape audits completed, is provided in Tables 6-6.

Table 6-6. Actual Conservation Activities, Expenditures, and Water Savings (DMM 5)

Year	2001*	2002*	2003*	2004*	2005*
Budgets developed	N/A	N/A	N/A	N/A	N/A
Landscape audits completed	N/A	3	3	0	3
Follow-up visits	N/A	N/A	N/A	N/A	N/A
Expenditures[a], dollars	N/A	N/A	113,507	104,104	N/A
Water savings, ac-ft/yr	N/A	3.2	4.9	4.9	8.1

[a]Source: CCWD Retail DMM Report, 2003 and CCWD Retail DMM Report, 2004.
*Data recorded for fiscal year from July 1 to June 30.

6.1.6 DMM 6—High-efficiency washing machine rebate programs

Description: This program is implemented by CCWD. CCWD, in coordination with six other water agencies, implemented a Bay Area Regional Clothes Washer Rebate Program. CCWD's program has offered rebates from $50 to $100 to residential customers who purchase clothes washers with a minimum water use efficiency, or water factor. The program is marketed primarily through the retail appliance stores. In addition, CCWD markets the program through the City of Antioch newsletter, *Citygram*, the Single Family Survey Program, and through newspaper advertisements.

PG&E also offers rebates of $35 and $75 for high-efficiency washers. To qualify for these rebates the water heater must be heated by natural gas distributed to the installation address by PG&E or electricity distributed to the installation address by PG&E. Water heaters that use propane do not qualify. For a $35 rebate (Level 1), the clothes washer must have a Modified Energy Factor (MEF) of 1.42-1.59 and a Water Factor (WF) of 9.5 or lower. For a $75 rebate (Level 2), the clothes washer must have a MEF of 1.60 or greater and a WF of 8.5 or lower (PG&E, 2005).

Schedule: The implementation of this DMM is ongoing. The program started in 2000.

Evaluation of DMM Effectiveness: This program is implemented by CCWD; program expenditures accrued by CCWD are provided in Table 6-7. The tabulated expenditures consist of the total cost of

CCWD's implementation and not the costs related specifically to implementation within the City. The number of rebates and amount of the rebate are provided in Tables 6-7.

Table 6-7. Actual Conservation Activities, Expenditures, and Water Savings (DMM 6)

Year	2001*	2002*	2003*	2004*	2005*
Dollars per rebate	$50/100	$50/100	$50/100	$50/100	$50/100
Rebates paid	108	259	440	30	371
Expenditures[a], dollars	N/A	N/A	109,965	73,692	N/A
Water savings, ac-ft/yr	1.7	5.7	12.6	13.1	18.9

[a]Source: CCWD Retail BMP Report, 2003 and CCWD Retail BMP Report, 2004.

6.1.7 DMM 7—Public information programs

Description: Public information is an ongoing component of the City's water conservation program. Activities incorporated in this program include bills inserts, newsletters, and brochures, participation in media events, and speaker's bureau. In addition, the City is a participating agency in the Contra Costa County Green Business Program. The Green Business Program is a partnership of environmental agencies, professional associations, waste management agencies, and utilities, working together to recognize and assist businesses and government agencies that operate in an environmentally friendly manner.

Schedule: The implementation of this DMM is ongoing. The City has been doing conservation outreach, on some level, for a very long time and the official start date is not documented.

Evaluation of DMM Effectiveness: Savings from this program cannot be directly quantified. Most of the expenditures for this program are not separately tracked but instead, are included in the conservation coordinator expenditures (DMM 12). The activities performed in this program as well as expenditures to-date and projected are provided in Tables 6-8.

Table 6-8. Actual Conservation Activities and Expenditures (DMM 7)

Year	2001	2002	2003	2004	2005 (projected)
Bill inserts/newsletters/brochures	N/A	N/A	N/A	N/A	N/A
Speaker events, media events, dollars	N/A	N/A	N/A	N/A	200
Speaker's bureau	N/A	N/A	N/A	N/A	N/A
Program to coordinate with other government agencies, industry, and public interest groups and media	N/A	N/A	N/A	N/A	N/A
Expenditures, dollars	N/A	N/A	N/A	N/A	200

6.1.8 DMM 8—School education programs

Description: The City makes the Water Treatment Plant (WTP) available for Antioch schools to come out and tour the facility as an educational fieldtrip. These tours involve an age-appropriate guided tour of the water treatment plant. Students receive booklets and conservation material when they visit the plant. This program has primarily been used by 3rd grade classes.

Schedule: This is an ongoing program.

Evaluation of DMM Effectiveness: As with most education programs, the direct effectiveness of our fieldtrips is difficult to quantify. The program is well received by the students and the teachers that have come out continue to schedule for years to come.

Table 6-9 Actual Conservation Activities and Expenditures (DMM 8)

Year	2001	2002	2003	2004	2005 (projected)
Grades K-3rd	6	8	8	0	8
Grades 4th-6th	N/A	N/A	N/A	N/A	N/A
Grades 7th-8th	N/A	N/A	N/A	N/A	N/A
High School	N/A	N/A	N/A	N/A	N/A
Expenditures, dollars	600	800	800	N/A	800

6.1.9 DMM 9a—Conservation programs for commercial, industrial, and institutional accounts

Description: This program is implemented by CCWD; the city is only responsible for marketing. Marketing costs for this program are not separately tracked but instead, are included in the conservation coordinator expenditures (DMM 12). The CII survey program targets a variety of commercial, institutional and industrial customers. Individual water-using devices are inspected, and customers receive a report listing improvements that can be made to the equipment and to the maintenance of that equipment. Rebates are offered as an incentive to upgrade to more efficient equipment.

Schedule: The implementation of this DMM is ongoing. The program started in 2004.

Evaluation of DMM Effectiveness: This program is implemented by CCWD; program expenditures accrued by CCWD are provided in Table 6-10. The tabulated expenditures consist of the total cost of CCWD's implementation and not the costs related specifically to implementation within the City. CCWD does not track CII program interventions and water savings. The activities performed in this program are provided in Tables 6-10.

Table 6-10. Actual Conservation Activities, Expenditures, and Water Savings (DMM 9)

Year	2001*	2002*	2003*	2004*	2005*
On-site surveys completed	N/A	N/A	N/A	25	12
Rebates provided	N/A	N/A	N/A	36	0
Follow-up visits	N/A	N/A	N/A	N/A	N/A
Expenditures[a], dollars	N/A	N/A	84,382	118,653	N/A
Water savings, ac-ft/yr	N/A	N/A	N/A	22.6	36.8

[a]Source: CCWD Retail DMM Report, 2003 and CCWD Retail DMM Report, 2004
*Data recorded for fiscal year from July 1 to June 30.

6.1.10 DMM 9b—Conservation programs for commercial, industrial, and institutional accounts

Description: In addition to the existing survey program, CCWD provides CII ULFT replacement. The program targets various commercial and institutional customers through various means: direct mail, bill inserts, bill message, newsletter, telephone, website, trade publications, trade shows, or through the CII Survey Program. The most effective form of marketing was found to be direct mailing. However, bill insets and bill messages were inexpensive and resulted in modest participation. Customers are targeted based on consumption ranking, potential savings, oldest meter, CII sector or subsector, and CII ULFT study subsector targeting. Repeated targeting seems to be the most effective method. CCWD keeps and maintains customer participant information and is willing to share this information for use in a CUWCC study. Customers are offered a rebate of 100% of the material cost up to $150 per ULFT. In addition, CCWD negotiated with

local plumbing wholesalers to offer select high quality toilets at wholesale prices to any participant. This assures that toilets installed will have long-term savings and customer satisfaction.

Schedule: The implementation of this DMM is ongoing. The program started in 2000.

Evaluation of DMM Effectiveness: This program is implemented by CCWD; program expenditures accrued by CCWD are provided in Table 6-11. The tabulated expenditures consist of the total cost of CCWD's implementation and not the costs related specifically to implementation within the City. The activities performed in this program are provided in Tables 6-11.

Table 6-11. ULFT Replacement Activities, Expenditures and Water Savings (DMM 9)

	2001*	2002*	2003*	2004*	2005*
# of commercial replacements	0	0	11	11	129
# of industrial replacements	0	0	0	0	0
# of institutional replacements	0	0	4	25	3
Actual expenditures[a] - dollars	0	0	282,353	50,839	N/A
Actual water savings - AF/Y	0	0	0.6	1.8	6.0

[a]Source: CCWD Retail BMP Report, 2003 and CCWD Retail BMP Report, 2004.
*Data recorded for fiscal year from July 1 to June 30.

6.1.11 DMM 10—Wholesale agency assistance programs

This DMM is not applicable to the City because the City is not a wholesale agency.

6.1.12 DMM 11—Conservation pricing

Description: The City's price rate structure includes a monthly service charge and a charge per 100 cubic feet of water use. The City does not divide rates by account type. Rather, the monthly service charge is based on water line size and the quantity charge is based on zone.

Schedule: N/A

Evaluation of DMM Effectiveness: The City currently does not measure the effectiveness of the rates schedule. This conservation program is in its initial stages and the results have not been fully realized.

Table 6-12. Description of District Rate Structures (DMM 11)

Account Type	Define
Residential Water rate structure Year rate effective	Zone 1 - $1.73/100 cfs 5/8" – 1" - $7.85 – 7.95 2003
Commercial Water rate structure Year rate effective	Zone 1 - $1.73/100 cfs 5/8" – 1" - $7.85 – 7.95 2003
Industrial Water rate structure Year rate effective	Zone 1 - $1.73/100 cfs 5/8" – 1" - $7.85 – 7.95 2003
Institutional Water rate structure Year rate effective	Zone 1 - $1.73/100 cfs 5/8" – 1" - $7.85 – 7.95 2003
Irrigation (dedicated meter) Water rate structure Year rate effective	Zone 1 - $1.73/100 cfs 5/8" – 1" - $7.85 – 7.95 2003

6.1.13 DMM 12—Conservation coordinator

Description: The conservation coordinator is an ongoing component of the City's water conservation program. The conservation coordinator is responsible for implementing and monitoring the City's water conservation activities. A conservation coordinator has been in place since July of 2000. The position title is Environmental Resource Coordinator. The Environmental Resource Coordinator is Julie Haas-Wajdowicz, who is a full time staff person but only devotes 1/3 of her time to water conservation. Regional conservation work is done through a partnership with CCWD. There is no additional staff provided by the City, however some leak checking and initial outreach is done by meter readers and other field workers, and customer service representatives often provide conservation and leak detection advice to customers. Conservation coordinator and staff information including historical annual expenditures is provided in Tables 6-13.

Schedule: The implementation of this DMM is ongoing. The program started in 2000.

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

Table 6-13. Actual Conservation Activities and Expenditures (DMM 12)

Year	2001	2002	2003	2004	2005 (projected)
Full-time positions	0	0	0	0	0
Part-time staff	1	1	1	1	1
Position supplied by other agency	N/A	N/A	N/A	N/A	N/A
Expenditures, dollars	20,000	21,000	45,000	45,000	50,000

6.1.14 DMM 13—Water waste prohibition

Description: Water waste prohibition is an ongoing component of the City's water conservation program. This City has adopted a water waste prohibition ordinance. The City's most current water waste ordinance is as follows:

Antioch Municipal Code

§ 6-5.10 WASTE OF WATER.
No person shall misuse or waste water. Any person misusing or wasting water shall be guilty of an infraction. The term ***MISUSE*** or ***WASTE*** shall mean the use of water which, to a reasonable person, is clearly in excess of the need or intended purpose. ***MISUSE*** or ***WASTE*** may also mean the use of water in excess of quantity standards imposed during any water shortage emergency declared by the City Council. In the event of any misuse or waste of water, in addition to criminal prosecution, the Finance Department may install flow restrictors at the premises where misuse or waste has occurred, following procedures established for such installation, which shall include at least one warning notice to the consumer prior to such installation.
('66 Code, § 6-5.10) (Ord. 76-A, passed 12-17-23; Am. Ord. 817-C-S, passed 7-11-91) Penalty, see § 6-5.33

The majority of the cases of water wasting involve over irrigation. All violators are referred to CCWD to take advantage of their water conservation programs and assistance. Enforcement is carried out by the City's Neighborhood Improvement Officers. To date, citations have not been issued for water wasting violations, as compliance is typically reached with courtesy notices and abatement letters. On-site visits noted in Table 6-14 below are verified cases created in the City's code violation tracking database. This is an under reporting of the efforts as most instances do not reach the code enforcement level of involvement. Currently, the City does not include water softener checks in the home water survey nor does it include information about Demand Initiated Regenerating and exchange-type water softeners in education efforts.

A summary of the program including annual expenditures in the past is provided in Tables 6-14.

Schedule: The implementation of this DMM is ongoing.

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

Table 6-14. Actual Conservation Activities and Expenditures (DMM 13)

Year	2001	2002	2003	2004	2005 (projected)
Waste ordinance in effect	Yes	Yes	Yes	Yes	Yes
On-site visits	6	1	N/A	5	5
Water softener ordinance	N/A	N/A	N/A	N/A	N/A
Expenditures, dollars	N/A	N/A	N/A	N/A	N/A

6.1.15 DMM 14—Residential ULFT replacement programs

Description: This program is implemented by CCWD; the City assists in the marketing of the program. Marketing costs for this program are not separately tracked but instead, are included in the conservation coordinator expenditures (DMM 12). CCWD offers both single-family and multi-family residential customers with Ultra Low Flow toilets (ULFTs). The program is marketed directly to customers with homes built prior to 1992 through the survey programs. The program is also marketed through articles in the City's newsletter, *The Citygram*, which is distributed in the water bills. Eligible customers receive a voucher and pick up their new ULFT at a specific vendor who contracts with CCWD. Customers are responsible for installa-

tion and CCWD conducts random inspections to insure proper installation. Multi-family customers who replace more than six toilets receive free delivery. The Multi-family program is marketed at least one time each year to a Property Managers Group that meets monthly with the Police Department and Neighborhood Improvement Services staff. Prior to the ULFT Distribution Program, CCWD offered rebates to single-family customers as an incentive to install ULFTs.

Schedule: The implementation of this DMM is ongoing. The program started in 1994.

Evaluation of DMM Effectiveness: This program is implemented by CCWD; program expenditures accrued by CCWD for both the single and multi-family programs are provided in Table 6-15 and Table 6-16. The tabulated expenditures consist of the total cost of CCWD's implementation and not the costs related specifically to implementation within the City. The number of ULFT rebates and installs performed in the City of Antioch for single and multi-family units are provided in Tables 6-15 and 6-16, respectively.

Table 6-15. Actual Conservation Activities and Expenditures (DMM 14 Single-Family)

Table N1-Actual	2001*	2002*	2003*	2004*	2005*
# of ULF rebates	53	80	N/A	0	N/A
# of ULF direct installs	53	80	101	261	334
# of ULF CBO installs	N/A	N/A	N/A	N/A	N/A
Actual expenditures[a] - dollars	N/A	N/A	124,703	22,167	N/A
Actual water savings -AF/Y	2.6	6.6	11.6	24.6	41.2

[a]Source: CCWD Retail BMP Report, 2003 and CCWD Retail BMP Report, 2004.
*Data recorded for fiscal year from July 1 to June 30.

Table 6-16. Actual Conservation Activities and Expenditures (DMM 14 Multi-Family)

Table N2-Actual	2001*	2002*	2003*	2004*	2005*
# of ULF rebates	N/A	N/A	N/A	0	N/A
# of ULF direct installs	28	75	190	343	72
# of ULF CBO installs	N/A	N/A	N/A	N/A	N/A
Actual expenditures - dollars	N/A	N/A	N/A	N/A	N/A
Actual water savings - AF/Y	1.5	5.3	15.2	33.0	36.7

*Data recorded for fiscal year from July 1 to June 30.

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SECTION 7
WATER SUPPLY VERSUS DEMAND COMPARISON

This section presents a comparison of existing and future water supply versus demand. The comparison is based on the water demand projections developed in Section 3 and the water supply volumes determined and projected in Section 4. The comparison considers the projected normal water year demands versus the projected normal water year supplies. Consideration was also given to water demand and supply conditions for a single dry water year and multiple dry water years.

7.1 Current and Projected Water Supplies vs. Demand

Tables 7-1, 7-2 and 7-3 summarize and compare the projected annual water supply and demand for normal water supply years. The City of Antioch (City) will have adequate capacity during normal years through the year 2025. Note that this comparison does not account for water saved as DMMs participation is increased. Increased participation in DMMs, could cause demand to decrease in the future.

Table 7-1. Projected Normal Water Supply, AF/Y (DWR Table 40)

	2010	2015	2020	2025
Supply	49,140	49,140	49,140	49,140
Percent of year 2004	101.1	101.1	101.1	101.1

Table 7-2. Projected Normal Water Demand, AF/Y (DWR Table 41)

	2010	2015	2020	2025
Demand	22,371	23,770	25,170	25,822
Percent of year 2004	102	109	115	118

Table 7-3. Projected Supply and Demand Comparison (DWR Table 42)

	2010	2015	2020	2025
Supply totals	49,140	49,140	49,140	49,140
Demand totals	22,371	23,770	25,170	25,822
Difference	26,769	25,370	23,970	23,318
Difference as percent of supply	54	52	49	47
Difference as percent of demand	120	107	95	90

7.2 Water Shortage Expectations

Tables 7-4 through 7-18 summarize the projected water supply and demand for normal, single dry, and multiple dry water years based on the assumptions about water reliability described in Section 4. These tables show that the City will have an adequate water supply during normal years, single dry years, and multiple dry water years through the year 2025. However, the City will advocate conservation and request or require cutbacks in the second and third dry water years of 10 and 15 percent respectively. These reductions recognize that the City's water demand associated with growth will continue to occur during multiple dry years.

Table 7-4. Projected Single Dry Year Water Supply, AF/Y (DWR Table 43)

	2010	2015	2020	2025
Supply	49,140	49,140	49,140	49,140
Percent of projected normal	100.0	100.0	100.0	100.0

Table 7-5. Projected Single Dry Year Water Demand, AF/Y (DWR Table 44)

	2010	2015	2020	2025
Demand	22,371	23,770	25,170	25,822
Percent of projected normal	100.0	100.0	100.0	100.0

Table 7-6. Projected Single Dry Year Water Demand, AF/Y (DWR Table 45)

	2010	2015	2020	2025
Supply totals	49,140	49,140	49,140	49,140
Demand totals	22,371	23,770	25,170	25,822
Difference	26,769	25,370	23,970	23,318
Difference as percent of supply	54.5	51.6	48.8	47.5
Difference as percent of demand	119.7	106.7	95.2	90.3

Table 7-7. Projected Supply During Multiple Dry Year Period Ending in 2010, AF/Y (DWR Table 46)

	2006	2007	2008	2009	2010
Supply	49,140	37,560	35,540	35,530	31,510
Percent of projected normal	100.0	76.4	72.3	68.2	64.1

Table 7-8. Projected Demand Multiple Dry Year Period Ending in 2010, AF/Y (DWR Table 47)

	2006	2007	2008	2009	2010
Demand	22,287	20,077	18,980	18,998	19,015
Percent of projected normal	101.9	91.8	86.8	86.9	87.0

Table 7-9. Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2010, AF/Y (DWR Table 48)

	2006	2007	2008	2009	2010
Supply totals	49,140	37,560	35,540	33,530	31,510
Demand totals	22,287	20,077	18,980	18,998	19,015
Difference	26,853	17,483	16,560	14,532	12,495
Difference as percent of supply	54.6	46.5	46.6	43.3	39.7
Difference as percent of demand	120.5	87.1	87.2	76.5	65.7

Table 7-10. Projected Supply During Multiple Dry Year Period Ending 2015, AF/Y (DWR Table 49)

	2011	2012	2013	2014	2015
Supply	49,140	37,560	35,540	35,530	31,510
Percent of projected normal	100.0	76.4	72.3	68.2	64.1

Table 7-11. Projected Demand Multiple Dry Year Period Ending in 2015, AF Year (DWR Table 50)

	2011	2012	2013	2014	2015
Demand	22,651	20,638	19,729	19,967	20,205
Percent of projected normal	100.0	91.1	87.1	88.2	89.2

Table 7-12. Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2015, AF/Y (DWR Table 51)

	2011	2012	2013	2014	2015
Supply totals	49,140	37,560	35,540	33,530	31,510
Demand totals	22,651	20,638	19,729	19,967	20,205
Difference	26,489	16,922	15,811	13,563	11,305
Difference as percent of supply	53.9	45.1	44.5	40.4	35.9
Difference as percent of demand	116.9	82.0	80.1	67.9	55.9

Table 7-13. Projected Supply During Multiple Dry Year Period Ending in 2020, AF/Y (DWR Table 52)

	2016	2017	2018	2019	2020
Supply	49,140	37,560	35,540	33,530	31,510
Percent of projected normal	100.0	76.4	72.3	68.2	64.1

Table 7-14. Projected Demand Multiple Dry Year Period Ending in 2020, AF Year (DWR Table 53)

	2016	2017	2018	2019	2020
Demand	24,050	21,897	20,919	21,157	21,395
Percent of projected normal	100.0	91.0	87.0	88.0	89.0

Table 7-15. Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2020, AF/Y (DWR Table 54)

	2016	2017	2018	2019	2020
Supply totals	49,140	37,560	35,540	33,530	31,510
Demand totals	24,050	21,897	20,919	21,157	21,395
Difference	25,090	15,663	14,622	12,374	10,116
Difference as percent of supply	51.1	41.7	41.1	36.9	32.1
Difference as percent of demand	104.3	71.5	69.9	58.5	47.3

Table 7-16. Projected Supply During Multiple Dry Year Period Ending in 2025, AF/Y (DWR Table 55)

	2021	2022	2023	2024	2025
Supply	49,140	37,560	35,540	33,530	31,510
Percent of projected normal	100.05	76.4	72.3	68.2	64.1

Table 7-17. Projected Demand Multiple Dry Year Period Ending in 2025, AF/Y (DWR Table 56)

	2021	2022	2023	2024	2025
Demand	25,300	22,887	21,726	21,837	21,947
Percent of projected normal	100.0	90.5	85.9	86.3	86.7

Table 7-18. Projected Supply and Demand Comparison During Multiple Dry Year Period Ending in 2025, AF/Y (DWR Table 57)

	2021	2022	2023	2024	2025
Supply totals	49,140	37,560	35,540	33,530	31,510
Demand totals	25,300	22,887	21,726	21,837	21,947
Difference	23,840	14,673	13,814	11,694	9,563
Difference as percent of supply	48.5	39.1	38.9	34.9	30.3
Difference as percent of demand	94.2	64.1	63.6	53.6	43.6

7.3 Conclusions on Supply Reliability and Demand

Based on available supplies and reasonable levels of local water conservation, the City should have adequate supply to meet normal, single and multiple dry years. For conservation during a drought, the following measures will be taken:

- During the second year of multiple dry years, voluntary/mandatory reductions in demand will be 10 percent.
- During the third year of multiple dry years, voluntary/mandatory reductions in demand will be 15 percent.

The above conclusions do not account for the full implementation of DMMs. There are five DMMs that have a B/C ratio greater than or equal to one. If these DMMs are fully implemented, demand could be even lower than that projected above.

SECTION 8
RECOMMENDATIONS

The City of Antioch (City) currently uses surface water from the San Joaquin River and Contra Costa Water District (CCWD) as its water supply sources. Specific water supply recommendations are given below.

- Continue to use surface water 1) pumped from the San Joaquin River and 2) purchased from CCWD as the primary sources of supply.
- Investigate the capital costs to implement a reclaimed water program.
- Continue to implement water conservation Demand Management Measures (formally Best Management Practices) in accordance with the Memorandum of Understanding (MOU).

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Appendix A

List of Abbreviations

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APPENDIX A

LIST OF ABBREVIATIONS

ABAG	Association of Bay Area Governments
ac-ft, AF	acre-feet
ac-ft/yr, AF/Y, AFY	acre-feet per year
Act	Urban Water Management Act
ADWF	average dry weather flow
BMPs	Best Management Practices
BPS	Booster pump station
Bureau	United States Bureau of Reclamation
Canal	Contra Costa Canal
CCWD	Contra Costa Water Department
CDHS	California Department of Health Services
City	City of Antioch
CUWCC	California Urban Water Conservation Council
DDSD	Delta Diablo Sanitation District
DEC	Delta Energy Center
DHS	California Department of Health Services
DMM	Demand Management Measure
DWR	California Department of Water Resources
EPA	U.S. Environmental Protection Agency
Eto	evapotranspiration
gpd, gal/d	gallons per day
gpm	gallons per minute
LMEC	Los Medanos Energy Center
MEF	Modified Energy Factor
MF	Multi-Family
mg	million gallons
mg/l	Milligrams per liter
μg/l	micrograms per liter
mgd	million gallons per day
MOU	Memorandum of Understanding Regarding Urban Water Conservation in California
NPDES	National Pollutant Discharge Elimination System
Plan, UWMP	Urban Water Management Plan
PRV	pressure reducing valve
psig	pounds per square inch gage
RBP	Randall-Bold Plant
RWF	Recycled Water Facility
SCADA	Supervisory Control and Data Acquisition
SF	Single-Family
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
THMs	Trihalomethanes
TMDL	Total Maximum Daily Load

ULFT	Ultra Low Flow Toilet
WF	Water Factor
WPCF	Water Pollution Control Facility
WRCC	Western Regional Climate Center
WTP	Water Treatment Plant
yr	year

Appendix B

California Department of Water Resources
2005 Urban Water Management Plan Checklist

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2005 Urban Water Management Plan "Review for Completeness" Form

For DWR Review Staff Use

Coordination with Appropriate Agencies **(Water Code § 10620 (d)(1)(2))**

Yes

☐ Participated in area, regional, watershed or basin wide plan _____ Reference & Page Number

Name of plan _____ Lead Agency _____ _____ Reference & Page Number

☐ Describe the coordination of the plan preparation and anticipated benefits. _____ Reference & Page Number

Table 1
Coordination with Appropriate Agencies

Check at least one box on each row	Participated in developing the plan	Commented on the draft	Attended public meetings	Was contacted for assistance	Was sent a copy of the draft plan	Was sent a notice of intention to adopt	Not Involved / No Information
Other water suppliers							
Water management agencies							
Relevant public agencies							
Other							
Other							

Describe resource maximization / import minimization plan **(Water Code §10620 (f))**

☐ Describe how water management tools / options maximize resources & minimize need to import water _____ Reference & Page Number

Plan Updated in Years Ending in Five and Zero **(Water Code § 10621(a))**

☐ Date updated and adopted plan received _____ (enter date) _____ Reference & Page Number

City and County Notification and Participation **(Water Code § 10621(b))**

☐ Notify any city or county within service area of UWMP of plan review & revision _____ Reference & Page Number

☐ Consult and obtain comments from cities and counties within service area _____ Reference & Page Number

Service Area Information **Water Code § 10631 (a))**

☐ Include current and projected population _____ Reference & Page Number

☐ Population projections were based on data from state, regional or local agency _____ Reference & Page Number

Table 2 Population - Current and Projected						
	2005	2010	2015	2020	2025	2030 - opt
Service Area Population						

☐ Describe climate characteristics that affect water management _____ Reference & Page Number

☐ Describe other demographic factors affecting water management _____ Reference & Page Number

Table 3 Climate						
	January	February	March	April	May	June
Standard Average ETo						
Average Rainfall						
Average Temperature						

Table 3 (continued)

Climate							
	July	August	September	October	November	December	Annual
Average ETo							0
Average Rainfall							0
Average Temperature							0

Water Sources **(Water Code § 10631 (b))**

☐	Identify existing and planned water supply sources	2-1	Reference & Page Number
☐	Provide current water supply quantities	2-1	Reference & Page Number
☐	Provide planned water supply quantities	2-1	Reference & Page Number

Table 4 Current and Planned Water Supplies - AFY						
Water Supply Sources	2005	2010	2015	2020	2025	2030 - opt
Water purchased from:						
U.S. Bureau of Reclamation						
Department of Water Resources						
Arcade Water District						
Calleguas Municipal Water District						
Castaic Lake Water Agency						
Central Basin Municipal Water District						
Chino Basin Municipal Water District						
Coastal Municipal Water District						
Contra Costa Water District						
Eastern Municipal Water District						
Foothill Municipal Water District						
Humboldt Bay Municipal Water District						

Inland Empire Utilities Agency						
Joint Regional Water Supply System						
Kern County Water Agency						
Metropolitan Water District of Southern Cal						
Municipal Water District of Orange County						
North of The River Municipal Water District						
Placer County Water Agency						
Sacramento County Water Management Dist						
San Diego County Water Authority						
San Francisco City of						
San Juan Water District						
San Luis Obispo County						
Santa Clara Valley Water District						
Solano County Water Agency						
Sonoma County Water Agency						
Stockton East Water District						
Tehachapi-Cummings County Water District						
Three Valleys Municipal Utility District						
Upper San Gabriel Valley Municipal Water						
Water Facilities Authority						
West Basin Municipal Water District						
Western Municipal Water Dist of Riverside						
Zone 7						
Other Wholesaler 1 (enter agency name)						
Other Wholesaler 2 (enter agency name)						
Other Wholesaler 3 (enter agency name)						
Supplier produced groundwater						

Supplier surface diversions						
Transfers in or out						
Exchanges In or out						
Recycled Water (projected use)						
Desalination						
Other						
Other						
Total	**0**	**0**	**0**	**0**	**0**	**0**

If Groundwater identified as existing or planned source **(Water Code §10631 (b)(1-4))**

☐	Has management plan	_____ Reference & Page Number
☐	Attached management plan (b)(1)	_____ Reference & Page Number
☐	Description of basin(s) (b)(2)	_____ Reference & Page Number
☐	Basin is adjudicated	_____ Reference & Page Number
☐	If adjudicated, attached order or decree (b)(2)	_____ Reference & Page Number
☐	Quantified amount of legal pumping right (b)(2)	_____ Reference & Page Number

Table 5
Groundwater Pumping Rights - AF Year

Basin Name	Pumping Right - AFY
Total	0

☐	DWR identified, or projected to be, in overdraft (b)(2)	_____ Reference & Page Number
☐	Plan to eliminate overdraft (b)(2)	_____ Reference & Page Number
☐	Analysis of location, amount & sufficiency, last five years (b)(3)	_____ Reference & Page Number
☐	Analysis of location & amount projected, 20 years (b)(4)	_____ Reference & Page Number

Table 6
Amount of Groundwater pumped - AFY

Basin Name (s)	2000	2001	2002	2003	2004
	0	0	0	0	0
% of Total Water Supply					

Table 7
Amount of Groundwater projected to be pumped - AFY

Basin Name(s)	2010	2015	2020	2025	2030 - opt
	0	0	0	0	0
% of Total Water Supply	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Reliability of Supply **(Water Code §10631 (c) (1-3)**

☐	Describes the reliability of the water supply and vulnerability to seasonal or climatic shortage	_____ Reference & Page Number

Table 8

Supply Reliability - AF Year					
		Multiple Dry Water Years			
Average / Normal Water Year	Single Dry Water Year	Year 1	Year 2	Year 3	Year 4
% of Normal	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Table 9 Basis of Water Year Data				
Water Year Type	Source name	Source name	Source name	
Average Water Year				_____ Reference & Page Number
Single-Dry Water Year				_____ Reference & Page Number
Multiple-Dry Water Years				_____ Reference & Page Number

Water Sources Not Available on a Consistent Basis **(Water Code §10631 (c))**

☐ Describe the reliability of the water supply due to seasonal or climatic shortages _____ Reference & Page Number

☐ Describe the vulnerability of the water supply to seasonal or climatic shortages _____ Reference & Page Number

☐ No unreliable sources _____ Reference & Page Number

Table 10 Factors resulting in inconsistency of supply				
Name of supply	Legal	Environ-mental	Water Quality	Climatic

☐ Describe plans to supplement or replace inconsistent sources with alternative sources or DMMs _____ Reference & Page Number

☐ No inconsistent sources _____ Reference & Page Number

Transfer or Exchange Opportunities (Water Code §10631 (d))

☐ Describe short term and long term exchange or transfer opportunities _____ Reference & Page Number

☐ No transfer opportunities _____ Reference & Page Number

Table11
Transfer and Exchange Opportunities - AF Year

Transfer Agency	Transfer or Exchange	Short term	Proposed Quantities	Long term	Proposed Quantities
Total			0		0

Water Use Provisions (Water Code §10631 (e)(1)(2))

☐ Quantify past water use by sector 4-2 Reference & Page Number

☐ Quantify current water use by sector — 4-2 Reference & Page Number

☐ Project future water use by sector — 4-2 Reference & Page Number

TABLE 12 - Past, Current and Projected Water Deliveries								
	2000				2005			
	metered		unmetered		metered		unmetered	
Water Use Sectors	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY
Single family								
Multi-family								
Commercial								
Industrial								
Institutional/gov								
Landscape								
Agriculture								
other								
Total	0	0	0	0	0	0	0	0

TABLE12 (continued) - Past, Current and Projected Water Deliveries								
	2010				2015			
	metered		unmetered		metered		unmetered	
Water Use Sectors	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY
Single family								
Multi-family								
Commercial								
Industrial								
Institutional/gov								

Landscape								
Agriculture								
other								
Total	0	0	0	0	0	0	0	0

TABLE12 (continued) - Past, Current and Projected Water Deliveries								
	2020				**2025**			
	metered		unmetered		metered		unmetered	
Water Use Sectors	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY
Single family								
Multi-family								
Commercial								
Industrial								
Institutional/gov								
Landscape								
Agriculture								
other								
Total	0	0	0	0	0	0	0	0

☐ Identify and quantify sales to other agencies _____ Reference & Page Number

☐ No sales to other agencies _____ Reference & Page Number

Table 13
Sales to Other Agencies - AF Year

Water Distributed	2000	2005	2010	2015	2020	2025	2030 - opt
La Cumbre							
name of agency							
name of agency							
Total							

☐ Identify and quantify additional water uses _____ Reference & Page Number

Table 14 Additional Water Uses and Losses - AF Year							
Water Use	2000	2005	2010	2015	2020	2025	2030 - opt
Saline barriers							
Groundwater recharge							
Conjunctive use							
raw water							
recycled							
other (define)							
Unaccounted-for system losses							
Total							

Any recycled water
14.

Table 15 Total Water Use - AF Year							
Water Use	2000	2005	2010	2015	2020	2025	2030 - opt
Total of Tables 12, 13, 14							

(Water Code §10631 (f) & (g), the 2005 Urban Water Management Plan "Review of DMMs for Completeness" Form is found on Sheet 2

Planned Water Supply Projects and Programs, including non-implemented DMMs	(Water Code §10631 (g))
☐ No non-implemented / not scheduled DMMs	_____ Reference & Page Number
☐ Cost-Benefit includes economic and non-economic factors (environmental, social, health, customer impact, and technological factors)	_____ Reference & Page Number
☐ Cost-Benefit analysis includes total benefits and total costs	_____ Reference & Page Number
☐ Identifies funding available for Projects with higher per-unit-cost than DMMs	_____ Reference & Page Number
☐ Identifies Suppliers' legal authority to implement DMMs, efforts to implement the measures and efforts to identify cost share partners	_____ Reference & Page Number

Table 16
Evaluation of unit cost of water resulting from non-implemented / non-scheduled DMMs and planned water supply project and programs

Non-implemented & Not Scheduled DMM / Planned Water Supply Projects (Name)	Per-AF Cost ($)

Planned Water Supply Projects and Programs	(Water Code §10631 (h))
☐ No future water supply projects or programs	
☐ Detailed description of expected future supply projects & programs	_____ Reference & Page Number
☐ Timeline for each proposed project	_____ Reference & Page Number
☐ Quantification of each projects normal yield (AFY)	_____ Reference & Page Number

☐ Quantification of each projects single dry-year yield (AFY) _____ Reference & Page Number

☐ Quantification of each projects multiple dry-year yield (AFY) _____ Reference & Page Number

Table 17 Future Water Supply Projects							
Project Name	**Projected Start Date**	**Projected Completion Date**	**Normal-year AF to agency**	**Single-dry year yield AF**	**Multiple-Dry-Year 1 AF**	**Multiple-Dry-Year 2 AF**	**Multiple-Dry-Year 3 AF**

Opportunities for development of desalinated water (Water Code §10631 (i))

☐ Describes opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply

☐ No opportunities for development of desalinated water

Table 18 Opportunities for desalinated water	
Sources of Water	**Check if yes**
Ocean Water	
Brackish ocean water	
Brackish groundwater	
other	

other	

District is a CUWCC signatory **(Water Code § 10631 (j))**

Urban suppliers that are California Urban Water Conservation Council members may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g).
The supplier's CUWCC Best Management Practices Report should be attached to the UWMP.

- ☐ Agency is a CUWCC member _____ Reference & Page Number
- ☐ 2003-04 annual updates are attached to plan _____ Reference & Page Number
- ☐ Both annual updates are considered completed by CUWCC website _____ Reference & Page Number

If Supplier receives or projects receiving water from a wholesale supplier **(Water Code §10631 (k))**

Yes

- ☐ Agency receives, or projects receiving, wholesale water _____ Reference & Page Number
- ☐ Agency provided written demand projections to wholesaler, 20 years _____ Reference & Page Number

Table 19
Agency demand projections provided to wholesale suppliers - AFY

Wholesaler	2010	2015	2020	2025	2030 - opt
(name 1)					
(name 2)					
(name 3)					

- ☐ Wholesaler provided written water availability projections, by source, to agency, 20 years _____ Reference & Page Number

(if agency served by more than one wholesaler, duplicate this table and provide the source availability for each wholesaler)

Table 20
Wholesaler identified & quantified the existing and planned sources of water- AFY

Wholesaler sources	2010	2015	2020	2025	2030 - opt
(source 1)					
(source 2)					
(source 3)					

☐ Reliability of wholesale supply provided in writing by wholesale agency _____ Reference & Page Number
(if agency served by more than one wholesaler, duplicate this table and provide the source availability for each wholesaler)

Table 21 Wholesale Supply Reliability - % of normal AFY					
	Multiple Dry Water Years				
Wholesaler sources	Single Dry	Year 1	Year 2	Year 3	Year 4
(source 1)					
(source 2)					
(source 3)					

Table 22 Factors resulting in inconsistency of wholesaler's supply				
Name of supply	Legal	Environment	Water Quality	Climatic

Water Shortage Contingency Plan Section **(Water Code § 10632)**

Stages of Action **(Water Code § 10632 (a))**

☐ Provide stages of action _____ Reference & Page Number

☐ Provide the water supply conditions for each stage _____ Reference & Page Number

☐ Includes plan for 50 percent supply shortage _____ Reference & Page Number

Table 23 Water Supply Shortage Stages and Conditions RATIONING STAGES		
Stage No.	**Water Supply Conditions**	**% Shortage**

Three-Year Minimum Water Supply **(Water Code §10632 (b))**

☐ Identifies driest 3-year period _____ Reference & Page Number

☐ Minimum water supply available by source for the next three years _____ Reference & Page Number

Table 24 Three-Year Estimated Minimum Water Supply - AF Year				
source**	**Normal**	**Year 1**	**Year 2**	**Year 3**

*Note: If reporting after 2005, please change the column headers (Year 1, 2, & 3) to the appropriate years

Total				

Preparation for catastrophic water supply interruption **(Water Code §10632 (c))**

☐ Provided catastrophic supply interruption plan _____ Reference & Page Number

Table 25 Preparation Actions for a Catastrophe	
Possible Catastrophe	**Check if Discussed**
Regional power outage	
Earthquake	
Other (name event)	
Other (name event)	

Prohibitions **(Water Code § 10632 (d))**

☐ List the mandatory prohibitions against specific water use practices during water shortages _____ Reference & Page Number

Table 26 Mandatory Prohibitions

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
Using potable water for street washing	
Other (name prohibition)	
Other (name prohibition)	
Other (name prohibition)	
Other (name prohibition)	
Other (name prohibition)	
Other (name prohibition)	

Consumption Reduction Methods (Water Code § 10632 (e))

☐ List the consumption reduction methods the water supplier will use to reduce water use in the most restrictive stages with up to a 50% reduction. _____ Reference & Page Number

Table 27 Consumption Reduction Methods		
Consumption Reduction Methods	**Stage When Method Takes Effect**	**Projected Reduction (%)**
name method		

name method		
name method		
name method		
name method		
name method		

Penalties (Water Code § 10632 (f))

☐ List excessive use penalties or charges for excessive use _____ Reference & Page Number

Table 28 Penalties and Charges	
Penalties or Charges	**Stage When Penalty Takes Effect**
Penalty for excess use	
Charge for excess use	
Other (name penalties or charges)	
Other (name penalties or charges)	
Other (name penalties or charges)	
Other (name penalties or charges)	
Other (name penalties or charges)	
Other (name penalties or charges)	

Revenue and Expenditure Impacts (Water Code § 10632 (g))

☐ Describe how actions and conditions impact revenues _____ Reference & Page Number

☐ Describe how actions and conditions impact expenditures _____ Reference & Page Number

☐ Describe measures to overcome the revenue and expenditure impacts _____ Reference & Page Number

Table 29 Proposed measures to overcome revenue impacts	
Names of measures	**Check if Discussed**
Rate adjustment	
Development of reserves	
name of measure	
name of measure	

Table 30 Proposed measures to overcome expenditure impacts	
Names of measures	**Check if Discussed**
name of measure	
name of measure	
name of measure	
name of measure	

Water Shortage Contingency Ordinance/Resolution **(Water Code § 10632 (h))**

☐ Attach a copy of the draft water shortage contingency resolution or ordinance. _____ Reference & Page Number

Reduction Measuring Mechanism (Water Code § 10632 (i))

☐ Provided mechanisms for determining actual reductions _____ Reference & Page Number

Table 31 Water Use Monitoring Mechanisms	
Mechanisms for determining actual reductions	**Type data expected (pop-up?)**
Name mechanism	
Name mechanism	
Name mechanism	

Recycling Plan Agency Coordination Water Code § 10633

☐ Describe the coordination of the recycling plan preparation information to the extent available.. _____ Reference & Page Number

Table 32 Participating agencies	
	participated
Water agencies	
Wastewater agencies	
Groundwater agencies	
Planning Agencies	

Wastewater System Description (Water Code § 10633 (a))

☐ Describe the wastewater collection and treatment systems in the supplier's service area _____ Reference & Page Number

☐ Quantify the volume of wastewater collected and treated _____ Reference & Page Number

Table 33 Wastewater Collection and Treatment - AF Year							
Type of Wastewater	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030 - opt**
Wastewater collected & treated in service area							
Volume that meets recycled water standard							

Wastewater Disposal and Recycled Water Uses **(Water Code § 10633 (a - d))**

☐ Describes methods of wastewater disposal _____ Reference & Page Number

☐ Describe the current type, place and use of recycled water _____ Reference & Page Number

☐ None _____ Reference & Page Number

☐ Describe and quantify potential uses of recycled water _____ Reference & Page Number

Table 34 Disposal of wastewater (non-recycled) AF Year							
Method of disposal	**Treatment Level**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030 - opt**
Name of method							
Name of method							
Name of method							
Name of method							
Total							

Table 35 Recycled Water Uses - Actual and Potential (AFY)							
User type	**Treatment Level**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030 - opt**
Agriculture							

Landscape							
Wildlife Habitat							
Wetlands							
Industrial							
Groundwater Recharge							
Other (user type)							
Other (user type)							
Total							

☐ Determination of technical and economic feasibility of serving the potential uses _____ Reference & Page Number

Projected Uses of Recycled Water (Water Code § 10633 (e))

☐ Projected use of recycled water, 20 years _____ Reference & Page Number

Table 36 Projected Future Use of Recycled Water in Service Area - AF Year					
	2010	**2015**	**2020**	**2025**	**2030 - opt**
Projected use of Recycled Water					

☐ Compare UWMP 2000 projections with UWMP 2005 actual (§ 10633 (e)) _____ Reference & Page Number

☐ None _____ Reference & Page Number

Table 37 Recycled Water Uses - 2000 Projection compared with 2005 actual - AFY		
User type	**2000 Projection for 2005**	**2005 actual use**
Agriculture		
Landscape		

Wildlife Habitat		
Wetlands		
Industrial		
Groundwater Recharge		
Other (user type)		
Other (user type)		
Total		

Plan to Optimize Use of Recycled Water **(Water Code § 10633 (f))**

☐ Describe actions that might be taken to encourage recycled water uses _____ Reference & Page Number

☐ Describe projected results of these actions in terms of acre-feet of recycled water used per year _____ Reference & Page Number

Table 38
Methods to Encourage Recycled Water Use

Actions	AF of use projected to result from this action				
	2010	2015	2020	2025	2030 - opt
Financial incentives					
name of action					
name of action					
name of action					
name of action					
name of action					
name of action					
name of action					
Total					

☐ Provide a recycled water use optimization plan which includes actions to facilitate the use of recycled water (dual distribution systems, promote recirculating uses) _____ Reference & Page Number

Water quality impacts on availability of supply (Water Code §10634)

☐ Discusses water quality impacts (by source) upon water management strategies and supply reliability _____ Reference & Page Number

☐ No water quality impacts projected _____

Table 39 Current & projected water supply changes due to water quality - percentage						
water source	**2005**	**2010**	**2015**	**2020**	**2025**	**2030 - opt**

Supply and Demand Comparison to 20 Years (Water Code § 10635 (a))

☐ Compare the projected normal water supply to projected normal water use over the next 20 years, in 5-year increments. _____ Reference & Page Number

Table 40 Projected Normal Water Supply - AF Year					
(from table 4)	**2010**	**2015**	**2020**	**2025**	**2030 - opt**
Supply					
% of year 2005					

Table 41

Projected Normal Water Demand - AF Year					
(from table 15)	2010	2015	2020	2025	2030 - opt
Demand					
% of year 2005					

Table 42 Projected Supply and Demand Comparison - AF Year					
	2010	2015	2020	2025	2030 - opt
Supply totals					
Demand totals					
Difference					
Difference as % of Supply					
Difference as % of Demand					

Supply and Demand Comparison: Single-dry Year Scenario **(Water Code § 10635 (a))**

☐ Compare the projected single-dry year water supply to projected single-dry year water use over the next 20 years, in 5-year increments. _____ Reference & Page Number

Table 43 Projected single dry year Water Supply - AF Year					
	2010	2015	2020	2025	2030 - opt

Supply					
% of projected normal					

Table 44 Projected single dry year Water Demand - AF Year					
	2010	**2015**	**2020**	**2025**	**2030 - opt**
Demand					
% of projected normal					

Table 45 Projected single dry year Supply and Demand Comparison - AF Year					
	2010	**2015**	**2020**	**2025**	**2030 - opt**
Supply totals					
Demand totals					
Difference					
Difference as % of Supply					
Difference as % of Demand					

Supply and Demand Comparison: Multiple-dry Year Scenario **(Water Code § 10635 (a))**

☐ Project a multiple-dry year period (as identified in Table 9) occurring between 2006-2010 and compare projected supply and demand during those years _____ Reference & Page Number

Table 46					
Projected supply during multiple dry year period ending in 2010 - AF Year					
	2006	2007	2008	2009	2010
Supply					
% of projected normal					

Table 47					
Projected demand multiple dry year period ending in 2010 - AFY					
	2006	2007	2008	2009	2010
Demand					
% of projected normal					

Table 48					
Projected Supply and Demand Comparison during multiple dry year period ending in 2010- AF Year					
	2006	2007	2008	2009	2010
Supply totals					
Demand totals					
Difference					
Difference as % of Supply					

Difference as % of Demand					

☐ Project a multiple-dry year period (as identified in Table 9) occurring between 2011-2015 and compare projected supply and demand during those years _____ Reference & Page Number

Table 49 Projected supply during multiple dry year period ending in 2015 - AF Year					
	2011	**2012**	**2013**	**2014**	**2015**
Supply					
% of projected normal					

Table 50 Projected demand multiple dry year period ending in 2015 - AFY					
	2011	**2012**	**2013**	**2014**	**2015**
Demand					
% of projected normal					

Table 51 Projected Supply and Demand Comparison during multiple dry year period ending in 2015- AF Year					
	2011	**2012**	**2013**	**2014**	**2015**
Supply totals					
Demand totals					
Difference					

Difference as % of Supply					
Difference as % of Demand					

☐ Project a multiple-dry year period (as identified in Table 9) occurring between 2016-2020 and compare projected supply and demand during those years _____ Reference & Page Number

Table 52 Projected supply during multiple dry year period ending in 2020 - AF Year					
	2016	**2017**	**2018**	**2019**	**2020**
Supply					
% of projected normal					

Table 53 Projected demand multiple dry year period ending in 2020 - AFY					
	2016	**2017**	**2018**	**2019**	**2020**
Demand					
% of projected normal					

Table 54 Projected Supply and Demand Comparison during multiple dry year period ending in 2020- AF Year

	2016	2017	2018	2019	2020
Supply totals					
Demand totals					
Difference					
Difference as % of Supply					
Difference as % of Demand					

☐ Project a multiple-dry year period (as identified in Table 9) occurring between 2021-2025 and compare projected supply and demand during those years _____ Reference & Page Number

Table 55					
Projected supply during multiple dry year period ending in 2025 - AF Year					
	2021	**2022**	**2023**	**2024**	**2025**
Supply					
% of projected normal					

Table 56					
Projected demand multiple dry year period ending in 2025 - AFY					
	2021	**2022**	**2023**	**2024**	**2025**
Demand					

% of projected normal					

Table 57					
Projected Supply and Demand Comparison during multiple dry year period ending in 2025- AF Year					
	2021	**2022**	**2023**	**2024**	**2025**
Supply totals					
Demand totals					
Difference					
Difference as % of Supply					
Difference as % of Demand					

Provision of Water Service Reliability section to cities/counties within service area **(Water Code § 10635(b))**

☐ Provided Water Service Reliability section of UWMP to cities and counties within which it provides water supplies within 60 days of UWMP submission to DWR _____ Reference & Page Number

Does the Plan Include Public Participation and Plan Adoption **(Water Code § 10642)**

☐ Attach a copy of adoption resolution _____ Reference & Page Number

☐ Encourage involvement of social, cultural & economic community groups _____ Reference & Page Number

☐ Plan available for public inspection _____ Reference & Page Number

☐	Provide proof of public hearing	_____	Reference & Page Number
☐	Provided meeting notice to local governments		Reference & Page Number

Review of implementation of 2000 UWMP		**(Water Code § 10643)**	
☐	Reviewed implementation plan and schedule of 2000 UWMP	_____	Reference & Page Number
☐	Implemented in accordance with the schedule set forth in plan	_____	Reference & Page Number
☐	2000 UWMP not required	_____	Reference & Page Number

Provision of 2005 UWMP to local governments		**(Water Code § 10644 (a))**	
☐	Provide 2005 UWMP to DWR, and cities and counties within 30 days of adoption	_____	Reference & Page Number

Does the plan or correspondence accompanying it show where it is available for public review		**(Water Code § 10645)**	
☐	Does UWMP or correspondence accompanying it show where it is available for public review	_____	Reference & Page Number

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Appendix C

California Department of Water Resources
2005 Demand Management Measures Checklist

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2005 Urban Water Management Plan "Review of DMMs for Completeness" Form

For DWR Review Staff Use

Water Survey Programs for Single-Family and Multi-Family Residential Customers (10631 f(1)(a))

Implementation **(Section 10631 (f))**

☐ Describe demand management measure currently being implemented or scheduled for implementation (10631 (f) (1)(2)) _____ Reference & Page Number

Year program started _____ or Year program scheduled to start _____

☐ Describes steps necessary to implement measure _____ Reference & Page Number

Table A1					
Actual	2001	2002	2003	2004	2005
# of single family surveys					
# of multifamily surveys					
actual expenditures - $					
actual water savings - AFY					

Table A2					
Planned	2006	2007	2008	2009	2010
# of single family surveys					
# of multifamily surveys					
projected expenditures - $					

projected water savings - AFY					

☐ Describe the methods, if any, used to evaluate the effectiveness of this demand management measure (10631 (f)(3)) _____ Reference & Page Number

☐ Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4)) _____ Reference & Page Number

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

☐ Evaluate legal authority (10631 (g)(4))

☐ Evaluate economic and non-economic factors (10631 (g)(1))

☐ Evaluate environmental, social, health factors (10631 (g)(1))

☐ Evaluate customer impact & technological factors (10631 (g)(1))

Table A3 - 10631 (g)(2)	
Cost Effectiveness Summary	
Total Costs	
Total Benefits	
Discount Rate	
Time Horizon	
Cost of Water ($ per AF)	
Water Savings (AFY)	

☐ Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))

☐ Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))

If Another Agency Implementing

☐ If another Agency is implementing (10631 (g)(4))

Agency Name

Residential Plumbing Retrofit (10631 (f)(1)(b))

Implementation **(Section 10631 (f) & (h))**

☐ Describe demand management measure currently being implemented or scheduled for implementation (10631 (f) (1)(2)) _____ Reference & Page Number

Year program started _____ or Year program scheduled to start _____

☐ Describes steps necessary to implement measure _____ Reference & Page Number

# of pre-1992 SF accounts _____ # of pre-1992 MF accounts _____

Table B1					
Actual	1992-2001	2002	2003	2004	2005
# of single family devices					
# of multi-family devices					
actual expenditures - $					
actual water savings - AFY					

Table B2

Planned	2006	2007	2008	2009	2010
# of single family devices					
# of multi-family devices					
projected expenditures - $					
projected water savings - AFY					

☐ Describe the methods, if any, used to evaluate the effectiveness of this demand management measure (10631 (f)(3)) _____ Reference & Page Number

☐ Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4)) _____ Reference & Page Number

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

☐ Evaluate legal authority (10631 (g)(4))

☐ Evaluate economic and non-economic factors (10631 (g)(1))

☐ Evaluate environmental, social, health factors (10631 (g)(1))

☐ Evaluate customer impact & technological factors (10631 (g)(1))

Table B3 - 10631 (g)(2)	
Cost Effectiveness Summary	
Total Costs	
Total Benefits	
Discount Rate	
Time Horizon	
Cost of Water	
Water Savings (AFY)	

☐ Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of

implementation (10631 (g)(4))

☐ Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))

If Another Agency Implementing

☐ If another Agency is implementing (10631 (g)(4))

Agency Name

System Water Audits, Leak Detection and Repair (10631 (f)(1)(c))

Implementation **(Section 10631 (f) & (h))**

☐ Describe demand management measure currently being implemented or scheduled for implementation (10631 (f) (1)(2)) _____ Reference & Page Number

Year program started _____ or Year program scheduled to start _____

☐ Describes steps necessary to implement measure _____ Reference & Page Number

Year of last complete audit _____ Year of next complete audit _____

Table C1					
Actual	2001	2002	2003	2004	2005
% of unaccounted water					
miles of mains surveyed					
miles of lines repaired					

actual expenditures - $					
actual water savings - AFY					

Table C2					
Planned	2006	2007	2008	2009	2010
% of unaccounted water					
miles of mains surveyed					
miles of lines repaired					
projected expenditures - $					
projected water savings - AFY					

☐ Describe the methods, if any, used to evaluate the effectiveness of this demand management measure (10631 (f)(3)) _____ Reference & Page Number

☐ Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4)) _____ Reference & Page Number

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

☐ Evaluate legal authority (10631 (g)(4))

☐ Evaluate economic and non-economic factors (10631 (g)(1))

☐ Evaluate environmental, social, health factors

Table C3 - 10631 (g)(2)	
Cost Effectiveness Summary	
Total Costs	
Total Benefits	
Discount Rate	

(10631 (g)(1))

☐ Evaluate customer impact & technological factors (10631 (g)(1))

Time Horizon	
Cost of Water	
Water Savings (AFY)	

☐ Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))

☐ Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))

If Another Agency Implementing

☐ If another Agency is implementing (10631 (g)(4))

Agency Name

Metering with Commodity Rates (10631 (f)(1)(d))

Implementation **(Section 10631 (f) & (h))**

☐ Describe demand management measure currently being implemented or scheduled for implementation (10631 (f) (1)(2)) _____ Reference & Page Number

Year program started _____ or Year program scheduled to start _____

☐ Describes steps necessary to implement measure _____ Reference & Page Number

Total number of accounts _____ # of accounts w/o commodity rates _____

Table D1					
Actual	2001	2002	2003	2004	2005

# of unmetered accounts					
# of retrofit meters installed					
# of accounts w/o commodity rates					
actual expenditures - $					
actual water savings - AFY					

Table D2					
Planned	2006	2007	2008	2009	2010
# of unmetered accounts					
# of retrofit meters installed					
# of accounts w/o commodity rates					
projected expenditures - $					
projected water savings - AFY					

☐ Describe the methods, if any, used to evaluate the effectiveness of this demand management measure (10631 (f)(3)) _____ Reference & Page Number

☐ Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4)) _____ Reference & Page Number

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

☐ Evaluate legal authority

Table D3 - 10631 (g)(2)

(10631 (g)(4))

☐ Evaluate economic and non-economic factors (10631 (g)(1))

☐ Evaluate environmental, social, health factors (10631 (g)(1))

☐ Evaluate customer impact & technological factors (10631 (g)(1))

Cost Effectiveness Summary	
Total Costs	
Total Benefits	
Discount Rate	
Time Horizon	
Cost of Water	
Water Savings (AFY)	

☐ Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))

☐ Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))

If Another Agency Implementing

☐ If another Agency is implementing (10631 (g)(4))

Agency Name

Large Landscape Conservation Programs and Incentives (10631 (f)(1)(e))

Implementation **(Section 10631 (f) & (h))**

☐ Describe demand management measure currently being implemented or scheduled for implementation (10631 (f) (1)(2)) _____ Reference & Page Number

Year program started _____ or Year program scheduled to start _____

☐ Describes steps necessary to implement measure _____ Reference & Page Number

# of landscape accounts _____

# of CII accounts _____

# of landscape accounts with budgets _____

# of CII accounts w/ landscape surveys _____
(CII mixed use meters)

Table E1					
Actual	2001	2002	2003	2004	2005
# of budgets developed					
# of surveys completed					
# of follow-up visits					
actual expenditures - $					
actual water savings - AFY					

Table E2					
Planned	2006	2007	2008	2009	2010
# of budgets developed					
# of surveys completed					
# of follow-up visits					
projected expenditures - $					
projected water savings - AFY					

☐ Describe the methods, if any, used to evaluate the effectiveness of this demand management measure (10631 (f)(3))

_____ Reference & Page Number

☐ Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4)) _____ Reference & Page Number

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

☐ Evaluate legal authority (10631 (g)(4))

☐ Evaluate economic and non-economic factors (10631 (g)(1))

☐ Evaluate environmental, social, health factors (10631 (g)(1))

☐ Evaluate customer impact & technological factors (10631 (g)(1))

Table E3 - 10631 (g)(2)	
Cost Effectiveness Summary	
Total Costs	
Total Benefits	
Discount Rate	
Time Horizon	
Cost of Water	
Water Savings (AFY)	

☐ Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))

☐ Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))

If Another Agency Implementing

☐ If another Agency is implementing (10631 (g)(4))

Agency Name

High-Efficiency Washing Machine Rebate Programs (10631 (f)(1)(f))

Implementation **(Section 10631 (f) & (h))**

☐ Describe demand management measure currently being implemented or scheduled for implementation (10631 (f) (1)(2)) _____ Reference & Page Number

Year program started _____ or Year program scheduled to start _____

Other agencies offer rebates _____ Cost-effectiveness calcs attached _____

☐ Describes steps necessary to implement measure _____ Reference & Page Number

Table F1					
Actual	2001	2002	2003	2004	2005
$ per rebate					
# of rebates paid					
actual expenditures - $					
actual water savings - AFY					

Table F2					
Planned	2006	2007	2008	2009	2010
$ per rebate					
# of rebates paid					
projected expenditures - $					
projected water savings - AFY					

☐ Describe the methods, if any, used to evaluate the effectiveness of this demand management measure (10631 (f)(3)) _____ Reference & Page Number

☐ Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce _____ Reference & Page Number

demand (10631(f)(4))

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

- ☐ Evaluate legal authority (10631 (g)(4))
- ☐ Evaluate economic and non-economic factors (10631 (g)(1))
- ☐ Evaluate environmental, social, health factors (10631 (g)(1))
- ☐ Evaluate customer impact & technological factors (10631 (g)(1))

Table F3 - 10631 (g)(2)	
Cost Effectiveness Summary	
Total Costs	
Total Benefits	
Discount Rate	
Time Horizon	
Cost of Water	
Water Savings (AFY)	

- ☐ Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))
- ☐ Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))

If Another Agency Implementing

- ☐ If another Agency is implementing (10631 (g)(4))

Agency Name

Public Information Programs (10631 (f)(1)(g))

Implementation **(Section 10631 (f))**

- ☐ Describe demand management measure currently being implemented or scheduled for implementation (10631 (f) (1)(2)) _____ Reference & Page Number

Year program started _____ or Year program scheduled to start _____

☐ Describes steps necessary to implement measure _____ Reference & Page Number

Table G1					
Actual	2001	2002	2003	2004	2005
a. paid advertising					
b. Public Service Announcement					
c. Bill Inserts / Newsletters / Brochures					
d. Bill showing water usage in comparison to previous year's usage					
e. Demonstration Gardens					
f. Special Events, Media Events					
g. Speaker's Bureau					
h. Program to coordinate with other government agencies, industry and public interest groups and media					
actual expenditures - $					

Table G2					
Planned	2006	2007	2008	2009	2010
a. paid advertising					
b. Public Service Announcement					
c. Bill Inserts / Newsletters / Brochures					
d. Bill showing water usage in comparison to previous year's usage					
e. Demonstration Gardens					
f. Special Events, Media Events					
g. Speaker's Bureau					
h. Program to coordinate with other					

government agencies, industry and public interest groups and media					
Projected expenditures - $					

☐ Describe the methods, if any, used to evaluate the effectiveness of this demand management measure (10631 (f)(3)) _____ Reference & Page Number

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

☐ Evaluate legal authority (10631 (g)(4))

☐ Evaluate economic and non-economic factors (10631 (g)(1))

☐ Evaluate environmental, social, health factors (10631 (g)(1))

☐ Evaluate customer impact & technological factors (10631 (g)(1))

Table G3 - 10631 (g)(2)	
Cost Effectiveness Summary	
Total Costs	
Total Benefits	
Discount Rate	
Time Horizon	
Cost of Water	
Water Savings (AFY)	

☐ Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))

☐ Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))

If Another Agency Implementing

☐ If another Agency is implementing (10631 (g)(4))

Agency Name

School Education Programs (10631 (f)(1)(h))

Implementation **(Section 10631 (f) & (h))**

☐ Describe demand management measure currently being implemented or scheduled for implementation (10631 (f) (1)(2)) _____ Reference & Page Number

Year program started _____ or Year program scheduled to start _____

☐ Describes steps necessary to implement measure _____ Reference & Page Number

Table H1		No. of class presentations				
Actual	# of classes	2001	2002	2003	2004	2005
Grades K-3rd						
Grades 4th-6th						
Grades 7th-8th						
High School						
actual expenditures - $						

Table H2		No. of class presentations				
Actual	# of classes	2006	2007	2008	2009	2010
Grades K-3rd						
Grades 4th-6th						
Grades 7th-8th						
High School						
projected expenditures - $						

☐ Describe the methods, if any, used to evaluate the effectiveness of this demand management measure (10631 (f)(3)) _____ Reference & Page Number

☐ Did your agency's material meet state education framework requirements? _____ Reference & Page Number

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

- ☐ Evaluate legal authority (10631 (g)(4))
- ☐ Evaluate economic and non-economic factors (10631 (g)(1))
- ☐ Evaluate environmental, social, health factors (10631 (g)(1))
- ☐ Evaluate customer impact & technological factors (10631 (g)(1))

Table H3 - 10631 (g)(2)	
Cost Effectiveness Summary	
Total Costs	
Total Benefits	
Discount Rate	
Time Horizon	
Cost of Water	
Water Savings (AFY)	

- ☐ Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))
- ☐ Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))

If Another Agency Implementing

- ☐ If another Agency is implementing (10631 (g)(4))

Agency Name

Conservation Programs for Commercial, Industrial and Institutional (10631 (f)(1)(i))

Implementation **(Section 10631 (f) & (h))**

- ☐ Describe demand management measure currently being implemented or scheduled for implementation (10631 (f) (1)(2)) _____ Reference & Page Number

  Year program started _____ or Year program scheduled to start _____

- ☐ Describes steps necessary to implement measure _____ Reference & Page Number

# of Commercial accounts _____ # of Industrial accounts _____ # of Institutional accounts _____

Table I1					
Actual	2001	2002	2003	2004	2005
# of surveys completed					
Were incentives provided?					
# of follow-up visits					
actual expenditures - $					
actual water savings - AFY					

Table I2					
Planned	2006	2007	2008	2009	2010
# of surveys completed					
Were incentives provided?					
# of follow-up visits					
projected expenditures - $					
projected water savings - AFY					

☐ Describe the methods, if any, used to evaluate the effectiveness of this demand management measure (10631 (f)(3)) _____ Reference & Page Number

☐ Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4)) _____ Reference & Page Number

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

- ☐ Evaluate legal authority (10631 (g)(4))
- ☐ Evaluate economic and non-economic factors (10631 (g)(1))
- ☐ Evaluate environmental, social, health factors (10631 (g)(1))
- ☐ Evaluate customer impact & technological factors (10631 (g)(1))

Table I3 - 10631 (g)(2)	
Cost Effectiveness Summary	
Total Costs	
Total Benefits	
Discount Rate	
Time Horizon	
Cost of Water	
Water Savings (AFY)	

- ☐ Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))
- ☐ Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))

If Another Agency Implementing

- ☐ If another Agency is implementing (10631 (g)(4))

Agency Name

Conservation Programs for Commercial, Industrial & Institutional - Toilet Replacement (10631 (f)(1)(i))

(this data is part of the Council Annual Report but is not specifically requested in the UWMP Act) change

Implementation **(Section 10631 (f) & (h))**

- ☐ Describe demand management measure currently being implemented or scheduled for implementation (10631 (f) (1)(2)) _____ Reference & Page Number

  Year program started _____ or Year program scheduled to start _____

- ☐ Describes steps necessary to implement measure _____ Reference & Page Number

Table I4					
Actual	2001	2002	2003	2004	2005
# of commercial replacements					
# of industrial replacements					
# of institutional replacements					
actual expenditures - $					
actual water savings - AFY					

Table I5					
Planned	2006	2007	2008	2009	2010
# of commercial replacements					
# of industrial replacements					
# of institutional replacements					
projected expenditures - $					
projected water savings - AFY					

☐ Describe the methods, if any, used to evaluate the effectiveness of this demand management measure (10631 (f)(3)) _____ Reference & Page Number

☐ Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4)) _____ Reference & Page Number

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

☐ Evaluate legal authority

Table I6 - 10631 (g)(2)

(10631 (g)(4))

☐ Evaluate economic and non-economic factors (10631 (g)(1))

☐ Evaluate environmental, social, health factors (10631 (g)(1))

☐ Evaluate customer impact & technological factors (10631 (g)(1))

Cost Effectiveness Summary	
Total Costs	
Total Benefits	
Discount Rate	
Time Horizon	
Cost of Water	
Water Savings (AFY)	

☐ Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))

☐ Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))

If Another Agency Implementing

☐ If another Agency is implementing (10631 (g)(4))

Agency Name

Wholesale Agency Programs (10631 (f)(1)(j))

☐ Not a wholesale agency

Implementation **(Section 10631 (f) & (h))**

☐ Describe demand management measure currently being implemented or scheduled for implementation (10631 (f) (1)(2)) _____ Reference & Page Number

Year program started _____ or Year program scheduled to start _____

# of suppliers you serve _____

☐ Describes steps necessary to implement measure _____ Reference & Page Number

Table J1	Number of agencies assisted				
program activities	2001	2002	2003	2004	2005
Water Surveys					
Residential Retrofit					
System Audits					
Metering-Commodity Rates					
Landscape Programs					
Washing Machines					
Public Information					
School Education					
CII WC					
CII ULF					
Water Waste					
Pricing					
WC Coordinator					
Water Waste					
UFLT Replacement					
actual expenditures - $					

Table J2	Number of agencies to be assisted				
program activities	2006	2007	2008	2009	2010
Water Surveys					
Residential Retrofit					
System Audits					
Metering-Commodity Rates					
Landscape Programs					
Washing Machines					
Public Information					

School Education					
CII WC					
CII ULF					
Water Waste					
Pricing					
WC Coordinator					
Water Waste					
UFLT Replacement					
projected expenditures - $					

☐ Describe the methods, if any, used to evaluate the effectiveness of this demand management measure (10631 (f)(3)) _____ Reference & Page Number

☐ Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631(f)(4)) _____ Reference & Page Number

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

☐ Evaluate legal authority (10631 (g)(4))

☐ Evaluate economic and non-economic factors (10631 (g)(1))

☐ Evaluate environmental, social, health factors (10631 (g)(1))

☐ Evaluate customer impact & technological factors (10631 (g)(1))

Table J3 - 10631 (g)(2)	
Cost Effectiveness Summary	
Total Costs	
Total Benefits	
Discount Rate	
Time Horizon	
Cost of Water	
Water Savings (AFY)	

☐ Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of

implementation (10631 (g)(4))

☐ Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))

If Another Agency Implementing

☐ If another Agency is implementing (10631 (g)(4))

Agency Name

Conservation Pricing (10631 (f)(1)(k))

Implementation **(Section 10631 (f) & (h))**

☐ Describe demand management measure currently being implemented or scheduled for implementation (10631 (f) (1)(2)) _____ Reference & Page Number

Year program started _____ or Year program scheduled to start _____

☐ Agency provides sewer service

☐ Describes steps necessary to implement measure _____ Reference & Page Number

Table K1				
RETAILERS				
Residential				
Water Rate Structure	pop-up list		Sewer Rate Structure	pop-up list
Year rate effective			Year rate effective	
Commercial				
Water Rate Structure	pop-up list		Sewer Rate Structure	pop-up list
Year rate effective			Year rate effective	

Industrial			
Water Rate Structure	pop-up list	Sewer Rate Structure	pop-up list
Year rate effective		Year rate effective	
Institutional/Government			
Water Rate Structure	pop-up list	Sewer Rate Structure	pop-up list
Year rate effective		Year rate effective	
Irrigation			
Water Rate Structure	pop-up list		
Year rate effective			
Other			
Water Rate Structure	pop-up list	Sewer Rate Structure	pop-up list
Year rate effective		Year rate effective	
Table K2			
WHOLESALERS			
Water Rate Structure	pop-up list		
Year rate effective			

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

- ☐ Evaluate legal authority (10631 (g)(4))
- ☐ Evaluate economic and non-economic factors (10631 (g)(1))
- ☐ Evaluate environmental, social, health factors

Table K3 - 10631 (g)(2)	
Cost Effectiveness Summary	
Total Costs	
Total Benefits	
Discount Rate	

(10631 (g)(1))

☐ Evaluate customer impact & technological factors (10631 (g)(1))

Time Horizon	
Cost of Water	
Water Savings (AFY)	

☐ Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))

☐ Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))

If Another Agency Implementing

☐ If another Agency is implementing (10631 (g)(4))

Agency Name

Water Conservation Coordinator (10631 (f)(1)(l))

Implementation **(Section 10631 (f) & (h))**

☐ Describe demand management measure currently being implemented or scheduled for implementation (10631 (f) (1)(2)) _____ Reference & Page Number

Year program started _____ or Year program scheduled to start _____

☐ Describes steps necessary to implement measure _____ Reference & Page Number

Table L1					
Actual	2001	2002	2003	2004	2005
# of full-time positions					
# of full/part-time staff					
actual expenditures - $					

Table L2					
Planned	2006	2007	2008	2009	2010
# of full-time positions					
# of full/part-time staff					
projected expenditures - $					

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

- ☐ Evaluate legal authority (10631 (g)(4))
- ☐ Evaluate economic and non-economic factors (10631 (g)(1))
- ☐ Evaluate environmental, social, health factors (10631 (g)(1))
- ☐ Evaluate customer impact & technological factors (10631 (g)(1))

Table L3 - 10631 (g)(2)	
Cost Effectiveness Summary	
Total Costs	
Total Benefits	
Discount Rate	
Time Horizon	
Cost of Water	
Water Savings (AFY)	

- ☐ Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))
- ☐ Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))

If Another Agency Implementing

- ☐ If another Agency is implementing (10631 (g)(4))

Agency Name

Waste Water Prohibition (10631 (f)(1)(m))

Implementation **(Section 10631 (f) & (h))**

☐ Describe demand management measure currently being implemented or scheduled for implementation (10631 (f) (1)(2)) _____ Reference & Page Number

Year program started _____ or Year program scheduled to start _____

☐ Describes steps necessary to implement measure _____ Reference & Page Number

Table M1					
Actual	2001	2002	2003	2004	2005
waste ordinance in effect					
# of on-site visits					
water softener ordinance					
actual expenditures - $					

Table M2					
Planned	2006	2007	2008	2009	2010
waste ordinance in effect					
# of on-site visits					
water softener ordinance					
projected expenditures - $					

☐ Describe the methods, if any, used to evaluate the effectiveness of this demand management measure (10631 (f) (3)) _____ Reference & Page Number

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

☐ Evaluate legal authority (10631 (g)(4))

Table M3 - 10631 (g)(2)
Cost Effectiveness Summary

☐ Evaluate economic and non-economic factors (10631 (g)(1))

☐ Evaluate environmental, social, health factors (10631 (g)(1))

☐ Evaluate customer impact & technological factors (10631 (g)(1))

Total Costs	
Total Benefits	
Discount Rate	
Time Horizon	
Cost of Water	
Water Savings (AFY)	

☐ Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))

☐ Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))

If Another Agency Implementing

☐ If another Agency is implementing (10631 (g)(4))

Agency Name

Residential Ultra-Low-Flush Toilet Replacement Programs (10631 (f)(1)(n))

Implementation **(Section 10631 (f) & (h))**

☐ Describe demand management measure currently being implemented or scheduled for implementation (10631 (f) (1)(2)) _____ Reference & Page Number

Year program started _____ or Year program scheduled to start _____

# of SF pre-1992 accounts _____

☐ Describes steps necessary to implement measure _____ Reference & Page Number

Table N1	Single-Family

Actual	2001	2002	2003	2004	2005
# of ULF rebates					
# of ULF direct installs					
# of ULF CBO installs					
actual expenditures - $					
actual water savings - AFY					

Table N2	Single-Family				
Planned	2006	2007	2008	2009	2010
# of ULF rebates					
# of ULF direct installs					
# of ULF CBO installs					
projected expenditures - $					
projected water savings - AFY					

# of MF pre-1992 units _____

Table N3	Multi-Family				
Actual	2001	2002	2003	2004	2005
# of ULF rebates					
# of ULF direct installs					
# of ULF CBO installs					
actual expenditures - $					
actual water savings - AFY					

Table N4	Multi-Family				
Planned	2006	2007	2008	2009	2010
# of ULF rebates					
# of ULF direct installs					
# of ULF CBO installs					
projected expenditures - $					
projected water savings - AFY					

☐ Is a toilet retrofit on resale ordinance in effect for your service area?

☐ Provide estimates, if available, of existing conservation savings on water use and the effect of such savings on the supplier's ability to further reduce demand (10631 (f)(4)) _____ Reference & Page Number

Provided an evaluation for this DMM if it is not implemented **(Section 10631 (g))**

☐ Evaluate legal authority (10631 (g)(4))

☐ Evaluate economic and non-economic factors (10631 (g)(1))

☐ Evaluate environmental, social, health factors (10631 (g)(1))

☐ Evaluate customer impact & technological factors

Table N5 - 10631 (g)(2)	
Cost Effectiveness Summary	
Total Costs	
Total Benefits	
Discount Rate	
Time Horizon	
Cost of Water	

(10631 (g)(1))

Water Savings (AFY)	

☐ Describe efforts to work with other relevant agencies to ensure implementation of the measure and to share the cost of implementation (10631 (g)(4))

☐ Describe funding available to implement any planned water supply project that would provide water at a higher unit cost (10631 (g)(3) & (h))

If Another Agency Implementing

☐ If another Agency is implementing (10631 (g)(4))

Agency Name

2005 Urban Water Management Plan Review for Completeness Form **(Water Code §10620 (d)(1)(2) - 10645**

(Water Code §10620 (d)(1)(2) - 10645, the 2005 Urban Water Management Plan Review for Completeness Form is found on Sheet 1

Appendix D

Past Water Conservation Ordinance 834-C-S

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ORDINANCE NO. 834-C-S

AN URGENCY ORDINANCE OF THE CITY OF ANTIOCH ADOPTING DROUGHT EMERGENCY REGULATIONS AND RESTRICTING THE QUANTITY AND USE OF WATER, IMPOSING PENALTIES FOR NON-COMPLIANCE AND DECLARING THE URGENCY THEREOF

The City Council of the City of Antioch does ordain as follows:

SECTION 1. INTRODUCTION AND FINDINGS.

The City of Antioch purchases raw water from the Contra Costa Water District which the City subsequently treats, distributes, and sells to its municipal customers. The City does have rights to pump raw water directly from the San Joaquin River. However, the quantities which the City can pump are restricted by the salinity of the river water, and by the size and capacity of existing equipment. Even under the most favorable conditions, the City obtains by far the largest percentage of its raw water from the Contra Costa Water District.

The Contra Costa Water District is part of the federal water project controlled by the federal Bureau of Reclamation. Because California is currently in the sixth year of drought conditions, and because federal reservoirs are at very low levels, the Bureau of Reclamation has decided to reduce the amount of water available to users, including the Contra Costa Water District.

Because of these restrictions, the Contra Costa Water District has announced that a reduction of 15% will be made in the amount of raw water available for purchase by the City and by other municipal water agencies during 1992.

The City Council finds that notice of the consideration of this ordinance was published pursuant to the requirements of Water Code §3352.

SECTION 2. DECLARATION OF WATER SHORTAGE EMERGENCY.

Because of the restrictions and reductions ordered by the Bureau of Reclamation and the Contra Costa Water District, the City Council hereby finds and determines that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the City, and that there would be insufficient water for human consumption, sanitation and fire protection without the regulations and restrictions specified herein.

Based upon the foregoing, the City Council does hereby declare a water shortage emergency condition to exist in the City of Antioch. The regulations specified herein shall be effective from the date of the adoption of this ordinance through December 31, 1992, or until such earlier date as the Council may declare that the condition has ended.

SECTION 3. ALLOCATION OF WATER.

In order to achieve the overall reduction of 15%, the City does hereby allocate water as follows:

Customer Type	Allocation
each single unit residence	330 gallons per day
apartments, condominiums	15% below 1990 use
commercial	15% below 1990 use
industrial	15% below 1990 use
public facilities	15% below 1990 use
landscaping	15% below 1990 use

SECTION 4. RULES AND VARIANCES.

The City Manager and/or his designee is hereby authorized to promulgate rules and regulations further implementing the policies ordered in this ordinance. The City Manager and/or his designee is also authorized to settle disputes regarding definitions of terms, applicability, and other disputes or questions that may arise regarding the implementation of this ordinance.

The City Manager and/or his designee is also authorized to provide procedures for, and to consider, grant, or deny requests for variances or exceptions to the provisions of this ordinance. For example, provisions shall be made for exceptions to the allocations based upon medical need. Exceptions shall also be made in the allocation of single family housing units occupied by more than four individuals. An additional 70 gallons per day shall be allowed for each individual residing at a location in excess of four. However, nothing herein shall require the allocation of more than 750 gallons per day for a single family residence, irrespective of the number of individuals residing therein.

An appeals process shall be established by the City Manager for persons dissatisfied with any decision made regarding application for an exception or variance.

SECTION 5. WATER BANKING.

Customers who use less than their allocations on a monthly basis shall be entitled to "bank" and accumulate such savings for use later in the year. Such savings shall be credited so as to prevent, to the extent applicable, surcharges or penalties from being imposed in later months if the customer subsequently uses water in excess of his or her allocation. Such banking and crediting shall be on a gallon-for-gallon basis.

SECTION 6. DETERMINATION OF GOALS; PENALTIES.

On or about May 1, 1992, and on the first of each month thereafter, the City Manager shall determine whether the City is meeting its goal of a 15% overall reduction in water use. If the City Manager determines that the City is not meeting or substantially meeting its overall goal of reduction, he shall implement a penalty or surcharge to be added to the water bills of customers and to be collected and enforced in the same manner as the collection and enforcement of the regular water bill:

Usage Exceeding Allotment By:	Excess Charge:
1 - 20%	2x the price per unit
20.01 - 30%	4x the price per unit
30.01 - 40%	6x the price per unit
40.01 - 50%	8x the price per unit
over 50%	10x the price per unit

The City Manager or his designee shall also be authorized to promulgate rules and regulations regarding the installation of a flow restrictor for customers who use excessive amounts of water. A warning shall be provided prior to the installation of a restrictor.

If the City Manager determines that it is necessary to implement the fine/surcharges indicated herein, he shall give notice of such determination to the press and shall post such notice in the Office of the City Clerk.

The City Manager shall also track on a monthly basis whether the City is meeting its goal of overall reduction. The City Manager may implement the fine/surcharges indicated herein at any time subsequent to May 1, 1992, if he makes a determination that the City is not substantially meeting its overall goal of reduction of water use.

SECTION 7. URGENCY ORDINANCE. EFFECTIVE IMMEDIATELY.

The Council finds that the public health, safety and welfare require that this ordinance become effective immediately upon its adoption and passage. This ordinance shall be published once in the Antioch Daily Ledger within fifteen (15) days of its adoption, and shall become effective immediately upon its passage and adoption.

* * * * * * * * * *

I HEREBY CERTIFY that the foregoing ordinance was introduced and adopted as an urgency ordinance by a four-fifths (4/5) vote of the City Council of the City of Antioch at a regular meeting thereof, held on the 25th day of February, 1992, by the following vote:

AYES: Council Members Stone, Price, Rimbault, Freitas and Mayor Keller.

NOES: None.

ABSENT: None.

MAYOR OF THE CITY OF ANTIOCH

ATTEST:

CITY CLERK OF THE CITY OF ANTIOCH

Appendix E

Landscaping and Irrigation Regulations

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City of Antioch
Landscaping and Irrigation Regulations

1. General Requirements

All landscaping and irrigation systems shall be designed, installed and maintained in accord with the standards and requirements of this section, which shall apply to all commercial, industrial, and residential projects requiring planned development, use permit and/or Design Review Board approval(s). The requirements of this section shall apply to all new construction, as well as existing structures (of over approximately 2,500 sq. ft.) undergoing significant exterior alterations. Individually owned single-family residences not within a Planned Development and commercial projects not requiring landscape areas (such as existing buildings in the Rivertown District) are exempt from the requirements of this section.

A. Prior to the issuance of a certificate of occupancy, the Community Development Department staff shall:

   1. Verify that landscaping and irrigation has been installed in accordance with the approved plans with respect to size, number and species of plants and adequate water coverage. (In unique situations, a bond may be posted on the uncompleted work with the approval of the Zoning Administrator.)

   2. Obtain from the applicant and/or developer a performance bond (period of one year after issuance of certificate of occupancy) to insure plant establishment. Bond shall cover cost of replacing all plant material but may exclude material and labor costs relating to irrigation and hardscape.

B. All planting areas shall be permanently maintained. As used in this section, "maintained" includes watering, weeding, pruning, insect and pest control, and replacement of plant materials, and irrigation equipment as needed to preserve the health and appearance of plant materials. Should the Neighborhood Improvement Coordinator determine that landscaping is not being maintained as defined by this section, the City reserves the right, at the owner's expense, to either undertake itself, or contract for, any and all work necessary to restore landscaping.

2. Required Landscape Plans

A. Landscape plans should be prepared by a licensed landscape architect, or equally qualified professional. The Zoning Administrator, Planning Commission, and/or Design Review Board may require as a project specific condition that final landscape plans be prepared by a licensed landscape architect. All landscape plans shall be drawn to scale and be consistent with architectural and civil engineering site plans.

B. All applications for final development plan, use permit, and/or design review shall provide a preliminary landscape plan. This plan shall, as a minimum, illustrate the extent and nature of proposed plantings as well as a proposed plant pallet.

C. Final landscape and irrigation plans shall be submitted concurrently with architectural, structural, and civil engineering plans when a building permit is requested. No building permit shall be issued for any project governed by the requirements of this section, until final landscape and irrigation plans have been reviewed and approved by Staff.

   1. Final landscape plans shall identify specific plant materials to be used, providing both common and botanical names, sizes and quantities.

   2. Irrigation Plans. Irrigation plans, encouraging drip irrigation systems whenever possible, shall be

submitted with development plans and shall contain all construction details for an automatic system including but not limited to, the following:

i. Location, type and size of lines;

ii. Location, type and gallon output of heads;

iii. Location and sizes of valves;

iv. Location and type of controller;

v. Installation details;

vi. Location and type of backflow prevention device (as per Health Code); and

vii. Available water pressure and water meter outlet size.

3. General Design Standards

A. Landscape plans shall demonstrate a recognizable pattern or theme for the overall development by choice and location of materials. To accomplish this, landscape plans shall conform to the following:

1. Plant materials shall be selected for: drought tolerance; adaptability and relationship to Antioch environment; color, form and pattern; ability to provide shade; soil retention; fire resistance, etc. The overall landscape plan shall be integrated with all elements of the project, such as buildings, parking lots and streets, to achieve desirable microclimate and minimize energy demand. Plant materials and landscape design shall be consistent with the City's water conservation guidelines.

2. Plant materials shall be sized and spaced to achieve immediate effect and shall normally not be less than a 15-gallon container for trees, 5-gallon container for specimen shrubs, and a 1-gallon container for mass planting. Turf areas shall be from sod and ground cover from either 1 gallon containers or flats. Larger plant materials may be required on a case by case basis in order to achieve a more immediate landscape benefit.

3. The use of crushed rock or gravel for large area coverage shall be avoided (except for walks and equestrian paths).

4. Nonturf areas, such as shrub beds, shall be top dressed with a medium decorative bark mulch to a depth of 2" or approved alternative.

5. Where shrubs or low-level vegetation are used, vegetative matter at maturity shall cover at least 75 percent of actual planted area.

4. Specific Design Standards

A. In addition to the general requirements of this section, additional code requirements and/or policy direction may be adopted by the City Council to address specific design issues. It is the applicant's responsibility to obtain all relevant information from the Department of Community Development prior to submittal of landscape plans.

1. Landscaping of parking facilities shall be as presented in this Ordinance.

2. Landscaping and associated grading of open spaces in planned developments shall conform to policy adopted by City Council Resolution No. 89-263.

3. Treatment of natural and man made creeks and drainageways shall conform to adopted City Council Resolution 92/237.

4. Water conservation measures shall be incorporated in all landscape design and maintenance programs as required by the Antioch Municipal Code.

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Appendix F

Resolution 89-263 for Landscape Guidelines for Public Open Space Area with Planned Developments

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LANDSCAPE GUIDELINES FOR PLANNED DEVELOPMENTS

APPROVED BY COUNCIL RESOLUTION 89-263, 8/22/89
CITY OF ANTIOCH

Introduction

I. PURPOSE

To assure that the public open space areas within Planned Developments provide the maximum aesthetic benefit to the community while minimizing the costs of landscape installation, maintenance, and water use. Public open space areas are defined as parcels within the development which are owned and/or maintained by either the city, a landscape maintenance district, or a public/private utility (EBMUD, PG&E etc.). Public open space areas are identified and established as part of the development review process (ie planned development, tentative map, etc.)

II. ORGANIZATION OF GUIDELINES

These guidelines are divided into 3 (three) sections. The first, "Design Standards", addresses the different types and uses of landscaping and explains the relationship between grading and landscape design. The second section, "Landscape Plan Review Process", explains the requirements for plan submittal and the steps leading to plan approval. The third section addresses the regulation of the installation and initial maintenance of landscaping, as well as the requirements for final acceptance of landscape improvements by the City.

Design Standards

I. TYPES OF LANDSCAPES

The degree of landscaping provided should be tailored to the visibility of the site and the nature of grading that will be taking place. Generally, there are three classes of landscaping that will be used in open space areas. Class I is the most intense with Class III being the least. All open space areas will be classified as requiring one of the 3 (three) treatments. **The components of the three classes are defined below, and their applications are discussed in the following section labeled "Uses of Landscape Types".**

A. CLASS I - Class I is what may be called "conventional landscaping". This class will have the highest aesthetic impact, along with the highest water use.

All areas will have either turf or ground cover planted from flats. A variety of shrubs, vines, and trees will also be utilized. For this traditional type of planting, all trees must be at least 15 gallon, with 5 gallon shrubs. 1 gallon shrubs may be considered on a case by case basis. In many cases, street trees will be selected from pallets to be established for the various arterial and collector roads. Full, permanent and automatic irrigation will be provided with conventional spray and bubbler systems.

B. CLASS II - Class II is to be considered a mid-range landscape, providing limited irrigated planting in place of either conventional Class I Landscaping or unirrigated grasses. While no low growing ground covers would be required, the main purpose of the Class II landscape is to cover graded slopes using a "shrub cover". The shrub cover may be used to either: a) provide coverage for 100% of total slope area; or b) provide partial slope coverage by clustering shrubs in irregular forms to simulate naturally occurring mixes of grasses and chaparral growth. In many cases, the two approaches will be used together, so that a highly visible slope face will receive 100% coverage and then "feather out" gradually into a less visible area.

Initially, areas to receive Class II shrub plantings shall be hydroseeded with an unirrigated "nurse crop"

for erosion control. Ultimate cover shall be provided by low growing, quick spreading shrubs. These shrubs may be planted from 1 gallon containers at 6' on center or if approved on a case by case basis, from liners at approximately 3' on center. Ideally, the desired cover should be provided in about three (3) years.

Other native and drought tolerant trees and shrubs are to be planted in clusters. Trees and large shrubs should be added to the "shrub cover" to provide accents and mass screening where needed. Selected plants should reflect a naturalistic setting, avoiding highly ornamental plantings. (**NOTE, a list of appropriate trees and shrubs is attached as an appendix to these guidelines.** Staff intends to update this list as new information regarding plant performance becomes available).

At this class, a variety of liners one, five and 15 gallon plant sizes may be used. Since all of the plants used in Class II are drought tolerant, water use should be less than with Class I. Automatic irrigation will either be from a permanent drip system (such as Pepco, or equal) or conventional spray and/or bubblers. Flow sensors to detect pressure loss (such as Data Industrial, or equal) shall be incorporated into the irrigation system, when required, so the affected system would shut down if there was a break in the line.

C. CLASS III - Class III plantings introduce the fewest changes to the natural landscape. Most of the areas to receive Class III treatment will be undisturbed open spaces where the natural grasses will be retained. In these undisturbed situations, the only additions to the existing landscape would be plantings of coast live and blue oaks, along with California Buckeyes. These trees will be clustered as non-irrigated seedlings at a rate of approximately 50 per acre. The intent is to recreate the Savannah landscape that has currently survived only in the higher foothills above Antioch. Special containers made for dry seedling plantings known as slips or liners shall be used These containers shall provide wire protection and water retaining polymers shall be placed in plating holes. In some unique or transitional situations, 5 and 15 gallon oak trees from nursery stock may be required.

In disturbed areas, a low growing hydroseed mix shall be used to replace the existing grasses. A variety of mixes, such as hard fescue will be considered on a case by case basis. In addition to replacing the grassland cover, oak seedlings and trees shall be planted as discussed above.

In both disturbed and undisturbed situations, the only irrigation used may be for the occasional planting of oak tree clusters from nursery stock as discussed above. As with Class II, low water use bubblers will be used.

II. USES OF LANDSCAPE TYPES

The three general classes of landscape types will be used both separately and in combination to match the aesthetic requirement of the specific situation. The plantings of the different classes should blend into each other, creating transitions where some shrubs and trees overlap the different zones. Highly linear "divisions" between the zones should be avoided.

Basically, Class I is to be used only in highly visible and accessible situations. Parkways and landscape strips adjacent to arterial and collector streets will be mostly planted with Class I landscapes. Open space areas adjacent to local streets and cul-de-sacs will receive a band of Class I landscaping of approximately 8' to 15' in depth.

Class II landscaping shall be used on graded slopes which are both highly visible and artificial in appearance.
The most typical situation where Class II shall be used is on a 2 to 1 or 3 to 1 slope which is both adjacent to an arterial road and contains mid-slope benches. Because these slopes have the highly visible and unnatural horizontal "banding" from the benches, and are usually steeper than the natural topography, they require the addition of irrigated landscaping to soften their appearance.

Another common use of Class II landscaping will be to act as a backdrop for the Class I plantings used along arterials, collectors, and local streets where they abut open space. This backdrop should extend for approximately 10' to 15' back from the Class I plantings. In this and in most situations, Class I and II landscapes should blend into each other, varying the limit line of the more refined Class I plantings.

Class III treatment will be used for ungraded slopes and graded slopes which have either low visibility, or have been graded to reflect the pre-existing contours. The use of Class III treatment is more likely to be acceptable if the graded slope appears as natural as possible. This would require these slopes to:

a) generally have slopes no steeper than three to one.

b) have curvilinear contours which simulate natural forms.

c) utilize concrete drainage benches only at the bottom of

slopes. Mid-slope benches, if required for soil engineering purposes, would highlight the artificial aspects of the slope and necessitate Class II level planting.

It should be stressed that the use of naturalistic grading with Class III treatment is highly desirable as it both pre serves the image of natural hillsides and reduces landscaping costs to both developer and maintenance district.

III. REDUCTION OF FIRE HAZARDS IN OPEN SPACE AREAS

The Riverview Fire Protection District requires that fire risk be reduced by the provision of a 30' fire break immediately adjacent to all homes which a join an open space area. The fire district has stated that this "fire break" can be established by either:

a) removing all growth by discing or chemical control.

b) limiting height of natural grasses to approximately 6 inches inches by cutting or chemical control.

c) use of "wet belt" landscaping which uses both permanent spray irrigation and fire retardate plant materials.

Where the fire break is immediately uphill from the homes, the area will have little visibility since the homes will block views of the slope. In these situations, grass removal or growth restrictor is the most appropriate. Where the need for the fire break is downhill from homes, and therefore likely to be highly visible, a "wet belt" landscaped treatment will most likely be required.

This wet belt can be achieved in many ways. All Class I landscapes will qualify as wet belt plantings.

But because some of the plants most likely to be used in Class II situations may not be considered fire retardant, Class II plantings will not automatically be considered a wet belt zone.

For a list of appropriate shrubs and ground covers to use in place of standard Class II scrubs, see Attachment #1.

The different shrubs species should be placed in multiple small clusters, so the risk of die out from too large of area of one species of shrub is reduced. This type wet belt may be irrigated by drip or spray.

This approach is intended to blend with Class II planting. Plants from the Attachment #1 list could be blended throughout a bank of Class II planting so that plantings

within and without the wet belt zone appear related. Furthermore, trees that are not a high fire risk (such as Coast Live and Blue Oak) which are used in Class II planting may be occasionally placed inside the wet belt zone to further blend the planting zones.

An alternate form of wet belt planting would be the establishment of a low growing grass or legume from hydroseed. These areas would be spray irrigated and must be kept green at all times. This treatment may blend best with the unirrigated Class III areas, although its use due to the greater addition of surface water, is subject to soils engineers' approval.

A final note on fire breaks address large parcels (ie. over 5 acres) of ungraded open spaces areas. These areas will be divided by seasonal discing to create areas of natural grasses not larger than 5 acres apiece. The location of these annual fire breaks should be determined early in landscape/plan development so that no oak seedlings are planted where discing will take place.

It must be stressed that the specific requirements of the fire district will vary from site to site so plantings related to fire safety will be reviewed on a case by case basis.

IV. UNIQUE SITUATIONS

Some sites may have unique features (such as long and narrow utility easements) that require additional treatment other than found in Class III, but where the more intense Class II treatment may be unnecessary. In these cases, use of an irrigated meadow grass may be considered on a case by case basis. This treatment would be implemented by occasional trees irrigated by individual bubblers.

Landscape review process

I. PLANNED DEVELOPMENT PLAN REVIEW

As part of the planned development/tentative map review process, a "landscape zones" map must be submitted. This plan conceptually shows where the three classes of planting will be utilized, as well as the locations of "wet belt" planting. Although most of this initial landscape plan review will be limited to the degree of landscape treatment proposed for an open space area (ie: Class II versus Class III) rather than specific plant materials, street trees for the major arterials should be included. The landscape zones map should use the preliminary grading plan for the planned development as a base (usually @ 100 scale). It should be noted that just as the preliminary grading plan is subject to change due to evolving information on the soils and geology of the site, the location of landscape zone may vary at the time more precise grading plans are developed.

While detailed "conceptual landscape plans" for the entire site are not required, preliminary meetings with staff may indicate that a conceptual plan that highlights specific areas of concern (such as a neighborhood entry, highly visible slope, or linear trailway) is desirable.

II. USE PERMIT REVIEW AND PRE-HEARING STAFF REVIEW

After the final development plan/tentative map have been approved, use permit review is required for the specific phases of the project. The use permit allows for more detailed review of grading, landscaping and exact unit and lot line locations. Use permit review shall precede engineering services' plan checking of the final map and civil improvement plans.

To begin the process, the applicant should review a preliminary grading and lot layout plan with planning staff. As a result of staff's comments, regarding grading refinements and landscape requirements, the applicant should prepare the required use permit submittals.

III. USE PERMIT SUBMISSION REQUIREMENTS

The use permit submittal shall include both grading and planting plans at 40 scale. The planting plan shall be of at least a "design development" stage, including a proposed plant pallet and ground cover and shrubs shown as masses. Specific tree and shrub "call outs" are desirable, so a draft of the final working drawings is acceptable in lieu of the "design development" drawing. These plans shall be reviewed by Planning, Engineering, Maintenance Services, and Fire District for conformance to the planned development approval and these landscape policy guidelines. It should be noted that in cases of hardship, due to project scheduling, the Zoning Administrator may allow landscape "design development" plans to be submitted after use permit hearing.

Once the use permit is approved, the plan changes required by "project specific conditions" shall be incorporated into the final grading and landscape working drawings submitted to Engineering Services.

With final grading and planting plans approved, precise working drawings of layout, irrigation, and planting must be submitted for final approval by the Public Works Department, Engineering Services.

IV. FINAL WORKING DRAWING SUBMISSION REQUIRED

The final working drawing submittal shall:

a) be on 24" X 36" size sheets and be to an engineering scale (1" = 10', 20' or 40'), as required by Engineering Services

b) call out all quantity totals and/or spacing requirements for all ground cover and shrubs planted from 1 and 5 gallon containers

c) utilize base sheets with approved grading and lot layout. Grading informations should be screened to 50%. All information extraneous to landscape issues (ie. building footprints, grading and drainage notes etc.) should be screened and/or removed so that all landscape call outs and irrigation lines are clearly legible.

d) utilize standard City irrigation details and specify previously accepted irrigation products whenever possible. Applicants should contact Engineering Services prior to plan submittal for information.

Three copies shall be submitted to Engineering Services. A set shall be routed to Planning to verify compliance of use permit conditions. Once all Engineering concerns are addressed, a final set of photo mylars shall be submitted for acceptance by the City Engineer. All applicable licenses and signatures shall be on each page of the set to be accepted.

Landscape installation, maintenance and final acceptance

I. INSTALLATION AND ACCEPTANCE FOR MAINTENANCE

The bond posted by the builder for the general infrastructure improvements shall include the streetscape and open space landscape improvements. None of this bond shall be released until the landscape installation is initially accepted by both Planning and Engineering staff. Initial acceptance for maintenance shall be based on compliance with the approved grading plan and the final working drawings as approved by the City Engineer. Should all other aspects of the infrastructure improvements be completed prior to the completion of the landscape work, all or part of the general improvement bond may be released with the approval of the City Engineer. But prior to this general bond release, the builder must post performance bond for the remaining landscape work. This bond shall cover the complete cost of the work, as estimated by either the builder's landscape architect, contractor, or City staff. **(Note: the release and posting of all bonds shall be in compliance with the subdivision requirements of the Antioch Municipal Code.)**

II. MAINTENANCE PERIOD

Once the acceptance for maintenance is given, the builder is responsible for 90 days maintenance of the landscape improvements. A portion of the general bond posted for subdivision improvements shall be retained to reflect the cost of potential replanting should the builder fail to provide proper maintenance during this 90 day period. During this period, officials from the Engineering Services (parks and maintenance services) shall schedule regular walk-throughs with the builder's contractor to review the project's status, help refine maintenance practices, and to correct current deficiencies. Problems with the irrigation system shall be corrected by the next watering cycles, and all others by the next walk-through.

III. FINAL ACCEPTANCE

At the end of the 90 days maintenance period, both Planning and Engineering shall review landscape improvements for final acceptance, using the following criteria (It should be noted

ATTACHMENT #1

Suggested plant list for Class II plantings - July 1989

Subject to revision - additional plants not currently on list will be considered on a case by case basis.

TREES

- Pinus elderica
- Pistacia Chinensis (Chinese Pitache)
- Quercus douglasii (Blue Oak)
- Quercus agrifalia (Coast Live Oak)
- Schinus molle (California Pepper)

SHRUBS

- Acacia redolens
- Arctosaphylos (Manzanita - various species)
- Baccharis pulularis - Pigeon Pt. (Prostrate Coyote Brush)
- Ceanothus (various species)
- Westringia Rosemarniformis

Shrubs that qualify for "wet zone" plantings:

- Atriplex Semibaccata (Creeping Saltbush)
- Artemesia caucasia (Spreading Sagebrush)
- Ceanothus (prostrate forms only)
- Myoporum parvitolium (Prostrate Myoporum)

NOTE: resources for possible additional plantings include:

- Water-Conserving Plants And Landscapes For The Bay Area, EBMUD, 1986
- Trees And Shurbs For Dry California Landscapes, by Bob Perry, Land Design Publishing, 1981

Corey\landscap

P L A N C H E C K G U I D E L I N E S date_____

AS BUILT PLANS MUST BE SUBMITTED TO CITY BEFORE PROJECT WILL BE FORMALLY ACCEPTED. **Must Include 1 Set of Laminated 8 1/2" x 11" Reduced Scale Irrigation Plans.**

THE DEVELOPER WILL BE RESPONSIBLE FOR SCHEDULING. **30 Day Inspections During Required 90 Day Maintenance Period.**

Yes	No	N/A	
			Irrigation System:
---	---	---	Check valves on any 10' or higher slope (KBI brand).
---	---	---	Control valves as per our CD one valve/box.
---	---	---	Isolation valves as required.
---	---	---	44 NP Quick coupler with locking lid and box located 12" from central valves installed as per our detail, ratio = 1 qc:4 valves or valve manifold area.
---	---	---	Quick coupler 3" below box lid.
---	---	---	Quick couplers next to tennis courts, picnic tables - 1 quick coupler at 2 opposing corners of tennis courts.
---	---	---	1 Quick coupler within 40' of tables.
---	---	---	1 Quick coupler/cul-de-sac.
---	---	---	Controller - Rain Master EV-XX-SAT series for 8 stations or above. EVADJS sensors (if used).
---	---	---	Irritrol MC+ on jobs under eight stations.
---	---	---	Controllers installed per our CD details. Cabinet 4X size of controller.
---	---	---	Pop up sprinklers instead of risers. Pop up bubblers 1-shrub, 2-tree.
---	---	---	As Built plans made available before release of job.
---	---	---	Sequence valves in order. Mark valve number on lid of valve box (2 1/2" letters and numbers).
---	---	---	Manual sprinkler system for baseball infield.
---	---	---	1 PVC union on all valves with one gate valve.
---	---	---	Brooks #1419 Box for Automatic Valves. #1100 Box for Gate & Quick Coupler Valves.
---	---	---	Irrigation system designed to complete summer watering (80% ET) in 12 hours.
---	---	---	Pressure check system 125 PSI for 2 hours on main lines.
---	---	---	Sleeves under pavement and identifying marks put on pavement.
---	---	---	RP Febco 825Y supported by concrete pad.
---	---	---	Coverage check and 14 day watering period before planting.
---	---	---	Swing joints on all heads.
---	---	---	Sprinkler system guarantee shall be 1 year and any manufacturers warranties.
---	---	---	Pipe shall be no closer than 4" to walkways 8" from buildings.
---	---	---	Pipe-main line = PVC - 1120-1220, type I, schedule 40 lateral line = PVC - 1120-1220, class 200.
---	---	---	PVC solvent welds - all cuts shall be square; primer to be used.
---	---	---	Fittings - schedule 80 - main line, schedule 40 - laterals.
---	---	---	Thread sealant - non hardening compatible with pipe.
---	---	---	Wire - U.L. approved for direct burial, copper, AWG-UF 600 volt #14 (minimum). Common wire shall be white (2 per system), control wires all same color other than white. Wires can be color coded according to use (i.e. orange = shrubs, red = turf, etc.).

Yes	No	N/A	
---	---	---	One bubbler per tree (min.) in all areas including turf.
---	---	---	Wires shall be labelled at clock with station number.
---	---	---	Splicing - no splices other than in automatic valve boxes. Packaged approved underground splice connectors only (i.e. Pentite, snaptite. 3M-DBY Seal Pack).
---	---	---	Extra wires (of one different color other than what is already used) shall run along mainline at a ratio of 1 extra wire per 6 stations used on clock. These wires shall loop inside all valve boxes.
---	---	---	Operations Manual - to be supplied in three ring binder. Shall include manufacturers data sheets, maintenance and parts information of any equipment installed and supplier from where it was obtained.
---	---	---	Flow monitor and shut-off master valve on slopes over 3:1 (Data Industrials).
---	---	---	Pepco Drip Systems only. Emitter tubing not to exceed 15'. Emitters and pip shall be buried.
---	---	---	Irrigation Heads - located 4" inside fences, curbs, structures, walks.
---	---	---	Supply a laminated, color coded (by station) reduced scale 8-1/2"x11" layout plan at each controller.
---	---	---	Pop-up bubblers only on cul-de-sacs - 1/shrub, 2/tree.
---	---	---	Phone line to controllers.

<u>Landscaping</u>:

---	---	---	Deep root boxes on all trees within 10' of pavement.
---	---	---	Trees shall not be planted in areas confined by pavement that are less than 10' from the pavement.
---	---	---	All trees to be 15 gallon size unless other sizes approved.
---	---	---	Contractor to provide City with soil analysis recommendations from City approved laboratory.
---	---	---	Contractor shall follow recommendations of testing lab. and inform City of recommendation for approval.
---	---	---	Amendments shall be 6 cubic yards/1,000 sq ft of nitrified redwood of fir compost rototilled 8" into native soil.
---	---	---	Two inch layer of bark mulch (size 1/4"-1/2" or shredded) shall be distributed over all ground cover areas and 3" under shrubs and unplanted areas.
---	---	---	City shall be notified 3 days prior to amending or fertilizing planting areas for inspection during work.
---	---	---	Pre-emergent herbicide applied to all ground cover, non-planted areas and tot lots, prior to sand and bark installation, at manufacturer's recommended rates. Contact City 24 hours prior to application.
---	---	---	All plant material to be inspected by City prior to installation.
---	---	---	Agriform (20-10-5) tablets installed at manufacturers recommendation rates under all trees and shrubs.
---	---	---	Fertilizer shall be a urea based 16-6-8, or City approved product at recommended rate approved by City.
---	---	---	Developers to provide City standard park name signs as per our detail, and install.
---	---	---	Ninety day maintenance period after final inspection on all areas. Maintenance period shall require weekly maintenance. Provide schedule prior to 90 day maintenance

Yes	No	N/A	
			period. Schedule 1 inspection per month with City.
	---	---	Concrete "V" ditch at base of slope adjacent to property line.
---	---	---	Use Hard Fescue (Festuca Longifolia) for slope erosion control.
---	---	---	One year guarantee on trees.
---	---	---	One year guarantee on shrubs.
---	---	---	Shrub type to be a maximum of 3' in height when mature on any median or intersection radius in view of traffic.
---	---	---	As Built plans made available before release of job.
---	---	---	Jute netting on any planted slope greater than 3:1.
---	---	---	Areas under trees and shrubs shall be excavated to a depth of 3'in areas where compaction has previously occurred, i.e. cul-de-sacs, medians, etc.

Rest Room:

---	---	---	Provide 1 gallon of each paint color used to City.
---	---	---	Vandal proof fasteners on all inside fixtures.
---	---	---	Two inch water supply to building.
---	---	---	Cleanout at drinking fountain trap.
---	---	---	Pressure regulator on supply.
---	---	---	Roof detail (to match subdivision).
---	---	---	Santana Plastic Partitions.
---	---	---	Fluorescent lights - vandal proof Kenall fixtures: one on each exterior corner of building, one over lavatory, one over toilet area, one in storeroom. All on timer except storeroom.
---	---	---	Pneumatic closers on men's and women's doors.
---	---	---	State approved signing.
---	---	---	Separate shut-off valve for drinking fountain.
---	---	---	Shut-off valve for building.
---	---	---	Hose bib with check valve inside each room.
---	---	---	Stainless steel mirrors.
---	---	---	Toilet Paper Dispensers shall be roll type. Vandal Stop Products, 851 Al Marida Dr., Cambell, CA 95008
---	---	---	Cap on sewer vent.
---	---	---	Phone line stubbed into storeroom.
---	---	---	Separate 100 amp service to circuit breaker panel.

Paving:

---	---	---	Concrete only - unless approved.
---	---	---	10' width on main access paths.
---	---	---	Sweeping curves for vehicular traffic from street through park.
---	---	---	12" wide mowbands.
---	---	---	Metal pipe, capped, painted, locking ballards - locks above grade (see bollard detail).

Play Equipment Area:

	---	---	Do not locate drinking fountain within 100'.
---	---	---	Metal, powder coated as per our specifications.
---	---	---	Lappis #16-20 sand - 12" deep minimum.
---	---	---	Drainage system as per our detail.

Yes	No	N/A	
---	---	---	Concrete curb and minimum 10' sidewalk around play area.
---	---	---	Meets all federal and state product and installation codes.
---	---	---	Provide 1-Mar-Ga sand comb to City. Mar-Ga Simple Concepts, P.O. Box 4910, Salinas, CA 93912.
			<u>Structures</u>:
---	---	---	Removable ballards shall be color-coated round steel pipe timberform 2190-3R or equivalent (per our detail).
---	---	---	3'vinyl clad chain link perimeter fence around entire site or property lines. 6 gauge fabric. Top-rail, bottom wire.
---	---	---	12" mowband at base of fence.
---	---	---	Centrecon Area Lights with vandal proof screws on access plates.
---	---	---	Picnic tables per our detail.
---	---	---	Ratio of 2 barbecues/3 tables and 1 garbage can/2 tables.
---	---	---	Garbage can holders - Patterson Williams 1151-01 or 1151-02 with lockable hold downs.
---	---	---	Two #1151-02/tot lot located at opposite ends of area.
---	---	---	One #1151-01 next to rest room.
---	---	---	Two #1151-01 next to dugouts at baseball field.
---	---	---	All drinking fountains connected to drain system. Install drain cleanout and shut off valve.
---	---	---	Barbecue - Miracle #1104 or equivalent.
---	---	---	Drinking Fountain Haws standard with vandal proof screws - drain installed into park drainage system.
---	---	---	Basketball offset upright = 1525 with #14 backstop and #8131 goal ring.
---	---	---	Tennis Court - post = Patterson Williams #2201-40 with #8351 net.
---	---	---	Prep. Tennis Courts for future lighting.
---	---	---	Picnic Tables - Mexico Forge 866-1576.
---	---	---	Area lights on timers or one photocell in central location next to circuit breakers or on rest room building.
---	---	---	Park regulation signs (our detail) at each Park entrance.
---	---	---	Park name sign (our detail) provided by developer.
			<u>Baseball Field</u>:
---	---	---	Use Hollywood brand: (Contractor to install per our detail) Base anchors - BBP-44 Homeplate - HPS Pitching - BBPB Bases - BBP
---	---	---	Check detail for infield - minimum 4" infield mix. Areas to slope away from infield (including pavement behind backstop).
---	---	---	Concrete under dugout.
---	---	---	Install 2"x 12" finished Pressure Treated Douglas Fir at base of fence on infield side of fence - 3 high behind home plate, 1 high along the rest of the fence.

Yes No N/A

Plant Material

--- --- --- Turf varieties shall be fine tall fescues, such as: Olympic, Adventure, Jaguar, Falcon, Hound, Apache.

--- --- --- Irrigated meadows and slope situations shall be: hard fescue (festuca ovina ssp. duriuscula) at a rate of:
seed = 220 lbs/acre (95% purity; 85% germination)
mulch = 1800 lbs/acre
R-binder = 60 lbs/acre
Fertilizer = 400 lbs/acre

--- --- --- Non irrigated erosion control.

--- --- --- The following erosion control mixture is to be used as the City Standard for all non-irrigated hydro-seeded applications (unless noted otherwise):

BOTANICAL NAME (COMMON NAME)	MIN. % PURITY	MIN. % GERMINATION	LB/ACRE
Festuca Meglura (Zorro Annual Fescue)	95%	85%	20
"Hycon" Rose Clover	90%	70%	20
Lupinus Nanus (Sky Lupine)	90%	70%	4
Eschscholtzia Californica (California Poppy)	90%	70%	4
Lobularia Maritima (Sweet Alyssum)	90%	70%	4

--- --- --- The erosion control materials shall be mixed and applied in approximately the following proportions:

MATERIAL	PER ACRE (SLOPE MEASUREMENT)
Seed	52 Pounds
Wood Fibre Mulch	1800 Pounds
R Binder	60 Pounds
Fertilizer (20-20-10)	400 Pounds
Water	As Needed for Application

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Appendix G

Resolution to Adopt the Urban Water Management Plan

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RESOLUTION NO. 2006/07

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF ANTIOCH ADOPTING THE 2005 URBAN WATER MANAGEMENT PLAN

WHEREAS, the Urban Water Management Planning Act requires every urban water supplier providing water for municipal purposes to more than 3,000 customers to adopt and submit a Urban Water Management Plan to the California Department of Water Resources every five years; and

WHEREAS, the City of Antioch is an urban water supplier providing water for municipal purposes to more than 29,800 customers; and

WHEREAS, the City of Antioch has prepared the required plan, allowed public review and held the appropriate Public Hearing;

NOW, THEREFORE BE IT RESOLVED by the City Council of the City of Antioch, that it does hereby adopt the 2005 update to the Urban Water Management Plan and authorizes City staff to submit the Plan to the Department of Water Resources

* * * * * *

I HEREBY CERTIFY that the foregoing resolution as passed and adopted by the City Council of the City of Antioch at a regular meeting thereof, held on the 10th day of January, 2006, by the following vote:

AYES: Council Member Davis, Kalinowski, Conley, Simonsen and Mayor Freitas

NOES: None

ABSENT: None

L. Jolene Martin

L. JOLENE MARTIN, City Clerk

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Appendix H

References

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APPENDIX H

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