

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

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

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

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

Table 3-3. Connections by Customer Classification

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

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

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

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

^c Source: SSWD staff

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

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

3.2 Historical Water Use

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

3.2.1 Annual Water Production and Average Daily Demand

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

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

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

Table 3-5. Historical Water Production

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

Table 3-5. Historical Water Production (continued)

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

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

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

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

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

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

3.2.2 Unaccounted-for Water

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

3.3 Unit Water Use

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

The unit water use factors, as seen in Table 3-7, are established by comparing year 2004 residential metered water use with metered accounts. The per dwelling unit water use factor is 409 gpd/DU. This is based on a weighted average of the single family per dwelling unit water use and the multi family per dwelling unit water use. The unit water use for single family accounts is estimated to be 575 gpd/DU. This is based on metered water usage for metered single family accounts in 2004. The unit water use for multi family DUs is estimated to be 225 gpd/DU. This is based on 2004 multi family connections, estimated number of dwelling units per connection, and 2004 water use. Estimated number of employees within the district were compared to 2004 commercial, institutional, and industrial water use to determine a per employee water use factor. For this analysis it is assumed that 2004 was a normal water year. These factors do not take into account future water conservation within the District. These unit water use factors are based on water sales and do not include unaccounted-for water.

Table 3-7. Unit Water Use Factors

Classification	Unit water use factor
Residential	409 gpd ^a /DU
Non-residential	97 gpd ^a /employee

Note: Factors do not include unaccounted-for water.

^aGallons per day

3.4 Projected Water Demands By Water Year Type

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

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

3.4.1 Projected Normal-Year Water Demands

Normal-year water demands through the year 2025 are estimated based on the unit water use factors (see Table 3-7) and the housing and employment projections (see Table 3-1). These water demand projections are shown in Table 3-8 and are illustrated on Figure 3-3. The projected demand breakdown by customer category is based on the year 2004 demand breakdown by customer category. Also shown is the projected water demand from the Sacramento County Water Agency's Arden Park Water System. Sacramento County Water Agency sales are estimated to be 40 mgd (123 ac-ft/yr) for 2005. Since the Sacramento County Water Agency Arden Park system is near buildout it is estimated that this demand will remain the same through 2025. The District is in negotiations with California American Water Company, Rio Linda Water District, and Del Paso Manor Water District to provide wholesale water in the future. The amount of water that would be transferred to Rio Linda Water District and Del Paso Manor Water District has not yet been determined. By 2025, water demands are expected to increase by 7 percent, from 42.7 million gallons per day (mgd) (47,780 ac-ft/yr) in 2004 to 45.7 mgd (51,146 ac-ft/yr) in 2025. Impacts to water use due to any conservation measures implemented in the future are not reflected in the projected water demands.

In summary, from 1990 to 2004, District water demands fluctuated, with an overall increase of 18 percent, which is a growth rate of approximately 1.2 percent per year. Annual average demands are expected to increase at an approximate rate of 0.3 percent per year from 2004 to 2025. The projected rate of growth in water use is less than what has historically occurred. This flattening of water demand is considered normal for an area as it reaches build-out conditions.

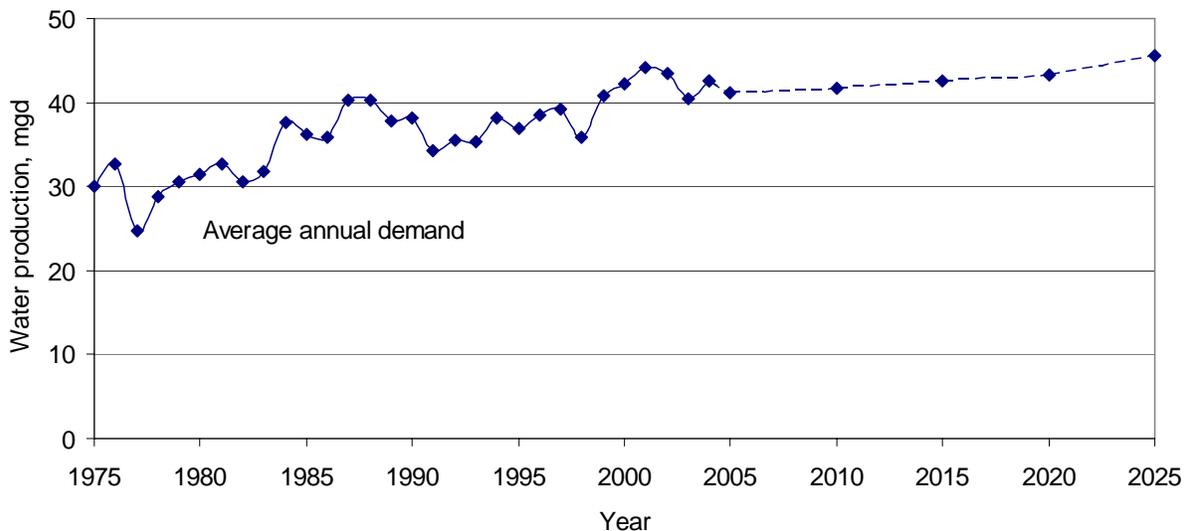


Figure 3-3. Historical and Projected Water Demand

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

Water use category	2005	2010	2015	2020	2025
Single-family					
Unmetered	16,418	12,727	8,483	4,238	0
Metered	7,533	11,502	16,263	20,908	26,553
Multi family	4,877	4,934	5,039	5,121	5,406
Commercial	11,134	11,263	11,503	11,689	12,340
Industrial	-	-	-	-	-
Institutional	1,336	1,352	1,381	1,403	1,481
Landscape irrigation	133	135	138	140	148
Water sales ^b -Sacramento County Water Agency (Arden Park Water System) ^c	123	123	123	123	123
Saline barriers	-	0	0	0	0
Groundwater recharge	-	0	0	0	0
Conjunctive use	-	0	0	0	0
Raw water	-	0	0	0	0
Recycled	-	0	0	0	0
Unaccounted-for water ^a	4,602	4,655	4,754	4,832	5,101
Total annual average	46,157	46,691	47,682	48,454	51,146
Percent of year 2005	100%	101%	103%	105%	111%

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

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

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

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

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

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

Year	2003 Plan ^a	This Plan	Based on SACOG Blueprint Preferred scenario	Water Forum Proposal ^b	Regional Water Master Plan ^c
2024	--	--	--	51,539	--
2025	49,165	51,146	--	--	--
2030	--	--	--	50,081	42,695-52,180
2050 (buildout) ^d	--	--	72,023	--	--

^aBrown and Caldwell. 2003.

^bSacramento City-County Office of Metropolitan Water Planning. 1999.

^cMontgomery Watson. 1999

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

3.4.2 Projected Single-Dry Year Water Demands

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

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

	2005	2010	2015	2020	2025
Total demand	46,157	46,691	47,682	48,454	51,146
Percent of projected normal ^a	100%	100%	100%	100%	100%

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

^aProjected normal from Table 3-8.

3.4.3 Projected Multiple-Dry Year Water Demands

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

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

	2006	2007	2008	2009	2010
Total demand	46,264	46,370	46,477	46,584	46,691
Percent of projected normal ^a	100%	100%	100%	100%	100%

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

^aProjected normal from Table 3-8.

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

	2011	2012	2013	2014	2015
Total demand	46,889	47,087	47,286	47,484	47,682
Percent of projected normal ^a	100%	100%	100%	100%	100%

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

^aProjected normal from Table 3-8.

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

	2016	2017	2018	2019	2020
Total demand	47,837	47,991	48,145	48,300	48,454
Percent of projected normal ^a	100%	100%	100%	100%	100%

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

^aProjected normal from Table 3-8.

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

	2021	2022	2023	2024	2025
Total demand	48,992	49,531	50,069	50,607	51,146
Percent of projected normal ^a	100%	100%	100%	100%	100%

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

^aProjected normal from Table 3-8.

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

Water supply sources	Normal water year	Single dry water year	Multiple dry water years			
			Year 1	Year 2	Year 3	Year 4
Surface Water						
Purchase - USBR (215)	10,000	0	0	0	0	0
Transfer - PCWA	29,000	0	0	0	0	0
Entitlement - City of Sacramento	22,400	0	0	0	0	0
Supplier produced groundwater	24,000	52,000 ^b	52,000 ^b	52,000 ^b	52,000 ^b	52,000 ^b
Recycled water ^c	0	0	0	0	0	0
Water supply loss due to water quality	(0)	(0)	(0)	(0)	(0)	(0)
Desalination water	0	0	0	0	0	0
Total	85,400	52,000	52,000	52,000	52,000	52,000
Percent of normal year supply	100%	61%	61%	61%	61%	61%

Units of measure : ac-ft/yr

^aThe District only purchases USBR (215) water when PCWA water is not available.

^bBased on assumption that groundwater use during dry years is greater than the average groundwater yield.

^cRecycled water is discussed in Chapter 5 of this Plan.

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

1. Normal year is a year in the historical sequence that most closely represents median runoff levels and patterns. Normal is defined as the median runoff over the previous 30 years or more. This median is recalculated every ten years.
2. Single-dry year is generally considered to be the lowest annual runoff for a watershed since the water year beginning in 1903.
3. Multiple-dry year period is generally considered to be the lowest average runoff for a consecutive multiple year period (three years or more) for a watershed since 1903.

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

Table 4-6. Basis of Water Year Data

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

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

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

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

Units of Measure: ac-ft/yr

4.6.2 Projected Multiple-Dry Year Water Supplies

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

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

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

Units of Measure: ac-ft/yr

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

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

Units of Measure: ac-ft/yr

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

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

Units of Measure: ac-ft/yr

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

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

Units of Measure: ac-ft/yr

CHAPTER 7 WATER SUPPLY VERSUS DEMAND COMPARISON

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

7.1 Current and Projected Water Supplies vs. Demand

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

7.1.1 Current and Projected Normal Year Water Supplies vs. Demand

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

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

	2005	2010	2015	2020	2025
Supply totals	63,200	81,400	85,400	85,400	85,400
Demand totals	46,157	46,691	47,682	48,454	51,146
Difference (supply minus demand)	17,043	34,709	37,718	36,946	34,254
Difference as a percent of supply	27%	43%	44%	43%	40%
Difference as a percent of demand	37%	74%	79%	76%	67%

Units of Measure: ac-ft/yr

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

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

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

	2005	2010	2015	2020	2025
Supply totals	52,000	52,000	52,000	52,000	52,000
Demand totals	46,157	46,691	47,682	48,454	51,146
Difference (supply minus demand)	5,843	5,309	4,318	3,546	854
Difference as a percent of supply	11%	10%	8%	7%	2%
Difference as a percent of demand	13%	11%	9%	7%	2%

Units of Measure: ac-ft/yr

7.1.3 Projected Multiple-Dry Year Water Supplies vs. Demand

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

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

	2006	2007	2008	2009	2010
Supply totals	52,000	52,000	52,000	52,000	52,000
Demand totals	46,264	46,370	46,477	46,584	46,691
Difference (supply minus demand)	5,736	5,630	5,523	5,416	5,309
Difference as a percent of supply	11%	11%	11%	10%	10%
Difference as a percent of demand	12%	12%	12%	12%	11%

Units of Measure: ac-ft/yr

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

	2011	2012	2013	2014	2015
Supply totals	52,000	52,000	52,000	52,000	52,000
Demand totals	46,889	47,087	47,286	47,484	47,682
Difference (supply minus demand)	5,111	4,913	4,714	4,516	4,318
Difference as a percent of supply	10%	9%	9%	9%	8%
Difference as a percent of demand	11%	10%	10%	10%	9%

Units of Measure: ac-ft/yr

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

	2016	2017	2018	2019	2020
Supply totals	52,000	52,000	52,000	52,000	52,000
Demand totals	47,837	47,991	48,145	48,300	48,454
Difference (supply minus demand)	4,163	4,009	3,855	3,700	3,546
Difference as a percent of supply	8%	8%	7%	7%	7%
Difference as a percent of demand	9%	8%	8%	8%	7%

Units of Measure: ac-ft/yr

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

	2021	2022	2023	2024	2025
Supply totals	52,000	52,000	52,000	52,000	52,000
Demand totals	48,992	49,531	50,069	50,607	51,146
Difference (supply minus demand)	3,008	2,469	1,931	1,393	854
Difference as a percent of supply	6%	5%	4%	3%	2%
Difference as a percent of demand	6%	5%	4%	3%	2%

Units of Measure: ac-ft/yr

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

Source	2006	2007	2008	Normal
Surface Water				
Purchase - USBR (215)	0	0	0	10,000
Transfer - PCWA	0	0	0	29,000
Entitlement - City of Sacramento	0	0	0	22,400
Supplier produced groundwater	52,000	52,000	52,000	24,000
Recycled water ^c	0	0	0	0
Water supply loss due to water quality	(0)	(0)	(0)	(0)
Desalination water	0	0	0	0
Total	52,000	52,000	52,000	85,400

7.3.3 Catastrophic Supply Interruption Plan

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

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

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

Site emergency - does not exceed the following criteria:

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

District emergency - exceeds site emergency criteria:

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

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