Palmdale Water District

2005 Urban Water Management Plan

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Palmdale Water District

2005 URBAN WATER MANAGEMENT PLAN

December 2005

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December 22, 2005
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Palmdale Water District
2029 East Avenue 'Q'
Palmdale, California 93550

Attention: Mr. Curtis Paxton

Subject: 2005 Urban Water Management Plan

Dear Mr. Paxton:

We are pleased to submit the Palmdale Water District 2005 Urban Water Management Plan. This document was adopted by the Palmdale Water District Board of Directors on December 19, 2005.

The report is organized as follows:

Chapter 1 - Introduction
Chapter 2 - Service Area
Chapter 3 - Water Supply
Chapter 4 - Reliability Planning
Chapter 5 - Water Use
Chapter 6 - Supply and Demand Comparison
Chapter 7 - Water Demand Management Measures
Chapter 8 - Water Shortage Contingency Plan
Chapter 9 - Water Recycling

We would like to extend our thanks to you, Mr. Matthew Knudson, Engineering Supervisor; Claudette L. Roberts, Water Conservation Manager; and other District staff whose courtesy and cooperation were valuable components in completing this study and producing this report.

Sincerely,

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Enclosures: 2005 Urban Water Management Plan

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Palmdale Water District

2005 URBAN WATER MANAGEMENT PLAN

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DWR "Review for Completeness" Checklist
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DWR "Review for Completeness" Checklist
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Provide 2005 UWMP to DWR, cities and counties within 30 days of adoption	Section 1.4
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Chapter 1

INTRODUCTION

1.1 PURPOSE

The California Water Code requires urban water suppliers within the state to prepare and adopt Urban Water Management Plans (UWMP) for submission to the Department of Water Resources (DWR). These plans, which must be filed every five years, must satisfy the requirements of the Urban Water Management Planning Act (UWMPA) of 1983 including amendments that have been made to the Act. The UWMPA requires urban water suppliers servicing 3,000 or more connections, or supplying more than 3,000 acre-feet (af) of water annually, to prepare an UWMP.

The purpose of the UWMP is to maintain efficient use of urban water supplies, continue to promote conservation programs and policies, ensure that sufficient water supplies are available for future beneficial use, and provide a mechanism for response during water drought conditions. This report, which was prepared in compliance with the California Water Code, and as set forth in the guidelines and format established by the DWR, constitutes the Palmdale Water District's (District) 2005 UWMP.

1.2 URBAN WATER MANAGEMENT PLANNING ACT

In 1983, State Assembly Bill 797 modified the California Water Code Division 6, by creating the UWMPA. Several amendments to the original UWMPA, which were introduced since 1983, have increased the data requirements and planning elements to be included in the 2005 plans.

Initial amendments to the UWMPA required that total projected water use be compared to water supply sources over the next 20 years, in 5-year increments. Recent DWR guidelines also suggest projecting through a 25-year planning horizon to maintain a 20-year timeframe until the next UWMP update has been completed.

Other amendments require that plans include provisions for recycled water use, demand management measures, and a water shortage contingency plan. The UWMPA requires inclusion of a Water Shortage Contingency Plan, which meets the specifications, set forth therein. Recycled water was added in the reporting requirements for water usage and figures prominently in the requirements for evaluation of alternative water supplies, when future projections predict the need for additional water supplies. Each urban water purveyor must coordinate the preparation of the Water Shortage Contingency Plan with other urban water purveyors in the area, to the extent practicable. Each water supplier must also describe their water demand management measures that are being implemented, or scheduled for implementation.

Amendments SB 610 (Costa, 2001), and AB 901 (Daucher, 2001), which became effective beginning January 1, 2002, require counties and cities to consider information relating to the availability of water to supply new large developments.

The most recent amendments include SB 318 (Alpert, 2004), which requires the plan to describe the opportunities for development of desalinated water, including but not limited to, ocean water, brackish water, and groundwater, as long-term supply. AB 105 (Wiggins, 2004) requires urban water suppliers to submit their UWMPs to the California State Library.

1.3 PREVIOUS URBAN WATER MANAGEMENT PLAN

This section briefly describes the major recommendations from the District's 2000 UWMP, dated December 2000.

1.3.1 2000 UWMP Recommendations

The 2000 UWMP provided water supply and demand forecasts, description of water sources and reliability, a water shortage contingency plan, water management accomplishments of the past five years, and water management programs to implement in the next five years.

The Groundwater Assessment and Protection Program included a wellhead protection plan to mitigate groundwater contamination, and a reliability analysis of the local groundwater including discussion of the DWR model. The water shortage contingency plan discussed several resolutions implemented by the District for voluntary and mandatory water conservation measures.

The recommended urban water management programs for the District described in the 2000 UWMP consisted of a combination of existing and proposed water conservation measures. The 2000 UWMP recommended that the District continue with its existing activities as implemented at that time, with the exception of some proposed changes. The conservation measures consisted of the following: Conservation, Education, Reclamation and Replenishment.

- Water conservation kits for retrofitting existing plumbing fixtures were made available to District customers at the District office.
- Improved leak detection and lining of the Palmdale ditch with Bentonite mixed soil has resulted in reduced losses due to leakage.
- In 1992, the Board of Directors enacted several resolutions adopting water conservation policies and requirements, having both voluntary and mandatory provisions and penalties for violations. The resolutions provide for prohibition of water wastage at all times, not only during times of drought.

- Staff training is a key element in water conservation training. Water auditing, irrigation planning, landscape design public relations, marketing, courses and water conservation certificates are encouraged.
- The District continues to participate in the California Water Awareness Campaign, promote their mascot, Aquadog, for increased awareness at public functions, improve the District's Water Awareness Fair and sponsor a poster and jingle contest for elementary students.
- Continued promotion of recycled water system for residential irrigation.
- Development of recycled water for groundwater recharge, landscape irrigation and agricultural irrigation.

1.4 PUBLIC PARTICIPATION AND PLAN ADOPTION

The UWMPA requires that the UWMP show the water agency solicited public participation.

Law

> 10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published … After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

In accordance with the UWMPA, the District held a public hearing and adopted the 2005 UWMP on December 19, 2005. A copy of the adopting resolution is included in Appendix A. Two successive weeks prior to adoption; a notice of the public hearing was published in the local newspaper, notifying interested parties that the draft 2005 UWMP was available at various District facilities and on the District's web page for review (Appendix B).

1.5 AGENCY COORDINATION

The UWMPA requires the UWMP identify the water agency's coordination with appropriate nearby agencies.

Law

> 10620 (d) (2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

The Palmdale Water District's 2005 UWMP is intended to address those aspects of the Act, which are under the control of the District, specifically water supply and water use. While preparing the 2005 UWMP, the District coordinated its efforts with relevant agencies to ensure that the data and issues are presented accurately.

The following agencies were notified and provided access to copies of the Public Review Document of the 2005 UWMP for the PWD:

- City of Palmdale
- Los Angeles County Department of Regional Planning
- Littlerock Creek Irrigation District
- Los Angeles County Waterworks District
- Los Angeles County Sanitation Districts
- Antelope Valley - East Kern Water Agency
- Quartz Hill Water District
- Rosamond Community Services District
- Los Angeles County Farm Bureau
- Building Industry Association of Southern California.
- Los Angeles World Airports

The District contacted the Department of Water Resources (DWR) to discuss the requirements of the UWMPA and obtain electronic workbooks, checklists, and other developed guidelines to prepare this report.

1.6 REPORT ORGANIZATION

This UWMP contains 9 chapters that were prepared to follow the outline requirements listed in the UWMPA. The chapters are briefly described below.

- Chapter 1 - Introduction
- Chapter 2 - Service Area
- Chapter 3 - Water Supply
- Chapter 4 - Reliability Planning
- Chapter 5 - Water Use
- Chapter 6 - Supply and Demand Comparison
- Chapter 7 - Water Demand Management Measures
- Chapter 8 - Water Shortage Contingency Plan
- Chapter 9 - Recycled Water

Additionally, the chapters are preceded with a separate section titled “DWR Review for Completeness Form”. This form is based on the 2005 UWMP Review Form and is provided to assist DWR staff during their review process.

1.7 ABBREVIATIONS

Abbreviations have been used in this report to improve readability. The abbreviations shown are each spelled out in the text the first time it is used and subsequently identified by abbreviation only. They are also summarized in Table 1.1 as a reference.

Table 1.1 Abbreviations
2005 Urban Water Management Plan
Palmdale Water District

Abbreviation	Definition
ADD	Average Day Demand
af	acre-feet
AFY	acre-feet per year
ACWA	Association of California Water Agencies
AVEK	Antelope Valley - East Kern Water Agency
AVWG	Antelope Valley Water Group
Agreement	Monterey Agreement
BMPs	Best Management Practices
cfs	cubic feet per second
CIP	Capital Improvement Program
CSD	County Sanitation District
CUWCC	California Urban Water Conservation Council
CWAC	California Water Awareness Campaign
City	City of Palmdale
DHS	Department of Health Services
DMMs	Demand Management Measures
DRL	Detection Report Limit
du	Dwelling Unit
DWR	Department of Water Resources
District	Palmdale Water District
EIR	Environmental Impact Report
EPA	United States Environmental Protection Agency

Table 1.1 Abbreviations
2005 Urban Water Management Plan
Palmdale Water District

Abbreviation	Definition
ETo	Evapotranspiration
F	Degrees Fahrenheit
gpd	gallons per day
GWR	Ground Water Rule
LACSD	Los Angeles County Sanitation Districts
LCID	Littlerock Creek Irrigation District
MCL	Maximum Contamination Level
MDD	Maximum Day Demand
MG	Million Gallons
mgd	Million Gallons per day
mg/L	milligrams per liter
MOU	Memorandum of Understanding
MWC	Mutual Water Company
NOAA	National Oceanic and Atmospheric Administration
PHD	Peak Hour Demands
PEIR	Preliminary Environmental Impact Report
PEIS	Preliminary Environmental Impact Statement
PWRP	Palmdale Water Reclamation Project
PWTP	Palmdale Water Treatment Plant
SCAG	Southern California Association of Governments
SWAP	Source Water Assessment Program
SWP	State Water Project
TDS	Total Dissolved Solids
ULFT	Ultra-Low Flush Toilets
USGS	United States Geological Survey
UWMP	Urban Water Management Plan
UWMPA	Urban Water Management Planning Act
WSMP	Water System Master Plan

SERVICE AREA

The UWMPA requires that the UWMP include a description of the water purveyor's service area and various aspects of the area served including climate, population, and other demographic factors.

Law

> 10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:
>
> 10631. (a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

2.1 DESCRIPTION OF THE DISTRICT

The Palmdale Water District (District) was established in 1918 as the Palmdale Irrigation District. The primary function of the District is to provide retail water service to the central and southern portions of the City of Palmdale (City) and adjacent unincorporated areas of Los Angeles County. Under the provisions of the California Water Code relating to the establishment of irrigation districts, the District has the power to carry out any act to provide sufficient water for present and future beneficial uses, including construction and operation of works to store, regulate, divert and distribute water for use within its boundaries. A Board of Directors, elected at large, with one representative from each of the five divisions, governs the District.

The District acts as a retailer of water supplies for domestic, commercial and industrial users. There are no agricultural deliveries made within the service area boundaries.

2.1.1 History

The District evolved from several private water companies. The first water agency, the Palmdale Irrigation Company, was established in 1886 to acquire land and water, and then rent, lease, and sell both as they were developed. As a means of providing water for these purposes, they constructed a six and a half mile irrigation ditch to divert water from nearby Littlerock Creek to Palmdale.

Not long after, it became apparent that water storage facilities were needed. In 1895, the South Antelope Valley Irrigation Company constructed an earthen dam forming Harold Reservoir known today as Palmdale Lake. To connect the water from Littlerock Creek to Harold Reservoir, they constructed another earthen ditch, including a flume and wooden trestle, parallel to the ditch being used by the Palmdale Irrigation Company.

By the early 1900s, it was decided that one or more dams on Littlerock Creek were necessary. By this time, the Palmdale Water Company and Littlerock Creek Irrigation District had acquired the facilities of earlier water companies. Together, they studied the costs and options for constructing one or more dams on Littlerock Creek.

It was determined that forming a public irrigation district was the best way to finance this construction. The Palmdale Irrigation District was then formed in 1918 by a vote of the public. It maintained a service area of about 4,500 acres and acquired the added facilities of the Palmdale Water Company.

Until the 1950s, the area within Palmdale Irrigation District's boundaries was primarily agricultural. However, with the activation of Air Force Plant 42 and the increased use of Edwards Air Force Base, agricultural water use diminished. As populations grew within the valley, the shift to domestic water began.

In 1963, the Palmdale Irrigation District entered into an agreement to purchase water from the newly planned State Water Project (also known as the California Aqueduct). This agreement guaranteed the District would have sufficient alternative source water to supply projected population growth well into its future.

To contain the increased water supply, bonds were sold to rebuild and expand Palmdale Lake (formerly known as Harold Reservoir) to an increased capacity of over 4,100-acre feet. This bond financing also allowed the construction of a new treatment facility adjacent to the Lake. As a result, this new water supply enabled the Palmdale Irrigation District to service a broader area of Palmdale.

It was decided in 1973, that the Palmdale Irrigation District name should be changed to the more appropriate Palmdale Water District. Founded as an Irrigation District supplying water mainly to farms for agricultural use, the District's boundaries had expanded with Palmdale's rapid population growth and the District shifted to providing predominantly municipal and industrial water.

For the last ten years, the Palmdale Water District continued to improve and add to its water distribution and storage facilities. The District's primary service area now covers approximately 46 square miles versus 4,500 acres in 1918. The distribution system encompasses approximately 380 miles of pipeline, multiple well sites, booster pumping stations, and water storage tanks maintaining a total storage capacity of over 44 million gallons (mg).

2.2 LOCATION

The District is located within the Antelope Valley in Los Angeles County, approximately 60 miles north of the City of Los Angeles and 50 miles west of the City of Victorville (Figure 2.1). The District's primary service area includes the central and southern portions

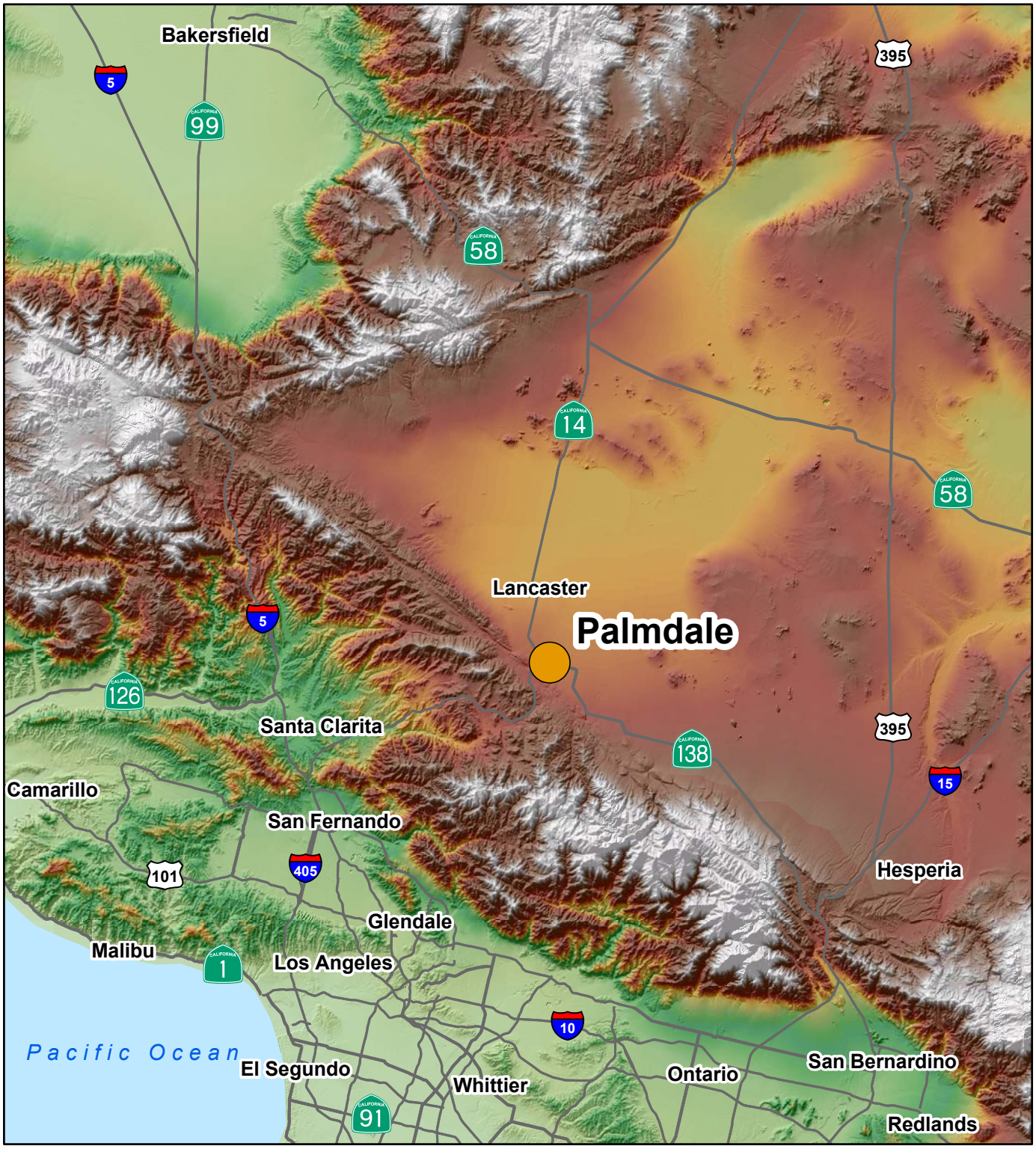


FIGURE 2.1
REGIONAL LOCATION MAP

2005 URBAN WATER MANAGEMENT PLAN

PALMDALE WATER DISTRICT

of the City of Palmdale and adjacent unincorporated areas of Los Angeles County. The City's nearest neighbor, Lancaster, is approximately 10 miles to the north. The Antelope Valley Freeway (State Freeway 14) runs north-south and the Pearblossom Highway (State Highway 138) meanders in the east-west direction through the District.

The lands in the area presently served by District slope gently upward to the foot of the northeast-facing slopes of the San Gabriel mountains. Elevations range from approximately 2,600 feet to 3,800 feet above sea level.

The entire District encompasses an area of approximately 140 square miles overlying more than thirty non-contiguous areas scattered throughout the southern Antelope Valley as shown in Figure 2.1. In addition to the primary service area shown in Figure 2.2, there is a federal land area of approximately 65 square miles upstream of Littlerock Dam in the Angeles National Forest. There is also a non-contiguous secondary area of approximately two square miles that is northwest of the primary service area. This area is served by two mutual water companies (West Side Park MWC and El Dorado MWC). According to the 2006 Water System Master Plan Update - Draft (2006 WSMP Update - Draft), water is wheeled to the MWCs through pipelines owned by the Antelope Valley - East Kern Water Agency.

2.3 LAND USE

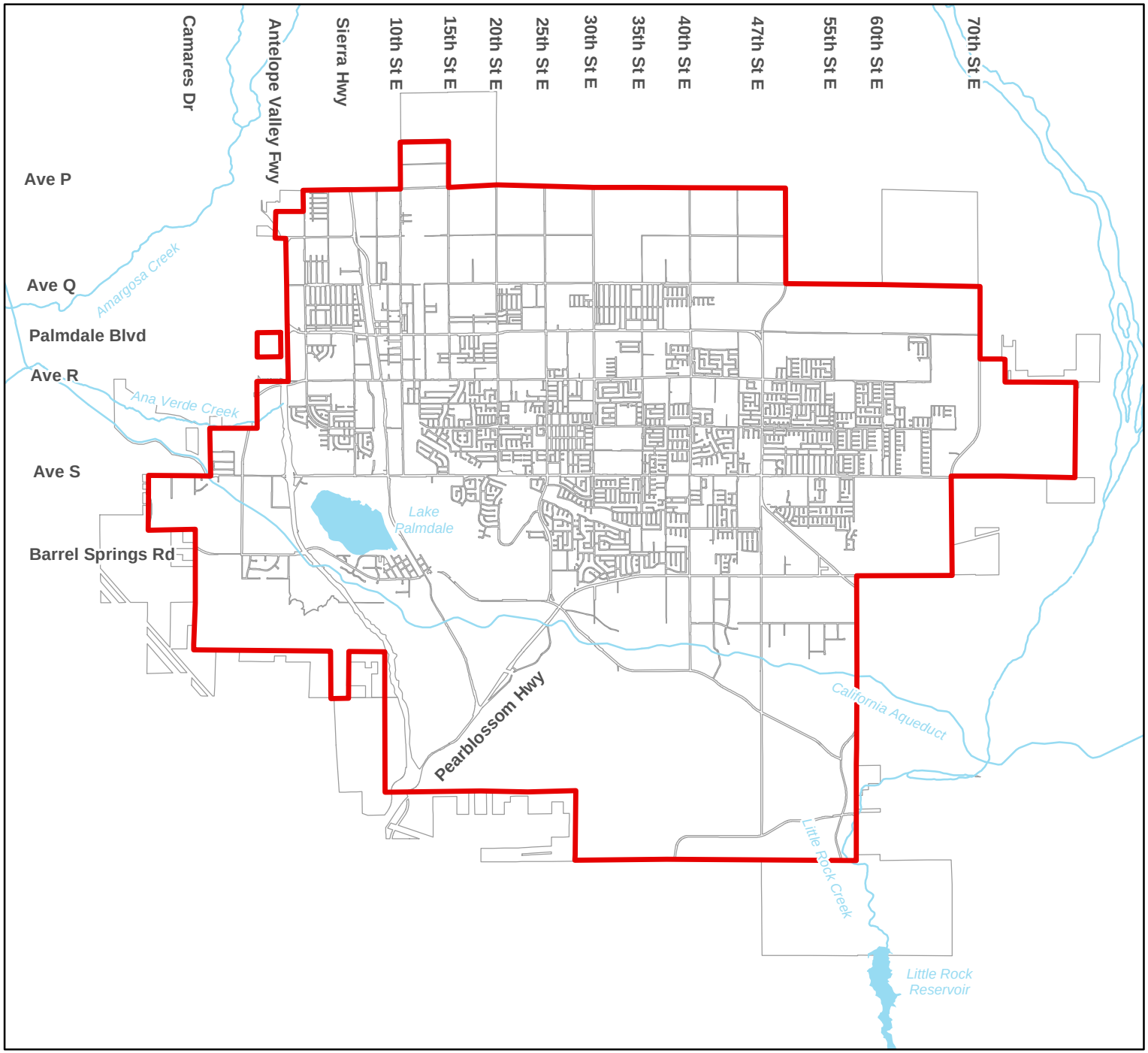
Historically, the District has been primarily agricultural. However, in the mid 1970s, the District's service area shifted from agricultural to municipal and industrial uses.

In the 2006 WSMP Update, the District's land use types were grouped into five categories (Table 2.1).

Commercial land use consists of the following land use types: business parks, downtown commercial, community commercial, neighborhood commercial and regional commercial. Industrial land use consists of the following land use types: airport, community manufacturing and industrial. Public facilities land use consists of open space and public facilities such as schools and public buildings. Residential low consists of those parcels that are zoned for 0-2 dwelling unit (du)/acre. Residential medium consists of those parcels zoned for 2-6 du/acre, which consists of most single-family homes. Residential high consists of those parcels zoned for 10-16 du/acre and consists mainly of apartment buildings, condominiums and townhouses.

2.4 CLIMATE

Wide temperature fluctuations, hot summers, cold winters, strong winds, low humidity and scant rainfall characterize the climate in the District service area. Temperatures in the summer months vary between an average low of 71 degrees Fahrenheit (degrees F) and



Legend

- Waterways
- Palmdale Water District Primary Service Boundary

N

0 1 2 Miles

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FIGURE 2.2
SERVICE AREA MAP

2005 URBAN WATER MANAGEMENT PLAN

PALMDALE WATER DISTRICT

Table 2.1 Land Use Categories (Primary Service Area) Urban Water Management Plan Palmdale Water District		
Land Use	**2005 Developed Area (acres)**	**2030 Projected Developed Area (acres)**
Residential		
Low Density	7,641	18,787
Medium Density	325	469
High Density	343	411
Commercial	933	2,438
Industrial	405	1,227
Open Space	717	5,122
Other	2,162	870
Total	12,526	29,324
Source: 2006 WSMP Update - Draft		

an average high of 95 degrees F. In the winter months, the average temperature extremes vary from 30 to 58 degrees F, respectively. Most of the precipitation occurs during the winter and spring months. Average annual precipitation is 6.7 inches in the northerly portion of the District (District Weather Station) and 12-inches in the southerly San Gabriel Mountain area (2006 Water Master Plan Update - Draft). Table 2.2 shows the average, monthly evapotranspiration (ETo), rainfall, and temperature for the District.

2.5 HISTORICAL AND PROJECTED POPULATION

Since the District's primary service area boundary does not coincide with the City boundary, as shown in Figure 2.3, population studies prepared by the City cannot be used directly to estimate the population served by the District. The District population increased from 14,400 in 1960 to approximately 29,000 in 1985 and about 84,546 in 1995. As a result of this substantial growth from 1965 to 1985, water production grew from 4,100-acre feet per year to over 8,000-acre feet per year and more than doubled in the five years after that. Since 1995, the population of the District service area has increased to approximately 109,845 most of whom live in the City of Palmdale.

The estimated historical District population between 1990 and 2004 are shown in Table 2.2. The data from the 1996 Water System Master Plan was estimated under the assumption that the District population between 1990 and 1994 grew at the same rate as the City population. An examination of the number of active service connections for the District between 1995 and 1999 revealed that, for this latter period, the District's growth rate was

lower than the City's overall growth rate. Thus for 1995 through 1999, the District population was estimated based on the apparent growth rate of the number of active service connections. Census data was used to estimate population for the year 2000 and growth projections from the Southern California Association of Governments (SCAG) was used to estimate population from 2001 through 2004.

Growth rates obtained from SCAG for the Palmdale area were used to project District population through 2030 (Table 2.4). It is estimated that the population within the District will reach approximately 164,000 by 2015 and 253,000 by 2030.

Table 2.2 Climate
2005 Urban Water Management Plan
Palmdale Water District

	Average ETo[1] (in.)	Average Rainfall[2] (in.)	Average Temperature[2] (ºF)
January	2.02	1.52	58.3
February	2.61	1.65	62.1
March	4.55	1.28	67.2
April	6.19	0.46	73.9
May	7.30	0.13	81.7
June	8.85	0.04	90.1
July	9.77	0.05	97.5
August	8.99	0.18	96.9
September	6.52	0.20	91.3
October	4.66	0.32	80.3
November	2.68	0.68	67.1
December	2.05	1.39	58.7
Annual	66.19	7.90	77.1

Notes:
1. DWR California Irrigation Management Information System website.
2. National Oceanic and Atmospheric Administration (NOAA) Western Regional Climate Center website.

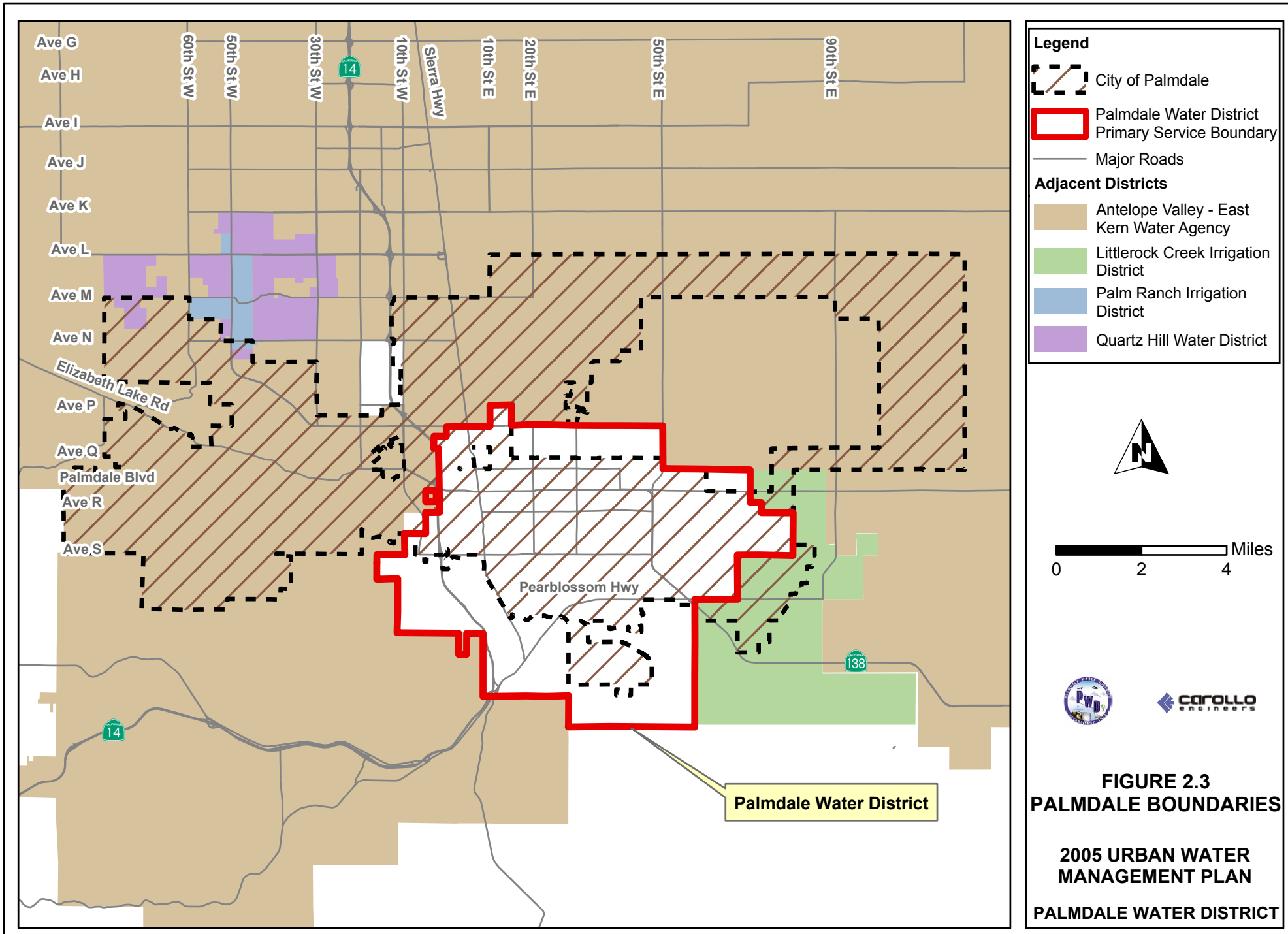


FIGURE 2.3
PALMDALE BOUNDARIES

2005 URBAN WATER MANAGEMENT PLAN

PALMDALE WATER DISTRICT

Table 2.3 Historical District Population 2005 Urban Water Management Plan Palmdale Water District	
Year	**District Population**
1990	58,324[(1)]
1991	63,447[(1)]
1992	67,792[(1)]
1993	74,939[(1)]
1994	80,106[(1)]
1995	84,546[(2)]
1996	84,546[(2)]
1997	84,174[(2)]
1998	84,813[(2)]
1999	87,042[(2)]
2000	88,578[(3)]
2001	92,831[(4)]
2002	97,085[(4)]
2003	101,338[(4)]
2004	105,592[(4)]

Notes:
1. 1996 WMP; 2000 UWMP.
2. Estimated from growth trends of District's connection; 2000 UWMP.
3. U.S. Census Bureau, Census Block Groups data.
4. Estimated from growth trends based on SCAG projections.

Table 2.4 Current and Projected Population 2005 Urban Water Management Plan Palmdale Water District						
	2005	**2010**	**2015**	**2020**	**2025**	**2030**
City of Palmdale[(1)]	145,995	176,506	218,387	259,712	299,324	337,314
Palmdale Water District	109,845	132,801	164,312	195,404	225,208	253,791
Annual Increase over Five Year Period	4.8%	4.2%	4.7%	3.8%	3.1%	4.8%

Source: Southern California Association of Governments (SCAG).

Chapter 3

WATER SUPPLY

The UWMPA requires that the UWMP include a description of the agency's existing and future water supply sources for the next 20 years. The description of water supplies must include detailed information on the groundwater basin such as water rights, determination if the basin is in overdraft, adjudication decree, and other information from the groundwater management plan (if available).

Law

> 10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:
>
> 10631 (b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments [to 20 years or as far as data is available.] (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:
>
> 10631 (b) (1) A copy of any groundwater management plan adopted by the urban water supplier…
>
> 10631 (b) (2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or board has adjudicated the rights to pump groundwater…For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted…

3.1 WATER SUPPLY FACILITIES

The District receives water from three sources: Littlerock Creek Dam and Reservoir, the State Water Project and Groundwater. Groundwater is obtained from underground aquifers via 27 active wells scattered throughout the District (Figure 3.1) and chlorinated prior to distribution. The pumping capacities of the District wells are shown on Table 3.1. SWP water is conveyed to Lake Palmdale via a 30-inch diameter pipeline. Lake Palmdale acts as a forebay for the District's 30 mgd water treatment plant and stores approximately 4,250 acre-feet of SWP water and Littlerock Creek water.

Water is conveyed from the wells or treatment plant to the consumers via a distribution system with pipe sizes ranging between 2- and 42-inches in diameter. The District maintains 19 storage tanks within the distribution system, with a total capacity of 44.6 MG.

The District produces 26,671 acre-feet annually composed of approximately 60 percent surface water and 40 percent groundwater. The District is usually more dependent on groundwater in winter, prior to the snowmelt.

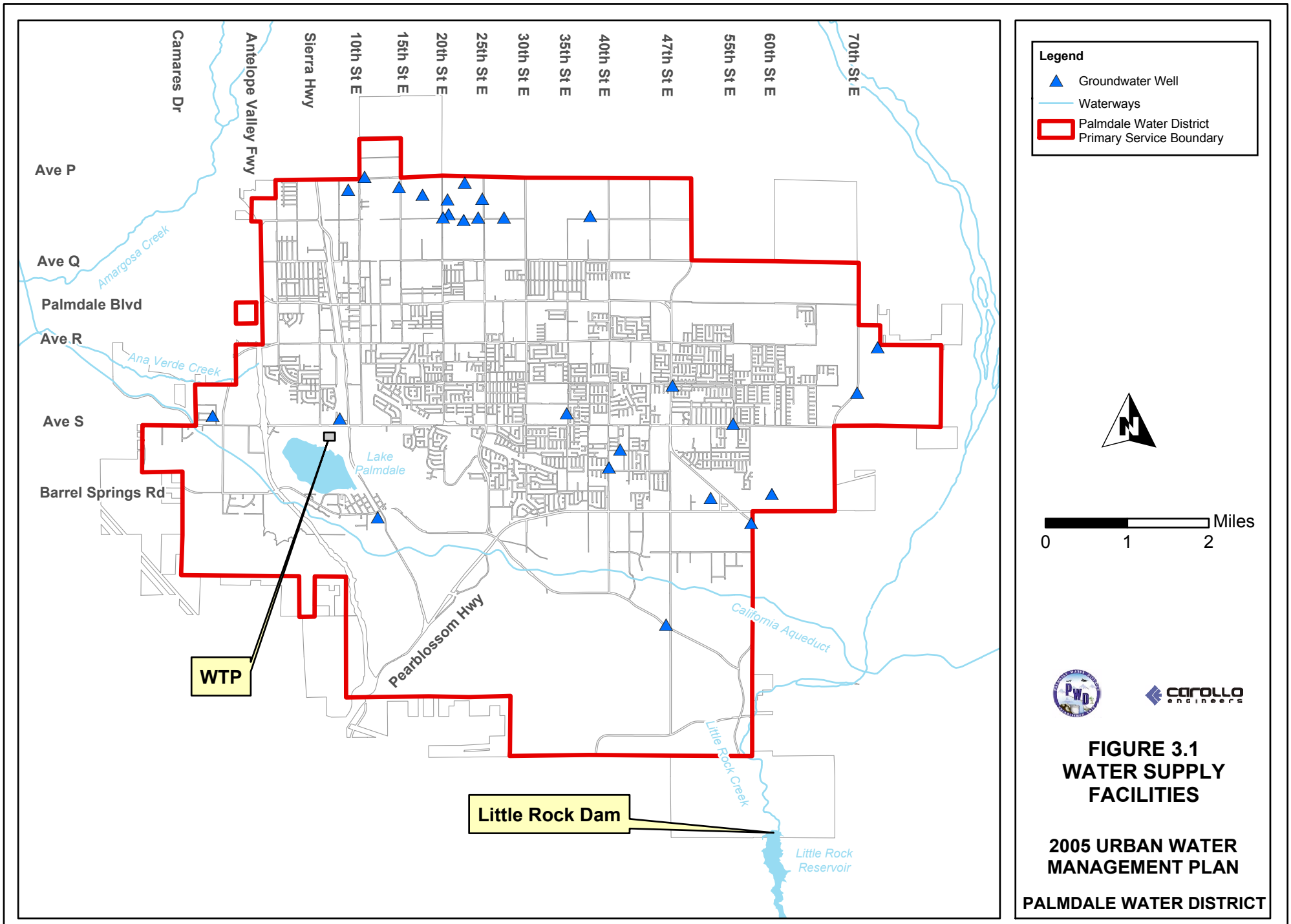


FIGURE 3.1
WATER SUPPLY FACILITIES

2005 URBAN WATER MANAGEMENT PLAN

PALMDALE WATER DISTRICT

Table 3.1 Groundwater Well Data Summary
2005 Urban Water Management Plan
Palmdale Water District

Well No.	Location	Groundwater Subbasin	Zone Served	Status	Year Drilled	Well Capacity (gpm)
2A	39400 20th Street E P-4	Lancaster	2800	Active	1968	1,475
3A	2163 E. Avenue P-8	Lancaster	2800	Active	1960	1,551
4A	2475 E. Avenue P-8	Lancaster	2800	Active	1970	515
5	1036 Barrel Springs Rd	San Andreas	2950	Offline	1965	--
6A	39455 10th Street E	Lancaster	2800	Active	1983	285
7A	39395 25th Street East	Lancaster	2800	Active	1985	1,589
8A	2200 E. Avenue P	Lancaster	2800	Active	1987	2,024
10	3701 E. Avenue P-8	Lancaster	2800	Active	1956	254
11A	39501 15th Street East	Lancaster	2800	Active	1963	931
14A	39401 20th Street East	Lancaster	2800	Active	1965	1,188
15	1003 East Avenue P	Lancaster	2800	Active	1960	1,098
16	4125 E Avenue S-4	Pearland	2950	Active	1960	150
17	718 Denise Avenue	San Andreas	3200	Inactive	1966	--
18	4640 Barrel Springs Rd	San Andreas	3250	Active	1954	96
19	4640 Barrel Springs Rd	San Andreas	3250	Active	1961	127
20	5680 Pearlblossom Hwy	Pearland	3000	Active	--	288
21	36525 52nd Street East	Pearland	2950	Active	--	227
22	Avenue S/55th Street East	Pearland	2850	Active	1974	347
23A	2202 E Avenue P-8	Lancaster	2800	Active	1977	743
24	2701 East Avenue P-8	Lancaster	2800	Offline	1985	--
25	37520 70th Street East	Pearland	2950	Active	1989	512
26	4701 Katrina	Pearland	2850	Active	1989	304
27	To be abandoned/relocated	Pearland	2950	Future	1989	--
28	--	Pearland	2950	Future	1989	--
29	--	Pearland	2850	Future	1989	--
30	7392 E Avenue R	Lancaster	2950	Active	1989	498
32	37301 35th Street E	Lancaster	2800	Active	1989	293
33	7160 E Avenue R	Lancaster	2950	Active	1989	418

Table 3.1 Groundwater Well Data Summary 2005 Urban Water Management Plan Palmdale Water District						
Well No.	**Location**	**Groundwater Subbasin**	**Zone Served**	**Status**	**Year Drilled**	**Well Capacity (gpm)**
34	--	Pearland	2950	Future	1991	--
35	36549 60th Street East	Lancaster	3000	Active	1991	444
Source: 2006 WSMP Update - Draft						

3.1.1 Water Facilities Capital Improvement Program

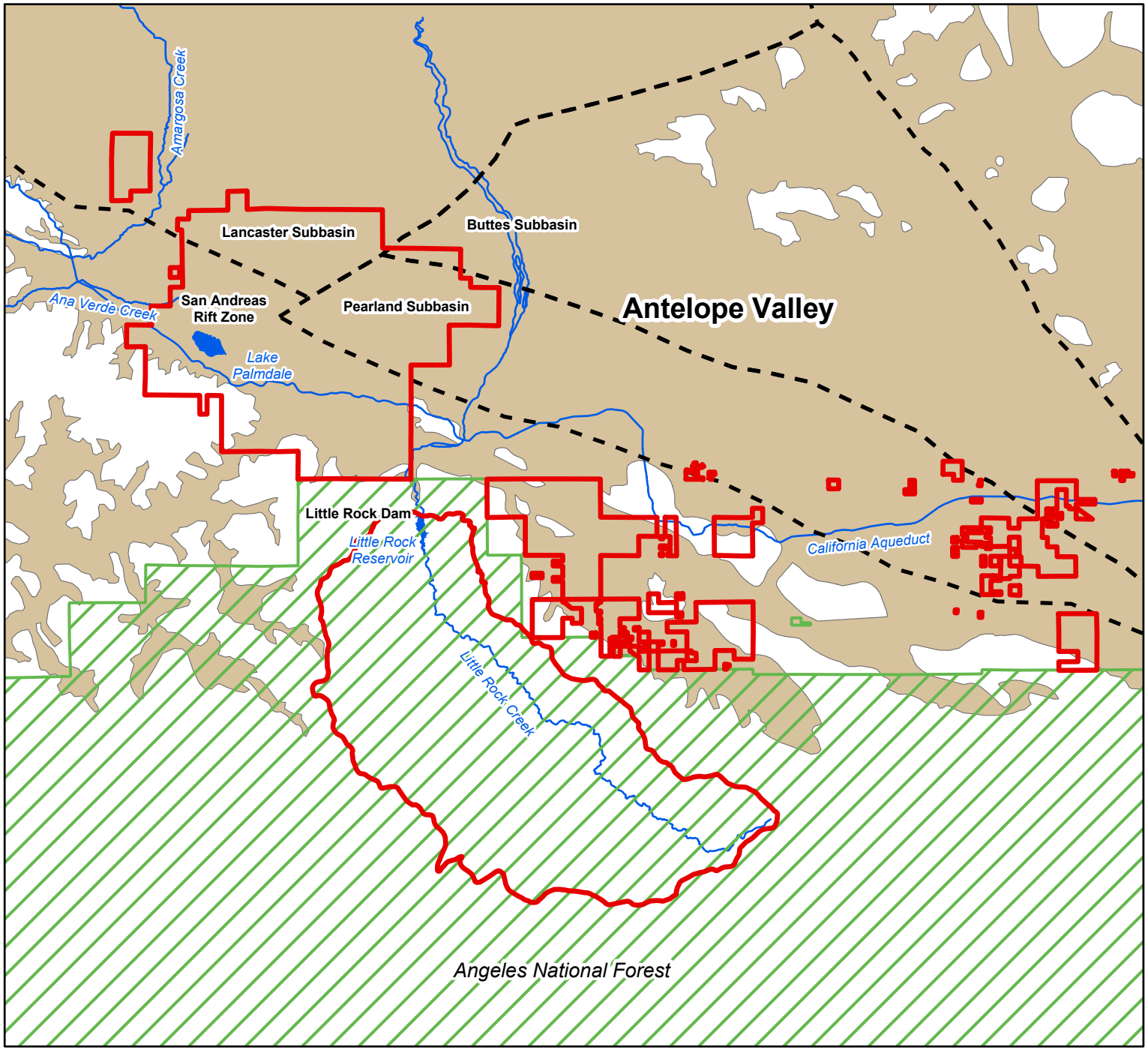
The extensive growth occurring in the City and surrounding unincorporated County areas during the late 1980's necessitated the implementation of a 42.5 million dollar capital improvement program by the District to serve the population projected by City Planning Department estimates. The Capital Improvement Program (CIP) includes construction of pipelines, increased storage capacity, increased well capacity and expansion of the water treatment plant. The CIP provided an increase to 34 MG of storage in 1995. Addition of the new 4 MG storage tank at 50th St. East in 2005 increased finished water storage to 44.6 MG.

3.2 SURFACE WATER

3.2.1 Littlerock Creek Dam and Reservoir

The principal streams tributary to the District service area are Littlerock and Big Rock creeks, which flow north from the San Gabriel Mountains along the southern District boundary. Numerous intermittent streams also flow into the service area, however run-off is meager. The Littlerock Creek Dam and Reservoir intercepts flows from the Littlerock and Santiago canyons. Runoff from the 65 square mile watershed in the Angeles National Forest to the reservoir is seasonal and varies widely from year to year. For the period 1953-1999, annual inflow for the available data was 13,285 acre-feet per year. The median inflow for this period was 6,707 acre-feet per year. The difference between the median and average demonstrates that dry years occur more frequently than wet years and that wet years tend to be more extreme.

Littlerock Creek Dam and Reservoir is located about 8.5 miles from the City and diverts water from Littlerock Creek. Since 1922, the District has shared water from this source with Littlerock Creek Irrigation District (LCID). The District and LCID jointly hold long-standing water rights to divert 5,500 acre-feet per year from Littlerock Creek flows. Per an agreement between the two districts, the first 13 cubic feet per second (cfs) of creek flows is available to LCID. Any flow above 13 cfs is shared between the two districts with 75 percent going to the District and 25 percent to LCID. Each of the districts is entitled to 50 percent of the



Legend

- Waterways
- Palmdale Water District Boundary
- Angeles National Forest
- Subbasin Boundary
- Antelope Valley

N

0 2.5 5 Miles

carollo engineers

FIGURE 3.2
GROUNDWATER BASINS

2005 URBAN WATER MANAGEMENT PLAN

PALMDALE WATER DISTRICT

Groundwater Basin Source: California Department of Water Resources, February 2004

reservoir's storage capacity. Water from Littlerock Creek Reservoir is conveyed to Lake Palmdale through an open canal.

In 1992, during renegotiations of the Districts' agreement, a plan to rehabilitate the existing dam was implemented. The plan involved reinforcing the original multiple-arch construction with a roller-compacted concrete buttress, raising the dam by 12 feet to increase capacity, providing recreational facilities around the reservoir, and replacing the historic wooden trestle between the creek and the reservoir with an underground siphon. The entire project was completed by the end of 1995. This agreement gives the District the authority to manage the reservoir. LCID granted ownership of its water rights to the District for the fifty-year term of the agreement in lieu of contributing financial resources for the rehabilitation work. LCID is entitled to purchase from the District, in any one calendar year, 1,000 acre-feet of water or 25 percent of the yield from Littlerock Reservoir, whichever is less. Upon termination of the 1992 Agreement, the terms of the 1922 Agreement will again define and govern the rights and responsibilities of the District and LCID with respect to the dam and the waters stored in the reservoir.

3.2.2 California State Water Project

The State Water Project is the primary source for imported water in the Antelope Valley (LACSD, 2005). The main transport structure of the State Water Project (SWP) is the California Aqueduct, which conveys water from Northern California to Southern California. This facility is managed by the Department of Water Resources (DWR). The aqueduct is an artificial concrete-lined water transport channel that is about 450 miles in length.

The District is one of 29 contracting agencies having entitlements to water supplies from the (SWP). The District has been able to take delivery of SWP water since 1985 from the East branch of the California Aqueduct, which passes through the service area. The District receives its entitlement from a 30 cfs connection on the East Branch, where SWP water is conveyed to Lake Palmdale via a 30-inch diameter pipeline. Lake Palmdale acts as a forebay for the Districts 30 mgd water treatment plant and stores approximately 4,250 acre-feet of SWP water and Littlerock Creek water.

In the 1996 Water Master Plan, it was recommended that the District purchase an additional 3,100 acre-feet per year of SWP water. On December 30, 1999 the District purchased 4,000 acre-feet per year from Belridge Water District, based out of Bakersfield, California. The District's current Table A amount is 21,300 acre-feet per year of SWP water.

3.2.2.1 Antelope Valley State Water Contractors Association

Three public agencies (Agencies) serving the Antelope Valley have executed contracts with the DWR for entitlement and delivery of water from the SWP.

- Antelope Valley – East Kern Water Agency
- Palmdale Water District

- Littlerock Creek Irrigation District

Each agency has capacity rights in the East Branch of the California Aqueduct, which traverses the Antelope Valley and has a combined Table A amount totaling 162,000 acre-feet per year. Furthermore, the combined boundaries of the Agencies encompass almost all of Antelope Valley.

Each agency operates to fulfill its duty and to develop and secure reliable water supplies within its boundary. In addition, each agency recognizes the potential benefits of cooperation on their individual duties and the Antelope Valley at large. The Agencies also see the need to optimize the utilization of water resources and protect surface water and groundwater storage against adverse effects in order to enable landowners and residents of the Antelope Valley to have a safe water supply provided in the most economical and efficient manner.

The Agencies formed an association known as the Antelope Valley State Water Contractors Association whose objective is to facilitate the coordinated development and implementation of plans and programs to satisfy their obligations consistent with their legal authority. The Association has declared a statement of principals and objectives.

To make optimum use of available water supplies to meet current and anticipated demands through the following:

- Encourage use of imported water, when and where appropriate.
- Encourage conservation of local surface water and groundwater.
- Optimize the use of available surface and subsurface water storage capacity.
- Identify the most suitable locations for replenishment and storage of available water.
- Consider all means of groundwater recharge.
- To confirm that the Association will not take away any water rights within the Antelope Valley.
- To develop plans for maximum cooperative use of the available water resources.
- To establish an equitable means apportioning the benefit and burdens of water resource management.
- To prevent the export of native surface water and groundwater from the Antelope Valley and develop reasonable limitations upon the export of any other water from the Antelope Valley.
- To provide a mechanism for the storage and recovery of water.
- To encourage the protection and preservation of surface water and groundwater quality.

- To develop conservation plans to promote reasonable beneficial use of water.
- To respect existing jurisdictional authority of the public agencies and water suppliers in the Antelope Valley.
- To solicit and welcome the advice, council and support of interested parties and the public in the implementation of these principals and objectives.
- To conduct regularly scheduled Association meetings to advance these principles and objectives and discuss other matters of common interest.

None of the aforementioned objectives are intended to be construed as transfer or compromise of any rights, property or legal authority owned or held by any member of the Association. Each member agency shall retain legal authority to act independently of the other member agencies.

3.2.3 Water Treatment Plant

The Palmdale Water Treatment Plant (PWTP) provides treatment for water extracted from Lake Palmdale. Lake Palmdale receives water from the two sources noted in the previous sections: the SWP and Littlerock Creek Dam and Reservoir. Water is conveyed from the SWP via a 30-inch diameter pipeline while water from Littlerock Creek Dam and Reservoir is conveyed through an open canal.

The treatment plant consists of chemical addition, flocculation, sedimentation, filtration, and disinfection. The capacity of the existing plant is 30 mgd. However, a water supply permit from the Department of Health Services (DHS) requires that one filter be kept off-line as a redundant source. This limits the capacity of the plant to 28 mgd.

The District is spending approximately $40 million to upgrade the Water Treatment Plant in order to meet more stringent water quality regulations (Stage 2 Disinfectants and Disinfection Byproduct Rule). These upgrades are being completed in two phases, and the second phase should be complete and operational by the end of 2007. The upgrades will allow the treatment capacity of the plant to be increased to approximately 35 mgd.

3.3 GROUNDWATER BASIN

The DWR divided the Antelope Valley Hydrologic Unit into thirteen subbasins. The Pearland and Buttes subbasins and the major portion of the Lancaster subbasin lie within the District boundaries (Figure 3.2) and are hydraulically connected (Law Environmental, 1991).

3.3.1 Basin Boundaries

The boundaries between the three subbasins are determined by discontinuity or by steepening of the groundwater surface as measured in wells, rather than by surface evidence of faults. The groundwater transfer from the Pearland and Buttes subbasins to the

Lancaster subbasin is slowed across these boundaries. The total amount of water transferred between these three subbasins is unknown (Law Environmental, 1991).

The Lancaster subbasin is located in the center of the Antelope Valley groundwater basin, with its southern most portion lying within the District service area. It is bounded by bedrock to the south and by the Buttes and Pearland subbasins to the east. Alluvium in this subbasin reaches a thickness of about 1,100 feet in the northern portion of the service area. Two aquifer zones occur in this subbasin. The principal (upper) aquifer is confined and is several hundred feet thick within the District service area. In 2003, the District operated 12 wells in the Lancaster subbasin, with a pumping capability of approximately 12,500 gpm. This is approximately 75 percent of the District's total annual groundwater production and approximately 30 percent of the District's total production.

The Pearland subbasin is located southeast of the Lancaster subbasin. This subbasin is bounded on the south by bedrock, on the north by a fault separating it from the Buttes subbasin and on the west by the basin boundary. The northern most portion of the subbasin lies within the District service area. A single aquifer zone occurs within the Pearland subbasin and consists of approximately 250 feet of saturated alluvial deposits. The District operates 10 wells in the Pearland subbasin, with a pumping capability of 3,500 gpm. This accounts for approximately 20 percent of the District's groundwater production and 10 percent of the District's total production.

The Buttes subbasin is also located southeast of the Lancaster subbasin. A small portion underlies the District's service area, however at this time, the District does not pump water from this subbasin. The aquifer zone consists of approximately 150 feet of saturated alluvial deposits.

Within the San Andreas Rift zone, there are two general groundwater-bearing areas that are defined on the basis of geologic mapping and topographic expression. These areas lie east and west of the intersection of Pearblossom Highway and Barrel Springs Road. The area to the east is a narrow valley that probably has poor groundwater potential. The area to the west is a broader valley with more extensive groundwater-bearing deposits. The District operates two wells in the eastern portion. These wells produce approximately 223 gpm, which accounts for approximately 2 percent of the District's groundwater production and less than 1 percent of the District's total production.

3.3.2 Groundwater Management

Groundwater management methods may be entered into voluntarily or groundwater users could form a Joint Powers Authority, a Special Act District or an AB 3030 District. Any of these could include regulations defining how much groundwater each user could extract, what recharge methods could be employed and what the cost of unallocated withdrawals should be (LACSD, 2005).

The Antelope Valley Water Group (AVWG), formed in 1990, consisted of local jurisdictions, water purveyors and other interested parties. The goal of the AVWG was to develop a plan for managing the area's local water resources. The group was an informal organization with no financing or enforcement authority (LACSD, 2005). Following the completion of a 1995 Water Resource Study, the group expanded and tried to develop a groundwater management plan. The AVWG could not reach agreement on a unified course of action and suspended further meetings (LACSD, 2005).

Several technical studies were funded by AVWG members, including the 1995 Kennedy/Jenks Water Resource Study. The Water Resource study presents a comprehensive study examining the availability, demand and options for the protection and management of Antelope Valley water resources (LACSD, 2005). This study recommends an action plan to minimize demand growth, protect and optimize the use of existing resources and develop additional water resources to meet projected future demands (2000 UWMP). The following actions were recommended:

- Create an institutional framework to manage the development and use of water supplies including the groundwater basin.
- Determine the safe yield of the Antelope Valley Groundwater Basin.
- Continue the current groundwater-monitoring program.
- Develop a program to optimize the use of available water supplies.
- Develop the recommended water conservation, reclaimed water, storm water management and aquifer storage and recovery programs.
- Actively encourage the CDWR to complete the SWP and improve reliability.
- Obtain additional imported water supplies.
- Develop a revenue plan to implement any recommended programs. Initiate a public education program.

Projections of water supply and demand indicate that the current supply may fall short of demand early in the 21st century (Kennedy/Jenks, 1995). Conjunctive use of surface and groundwater, along with methods than can enhance or better use the groundwater resource, will likely become an important part of water resource management in the Antelope Valley.

3.3.3 Adjudication

The Antelope Valley groundwater basin is not adjudicated and the groundwater yield has not been allocated among the pumpers. Rather, each groundwater pumper has a correlative right to pump groundwater for beneficial uses. Moreover, no regional groundwater management plan currently exists for the basin. In late 2004, the County of Los Angeles Wastewater District No. 40 filed a civil complaint against various groundwater users in the basin, including the District, for adjudication of water rights. At some future

time, an allocation of water rights may be assigned that could affect all users, presumably to reduce groundwater extractions to levels that will stabilize or reverse groundwater level declines. Such adjudication proceedings can take from 10 to 15 years, or longer, to resolve. A copy of the summons and complaint for Declaratory and Injunctive relief and Adjudication of Water Rights is included in Appendix C.

3.4 GROUNDWATER STUDY

In this section, local groundwater quality and subsurface geologic conditions were examined and summarized.

3.4.1 Subsurface Geologic Conditions

The two aquifers in the Antelope Valley Groundwater Basin, known as the principal and deep water-bearing zones, are separated by clay and silt layers, known as the aquitard. Near the valley's southern boundary, the aquitard is buried beneath about 900 feet of alluvial fan deposits. This has created a two-layer system in which, near the San Gabriel Mountains, the principal water-bearing zone is thick and the deep water-bearing zone is thin (Law Environmental, 1991).

3.4.2 District Supply Wells

The District has 27 wells within its service area that are used to pump groundwater from the Lancaster and Pearland sub-basins, which are contained within the Antelope Valley Groundwater Basin, into the distribution system. Three of the District's wells also pump water from deposits that are within the San Andreas Rift Zone. Since the water quality of the groundwater meets state and federal standards, the wells pump directly into the District's distribution system or into nearby holding tanks without the need for treatment, except for chlorination. Combined production from the District's active wells is currently 22.1 mgd or 15,357 gpm (2006 WSMP Update - Draft).

3.4.3 Groundwater Wells

Groundwater level declines have increased pumping lifts, reduced well efficiency, and caused aquifer systems compaction and more than 6 feet of land subsidence in some areas (Ikehara and Phillips, 1994). Projected urban growth and limits on the available imported water may continue to increase the reliance on groundwater and exacerbate aquifer system compaction and land subsidence.

According to the USGS and Department of Water Resources, there is an estimated 68 million acre-feet of total storage capacity and 20 million acre-feet of recoverable, useable groundwater in storage in the Antelope Valley Groundwater Basin. Simulation of groundwater flow conditions by the USGS (Leighton and Phillips, 2003) suggests that groundwater in storage in the basin declined more than 8.5 million acre-feet from 1915 to

1995. Groundwater pumpage is currently estimated to be on the order of 90,000 acre-feet per year, which exceeds estimated recharge by approximately 40,000 acre-feet per year.

Declining water levels in the greater Lancaster subbasin have caused concern for many decades. Such water level declines in the Palmdale area of the Lancaster subbasin have not been as pronounced, at least over the last 10 years. As an example, District Well Nos. 2a and 3a indicated water level declines of about 20 feet over the last 10 years. Many of the District wells in the Lancaster subbasin have experienced minimal, if any, water level declines in the past 10 years.

The primary influence on water levels in the Lancaster subbasin is pumping. Agricultural use has historically represented a significant portion of extraction from the subbasin. However, since the mid-1960s, agricultural pumping has declined from over 150,000 acre-feet per year to less than 40,000 acre-feet per year in the mid 1990s. However, this number may have increased by as much as 50 percent in the late 1990s due to additional agriculture in the region. Groundwater extraction for municipal use in the Greater Lancaster subbasin has also increased substantially in the last 20 years. Groundwater levels east of Lancaster have declined by as much as 200 feet between 1932 and 2003 due to groundwater extraction (Christianson, 2004). Depths to water vary, depending on location and season, but were in the range of 520 to 550 feet in 2003.

In the Pearland subbasin, good recharge during wet years typically leads to complete recovery from the prior effects of pumping. Groundwater levels respond rapidly to runoff from Big Rock and Littlerock creeks, which are the main recharge sources to this subbasin. Generally, groundwater levels in both the Pearland and Buttes subbasins are from 125 to 300 feet below ground surface. The average seasonal fluctuation in the groundwater level is approximately 30 feet. Over the long term, groundwater levels, in the Pearland subbasin, in monitored wells has remained stable.

Depth to groundwater along the San Andreas Rift Zone is generally about 25 feet below the ground surface. Seasonal groundwater level fluctuations over the last 10 years are typically about 15 feet. Over the long term, groundwater levels in sediments within the fault zone have remained relatively stable.

3.4.4 Sources of Recharge and Discharge

Groundwater recharge is from stream recharge, and deep percolation of precipitation, sewage and applied municipal water. Deep percolation from stream runoff is the primary supply source. Due to arid conditions, groundwater recharge by precipitation onto the valley floor is sporadic. Most recharge from precipitation occurs near the mountain fronts and from long duration storms. Treated water from the two wastewater treatment plants in the Antelope Valley is either reused for irrigation or is transferred to ponds where it evaporates and/or percolates. This accounts for less than 10 percent of water supply to the aquifer. It is estimated that greater than 50 percent of the water delivered to a home goes to outside

irrigation of lawns and trees. It is estimated that 20 percent of this municipal irrigation water percolates back into the aquifer (Law Environmental, 1991).

3.4.5 Well Yields and Aquifer Characteristics

Pumping rates for District wells range from 96 to 2,024 gpm. Pumping rates for five of the 27 active wells exceed 1,000 gpm.

3.5 WATER SUPPLY PROJECTIONS

In determining the adequacy of the water supply facilities, the source must be large enough to meet the varying water demand conditions, as well as provide sufficient water during potential emergencies such as power outages and natural disasters.

3.5.1 Current Supply Capacity

In accordance with industry standard practices and the California Department of Health Services (DHS) criteria for “Adequate Source Capacity” on water supply, the source should be sized to serve the maximum day demand (MDD). On the day of maximum demand, it is desirable to maintain a water supply rate equal to the MDD rate. Water required for peak hour demands (PHD) or for fire, flows would come from storage.

Standby production capacity is required for system reliability. Under normal operating conditions, it is possible that one or two of the District’s wells can be placed out of service during MDD conditions due to equipment malfunction, for servicing, or for water quality concerns. The DHS criterion recommends counting the capacity of the largest well being out of service.

The District’s current maximum day demand is around 41.2 mgd while the current supply capacity, based on treatment plant and firm well capacity is 50.7 mgd (2006 WSMP Update-Draft).

3.5.2 Future Supply Capacity

The future sources of supply for the District will consist of groundwater wells, water from Littlerock Creek Dam and Reservoir and the State Water Project, in addition to conjunctive use, transfers and other programs currently being investigated.

This Plan includes a projection of the District’s supply capacity requirements through the planning horizon of 2030, concurrent with the 2006 WSMP Update - Draft. These projections are summarized in Table 3.2, in 5-year increments, through the planning horizon of 2030.

Table 3.2	Current and Projected Water Supply Capacity 2005 Urban Water Management Plan Palmdale Water District					
Supply Units	**Current and Projected Years**					
	2005	**2010**	**2015**	**2020**	**2025**	**2030**
MGD	39.8	47.9	61.1	75.0	83.6	92.4
Source: 2006 WSMP Update - Draft						

3.6 DESALINATED WATER

The UWMPA requires that the UWMP address the opportunities for development of desalinated water, including ocean water, brackish water and groundwater.

Law

> 10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:
>
> 10631 (i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long term supply.

3.6.1 Brackish Water and/or Groundwater Desalination

The groundwater that underlies the District is not brackish in nature and does not require desalination. However, the District could provide financial assistance to other SWP contractors in exchange for SWP supplies. Communities near the desalination plant would receive the desalinated water and a similar amount of SWP supplied would be exchanged and allocated to the District. Should the need arise, the District may consider this option.

3.6.2 Seawater Desalination

Because the District is not located in a coastal area, it is not practical nor economically feasible to implement a seawater desalination program. However, the District could provide financial incentive to other SWP Contractors in the construction of their seawater desalination facilities in exchange for SWP supplies.

In March 2004, the California Coastal Commission released the “Seawater Desalination and the California Coastal Act” which included a summary and status of existing and proposed seawater desalination plants in California.

Existing and planned public facilities are listed in Table 3.3. Most of these facilities would not be operated by agencies that are SWP Contractors. Thus for an exchange of SWP supplies to take place, a third party who is a SWP contractor would have to be involved.

Table 3.3 Existing and Planned Desalination Projects 2005 Urban Water Management Plan Palmdale Water District

Operator/Location	Maximum Capacity (AFY)	Status
Cambria Community Services District	560	Planning
City of Morro Bay	929	Active
City of Sand City	30	Planning
City of Santa Barbara	N/A	Inactive
City of Santa Cruz	2,800	Planning
Long Beach	11,000	Planning
Los Angeles Dept. of Water and Power	11,000	Planning
Marina Coast Water District	335	Active
Marina Coast West District / Fort Ord	3,000	Planning
Monterey Peninsula Water management Dept. / Sand City	8,400	Planning
Municipal Water District of Orange County / Dana Point	30,000	Planning
San Diego County Water Authority / South County	55,000	Planning
San Diego County Water Authority & Poseidon Resources / Carlsbad	55,000	Planning
West Basin Municipal Water District	22,000	Planning

Source: Seawater and the California Coastal Act, California Coastal Commission, March 2004.

At this point in time, the District has determined that desalination is not a cost-effective solution for water supply needs due to the local project and water resource opportunities that are currently available at a lower cost.

Chapter 4

RELIABILITY PLANNING

The UWMPA requires that the UWMP address the reliability of the agency's water supplies. This includes supplies that are vulnerable to seasonal or climatic variations. In addition, an analysis must be included to address supply availability in a single dry year and in multiple dry years.

Law

> 10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:
>
> 10631 (c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable.
>
> 10631 (c) For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to replace that source with alternative sources or water demand management measures, to the extent practicable.
>
> 10631 (c) Provide data for each of the following: (1) An average water year, (2) A single dry water year, (3) Multiple dry water years.
>
> 10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:
>
> 10632 (b) An estimate of the minimum water supply available during each of the next three-water years based on the driest three-year historic sequence for the agency's water supply.

4.1 WATER SUPPLY RELIABILITY

There are two aspects of supply reliability that can be considered. The first relates to immediate service needs and is primarily a function of the availability and adequacy of the supply facilities. The second aspect is climate-related, and involves the availability of water during mild or severe drought periods. This chapter considers the District's water supply reliability during three water scenarios: normal water year, single dry water year, and multiple dry water years. These scenarios are defined as follows:

- **Normal Year**: The normal year is a year in the historical sequence that most closely represents median runoff levels and patterns. The supply quantities for this condition are derived from historical average yields.
- **Single Dry Year**: This is defined as the year with the minimum useable supply. The supply quantities for this condition are derived from the minimum historical annual yield.
- **Multiple Dry Years:** This is defined as the three consecutive years with the minimum useable supply. Water systems are more vulnerable to these droughts of

long duration, because they deplete water storage reserves in local and state reservoirs and in groundwater basins. The supply quantities for this condition are derived from the minimum of historical three-year running average yields.

The District's water supply, which is described in more detail in other Chapters, consists of the following four categories:

- Surface Water (Littlerock Creek Dam and Reservoir)
- Imported Water (State Water Project)
- Groundwater
- Recycled Water

4.1.1 Surface Water: Littlerock Creek Dam and Reservoir

According to the 2001 Water Master Plan, prepared by Montgomery Watson, a reliability analysis was performed for the reservoir yield using actual hydrology from 1949-1999, obtained from the Los Angeles County Department of Public Works. This analysis projected annual diversions ranging from 1,178 to 15,900 acre-feet per year. The average annual yield was estimated to be 7,396 acre-feet per year, however conveyance losses of 9 percent reduce this yield to 6,920 acre-feet per year. The probability of the District being able to divert their full allotment of 5,500 acre-feet per year from Littlerock Creek Dam and Reservoir is approximately 50 percent of the time, as shown in Table 4.1.

Table 4.1 Littlerock Creek Dam and Reservoir Reliability 2005 Urban Water Management Plan Palmdale Water District

Percent of Time Available (%)	Total Diversions[(1)] (AFY)	Yield to District (AFY)
5%	14,120	12,849
50%	6,753	5,982
95%	1,709	1,555
Minimum	1,178	1,072
Average	7,396	6,920
Maximum	15,900	14,469

Notes:
1. Diversions are based on 25 cfs of ditch capacity.
2. Source: 2001 WMP; 2000 UWMP

Historical data was used to determine how the reliability of the Littlerock Creek Dam and Reservoir would be affected by the specified climate conditions (Table 4.2).

Table 4.2 Surface Water Supply Reliability 2005 Urban Water Management Plan Palmdale Water District					
Supply Units	Normal Water Year	Single Dry Water Year	Multiple Dry Water Years		
			Year 1	Year 2	Year 3
MGD	3.0	0.2	1.5	1.5	1.5
AFY	3,405	232	1,663	1,663	1,663
Source: 2001 WMP					

A normal year results in approximately 4,405 acre-feet of water, which includes allotments for both LCID and the District. In years when Littlerock Creek yield is above 4,000 acre-feet, LCID is entitled to 1,000 acre-feet and in dry years when yield falls below 4,000 acre-feet, LCID is entitled to 25 percent of the yield. Thus, in a normal year scenario, LCID would receive 1,000 acre-feet and the District would receive 3,405 acre-feet. The driest year on record was 1951 with an annual yield of 310 acre-feet, of which 25 percent was allocated to LCID, and resulted in a yield to the District of 232 acre-feet. In an extended drought scenario, Littlerock Creek Dam and Reservoir is expected to yield 2,217 acre-feet of water, and the District would be entitled to 1,663 acre-feet.

4.1.2 Imported Water: State Water Project

The reliability of SWP water is affected by many factors including hydrologic conditions, state and federal water quality standards, protection of endangered species and water delivery requirements. In 1995, two actions had a significant impact on SWP reliability: the Monterey Agreement and the Water Quality Control Plan for the Bay-Delta Estuary. Since then, however, the CALFED Bay Delta Program was established and will have a marked impact on SWP reliability. Reliability of the SWP was extrapolated using the Working Draft of the 2005 State Water Project Delivery Reliability Report and summarized in Table 4.3.

Table 4.3 State Water Project Reliability 2005 Urban Water Management Plan Palmdale Water District		
Percent of Time Available	Percent of Total Allotment	Yield to District (AFY)
5%	100%	21,300
30%	95%	20,235
50%	85%	18,100
70%	70%	14,910
95%	20%	4,260
Note: 1. Extracted from Working Draft of 2005 State Water Project Delivery Reliability Report		

Historical data was used in preparing the 2005 State Water Project Reliability report to determine how the water supply would be affected by the specified climate conditions (Table 4.4). During a normal year, the DWR expects to deliver between 69 and 77 percent of Table A water, which results in a District yield between 14,697 and 16,401 acre-feet. A single year drought, such as the one that occurred in 1977, would result in a yield of approximately 4 to 5 percent of the District's Table A amount, and, in an extended drought scenario, the District can expect to receive 32 to 33 percent of its Table A amount.

Table 4.4 State Water Project Reliability
2005 Urban Water Management Plan
Palmdale Water District

Supply Units	Normal Water Year	Single Dry Water Year	Multiple Dry Water Years		
			Year 1	Year 2	Year 3
2005					
MGD	13.1	0.8	6.1	6.1	6.1
AFY	14,697	852	6,816	6,816	6,816
2010					
MGD	13.5	0.8	6.1	6.1	6.1
AFY	15,123	852	6,816	6,816	6,816
2015					
MGD	13.9	0.8	6.3	6.3	6.3
AFY	15,549	852	7,029	7,029	7,029
2020					
MGD	14.3	0.8	6.3	6.3	6.3
AFY	15,975	852	7,029	7,029	7,029
2025					
MGD	14.6	1.0	6.3	6.3	6.3
AFY	16,401	1,065	7,029	7,029	7,029
2030					
MGD	14.6	1.0	6.3	6.3	6.3
AFY	16,401	1,065	7,029	7,029	7,029

Note:
1. Extracted from Working Draft of 2005 State Water Project Delivery Reliability Report

4.1.2.1 Monterey Agreement

The Monterey Agreement (Agreement) is an agreement between the Department of Water Resources (DWR) and the SWP contractors on a statement of principals intended to resolve several disputes concerning interpretation of water service contracts. Among other items, the Agreement includes provisions for turn-back, resale or storage of unneeded water; purchase of 130,000 acre-feet of entitlement from agricultural contractors; deletion of provisions that those agricultural users take the first reductions during a shortage, sale or lease of the Kern Water Bank property and facilities, along with retirement of 45,000 acre-feet per year of agricultural entitlement; a portion of SWP revenues will be used, after repayment of the California Water Fund in 1997, to establish a rate-stabilization fund for agricultural contractors and payment reductions for urban contractors; and contractors have the right to transport non-SWP water in SWP facilities for the same power costs a SWP water in proportion to their entitlement.

In September of 2000, the California Third Appellate District Court invalidated the Monterey agreement EIR. This decision may have an effect on the reliability of SWP.

4.1.2.2 CALFED Bay Delta Program

The Sacramento-San Joaquin Delta in Northern California covers 738,000 acres, which includes a myriad of waterways and islands. The Delta is a critical portion of the SWP water transportation system since water released from the Oroville Dam must flow north of the Delta to the export pumps in the southern portion of the Delta, causing a reversal in the normal flow direction.

To resolve conflicting needs within the Delta, the Bay-Delta Accord was signed in December 1994. The Accord created the CALFED Bay-Delta programs, a consortium of state and federal agencies. The mission of the CALFED Program is to develop a long-term, comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Bay-Delta System. The program is being conducted in three phases:

- Phase I - Define Bay-Delta problems, identify actions to address the problems and combine actions into several comprehensive solutions.
- Phase II - Prepare a programmatic environmental impact document, perform technical analysis to refine the alternative plans and develop an implementation process.
- Phase III - Prepare site-specific environmental documents for the preferred alternative.

Phase I was completed in September 1996. The Final PEIS/PEIR was issued on July 21, 2000 for Phase II. On August 28, CALFED released its Programmatic Record of Decision. With this Record of Decision, CALFED officially starts the Phase III Implementation period. Initially, the CALFED program will focus on Stage I, which is the first seven years of

implementation. The Delta solution implementation by CALFED will have an effect on SWP reliability for the Palmdale Water District.

4.1.3 Groundwater

Reliability of the groundwater supply to the District depends, in part, on the several factors including:

- Reliability of water from the source (i.e., their existing wells),
- Useable groundwater in storage, projected water level declines in the District's service area over the 25-year planning horizon to year 2030 given current and projected levels of groundwater pumpage,
- Outcome of the adjudication proceedings that could affect the amount and patterns of groundwater use by the District.

The criterion of reliability considered is that groundwater supply is capable of meeting projected demands 90 percent of the time for average water year, single dry-water year, and multiple dry-water year conditions.

With respect to existing District groundwater supply facilities, there is an instantaneous capacity of approximately 18,000 acre-feet per year, which is 150 percent greater than dry-water year and multiple dry-water year periods experienced by the District in the last 10 years. Thus, sufficient redundancy exists within the groundwater facilities to accommodate shortfalls in imported water supply.

Total remaining useable groundwater in storage in the Antelope Valley groundwater basin is 20 million acre-feet. Water level variations in wells operated by the District have been relatively stable. Pump settings are sufficiently deep in all wells to accommodate both seasonal and longer term, multiple dry-water year periods through the planning horizon period to 2030. The USGS (Leighton and Phillips, 2003) simulation of groundwater level declines for the District service area through the year 2025, based on an annual population increase of 3.3 percent, is on the order of 2 feet per year. District wells, based on number, depth, specific capacity values, pump settings, and the routine maintenance and replacement of aging wells within the system, can accommodate these projected water level declines without significant loss of capacity.

With regard to the recently initiated adjudication proceedings, there is no ability to predict the timing and outcome. To the extent that reductions in pumping allocations may occur related to adjudication, it is assumed that the difference in supply would be made up through various water management strategies, such as through conjunctive use and participation in a regional aquifer injection and storage program (Phillips, et al., 2003). Based on the above, it is assumed that in all three scenarios of water supply conditions including normal water year, single dry-water year, and multiple 3-year dry-water year

scenarios, that District would use additional groundwater to make up for losses in SWP water.

The groundwater supplies shown are based on the District's goal of meeting demand with 40 percent groundwater (Table 4.5). The District has the pumping capability to extract more groundwater to meet demand, however the local groundwater basins are in overdraft and pumping beyond the safe yield limits in the absence of a water management plan should not be a long-term solution.

Table 4.5 Groundwater Reliability
2005 Urban Water Management Plan
Palmdale Water District

Supply Units	Normal Water Year[1]	Single Dry Water Year	Multiple Dry Water Years		
			Year 1	Year 2	Year 3
2005					
MGD	9.2	9.2	9.2	9.2	9.2
AFY	10,310	10,310	10,310	10,310	10,310
2010					
MGD	11.1	11.1	11.1	11.1	11.1
AFY	12,414	12,414	12,414	12,414	12,414
2015					
MGD	14.1	14.1	14.1	14.1	14.1
AFY	15,825	15,825	15,825	15,825	15,825
2020					
MGD	17.3	17.3	17.3	17.3	17.3
AFY	19,428	19,428	19,428	19,428	19,428
2025					
MGD	19.3	19.3	19.3	19.3	19.3
AFY	21,640	21,640	21,640	21,640	21,640
2030					
MGD	21.4	21.4	21.4	21.4	21.4
AFY	23,935	23,935	23,935	23,935	23,935

Note:
1. Estimated at 40 percent of demand.

4.1.4 Recycled Water

Recycled water is discussed in another Chapter of this report. The Palmdale Water Reclamation Plant (PWRP) produces disinfected secondary treated effluent that is land applied with a crop or used for agricultural irrigation at agronomic rate (LACSD, 2005). During single and Multi-Dry water years, this plan assumes recycled water to be 100 percent reliable (Table 4.6). (LACSD) is planning to upgrade and expand the facility, in the near future, in order to accommodate 2030 wastewater flows.

Table 4.6 Recycled Water Reliability
2005 Urban Water Management Plan
Palmdale Water District

Supply Units	Normal Water Year	Single Dry Water Year	Multiple Dry Water Years		
			Year 1	Year 2	Year 3
2005[(1)]					
MGD	0	0	0	0	0
AFY	0	0	0	0	0
2010					
MGD	2.2	2.2	2.2	2.2	2.2
AFY	2,500	2,500	2,500	2,500	2,500
2015					
MGD	12.9	12.9	12.9	12.9	12.9
AFY	14,440	14,440	14,440	14,440	14,440
2020					
MGD	14.6	14.6	14.6	14.6	14.6
AFY	16,373	16,373	16,373	16,373	16,373
2025					
MGD	14.6	14.6	14.6	14.6	14.6
AFY	16,373	16,373	16,373	16,373	16,373
2030					
MGD	14.6	14.6	14.6	14.6	14.6
AFY	16,373	16,373	16,373	16,373	16,373

Notes:
1. Tertiary treated effluent expected to be available in 2009.
2. LACSD planning horizon runs through 2025.

With the expansion of the Palmdale Water Reclamation Plant to include tertiary treatment, the District has started looking at ways to utilize recycled water. The City of Palmdale is proposing to build a new power plant within the District boundaries, which is expected to have a demand of 2,500 acre-feet per year for recycled water for cooling purposes. Beginning in 2015, 1,940 acre-feet of recycled water will be reused for irrigation. It is estimated that recycled water for this purpose will eventually reach 3,873 acre-feet per year. The District is actively investigating the possibility of using recycled for groundwater recharge.

4.1.5 Summary of Sources and Reliability

Supply reliability is presented as the probability of occurrences for the selected supply quantities. Reliability factors for groundwater are not included since the basin is not adjudicated and groundwater is affected by the actions of other pumpers in the basin. Tables 4.7 presents a summary of the existing water sources and their reliability.

According to the 2001 WMP, prepared by Montgomery Watson, the SWP water comprises a greater portion of the District's total surface water supply compared to Littlerock Creek Dam and Reservoir water. Thus, a dry year in Northern California that decreases SWP supplies can have greater impacts on the District than a dry year that impacts only the Littlerock Creek Dam and Reservoir supply.

For example, the driest year for Littlerock Creek Dam and Reservoir occurs with the historical hydrology from 1951, however, that same hydrology year for SWP would have resulted in the District receiving their full allocation. In contrast, the driest year for SWP delivery occurs with the historical hydrology from 1977, and despite the above normal yield from Littlerock Creek Dam and Reservoir for that same hydrology year, the total surface water supply for the District was at a low 9,494 acre-feet.

Because the minimum yields of the two sources do not coincide, the supply analysis will focus on dry years that result in the occurrence of minimum total inflow to Lake Palmdale (Table 4.7).

The District has a proactive policy on water resources and is currently investigating other sources. These sources include additional groundwater with replenishment, conjunctive use, short-term and long-term transfers, water banking both in and out of the Antelope Valley, purchase of additional Table A SWP water and recycled water. When implemented these sources will greatly increase the District water supply (Table 4.8).

In addition, the District has previously participated in short-term water transfer programs to meet dry year demands. In 2001 and 2003, the District purchased SWP turnback pool water as well as participated in the Dry-Year programs developed by DWR.

Table 4.7 Supply Reliability - Existing Programs and Sources
2005 Urban Water Management Plan
Palmdale Water District

	Normal Water Year (AFY)	Single Dry Water Year (AFY)	Multiple Dry Water Years		
			Year 1 (AFY)	Year 2 (AFY)	Year 3 (AFY)
2005					
Surface Water[1]	3,405	3,760	2,189	2,189	2,189
Imported Water[2]	14,697	852	6,816	6,816	6,816
Groundwater[3]	10,310	10,310	10,310	10,310	10,310
Total	**28,412**	**14,922**	**19,315**	**19,315**	**19,315**
2010					
Surface Water[1]	3,405	3,760	2,189	2,189	2,189
Imported Water[2]	15,123	852	6,816	6,816	6,816
Groundwater[3]	10,310	10,310	10,310	10,310	10,310
Total	**28,838**	**14,922**	**19,315**	**19,315**	**19,315**
2015					
Surface Water[1]	3,405	3,760	2,189	2,189	2,189
Imported Water[2]	15,549	852	7,029	7,029	7,029
Groundwater[3]	10,310	10,310	10,310	10,310	10,310
Total	**29,264**	**14,922**	**19,528**	**19,528**	**19,528**
2020					
Surface Water[1]	3,405	3,760	2,189	2,189	2,189
Imported Water[2]	15,975	852	7,029	7,029	7,029
Groundwater[3]	10,310	10,310	10,310	10,310	10,310
Total	**29,690**	**14,922**	**19,528**	**19,528**	**19,528**
2025					
Surface Water[1]	3,405	3,760	2,189	2,189	2,189
Imported Water[2]	16,401	1,065	7,029	7,029	7,029
Groundwater[3]	10,310	10,310	10,310	10,310	10,310
Total	**30,116**	**15,135**	**19,528**	**19,528**	**19,528**
2030					
Surface Water[1]	3,405	3,760	2,189	2,189	2,189
Imported Water[2]	16,401	1,065	7,029	7,029	7,029
Groundwater[3]	10,310	10,310	10,310	10,310	10,310
Total	**30,116**	**15,135**	**19,528**	**19,528**	**19,528**

Notes:
1. 2001 WMP
2. Working Draft of 2005 SWP Reliability Report.
3. Estimated at 40 percent District's projected demands in 2005.

Table 4.8 Supply Reliability - Proposed Programs and Sources
2005 Urban Water Management Plan
Palmdale Water District

	Normal Water Year (AFY)	Single Dry Water Year (AFY)	Multiple Dry Water Years		
			Year 1 (AFY)	Year 2 (AFY)	Year 3 (AFY)
2005					
Existing Sources	28,412	14,922	19,315	19,315	19,315
Additional Groundwater[1]	0	0	0	0	0
Recycled Water[2]	0	0	0	0	0
Total	**28,412**	**14,922**	**19,315**	**19,315**	**19,315**
2010					
Existing Sources	28,838	14,922	19,315	19,315	19,315
Additional Water Resource[1]	2,104	2,104	2,104	2,104	2,104
Recycled Water[2]	2,500	2,500	2,500	2,500	2,500
Total	**33,442**	**19,526**	**23,919**	**23,919**	**23,919**
2015					
Existing Sources	29,264	14,922	19,528	19,528	19,528
Additional Water Resource[1]	5,858	5,858	5,858	5,858	5,858
Recycled Water[2]	4,440	4,440	4,440	4,440	4,440
Total	**39,562**	**25,220**	**29,826**	**29,826**	**29,826**
2020					
Existing Sources	29,690	14,922	19,528	19,528	19,528
Additional Water Resource[1]	12,507	12,507	12,507	12,507	12,507
Recycled Water[2]	6,373	6,373	6,373	6,373	6,373
Total	**48,570**	**33,802**	**38,408**	**38,408**	**38,408**
2025					
Existing Sources	30,116	15,135	19,528	19,528	19,528
Additional Water Resource[1]	17,612	17,612	17,612	17,612	17,612
Recycled Water[2]	6,373	6,373	6,373	6,373	6,373
Total	**54,101**	**39,120**	**43,513**	**43,513**	**43,513**
2030					
Existing Sources	30,116	15,135	19,528	19,528	19,528
Additional Water Resource[1]	23,348	23,348	23,348	23,348	23,348
Recycled Water[2]	6,373	6,373	6,373	6,373	6,373
Total	**59,837**	**44,856**	**49,249**	**49,249**	**49,249**

Notes:
1. Proposed water resource projects include water transfers (agricultural to urban) purchase of additional Table A SWP water, additional groundwater from water banking (conjunctive use), and possible recharge of recycled water.
2. Includes recycled water allotted for the irrigation and the proposed power plant.

4.2 GROUNDWATER QUALITY

The UWMPA also requires that the UWMP include information on the quality of water supplies and how this affects management strategies and supply reliability.

Law

> 10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631 and the manner in which water quality affects management strategies and supply reliability.

The United States Environmental Protection Agency (EPA) is currently considering implementing several new or revised drinking water standards. The Ground Water Rule (GWR) contains measures to establish multiple barriers to further protect against bacteria and viruses in drinking water from the groundwater sources. The GWR will specify when corrective action is required to further protect consumers serviced by groundwater systems from bacteria and viruses.

4.2.1 Local Groundwater Quality

Based on information contained in studies by the USGS (Leighton and Phillips, 2003; Phillips, et al., 2003) groundwater quality in the Antelope Valley is generally excellent and considered suitable for domestic, agricultural, and industrial uses. Groundwater quality in the principal aquifers has total dissolved solids (TDS) concentrations of about 500 to 750 milligrams per liter (mg/L), with moderate hardness and variably elevated concentrations of boron and nitrate ions. As discussed in the PWD 2004 Consumer Confidence Report, groundwater produced from the 27 active wells in the system contains an average concentration of about 4 mg/L of Nitrate and is well under the State Maximum Contaminant Level (MCL) of 45 mg/L measured as Nitrate or 10 mg/L measured as Nitrate-Nitrogen. Arsenic concentrations in PWD groundwater averages less than the two parts per billion detection reporting limit (DRL). The State of California is in the process of developing regulations for arsenic in groundwater, which may be promulgated in 2006. It is anticipated that the PWD will be able to meet such regulations. A copy of the 2004 Consumer Confidence Report is included in Appendix D.

4.2.2 Groundwater Assessment & Protection Program

In November of 1998, the PWD and Standish-Lee consultants prepared the Palmdale Water District's Source Water Assessment program (SWAP). The purpose of the program is to develop a Groundwater and Wellhead Protection Plan for the District and to meet the State of California's requirements for Source assessment and protection.

The District relies on groundwater to provide at least 40 percent of its water supply and clean up is time consuming and costly. In addition, contamination of the groundwater could cause water shortages.

The goals of this project were:

- Locate District's wells and prepare an assessment map
- Delineate the groundwater protection areas
- Evaluate the drinking water source and it's site characteristics in terms of effectiveness of the physical barriers to contaminants reaching the sources.
- Conduct an inventory of Potential Contaminating Activities (PCAs) within the delineated areas, rank their risk level and identify them on the assessment map.
- Evaluate the risk from potential contaminating activities to each source.
- Start developing management strategies for the drinking water protection areas of existing wells.
- Develop a strategy for public involvement and public education.

4.2.3 Wellhead Protection Plan

On November 8, 2000, PWD adopted the District's Wellhead Protection Plan, prepared by Standish-Lee consultants. The goal of local source water protection is to identify, develop and implement local measures that provide protection to the drinking water supply. Wellhead protection provides one more barrier to contamination in a multi-barrier protection treatment train.

To encourage states and local agencies to go beyond source water assessment and into implementation of management techniques to protect sources of drinking water, the EPA incorporated amendments to the Safe Drinking Water Act. Although the amendments do not impose regulatory or enforcement provisions the prevention of source water contamination provides great benefits to the public and is almost always less expensive than treatment and monitoring after a drinking water source has been contaminated.

Management of the wellhead protection areas to prevent groundwater contamination involves several steps:

- Identification of protection options appropriate for the types of Potential contaminating activities present.
- Selection of those that are technically and politically feasible
- Implementation
- Monitoring the effectiveness of management options and application of additional Best Management Practices (BMPs) if required.

- Development of contingency plans to address threats to water supply that could result from accidents.

Chapter 5

WATER USE

The UWMPA requires that the UWMP identify the quantity of water supplied to the agency's customers including a breakdown by user classification.

Law

> 10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:
>
> 10631 (b) (3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic records.
>
> 10631 (e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the- following uses:
>
> A) Single-family residential; (B) Multifamily; (C) Commercial; (D) Industrial; (E) Institutional and governmental; (F) Landscape; (G) Sales to other agencies; (H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof; and (I) Agricultural.
>
> (2) The water use projections shall be in the same 5-year increments to 20 years or as far as data is available.

5.1 PAST, CURRENT, AND PROJECTED WATER USE

The Palmdale Water District's customers include residential, commercial, industrial, and institutional groups. Meters are on all residential, commercial and landscape service connections in the service area and the District requires meters on all new connections. Table 5.1 and Figure 5.1 show the historical and projected water use.

5.1.1 Historical Water Use

The District provides potable water service to its residential, commercial, industrial, and institutional customers within District service area, and serves supplemental water to several customers outside its primary service area in accordance with agreements made with the Antelope Valley - East Kern Water Agency (AVEK). This area is approximately two square miles and is served by two mutual water companies (West Side Park MWC and El Dorado MWC).

The District has historically obtained its water from local surface and groundwater sources. Deliveries from the SWP began in 1985. Since then, approximately 40 to 50 percent of the water delivered is groundwater; the remaining is surface water (both local and imported). The highest annual water use was experienced in 2004 at a total of 26,671 afy. The District

has indicated that it desires to meet approximately 60 percent of its average demand from surface water sources and 40 percent from groundwater sources.

Table 5.1 Historical Monthly and Annual Water Production
2005 Urban Water Management Plan
Palmdale Water District

Year	Production Source				Total (acre-feet)
	Groundwater Wells		Treatment Plant		
	acre-feet	%	acre-feet	%	
1994	11,460	55.6	9,158	44.4	20,618
1995	11,276	50.7	10,957	49.3	22,233
1996	9,690	41.2	13,823	58.8	23,513
1997	9,285	40.1	13,867	59.9	23,152
1998	8,166	39.6	12,460	60.4	20,626
1999	9,720	41.5	13,678	58.5	23,398
2000	9,765	37.7	16,136	62.3	25,901
2001	11,302	44.8	13,918	55.2	25,220
2002	8,298	32.3	17,372	67.7	25,670
2003	10,606	42.6	14,304	57.4	24,909
2004	11,038	41.4	15,633	58.6	26,671

Source: 2006 WSMP Update - Draft

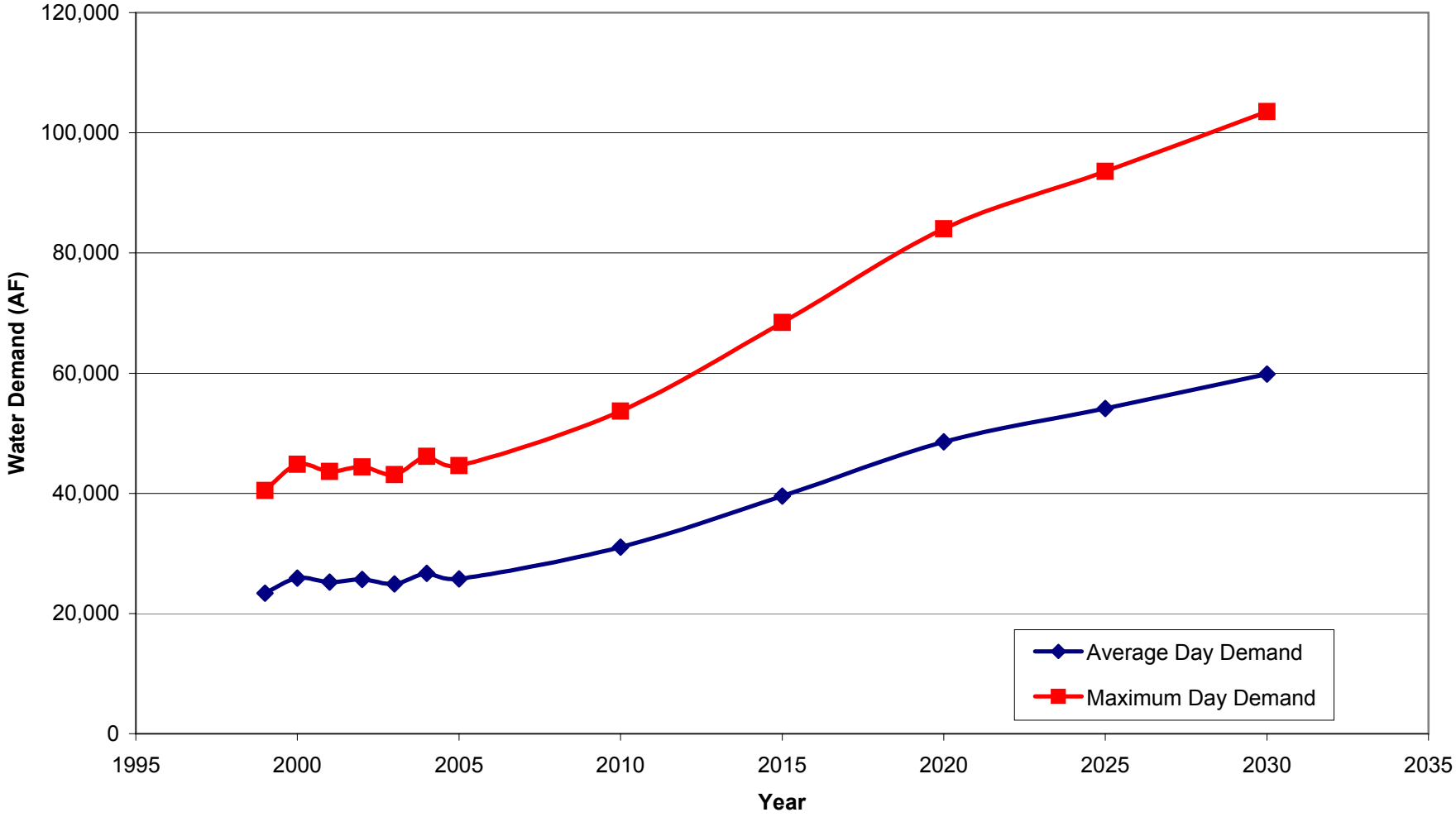
Table 5.1 lists the available annual water production from 1994 to 2004 and Appendix E shows the historical monthly water production from 1993 to 2004, including water loss and per capita water use.

5.1.2 Maximum Day Demand

One of the water demand conditions that is of particular significance is the maximum day demand (MDD). This is the highest water demand during a 24-hour period of the year. The MDD peaking factor is expressed as a multiplier applied to the average day demand. Water system sources are typically sized to meet the anticipated MDD of a water system.

Based on the 2006 WSMP Update - Draft, a factor of 1.73 was used to estimate future MDD.

Figure 5.1
Historical and Projected Water Demand



5.1.3 Past, Current, and Projected Per-Capita Consumption

The historical per capita consumption rate is typically used to estimate the District's future water requirements, evaluating the adequacy of the supply source, and determining storage needs. However, the 2006 WSMP Update - Draft uses land use, densities, and proposed planning developments to determine future water demands for specific planning years.

Because of the rate of increased development in the District, water demand estimates based on proposed land use will provide more accurate projections.

5.1.4 Projected Water Use

Calibration between future trends in population and proposed land use development was performed to derive the projected water demand. The water demand factors for low density, medium density, and high-density residential use were 1,650, 2,200, and 6,500 gpd/acre respectively. The water demand factors for commercial land use and industrial land use were 1,900 gallons per day per acre (gpd/acre) and 2,300 gpd/acre respectively. Table 5.2 shows the acreage by land use for each planning year along with the resulting water demand.

The District's future water requirements were estimated and summarized in Table 5.3 and Figure 5.1. As shown in Figure 5.1, the historical production values are based on recorded production. However, the projected water use is based on projected development.

Table 5.3 shows the projected annual water production from the draft WMP along with the projected populations from Chapter 2 for planning years 2010 through 2030. In addition to the projected ADD, Table 5.3 includes annual estimates for the MDD, through the planning horizon year of 2030. Based on these projections, it is anticipated that the District's average day and maximum day requirements for 2030 will approach 53.4 mgd or 37,101 gallons per minute (gpm) and 92.4 mgd (64,185 gpm), respectively.

During periods of drought, the District can impose mandatory conservation, rationing and reduction methods to ensure water is used wisely and not wasted. For the single driest year, it is assumed that water rationing of 20 percent of demand will be enforced and water rationing of 10 percent will be enforced for the multiple dry year scenario (Table 5.4).

Table 5.2 Water Demands 2005 Urban Water Management Plan Palmdale Water District					
Planning Year	**Land Use Type[(1)]**	**Area (acres)**	**Water Demand Factors (gpd/acre)**	**Water Demand (gpd)**	**(MGD)**
2005	LDR	7,641	1,650	12,607,880	
	MDR	325	2,200	715,344	
	HDR	343	6,500	2,229,908	
	COMM	933	1,900	1,772,326	
	IND	405	2,300	931,394	
	Other	2,162	2,200	4,755,468	
	Open Space	717	-	0	
	Total	**12,526**		23,012,320	**23.0**
2010	LDR	9,569	1,650	15,789,493	
	MDR	391	2,200	861,144	
	HDR	358	6,500	2,324,373	
	COMM	1,048	1,900	1,991,769	
	IND	483	2,300	1,110,086	
	Other	2,560	2,200	5,631,791	
	Open Space	719	-	0	
	Total	**15,128**		27,708,657	**27.7**
2015	LDR	11,766	1,650	19,413,670	
	MDR	464	2,200	1,020,706	
	HDR	411	6,500	2,671,383	
	COMM	1,765	1,900	3,353,207	
	IND	664	2,300	1,527,551	
	Other	3,335	2,200	7,336,594	
	Open Space	782	-	0	
	Total	**19,187**		35,323,111	**35.3**

Table 5.2 Water Demands
2005 Urban Water Management Plan
Palmdale Water District

Planning Year	Land Use Type[(1)]	Area (acres)	Water Demand Factors (gpd/acre)	Water Demand (gpd)	(MGD)
2020	LDR	13,062	1,650	21,551,528	
	MDR	469	2,200	1,032,701	
	HDR	411	6,500	2,671,535	
	COMM	2,367	1,900	4,498,059	
	IND	1,227	2,300	2,821,682	
	Other	4,906	2,200	10,793,470	
	Open Space	810	-	0	
	Total	**23,252**		43,368,976	**43.4**
2025	LDR	15,868	1,650	26,181,999	
	MDR	469	2,200	1,032,736	
	HDR	411	6,500	2,671,996	
	COMM	2,403	1,900	4,565,389	
	IND	1,227	2,300	2,821,682	
	Other	5,014	2,200	11,030,927	
	Open Space	840	-	0	
	Total	**26,232**		48,304,729	**48.3**
2030	LDR	18,787	1,650	30,997,928	
	MDR	469	2,200	1,032,772	
	HDR	411	6,500	2,672,457	
	COMM	2,438	1,900	4,632,718	
	IND	1,227	2,300	2,821,682	
	Other	5,122	2,200	11,268,385	
	Open Space	870	-	0	
	Total	**29,324**		53,425,941	**53.4**

Note:
1. LDR - Low Density Residential, MDR - Medium Density Residential, HDR - High Density Residential, COMM - Commercial, IND - Industrial.

Table 5.3 Past, Current, and Projected Water Use
2005 Urban Water Management Plan
Palmdale Water District

Year	Population (1) (2)	Annual Production (AF)	(MGY)	(MGD)	(gpm)
Annual Average Production					
1999	-	23,398	7,626	20.9	14,530
2000	-	25,901	8,442	23.1	16,085
2001	88,578	25,220	8,220	22.5	15,662
2002	-	25,670	8,367	22.9	15,941
2003	-	24,909	8,119	22.2	15,468
2004	-	26,671	8,693	23.8	16,563
2005	109,845	25,774	8,399	23.0	15,981
2010	132,801	31,034	10,114	27.7	19,242
2015	164,312	39,562	12,893	35.3	24,530
2020	195,404	48,570	15,829	43.4	30,115
2025	225,208	54,101	17,631	48.3	33,545
2030	253,791	59,837	19,500	53.4	37,101
Maximum Day Production					
1999	-	40,479	13,194	36.1	25,137
2000	-	44,809	14,605	40.0	27,826
2001	88,578	43,631	14,221	39.0	27,095
2002	-	44,409	14,475	39.7	27,578
2003	-	43,093	14,046	38.5	26,760
2004	-	46,141	15,039	41.2	28,653
2005	109,845	44,589	14,531	39.8	27,647
2010	132,801	53,688	17,497	47.9	33,289
2015	164,312	68,442	22,305	61.1	42,437
2020	195,404	84,026	27,383	75.0	52,099
2025	225,208	93,595	30,502	83.6	58,033
2030	253,791	103,518	33,736	92.4	64,185

Notes:
1. Year 2000 District Population Source: U.S. Census Bureau, Census Block Groups data.
2. Projected Population values are derived using the ratio of increase for the City of Palmdale. City Population Projections Source: Southern California Association of Governments (SCAG).

Table 5.4 Demand During Drought Periods
2005 Urban Water Management Plan
Palmdale Water District

Year	Normal Water Year[1] (AF)	Single Dry Water Year[2] (AF)	Multiple Dry Water Years[3]		
			Year 1 (AF)	Year 2 (AF)	Year 3 (AF)
2005	25,774	20,619	23,197	23,197	23,197
2010	31,034	24,827	27,931	27,931	27,931
2015	39,562	31,650	35,606	35,606	35,606
2020	48,570	38,856	43,713	43,713	43,713
2025	54,101	43,281	48,691	48,691	48,691
2030	59,837	47,870	53,853	53,853	53,853

Notes:
1. 2006 WSMP Update - Draft.
2. Estimated at 80 percent of normal year demand.
3. Estimated at 90 percent of normal year demand.

5.2 EXPANSION PROJECTS

The UWMPA requires that the UWMP identify the major developments within the agency's service area that would require water supply planning.

Law

> 10910. (a) Any city or county that determines that a project, as defined in section 10912, is subject to the California Environmental Quality…
>
> 10912. For the purpose of this part, the following terms have the following meanings:
>
> 10912 (a) "Project" means any of the following:
> (1) A proposed residential development of more than 500 dwelling units.
> (2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.
> (3) A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.
> (4) A proposed hotel or motel, or both, having more than 500 rooms.
> (5) A proposed industrial, manufacturing or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.
> (6) A mixed-use project that includes one or more of the projects specified in this subdivision.
> (7) A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.

There are three expansion projects proposed within the District boundaries. They are:

- Palmdale College Park

- Palmdale Transit Village
- Quail Valley

The Palmdale College Park development includes 847 single-family homes, a community college and an elementary school (Brown & Caldwell, 2004). The site is approximately 540.6 acres and is located in the City of Palmdale (Brown & Caldwell, 2004). At build out, this project is expected to add over 2,600 people the District's population with a projected water demand of 1,360 af per year (Brown & Caldwell, 2004). The average water demand per day is expected to be 260,281 gpd (Brown & Caldwell, 2004).

The proposed College Park development has been included in District planning efforts for a number of years, including the 1996 Water System Master Plan Update, the 2000 Urban Water Management Plan, and the 2001 Water System Master Plan Update.

The Palmdale Transit Village Project includes approximately 1000 equivalent dwelling units. According to the Palmdale Transit Village Specific Plan, dated March 2005, the site is approximately a 100-acre site bounded between Technology Boulevard to the north and Avenue Q-3 to the south, by Sierra Highway to the east and 3rd Street East to the west. The various permitted uses within the project include: retail/commercial, office, mixed-use, civic, and residential (single-family detached, single-family attached, condominiums/apartments, accessory units). The development of the Transit Village will occur over the course of a number of years, and will most likely occur in three phases.

The Quail Valley development is located on the western edge of the District's primary service area and includes approximately 725 residential units. Approximately 300 units are located within the District's boundaries and approximately 425 units are located outside of the District's boundaries. The decision has not been made how this development will be served since the entire development does not lie within the District's boundaries. The area within the District's boundaries has been included in the demand projections in the Plan developed from land use projections, and the demand associated with the 425 units outside of the boundaries is estimated to be 425 af/year (based on an average of 1 af/year/connection) and has been added to the demand projections beginning in 2010 and beyond.

SUPPLY AND DEMAND COMPARISON

The UWMPA requires that the UWMP demonstrate that sufficient water supplies will be available for the next 20 years of projected water demands.

Law

> 10635 (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from the state, regional, or local agency population projections within the service area of the urban water supplier.

6.1 SUPPLY AND DEMAND COMPARISON

Comparisons of projected supplies and demands are shown on Table 6.1. The Palmdale Water District (District) currently has the water supply capabilities to meet MDD and to provide standby production capabilities; the current supply capacity will not meet the projected demand requirements.

This plan predicts that the District will experience a shortage of water under normal conditions, by approximately 2010. The District has the pumping capability to extract more groundwater to meet demand, however the local groundwater basins are in overdraft and pumping beyond the safe yield limits in the absence of a water management plan should not be a long-term solution.

The District has a proactive policy on water resources and is currently investigating other sources of water to increase their supply and reliability. The District is investigating short to mid-term water transfers for the purpose of increasing the reliability of the State Water Project supply. The District is investigating mid to long-term water transfers to accommodate increased demand for new development. Both of these types of water transfers can be maximized when used with water banking (conjunctive use) programs. The District is investigating water banking programs both locally in the Antelope Valley and programs that exist outside of the Antelope Valley. The purchase of additional Table A SWP water is another potential water resource being looked at by the District. The District is also looking into the possibility of groundwater recharge using recycled water.

When implemented, this policy will greatly increase the availability of supplies as shown on Table 6.2.

Table 6.1 Projected Supply and Demand Comparison - Existing Programs and Sources
2005 Urban Water Management Plan
Palmdale Water District

Condition	Demand		Available Supply		Supply Deficit
	(AF)	(MGD)	(AF)	(MGD)	(MGD)
2005					
Normal	25,774	23.0	28,412	25.4	None
Single Dry Year	20,619	18.4	14,922	13.3	5.1
Multiple Dry Year					
Year 1	23,197	20.7	19,315	17.2	3.5
Year 2	23,197	20.7	19,315	17.2	3.5
Year 3	23,197	20.7	19,315	17.2	3.5
2010					
Normal	31,034	27.7	28,838	25.7	2.0
Single Dry Year	24,827	22.2	14,922	13.3	8.8
Multiple Dry Year					
Year 1	27,931	24.9	19,315	17.2	7.7
Year 2	27,931	24.9	19,315	17.2	7.7
Year 3	27,931	24.9	19,315	17.2	7.7
2015					
Normal	39,562	35.3	29,264	26.1	9.2
Single Dry Year	31,650	28.3	14,922	13.3	14.9
Multiple Dry Year					
Year 1	35,606	31.8	19,528	17.4	14.4
Year 2	35,606	31.8	19,528	17.4	14.4
Year 3	35,606	31.8	19,528	17.4	14.4

Table 6.1 Projected Supply and Demand Comparison - Existing Programs and Sources
2005 Urban Water Management Plan
Palmdale Water District

Condition	Demand (AF)	Demand (MGD)	Available Supply (AF)	Available Supply (MGD)	Supply Deficit (MGD)
2020					
Normal	48,570	43.4	29,690	26.5	16.9
Single Dry Year	38,856	34.7	14,922	13.3	21.4
Multiple Dry Year					
Year 1	43,713	39.0	19,528	17.4	21.6
Year 2	43,713	39.0	19,528	17.4	21.6
Year 3	43,713	39.0	19,528	17.4	21.6
2025					
Normal	54,101	48.3	30,116	26.9	21.4
Single Dry Year	43,281	38.6	15,135	13.5	25.1
Multiple Dry Year					
Year 1	48,691	43.5	19,528	17.4	26.0
Year 2	48,691	43.5	19,528	17.4	26.0
Year 3	48,691	43.5	19,528	17.4	26.0
2030					
Normal	59,837	53.4	30,116	26.9	26.5
Single Dry Year	47,870	42.7	15,135	13.5	29.2
Multiple Dry Year					
Year 1	53,853	48.1	19,528	17.4	30.6
Year 2	53,853	48.1	19,528	17.4	30.6
Year 3	53,853	48.1	19,528	17.4	30.6

Note:

1. An update to the District's Water Master Plan (WMP) is currently in progress. The criteria and methodology for establishing future water demands will be the same as the previous WMP. Recommended supply improvements are to meet future maximum day demands.

Figure 6.1
Projected Supply and Demand Comparison

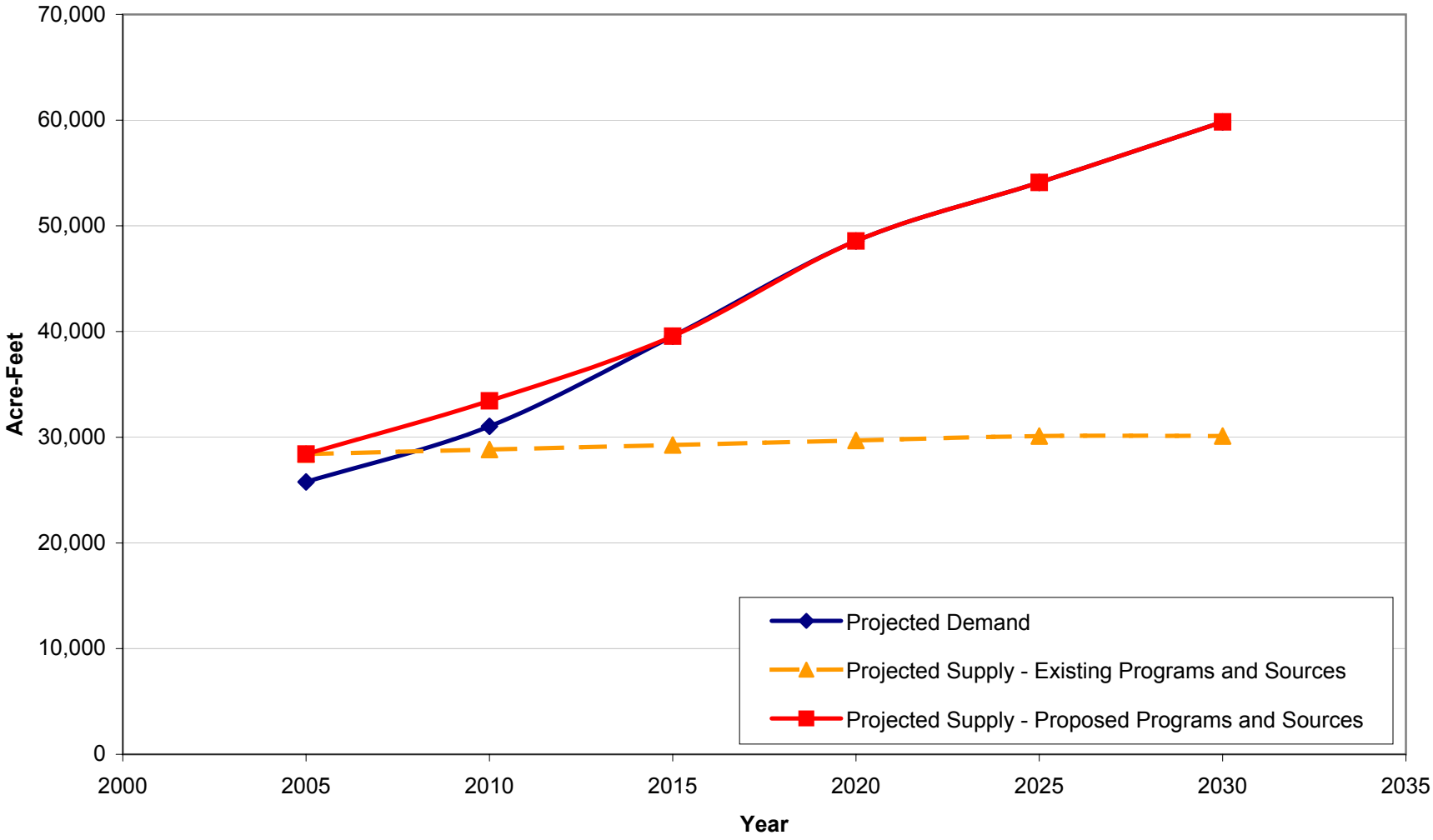


Table 6.2 Projected Supply and Demand Comparison - Proposed Programs and Sources
2005 Urban Water Management Plan
Palmdale Water District

Condition	Demand		Projected Supply		Supply Deficit
	(AF)	(MGD)	(AF)	(MGD)	(MGD)
2005					
Normal	25,774	23.0	28,412	25.4	None
Single Dry Year	20,619	18.4	14,922	13.3	5.1
Multiple Dry Year					
Year 1	23,197	20.7	19,315	17.2	3.5
Year 2	23,197	20.7	19,315	17.2	3.5
Year 3	23,197	20.7	19,315	17.2	3.5
2010					
Normal	31,034	27.7	33,442	29.9	None
Single Dry Year	24,827	22.2	19,526	17.4	4.7
Multiple Dry Year					
Year 1	27,931	24.9	23,919	21.4	3.6
Year 2	27,931	24.9	23,919	21.4	3.6
Year 3	27,931	24.9	23,919	21.4	3.6
2015					
Normal	39,562	35.3	39,562	35.3	None
Single Dry Year	31,650	28.3	25,220	22.5	5.7
Multiple Dry Year					
Year 1	35,606	31.8	29,826	26.6	5.2
Year 2	35,606	31.8	29,826	26.6	5.2
Year 3	35,606	31.8	29.826	26.6	5.2

Table 6.2 Projected Supply and Demand Comparison - Proposed Programs and Sources 2005 Urban Water Management Plan Palmdale Water District					
Condition	**Demand**		**Projected Supply**		**Supply Deficit**
	(AF)	**(MGD)**	**(AF)**	**(MGD)**	**(MGD)**
2020					
Normal	48,570	43.4	48,570	43.4	None
Single Dry Year	38,856	34.7	33,802	30.2	4.5
Multiple Dry Year					
Year 1	43,713	39.0	38,408	34.3	4.7
Year 2	43,713	39.0	38,408	34.3	4.7
Year 3	43,713	39.0	38,408	34.3	4.7
2025					
Normal	54,101	48.3	54,101	48.3	None
Single Dry Year	43,281	38.6	39,120	34.9	3.7
Multiple Dry Year					
Year 1	48,691	43.5	43.573	38.8	4.6
Year 2	48,691	43.5	43.573	38.8	4.6
Year 3	48,691	43.5	43.573	38.8	4.6
2030					
Normal	59,837	53.4	59,837	53.4	None
Single Dry Year	47,870	42.7	44,856	40.0	2.7
Multiple Dry Year					
Year 1	53,853	48.1	49,249	44.0	4.1
Year 2	53,853	48.1	49,249	44.0	4.1
Year 3	53,853	48.1	49,249	44.0	4.1

WATER DEMAND MANAGEMENT MEASURES

The UWMPA identifies fourteen Demand Management Measures (DMM) for urban water suppliers to address. These measures are derived from the original BMPs established in the UWMPA and the 1991 Memorandum of Understanding.

Law

> 10631 (f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:
>
> (1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following…
>
> (A) Water survey programs for single-family residential and multifamily residential customers.
>
> (B) Residential plumbing retrofit.
>
> (C) System water audits, leak detection, and repair.
>
> (D) Metering with commodity rates for all new connections and retrofit of existing connections.
>
> (E) Large landscape conservation programs and incentives.
>
> (F) High-efficiency washing machine rebate programs.
>
> (G) Public information programs.
>
> (H) School education programs.
>
> (I) Conservation programs for commercial, industrial, and institutional accounts.
>
> (J) Wholesale agency programs.
>
> (K) Conservation pricing.
>
> (L) Water conservation coordinator.
>
> (M) Water waste prohibitions.
>
> (N) Residential ultra-low-flush toilet replacement programs.

In 1991, a Memorandum of Understanding (MOU) regarding Urban Water Conservation in California formed the California Urban Water Conservation Council (CUWCC). The Palmdale Water District (District) is not currently a signatory of the MOU and is therefore not a member of CUWCC.

However, the District realizes the importance of the Best Management Practices (BMPs) to ensure a reliable future water supply. The District is committed to implementing water conservation and water recycling programs to maximize sustainability in meeting future water needs for its customers.

The District's previous Urban Water Management Plan (2000 Plan), provided information regarding the District's conservation measures already in place and those that would improve the efficiency of water use within the District.

Table 7.1 Demand Management Measures 2005 Urban Water Management Plan Palmdale Water District

Demand Management Measure	Implemented	Planning to Implement/ Not Implemented	Not Applicable
DMM 1 - Water Survey Programs	√		
DMM 2 - Residential Plumbing Retrofit	√		
DMM 3 - Water System Audits	√		
DMM 4 - Metering with Commodity Rates	√		
DMM 5 - Landscape Irrigation Programs	√		
DMM 6 - Washing Machine Rebate Program		√	
DMM 7 - Public Information	√		
DMM 8 - School Education	√		
DMM 9 - Commercial, Industrial & Institutional Programs	√		
DMM 10 - Wholesale Agency Programs			√
DMM 11 - Conservation Pricing	√		
DMM 12 - Water Conservation Coordinator	√		
DMM 13 - Water Waste Prohibition	√		
DMM 14 - Ultra Low Flush Toilet Replacement		√	

The California Department of Water Resources (DWR) has assigned an enhanced terminology to the BMPs. Accordingly; this chapter will refer to them as Demand Management Measures (DMMs).

7.1 DMM 1 - WATER SURVEY PROGRAMS FOR SINGLE-FAMILY RESIDENTIAL AND MULTI-FAMILY RESIDENTAL CUSTOMERS

This program consists of offering water audits to residential customers. Audit components include reviewing water usage history with the customer, identifying leaks inside and outside, and recommending improvements.

The District performs water audits for multifamily and residential customers by appointment only. In 2002, the District sent out letters to the largest multifamily customers with only a few customers requesting water audits. After each audit the District sent each customer a follow up letter providing information on water saving techniques the customer could do to reduce water use. Water saving devices and materials were also given to each customer.

The District provides regular free landscape workshops, gives out lists of water tolerant plants and provides customers with information on the newest techniques and equipment for better irrigation control. The Fair Board of the Antelope Valley sponsors the annual Home & Garden Show where PWD gives out faucet aerators, showerheads, moisture meters, and other plumbing retrofits.

7.2 DMM 2 - RESIDENTIAL PLUMBING RETROFIT

This program consists of installing physical devices to reduce the amount of water used or to limit the amount of water, which can be served to the customer. In accordance with State Law, low flow fixtures have been required on all new construction since 1978. In addition, State legislation enacted in 1990 requires all new buildings after January 1, 1992 to install Ultra-Low Flush Toilets (ULFT).

Several studies suggest that savings resulting from miscellaneous interior retrofit fixtures can range between 25 and 65 gpd per housing unit. The studies also suggest that installation of retrofit fixtures in older single-family homes tend to produce more savings, while newer multi-family homes tend to produce fewer saving per housing unit.

Water conservation kits for retrofitting existing plumbing fixtures are made available to District customers at the District office. The District gives out water conservation kits, showerheads, faucet aerators, moisture meters and other items at all community events throughout the year and upon request.

7.3 DMM 3 - SYSTEM WATER AUDITS, LEAK DETECTION AND REPAIR

A water audit is a process of accounting for water use throughout a water system in order to quantify the unaccounted-for water. Unaccounted-for water is the difference between metered production and metered usage on a system-wide basis.

The District purchased leak detection equipment a few years ago. A rapid rise in reported leaks occurred in 1989-1990, much of it was due to construction activity. At that time, it also became apparent that many of the older water mains were in need of replacement. As a result, a pipeline replacement program was instituted and funded by revenues from water sales.

The District has also completed repairs to the existing leakage areas in the Palmdale Ditch, which carries water from the Littlerock Dam to the Palmdale Lake. In 2000, a construction project was completed that repaired and lined several leak areas in the Ditch with bentonite. Bentonite is mixed with soil from the ditch is then re-compacted and forms a clay-like lining that reduces leakage. This procedure has reduced leakage from approximately 17-20 percent to 12 percent. In 2004/2005, the Palmdale Water District received a grant from the State Regional Water Quality Control Board for non-point pollution control (Prop 13). The District is in the process of installing 5,200 lineal ft. of 48-inch concrete pipe in the Palmdale Ditch which will not only protect the ditch from local run off but will help leakage.

The District has continued with an aggressive maintenance replacement program, which identifies main replacement locations through documented leak history and age, type of materials and coatings of the pipe. System water audits indicate that unaccounted for water is less than 10 percent of production (Table 7.2).

7.4 DMM 4 - METERING WITH COMMODITY RATES FOR ALL NEW CONNECTIONS AND RETROFIT OF EXISTING CONNECTIONS

This DMM requires water meters for all new constructions and billing by volume of use, as well as establishing a program for retrofitting any existing unmetered connections.

Meters are installed on all existing residential, commercial and landscape service connections in the District service area. The District also requires meters on all new connections. During the sudden growth period in Palmdale, the District discovered a considerable number of poor quality and potentially inefficient water meters which were placed in service. The District then embarked upon a meter replacement program, which was completed by 1992.

Table 7.2 Unaccounted For Water 2005 Urban Water Management Plan Palmdale Water District			
Year	**Total Annual Water Production[(1)] (ac-ft/yr)**	**Total Annual Water Consumptions (ac-ft/yr)**	**Unaccounted for Water (%)**
1993	18,346	17,161	6%
1994	20,619	19,258	7%
1995	22,233	19,846	11%
1996	23,514	21,458	9%
1997	23,152	21,042	9%
1998	20,626	18,849	9%
1999	23,397	22,225	5%
2000	25,901	23,353	10%
2001	25,242	23,342	8%
2002	25,668	23,773	7%
2003	24,911	23,929	4%
2004	26,646	24,229	9%
Average	**23,355**	**21,539**	**8%**
Source: 2006 WSMP Update - Draft			

In 2000, the District started a program that uses an automatic meter reading system. The Ramar system permits the meter reader to read from their vehicle instead of walking. The District is in the process of replacing existing meters with water meters that have remote read-out.

Between 2001-2004 the failure rate for the Ramar meters increased considerably. The District turned to an automatic meter system using the Itron unit. The District is in the process of replacing and installing the new meters and will have all Itron remote reading meters installed by mid 2006. The development of software for the meters, which is in progress, will enable the District to pull up data from an individual resident and read the amount of water used per day.

7.5 DMM 5 - LARGE LANDSCAPE CONSERVATION PROGRAMS AND INCENTIVES

This DMM calls for agencies to commence assigning reference evapotranspiration-based (ETo) water budgets to accounts with dedicated irrigation meters and provide water-use audits to accounts with mixed-use meters.

Large-scale irrigators of landscaping and turf areas are the largest water users within the District service area. In 1993, the City of Palmdale passed a Water Efficient Landscape Ordinance implementing low water use standards for commercial and industrial new landscapes. These include low water use plants pallets, requirements for re-circulating fountains and efficiency standards for irrigation systems.

In 2004, PWD applied for a Water Use Efficiency Grant from DWR. The grant proposal consisted of a pilot program to install “ET” based controllers on 14 large landscape users to reduce landscape water use by 30 percent. PWD was partnering with the City of Palmdale to install two weather stations for accurate “ET” for microclimates in this area. The weather stations would be maintained by the City. The pilot program was meant to develop future programs for large landscape water audit and incentives for water use reduction in commercial and industrial landscape areas.

In 2002, the District started free landscape workshops for the public including landscape contractors and maintenance professionals. There has been an enormous response of concerns for reliability of sustaining an affordable and low maintenance landscape while trying to conserve water in the High Desert that the District has expanded the workshops to 6-8 per year. The landscape booklet the District produced with help from other agencies, “Plants for the California High Desert” is also provided to large landscape users.

7.6 DMM 6 - HIGH-EFFICIENCY WASHING MACHINE REBATE PROGRAM

This program generally provides a financial incentive (rebate offer) to qualifying customers who install a high efficiency washing machine in their home. Other regional municipalities that performed an economic analysis on this program concluded that it would have a low benefit-to-cost ratio. The District does not currently implement this program.

In the past, the District has used alternative methods for reducing water use instead of providing a rebate on washing machines. Palmdale is a new community, with large growth years starting in 1982 and again in 1998. Regulation of low water use plumbing fixtures and the high cost of low use washing machines makes the rebate program less desirable at this time. The District will continue to revisit this program and determine a feasible implementation plan.

7.7 DMM 7 - PUBLIC INFORMATION PROGRAMS

This program consists of distributing information to the public through a variety of methods including brochures, radio and television, school presentations and videos, and web sites.

7.7.1 Public Events

Since 1995, the District has participated in the California Water Awareness Campaign (CWAC) sponsored by the Association of California Water Agencies (ACWA). The campaign advisory committee has several subcommittees, the District has served on the education and public relations / marketing committees at different times. Through the campaign and participation in public functions the Palmdale Water District has expanded public awareness of the importance of water conservation, which has resulted in an increase in requests for pamphlets and information on methods of water conservation. The District participates in several community functions such as:

- City of Palmdale's Fall Festival
- District's Water Awareness Fair
- Antelope Valley's Home and Garden Show and Fair
- Jethawks Stadium water awareness night
- City of Palmdale's eight weeks of "Thursday Night on the Square"
- Antelope Valley Airport's the Santa Fly-In
- City of Palmdale's Chamber Christmas Parade.

The District has sponsored a Water Fair & Festival for nine years. The water fair provides information and education on water conservation. Landscape contractors provide talks, materials and literature on plants and irrigation products. Events such as the Dr. Wilderness show provide fun with water history and educational water facts. Vendors provide information such as "waterless grass" or recycling green waste. The fair has been instrumental in providing the public with information on water conservation and it is a fun and interesting way for students to learn about their environment.

The kids tent is the focal point for the fair where educational games are played that introduce a variety of water conservation concepts and ideas. The vendors tent gives the community an opportunity to be apart of the District's effort to inform the public about water conservation. Other water districts have joined the District's efforts by either sponsoring books for the Youth Library or by having a booth at the fair. Landscape contractors and nurseries to provide the public with information on landscape conservation design and water tolerant plants.

7.7.2 Aquadog

The District has benefited from an increasingly positive public image using the District's mascot, "Aquadog." Aquadog has been visible for the last nine years and has gained in popularity so much that he is in high demand. School functions and community events keep him in constant demand. Aquadog has been used as a tool for greater acceptance and appreciation of water conservation.

7.7.3 Brochures

Brochures outlining water conservation measures are available at the District's public counter and by mail upon request. The District mails a quarterly newsletter to its customers entitled Water News (Appendix F). The newsletter describes water conservation articles, current capital improvement projects; Aquadog tips for water conservation and a water tolerant flower of the quarter, plus Board of Directors meetings and general information about the District.

In 2004-2005 the District partnered with Indian Wells Valley Water District, City of Palmdale, Kern County Water Agency, Rosamond Community Services District and the Naval Air Weapons Station in China Lake to produce a booklet, "Landscape Plants for the California High Desert." The booklet encourages us to appreciate the beauty and character of plants that are in tune with our desert environment and are efficient water users. The booklet has a guide to the 7 steps of Xeriscape and simple landscape techniques showing step-by-step ways to create water conserving landscape designs.

The Palmdale Water District and the City of Palmdale partnered in a marketing and media campaign plan to distribute the booklet thoughout the Antelope Valley. Several Ads and story write-ups have been produced in the AV Press's "Lifestyle" magazine to notify residents of the booklet. The City and the District have been on the local TV station (Adelphia) to educate the public about conservation and the booklet. Booklets are given out at landscape workshops and other community events. The District provides a free booklet to all District customers and asks for a small donation to anyone outside the District.

7.7.4 Water Conservation Garden Park

The Palmdale Water District is proposing to build a "Water Conservation Garden Park" on 5.46 acres of existing District property. The design concept plans have been developed and the District is in the process of developing funding sources.

The Water Conservation Garden Park will provide a "Concept of Resource Protection" not just water conservation but anti-pollution, waste management and energy management. The surrounding communities need to visually see and be educated on landscape for desert living. There will be landscape workshops, tours and public outreach information (interpretative exhibits) for the surrounding communities.

The City has passed a landscape beautification ordinance which requires residents to implement water use standards for landscaping their front yards. The District's proposal to create a water conservation garden park will not only provide recreation for local and surrounding area residents but will educate and provide information on what types of plants will grow and survive in this arid region while protecting our precious resource, water. Included in the conservation park will be other conservation projects such as green waste, conservation ethics, ground water protection, and pollution control with emphases on littering. A kiosk will be generated for each effort and conservation equipment will be installed throughout the park.

7.7.5 Website

In 2003/2004, the District presented its new web site (palmdalewater.org). The District's new web site is easy to use and full of information from water rates to the Kid's Corner. There are water saving tips, all about xeriscape, water conservation facts, what's your water IQ, water quality and many other informational services. In 2005, a web brochure was produced to inform the public on all activities provided on the web site.

7.8 DMM 8 - SCHOOL EDUCATION PROGRAM

This DMM requires water supplier to implement a school education program that includes providing educational materials and instructional assistance.

The District produces a yearly "Water Awareness Program" brochure that is sent out to every teacher in the Palmdale School District. This brochure outlines the District's up-coming contests and events for the year. The water awareness program is intended to develop an awareness of water conservation and protection of a valuable resource that will carry over into adult life. The school program provides tours to the District's treatment plant and Littlerock Dam, staff presentations on conservation and the environment, contests, and curriculum materials.

After 2001 (9/11), the District stopped bus tours for the public at the Treatment plant. In 2004, the District started bus tours to the District offices and to Littlerock Dam for lunch. After construction ceases at the treatment plant the District hopes to provide tours to the treatment plant again.

Over the last five years, the Palmdale Water District has sponsored several contests. A poster and jingle contest or a poster and story contest for grades third through seventh. In the year 2000, the District also included a coloring contest of Aquadog for kindergarten through second grade. The theme for the contests are designed to educate and bring water awareness to the forefront especially in the month of May, which is water Awareness month. The panel of five judges is made up of two members of the District's Board of directors, two members of the Palmdale School Board of Trustees and one other community leader. Prizes are awarded for first, second and third place in each grade, with

an over all grand prizewinner for all grades. Each classroom participating also receives a token prize and water conservation material for each student.

In 2004, the District presented a new contest called Landscape-in-a-box for fourth through eighth grades. The contest was an overwhelming success. Many teachers used the contest as a science project. The contest was designed to present early education on the concept of the 7 steps to xeriscape or the 7 steps to good landscape design. The main concepts targeted are planning and design first followed by plant selection and grouping plants into appropriate watering zones. The District provided the box, soil, mulch, seeds, instructions on the 7 steps to xeriscape and samples of plants. This was a class plus contest which presented the winner with a cash prize and the class with a cash prize. Prizes are awarded for first, second and third place in each grade. The District added a few more judges that included landscape professionals. Winning entries are displayed at the District's Water Awareness Fair in May and other District functions.

The District supports the California Water Awareness Campaign in Sacramento which provides unit booklets on water education. Education booklets are bought and distributed to teachers within the Palmdale School District. The PWD has formed a good relationship with the teachers and parents and provide information and materials for projects on request.

7.9 DMM 9 - CONSERVATION PROGRAMS FOR COMMERCIAL, INDUSTRIAL, AND INSTITUTIONAL ACCOUNTS

Palmdale Water District works closely with the Palmdale Chamber of Commerce in providing information to commercial, industrial and institutional accounts including participation in the annual Business Show Case.

In 2003, the District met the superintendent of schools and now provides the Palmdale School district maintenance dept. with account data to help reduce indoor and out water use.

The Palmdale Water District sponsors landscape workshops that provide speakers and suppliers the opportunity to give out information on the newest landscape technology, which has included three-hour sessions on ET and smart based controllers for commercial use.

The development of a Water Conservation Plan in 2005-2006 will provide the necessary information to plan a comprehensive program for commercial, industrial and institutional accounts.

7.10 DMM 10 - WHOLESALE AGENCY PROGRAMS

This DMM applies to wholesale agencies and defines a wholesaler's role in terms of financial, technical, and programmatic assistance to its retail agencies implementing DMMs.

Table 7.3 Water Rate History
2005 Urban Water Management Plan
Palmdale Water District

Year Adopted	Type of Rate Structure	Number of Tiers	Cost of 30 units of water		Change of Previous Rate	
			($)	(2005 $)	($)	(2005 $)
1969	Decreasing Block	3	7.50	40.26	N/A	N/A
1976	Decreasing Block	3	9.00	31.16	20.0%	-22.6%
1979	Flat	N/A	9.00	24.43	0.0%	-21.6%
1980	Flat	N/A	12.00	28.69	33.3%	17.4%
1982	Flat	N/A	15.00	30.62	25.0%	6.8%
1983	Flat	N/A	17.50	34.61	16.7%	13.0%
1986	Flat	N/A	20.25	36.39	15.7%	5.2%
1989	Increasing Block	2	24.84	39.47	22.7%	8.4%
1990	Increasing Block	2	27.58	41.57	11.0%	5.3%
1992	Increasing Block	2	32.50	45.63	17.8%	9.8%
2000-2001	Increasing Block	5 w/ 3 Elev.	33.80	38.68	4.0%	-15.3%
	Top Elev. Area	N/A	37.55	42.96	15.5%	-5.9%
2001-2002	Increasing Block	5 w/ 3 Elev.	38.30	42.60	13.3%	-0.8%
	Top Elev. Area	N/A	42.36	47.12	12.8%	9.7%
2002-2003	Increasing Block	5 w/ 3 Elev.	38.97	42.92	1.7%	0.7%
	Top Elev. Area	N/A	53.97	59.43	27.4%	26.1%
2003-2004	Increasing Block	5 w/ 3 Elev.	39.40	42.71	1.1%	-0.5%
	Top Elev. Area	N/A	66.65	72.24	23.5%	21.5%
2004-2005	Increasing Block	5 w/ 3 Elev.	40.08	42.18	1.7%	-1.2%
	Top Elev. Area	N/A	77.83	81.91	16.8%	13.4%
2005-2006	Increasing Block	5 w/ 3 Elev.	42.12	42.12	5.1%	-0.1%
	Top Elev. Area	N/A	71.37	71.37	-8.3%	-12.9%

Table 7.4 Minimum Charges 2005 Urban Water Management Plan Palmdale Water District		
Meter Size (in.)	**Minimum Charge ($)**	**Included in Minimum (100 cu. ft.)**
5/8" x 3/4"	12.87	5
1"	25.73	10
1-1/2"	38.60	15
2"	64.34	25
3"	128.67	50
4"	218.74	85
6"	424.61	165
8"	681.95	265
10"	990.76	385
12"	1,286.70	500

Table 7.5 Water Use in Excess of Minimum 2005 Urban Water Management Plan Palmdale Water District				
Usage (100 cu. ft.)	**Base ($/ 100 cu. ft)**	**Area 1 ($/ 100 cu. ft)**	**Area 2 ($/ 100 cu. ft)**	**Area 3 ($/ 100 cu. ft)**
1-10	1.27	1.44	1.63	2.53
11-25	1.29	1.46	1.65	2.55
26-50	1.32	1.49	1.68	2.58
51-100	1.37	1.54	1.73	2.63
101-above	1.41	1.58	1.77	2.67

7.11 DMM 11 - CONSERVATION PRICING

The District currently has a tier billing structure designed to promote water conservation. The total water bill includes a base rate, determined by elevation and a tiered unit rate that varies with water usage. Table 7.3 illustrates the water rate history for the District. Tables 7.4, 7.5 and 7.6 show the District's current billing rates and tiers.

7.12 DMM 12 - WATER CONSERVATION COORDINATOR

The Special Projects Coordinator Position was hired in 1991 to comply with Demand Management Practices. In 2003-2004, the District changed the Special Projects

Coordinator position to Water Conservation Manager and hired a Water Conservation Aid to enhance water conservation activities.

In addition, staff training is a key element of water conservation training. Water auditing, irrigation planning, landscape design, public relations, marketing courses and water conservation certifications are encouraged for all staff members.

7.13 DMM 13 - WATER WASTE PROHIBITION

In 1991, during the most recent drought, the PWD Board of Directors enacted several resolutions adopting water conservation polices and requirements, having both voluntary and mandatory provisions and penalties for violations. The resolutions provide for prohibition of water wastage at all times, not only in times of drought. These resolutions are described in detail in Chapter 8.

In 2005, the Board of Directors approved a “Don’t Waste Water Hot-Line” to give the public a number to actively use when they see water being wasted due to; visible over lawn watering practices, broken sprinkler heads, or incorrectly directed sprinkler heads and broken pipes leading to street run off. As a discipline, the District will implement its Water Waste policy set forth in Appendix O of District’s Rules & Regulations (Appendix G).

7.14 DMM 14 - RESIDENTIAL ULTRA-LOW-FLUSH TOILET REPLACEMENT PROGRAMS

State legislation requires the installation of efficient plumbing in new construction, and effective 1994 require that only ULFT be sold in California. Subsequently, homes constructed since 1994 in the District have ULFT.

Additionally, the District is in the process of developing a “Water Conservation Plan” and a low flush program will be assessed at that time. Implementation of previous legislation mandating use of Low Flush toilets in 1979 predates most of the development in the Lancaster- Palmdale area. Therefore, at this time, the District has used alternative methods for reducing water use instead of providing a rebate on existing toilets.

The District will continue to revisit this program and determine a feasible implementation plan.

Chapter 8

WATER SHORTAGE CONTINGENCY PLAN

8.1 STAGES OF ACTIONS

The UWMPA requires that the UWMP include an urban water shortage contingency analysis that addresses specified issues.

Law

> 10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:
>
> 10632 (a) Stages of action to be undertaken by the urban water supplier 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.

8.1.1 History of Water Shortage and Conservation Resolutions

In 1991, the State of California experienced a four-year drought condition. Subsequently, the PWD Board of Directors approved several resolutions for voluntary and mandatory water conservation measures.

On February 21, 1991, the Board of Directors approved Resolution 91-4 (Appendix H) adopting a voluntary water conservation program with a goal of reducing water use by 15 percent. This resolution encouraged District customers to practice water conservation methods including adjustment of sprinklers to avoid over spray and runoff, avoid watering during the daytime or during peak morning and evening hours, install drought tolerant landscaping and efficient irrigation systems, turn off decorative fountains, not hose down driveways, sidewalks or other paved surfaces, install pool and spa covers, not allow hoses to run while washing vehicles, retrofit indoor plumbing fixtures with low flow devices and check plumbing and irrigation systems for leaks and repair them immediately.

On April 9, 1991, the Board of Directions approved Resolution 91-9 (Appendix I) declaring a water shortage emergency condition and adopting regulations and restrictions on the delivery and consumption of water for public use. This resolution authorized the General Manager to implement the regulations and restrictions set forth in the Resolution including issuing a moratorium on new connections and mandatory water rationing.

On July 9, 1991, the Board of Directors approved Resolution 91-10 (Appendix J) establishing conservation regulations. This Resolution established the base water use for the customers as the amount of water delivered to that customer during the water year ending on December 31, 1990. Water consumed in excess of the established conservation percentage was charged at a rate of $3.00 per 100 cubic feet, in addition to the base water rate. A conservation goal of twenty percent was established. A method of adjusting the

base amount was included in the Resolution for special circumstances. Mandatory water conservation regulations were imposed. These included restrictions on hosing down paved areas, washing of vehicles filling of decorative fountains, lakes, etc, leak repair, service of drinking water in public eating areas, commercial nurseries, parks and other public open space, noticing requirements for water conservation methods at public lodging facilities, including hotels, inns and motels and restrictions on use of water from fire hydrants.

On August 13, 1991 the Board of Directors adopted a Water Waste Policy to the District Policy Manual (Appendix O). Appendix O imposes fines for water or misuse of water and allows disconnection of service for repeated offenses.

In March 1992, the District Board of Directors moved to withdraw from the voluntary water rationing program.

PWD will commence using these same resolutions of water conservation regulations if it necessary, due to a shortage of rainfall or if there is a reduction in the District allotment of SWP water. The reliability of the SWP and the District's intent to use 40 percent groundwater may result in the need to use voluntary conservation measures when dry years occur.

8.1.2 Water Shortage Stages and Reduction Objectives

Water agencies relying largely on surface water, such as the District, are more likely to experience water shortages than those agencies relying primarily on groundwater.

The District has developed a three-stage rationing plan (Table 8.1) that will be invoked during declared water shortages. Each stage includes a water reduction objective, in percent of normal demands. The rationing plan is dependant on the cause, severity and anticipated duration of the water supply shortage.

Table 8.1 Water Shortage Stages and Reduction Objectives
2005 Urban Water Management Plan
Palmdale Water District

Stage	Description	Reduction Objective
1	Minor Shortage Potential	20% reduction in deliveries
2	Moderate Shortage Potential	35% reduction in deliveries
3	Critical Shortage Potential	40-50% reduction in deliveries(1)

Note:
1. The District is planning to amend Stage 3 to include up to 50 percent reduction in supply.

8.1.3 Water Reduction Stage Triggering Mechanisms

Emergency response stage actions become effective when the Board of Directors declares that the District is unable to provide sufficient water supply to meet ordinary demands, to the extent that insufficient supplies would be available for human consumption, sanitation and fire protection. Then the General Manager is authorized to implement regulations and restrictions, including a moratorium on new connections and mandatory water rationing.

A combination of voluntary and mandatory water conservation measures would be used to reduce water usage in the event of water shortages. Reduction in deliveries is based upon the amount of water delivered to that customer during the preceding year.

8.1.4 Administration of Water Shortage Program

The administration of a water shortage program as described in this section would involve coordination among a number of local agencies. An individual in the District would be identified as the Program Manager and be the primary coordinator of water shortage activities.

An appropriate organizational structure for water shortage management team would be determined based on the actual situation. Figure 8.1 presents an example of a typical organizational structure. Specific individuals would be designated to fill the identified roles. The District would probably not have to hire additional staff or outside contractors to implement the program.

The major elements to be considered in administering and implementing the program include:

- Identifying the District staff members to fill the key roles on the water shortage management team. It is anticipated that the General Manager for the District would designate the appropriate individuals.

- Intensifying the public information program to provide comprehensive information on the water shortage as necessary actions that must be undertaken by the District and by the public. The scope of the public information program can be developed by reviewing published references, especially those published by DWR, and researching successful aspects of the current programs conducted by neighboring water agencies. A public information hotline may be advisable to answer any questions regarding the program.

- Monitoring program effectiveness. Ongoing monitoring will be needed to track supply availability and actual water user reductions. This procedure will allow the District to continuously re-evaluate the situation and make informal decisions as to whether another reduction level is needed.

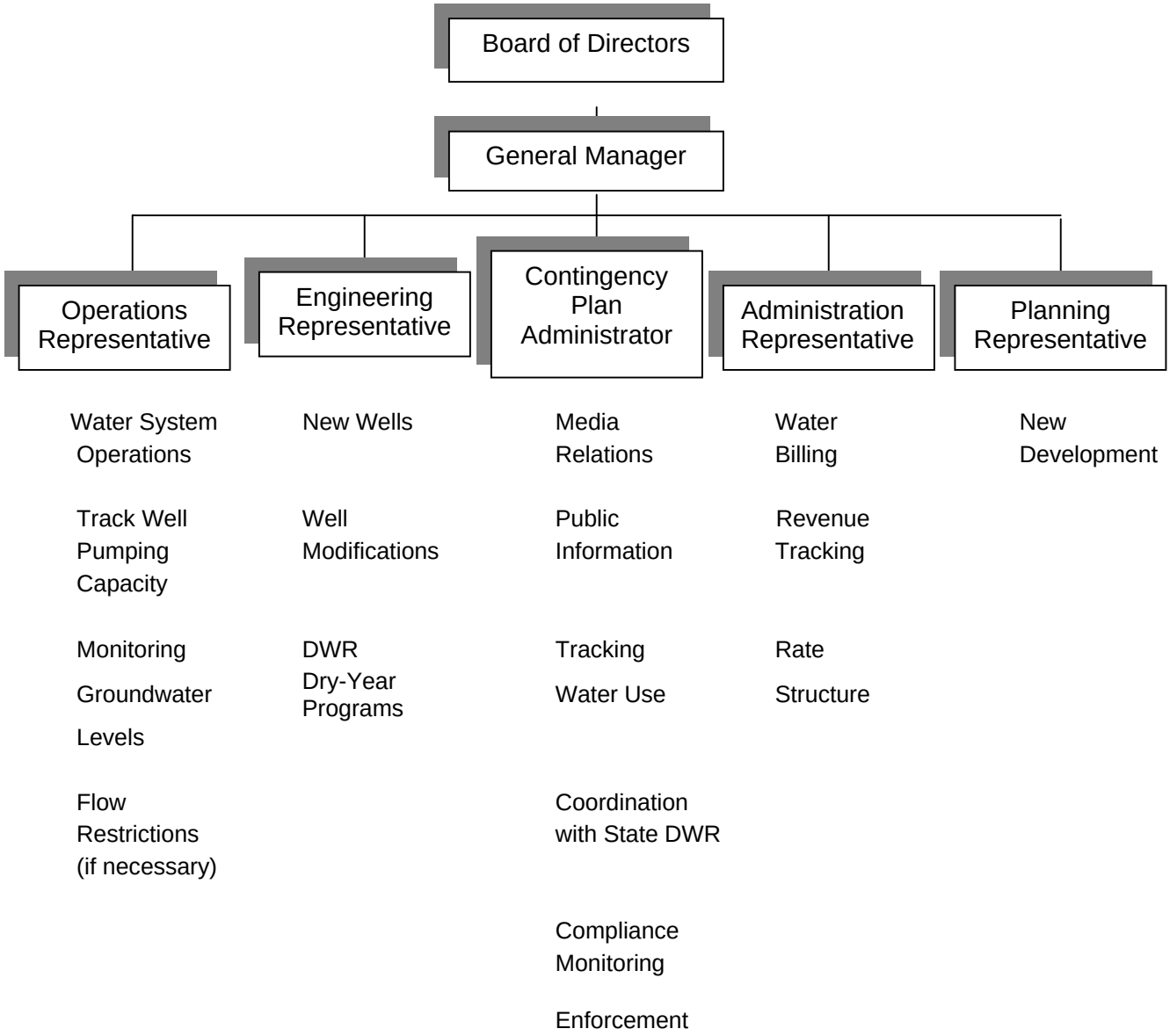


Figure 8.1
Water Shortage Contingency Plan
Typical Management Team Organization
2005 Urban Water Management Plan
Palmdale Water District

- Enforcing program requirements. From the 20 to 40 percent reduction programs, enforcement of water use prohibitions and water use allocations will be more important in achieving the program goals. Inspectors and enforcement personnel could be identified among District staff that are in the community on other business.

- Dealing with equity issues that might arise from the mandatory restrictions or higher water rates. Depending on the level of restriction, there may be a greater need to address specific concerns of individual customers who might have special conditions or extenuating circumstances and are unduly affected by the program. A procedure should be identified for dealing with such special requests and/or for reviewing specific accounts.

- Coordinating with other agencies. Since most of the District's primary service area lies with the Palmdale city limits, it is critical to have ongoing coordination with a specific contact person at the City who will be aware of District developments.

- Adjusting water rates. Revenues from water sales should be reviewed periodically to determine whether an increase in rates might be needed to cover revenue shortfalls due to the decrease in demand.

- Addressing new development proposals. During periods of severe water shortage, it may be necessary to impose additional requirements on new development to reduce new demand or to temporarily curtail new hook-ups.

It is required that the water shortage contingency plan undergoes a formal public review process including a public hearing. A thorough public review process will help minimize future objections when mandatory prohibitions are needed.

8.2 WATER SHORTAGE CONTINGENCY ORDINANCE/ RESOLUTION

According to the UWMPA, the UWMP is required to include an urban water shortage contingency analysis that includes a draft water shortage contingency resolution or ordinance.

Law

> 10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:
>
> 10632 (h) A draft water shortage contingency resolution or ordinance.

The District adopted its Water Shortage Contingency Ordinance on April 9, 1991. A copy of the adopting resolution is included in Appendix I.

8.3 PROHIBITIONS, CONSUMPTION REDUCTION METHODS, AND PENALTIES

The UWMPA requires that the UWMP include an urban water shortage contingency analysis that addresses methods to reduce consumption.

Law

> 10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier…
>
> 10632 (d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.
>
> 10632 (e) Consumption reduction methods in the most restrictive stages. 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.
> 10632 (f) Penalties or charges for excessive use, where applicable.

8.3.1 Mandatory Prohibitions on Water Wasting

Mandatory compliance measures enacted during a water shortage are more severe than voluntary measures, produce greater savings, and are less costly to the utility. The principal drawback to these measures is the customer resentment if the measures are not seen as equitable. Therefore, such measures need to be accompanied by a good public relations campaign.

Mandatory measures may include:

- Ordinances making water waste illegal
- Ordinances controlling landscape irrigation
- Ordinances restricting nonirrigation outdoor water uses
- Prohibitions on new connections or the incorporation of new areas
- Rationing

Prohibitions on new development may conflict with other policies and needs. However, if existing customers are called upon to make sacrifices during a drought period, they may feel that water agencies should concentrate on fulfilling current obligations rather than taking on new customers. Such prohibitions may need to be considered in the event of a critical shortage, such as the 40-50 percent reduction program. If necessary, an offset program might be considered whereby developers demonstrate that they will implement

measures to conserve at least as much water in the existing community as their new project will use. In some cases, a two to one offset may be required of the new development.

During a water shortage the District enforces Resolution 91-10. Resolution 91-10 becomes mandatory when a Stage 1 Water Shortage Emergency is declared. This resolution states:

- There shall be no washing of sidewalks, walkways, buildings, walls, patios, driveways, parking areas or other paved surfaces, or walls, except to eliminate conditions dangerous to public health or safety or when required as surface preparation for application of architectural coating or painting.
- Washing of motor vehicles, trailers, boats and other types of equipment shall be done only with a hand held bucket or a hose equipped with a positive shut off nozzle for quick rinses. Washing may also be done with reclaimed wastewater or by a commercial car wash using a recycled system.
- No water shall be used to clean, fill or maintain levels in decorative fountains, ponds, lakes or other similar aesthetic structures unless such water is part of a recycling system.
- No restaurant, hotel, café, cafeteria or other public place where food is sold, served or offered for sale, shall serve drinking water to any customer unless expressly requested and shall display a notice to that effect.
- All water users shall promptly repair all leaks from indoor and outdoor plumbing fixtures.
- No lawn, landscape or other turf area shall be watered more than once every other day nor during the hours between 10:00 am and 4:00 pm.
- No water users shall cause or allow the water to run off landscape areas into adjoining streets, sidewalks, or other paved areas due to incorrectly directed or maintained sprinklers or excessive watering.
- The owner and manager of every hotel, motel, inn, guest-house, bed and breakfast facility and short-term commercial lodging shall post a notice to such shortage and any necessary compliance measures.
- Commercial nurseries, golf courses, parks, school yards, and other public open space and landscaped areas shall be prohibited from watering lawn, landscaping, and other turf areas more often than every third day and between the hours of 6:00 a.m. and 6:00 p.m., except that there shall be no restriction on watering utilizing reclaimed water.

- The use of water from fire hydrants shall be limited to fire fighting and related activities and other uses of water for municipal purposes shall be limited to activities necessary to maintain public health, safety and welfare.

8.3.2 Excessive Use Penalties

Customers found wasting or misusing water shall receive the following actions by the District:

- First Violation. A written warning of the violation shall be issued by District personnel to the respective water customer. Photographic record of the violation will be made and the warning will be logged in the customer's service record.
- Second Violation. A written warning of the violation shall be issued by District personnel to the respective water customer stating that a third violation will result in disconnection. The customer will also be charged a $50.00 penalty.
- Third Violation. A written warning of the violation shall be issued by District personnel to the respective water customer stating that disconnection will occur within five days after the notice. The customer will be charged a disconnection fee, as well as a reconnection fee if service is later restored.

8.3.3 Review Process

A customer that has been assessed a penalty for violating or exceeding the water use allocation will have the right to a review of the penalty by the General Manager. The customer has five working days within which to file a request for reconsideration. If the customer is not satisfied with the General Manager's decision, the customer has 15 days to file an appeal with the Board. The Board's decision is final and conclusive.

8.4 REVENUE AND EXPENDITURE IMPACTS/MEASURES TO OVERCOME IMPACTS

According to the UWMPA, the UWMP is required to include an urban water shortage contingency analysis that addresses the financial impacts from reduced water sales.

Law

> 10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:
>
> 10632 (g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier…
>
> 10632 (g) [An analysis of the impacts of each of the proposed measures to overcome those [revenue and expenditure] impacts, such as the development of reserves and rate adjustments.

Table 8.2 Operational Review
2005 Urban Water Management Plan
Palmdale Water District

	Actual 2004 ($)	Reduction in Water Use ($)		
		10%	20%	40%
Operating Revenues				
Water Sales and Service Fees	16,800,264	15,120,238	13,440,211	10,080,158
Operating Expenses				
Administration	2,885,066	2,885,066	2,885,066	2,885,066
Business	1,899,445	1,899,445	1,899,445	1,899,445
Engineering	878,138	878,138	878,138	878,138
Facilities	2,637,310	2,637,310	2,637,310	2,637,310
Operations and Production	3,880,023	3,880,023	3,880,023	3,880,023
Purchased Water	1,605,219	1,605,219	1,605,219	1,605,219
Depreciation	4,572,821	4,572,821	4,572,821	4,572,821
Total Operating Expenses	18,358,022	18,358,022	18,358,022	18,358,022
Less Capitalized Construction Costs	(1,640,413)	(1,640,413)	(1,640,413)	(1,640,413)
Net Operating Expenses	16,717,609	16,717,609	16,717,609	16,717,609
Operating (Loss) Income	**82,655**	**(1,597,371)**	**(3,277,398)**	**(6,637,451)**
Non-Operating Revenue (Expenses)				
Taxes	2,981,140	2,981,140	2,981,140	2,981,140
Interest	474,654	474,654	474,654	474,654
Amortization	(874,956)	(874,956)	(874,956)	(874,956)
Interest Expense	(1,478,047)	(1,478,047)	(1,478,047)	(1,478,047)
Capital Improvement Fees	3,642,961	3,642,961	3,642,961	3,642,961
Other, Net	135,930	135,930	135,930	135,930
Total Non Operating Revenue	4,881,682	4,881,682	4,881,682	4,881,682
Change in Net Assets	**4,964,337**	**3,284,311**	**1,604,284**	**(1,755,769)**

Source: Palmdale Water District, 2005

Table 8.3 Operational Review with Purchase of Dry-Year Water
2005 Urban Water Management Plan
Palmdale Water District

	Actual 2004 ($)	Reduction in Water Use ($)		
		10%	20%	40%
Operating Revenues				
Water Sales and Service Fees	16,800,264	16,800,264	16,800,264	16,800,264
Operating Expenses				
Administration	2,885,066	2,885,066	2,885,066	2,885,066
Business	1,899,445	1,899,445	1,899,445	1,899,445
Engineering	878,138	878,138	878,138	878,138
Facilities	2,637,310	2,637,310	2,637,310	2,637,310
Operations and Production	3,880,023	3,880,023	3,880,023	3,880,023
Purchased Water	1,605,219	1,605,219	1,605,219	1,605,219
Water Transfers	--	683,444	1,366,889	2,733,778
Depreciation	4,572,821	4,572,821	4,572,821	4,572,821
Total Operating Expenses	18,358,022	19,041,466	19,724,911	21,091,800
Less Capitalized Construction Costs	(1,640,413)	(1,640,413)	(1,640,413)	(1,640,413)
Net Operating Expenses	16,717,609	17,401,053	18,084,498	19,451,387
Operating (Loss) Income	**82,655**	**(600,789)**	**(1,284,234)**	**(2,651,123)**
Non-Operating Revenue (Expenses)				
Taxes	2,981,140	2,981,140	2,981,140	2,981,140
Interest	474,654	474,654	474,654	474,654
Amortization	(874,956)	(874,956)	(874,956)	(874,956)
Interest Expense	(1,478,047)	(1,478,047)	(1,478,047)	(1,478,047)
Capital Improvement Fees	3,642,961	3,642,961	3,642,961	3,642,961
Other, Net	135,930	135,930	135,930	135,930
Total Non Operating Revenue	4,881,682	4,881,682	4,881,682	4,881,682
Change in Net Assets	**4,964,337**	**4,280,893**	**3,597,448**	**2,230,560**

Source: Palmdale Water District, 2005

The majority of operating costs for most water agencies are fixed rather than a function of the amount of water sold. As a result, when significant conservation programs are undertaken, a budget deficit is likely to occur (Table 8.2). The District has annual revenue of approximately ten million dollars. Surplus revenues are carried over in a reserve fund for maintenance, capital improvement and budget deficits. However, the District can also purchase Dry-Year water in lieu of conservation. This greatly reduces the financial impact of droughts (Table 8.3).

8.5 ACTIONS DURING A CATASTROPHIC INTERRUPTION

The UWMPA requires that the UWMP include an urban water shortage contingency analysis that address a catastrophic interruption of water supplies.

Law

> 10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier…
>
> 10632 (c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

During declared shortages, or when a shortage declaration appears imminent, the General Manager will activate a water shortage response team. The team includes: water, fire, planning, health, and emergency personnel. Other actions and procedures to follow during catastrophic events will be developed.

An interconnection exists between AVEK and the District for reciprocal emergency water supply.

8.6 REDUCTION MEASURING MECHANISM

The UWMPA requires that the UWMP include an urban water shortage contingency analysis that identifies a mechanism to measure the actual water reductions.

Law

> 10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:
>
> 10632 (i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

The District's water system is supplied by groundwater wells and treated surface water. The District measures the amount of water entering the distribution system through flow monitoring devices installed on each well and at the Water Treatment Plant. There are also meters on all connections measure the amount of water used. These devices will be used to measure District-wide reduction in water use.

Chapter 9

WATER RECYCLING

The UWMPA requires that the UWMP include information on water recycling and potential uses for recycled water.

Law

> 10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:
>
> 10633 (a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.
>
> 10633 (b) A description of the recycled water currently being used in the supplier's service area, including but not limited to, the type, place and quantity of use.
>
> 10633 (c) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse determination with regard to the technical and economic feasibility of serving those uses, groundwater recharge, and other appropriate uses, and a
>
> 10633 (d) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years.
>
> 10633 (e) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.
>
> 10633 (f) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems and to promote recirculating uses.

9.1 PALMDALE WASTEWATER TREATMENT AND RECYCLING

County Sanitation District No. 20 provides wastewater management services for the Palmdale area. It was formed in 1951 and originally encompassed 1.9 square miles. Today the CSD No. 20 is approximately 31.4 square miles and serves the majority of the residents within the City of Palmdale (LACSD, 2005).

Antelope Valley has experienced rapid growth over the last 20 years, which have resulted in higher wastewater flows. With rapidly growing cities in the Antelope Valley, water agencies must contend with complex local water issues (LACSD, 2005). Water sources for this area include surface water, groundwater, and recycled water. Surface water is limited by the small amount of rainfall and groundwater has been overdrafted for years (LACSD, 2005).

In planning for future growth, public agencies in the Antelope Valley have recognized that recycled water is not being used to its full potential. Both the District and LA County Waterworks District No. 40 have expressed an interest in developing municipal reuse of the effluent from the Palmdale Water Reclamation Plant (LACSD, 2005).

9.2 EXISTING WATER RECYCLING FACILITIES

The Palmdale Water Reclamation Plant (PWRP) was constructed in 1953 with an initial treatment capacity of 0.75 mgd (LACSD, 2005). Currently the PWRP treats 9.4 mgd utilizing settling, oxidation ponds and a chlorination facility. Effluent is either land-applied to areas with a crop or used for irrigation at agronomic rates at the 2,680-acre effluent management site (LACSD, 2005). The PWRP's current capacity is 15 mgd. Irrigated crops are alfalfa, pine trees and Pistachio trees. Irrigation methods include furrow irrigation and center pivot irrigation and are regulated by the Lahontan Regional Water Quality Control Board.

Wastewater in LACSD No. 20 is conveyed through a system of sewers that rely solely on gravity. There is approximately 40 miles of trunk sewers, ranging from 12- to 39-inches in diameter (LACSD, 2005). These sewers are made of vitrified clay pipe or reinforced concrete pipe. Local lines that convey wastewater from laterals to trunk sewers are typically less than 15-inches in diameter (LACSD, 2005.)

LACSD No. 20 Board adopted the 2025 Facilities Plan and EIR for the PWRP on October 26, 2005. The 2025 Plan outlines the addition of tertiary treatment to the PWRP, and the tertiary water should be available for distribution by late 2009. Expansion of the plant will also include:

- Construction of storage reservoirs
- Expansion of agricultural reuse facilities
- Commencement of municipal reuse

The current schedule indicates these projects will be completed by 2013. A schematic of the expanded plant is shown in Figure 9.1

Municipal use of recycled water to irrigate parks, school grounds, golf courses and similar areas can significantly reduce potable water demands. In the Palmdale area, it is estimated that 7.8 mgd can be used as landscape irrigation, which is approximately 15 percent of the projected 2030 demand.

The District is working with Los Angeles County Waterworks District No. 40, the City of Palmdale, the City of Lancaster, and the LACSD (District 14 and District 20) on the planning of a community-wide recycled water backbone system. The general idea of the backbone system is to provide a transmission main distribution system, storage, and necessary pump stations in the communities of Lancaster and Palmdale that will deliver recycled water over

a wide area. The system will connect the backbone pipelines from the Lancaster Water Reclamation Plant and the Palmdale Water Reclamation Plant to provide redundancy for recycled water delivery. The system will be constructed in four phases.

The District is investigating the possibility of groundwater recharge using tertiary-treated recycled water. LACSD No. 20 has expressed that they will remain actively involved with stakeholders (The District) in the region interested in developing a recharge project, since groundwater recharge provides a beneficial use of recycled water (LACSD, 2005).

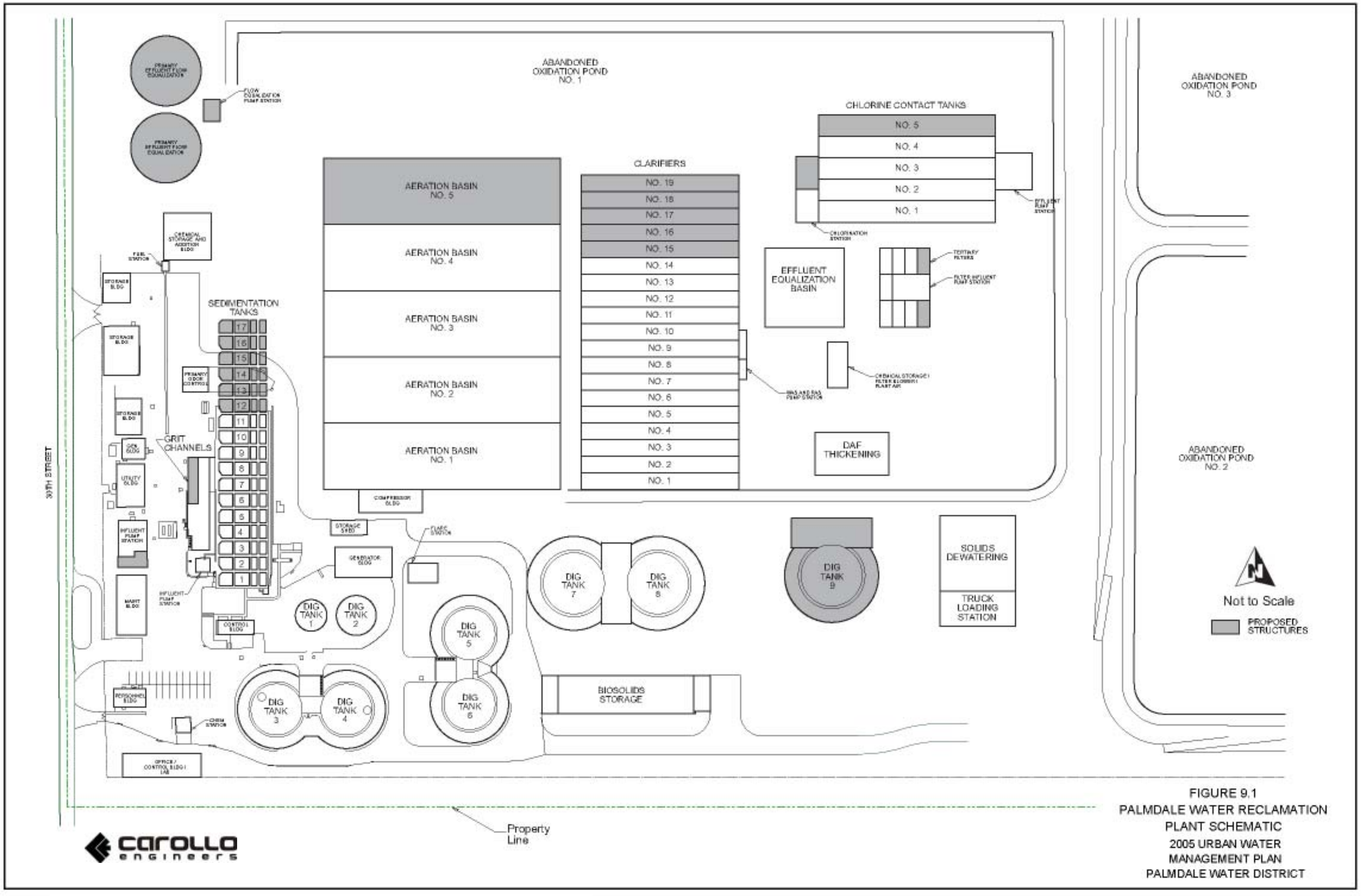


FIGURE 9.1
PALMDALE WATER RECLAMATION
PLANT SCHEMATIC
2005 URBAN WATER
MANAGEMENT PLAN
PALMDALE WATER DISTRICT

Source: LACSD 2025 Palmdale Water Reclamation Plant Facilities Plan