William Mulholland, First Superintendent
City of Los Angeles Water Department

City of Los Angeles
Department of Water and Power

2005
urban water management plan

Message from the General Manager
Ronald F. Deaton

Since 1902, the Los Angeles Department of Water and Power (LADWP) has provided the residents and businesses of Los Angeles with a reliable and sufficient supply of water. While the job of collecting, cleaning, and distributing this water is as important in 2005 as it was more than one hundred years ago, the challenge of serving a metropolis of nearly four million people is in many ways greater than in previous generations.

One of the greatest challenges is ensuring that enough water is available for all of the City's needs. Though our population and economy have grown steadily in the last century, our sources of water have not. To keep water flowing in and to the City, it is important that we balance our commitment to the environment with a reliable supply to our customers. This includes increasing our water conservation and recycling, enhancing our partnerships with environmental groups and other water agencies, as well as fulfilling our environmental commitments to the Owens Valley and Mono Basin.

Another of today's great challenges is the safeguarding of our water supply and maintaining the highest water quality standards. Since September 11, 2001, the security of our water infrastructure and the high operational integrity of the water system have become more important than ever. Keeping a safe, clean, and secure supply of water is one of the highest priorities of LADWP.

The 2005 Urban Water Management Plan serves as the master plan for water supply and water resource management for the City. It provides an in-depth discussion of the City's water resources issues and needs for the next 25 years. As always, LADWP remains committed to prudent resource management actions that will ensure a sustainable supply of quality water to Los Angeles.

Thank you.

Message from the Chief Operating Officer – Water System
James B. McDaniel

In the five years since the Year 2000 Urban Water Management Plan update, Los Angeles has experienced one of the driest (2001-02) and one of the wettest (2004-05) precipitation years in its recorded history. These events show just how unpredictable our sources of water can be and demonstrate how important it is for LADWP to provide consistent, effective water resource management today and in the future.

To limit the effects of these extreme changes, LADWP has worked very hard to ensure that we prudently use the water available to Los Angeles. In the last five years, we have made important gains across many aspects of our water portfolio.

Conservation continues to provide the most dramatic path toward water efficiency. In 2005, the water use level in Los Angeles is approximately the same as it was in 1985, even with a population increase of more than 750,000 people. This proves that diligently striving to make every drop count is paying off for Los Angeles, and the conservation efforts of the residents and businesses in Los Angeles have indeed been remarkable.

LADWP also has been working hard to ensure a high quality of water for its customers. We have increased our monitoring and testing for all the regulated constituents in our water supply. LADWP continuously strives to improve water quality beyond regulatory levels, providing an increased margin of safety in a manner that is affordable for our customers.

We have acknowledged that integrated resources planning is a key element to successful water management and have worked closely with the Metropolitan Water District of Southern California (MWD), the City of Los Angeles Bureau of Sanitation, and others to ensure that the utility of the region's limited water supplies are protected and enhanced.

LADWP is committed to meeting the City's future water challenges. As the 2005 Urban Water Management Plan shows, LADWP is fully prepared to succeed in achieving its mission: to deliver a dependable supply of safe, quality water to our customers in an efficient and publicly responsible manner.

DEPARTMENT OF WATER AND POWER
CITY OF LOS ANGELES
FOUNDED 1781

Urban Water Management Plan for the Los Angeles Department of Water and Power
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Urban Water Management Plan for the Los Angeles Department of Water and Power Glossary of Abbreviations and Terms

Agencies

BOS	City of Los Angeles Department of Public Works, Bureau of Sanitation
Caltrans	California Department of Transportation
CITY	City of Los Angeles
CORPS	United States Army Corps of Engineers
CUWCC	California Urban Water Conservation Council
DHS	California Department of Health Services
DWR	California Department of Water Resources
EPA	United States Environmental Protection Agency
IID	Imperial Irrigation District
LACDPW	Los Angeles County Department of Public Works
LADWP	Los Angeles Department of Water and Power
MWD	Metropolitan Water District of Southern California
PVID	Palo Verde Irrigation District
RWQCB	Regional Water Quality Control Board
SAWPA	Santa Ana Watershed Project Authority
SCAG	Southern California Association of Governments
SDCWA	San Diego County Water Authority
SWRCB	State Water Resources Control Board
WBMWD	West Basin Municipal Water District

Facilities and Locations

BAY-DELTA	San Francisco Bay and Sacramento-San Joaquin River Delta
CRA	Colorado River Aqueduct
EOC	Emergency Operations Center
HTP	Hyperion Wastewater Treatment Plant
LAA	Los Angeles Aqueducts (First and Second)
LAGWRP	Los Angeles/Glendale Water Reclamation Plant
SFB	San Fernando Basin
SWP	State Water Project
TITP	Terminal Island Treatment Plant
TWRP	Donald C. Tillman Water Reclamation Plant
ULARA	Upper Los Angeles River Area
WBWRP	West Basin Water Reclamation Plant

Measurements and Miscellaneous

ACT	Urban Water Management Planning Act
ADJUSTMENT	Water Revenue Adjustment Factor
AF	Acre-Feet
AFY	Acre-Feet Per Year
AOP	Advanced Oxidation Process

BMP	Best Management Practices
CBO	Community-Based Organizations
CEQA	California Environmental Quality Act
CII	Commercial/Industrial/Institutional
CIP	Capital Improvement Program
CWC	California Water Code
EIR	Environmental Impact Report
ETo	Evapotranspiration Rate
ERP	Emergency Response Plan
GAC	Granular Activated Carbon
GPM	Gallons Per Minute
IRP	Integrated Resources Plan
IRWMP	Integrated Regional Water Management Plan
KWh	Kilowatt-Hour
M&I	Municipal and Industrial
MCL	Maximum Contaminant Level
MF/RO	Microfiltration/Reverse Osmosis
MGD	Million Gallons Per Day
MOU	Memorandum of Understanding Regarding Urban Water Conservation in California
NO_3	Nitrates
PCE	Perchloroethylene
PPB	Parts Per Billion
PPM	Parts Per Million
QSA	Quantification Settlement Agreement
RI	Remedial Investigation
RTP	Southern California Association of Governments Regional Transportation Plan
SAC	System Access Charge
SIP	State Implementation Plan
SOC	Synthetic Organic Compounds
SMURRF	Santa Monica Urban Runoff Recycling Facility
TAP	Technical Assistance Program
TCE	Trichloroethylene
ULF	Ultra-Low Flush
VOCs	Volatile Organic Compounds
WATER PLAN	Urban Water Management Plan
WSDM Plan	Water Surplus and Drought Management Plan

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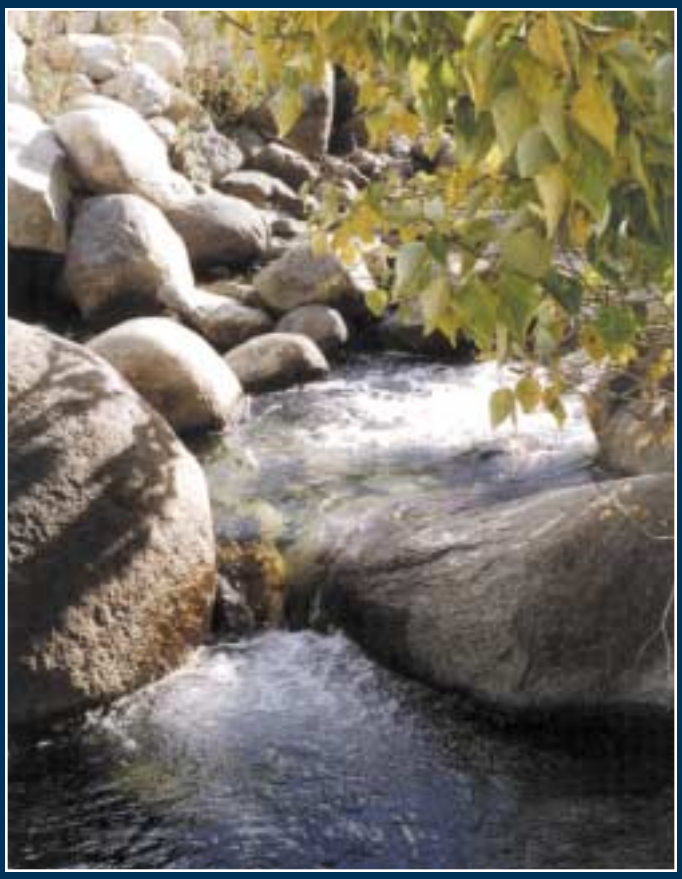
executive summary



Executive Summary

Overview

The City of Los Angeles (City), founded in 1781 by a small group of settlers as a Spanish outpost, has grown to become the second largest city in the United States with nearly 4 million people, and encompassing an area of 464 square miles. In 1902, a municipal water system was created to quench the thirst and water the land of a growing metropolis. From its beginnings as a small pueblo, the Los Angeles area has emerged as the world's tenth largest economy. Today, the Los Angeles Department of Water and Power (LADWP), the largest municipally-owned utility in the United States, continues its long-term commitment to water use efficiency and the environment while providing a safe, reliable, and affordable water supply to City residents.

With increasing demands for imported water supplies, LADWP, along with all of the water agencies in Southern California, is faced with the challenge of providing a reliable water supply for a growing population. While complying with Sections 10610 through 10657 of the California Water Code (Urban Water Management Planning Act), this Urban Water Management Plan explains how LADWP plans to meet all City customer water needs through the following actions:

- Pursue cost-effective water conservation and recycling projects to increase supply reliability and offset increases in water demand due to growth and environmental enhancements.
- Protect existing groundwater supplies from contamination and provide treatment to optimize their use.
- Ensure access to reliable and affordable supplemental water supplies through active and effective representation at the Metropolitan Water District of Southern California (MWD).
- Maintain the operational integrity of the Los Angeles Aqueduct and the City's water distribution system.
- Secure needed funds, including the pursuit of outside funding, to develop alternative supplies, such as conservation and recycling projects, and resource management programs.

Collectively, these actions allow LADWP to fulfill its mission "to deliver a dependable supply of safe, quality water to our customers in an efficient and publicly responsible manner."

Purpose of the Water Plan

The Urban Water Management Planning Act (Act) became effective on January 1, 1984, and requires that every urban water supplier that provides municipal and industrial water to more than 3,000 customers, or supplies more than 3,000 acre-feet per year (AFY) prepare and adopt an urban water management plan in accordance with prescribed requirements.

The Act was originally developed due to concerns for potential water supply shortages throughout the State. Therefore, it required information that focused primarily on water supply reliability and water use efficiency measures. Since its original passage in 1983, there have been several amendments added, the most recent adopted in 2004.

Some of the recent amendments include: providing additional emphasis on drought contingency planning and recycled water, as well as incorporation of water quality issues and how they might affect water supply reliability.

With the passage of Senate Bills 610 and 221, in 2001, Urban Water Management Plans take on even more importance. SB 610 and 221 require that counties and cities consider the availability of adequate water supplies for certain new large developments. These statutes require written verification of sufficient water supply to serve the new development, and Urban Water Management Plans are identified as key source documents for this verification.

LADWP's Urban Water Management Plan is not only designed to meet the current requirements of the Act, but also serves as the City's master plan for water supply and resources management. This plan is not only intended for government officials in Sacramento, but also helps guide policy makers in the City and MWD, as well as providing important information to citizens of Los Angeles. While serving as a valuable resource for information, this plan provides the basic policy principles that will guide LADWP's decision-making process to secure a sustainable water supply for Los Angeles.

Water Demand

In order to properly plan for water supply, it is important to understand water demands and the factors that influence them over time. LADWP maintains historical water use data in four major billing categories: single-family residential, multi-family residential, industrial, and commercial/institutional. This breakdown of demand allows for better evaluation of trends in water use over time and allows for more precise targeting of water conservation measures. Factors playing a role in water demand are land use, demographics, and climate.

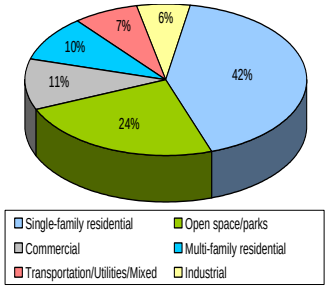
Land Use

The City is comprised of approximately 295,000 acres, with residential development as the largest land use (see Exhibit ES-A).

Exhibit ES-A
City of Los Angeles Land Uses

Land Use Type	Acres
Single-family residential	123,420
Open space/parks	71,100
Commercial	31,900
Multi-family residential	28,200
Transportation/Utilities/Mixed	22,080
Industrial	18,300
Total	295,000

Source:City of Los Angeles Integrated Resources Plan



Demographics

The City is the second most populous city in the United States with almost 4 million people residing in its 464 square-mile area. The City's population is expected to continue to grow over the next 25 years at a rate of 0.4 percent annually. While this is substantially less than the historical 1.3 percent annual growth rate from 1980 to 2000, it will still lead to approximately 368,000 new residents in the next 25 years.

Housing is expected to grow faster than population in the next 25 years, but it is anticipated that family size will start to decrease by 2010. By 2030, it is projected that family size will decrease to 2.57 persons per household. Multi-family housing is expected to increase faster than single-family housing (1.2 percent versus 0.6 percent annual growth).

Employment is expected to increase by 0.7 percent annually. This growth is primarily driven by the current and long-term opportunities available from the diverse economic base within the five-county metropolitan region of Southern California.

Exhibit ES-B shows current and projected demographics.

Exhibit ES-B						
Demographic Projections for LADWP Service Area						
Demographic	2005	2010	2015	2020	2025	2030
Population	3,955,429	4,099,389	4,157,727	4,215,380	4,270,520	4,323,307
Housing						
Single-family	595,138	609,629	618,414	648,999	678,606	688,109
Multi-family	733,387	775,150	832,322	868,774	905,223	961,412
Total housing	1,328,525	1,384,779	1,450,736	1,517,773	1,583,829	1,649,521
Persons per household	2.91	2.90	2.81	2.72	2.64	2.57
Employment						
Commercial	1,689,650	1,808,123	1,875,338	1,930,704	1,981,135	2,036,301
Industrial	185,215	182,209	178,824	183,909	188,532	184,677
Total employment	1,874,865	1,990,332	2,054,162	2,114,613	2,169,667	2,220,978

Source: SCAG Regional Transportation Plan (2004), modified using MWD's land use planning tool to represent LADWP's service area.

Climate

Weather in Los Angeles is mild, which is a major attribute that attracts businesses, residents, and tourists to the City. On average, the City experiences 329 days of sunshine per year. The City's average annual temperature is 74.9° Fahrenheit, and the average annual rainfall is 14.5 inches. However, rainfall can vary significantly, sometimes exceeding 30 inches in an extreme wet year. For instance, the City received a near record 37.25 inches of rainfall from July 2004 through June 2005.

Current and Projected Demands

Water demands are a function of many variables, such as demographics, weather, and economy. LADWP categorizes water use into the following major billing sectors: single-family residential, multi-family residential, commercial/institutional (which includes some large landscape uses), governmental (which includes some large landscape uses), and non-revenue/system losses.

Historical water demands increased from just under 600,000 acre-feet (AF) in 1980 to just over 700,000 AF in 1989. Water demands peaked in 1989 at more than 700,000 AF per year. By 1990, the City had embarked on a public education/information campaign asking people to use water more efficiently due to limitations on imported water supplies. LADWP also started its ultra-low-flush toilet retrofit program, as well as other indoor and outdoor conservation programs. This effort, combined with mandatory restrictions imposed in 1991, led to water demands sharply declining to about 550,000 AF (a 21 percent decrease from 1989 levels). Today, water usage in the City is the same as it was 20 years ago despite an increase in population of more than 750,000 people (see Exhibit ES-C)

While population is a primary driver of how much water is used, trends in development within an area also impacts water demand. Since 1990, housing density in the City has increased. This trend is expected to continue with the expected growth in the City's multi-family residential housing. These historical and future trends in housing density will translate into lower water demands as multi-family households use far less water than single-family households. Within the City, an average multi-family household uses about 240 gallons per home per day, while an average single-family household uses about 350 gallons per home per day.

LADWP projects water demands based on historical trends in billing data, projections of water conservation, and projections of demographics provided by the Southern California Association of Governments (SCAG). Exhibit ES-D summarizes these water demand projections.

Exhibit ES-C
City of Los Angeles Water Use

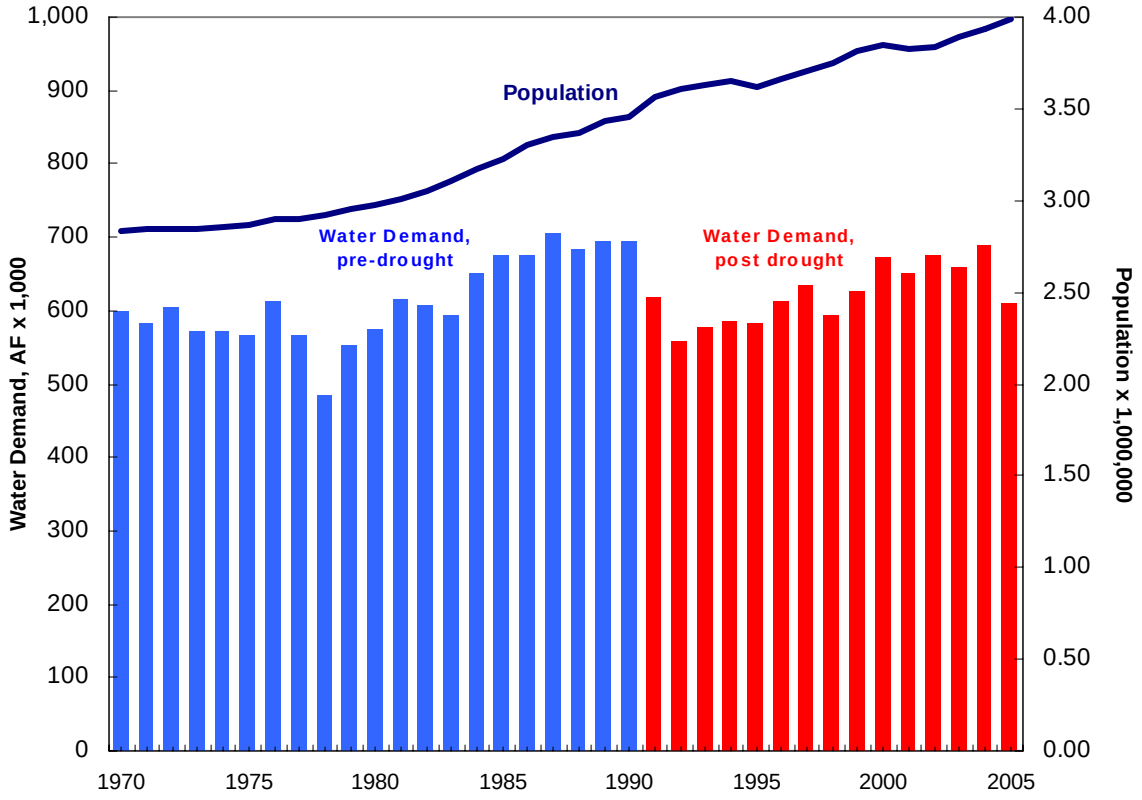
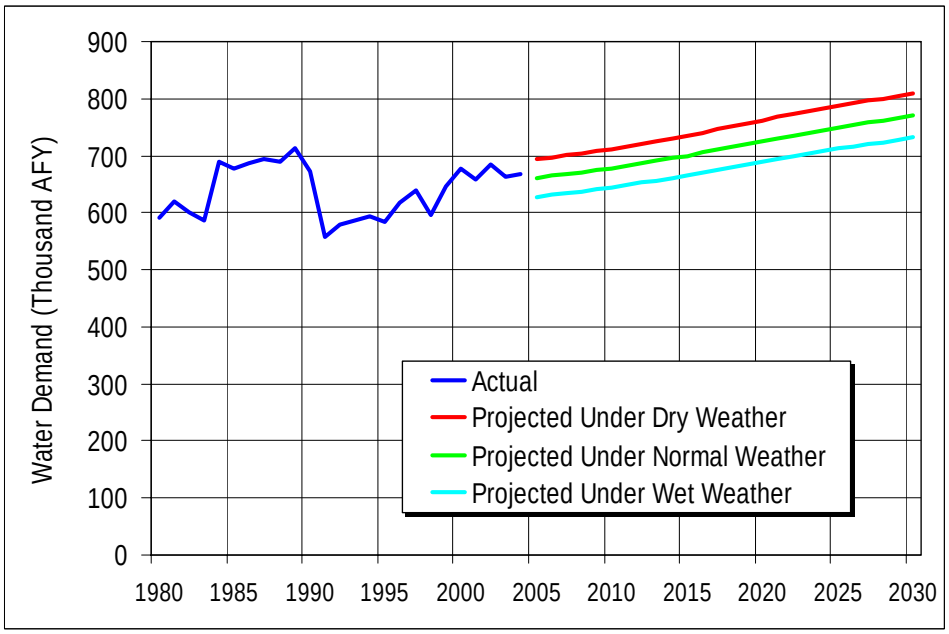


Exhibit ES-D
Projected Water Demands for Los Angeles



Water Conservation

Los Angeles has long taken a leadership role in managing its demand for water – a precious, limited natural resource. Thanks to demand management measures, Los Angeles' water use today is equal to the annual use of about 20 years ago, despite a growth in population of more than 750,000 people. These significant accomplishments have resulted from the City's sustained implementation of effective water conservation programs, and the City's culture of conservation as a way of life.

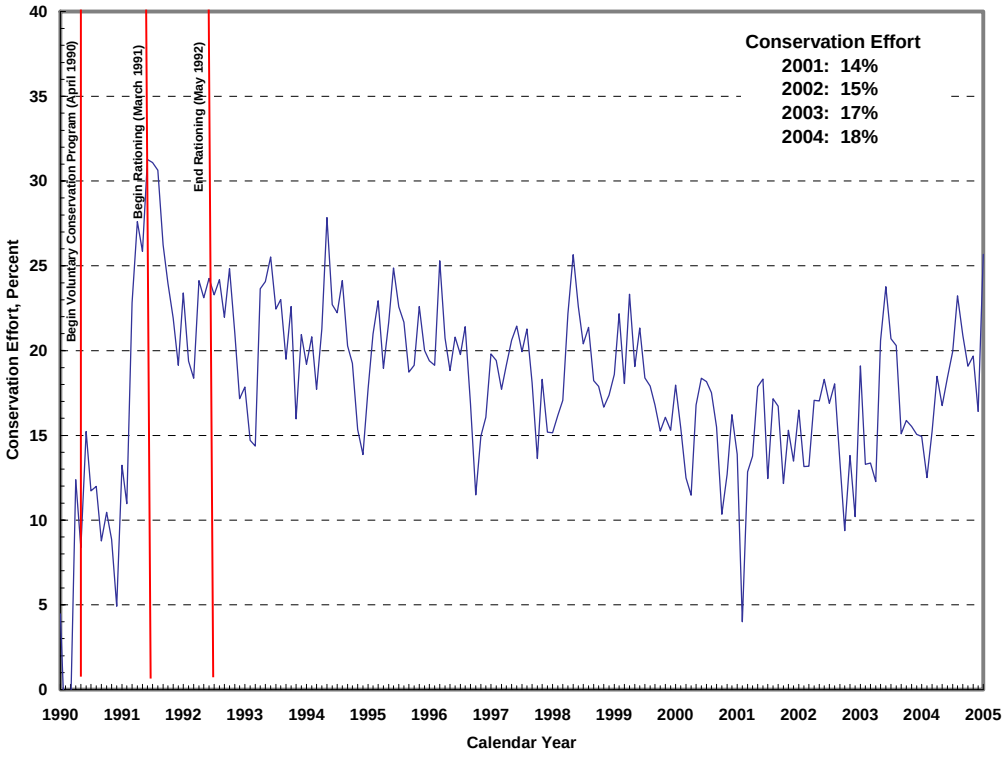
LADWP has invested over $164 million in conservation programs and measures targeting reductions in water use since 1991. Looking forward, LADWP will continue making comparable investments in conservation programs, expanding its focus to landscape water use and conservation opportunities in the commercial/industrial/institutional customer sectors. LADWP is also committed to acquire outside funding for City conservation projects. Exhibit ES-E illustrates Los Angeles' conservation efforts since the City began its voluntary conservation programs in 1990.

During the 1980s, per person daily water use averaged over 180 gallons per day. Due to the drought, wet weather, and economic recession from 1991 through 1995, the daily per person use sharply fell to about 145 gallons per day. Since 1996, the daily per person use has been averaging approximately 155 gallons per day. The annual water savings of about 15 percent between today's per person use and that which occurred during the 1980s is attributed to long-term conservation measures that the City implemented.

Water Conservation Goal

Water conservation reduces demand that typically rises over time with growth in population and commerce. Conservation improves supply reliability and lessens costs. While in the past LADWP has achieved a water conservation effort of 15 percent, the City has increased its conservation goal to a 20 percent reduction in this Water Plan. Achieving this level of conservation will lessen the City's reliance on imported water while providing a drought-proof resource that is not subject to environmental restrictions and weather conditions.

Exhibit ES-E
Los Angeles Water Conservation Efforts



Best Management Practices

The California Urban Water Conservation Council (CUWCC) is the voice of urban water conservation in California. LADWP has had an active role in the CUWCC since its inception in 1991. LADWP, as a signatory to the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU), has committed itself to submit a Best Management Practices Retail Water Agency Report to CUWCC. As required in the biennial report, LADWP provides an update on its implementation of 13 of the 14 BMPs specified in the MOU (one BMP applies only to wholesale water agencies).

LADWP continues to develop cost-effective programs to achieve its multiple goals of demand reduction, customer service, and environmental responsibility. Conservation potential is considered in determining each program's approach and duration. LADWP's conservation programs generally fall into five categories: awareness/support, residential, commercial/industrial/institutional, landscape, and system maintenance measures.

Awareness/ Support Measures

Awareness/support measures can be active or passive. Active components include full metering of water use, assessment of volumetric sewer charges, and a conservation rate structure. Passive components typically include providing educational materials for schools, community and customer presentations, maintaining a conservation hotline, and a wide range of information distributed through customer bills, advertising in public venues, LADWP's website, and direct mail.

Residential

Residential conservation programs include the ULF Toilet Distribution Program and free water saving showerheads, faucet aerators and replacement toilet flapper valves. In addition, the High Efficiency Washer Rebate Program was initiated in 1998 and pilot programs examining the effectiveness of weather sensitive irrigation controllers in residential applications are presently underway.

Commercial/Industrial/Governmental

LADWP, in partnership with MWD, has implemented a commercial rebate program designed specifically for customers in the commercial/industrial/ institutional (CII) category. In addition, water use efficiency solutions are being developed for specific business sectors. The cornerstone of LADWP's efforts to maximize conservation in the CII sector is the Technical Assistance Program (TAP).

Landscape

Recognizing that a substantial amount of water is used outdoors for irrigation, LADWP continues to invest in landscape irrigation efficiency programs and projects. Pilot programs examining the effectiveness of weather sensitive irrigation controllers (pictured) in residential applications are presently underway. Information obtained from this and other similar pilot programs will guide development of a long-term program supporting this technology.

System Maintenance

Maintaining system infrastructure reduces water waste and allows for greater water accountability. Infrastructure maintenance, such as pipeline replacement, cement-mortar lining, meter replacement, and others, are a high priority in LADWP's daily activities.

Conservation Pricing Structure

LADWP's tiered rate structure, first implemented in 1993, applies a lower tier block rate for responsible water use within a specified water amount, and a higher rate for every billing unit above this block. To further encourage water conservation, water charges are based solely on water used and do not include fixed charges. LADWP's 100 percent commodity-based rate structure encourages conservation activities and assists in postponing the need to construct new facilities or purchase even larger quantities of imported water.

Current Water Supply

The Los Angeles Aqueduct, groundwater, and purchased water from MWD are the primary sources of water supply for the City. These three sources have historically delivered an adequate and reliable supply to serve the City's needs. Implementation of recycled water projects is progressing and expected to fill a larger role in the City's water supply portfolio. Exhibit ES-F shows the City's primary water supply sources.

Los Angeles Aqueduct Cascades

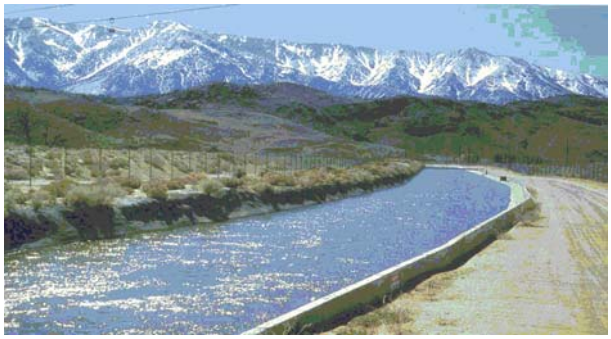
Exhibit ES-F
Major Sources of Water Supply for Los Angeles

Local Groundwater

A key resource that the City has relied upon is its local groundwater supply. Local groundwater provides approximately 15 percent of the total water supply for Los Angeles, and has provided nearly 30 percent of the total supply in drought years.

The City owns water rights in three Upper Los Angeles River Area (ULARA) groundwater basins: San Fernando, Sylmar, and Eagle Rock, as well as Central and West Coast Basins. On average, about 86 percent (90,755 AFY) of the City's groundwater supply is extracted from ULARA groundwater basins, while the Central Basin provides 14 percent (15,000 AFY). The City also owns 1,503 AFY of West Coast Basin groundwater rights. However, localized water quality issues have impacted the exercise of LADWP's water rights in the West Coast Basin.

Los Angeles Aqueduct



The Los Angeles Aqueduct extends approximately 340 miles from the Mono Basin to Los Angeles. Water is conveyed the entire distance by gravity alone. There are seven reservoirs in the system with a combined storage capacity of 300,560 AF. In addition, there are 12 hydroelectric power generation facilities that have a maximum generation capacity of nearly 250 megawatts.

The Los Angeles Aqueduct is fed by runoff from the eastern slopes of the Sierra Nevada. Runoff from this watershed peaks during late spring and summer, after most of the year's precipitation has already occurred.

The cyclical nature of hydrology is exhibited best by Los Angeles Aqueduct deliveries over the last ten years. This general period was characterized by a series of wet years, followed by a series of dry years (which ended in the winter of 2004). During very wet years, the Los Angeles Aqueduct can provide more than 400,000 AF annually, while very dry years can produce less than 75,000 AF. From 1995 through 2004, Los Angeles Aqueduct deliveries supplied about half of the City's water needs.

The City has committed approximately 40 percent of its historic Los Angeles Aqueduct water supply to environmental enhancement projects in the Owens Valley and Mono Basin watersheds. Recently, this water supply offset was compounded by six consecutive years of below normal runoff from the eastern Sierra Nevada, the source of the City's aqueduct supply. Various water management strategies, including increased water conservation and recycling, are necessary to accommodate these environmental offsets while maintaining reliability.

Mono Lake

Recycled Water

Early on, the City recognized the potential for water reuse and invested in infrastructure that processed water to tertiary quality - a high treatment standard for wastewater. This vision resulted in the building of tertiary wastewater treatment plants upstream instead of enlarging the two existing terminus treatment plants. These system enhancements paved the way for the City to expand recycled water projects to supplement local and imported water supplies.

Currently, almost 65,000 AFY of the City's wastewater is recycled. Approximately 1,950 AFY of recycled water is used for municipal and industrial (M&I) purposes. Recycled water used for M&I purposes reduces demands for imported water supplies for the LADWP service area.

Another 28,000 AFY of recycled water is also used for environmental enhancement and recreation in the Sepulveda Basin (such as the Japanese Gardens and Lake Balboa). Finally, the City delivers approximately 34,000 AFY of secondary-treated wastewater sold from the City's Hyperion Wastewater Treatment Plant to West Basin Municipal Water District, which then provides further treatment to meet demands within its service area.

LADWP is expanding its recycled water program for irrigation in the East and South Valley area and Central City area, which will be supplied by the Tillman Water Reclamation Plant and the Los Angeles/Glendale Water Reclamation Plant. A recycled water project also exists near Los Angeles International Airport.

Recycled water flowing into Lake Balboa

LADWP's implementation of recycled water must factor in economics, water quality regulations, and public acceptance. With implementation of the City's Integrated Resources Plan (IRP), additional recycled water will be produced by the City's wastewater treatment and recycled water plants. In addition, the City's IRP also identifies the potential for reuse of dry weather urban runoff (caused by excessive irrigation). Small treatment plants could be located where dry weather runoff is predominant and also near potential demand (such as parks, commercial development, or golf courses). Reusing the dry weather runoff for irrigation reduces pollution that is carried to our ocean and rivers, while also providing a water supply benefit.

Implementation of LADWP's recycled water program has been very challenging. Among the most notable challenges include the use of recycled water for groundwater recharge, and increasingly more stringent water quality regulations for recycled water.

LADWP believes in the safety and reliability of its recycled water program, and will continue to work with the regulatory agencies and other stakeholders to ensure recycled water quality criteria that are protective of the public's safety while minimizing the cost of implementation to the consumers.

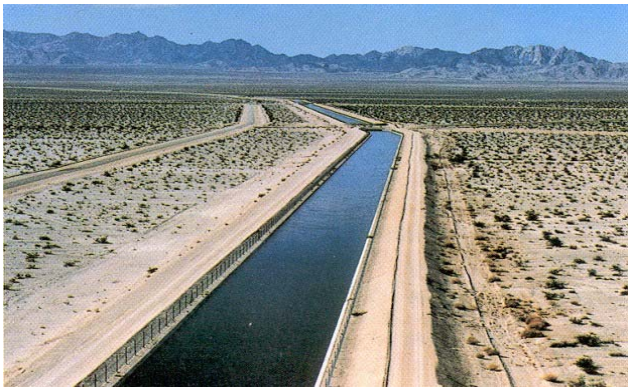
Exhibit ES-G summarizes the City's existing, planned and potential recycled water for non-potable municipal and industrial purposes.

Exhibit ES-G Summary of Existing, Planned, and Potential Recycled Water Supplies Used for Municipal & Industrial Purposes within LADWP Service Area [1]						
	Volume (AFY)					
	2005	2010	2015	2020	2025	2030
Existing	1,950	1,950	1,950	1,950	1,950	1,950
Planned		15,000	18,000	20,000	25,000	29,000
Sub-Total	1,950	16,950	19,950	21,950	26,950	30,950
Potential				20,050 to 34,150	15,050 to 29,150	11,050 to 25,150
Total with Potential [2]				42,000 to 56,100	42,000 to 56,100	42,000 to 56,100

[1] These recycled water supplies offset the demand for imported water within LADWP's service area, but do not include recycled water used for environmental benefits or delivered to West Basin MWD (see Exhibit 3K).

[2] Represents potential supply with the implementation of City's IRP.

MWD Supplies



Colorado River Aqueduct

MWD is the largest water wholesaler for domestic and municipal uses in California. MWD owns and operates the Colorado River Aqueduct (CRA), and is a contractor for water from the California State Water Project (SWP). The City purchases water from MWD to supplement its supplies from local groundwater, the Los Angeles Aqueduct, and recycled water. The City is one of 26 MWD member public agencies.

LADWP has historically purchased MWD water to make up the deficit between demand and other City supplies. The City has made significant investments in MWD and will continue to rely on the wholesaler to meet its current and future supplemental water needs.

MWD's main sources of supply, the CRA and SWP, are subject to droughts and competing needs of other users. MWD's CRA supply, for example, has been limited due to the implementation of "California's Colorado River Water Use Plan" and due to one of the longest dry periods along the Colorado River Basin. The SWP is subject not only to hydrologic variability but also environmental restrictions in the San Francisco/San Joaquin Bay-Delta (Bay-Delta).

During very wet years, MWD's CRA and SWP supplies can total over 3 million AF, while deliveries in very dry years can be much less (approximately 1.2 million AF). To help ensure reliable deliveries of imported water to its 26 member agencies, MWD has implemented a variety of storage projects and water transfer programs. Examples include the new Diamond Valley Lake, an 800,000 AF reservoir, and groundwater banking programs in the Central Valley that can produce almost 200,000 AF of supply in a dry year.

MWD is also actively pursuing improvements in the way the SWP operates and solutions for the Bay-Delta that would not only improve the environment but provide more flexibility and reliability in SWP supplies.

Water Quality

As part of its regulatory compliance efforts, LADWP works with the California Department of Health Services to perform water quality testing of groundwater production wells in the San Fernando Basin. During testing, trace levels of the contaminants trichloroethylene (TCE), perchloroethylene (PCE), and other volatile organic compounds (VOCs) were detected. The presence of these contaminants is due to improper chemical disposal practices done in the past by numerous companies in the San Fernando Valley that were using such materials.

To maximize its use of local groundwater, LADWP, in coordination with other agencies, performs various remedial investigations followed by appropriate actions. These actions include water quality monitoring of groundwater contaminant plumes, management of production well operations, operation of groundwater treatment facilities, and necessary capital improvements. Various steps to expand the City's current extraction capability and to improve groundwater quality are underway.

LADWP's Water Quality Test Lab

Integrated Resources Plans

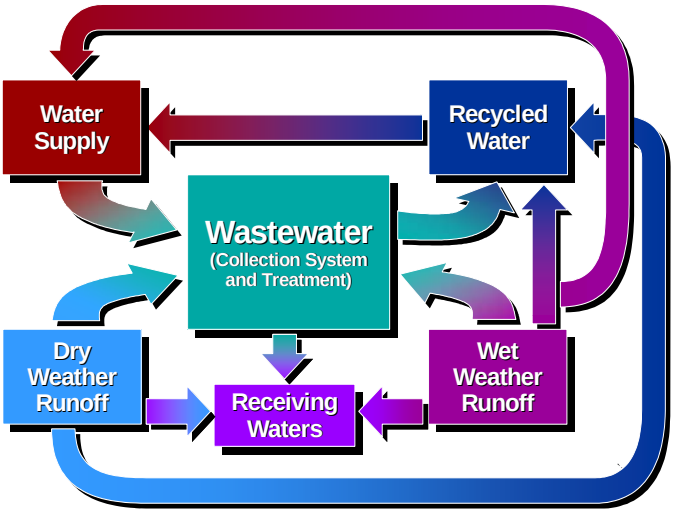
LADWP has been actively involved in integrated resources planning since 1993, when MWD initiated the region's first Integrated Resources Plan (IRP). LADWP was an active member of the technical workgroup that oversaw the development of alternatives and recommendations from MWD's IRP. The following discussion addresses the impacts of both the City of Los Angeles and MWD IRPs.

Los Angeles IRP

In 2002, the City of Los Angeles embarked on its first IRP for wastewater, stormwater and water supply. The LADWP is a partner in this effort, working with the City's Bureau of Sanitation, public stakeholders, and other agencies. The IRP should be completed in 2006.

The City's IRP is utilizing a unique approach of technical integration and community involvement to guide water resources policy decisions and facilities planning. The Los Angeles IRP recognizes the interrelationship of water, wastewater, and runoff management in forming a future vision for the City's water resources activities and functions (see Exhibit ES-H).

Exhibit ES-H
Interrelationships Between City's Water Resources



The IRP alternatives examine ways to decrease potable water needs by expanding the City's recycled water program and encouraging rainwater harvesting; increase water efficiency by installing smart irrigation devices that reduce irrigation demands; and increase groundwater resources by using wet weather runoff to recharge the aquifer.

In the past, the City traditionally utilized single-purpose planning efforts for each separate agency, such as one plan for wastewater and one unrelated plan for water supply. This new approach has identified a number of innovative solutions that the City could implement that would provide water supply benefits, along with other benefits such as protection of the environment by reducing pollutants going into our ocean and rivers, creation of more open space, flood control, and improving the overall quality of life for the citizens of Los Angeles.

MWD IRP

In 1996, MWD adopted the region's first IRP. The IRP tried to balance such objectives as supply reliability, cost, water quality, and risk. The result of the 1996 IRP was a balanced water supply portfolio that called for investments in local water resources and imported water improvements, along with a corresponding regional Capital Improvement Program

(CIP). Since 1996, MWD and its 26 member agencies have been implementing a number of the projects and programs identified in the 1996 IRP with great success. It was because of these local and regional water supply investments that the region did not have to incur any type of water rationing despite record dry years and the reduction of almost half of the CRA supply.

In 2001, MWD's Board of Directors developed a work plan to update the 1996 IRP in order to accommodate changed conditions and extend the supply targets through 2025. Specifically, the IRP Update had three main objectives: (1) review the resource development targets and implementation achievements of the 1996 IRP; (2) identify significant changed conditions for water resource development since the adoption of the 1996 IRP; and (3) evaluate the reliability of the IRP Preferred Resource Mix through 2020, adjust targets as needed to reflect changed conditions, and extend resource targets through 2025. The updated IRP resource targets are shown in Exhibit ES-I.

Exhibit ES-I

MWD IRP Targets (AF)

IRP Resource Targets	1996 IRP 2020	IRP Update 2020	Change
Water Conservation	882,000	1,028,000	+145,600
Local Projects [1]	500,000	750,000	+250,000 (buffer)[4]
Colorado River Aqueduct [2]	1,200,000	1,250,000	+50,000
State Water Project	593,000	650,000	+57,000
Groundwater Conjunctive Use	300,000	300,000	0
Central Valley Storage and Transfers	300,000	550,000	+250,000 (buffer)
MWD Surface Water Storage [3]	620,000	620,000	0

[1] Includes recycled water, brackish groundwater desalination, and seawater desalination.
[2] Target for specific year types, the CRA is not intended to be full at all times.
[3] Represents the total amount that can be withdrawn from surface reservoirs.
[4] Buffer supply intended to make up for any shortfall in other resource targets.
Source: MWD (2004)

The holistic and coordinated nature of integrated planning through IRPs and IRWMs are key elements of a sustainable approach that is important to the success of long-term water resources planning in southern California.

Alternative Water Supplies

LADWP is moving forward with development of alternative, viable water supply options to provide an adequate and reliable water supply for the City. In recent years, LADWP has actively pursued alternative supply options including water transfers, seawater desalination, and beneficial reuse of urban runoff. Evaluating the viability of these and other water resource options is a key element to ensuring the City's future water supply reliability. Such options, with proper planning, can contribute toward fulfilling future demand under various conditions. Future challenges, which include increased demand that must be met with diminishing supply, warrant thoughtful consideration of these alternative resources.

Water Transfers

Water transfers involve the lease or sale of water or water rights between consenting parties. LADWP is planning to acquire water through transfers to replace environmental water uses in the Owens Valley and Mono Lake.

Seawater Desalination

For the City, seawater desalination is a resource that can offset supplies that have been committed from the Los Angeles Aqueduct for environmental restoration in the Owens Valley and Mono Basin. Development of a publicly and environmentally responsible seawater desalination program will provide significant value through a long-term, reliable water supply to the City and the entire southern California region.

Enhanced Local Groundwater Basin Production

There are three groundwater basins near or within LADWP's service area with potential resource availability. The Hollywood, La Brea sub-area of the Central Basin, and Santa Monica are unadjudicated basins, where water rights have not been legally established. However, the groundwater in all three basins exhibits poor water quality and would require significant treatment prior to distribution. At this time, the relatively high costs involved in developing these supplies make them economically unattractive.

Beneficial Use of Urban Runoff

Urban runoff is a relatively untapped alternative water supply for the City. By managing runoff and beneficially reusing it, the City can reduce its dependence on imported water. As part of the City's IRP process, the City investigated the beneficial reuse of urban runoff. Both dry and wet weather runoff can be beneficially used. Dry weather runoff is any runoff that occurs in the absence of rainfall, while wet weather runoff is any runoff that occurs as a direct result of rainfall. Wet weather runoff represents a significantly larger volume of water than dry weather runoff. The beneficial use option for dry weather runoff consists of capturing runoff, treating it, and then reusing it. Wet weather runoff options include cisterns, treatment and beneficial reuse, neighborhood recharge, and regional recharge. Chapter 5 discusses in further detail the potential options for surface runoff capture within the City.

Installation of underground cistern for stormwater capture (photo courtesy of TreePeople)

Water Service Reliability Assessment

Providing a reliable water supply in a semiarid climate presents many challenges. One significant challenge to Los Angeles is the fact that surface water supplies from the Los Angeles Aqueduct, MWD's Colorado River Aqueduct, and the SWP vary substantially due to hydrology. To mitigate against the variability of surface supplies, LADWP has made significant investments in groundwater, recycled water, and water conservation. These supplies and demand-side management provide a "hedge" against droughts and variability of surface water.

Evidence continues to accumulate that the global climate may be changing as a result of increased atmospheric greenhouse gas concentrations.

Climate change can impact surface water supplies from the Los Angeles Aqueduct and MWD. Although science has not yet determined definitive impacts on these supplies, most scientists believe that climate change could alter seasonality of precipitation for the West. LADWP will continue to monitor climate change research and will study potential actions to adapt to future changing conditions.

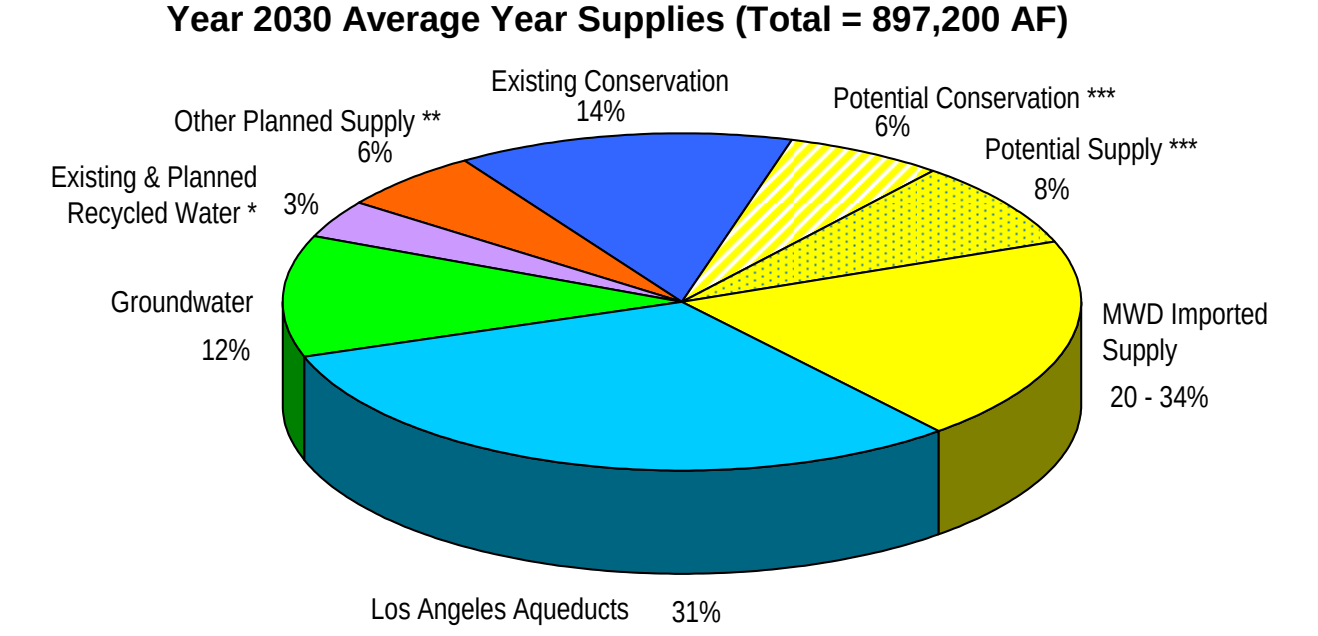
Reliability of Current and Future Supplies

To determine the overall service area reliability, LADWP defined three hydrologic conditions: average (or normal weather), single dry year (such as a repeat of the 1976-77 drought), and multi-year drought (such as a repeat of the 1987-92 drought). Under the three hydrologic conditions throughout the 25 year projection period, LADWP's supply portfolio is expected to be reliable, with adequate supplies available to meet projected demands. ES-J summarizes LADWP's water supply portfolio projected for 2030, under an average weather year and a dry weather year. It should be noted that under a dry weather year, water demands are expected to be approximately 5 percent greater than normal demands. Also, water conservation is shown in this exhibit as a water supply.

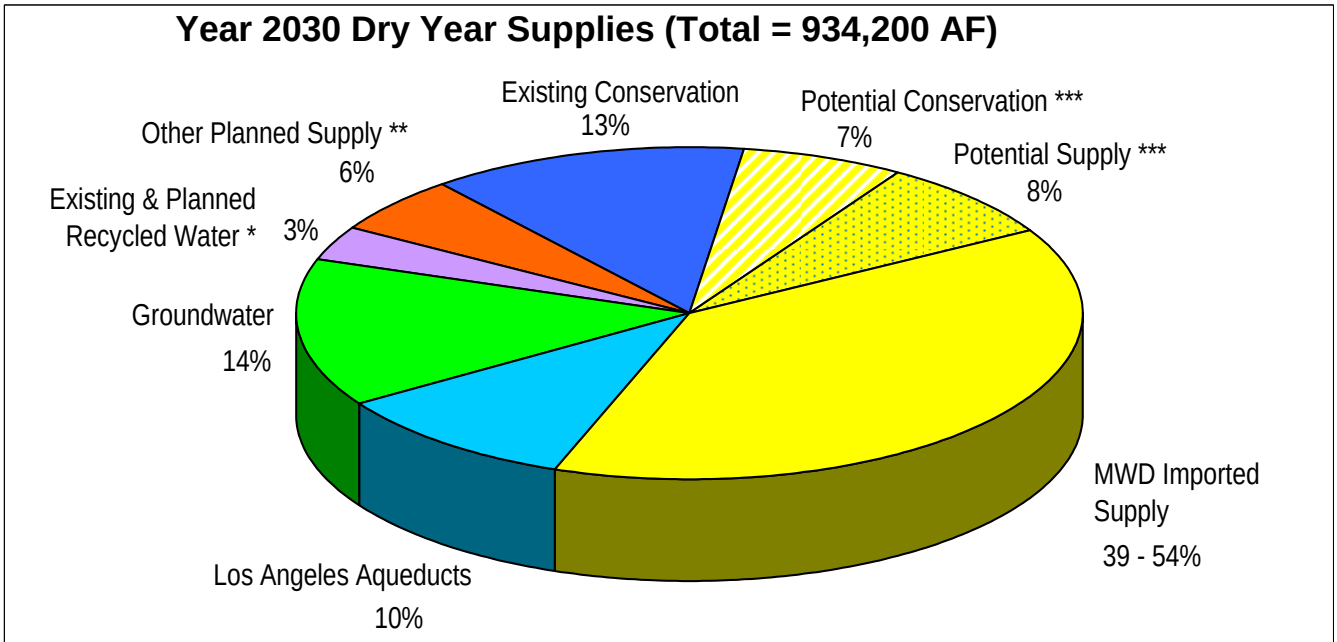
Under average weather conditions, approximately 66 percent of the total supply (estimated to be 897,200 AF) is from existing and planned locally-developed supplies, including Los Angeles Aqueducts and conservation. The potential supplies and additional potential conservation represent 14 percent. The remaining 20 percent of supply is imported water from MWD. Should the potential supplies not be developed due to cost, technology, regulatory compliance, and/or customer acceptance issues, then the MWD portion of supply would represent 34 percent. During a dry year, existing and planned locally developed supplies represent 46 percent of the total supply (estimated to be 934,200 AF); while 15 percent is potential supplies and conservation. The remaining 39 percent is imported water from MWD.

A summary of the alternative water supplies that are being explored by LADWP is presented in Exhibit ES-K. Shown in this table is the potential supply yield, unit cost ($/AF), risks for implementation and other benefits (such as water quality).

Exhibit ES-J
LADWP Water Supply Reliability Summary for Year 2030



* For non-potable municipal & industrial purposes.
** Includes seawater desalination and water transfer.
*** Potential conservation may include smart irrigation and other measures; while potential supplies may include additional recycled water, additional seawater desalination, and beneficial reuse of urban runoff. However if these potential conservation measures and supplies are not developed due to cost, technology and/or customer acceptance, greater reliance on MWD would be needed.



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** Includes seawater desalination and water transfer.
*** Potential conservation may include smart irrigation and other measures; while potential supplies may include additional recycled water, additional seawater desalination, and beneficial reuse of urban runoff. However if these potential conservation measures and supplies are not developed due to cost, technology and/or customer acceptance, greater reliance on MWD would be needed.

Exhibit ES-K				
Alternative Water Supplies Being Explored by LADWP				
Alternative Water Supplies	Potential Water Yield (AFY)	Unit Cost ($/AF)	Implementation Risks	Additional Benefits
Smart Irrigation	25,000	290	Requires customer to install and use properly.	Reduces the amount of pollution being carried to the ocean and waterways.
Urban Runoff Plants	5,000	3,500	Water users may need incentives to use supply.	Reduces the amount of pollution being carried to the ocean and waterways.
Cisterns [1]	8,000	2,100	Requires customer to maintain device.	Reduces the amount of pollution being carried to the ocean and waterways, and hedges against climate change.
Neighborhood Recharge [2]	12,000	2,900	Requires protection of groundwater quality.	Reduces the amount of pollution being carried to the ocean and waterways, and hedges against climate change.
Regional Recharge [3]	10,000	Cost undetermined	Requires protection of groundwater quality.	Reduces the amount of pollution being carried to the ocean and waterways, and hedges against climate change.
Seawater Desalination [4]	25,000	1,080	Regulatory compliance may be challenging.	Replaces water committed to the environment. Hedges against climate change.
Water Transfer	40,000	Cost negotiated between parties	Wheeling and other institutional issues must be addressed.	Replaces water committed to the environment.

Source: City of Los Angeles Integrated Resources Plan (2004)

For Comparison Purposes:
Local Groundwater Pumping Unit Cost = $150/AF
MWD Tier 1 Water Supply Unit Cost = $453/AF
MWD Tier 2 Water Supply Unit Cost = $549/AF

Notes:

[1] Capturing and reusing stormwater on-site for schools and government only.

[2] Groundwater recharge of stormwater for open spaces, parks, abandoned alleys on land where the soil is highly permeable.

[3] Groundwater recharge of stormwater in the East Valley using existing recharge system.

[4] Yield shown here is based on LADWP's optimization study.

Water Shortage Contingency Plan

LADWP has a water shortage contingency plan to provide for a sufficient and continuous supply of water in case of a water supply shortage in the service area.

The City has stages of action that can be undertaken in response to water supply shortages, including up to a 50 percent reduction in water supply. Depending on the severity of shortage, these actions may include:

- Washing cars only with bucket or hand-held hose with shut-off valves; restricting frequency of landscape irrigation to two times per week.
- Developing a large industrial customer incentive program that provides a monetary credit for all water reduction beyond a specified goal.

- Reducing or eliminating municipal public water uses (such as street cleaning) not required for health or safety unless recycled water is being used.
- Irrigating public parks and landscape areas only with recycled water.
- Requiring commercial car washes to use recycled water in both the soap and rinse cycles; eliminating private irrigation of turf and landscaped areas except by drip irrigation systems or buckets.
- Requiring all water used for construction to be recycled water.

In the event that three consecutive dry years curtailing the Los Angeles Aqueduct System deliveries should follow 2005 water supply conditions, LADWP will rely on increased groundwater pumping and purchases from MWD to meet City water demands. During such severe drought periods, MWD may take actions consistent with the framework developed in its Water Surplus and Drought Management Plan.

LADWP has Emergency Response Plans in place to restore water service for essential use in the City if a disaster should result in the temporary reduction of water supply. This entails a coordinated effort with the City's Emergency Operations Center to resume water supply service after a catastrophic event.

The Los Angeles Municipal Code contains an Emergency Water Conservation Plan with six permanently prohibited uses to prevent wasteful water use. During shortages, education and enforcement of these provisions will be increased. Penalties for violations of these prohibited uses are included in the municipal code.

LADWP has both short and long term consumption reduction actions to reduce water use during shortages. Short-term actions include the tiered billing structure, water conservation public announcements, billboard ads, flyer distributions, conservation workshops, and public exhibits. Long-term actions include maintaining and increasing conservation programs, including hardware conservation and measures to reduce outdoor water use.

While drought cycles are an inevitable part of life in southern California, LADWP is proactively taking prudent measures to effectively counteract short- and long-term reductions in the City's water supplies. Such measures are an important element of continued sustainability and safety of the City's water resources through 2030. The following chapters will describe these efforts in greater detail.

Water Supply Assessments

In 1994, the California Legislature enacted Water Code section 10910 (Senate Bill 901), which requires cities and counties, as part of the California Environmental Quality Act review, to request the applicable public water system to assess whether the system's projected water supplies were sufficient to meet a proposed development's anticipated water demand.

Subsequently, California Senate Bill 610 and Senate Bill 221 amended state law, effective January 1, 2002 to promote more collaborative planning between local water suppliers and cities and counties. They improve the link between information on water supply availability and certain land use decisions made by cities and counties. Both statutes require detailed information regarding water availability to be provided to the city and county decision-makers prior to approval of specified large development projects.

As of 2005, LADWP has been requested to develop over 25 water supply assessments. As required by State law, each of the assessments performed by LADWP has been approved by its Board of Commissioners. LADWP will continue to perform water supply assessments as part of its long-term water supply planning efforts for its service area.

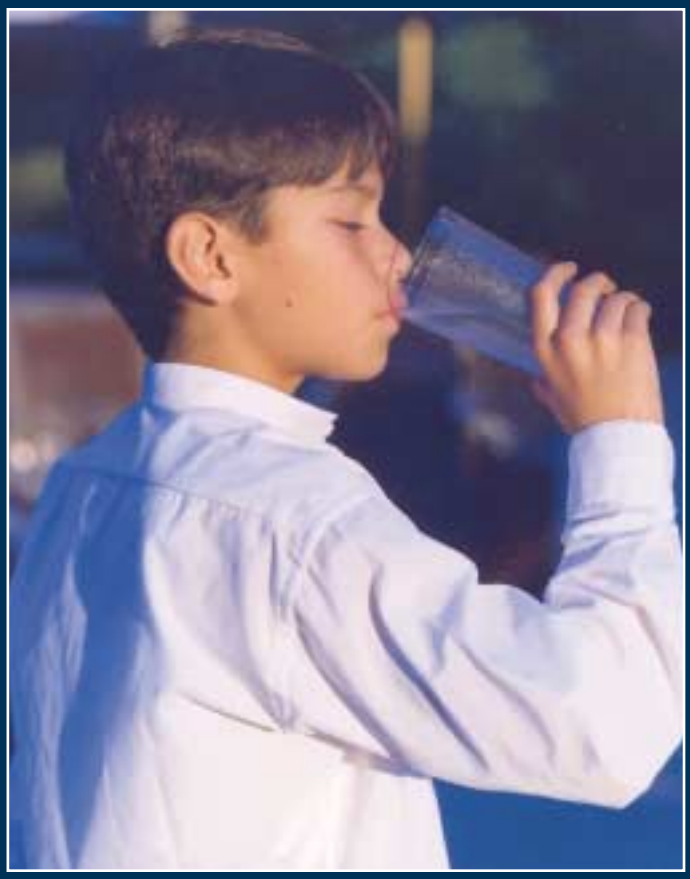
Financing

Capital cost to finance the delivery of water supply to LADWP's service area is supported through customer-billed water rates. The LADWP Board of Commissioners (Board) sets the rates subject to approval of the Los Angeles City Council by ordinance.

The water service rate structure contains water procurement adjustments under which the cost of purchased water, including water purchased from MWD, demand-side management programs such as water conservation programs, and reclaimed water projects are recovered. In addition, the rate structure contains a water quality improvement adjustment to recover expenditures to upgrade and equalize water quality throughout the City of Los Angeles and to construct facilities to meet state and federal water quality standards, including the payment of debt service on bonds issued for such purposes.

Chapter 1

water demand



Chapter One
Water Demand

1.0 Overview

In order to properly plan for water supply, it is important to understand water demands and the factors that influence them over time. The Los Angeles Department of Water & Power (LADWP) maintains historical water use data separated into major billing categories: single-family residential, multi-family residential, industrial, and commercial/institutional. This categorization of demand allows for better evaluation of trends in water use over time and allows more precise targeting of water conservation measures.

This chapter will present service area information for LADWP, including land use, demographics and climate. It will also summarize historical and projected water demands for the next 25 years.

1.1 Service Area Description

Land Use

The City is comprised of approximately 295,000 acres. Residential development constitutes over 50 percent of the total land use within the City. Within the residential land use category, single-family residential is the largest (approximately 42 percent of the total). Open space/parks is the next largest land use within the City, occupying approximately 24 percent of the total. Commercial and industrial land uses combined account for approximately 17 percent of total. Exhibit 1A provides a breakdown of the land uses within the City.

Demographics

The LADWP service area is slightly larger than the legal boundary of the City. LADWP provides water service to portions of West Hollywood, Culver City, and minor portions adjacent to the City limits. With almost 4 million people residing in this 295,000 acre service area, Los Angeles is the second most populous city in the United States.

The population within LADWP's service area increased from 2.97 million in 1980 to 3.73 million in 2000, representing an average annual growth rate of 1.3 percent. The total number of housing units increased from 1.10 million in 1980 to 1.29 million in 2000, representing an average annual growth rate of 0.9 percent. During this time, average household size increased from 2.7 persons in 1980 to almost 2.9 in 2000. Employment grew by about 1.0 percent annually from 1980 to 1990, but declined from 1990 to 2000 as a result of a severe economic recession that started in 1991 and the economic recovery that occurred thereafter. Overall, employment increased by about 0.3 percent annually from 1980 to 2000. Exhibit 1B summarizes the historical demographics for the LADWP service area.

Demographic projections were obtained for the LADWP service area from the Metropolitan Water District of Southern California (MWD) utilizing a land-use based planning tool that allocates projected demographic data from the Southern California Association of Governments (SCAG) into water service areas for their member agencies. MWD's demographic projections use data reported in SCAG's 2004 Regional Transportation Plan (RTP). Exhibit 1C summarizes these demographic projections for the LADWP service area.

Los Angeles' population is expected to continue to grow over the next 25 years at a rate of 0.4 percent annually. While this is substantially less than the historical 1.3 percent annual growth rate from 1980 to 2000, it will still lead to approximately 368,000 new residents over the next 25 years. According to SCAG's 2004 RTP, housing is expected to grow faster than population over the next 25 years at 1.8% annual growth versus 0.4% annual growth for population, as it is anticipated that household size will start to decrease by 2010.

Exhibit 1A
City of Los Angeles Land Uses

Land Use Type	Acres
Single-family residential	123,420
Open space/parks	71,100
Commercial	31,900
Multi-family residential	28,200
Transportation/Utilities/Mixed	22,080
Industrial	18,300
Total	295,000

Source:City of Los Angeles Integrated Resources Plan

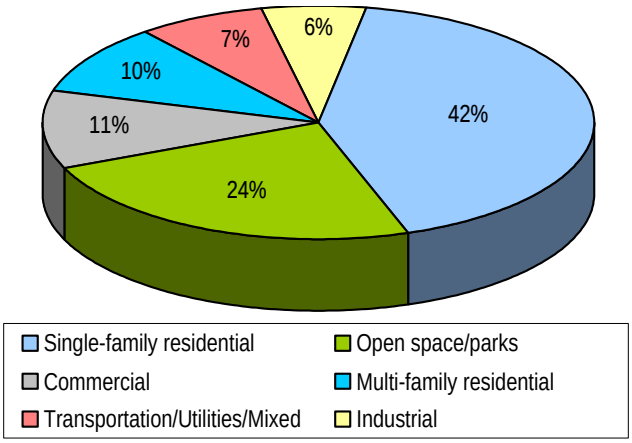
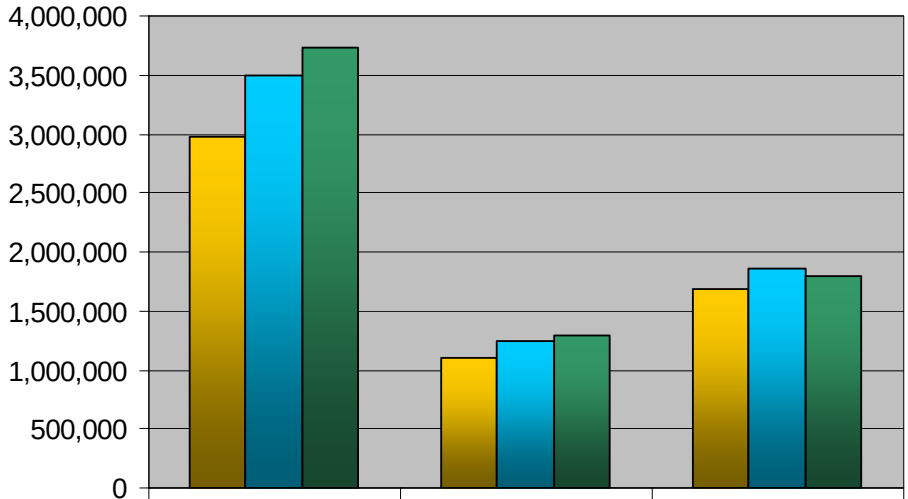


Exhibit 1B
Historical Demographics for LADWP Service Area



	Population	Housing	Employment
1980	2,970,000	1,100,000	1,692,900
1990	3,501,602	1,243,022	1,856,185
2000	3,725,919	1,290,287	1,793,026

Sources:
U.S. Census
California Department of Finance
California Employment Development Department

Exhibit 1C						
Demographic Projections for LADWP Service Area						
Demographic	2005	2010	2015	2020	2025	2030
Population	3,955,429	4,099,389	4,157,727	4,215,380	4,270,520	4,323,307
Housing						
Single-family	595,138	609,629	618,414	648,999	678,606	688,109
Multi-family	733,387	775,150	832,322	868,774	905,223	961,412
Total housing	1,328,525	1,384,779	1,450,736	1,517,773	1,583,829	1,649,521
Persons per household	2.91	2.90	2.81	2.72	2.64	2.57
Employment						
Commercial	1,689,650	1,808,123	1,875,338	1,930,704	1,981,135	2,036,301
Industrial	185,215	182,209	178,824	183,909	188,532	184,677
Total employment	1,874,865	1,990,332	2,054,162	2,114,613	2,169,667	2,220,978

Source: SCAG Regional Transportation Plan (2004), modified using MWD's land use planning tool to represent LADWP's service area.

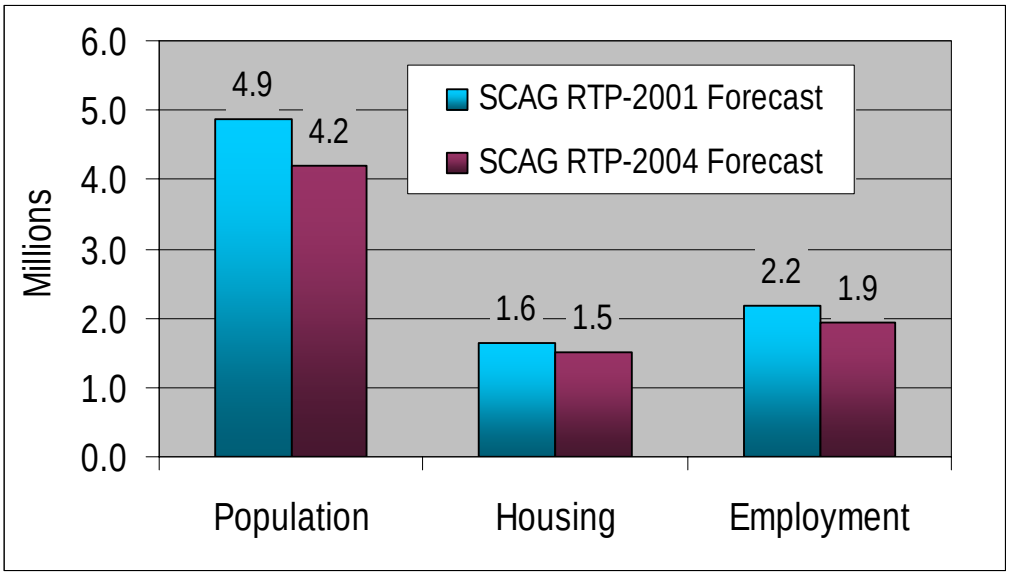
By 2030, it is projected that household size will decrease to 2.57 persons per household. Multi-family housing is expected to increase faster than single-family housing (1.2 percent annual growth vs. 0.6 percent annual growth).

Employment is expected to increase by 0.7 percent annually. This growth is primarily driven by the current and long-term opportunities available from the diverse economic base within the five-county metropolitan region of Southern California. The economies supported are wide-ranging and include services, wholesale and retail trade, manufacturing, government, financial service industries, transportation, utilities, construction, education, and tourism. Over the 25 year forecast period, industrial growth is expected to remain essentially stagnant, while commercial employment is expected to increase by about 0.8 percent annually.

The SCAG demographic projections for population, households, and employment included in their 2004 Regional Transportation Plan (RTP), and presented in LADWP's 2005 UWMP, are substantially lower than what was presented in LADWP's 2000 UWMP. The demographic projections in the 2000 UWMP were based on SCAG's 2001 RTP. The current 2004 projections incorporate the 2000 Census data, and reflect the downward adjustments in future population growth, the State's projected fiscal condition, labor force participation, natural unemployment, household formation levels, and an employment shift from the manufacturing sector to the service sector. Exhibit 1D shows the differences between the SCAG demographic projections for the RTP in 2001 and 2004.

For the forecast year 2020, population was projected to be 4.86 million under the SCAG 2001 RTP and 4.21 million under the 2004 RTP, a difference of about 650,000. Housing was projected to be 1.63 million under the SCAG 2001 RTP and 1.52 million under the 2004 RTP, while employment was projected to be 2.17 million under the SCAG 2001 RTP and 1.94 million under the 2004 RTP.

Exhibit 1D
Differences in SCAG Demographic Projections for Los Angeles
Between 2001 and 2004 RTP Forecasts for Year 2020



Climate

Weather in Los Angeles is considered mild, which is a major attribute that attracts businesses, residents, and tourists to the City. On average, the City experiences 329 days of sunshine per year. Because of its relative dryness, Los Angeles' climate has been characterized as Mediterranean. Exhibit 1E provides a summary of average monthly rainfall, maximum temperatures, and evapotranspiration readings.

The City's average monthly maximum temperature is 74.94 degrees Fahrenheit. This is based on data from the Los Angeles Civic Center weather station. The standard annual average evapotranspiration rate (ETo) for the Los Angeles area is 4.00 feet per year. ETo measures the loss of water to the atmosphere by evaporation from soil and plant surfaces and transpiration from plants. ETo serves as an indicator of how much water plants need for healthy growth. Total precipitation averages 14.48 inches per year, with over 90 percent of the total amount typically falling through the period of November through April.

Exhibit 1E

Average Climate Data for Los Angeles

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
Standard Average ETo (feet per year) [1]	2.00	2.29	3.47	4.62	5.02	5.55	6.08	6.02	4.48	3.68	2.58	2.27	4.00
Average Rainfall (inches)[2]	3.35	3.20	2.52	1.04	0.26	0.05	0.01	0.09	0.26	0.29	1.54	1.89	14.48
Average Max. Temperature (°F)[2]	66.95	68.54	69.34	71.99	73.95	78.21	83.59	84.39	83.03	78.53	72.86	67.88	74.94

[1]Average of Glendale and Santa Monica ETo stations, as there are no active stations in Los Angeles
[2]Downtown Los Angeles (1948-2003)

1.2 Historical Water Use

LADWP categorizes water use into the following major billing sectors: single-family residential, multi-family residential, industrial, commercial (which includes some large landscape uses), governmental (which includes some large landscape uses), and unaccounted/system losses. Exhibit 1F shows the historical water use for LADWP from 1985 to 2004. Water demands peaked in 1989, at just over 750,000 acre-feet per year (AFY). In 1991, which was the fifth year of a severe drought, LADWP along with other southern California water providers imposed mandatory drought conservation practices. This drought conservation, along with wet weather (in 1992 and 1993) and an economic recession, resulted in water use dropping to about 580,000 AFY. By 2002, water use had increased back to pre-drought levels.

However, because of LADWP's aggressive long-term conservation measures, such as the installation of over 1.24 million ultra-low-flush toilets, water use in 2005 is equal to the annual use of about 20 years ago, despite a growth in population of more than 750,000 people.

Exhibit 1G shows the per person water use for the same historical period, expressed as gallons per day per person. During the 1980's, per person use averaged over 180 gallons/day/person. Due to the drought, wet weather, and economic recession, per person use sharply fell to about 145 gallons/day/person in the early 1990s. Since 1996, per person use has been averaging approximately 155 gallons/day/person. The annual water savings of about 15 percent between today's per person use and that which occurred during the 1980's is attributed to long-term conservation measures that the City implemented.

In terms of total actual use within the City, single-family and multi-family dwellings constitute the greatest demands (60 percent of the total demand). Commercial water use accounts for over 20 percent, governmental use about 7 percent, industrial use about 4 percent, and non-revenue water accounts for about 8 percent of the total water demand.

A portion of non-revenue water is lost in the process of transporting and delivering water to customers. LADWP's efforts to minimize water loss through an aggressive infrastructure rehabilitation and maintenance program include pipeline rehabilitation, leak detection and repair, meter replacement, and cement lining programs. LADWP's goal is to maintain non-revenue water at or below the ten percent benchmark established by the American WaterWorks Association. The City's non-revenue water is below the national average of approximately 16 percent.

Exhibit 1H summarizes the historical water use in LADWP's service area by major billing sector.

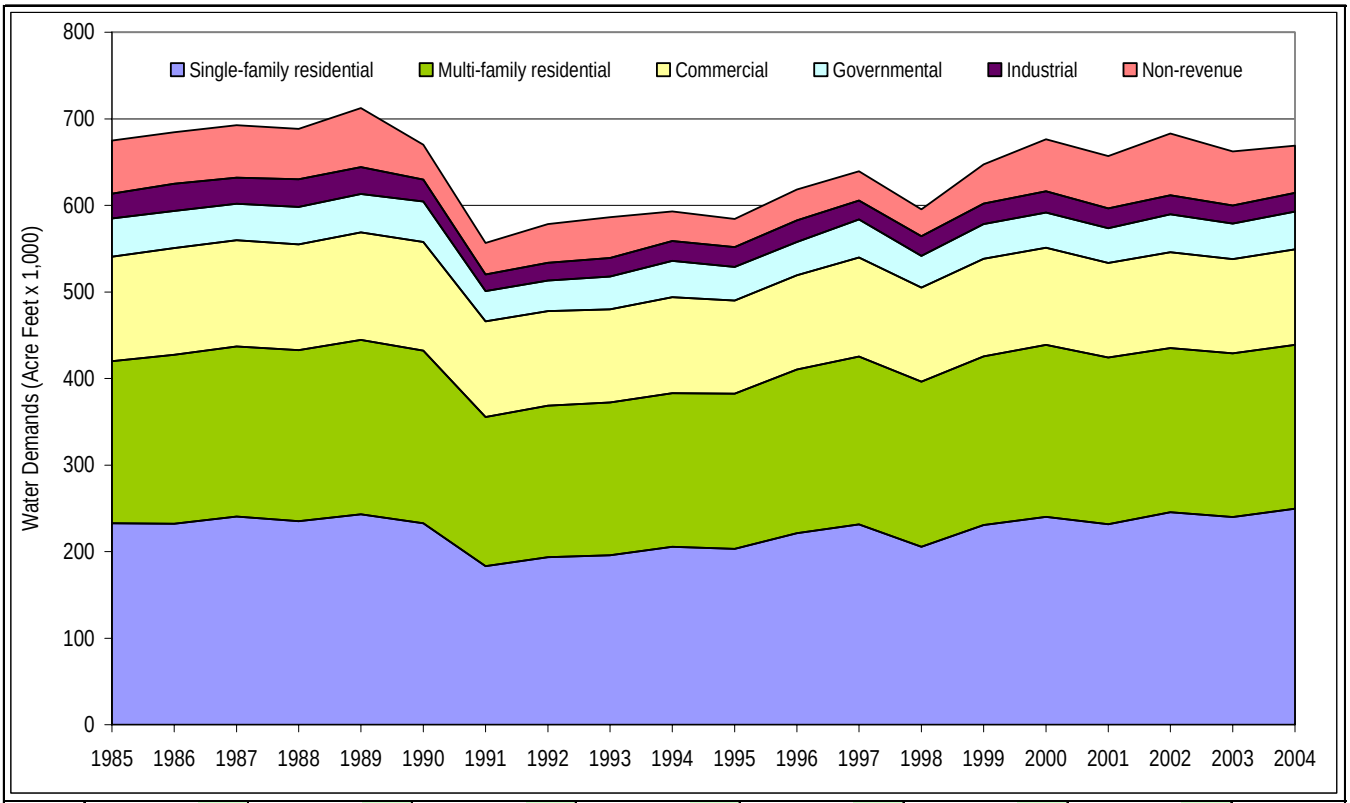
1.3 Water Demand Projections

Demand Forecasting Methodology

Water demands are a function of many variables, such as demographics, weather, and economy. As exhibited in Exhibit 1F, the proportion of water use among the customer class sectors within the City has been very consistent over the last two decades. For planning purposes, it is important to develop a method whereby future demands are projected based on variables that are know to affect water use in the service area.

LADWP used a statistical approach to forecast the City's water demands. Regression analysis is a statistical method to estimate any trend that might exist among important factors. To project water demands, factors such as billing data for each major customer class (e.g., single-family residential), rainfall, temperature, and demographic data (e.g., population, projected housing units, employment, etc.) were used. Information from SCAG, MWD, and the National Weather Service were used in developing the water demand projections.

Exhibit 1F
Historical Water Use in LADWP Service Area



Calendar Year	Single-family residential Total	% of Total	Multi-family residential Total	% of Total	Commercial Total	% of Total	Governmental Total	% of Total	Industrial Total	% of Total	Total Retail Use	% of Total	Non-revenue Total	% of Total	Water Use Total
1985	233	34%	187	28%	121	18%	44	7%	29	4%	**614**	**91%**	61	9%	**677**
1986	232	34%	195	28%	123	18%	43	6%	31	5%	**625**	**91%**	59	9%	**686**
1987	240	35%	197	28%	123	18%	42	6%	30	4%	**632**	**91%**	61	9%	**694**
1988	235	34%	198	29%	122	18%	43	6%	32	5%	**630**	**91%**	58	8%	**690**
1989	243	34%	201	28%	124	17%	44	6%	31	4%	**644**	**90%**	68	10%	**713**
1990	233	35%	199	30%	126	19%	47	7%	25	4%	**630**	**94%**	40	6%	**672**
1991	183	33%	172	31%	111	20%	35	6%	19	3%	**520**	**93%**	36	7%	**557**
1992	194	33%	175	30%	109	19%	35	6%	21	4%	**534**	**92%**	45	8%	**578**
1993	196	33%	177	30%	108	18%	38	6%	22	4%	**539**	**92%**	47	8%	**586**
1994	206	35%	178	30%	111	19%	42	7%	23	4%	**559**	**94%**	34	6%	**593**
1995	203	35%	179	31%	108	18%	39	7%	23	4%	**552**	**94%**	33	6%	**584**
1996	221	36%	189	31%	109	18%	38	6%	25	4%	**583**	**94%**	36	6%	**618**
1997	231	36%	194	30%	115	18%	44	7%	22	3%	**606**	**95%**	34	5%	**640**
1998	206	35%	191	32%	109	18%	37	6%	23	4%	**564**	**95%**	31	5%	**596**
1999	231	36%	195	30%	113	17%	40	6%	24	4%	**602**	**93%**	45	7%	**647**
2000	240	36%	199	29%	112	17%	41	6%	24	4%	**616**	**91%**	60	9%	**676**
2001	232	35%	193	29%	109	17%	40	6%	23	3%	**597**	**91%**	60	9%	**657**
2002	245	36%	190	28%	111	16%	44	6%	22	3%	**612**	**90%**	71	10%	**683**
2003	240	36%	189	29%	109	16%	41	6%	21	3%	**600**	**91%**	63	9%	**662**
2004	249	37%	190	28%	110	16%	44	7%	22	3%	**614**	**92%**	55	8%	**669**
Average		35%		29%		18%		6%		4%		**92%**		8%	

Note: Units in thousand AF

Exhibit 1G
Per Person Water Use in LADWP Service Area

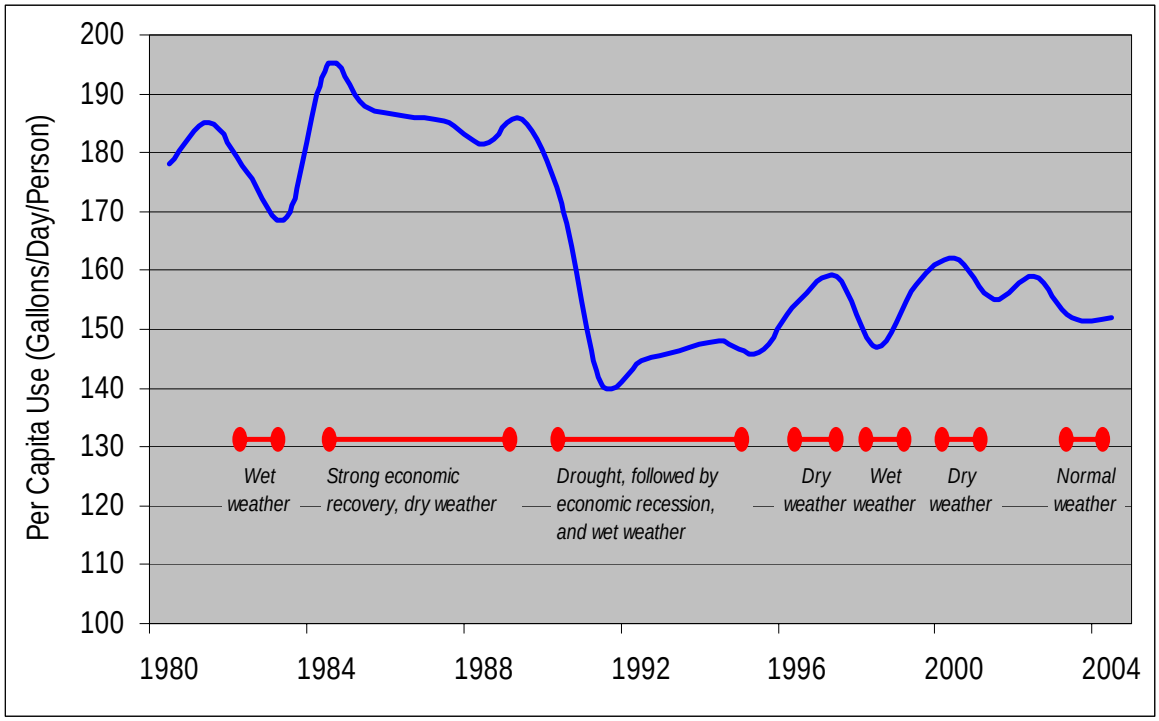
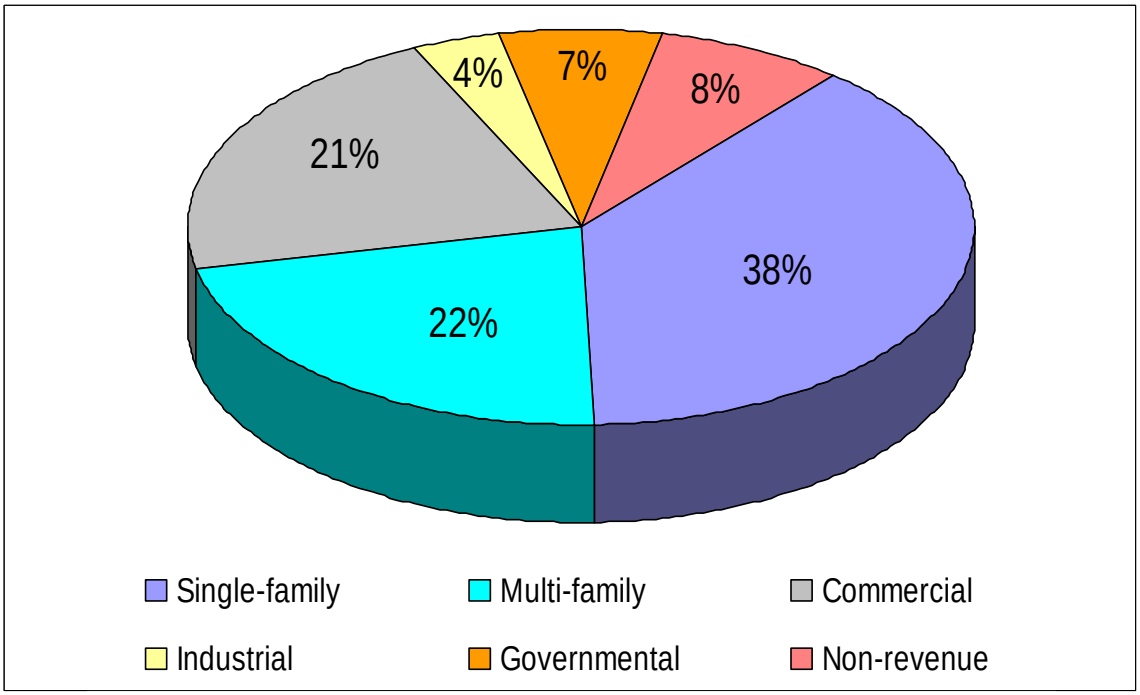


Exhibit 1H
Breakdown of Water Use in LADWP Service Area



To forecast total water demands for each of the billing categories, the per unit water use estimates from the statistical models were multiplied by demographic projections provided by SCAG. This approach allows LADWP to project water demands as a function of future demographics.

Conservation's Impact on Water Demand

Water conservation can play a significant role in ensuring that the City will meet its future water demands. Water conservation has been shown to reliably reduce water demands, thereby extending existing water supplies and reducing the need for new supplies. This conservation is realized both through hardware measures and behavioral changes in water use of City residents.

Since the 2000 UWMP was completed, significant progress has been made in the distribution and installation of water conserving hardware within LADWP's service area. The hardware-based water savings estimates included in the 2000 Water Plan have been exceeded by nearly 70 percent due in large part to an increased emphasis on the installation of ultra-low-flush (ULF) toilets, low-flow showerheads, and high efficiency clothes washers. The substantially increased water savings from low-flow showerheads are directly attributable to continuing savings from existing showerhead replacements, as well as a recently added installation service component of the ULF Toilet Distribution Program, where both water saving showerheads and ULF toilets are provided and installed free of charge. As of 2005, over 1.24 million ULF toilets have been paid for or subsidized by LADWP. Current program efforts include an increased focus on commercial business toilet replacements. LADWP's water conservation hardware program has also been expanded to include other devices that broaden the program approach and contribute to water savings. Exhibit 1I provides a description of LADWP's current hardware–based conservation measures with anticipated future savings. Additional information regarding the City's water conservation programs are provided in Chapter 2.

Demand Projections

Future water demands for each major customer sector were estimated by taking into account projected water conservation savings tabulated in Exhibit 1I. Historical and projected total water demands for the LADWP service area are shown in Exhibit 1J. Shown on this exhibit is the effect that weather can have on total demands. During wet/cold conditions, water demands can be approximately 5 percent lower than during normal weather conditions; while during dry/hot conditions, water demands can be approximately 5 percent greater than during normal weather conditions.

Water demands by major billing category are shown in Exhibit 1K. LADWP does not project water demands based upon the number of billing accounts; rather, it projects water demands using SCAG demographic data.

Exhibit 1I							
Water Savings from Hardware-Based Conservation Measures (AFY)							
Conservation Measure	2005	2010	2015	2020	2025	2030	Average Ann. Growth
Ultra-Low Flush Toilets	42,700	45,600	46,700	46,800	46,800	46,800	0.4%
High Efficiency Washing Machines	1,400	2,700	2,700	2,700	2,700	2,700	3.7%
Low-Flow Showerheads	40,600	44,100	44,300	44,600	44,800	45,100	0.4%
Faucet Aerators	500	900	900	1,000	1,000	1,100	4.8%
Pre-Rinse Sprayheads	900	1,800	1,900	1,900	1,900	1,900	4.4%
Technical Assistance Program	500	600	700	800	900	900	3.2%
X-Ray Processor	300	1,600	2,500	2,600	2,600	2,600	90.7%
Cooling Tower Conductivity Controller	200	800	1,500	1,600	1,600	1,600	28.0%
Large Landscape	3,800	5,900	7,600	10,100	13,800	18,500	15.5%
Total Water Conserved	90,900	104,000	108,800	112,100	116,100	121,200	1.3%

Exhibit 1J
Projected Total Water Demands

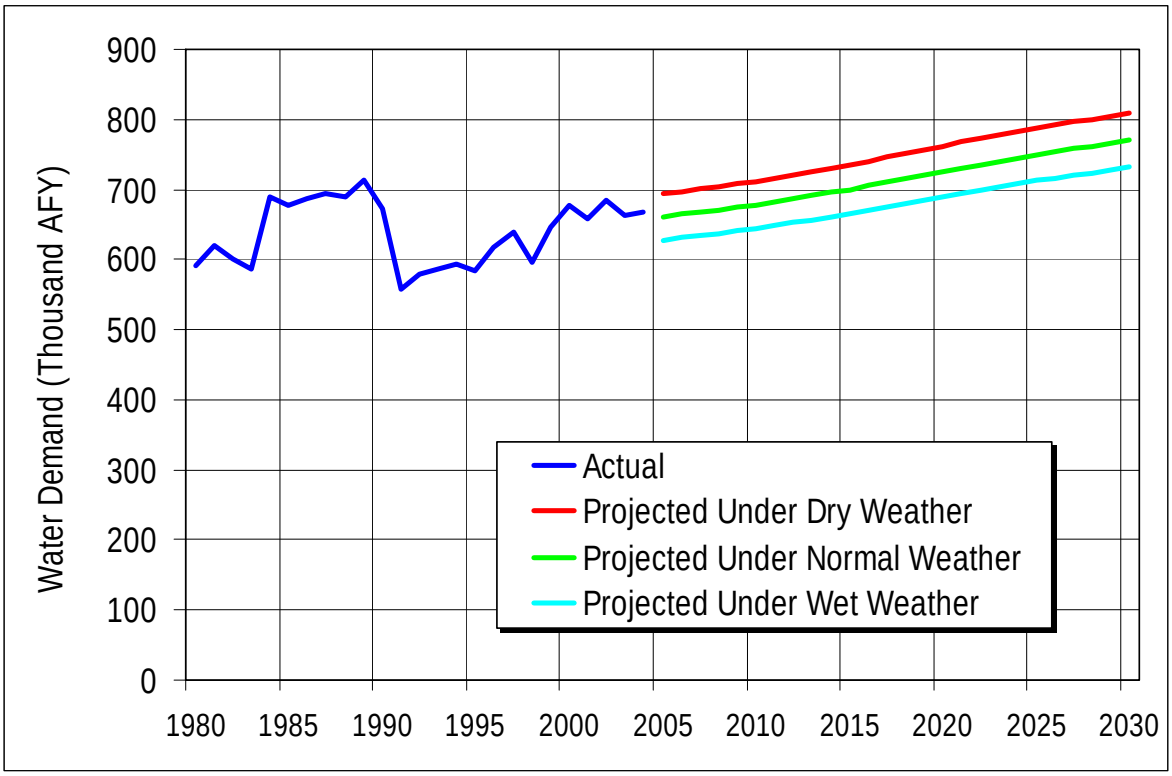


Exhibit 1K							
Projected Sector Water Demands* (Thousand AFY)							
Water Use Sector	2000	2005	2010	2015	2020	2025	2030
Single-family	240	231	237	239	250	260	262
Multi-family	199	198	205	219	228	236	250
Commercial	112	119	126	130	134	137	140
Government	41	43	44	44	45	45	46
Industrial	24	20	19	19	19	19	19
Non-revenue	60	48	50	52	55	57	58
Total	677	661	683	705	731	755	776

* 2000 represents actual year data (which was considered dry); while 2005 through 2030 are projected based on normal weather conditions and with projected conservation.

1.4 Trends in Water Use

While population is a primary driver of how much water is used, trends in development within an area also impacts water demand. As the City's population increases, there is a growing trend towards development that caters to more efficient water use. While some of these trends are required by local ordinances (e.g., plumbing efficient devices, tiered water rate structure, prohibited uses of water, etc.), others are patterned after "smart growth" principles.

Since 1990, housing density in the City has increased. According to the Los Angeles Department of City Planning, there were approximately 2,684 homes per square mile in 1990. In 2000, the housing density increased to 2,762 homes per square mile; while 2004 had an estimated density of 2,794 homes per square mile. This trend is expected to continue with the expected growth in the City's multi-family residential housing.

According to the SCAG demographic projections for the City, multi-family housing is expected to grow at twice the rate of single-family housing over the next 25 years (1.2 percent annual growth for multi-family vs. 0.6 percent annual growth for single-family).

These historical and future trends in housing density will translate into lower water demands as multi-family households use far less water than single-family households. Within the City, an average multi-family household uses about 240 gallons per home per day, while an average single-family household uses about 350 gallons per home per day.

LADWP's projection of water demands has incorporated the trends in multi-family and single-family housing, and their corresponding water use.

In addition to the multi-family vs. single-family housing trends and water use, new developments that use smart growth principles such as small-lot designs of single-family homes, more efficient plumbing devices, and drought-tolerant gardens will further result in water use reduction. This reduction will mainly be due to smaller yards and lower water use for irrigation.

LADWP will continue to monitor trends in development within its service area and will identify ways (primarily through its conservation program) to assist its customers in further reducing their overall water use.

Chapter 2

water conservation

Chapter Two
Water Conservation

2.0 Overview

Los Angeles has historically taken a leadership role in managing its demand for water. Water conservation, or demand management measures, is largely responsible for closing the gap between supply and demand in a time marked by significant reductions in the City's imported water resources. Los Angeles consistently ranks among the lowest in per person water consumption when compared to California's largest cities. These significant accomplishments have resulted from the City's sustained implementation of effective water conservation programs, and the City's culture of conservation as a way of life.

LADWP has annually invested in water conservation programs and measures targeting reductions in water use. Looking forward, LADWP plans to continue to make investments in conservation programs, and expand its focus on landscape water use efficiency and conservation opportunities in the commercial/industrial/institutional customer sectors. LADWP's conservation planning process includes working with other City departments to ensure that mutual needs are addressed and goals are achieved (e.g., landscape water use efficiency and dry weather runoff reduction).

The civic culture of water conservation in Los Angeles began with the installation of water meters on all services in the early 1900's. At that time, this basic conservation measure resulted in a 30 percent reduction in water use. The recurrence of periodic droughts has illustrated the concern and responsiveness of LADWP customers in times of water shortage. When faced with significant supply shortages, City residents have responded with unprecedented reductions in their water use. Los Angeles was the only city in southern California to invoke mandatory water rationing during the 1976 through 1977 drought. While severe, the two-year drought resulted in only a temporary reduction in water use, as a subsequent series of wet years erased memories of the water shortage experienced during the brief drought period. However, it was the drought that followed the 1978 through 1986 wet cycle that would prove to be the turning point in Los Angeles' water use awareness.

The drought of 1987-1992 left a permanent imprint on Los Angeles water customers. In response to this drought, LADWP expanded a voluntary water conservation program in 1990. Prompted by an extensive public awareness program and education campaign, LADWP customers responded not only with water saving practices but also by installing conservation measures in their homes and businesses. Devices such as low-flow showerheads and ULF toilets replaced existing non-water saving devices. These hardware changes, coupled with more responsible use habits, have kept the City from becoming more dependent on imported water supplies.

Despite the fact that total water demand has been slowly increasing since the end of water rationing in 1992, water conservation levels remain above 15 percent (meaning that total demand is at least 15 percent lower than it would be without conservation). Conservation has had a tremendous impact on Los Angeles' water use patterns, and has become a permanent element of LADWP's water management philosophy. Water usage in the City is the same as it was 20 years ago despite an increase in population of over 750,000 people (see Exhibit 2A). Los Angeles' conservation efforts since the City began its voluntary conservation program in 1990 are shown in Exhibit 2B. It is worthwhile to note that the conservation efforts shown correspond to actual water savings that have been brought about by hardware measures and changes in the water usage pattern of City residents.

Exhibit 2A
City of Los Angeles Water Use

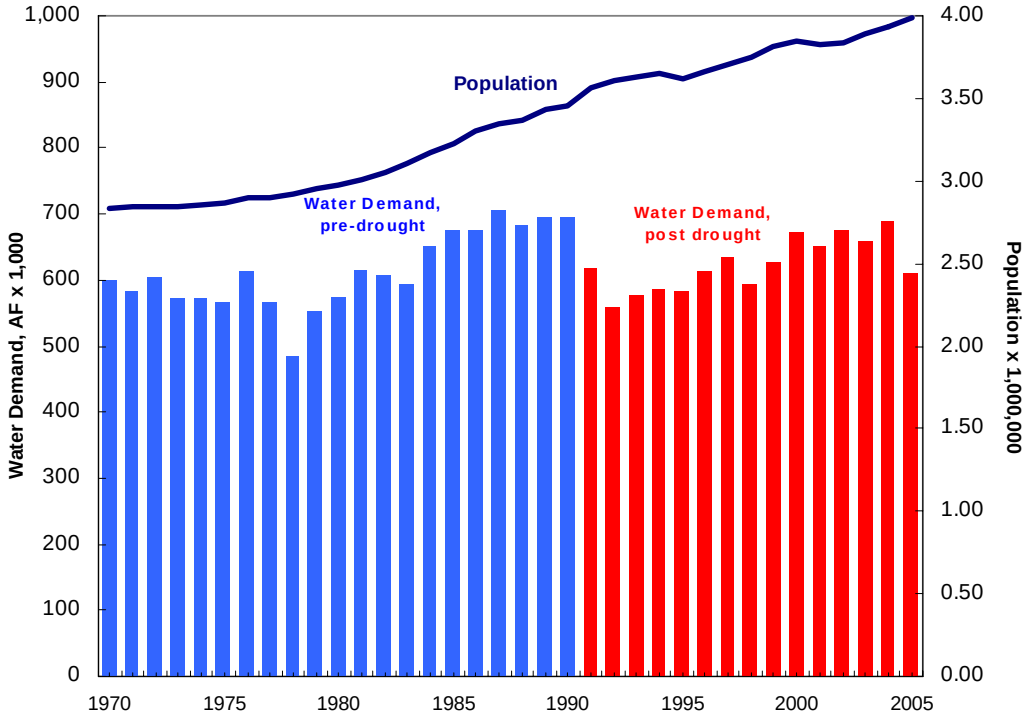
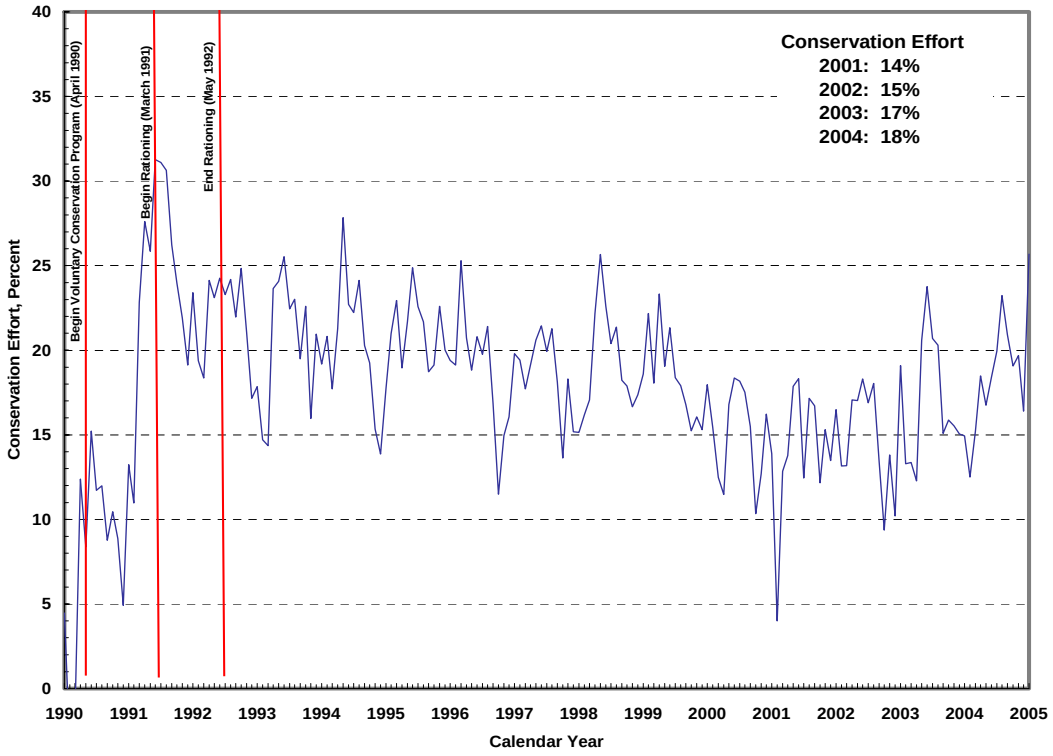


Exhibit 2B
Water Conservation Effort



Conservation benefits the City by improving water supply reliability and reducing energy use for water treatment and pumping. Conserving customers see a tangible benefit as well through monetary savings on their water bill. Another ancillary benefit of conserving water is that the need for costly sewer facility expansions is deferred by reducing wastewater discharge into the sewer collection and treatment systems. In the end, the primary beneficiaries of conservation are the water customers themselves and the environment from where the sources of supply originates.

Los Angeles has been implementing permanent conservation since the 1980's. In 1988, the City adopted a plumbing retrofit ordinance to mandate the installation of conservation devices in all properties and to require water-efficient landscaping in new construction. The ordinance was amended in 1999, requiring the installation of ULF toilets and water saving showerheads in single-family and multi-family residences prior to resale. LADWP's water conservation programs have assisted customers affected by the ordinance by offering free ULF toilets and showerheads, free installation of ULF toilets and showerheads, as well as rebates for ULF toilets purchased and installed.

2.1 Water Conservation Goal

Water conservation reduces demand that typically rises over time with growth in population and commerce. By mitigating those increases in demand, water supply reliability is improved while costs are reduced. In the early 1990s, City residents responded with conservation levels exceeding 30 percent due to increasingly drier conditions and mandatory conservation. As normal water supply conditions returned and with continuation of LADWP's conservation program, conservation levels stabilized at approximately 15 percent. In this Water Plan, LADWP has increased its goal of achieving water conservation with a 20 percent reduction over historical water usage within the City. This level of conservation will further lessen the City's reliance on imported water while providing a drought-proof resource that is not subject to weather conditions.

LADWP is committed to conservation as a means of providing a sustainable source of water supply to the City. Measures such as tiered water pricing, financial incentives for the installation of a variety of conservation measures, ULF toilets, free low flow showerheads, Technical Assistance Program incentives for business and industry, and large landscape irrigation efficiency programs are just some of the ways LADWP provides leadership and results in the conservation area. Conservation is a key component of LADWP's water resource planning efforts and will continue to be implemented over the long-term.

This Urban Water Management Plan outlines programs to achieve this conservation goal over the next 25 years. LADWP intends to continually examine the water conservation program to assess progress toward this goal. Programs will be revised, and new programs will be developed to increase conservation levels as water demands grow with increased population.

2.2 Conservation Pricing Structure

In 1993, Los Angeles restructured its water rates to provide customers with a clear financial signal to use water more efficiently. It was the first time in LADWP's history that an ascending tiered rate structure was used. This conservation-based rate structure remains in use and applies a lower first tier rate for water used within a specified allotment, and a higher second tier rate for every billing unit (748 gallons) that exceeds the first tier allotment. A unique feature of the rate structure is that the first tier allotment considers factors that influence individual residential customer's water use patterns (i.e. lot size, climate zone, and family size).

The goals of LADWP's two-tiered water rate structure are to:

- Use price as a signal to encourage the efficient use of water.
- Provide basic water needs at an affordable price.
- Provide equity among customers.
- Use price to stabilize water use during a shortage.
- Generate adequate revenue for maintaining and upgrading the water system.

In a period where increasing demands and reductions in water supply are becoming more commonplace, a rate structure that provides appropriate signals to encourage efficient water use has become a necessity for many areas, including Los Angeles.

The substantial investments required for water quality improvements, security, and supply development have significantly raised the cost of delivering water. As rates increase, water agencies have noticed a change in use patterns. Because there is a known correlation between price and use, agencies use rates to encourage conservation activities and to postpone the need to construct new facilities or purchase even larger quantities of imported water.

LADWP's tiered rate structure, first implemented in 1993 with assistance from a broad-based group of stakeholders, applies a lower tier block rate for responsible water use within a specified amount of water, and a much higher rate for every billing unit above this block. The higher block rate reflects the "marginal cost," or the projected cost for additional water that would be required to meet these needs.

To further emphasize the conservation message, water charges are based solely on water used. This eliminates the inclusion of fixed charges. There are automatic adjustments triggered when a water shortage exists. These adjustments are based on the actual water use patterns that occurred during the 1991 period of mandatory water rationing. The purpose of these adjustments is to use price to encourage additional conservation and to provide LADWP with the revenue necessary to operate the system efficiently during a shortage.

The combination of hardware-based demand reduction programs, education, and the use of price signals to encourage efficient water use has to date successfully maintained Los Angeles' water use to approximately the same levels seen in the mid-1980s. This achievement is made even more significant by the fact that the City's population has increased by more than 750,000 residents since that period.

2.3 Best Management Practices

The California Urban Water Conservation Council (CUWCC) is the voice of urban water conservation in California, and LADWP has been active in the CUWCC since its inception in 1991. Instrumental in the development of the *Memorandum of Understanding Regarding Urban Water Conservation in California* (MOU), LADWP was also one of the original signatories. The MOU identifies "Best Management Practices," or BMPs, as proven conservation measures as determined by the CUWCC. All Group One (water purveyor) signatories to the MOU are committed to implement the BMPs.

Over the last 14 years, LADWP has played a significant role in the governance and policy making at the CUWCC, holding a seat on the Steering Committee (i.e., Board of Directors), Strategic Planning Committee, By-Laws Committee, and as co-chair of the Membership Committee. LADWP also has been actively involved in all of the revisions that the MOU has undergone to date.

One of the obligations as a signatory to the MOU is to submit a Best Management Practices Retail Water Agency Report to the CUWCC. Previously submitted annually, this report is now submitted biennially and details progress in implementing the 14 BMPs as currently specified in the MOU. LADWP actively implements the BMPs and the CUWCC BMP reports are available for review through the internet by accessing CUWCC's website at www.cuwcc.org.

In the early 1990s, the State Water Resources Control Board identified urban water conservation as a major means for resolving problems in the Bay-Delta. Large water agencies, including LADWP, actively participated in work groups to develop conservation strategies. The result of this effort is the aforementioned MOU.

The MOU commits signatory water suppliers to develop comprehensive conservation programs using sound economic criteria and to consider water conservation on an equal footing with other water management options. The MOU established the CUWCC to monitor implementation of the BMPs, and to maintain the list of BMPs.

A BMP is defined as:

(a) An established and generally accepted practice among water suppliers that results in more efficient use or conservation of water.

(b) A practice for which sufficient data are available from existing water conservation projects to indicate that significant conservation or conservation-related benefits can be achieved; that the practice is technically and economically reasonable and not environmentally or socially unacceptable; and that the practice is not otherwise unreasonable for most water suppliers to carry out.

LADWP implements all of the BMP requirements in the MOU except for BMP 10, which applies only to wholesale water agencies. A listing of the 14 BMPs is shown in Exhibit 2C. Potential BMPs and other additional conservation measures that have been implemented by LADWP are shown in Exhibit 2D.

The remainder of this chapter focuses on existing and future water conservation measures in Los Angeles. Information is provided on the different categories of LADWP conservation programs, conservation measures identified in the 2000 Urban Water Management Plan that have been implemented, the current BMPs and potential BMPs as determined by the CUWCC, and funding sources that enable LADWP to implement these programs.

Exhibit 2C

BMPs FOR URBAN CONSERVATION IN CALIFORNIA

	PRACTICES	STATUS
1.	Interior and exterior water audits and incentive programs for single- and multi-family residential customers	Implemented
2.	Residential plumbing retrofit	Implemented
3.	Distribution system water audits, leak detection and repair	Implemented
4.	Metering with commodity rates for all new connections, and retrofit of existing connections	Implemented
5.	Large landscape water audits and incentives	Implemented
6.	High efficiency washing machine rebate program	Implemented
7.	Public information	Implemented
8.	School education	Implemented
9.	Commercial and industrial water conservation	Implemented
10.	Wholesale agency assistance program	Not applicable
11.	Conservation pricing	Implemented
12.	Water conservation coordinator	Implemented
13.	Water waste prohibition	Implemented
14.	Residential ULF toilet replacement program	Implemented

Exhibit 2D
POTENTIAL BMPs AND OTHER CONSERVATION MEASURES IMPLEMENTED
Direct installation of ULF toilets, showerheads, and aerators
Public Agency Retrofits (through TAP and ULF Toilet programs)
Large Industrial Incentive Program (through TAP)
Industrial Cooling Water Study
Large Industrial Incentive Program
Ascending Block Rate Structure and other economic incentives
Development and use of ULF toilet Supplementary Purchase Specification
Homeowner Association Irrigation Pilot Program and Study
Landscape Education (in English and in Spanish through Protector del Agua Program)
ULF toilet installation on resale ordinance
Residential Evapotranspiration-Based Irrigation Controller Program - pilot
Toilet Flapper Study and Replacement Program
Graywater use
Customer class-based billing records

2.4 Evaluation and Selection Criteria

LADWP develops cost effective programs to achieve multiple goals of cost-effective demand reduction, customer service, and environmental responsibility. Conservation potential is considered in determining program approach and duration. Some types of conservation programs result in savings that are more easily measured than others. Demand-side management programs, like the rebate programs for ULF toilets and high-efficiency washing machines, produce results that are measurable. Public information, education and other general conservation awareness programs are intended to alter customers' behavioral patterns on water use, and thus are more difficult to quantify. It is such behavioral change in water use, however, that the City can point to as the primary reason for significant reduction in water consumption during drought periods.

LADWP's conservation programs generally break down into five categories: awareness/support, residential, commercial/industrial/institutional (CII), landscape, and system maintenance measures. Specific programs (past and present) associated with these categories are broken down in Exhibit 2E, and are fully discussed below.

Exhibit 2E			
Conservation Measure Categories			
BMP #	AWARENESS/SUPPORT	pre 1985	Year in Service
	Pricing		
4	Full Metering and Volumetric Pricing	x	
11	Sewer Charge using Volumetric Pricing	x	
11, 13	Tiered Rate Structure		
7	Public Information		
	Advertising	x	

Exhibit 2E (Continued)			
Conservation Measure Categories			
BMP #	AWARENESS/SUPPORT	pre 1985	Year in Service
	Bill inserts	x	
	Brochures	x	
	Community Involvement Program	x	
	Exhibits	x	
	Hotline	x	
	Speakers Bureau	x	
	ULFT Customer Satisfaction Survey		1992
	School Education		
	Lower Elementary	x	
	Upper Elementary	x	
	Junior High	x	
	High School in concert with the Environment - Student Home Water/Energy Survey		1994
	RESIDENTIAL		
2	Better Idea/Neighborhood Bill Reduction Service Program --Showerhead installation		1993
14	Community-Based Organization Toilet Distribution Centers, Direct Install		1992
6	High efficiency washing machine rebate program		1998
1	Home Water Surveys		1990
2	Retrofit Kits Distribution		1988
2	Ultra-Low Flush Toilet Rebate		1990
	COMMERCIAL/INDUSTRIAL/GOVERNMENTAL		
2, 9	Commercial Rebate Program		1991
9	Commercial/Industrial Conservation Guidebook		1992
9	Cooling Tower Manual and Workshops		1992
1	Interior Water Use Audits		1991
7	Targeted Literature Mailing		1993
9	Technical Assistance Program (TAP)		1991
1, 3, 5	Typical Audits		1991
	LANDSCAPE		
2	Large Turf Irrigation Controller Pilot Program		2000
7	Demonstration Gardens		1988
5	Improving Irrigation Performance Manual & Workshop		1993
5	Large Turf Audits and Audit Training		1993
7	Lawn Water Guide Direct Mailing (as requested)		1989
5	Protector del Agua -- English and Spanish Language Workshops		1995
5	Ten Percent Large Turf Water Reduction Program		1988
	SYSTEM MAINTENANCE MEASURES		
3	Cement Mortar Lining of Pipelines	x	
3	Corrosion/Cathodic Protection	x	
3	Fire Hydrant Shutoffs		1991
3	Infrastructure Program	x	
3	Meter Replacement Program		1988

Note: Department-implemented water conservation programs are overseen by a water conservation coordinator (BMP No. 12).

2.5 Conservation Measures - Existing and Proposed

Conservation programs can be grouped into five categories: awareness/support, residential, commercial/ industrial/institutional, landscape, and system maintenance measures. LADWP's programs include traditional demand-side management measures, as well as infrastructure improvement programs that contribute to water waste reductions. Combined with LADWP's conservation pricing structure discussed in section 2.2, these programs increase system reliability and efficiency.

Awareness/Support Measures

Awareness/support measures can be active or passive. Active components include full metering of water use, assessment of volumetric sewer charges, and a conservation rate structure. Passive components typically include providing educational materials for schools, community and customer presentations, maintaining a conservation hotline, and a wide range of information distributed through customer bills, advertising in public venues, LADWP's website, and direct mail. Passive awareness/support measures provide the foundation for conservation by raising water use awareness, water conservation program visibility, and encouraging community involvement.

Another aspect of awareness/support is that of advocacy. LADWP has been instrumental in the development of more stringent standards (Supplementary Purchase Specification) for ULF toilets that are in use within the City as well as by other water agencies in California and other areas. LADWP also assisted in the adoption of higher residential clothes washer efficiency standards by the California Energy Commission. Recognizing the importance of this activity, LADWP actively participates in advocating local and statewide conservation research and planning.

Residential Category

Conservation programs were developed and launched during the drought of 1987 through 1992. In 1990, the ULF Toilet Rebate Program was initiated, followed two years later by the ULF Toilet Distribution Program. In 2003, a well-received free installation service component was added to the ULF Toilet Distribution Program that includes free water-saving showerheads, faucet aerators and replacement toilet flapper valves. These programs have proven to be very popular, and are the most successful of their kind in the country.

LADWP has been assisted by community-based organizations (CBOs) to reach the milestone of more than 1.24 million toilet installations to date. CBOs have been integral to LADWP's success, reaching into the communities they serve to convey the conservation message and directly undertake conservation activities. Benefits of this approach accrue to community participants through reduced water bills, to the CBOs through employment opportunities and revenues earned, and to the City through significant water savings achieved. Funded at more than $7 million annually, the program produces estimated water savings of more than 20,600 AFY. Water savings are delivered from these toilets and other measures over time at a cost of $315 per AF.

The High Efficiency Washer Rebate Program was initiated in 1998 and promotes the purchase and installation of high efficiency models that save both water and energy. As of 2005, more than 32,000 machines have been purchased and installed through the program. The program's minimum efficiency requirements for rebate eligibility were increased January 1, 2004, resulting in the promotion of higher efficiency models. New State efficiency standards for clothes washers are due to become effective on January 1, 2007. Continuance of LADWP's rebate

program in 2007 will be assessed prior to that time. Initial co-funding of the program was provided by the City's Department of Public Works Bureau of Sanitation (responsible for wastewater treatment), and by the Southern California Gas Company. Ongoing co-funding for the program is provided by MWD.

Since an amendment to the City's existing plumbing retrofit ordinance in 1999, all residential properties (single-family and multi-family) sold within the City must have ULF toilets and low-flow showerheads installed prior to the close of escrow. This progressive requirement is implemented with the help of local real estate professionals and is strongly supported by LADWP's toilet replacement programs. LADWP has explored the expansion of the City's Retrofit on Resale Ordinance to include nonresidential properties. However, such changes were determined to be infeasible due to concerns over the applicability of certain provisions of the Americans with Disabilities Act whereby the replacement of a toilet could trigger requirements for costly accessibility improvements.

As part of past programs promoting residential water conservation measures, students conducted home water surveys through a resource efficiency education program implemented by LADWP in Los Angeles area high schools. While water conservation curricula is still a component of the education program, local CBOs now visit many Los Angeles residences throughout the year, assessing water conservation opportunities in the home and installing applicable measures to immediately capture water savings.

Water-saving showerheads are still available to LADWP customers, free of charge, upon request. These devices supplement the over 1.5 million water conservation retrofit kits that were distributed throughout Los Angeles during the last drought. The kits included one-gallon toilet displacement bags, low-flow showerheads, and toilet leak detection tablets.

LADWP has conducted a toilet flapper valve replacement pilot program. Although long-term water savings from ULF toilets are predicated on timely replacement of leaking toilet flapper valves with appropriate replacement units, findings from the pilot program indicate a small incidence of leaking flapper valves in toilets rebated or distributed by LADWP. However, toilet leak testing and flapper valve replacement was added to the ULF Toilet Distribution Program's installation service component for toilets not replaced through the program.

Finally, a pilot program examining the effectiveness of weather sensitive irrigation controllers in residential applications is presently underway. Information obtained from this pilot and others conducted in southern California will guide development of a long-term program to support this technology.

Commercial/Industrial/Institutional Category

This category represents some of the largest volume water users in LADWP's customer base, and represents a great deal of conservation potential. LADWP, in partnership with MWD, has implemented a commercial rebate program designed specifically for customers in the CII category. In addition, packaged water use efficiency solutions are being developed for specific business sectors. Efforts are also underway to better promote the financial incentives available that make water conservation retrofits more cost effective for business and industry. LADWP takes full advantage of regional programs offered by or through MWD for the CII sector.

The Commercial Rebate Program was launched in 2001 to provide menu-based rebates for water conserving measures applicable to many types of CII facilities. The list of measures includes ULF toilets and urinals, high efficiency coin operated clothes washers, cooling tower conductivity controllers, and other devices. The program design provides for ease of participation, and has been well-received by LADWP customers. As of 2005, rebates have been paid for more than 15,500 ULF toilets and 5,600 high efficiency clothes washers through the Commercial Rebate Program.

The Technical Assistance Program (TAP) was created in 1992 to provide incentives for retrofitting water-intensive equipment. Different from the Commercial Rebate Program, the TAP encourages site-specific projects and TAP incentives are based on a given project's water savings. The estimated unit cost for TAP overall is about $315 per AF saved.

Cooling tower (pictured) water use represents a significant water conservation opportunity, and cooling tower projects are funded through TAP. Through a cooling tower controller upgrade and enhanced water treatment, a typical cooling tower project can save one million gallons of water annually. TAP incentives are available and have been paid for such projects through LADWP.

Another promising technology funded through TAP is an x-ray processor recirculation system. Described in the 2000 Water Plan, a single recirculation system can save one million gallons annually and a typical hospital may have as many as 15 processors. As a result of a Proposition 13 Water Use Efficiency grant awarded to LADWP and the San Diego County Water Authority (in partnership), 250 x-ray processor recirculation systems (such as one shown below) will be installed free of charge in medical facilities in Los Angeles.

Landscape Category

Recognizing that a substantial amount of water is used outdoors for irrigation, LADWP continues to invest in landscape irrigation efficiency programs and projects.

In 1988, the City passed a plumbing retrofit ordinance that included a requirement for LADWP customers with three acres or more of turf to reduce consumption by 10 percent from 1986 levels or face a 100 percent surcharge on their water bills. To help these customers comply with the ordinance, LADWP has sponsored free training courses specifically targeting the City's large turf customers. To further assist this group, LADWP developed a guidebook, "Improving Irrigation Performance" to demonstrate ways for enhancing existing irrigation systems.

LADWP has also sponsored conservation and garden expos to highlight various aspects of efficient outdoor water use and planting practices, and emphasizing native, drought-tolerant plants. Funding was provided for three demonstration gardens to showcase the use of drought-

tolerant plants and flowers, including the landmark Lummis Home in Highland Park. Lawn watering guides were mailed to all single-family and duplex residences. Planting guides for native and drought-tolerant plants are also available upon request. Additionally, to demonstrate the beauty and appeal of a water-conserving landscape, LADWP's John Ferraro Building facility (below) has a drought-tolerant garden that is open to visitors year-round.

The City's Landscape Ordinance (No. 170,978) became effective in May 1996 and includes requirements for water management and irrigation specifications, planting techniques, plant materials, and source reduction of waste. The City adopted this ordinance to comply with the California Water Conservation in Landscaping Act (AB325).

LADWP contributed to the work of the state's Landscape Task Force (established through AB 2717), serving as co-chair of the Economics Workgroup. Among the recommendations approved by the Task Force are incentives and disincentives for landscape water use, and water budget based rates as well as other effective rate structures. The subject of water rates was referred to the CUWCC for consideration under a revision to BMP 11, conservation pricing. The work of the Task Force offers significant potential for further landscape water use efficiency statewide.

Landscape irrigation improvement projects are currently funded through the TAP, with incentives calculated on the basis of a project's water savings. LADWP staff includes certified landscape auditors, and large landscape audits are available upon request.

LADWP is also investigating new programs using data obtained through pilot program efforts. A recent pilot program was conducted to determine the effectiveness of weather sensitive irrigation controllers in large landscape applications. This technology was shown to save, on average, one acre-foot of water per acre controlled per year. Additional efforts are being undertaken to make available a landscape irrigation education program for homeowner associations and other large landscape customers. This program would focus on common green areas in multi-unit complexes to improve irrigation efficiency, including irrigation system maintenance and repair, and plant selection. LADWP will continue to study smart irrigation controllers with a goal of developing a financial incentive program to expand their use.

There is also potential for the use of non-potable water for irrigation, which can help extend the utility of the City's traditional water supplies. Through recycled water, increased stormwater capture, and groundwater recharge with captured storm and irrigation runoff, imported surface water and local groundwater used for landscape irrigation can be conserved. The potential to use such non-potable water supplies is further discussed in the Water Recycling and in the Beneficial Reuse of Urban Runoff sections (Chapters 3 and 5, respectively).

Innovative ways to conserve water for landscape use has also been implemented within the City through the work of TreePeople, who has partnered with various City departments, including LADWP, through programs such as Cool Schools and the Open Charter Stormwater Project.

The Open Charter Elementary School Stormwater Project is one of several stormwater management systems that TreePeople has established in Los Angeles over the past six years that include: a 250,000-gallon underground cistern in Coldwater Canyon Park, a retrofitted home in

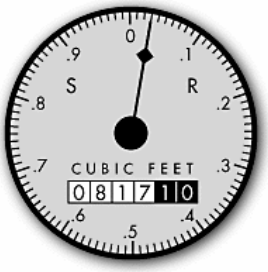
South Los Angeles, a 7,600-square-foot infiltration field at a Pacoima elementary school and, with the County Department of Public Works, a 2,700-acre watershed retrofit in Sun Valley. These activities create the foundation that will lead to further landscape water conservation to preserve the City's limited water supplies.

System Maintenance Category

Maintaining system infrastructure reduces water waste and allows for greater water accountability. Infrastructure maintenance is a high priority for LADWP. On-going programs such as pipeline replacement, pipeline corrosion control, and cement lining not only preserve the operational integrity of City water facilities, but also reduce unaccounted water losses.

In 1940, LADWP started a cement-mortar lining program for its older pipelines. At one-third the cost of replacement, pipes are rehabilitated through cleaning and lining with cement mortar which reduces water loss, prevents corrosion build up and improves water flows and water quality. By 2005, almost all of LADWP's 7,200-mile pipeline distribution system will be lined.

LADWP has made significant progress in replacing and/or retrofitting water meters through its meter replacement program that started in 1988. As water meters age, they typically begin reading less than 100% of their intended accuracy. The meter replacement program has been valuable in maximizing the accuracy of the approximately 700,000 meters within the City.



Water Meter

2.6 Funding

More than $164 million has been invested in water conservation since 1991. Conservation is the cornerstone of LADWP's water demand management activities and ongoing investments will be made in viable programs. This commitment is subject to funding availability and LADWP's ability to implement such programs. Outside resources for funding are sought to complement the City's resources. A stronger commitment is also being made to acquire outside grant funding for City conservation projects.

Currently, the funding sources for conservation are:

- *Water Rate Adjustment* - An adjustment factor to fund both water conservation and recycling projects is part of the City's water rate structure. This adjustment pays for both programs and adds 25 cents per month to the total bill for typical customers.

- *MWD Conservation Credits Program* - MWD offers rebates to member agencies that promote water conservation through the installation of specified conservation measures. The rebates equate to $154 per AF of water saved, or half the project cost.

- *Grant Funding* - LADWP has successfully received grant funding from the State under Proposition 13. A grant for $615,000 supplemented the rebate funding available for commercial ULF toilets and high efficiency clothes washers. A second grant for $623,500 will promote the installation of x-ray processor recirculation systems, funding that will be shared equally with the San Diego County Water Authority (LADWP's project partner). LADWP was awarded three grants in 2005 under Proposition 50, and will continue to participate in the competitive grant funding process.

In addition, $5 million has been appropriated under the Environmental Water Fund (AB444) that provided money for projects with water savings that enable an equal amount of water to remain in the Mono Basin.

2.7 Demand Hardening

Although LADWP regularly assesses new water conservation opportunities, conservation programs may, at some point in time, have a diminishing impact on a customer's ability to further conserve water, in particular during short-term water supply shortages caused by droughts or other emergencies. This phenomenon is known as "demand hardening." The California Urban Water Agencies defines demand hardening as, "the diminished ability or willingness of a customer to reduce demand during a supply shortage as the result of having implemented long-term conservation measures." Long-term conservation measures can include hardware conservation measures, such as the installation of ULF toilets and behavioral conservation, such as watering during specified periods of the day.

Demand hardening can occur when options available for reducing water use are narrowed as the customer base is saturated with hardware conversions causing efficient water usage patterns to prevail. The impact of demand hardening can be most prevalent during water supply shortages where customers have already been implementing long-term water conservation measures.

However, it can be argued that hardware-based conservation devices will continue to be developed and piloted, such as the previously discussed weather sensitive irrigation controllers, thus improving the ability to further conserve in the future. During droughts, consumers will respond to the call for more conservation by behaviorally adjusting their water use. Additionally, full saturation of current conservation devices has not occurred, and there is still a significant potential in the landscape sector. For these reasons, others believe demand hardening is irrelevant and there is a continued need for aggressive conservation programs.

Full implementation of current conservation measures, including reducing leaks, has the potential to reduce per capita water demands even further. Past water conservation efforts have reduced water use within LADWP's service area even though the population has continued to expand as illustrated in Exhibit 2A. It is expected that future water conservation efforts will continue this trend as increased saturation of water saving hardware devices occurs and new hardware devices are developed.

LADWP will continue to develop and pilot test hardware-based conservation devices (such as the previously discussed weather-sensitive irrigation controllers) to improve the ability to further conserve in the future. These pilot tests, combined with continued implementation of conservation programs, will maximize water use efficiency within the City.

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Chapter 3

current water supplies

Chapter Three
Current Water Supplies

3.0 Overview

It has been said that water is the lifeblood of the West. This statement holds true for the City. Water has been an integral part of the City's initial development when a growing population and economy was supported through local surface flows primarily from the Los Angeles River, and groundwater primarily from the San Fernando Basin.

As the City grew, so did its need for water. Having utilized much of the local groundwater supply and all local surface flows, the citizens of Los Angeles, under the leadership of William Mulholland (pictured), then chief engineer of the Los Angeles Water Bureau, approved by a 10 to 1 margin a $23 million bond measure to construct the First Los Angeles Aqueduct in 1913. This investment was equal to 12 percent of the entire City's assessed valuation at that time. In 1940, an additional $40 million was spent to extend the first aqueduct from the Owens River 40 miles north to tap into high-quality streams that are tributaries to Mono Lake. The value of the City's historical investments in the Los Angeles Aqueduct System is several billion dollars today. And for nearly a century, the City has benefited from the delivery of high-quality, cost-effective water supplies from the eastern Sierra Nevada.

In the early 1900s, while there was adequate supply of Los Angeles Aqueduct water, the City once again took a leadership role in ensuring that additional water supplies were developed. In October 1923, Mulholland recommended that the City of Los Angeles investigate the Colorado River as a potential supplemental water resource. After determining that construction of an aqueduct was feasible along several routes, Los Angeles submitted a water rights filing with the State of California in June 1924 to obtain rights to approximately 1,500 cubic feet per second of Colorado River water. In 1928, several southern California cities joined Los Angeles in forming the MWD with an initial goal of bringing Colorado River water to southern California. In September 1931, voters in the cities that formed MWD approved (by nearly 5 to 1) a $220 million bond issue for construction of the Colorado River Aqueduct (CRA). These construction bonds were financed through property tax revenues, with Los Angeles contributing over 80 percent of payments during the early years. Mulholland led the six-year survey that ultimately defined the route that the CRA would take. Subsequent completion of MWD's CRA in 1941 allowed for the diversion of Colorado River water pursuant to Los Angeles' 1924 water rights filing for use by Los Angeles and the other cities who had agreed to be part of MWD.

Los Angeles Aqueduct Cascades

To meet the water needs of its growing population, the City decided to construct the Second Los Angeles Aqueduct in 1963. Construction of the Second Los Angeles Aqueduct was completed in 1970. The second aqueduct increased the City's ability to deliver water from the Mono Basin and the Owens Valley to Los Angeles by 75 percent. It was also during this time that MWD signed on as a contractor with the SWP,

contracting for approximately 50 percent of all water delivered through the project. This paved the way for delivery of water from the San Joaquin and Sacramento River Delta into southern California.

The Los Angeles Aqueduct, the CRA, and the SWP are the City's primary imported water sources and are fundamental to LADWP's ability to deliver a reliable water supply to Los Angeles. Illustrated in Exhibit 3A, these facilities serve water that makes up 85 percent of the City's average annual supply, and combine with local groundwater to meet the needs of approximately 4 million people.

Exhibit 3A
Major Sources of Water Supply for Los Angeles

Over time, environmental considerations have required that the City use a significant portion of its imported water supply for mitigation purposes. While this change has posed a significant challenge to the City's water resources, LADWP has embraced its commitment to the environment and found resource management opportunities that have changed the City's approach toward water stewardship. Since the major drought of 1987 through 1992, water conservation and recycling have become important resource management tools for supplementing the City's water supplies. Though it is LADWP's goal to maximize the use of conservation and recycling to offset the need for supplemental imported water, additional environmental regulations, and even the potential impacts of climate change, necessitate the development of alternative water supplies to meet future demands.

Mono Lake

This chapter focuses on Los Angeles' current and future water supply outlook. Each supply source is discussed, and different scenarios are considered to illustrate the sources that will be required to meet water needs through the year 2030.

3.1 Historical Water Supplies

The Los Angeles Aqueducts (LAA), local groundwater, and supplemental water purchased from MWD are the primary sources of water supply for the City. These three sources have historically delivered an adequate and reliable supply to serve the City's needs. Implementation of recycled water projects is progressing and is expected to fill a larger role in Los Angeles' water supply portfolio. Extending the usefulness of the City's water resources is an active conservation program that has been extremely effective in decreasing water use within LADWP's service area.

With the majority of its water supplies emanating from surface (snowmelt) runoff, Los Angeles' imported water supplies are subject to substantial vulnerability due to hydrologic variability. Annual LAA deliveries are

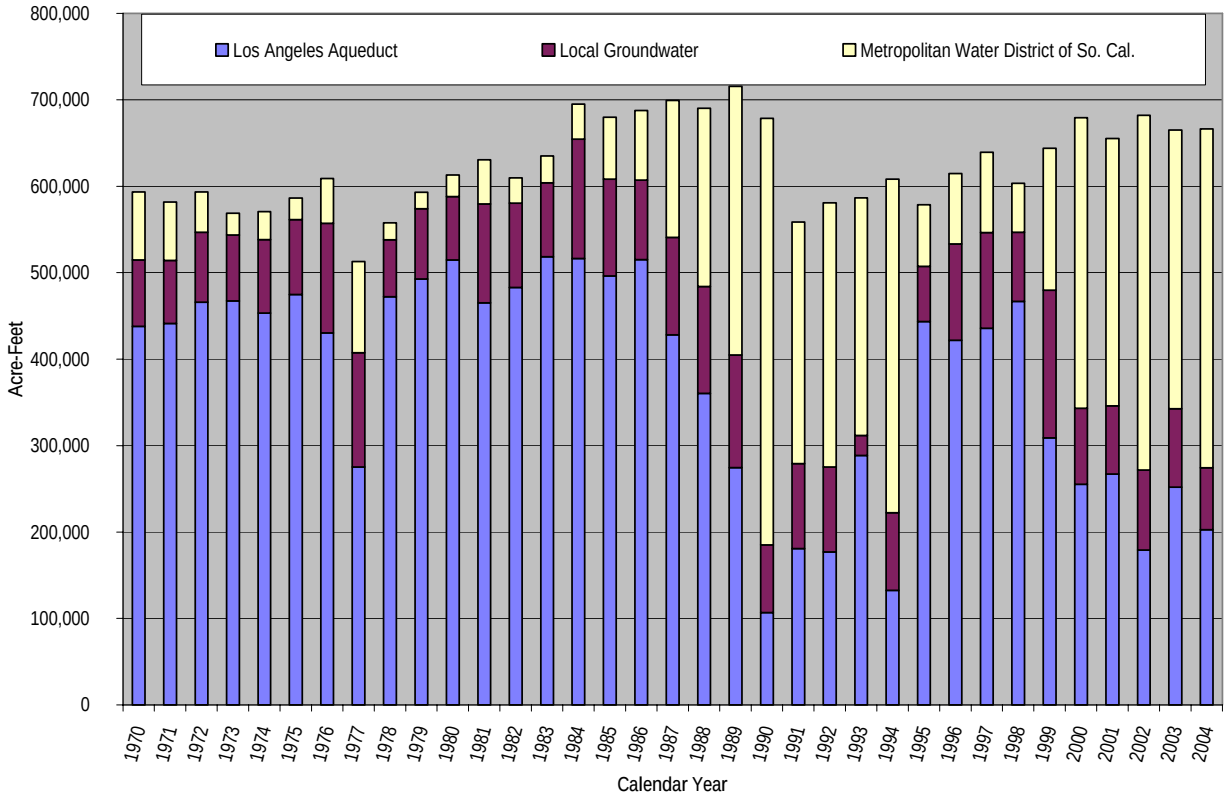
dependent on snowfall in the eastern Sierra Nevada. Years with abundant snowpack result in larger quantities of water deliveries from the LAA, and typically lower supplemental water purchases from MWD. City groundwater supplies are produced in accordance with adjudicated entitlements that protect the aquifers from adverse impacts (commonly known as "safe-yield" operation of the groundwater basin). Exhibit 3B illustrates the variable and steady nature of the City's imported and groundwater supplies, respectively.

The City has committed approximately 166,000 AFY of water supplies for environmental enhancement in the Owens Valley and Mono Basin regions. LAA deliveries were also reduced from 1999 through 2004 due to below normal snowfall. An abundant snowfall and rain during the winter of 2005 provided an above average water supply for the entire region for the year. Having proven the value of investments in water resource management during the last six-year dry spell, the City and the southern California water community are continuing to work collaboratively to develop additional, sustainable resource management measures.

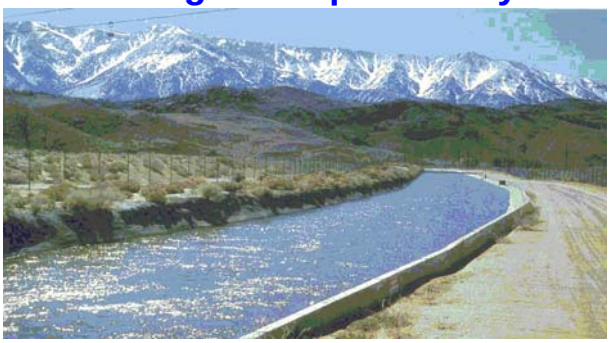
LADWP is focused on preserving the reliability of its Los Angeles Aqueduct, local groundwater, and MWD supplies. By working with other water agencies in a coordinated manner, the City is furthering the goal of providing long-term water supply reliability. Development of alternative water supply options, such as water transfers and seawater desalination, are among the options being considered to supplement the City's existing sources of supply.

The remaining chapter discusses in greater detail sources of the City's supply.

Exhibit 3B
Historical Water Supply



3.2 Los Angeles Aqueduct System



The Los Angeles Aqueduct (LAA) system extends approximately 340 miles from the Mono Basin to Los Angeles. Water is conveyed the entire distance by gravity alone. There are seven reservoirs in the system with a combined storage capacity of 300,560 AF. In addition, there are 12 hydroelectric power generation facilities that have a maximum generation capacity of nearly 250 megawatts.

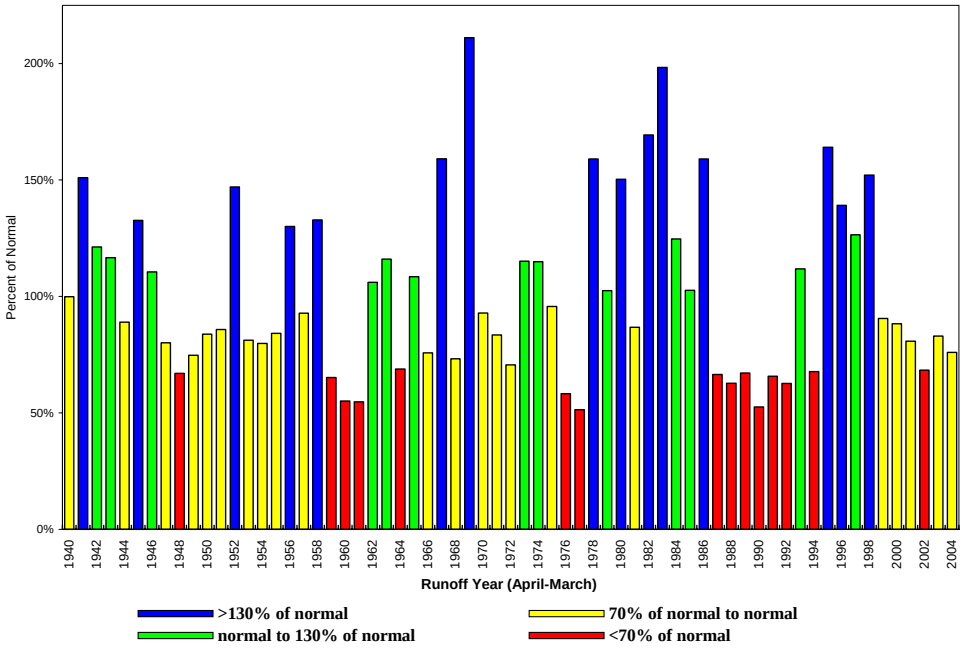
The LAA is fed by runoff from the east slope of the Sierra Nevada. Runoff from the east slope peaks in the late spring and summer, after most of the year's precipitation has already occurred. This provides significant flexibility for operating the LAA – flexibility that is needed in light of the minimal storage capability along the system.

The runoff is also heavily dependent on snowpack. Unfortunately, a given year's snowpack cannot be predicted with certainty, and thus, the LAA system is subject to significant hydrologic variability.

The cyclical nature of hydrology is exhibited best by LAA deliveries over the last ten years. This general period was characterized by a series of wet years, followed by a series of dry years (which ended in the winter of 2004). From 1995 through 2004, LAA deliveries supplied about half of the City's water needs. Total LAA water supply deliveries for the ten-year cycle are as follows: 63 percent from 1995 through 2000 and 34 percent from 2001 through 2004.

The reliability impact of hydrologic cycles on LAA supplies, however, had been demonstrated prior to the last decade. A broader look at how deliveries from the LAA have fluctuated from year to year is shown in Exhibit 3C. Here, the general cycle of wet and dry years is evident, particularly since the late 1960s.

Exhibit 3C
Eastern Sierra Nevada Runoff - Mono Basin and Owens Valley



Mono Basin and Owens Valley Supplies

Mono Lake Tufa Towers

The impact to LAA water supplies due to varying hydrology in the Mono Basin and Owens Valley is amplified by the requirements to provide water for environmental restoration efforts in the eastern Sierra Nevada.

Since 1989, when City water exports were significantly reduced to restore the Mono Basin's ecosystem, LAA deliveries from the Mono Basin and Owens Valley have ranged from 106,700 AF in 1990 to 466,800 AF in 1998. Average LAA deliveries since that time have been approximately 275,000 AF, about 45 percent of the City's total water needs.

With contributions from the state through grants (e.g., AB444, Propositions 13 and 50, etc.), LADWP has been able to fund additional conservation and water recycling programs that reduce water use within the City. Currently, Mono Basin exports will remain at no more than 16,000 AFY until Mono Lake reaches its target elevation. Computer modeling analysis indicates that this will take 20 years to attain. Restoration activities in the Mono Basin are improving streams, fishery, and waterfowl habitats, and are accompanied by an extensive monitoring program. With restoration progress and reduced diversions from the basin, Mono Lake's elevation will rise and the restoration goals will be achieved, eventually enabling exports from the Mono Basin to moderately increase under certain hydrologic conditions.

Surface runoff from the Owens Valley is the primary source of supply for the LAA. LADWP maximizes system output through storage control at seven reservoirs, beginning with the largest reservoir in the LAA system, Long Valley Reservoir. Hydroelectric power is also generated from 12 power plants along the LAA. All water-gathering activities are balanced with meeting domestic, agricultural, recreational, and environmental water needs within the Owens Valley.

Enhancement and Mitigation Projects have been completed as part of the City's commitment to meet the environmental water needs of the Owens Valley. Currently, LADWP is diverting 21,000 AF of water from the LAA for these Owens Valley Enhancement and Mitigation Projects. Upon completion of all identified projects, which includes the Lower Owens River Project, it is expected that the Enhancement and Mitigation Project water use will increase to approximately 60,000 AF annually. This amount is in addition to releases that provide environmental benefits in the Mono Basin and Owens Lake.

Owens Lake Shallow Flooding

Owens Lake

Historically, the Owens River was the main source of water for Owens Lake. Diversion of water from the river resulted in the lake drying up completely by the late 1920's. The exposed lakebed became a major source of windblown dust resulting in the United States Environmental Protection Agency (EPA) classifying the southern Owens Valley as a serious non-attainment area

for particulates (dust) in 1991. The EPA required California to prepare a State Implementation Plan (SIP) to bring the region into compliance with Federal air quality standards by 2006.

In July 1998, LADWP entered into a Memorandum of Agreement that: 1) delineated the dust producing areas on the lakebed that needed to be controlled; 2) specified what measures must be used to control the dust; and 3) outlined a timetable for implementation of the control measures. The Memorandum of Agreement was incorporated into a formal air quality control SIP by the Great Basin Unified Air Pollution Control District (District). The plan was approved by the EPA in October 1999.

Since 2001, LADWP has diverted water for the Owens Lake Dust Control Project. In November 2003, a revised plan was adopted that defined a 29.8 square-mile boundary on the lakebed that must be controlled. This included areas that LADWP has already controlled.

LADWP is in the midst of its multi-phase, multi-year program to implement the requirements of the District's SIP. A combination of shallow flooding and managed vegetation techniques are used at various lakebed locations to control dust. As of 2005, over two-thirds of the 29.8 square-mile boundary has been completed through shallow flooding and planting of salt grass. It is estimated that up to 55,000 AFY of water will be required for the Owens Lake Dust Control Project.

Lower Owens River Project

The Lower Owens River Project will release water from the LAA and create a warm water fishery along a 62-mile section of the Owens River. Water will be released near the LAA intake facility and a pump back station will be constructed downstream.

Due to project delays, the Superior Court of Inyo County rendered an order in August 2005 for LADWP to lower its annual groundwater pumping from the Owens Valley and supply water for groundwater recharge in the Laws Wellfield annually until a permanent base flow throughout the Lower Owens River of approximately 40 cubic feet per second has been established.

To meet the Court's order, the City agreed to pay Inyo County's share of construction and initial implementation for the Lower Owens River Project. This financing assistance will expedite construction of the project's pump back station, allowing the City to meet the Court-imposed deadline and lifting sanctions imposed by the Court.

It is estimated that the long-term use and transit losses from the project will be approximately 35,000 AFY. LADWP has approved an Environmental Impact Report for the Lower Owens River Project.

Taking the foreseeable factors discussed above into consideration, the average annual LAA delivery over the next 25 years is expected to be approximately 276,000 AF. Deliveries for a series of dry years, using 1987 through 1991 hydrology, are expected to range from approximately 63,000 AF to 120,000 AFY. A single dry year minimum of about 95,000 AF can also be expected with a repeat of a 1977 hydrology.

Water Rights – Mono Basin & Owens Valley

The City's right to export water from the eastern Sierra Nevada is based on approximately 140 water right licenses along various streams in the Mono Basin and Owens Valley. The most significant basis for export of surface water from the eastern Sierra Nevada is a license to divert 50,000 miner's inches (1,200 cubic feet per second) from the Owens River approximately 15 miles north of the town of Independence to the LAA for transport to Los Angeles. The majority of the City's water rights

were filed prior to 1914 with the California State Water Resources Control Board.

The City's water right licenses in the Mono Basin were amended in 1994 through the Mono Lake Basin Water Right Decision 1631. Currently, water export from the Mono Basin is limited to 16,000 AFY based on a court order.

The primary groundwater right upon which Los Angeles has developed groundwater resources in the Owens Valley is based on the ownership of the majority of land (approximately 300,000 acres) and associated water rights in the Owens Valley. Management of the groundwater supply in the Owens Valley is according to an agreement between Inyo County and LADWP. The goal of this agreement is to avoid certain described decreases and changes in vegetation and to cause no significant effect on the environment which cannot be acceptably mitigated, while providing a reliable supply of water to Los Angeles.

Water Quality – LAA Supplies

Water delivered by the LAA is the highest quality supply source available to the City. This is due to the fact that as land owners of much of the Owens River watershed, LADWP has placed strict limits on the extent of development along these City-owned lands. Snowmelt from the eastern Sierra Nevada contains low total organic carbon (TOC) and bromide concentrations, constituents that can form disinfectant byproducts during the water treatment process.

One constituent in LAA water that is present in greater than background concentration is arsenic. Arsenic is collected as the Owens River makes its way down through volcanic formations in the vicinity of the Hot Creek area in Long Valley. While the average arsenic concentration within LADWP's water distribution system of 5 parts per billion is well below the current Federal and State drinking water standard, LADWP is taking a proactive approach in addressing this issue in light of potential, more stringent arsenic regulations.

LADWP is evaluating enhanced coagulation at the Los Angeles Aqueduct Filtration Plant as a means of addressing future water quality regulations faced by LADWP, including arsenic. A pilot project using enhanced coagulation will be performed. If successful, enhanced coagulation may be a part of the treatment process at the Los Angeles Aqueduct Filtration Plant (pictured) by 2015.

Another water quality improvement effort being implemented to recover operational flexibility due to the loss of in-city reservoir storage (as a result of the Surface Water Treatment Rule) is the transition to chloramines for disinfection. This transition, which is expected to be completed by 2008, will allow LADWP to maintain the same high level of disinfection in its water supply while freeing itself from other potential disinfection issues associated with the use of chlorine as a disinfectant. The use of chloramines will also allow chemical disinfection for compatibility in cases where the City must purchase and blend MWD water (which is chloraminated) with other sources of supply in the distribution system.

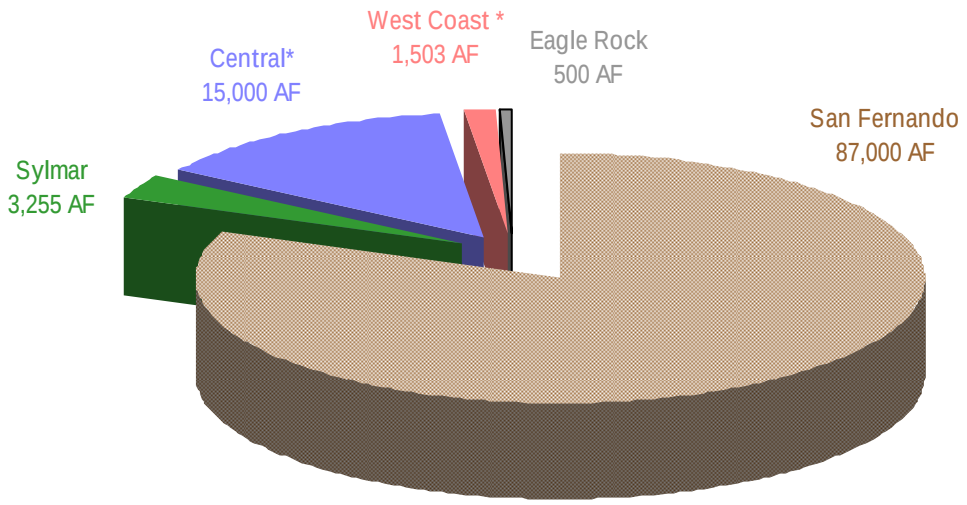
3.3 Local Groundwater

A key resource that the City has relied upon is its local groundwater supply. Local groundwater provides approximately 15 percent of the total water supply for Los Angeles, and has provided nearly 30 percent of the total supply in drought years.

The City owns water rights in three Upper Los Angeles River Area (ULARA) groundwater basins: San Fernando, Sylmar, and Eagle Rock, as well as Central and West Coast Basins. On average, about 86 percent (90,755 AFY) of the City's groundwater supply is extracted from ULARA groundwater basins, while the Central Basin

provides 14 percent (15,000 AFY). The City also owns 1,503 AFY of West Coast Basin groundwater rights. However, LADWP does not exercise its pumping rights in the West Coast Basin at this time due to localized water quality issues. Exhibits 3D and 3E summarize the City's annual local groundwater entitlements and supply over the last five years, respectively.

Exhibit 3D
Annual Groundwater Entitlements



Total: 107,258 AF per year

* Groundwater basins outside the Upper Los Angeles River Area boundaries

Exhibit 3E					
Local Groundwater Basin Supply (from October – September in AF)					
Groundwater Basin	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
San Fernando	98,016	65,409	66,823	78,045	72,235
Sylmar	2,634	2,606	1,240	3,662	2,634
Central	10,513	11,893	8,639	9,811	15,907
West Coast	0	0	0	0	0

Groundwater Rights

The City's entitlements in the San Fernando, Sylmar, and Eagle Rock Basins were established in a Judgment by the Superior Court of the State of California for the County of Los Angeles in Case No. 650079, *The City of Los Angeles, Plaintiff, vs. Cities of San Fernando, et. al., Defendants*, dated January 26, 1979 (Judgment). The Judgment was based on maintaining a safe yield operation for the basin, whereby groundwater extractions over the long-term will be maintained in a manner that does not create an overdraft condition in the basin. The Watermaster of the Upper Los Angeles River Area (ULARA) administers the Judgment on behalf of the Superior Court.

In accordance with the Judgment, the City has the right to all native water within the ULARA, based on its Pueblo Rights, and the right to imported water that is delivered and returned to the San Fernando Basin (SFB) by the City. With the Native Safe Yield being fixed at 43,660 AF/yr and the return of imported water averaging approximately 43,000 AF/yr, the total provides an average SFB entitlement for the City of approximately 87,000 AF/yr. In addition, the Judgment also allows the City to store water in the SFB. Stored water credits can be used to supplement the City's annual SFB entitlement. As of October 2005, the City has a stored water credit of nearly 320,000 AF in the SFB.

The City's entitlements in the Central and West Coast Basin were both also established in separate judgments by the Superior Court of the State of California for the County of Los Angeles through the Central Basin Judgment (Case No. 786,656 – amended judgment) and West Coast Basin Judgment (Case No. 506,806 – amended judgment).

The Central Basin Judgment granted the City 15,000 AFY of groundwater right. In addition to its annual entitlement, the Central Basin Judgment allows for storage of unused pumping right (referred to as carry-over storage) of up to 20 percent of the purveyor's pumping allocation and also allows for over extraction of 20 percent under emergency situations that would be debited against the purveyor's following year entitlement. The City uses its carry over storage right of 3,000 AF for operational flexibility and conjunctive use.

The West Coast Basin Judgment provided the City with a right to 1,503 AFY of groundwater from the West Coast Basin.

Superior Court Judgments for the San Fernando, Sylmar, Eagle Rock, Central, and West Coast groundwater basins are attached in Appendix F.

San Fernando Basin

The primary source of local groundwater for the City is the SFB, providing over 80 percent of the City's groundwater supply. The SFB is the largest basin within the ULARA at approximately 112,000-acres in area. It is bounded on the east and northeast by the San Rafael Hills, Verdugo Mountains, and San Gabriel Mountains; on the north by the San Gabriel Mountains and the eroded south limb of the Little Tujunga formation which separates it from the Sylmar Basin; on the northwest and west by the Santa Susana Mountains and Simi Hills; and on the south by the Santa Monica Mountains. A map of the basin is shown in Exhibit 3F.

Groundwater Replenishment and Strategies

Groundwater Operations. LADWP routinely monitors groundwater levels and water quality within the SFB. Computer simulation modeling of operations in the SFB is also performed to forecast the response of groundwater gradients and contaminant plume movement. Based on outcome from the SFB monitoring and model simulations, groundwater production strategies are reviewed and adjusted monthly to balance the City's water supply needs with SFB management.

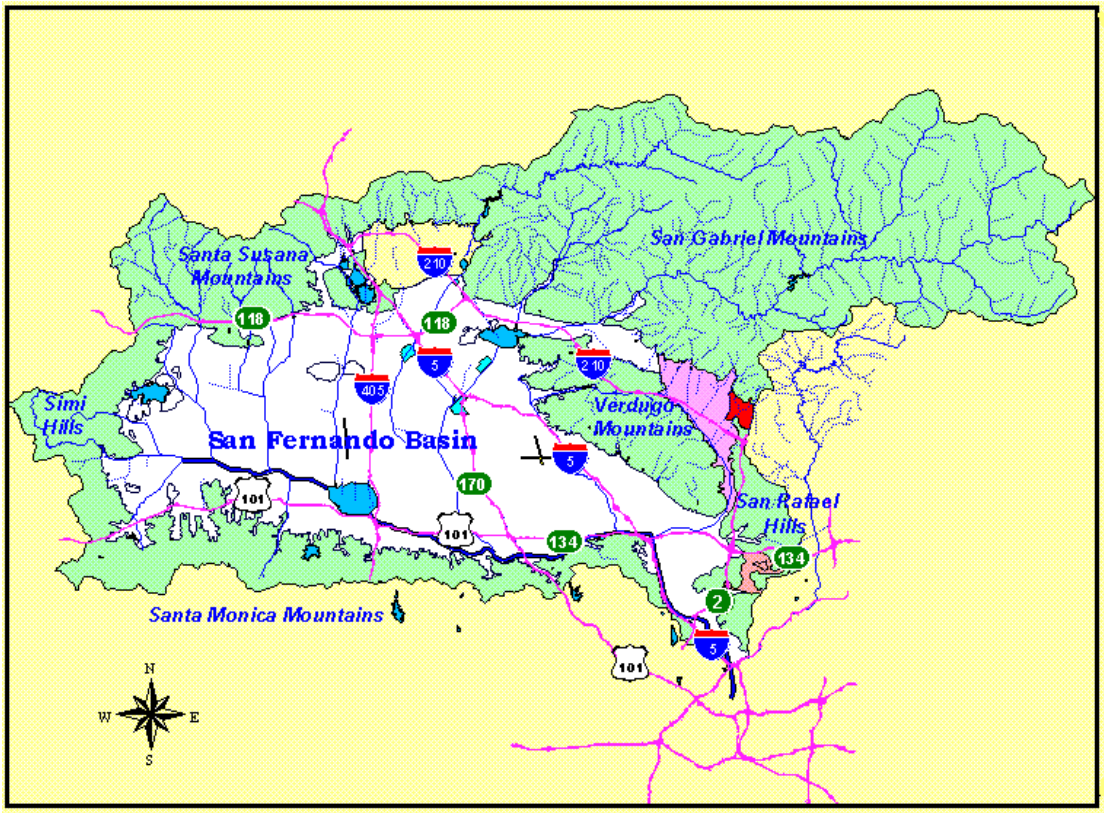
Conjunctive Use. LADWP operates its wells in a manner that optimizes the available production of its groundwater basins. This is done through conjunctive use, which is the coordinated use of surface and groundwater supplies.

Conjunctive use of the City's local groundwater supplies and imported water supplies (LAA and/or MWD) is performed by LADWP, ideally, during the course of each year by pumping its annual entitlement generally from April to October when the highest water-demand occurs. In this manner, imported water that is more readily available in the lower-water demand months (November to March) would primarily supply the City's needs.

If imported water is found to be in short supply, LADWP can use its full entitlement plus any stored water credit in the SFB to reduce its reliance on imported supplies through the high-water demand months.

Furthermore, conjunctive use can be implemented to enable LADWP to purchase MWD supplies at a reduced unit cost, when available.

Exhibit 3F
San Fernando Basin Boundary Map

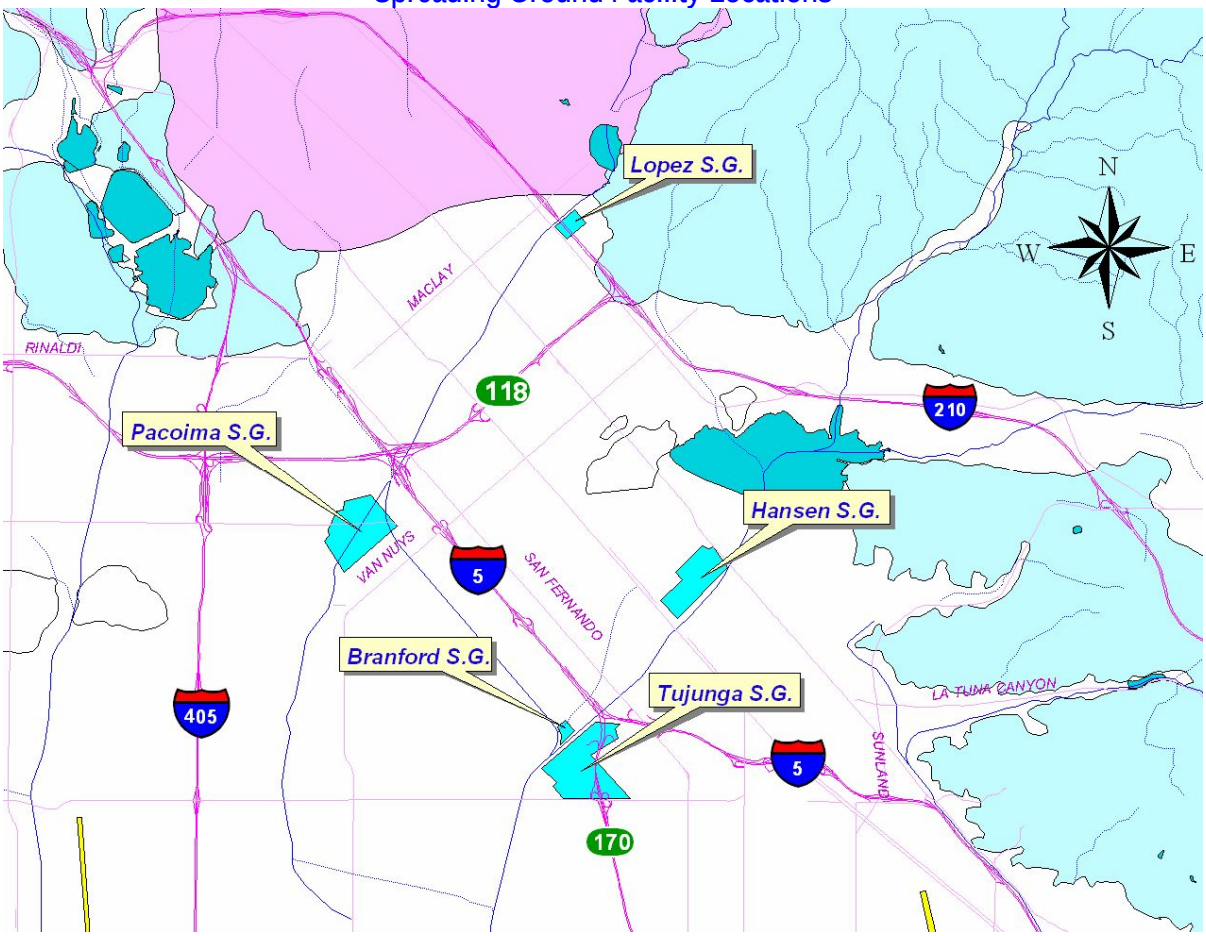


Groundwater Recharge. Groundwater recharge, or the natural process of increasing an aquifer's water content through percolation of surface water, is done in the SFB using captured stormwater and/or imported water. It is more common to spread captured stormwater in the SFB due to its availability in the rainfall season, and because imported water is primarily used to supply direct municipal uses. LADWP coordinates with the Los Angeles County Department of Public Works to recharge the SFB through the spreading of native water. Flood control facilities are the primary means to divert native runoff into the spreading ground facilities listed and mapped in Exhibits 3G and 3H, respectively. A more in-depth discussion on efforts to maximize groundwater recharge within the City is provided in Chapter 5.

Exhibit 3G		
SFB Spreading Ground Facilities		
		Average Annual Spreading*
Facility	Location	(AF)
Branford	Mission Hills, CA	520
Hansen	Sun Valley, CA	14,010
Lopez	Lake View Terrace, CA	540
Tujunga	Sun Valley, CA	3,730
Pacoima	Pacoima, CA	6,590
	Total	25,390

* Annual spreading is dependent on rainfall and will vary from year to year.

Exhibit 3H
Spreading Ground Facility Locations



LADWP has the ability to spread imported supplies at the Tujunga Spreading Grounds (pictured) and the Pacoima Spreading Grounds for storage in the SFB.

Water Quality Issues – San Fernando Basin

As part of its regulatory compliance efforts, LADWP works with the California Department of Health Services (DHS) to perform water quality testing of production wells in the SFB. During testing, trace levels of the contaminants trichloroethylene (TCE), perchloroethylene (PCE), and other volatile organic compounds (VOCs) were detected. The presence of these contaminants is due to improper chemical disposal practices done in the past by numerous companies in the San Fernando Valley that were using such materials.

In the 1990s, detectable amounts of hexavalent chromium and perchlorate were found in various wells within the SFB. Chromium is a heavy metal that has been used in industry for various purposes such as electroplating,

leather tanning, and textile manufacturing, as well as controlling biofilm formation in cooling towers. Perchlorate is an inorganic compound that is most commonly used in the manufacture of rocket fuel, munitions, and fireworks.

Since the 1990s, SFB wells have also shown a trend of increasing nitrate levels. The source of nitrates is the result of decades of agricultural activity in the San Fernando Valley.

While there are water quality challenges, the groundwater management efforts that LADWP undertakes has resulted in all SFB groundwater delivered to customers that meets or exceeds water quality regulations.

LADWP will be undertaking a comprehensive groundwater study for the SFB that will review current and future contaminants of concern. Results from the study may lead to enhanced treatment of groundwater supplies.

Neither hexavalent chromium nor perchlorate has an enforceable drinking water standard at this time. Hexavalent chromium is included in the state total chromium standard of 50 parts per billion (ppb). Perchlorate currently has a State action level of 6 ppb. Perchlorate has also been detected in Colorado River Aqueduct water. DHS is expected to establish drinking water standards for perchlorate and hexavalent chromium in the near future.

Water Quality Operating Goals

LADWP has established operating goals for TCE, PCE, hexavalent chromium, perchlorate, and nitrates that are more stringent than the maximum contaminant levels (MCLs) permitted by Federal or State regulations. These stricter operational limits provide an additional safety margin from these contaminants for City customers. Exhibit 3I summarizes these water quality goals and compares them with the State-regulated requirements, which are generally more stringent than Federal requirements.

LADWP's Water Quality Test Lab

EXHIBIT 3I

OPERATING LIMITS OF REGULATED COMPOUNDS

Compound	State of California Limit	LADWP Operational Goals	LADWP Added Safety Margin
Trichloroethylene (TCE)	5 parts per billion	3 parts per billion	40%
Perchloroethylene (PCE)	5 parts per billion	3 parts per billion	40%
Nitrate (NO_3)	45 parts per million	30 parts per million	33%
Perchlorate (ClO_4)	6 parts per billion	4 parts per billion	33%
Hexavalent Chromium	50 parts per million	30 parts per million	40%

Nitrate is a concern because of its acute effect of impeding the uptake of oxygen to the blood. Infants (who are in the earliest stages of development) are most sensitive to the effects of nitrates. The current standard for nitrate is 45 parts per million (ppm). A single exceedence of the nitrate standard is classified as an acute violation requiring immediate public notification. Treatment for nitrates may eventually become necessary for affected City groundwater supplies.

Groundwater Monitoring

Every well that is pumped to supply water to the City is actively monitored by LADWP as required by DHS. LADWP's groundwater monitoring program is comprised of several distinct components, including:

- monitoring of general minerals annually.
- monitoring of metals, coliform bacteria, inorganics, volatile organic compounds (VOCs) and unregulated compounds such as vanadium, boron, and perchlorate annually, quarterly, or monthly, depending on the levels found in each well.
- monitoring of radiological and synthetic organic compounds (SOCs) every three years.
- monitoring of asbestos every nine years.

Monitoring for all contaminants is performed at entry points into the distribution system in close proximity to where the water is being pumped from the wells. If water quality problems are detected, the well source is immediately isolated and retested.

Groundwater from the SFB is an important component of the City's water supply portfolio, providing needed operational flexibility and reliability for the City's water system. LADWP will take all reasonable measures to monitor, treat, and operate local SFB groundwater to maintain the same high level of quality and reliability that has historically benefited the City.

Groundwater Remediation Measures

LADWP actively coordinates with other agencies and stakeholders to pursue protective and remedial measures for the SFB. The primary parties that are involved with SFB source protection include the DHS, Regional Water Quality Control Board (RWQCB), Department of Toxic Substance Control, and the United States Environmental Protection Agency (EPA).

The DHS, RWQCB, and Department of Toxic Substance Control are the three regulatory agencies with enforcement responsibilities within the SFB. The Regional Water Quality Control Board and the Department of Toxic Substance Control issue enforcement directives for pollutant sites and guide the development of cleanup workplans and cleanup of polluted groundwater sites. The DHS oversees the quality of potable water from groundwater sources.

These three regulatory agencies are participants in the Interagency Coordinating Committee, which also includes representatives of the pollutant sites, water purveyors with SFB entitlements, and the ULARA Watermaster.

The Interagency Coordinating Committee coordinates the implementation measures recommended in the "Groundwater Quality Management Plan—San Fernando Valley Groundwater Basin," which was issued in 1983 to aggressively protect and improve the groundwater in the SFB from volatile organic compounds and other emerging contaminants. Accomplishments under this plan include:

1) Implementation of a City ordinance that requires mandatory sewer connections for commercial and industrial properties in the San Fernando Valley.

2) Acquisition of support and assistance from other agencies in actively protecting the SFB's groundwater (e.g., through its

Underground Storage Tank Program, the Los Angeles Fire Department monitors and tests all underground storage tanks for leaks).

3) Implementation of a solid waste assessment test program by the Regional Water Quality Control Board at all active and inactive landfills to assess the impact of this refuse on groundwater quality, including determination of the presence of other potential pollutants.

In 1987, LADWP entered into a Cooperative Agreement with the EPA to serve as the lead agency in conducting the "Remedial Investigation of Groundwater Contamination in the San Fernando Valley." Under this agreement, LADWP has received more than $23 million in Federal grants from the EPA's Superfund Program to carry out: (1) construction, operation, and maintenance of the North Hollywood Operable Unit, which consists of a groundwater treatment facility and a system of eight production wells (construction completed in 1989); and (2) completion of the Remedial Investigation (RI) to characterize the SFB and the nature and extent of its groundwater contamination. The RI included: (a) the installation in 1992 of 88 shallow and clustered monitoring wells that were developed to monitor contamination plumes of TCE, PCE, and nitrates in the SFB; (b) the development of a groundwater flow model and the preparation of the RI report that was completed for the EPA in 1992; and (c) on-going monitoring for TCE, PCE, nitrates, and emerging contaminants.

Long-Term Action Plans

The City's actions in the SFB seek to maintain the long-term safety and reliability of this local supply. To maximize its use of the SFB as a reliable and essential water supply for the City, the LADWP, in coordination with other agencies, performs various remedial investigations followed by appropriate actions. These actions include water quality monitoring of SFB contaminant plumes, management of production well operations, operation of groundwater treatment facilities, and necessary capital improvements.

Various steps to expand the City's current extraction capability and to improve groundwater quality are underway. The following are some of LADWP's completed, current, and planned projects for the SFB.

North Hollywood Operable Unit. In 1989, the North Hollywood Operable Unit was placed into service with a capacity of 2,000 gallons per minute (GPM), or 3,230 AFY. This facility has one aeration tower with vapor-phase granular activated carbon (GAC) air emissions control system. This technology uses air to remove the VOCs from the groundwater and uses the vapor-phase GAC to remove the VOCs from the air stream that exits into the atmosphere.

Remedial Investigation. In 1992, the RI to characterize the nature and extent of groundwater contamination in the SFB was completed for the EPA. The RI activity included the construction of 88 shallow and clustered monitoring wells, which were developed to monitor contamination plumes of TCE, PCE, and nitrates in the SFB. These monitoring wells are also being used to monitor for emerging chemicals.

Sheldon/Arleta Landfill Recharge Restoration Project – Tujunga Spreading Grounds. In 1998, a Task Force comprised of representatives from LADWP, other City Departments (Bureau of Sanitation, Bureau of Engineering, and Environmental Affairs) and the Upper Los Angeles River Area Watermaster was formed to review the issues surrounding the recharge of groundwater through spreading at the Tujunga Spreading Grounds. The objective of this Task Force was to maximize water spreading at the Tujunga Spreading Grounds without causing off-site landfill gas migration.

The result was the Sheldon/Arleta Landfill Recharge Restoration Project. The project's purpose is to develop and implement various measures to mitigate landfill methane gas migration from the Sheldon-Arleta Landfill, which has restricted the recharge capacity of the Tujunga Spreading Grounds. The measures include the installation of more than 30 gas extraction wells, a flare system to burn off the methane gas, a monitoring system, and other potential site improvements.

Pollock Wells Treatment Plant. In 1999, the Pollock Wells Treatment Plant (pictured) was constructed and placed in service. This project was funded by LADWP, and it includes a groundwater treatment facility with four liquid-phase GAC units. Up to 3,000 gallons per minute (4,840 AFY) of groundwater is treated to remove VOCs before delivery to customers.

Chromium Treatment Research. A cost-effective treatment technology to remove low levels of hexavalent chromium from water does not exist for large scale applications. In 2001, LADWP, along with the Cities of Burbank, Glendale, and San Fernando, and the National Water Research Institute, entered into a research partnership with the American Water Works Association Research Foundation to identify and bench-test new technologies that can remove hexavalent chromium to extremely low levels. This research is being conducted in anticipation of a new standard for hexavalent chromium.

Vulnerability Assessment. LADWP is planning to conduct a comprehensive groundwater vulnerability assessment of the San Fernando Groundwater Basin. LADWP's objective is to maximize the utility of the SFB and to ensure the long-term viability of its groundwater supply. Water quality concerns limit LADWP in its ability to optimize the use of the SFB and may pose a risk to future supplies. The proposed vulnerability assessment will determine the risks and provide recommendations on how LADWP can effectively address these risks to maximize the returns from its groundwater supplies.

Central Basin

LADWP extracts its annual water right of 15,000 AF from the Central Basin from two production well fields. Similar to the SFB, conjunctive use is also practiced here. Planning for construction of new production wells in the Central Basin to replace some of the older wells that are nearing the end of their useful life is underway.

Water Quality Issues – Central Basin

Contaminants of concern in the Central Basin 99th Street Well Field include iron and manganese. Two new wells were drilled in 2003. During the first several months of operation of the new wells, numerous color complaints were received from customers. To address the situation, a corrosion control station was activated utilizing zinc orthophosphate, which improved the water quality. LADWP will continuously monitor water quality at the 99th Street well field, and will evaluate additional treatment if necessary. Hydrogen sulfide is also present at the 99th Street well field but, when chlorinated, is not an imminent threat to the reliability of this well supply.

3.4 Water Recycling

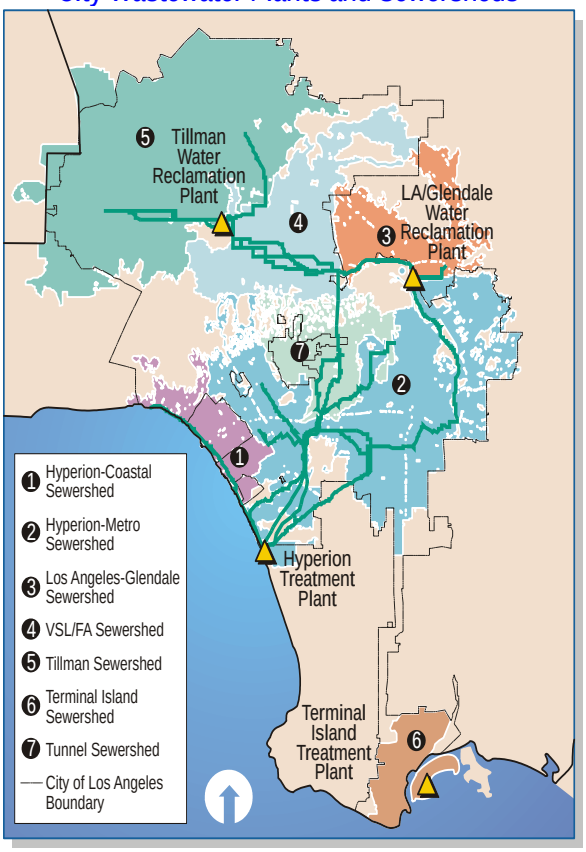
LADWP is committed to integrating recycled water as a significant component of the City's water supply portfolio. Viable opportunities to extend the water recycling program will be explored to fully optimize the benefits of this resource.

LADWP's water recycling program is dependent on the City's wastewater treatment infrastructure. Wastewater in the City of Los Angeles is collected and transported through some 6,500 miles of major interceptors and mainline sewers, more than 11,000 miles of house-sewer connections, 46 pumping plants, and four treatment plants. The Department of Public Works, Bureau of Sanitation (BOS) is responsible for the planning and operation of the wastewater program. Exhibit 3J shows the City's four wastewater treatment plants and seven sewersheds that feed into the plants.

A portion of the treated effluent from the wastewater plants is utilized by LADWP to meet recycled water demands. LADWP is responsible for planning, constructing, and operating recycled water projects.

Early on, the City recognized the potential for water reuse and invested in infrastructure that processed water to tertiary quality, a high treatment standard for wastewater. This resulted in the building of tertiary wastewater treatment plants upstream instead of enlarging the two existing terminus treatment plants.

Exhibit 3J
City Wastewater Plants and Sewersheds



These system enhancements paved the way for the City to expand recycled water projects to supplement local and imported water supplies.

Since 1979, LADWP has delivered recycled water to the Department of Recreation and Parks to irrigate areas in Griffith Park, later expanding to include the golf courses. In 1984, freeway landscaping adjacent to the park was also irrigated with recycled water. BOS operates the Japanese Garden in the Sepulveda Basin, which utilizes recycled water. In addition, the Greenbelt Project, which began operating in 1992, represents LADWP's first attempt to seek non-governmental recycled water customers. Future recycled water projects will attempt to build on the success of prior projects to make recycled water a more prominent component of the City's water supply.

Wastewater Treatment Plants

LADWP utilizes recycled water produced by four wastewater treatment plants owned and operated by the BOS. City wastewater treatment consists of a series of processes that, at a minimum, remove solids to a level sufficient to meet regulatory water quality standards. During the preliminary, primary, secondary, and tertiary treatment processes, progressively finer solid particles are removed. Preliminary treatment removes grit and large size particles through grit removal basins and screening. Primary treatment relies on sedimentation to remove smaller solids. With most of the grit, large sized particles, and solids already removed, secondary treatment converts organic matter into harmless by-products and removes more solids through biological treatment and further sedimentation. At the end of secondary treatment, most solids will have been removed from the water. Tertiary treatment follows secondary treatment to eliminate the remaining impurities through filtration and chemical disinfection. At this stage, sodium hypochlorite (the chemical contained in household bleach) provides disinfection.

All recycled water used within the City is given, at a minimum, tertiary treatment and disinfection. In the Harbor, recycled water is also given advanced treatment with microfiltration/reverse osmosis (MF/RO). MF/RO is a two-stage process using high-pressure membrane filters to remove microscopic impurities from the source water.

Donald C. Tillman Water Reclamation Plant

In service since 1985, the Donald C. Tillman Water Reclamation Plant (Tillman Plant) has a rated capacity of 64 million gallons per day (mgd) [1] and currently treats about 52 mgd. The current level of treatment is Title 22 (tertiary). In the near future, a nitrogen removal (NdN) process will be operational. Currently, this plant is providing recycled water to the Japanese Garden, Wildlife Lake, and Lake Balboa.

[1] Rated capacity of 64 mgd reflects potential reduction from 80 mgd due to nitrification/denitrification (NdN) project.

Donald C. Tillman Water Reclamation Plant

The remaining tertiary-treated water is discharged into the Los Angeles River.

Los Angeles-Glendale Water Reclamation Plant

A joint project of the City of Los Angeles and City of Glendale, the Los Angeles-Glendale Water Reclamation Plant (LA/Glendale Plant) began treating wastewater in 1976. Originally designed without considering nutrient removal, its design capacity is 20 mgd and currently treats about 17 mgd. With a level of treatment of Title 22 plus soon to be implemented nitrogen removal (NdN), the hydraulic capacity could decrease to as low as 15 mgd to meet new regulatory discharge requirements. Recycled water from the LA/Glendale Plant provides landscape irrigation for Griffith Park and the Los Angeles Greenbelt Project. The City of Glendale retains the right to half of the recycled water produced at the plant and serves a number of customers in their service area. As with the Tillman Plant, the remaining tertiary-treated water is discharged into the Los Angeles River.

Terminal Island Treatment Plant

Originally built in 1935, the Terminal Island Treatment Plant has been providing secondary treatment since the 1970s. Tertiary treatment was added in 1996. Water from the plant is currently discharged into the Los Angeles Harbor. With the completion of the Advanced Wastewater Treatment Facility, which will add MF/RO treatment to a portion of the wastewater effluent, this recycled water can be used for seawater barrier and industrial and landscaping uses in the harbor area. Approximately 5 mgd of advanced treated recycled water will initially be produced.

The current wastewater treatment capacity of Terminal Island Treatment Plant is 30 mgd, with average wastewater flows of about 16 mgd.

Hyperion Treatment Plant

Operating since 1894, the Hyperion Treatment Plant (pictured) is the oldest and largest of the City's wastewater treatment plants. Its $1.2 billion construction upgrade, completed in 1999, allows for full secondary treatment. A majority of the treated water is discharged through a 5-mile outfall into the Santa Monica Bay, and the rest is delivered to the West Basin Water Reclamation Plant to meet recycled water demands in the West Basin Municipal Water District (West Basin) service area and parts of the City.

As of 2005, approximately 34,000 AFY of water from Hyperion Treatment Plant is sold to West Basin for additional treatment. A portion of this water is sold back to LADWP for the Westside Water Recycling Project, and the rest is then used to meet recycled water demands in West Basin's service area.

The current capacity of Hyperion Treatment Plant is 450 mgd, with an average wastewater flow of 350 mgd.

Encouraging Recycled Water Use

Following policy established by the State Legislature in 1969, the City's water recycling projects seek to replace potable water where non-potable water is available and can be used instead. According to Chapter 7 and 7.5 of the California Water Code, the quality of this non-potable water must meet all of the following conditions:

- The source of recycled water is of adequate quality for those uses.
- The recycled water may be furnished for these uses at a reasonable cost to the user.
- The use of recycled water from the proposed source will not be detrimental to public health.
- The use of recycled water will not adversely affect downstream water rights or degrade water quality.

In addition, the California Water Code recommends public agencies, such as the LADWP, lead by example in this conversion by requiring them to serve recycled water for non-potable uses if suitable recycled water is available.

Demand for recycled water is based on customer acceptance of this water as a viable alternative to traditional supplies. Outreach efforts educating the public on recycled water and its potential uses are important to this process as the City's recycled water program expands within its service boundaries. LADWP's current focus is on expanded irrigation and industrial/commercial uses of recycled water.

Recycled water flowing into Lake Balboa

LADWP's customer education programs encourage private and public sector use of recycled water for landscape irrigation and industrial/commercial applications. Financial incentives for the use of recycled water are offered through long-term contracts providing an approximate 50 percent discount on potable water charges.

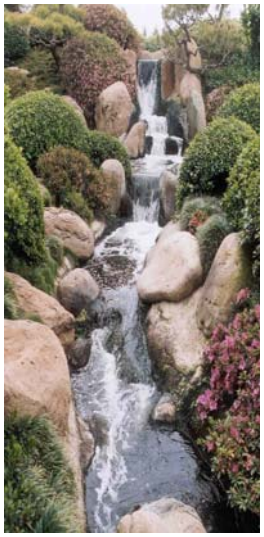
Recycled water is provided to customers only on a contractual basis. These contracts provide reliability and price certainty for customers while enhancing supply reliability for the City. Prior to executing these contracts, the economics of serving each customer desiring recycled water is evaluated to ensure the cost-effectiveness of each incremental expansion of the recycled water distribution system.

Existing Recycled Water Projects

The City has several recycled water projects that are currently providing recycled water for landscape irrigation and commercial uses.

Japanese Garden

The 6.5-acre Japanese Garden is located at the Sepulveda Dam Recreation Area. It receives more than 10,000 visitors per year. The Tillman Plant provides about 4,400 AF of recycled water every year for the lake and landscaping at the Japanese Garden.



Japanese Garden

Wildlife Lake

Located in the Sepulveda Basin, the Wildlife Lake uses about 7,800 AFY of recycled water from the Tillman Plant for wildlife habitat management.

Lake Balboa

Lake Balboa is the centerpiece of the Sepulveda Dam Recreation Area and is a popular recreational facility. About 16,300 AFY of recycled water is provided for this lake from the Tillman Plant.

Griffith Park

Started in 1979, the Griffith Park project was the City's first recycled water project. The LA/Glendale Plant supplies recycled water to irrigate two golf courses (pictured), some parkland, and a seven-mile stretch along the Golden State Freeway adjoining the park.

Los Angeles Greenbelt Project

Dedicated in 1992, the Los Angeles Greenbelt Project was the City's first commercial recycling project. Recycled water supplied by the LA/Glendale Plant is used for landscape irrigation of Forest Lawn Memorial Park-Hollywood Hills, Mt. Sinai Memorial Park, Lakeside Golf Course and MCA Inc. In total, about 1,600 AFY is used for both the Griffith Park and Los Angeles Greenbelt projects. There is a potential for almost doubling the recycled water use in this area.

Westside Water Recycling Project

The Westside Water Recycling Project was initiated in 1996. The City of Los Angeles provides secondary treated water from Hyperion Treatment Plant to the West Basin MWD. West Basin then treats this water to Title 22 standards with its West Basin Water Reclamation Plant, and sells recycled water back to the City. To increase the use of recycled water on the Westside, LADWP has constructed more than five miles of distribution trunk lines to serve Westchester, Los Angeles World Airport, and Playa Vista development areas. Currently, LADWP purchases 350 AF of recycled water from the West Basin for irrigation and industrial uses. This number is expected to increase by as much as 1,850 AFY upon completion of the Playa Vista development.

San Fernando Valley Water Recycling Projects

The East Valley trunkline is the initial backbone of a distribution system to deliver recycled water throughout the San Fernando Valley for irrigation, commercial, and industrial use. State and Federal funding provided 75 percent of the $55 million total cost for the major portion of the distribution system. The San Fernando Valley Water Recycling Projects facilities will provide recycled water to the Sepulveda Basin, South San Fernando Valley, and Hansen Water Recycling Projects, making recycled water available to areas stretching from the Warner Center in Woodland Hills to North Hollywood and to the Hansen Dam Recreation area. Planned projects will supply approximately 10,000 AFY of recycled water to irrigation and industrial users.

LADWP plans to connect large recycled water customers first including the Hansen Dam Recreation Area and the Valley Generating Station in the eastern portion of the San Fernando Valley, and the Sepulveda Basin and Pierce College in the southwestern portion of the Valley. Approximately 4,565 AFY of irrigation demand and 2,500 AFY of industrial demand have been identified, over half of the 10,000 AFY target for recycled water use.

The identified demand includes 2,000 AFY for the Sepulveda Basin Project, 1,000 AFY for the South Valley Project, 2,500 AFY for Hansen Area Phase I, and 1,565 AFY for Hansen Area Phase II. The City anticipates all of these projects will be delivering recycled water by 2010. Smaller users in the vicinity of these projects will be identified and connected to close the gap between the major users already identified and LADWP's recycled water supply target for this region.

Harbor Water Recycling Project

The Harbor Water Recycling Project, currently underway, is a multi-phase project that is developed jointly between LADWP and Bureau of Sanitation. Treated water from Terminal Island Treatment Plant will be used for industrial purposes, as well as groundwater recharge to protect against seawater intrusion. Up to 5,000 AFY is available for recycled water delivery. If determined feasible, the project could be expanded to supply additional recycled water to the City.

Summary of Existing Recycled Water Supply

The City currently uses approximately 1,950 AFY of recycled water for municipal and industrial (M&I) purposes. Recycled water used for M&I purposes reduces demands for imported water supplies for the LADWP service area.

Another 28,500 AFY of recycled water is also used for environmental enhancement and recreation in the Sepulveda Basin, and to provide beneficial flows for the Los Angeles River. Finally, the City delivers approximately 34,000 AFY of secondary-treated wastewater to West Basin Municipal Water District which is then further treated to meet demands within its service area.

Exhibit 3K summarizes the existing recycled water that is produced by the City. The actual existing recycled supply shown is about 17,000 AFY less than the 2005 projection shown in LADWP's 2000 Urban Water Management Plan. This is mainly due to the termination of the groundwater recharge component of the San Fernando Valley Water Recycling Projects and regulatory issues affecting the Harbor project.

Exhibit 3K

Existing Recycled Water Produced by City of Los Angeles

Type of Use Project	Source of Supply	Amount of Supply
Irrigation		
-Griffith Park and LA Greenbelt	LA/Glendale Plant	1,600 AFY
-Westside	Hyperion Treatment Plant/West Basin Water Reclamation Plant	350 AFY
Sub-Total		1,950 AFY
Environmental/ Recreation		
-Japanese Garden	Tillman Plant	4,400 AFY
-Wildlife Lake	Tillman Plant	7,800 AFY
-Lake Balboa	Tillman Plant	16,300 AFY
Sub-Total[1]		28,500 AFY
Wholesale Sales to West Basin Municipal Water District[2]	Hyperion Treatment Plant	34,000 AFY
Total Beneficial Use		64,450 AFY

[1] The water provided to Japanese Garden, Wildlife Lake and Lake Balboa is ultimately discharged into the Los Angeles River and is providing additional environmental benefits.

[2] Secondary treated wastewater provided to West Basin MWD, which is further treated to meet recycled water demands in its service area.

Potential Recycled Water Projects

Estimating Future Demand

LADWP's implementation of recycled water must factor in economics, water quality regulations, and customer and public acceptance. A recycled water system requires construction of pipelines, pump stations, and storage tanks needed to transport treated wastewater or treated runoff to LADWP's water customers. In addition, most water customers do not have dual plumbing systems—meaning separate pipelines for potable and non-potable uses, such as irrigation. Therefore, retrofits for the plumbing system are needed. This can be very expensive depending on the plumbing layout of the water customers.

LADWP's approach for identifying recycled water customers takes into account the following criteria:

- Size of potential customer – by focusing on larger water customers first, smaller customers along the routes can be economically added later
- Type of water use – landscape irrigation and commercial uses usually require less cost (from a treatment standpoint) and regulatory hurdle, whereas some industrial uses or groundwater recharge would very likely require advanced treatment (such as microfiltration and reverse osmosis) and greater levels of public education and acceptance.
- Proximity to existing recycled water system – those potential customers nearest to existing wastewater treatment plants or existing recycled water pipelines would be the least expensive to serve because of the distribution cost (pipelines, pump stations, etc.).
- Willingness to use recycled water – not all potential water customers have a desire to use recycled water, and many base the decision to use such water on cost and/or reliability—meaning in most cases the City may need to provide proper financial incentives.

The potential types of recycled water users can be summarized into three main categories:

- Landscape irrigation for large users such as golf courses, cemeteries, parks, master planned communities, and other large developments.
- Industrial use for cooling towers, recirculation and process water.
- Groundwater recharge for seawater intrusion barrier and indirect potable use, which will require advanced treatment and public acceptance.

Exhibit 3L presents these potential recycled water demands based on actual and projected data and potential customers.

Exhibit 3L

Potential Recycled Water Demand[1]

Demand Category	Number of Potential Recycled Water Customers	Ultimate Potential Recycled Water Demand (AFY)
Industrial	30	8,500
Irrigation	2,342	93,500
Seawater Barrier	1	5,000
Total	2,373	107,000

[1] Potential recycled water demands do not include demands to maintain minimum required flows necessary for maintaining habitats within the River.

Source: City of Los Angeles IRP Facilities Plan Volume 2: Water Management (based on potential recycled water customers within the Tier 1 area as shown in Exhibit 3M)

These potential recycled water customers are mapped in Exhibit 3M to show their proximity to LADWP's existing recycled water system. Each circle on the map represents a potential recycled water customer. The size of the circle indicates the potential water demand (i.e., the bigger the circle, the bigger the demand). The pink shaded areas represent the Tier 1 potential for recycled water—the customers in these areas are the closest to the existing (or immediately planned) recycled water system. The green shaded areas represent the Tier 2 potential for recycled water—the customers in these areas are further away from the existing (or immediately planned) recycled water system. In general, the Tier 1 customers would be less expensive to serve than the Tier 2 customers.

Exhibit 3M shows four areas of the City where delivery of recycled water is most economical:

- San Fernando Valley – Tier 1 recycled water demand potential of 14,200 AFY, and a Tier 2 potential of 42,400 AFY.
- Central City – Tier 1 recycled water demand potential of 2,000 AFY, and a Tier 2 potential of 29,500 AFY.
- Westside – Tier 1 recycled water demand potential of 4,000 AFY, and a Tier 2 potential of 14,300 AFY.
- Harbor – Tier 1 recycled water demand potential of 9,300 AFY, and a Tier 2 potential of 10,900 AFY.
- Total – Tier 1 recycled water demand potential is 29,500 AFY, while the Tier 2 recycled water demand potential is 97,100 AFY.

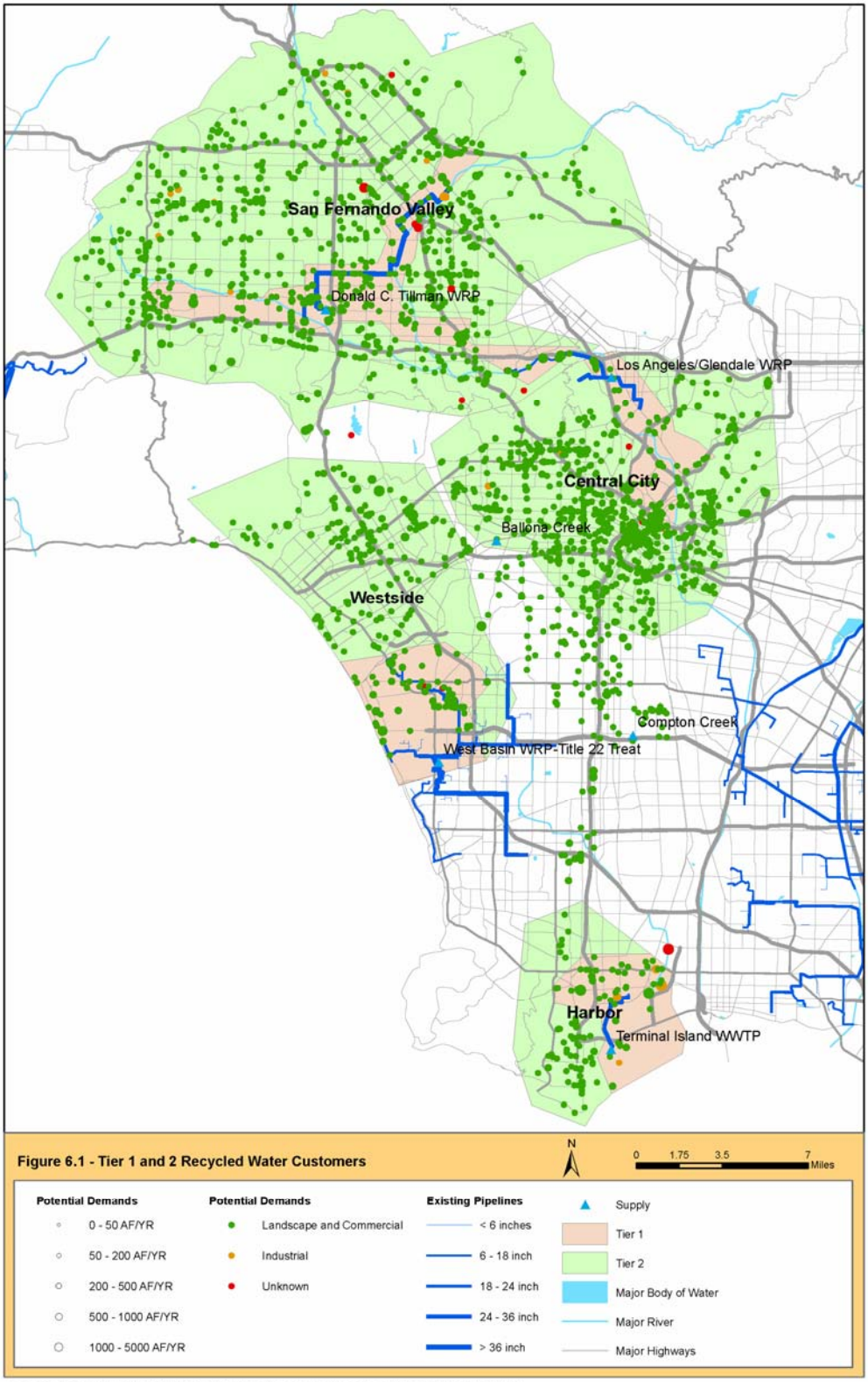
There are approximately 160 water customers that are a considerable distance from existing or planned City facilities and, therefore, do not meet Tier 1 or Tier 2 criteria. Their cumulative demands account for about 10,000 AFY.

It should be noted that this potential recycled water demand does not factor in the availability of recycled water. Wastewater flows (current and projected) and plant capacities could limit the amount of water that is available for all of the City's water resources activities and functions (see Chapter 4 for a complete discussion of the City's IRP). The IRP has identified planning parameters that will result in the need for new programs, infrastructure, and facilities to meet the water resources needs by 2020. These planning parameters, or drivers, include population growth, increased wastewater flows, increased dry and wet weather runoff flows, increased demands for drinking water, and current and future regulations to protect water quality in the local watersheds.

To meet the 2020 needs, the IRP needed to develop integrated solutions, which combined wastewater, recycled water, and runoff options into comprehensive water resources alternatives. By using an integrated watershed or holistic approach to water resources planning, more effective solutions were identified.

After an intensive planning process that involved stakeholders (who represented communities, environmental interests, businesses, and government officials) 21 initial alternatives were narrowed down to four draft alternatives. These alternatives propose to maximize the potential for beneficial use of recycled water and urban runoff, optimize the use of the City's existing facilities and water resources, reduce pollution, and lessen LADWP's dependency on imported water. These four draft alternatives are now being evaluated under the California Environmental Quality Act (CEQA), where an Environmental Impact Report (EIR) will be completed.

Exhibit 3M
Potential Recycled Water Customers



IRP Planning

To help plan future water, wastewater, runoff, and recycled water facilities, LADWP has partnered with the City's Bureau of Sanitation in developing an IRP that explicitly recognizes the complex relationships that exist.

The alternatives consider three basic parameters: (1) location and type of treatment for wastewater expansion; (2) amount of recycled water; and (3) the amount of urban runoff managed, and how much urban runoff could potentially be beneficially reused for water supply. These recommended draft alternatives include:

- Alternative 1: Hyperion Treatment Plant expansion with moderate potential for water resources projects (i.e., recycled water and beneficial reuse of urban runoff).
- Alternative 2: Tillman Plant and LA/Glendale Plant expansions with high potential for water resources projects.
- Alternative 3: Tillman Plant expansion with moderate potential for water resources projects.
- Alternative 4: Tillman Plant expansion with high potential for water resources projects.

The four draft IRP alternatives have different ultimate wastewater plant capacities, based on wastewater flow projections, existing plant capacities and expansion potential, and water quality regulations. Exhibit 3N summarizes the available water quantity and level of treatment under these alternatives.

The additional potential recycled water supply for the draft IRP alternatives is shown in Exhibit 3N. Supply numbers shown do not include existing recycled water supply shown in Exhibit 3K. This potential new supply is based on: (1) the potential recycled water demands in Exhibit 3L; (2) the projected wastewater quantity shown in Exhibit 3N; (3) the cost of the alternatives; and (4) public acceptance. It should be noted that this represents only the maximum potential recycled water supply, and not necessarily what will be implemented due to the many factors discussed previously.

Preliminary cost estimates were developed during the IRP process for each of the draft alternatives. Exhibit 3P presents capital costs for the recycled water portion of each of the alternatives. Exhibit 3Q shows where these potential recycled water projects could be located.

Groundwater Recharge Potential

The East Valley Water Recycling Project was to have been the City's first project to use recycled water for recharging groundwater supplies in the San Fernando Groundwater Basin. The project was to use 10,000 AF of recycled water from the Tillman Plant to recharge the local groundwater supply with a goal of expanding the recharge capacity to 32,000 AF of recycled water by 2020. Safeguards were included in the construction of project that would allow extracted groundwater to exceed standards required by the California DHS by tenfold. As a result of public opposition prior to operation of the project, the project was altered to not use recycled water to recharge groundwater but instead focus on using the water for non-potable demands. The project was fully funded, designed, and constructed prior to this policy change.

Currently, LADWP recycled water planning focuses on non-potable uses such as landscape irrigation and industrial use. However, public comments during the scoping process for the City's IRP recommended that alternatives to be studied in the IRP's EIR should include groundwater recharge with recycled water. Groundwater recharge with recycled water is a technically feasible option consistent with the objectives of the IRP and, thus, is a reasonable alternative that merits consideration in the EIR. As a result, groundwater recharge with recycled water is being included in the EIR as a potential option to development of non-potable uses of recycled water. The IRP has identified the potential to use up to approximately 33,600 AFY of advanced treated (microfiltration, reverse osmosis, and ultraviolet disinfection) recycled water for groundwater recharge, similar to Orange County's Ground Water Replenishment System presently under construction.

Although the City has not decided to implement groundwater recharge with recycled water, the groundwater recharge option will be included in the EIR to comply with CEQA, which requires that a reasonable range of alternatives be considered. If the City decides to pursue groundwater recharge with recycled water, further environmental documentation under CEQA would occur, along with extensive public outreach in conjunction with a coordinated permitting process through the DHS and the Regional Water Quality Control Board.

Exhibit 3N

Summary of Potential Additional Recycled Water Supply for the IRP Draft Alternatives

Plant	Level of Treatment	Area of Use	Type of Use	Recycled Water Supply (AFY)			
				Alt 1	Alt 2	Alt 3	Alt 4
Tillman	Advanced Treatment (MF/RO)	San Fernando Valley	Industrial & Irrigation	11,400	17,600	20,800	25,500
LAGWRP	Title 22 w/ nitrogen removal	Downtown	Irrigation	5,400	10,400	2,800	5,400
Hyperion	Secondary with Title 22[1]	Westside	Irrigation	12,500	12,500	12,500	12,500
Terminal Island	Title 22 and Advanced Treatment (MF/RO)	Harbor	Industrial & Irrigation, Seawater Barrier	9,400	9,400	4,000	9,400
Sub-Total for Wastewater Recycled Supply				38,700	49,900	40,100	52,800
Urban Runoff Plants	Title 22	Ballona and Compton Creeks	Irrigation	3,300	3,300	3,300	3,300
Total Potential for Recycled Supply (Wastewater & Urban Runoff)				42,000	53,200	43,400	56,100

[1] Title 22 treatment provided by West Basin Water Reclamation Plant, using Hyperion's full secondary treated effluent.

Source: IRP Facilities Plan, Volume 4: Alternatives Development and Analysis, July 2004

Exhibit 3O					
Wastewater Quantity and Treatment for IRP Draft Alternatives					
Treatment Plants		Existing	Alternative 1	Alternative 2	Alternative 3 & 4
Tillman	Capacity	64 mgd	64 mgd	80 mgd	100 mgd
	Level of treatment	Title 22 with Nitrification & Denitrification	Advanced Treatment	Advanced Treatment	Advanced Treatment
LAGWRP	Capacity	15 mgd	15 mgd	30 mgd	15 mgd
	Level of treatment	Title 22 with Nitrification & Denitrification	Current + added diurnal storage	Advanced Treatment	Current + added storage
Hyperion	Capacity	450 mgd	500 mgd	450 mgd	450 mgd
	Level of treatment	Secondary	Current + new digesters	Current + new digesters	Current + new digesters
Terminal Island	Capacity	30mgd	30 mgd	30 mgd	30 mgd
	Level of treatment	Advanced Treatment	Advanced Treatment	Advanced Treatment	Advanced Treatment
Total		559 mgd	609 mgd	590 mgd	595 mgd

Advanced treatment includes microfiltration and reverse osmosis (MF/RO).

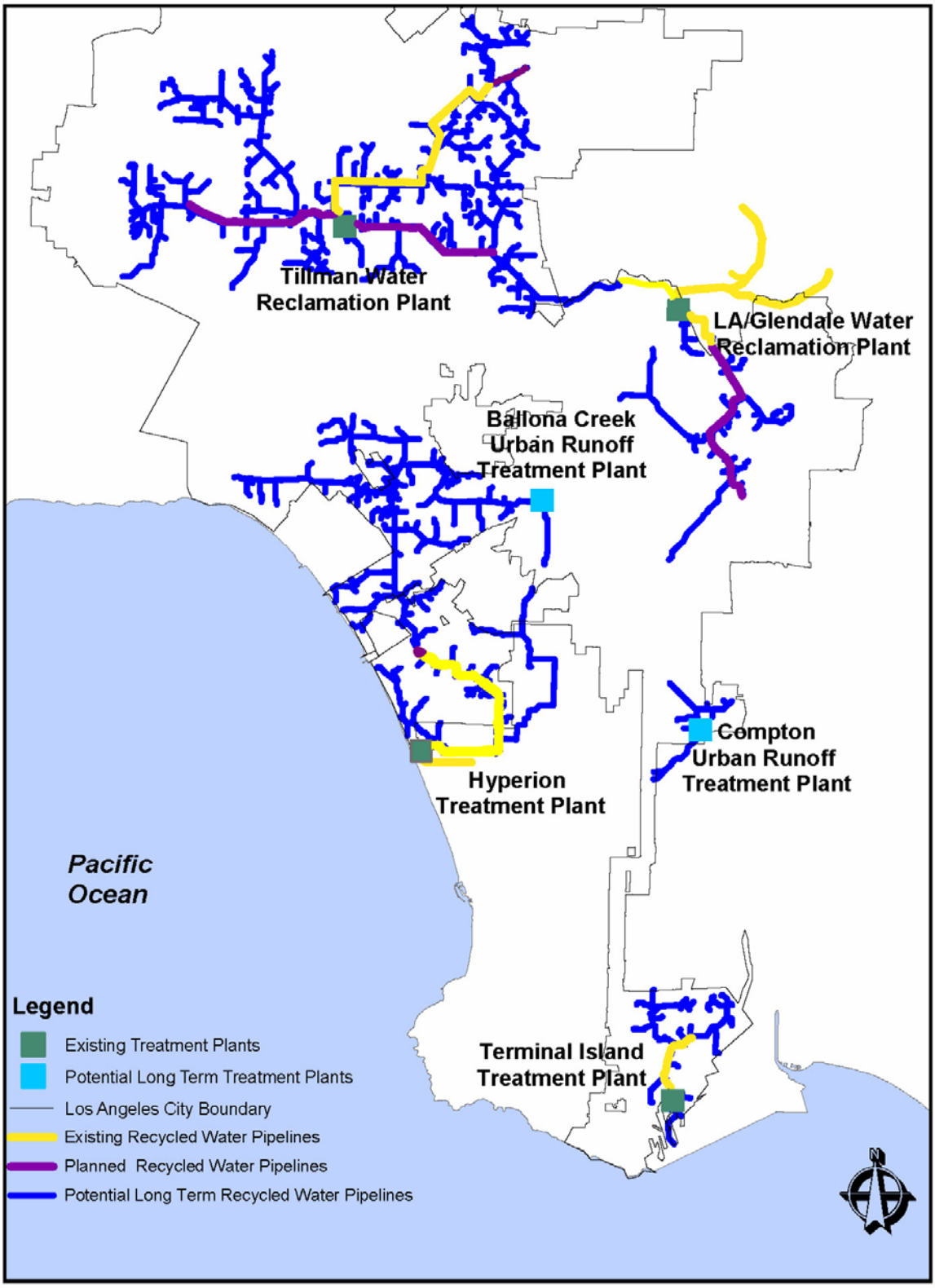
Source: IRP Facilities Plan, Volume 4: Alternatives Development and Analysis, July 2004

Exhibit 3P	
Recycled Water Cost Estimates for IRP Draft Alternatives	
IRP Draft Alternative	Estimated Capital Cost[1] ($ millions)
1	$375
2	$515
3	$443
4	$544

[1] Costs shown are 2002 estimates.

Source: IRP Facilities Plan, Volume 4: Alternatives Development and Analysis Appendix Q, July 2004

Exhibit 3Q
Location of Existing, Planned, and Potential Recycled Water Projects



Summary of Planned and Potential Recycled Water Supply

Based on current assumptions regarding cost, treatment technology, regulations, and public acceptance, LADWP is moving forward with a capital improvement program for recycled water that will make progress towards meeting Tier 1 recycled water demands (see Exhibit 3M). This planned recycled water program will provide approximately 29,500 AFY of additional recycled water supply.

LADWP will assess the provision of additional recycled water to its customers beyond the planned projects based on a number of key factors:

- The outcome of the CEQA phase of the City's IRP, where a preferred alternative for wastewater and stormwater will be selected.
- The outcome of future water quality regulations regarding discharge into the Los Angeles River and other related regulations concerning the use of recycled water.
- Cost and technology of treatment and distribution.
- Availability of state and federal funding.
- Willingness of LADWP ratepayers to subsidize recycled water development.
- Customer acceptance of recycled water.

Exhibit 3R summarizes the existing, planned, and potential range of recycled water supply for M&I purposes within LADWP's service area, exclusive of environmental benefits and wholesale water deliveries to West Basin MWD. The planned recycled water supply is based on LADWP's current capital improvement program. The potential recycled water supply is based on the four draft alternatives developed in the City's IRP.

Recycled Water Quality

All recycled water provided by LADWP meets at least Title 22 standards. Title 22, Chapter 4, of the California Code of Regulations establishes water quality standards and treatment reliability criteria for water recycling to ensure public safety. Title 22 standards are achieved with tertiary treatment and disinfection.

Advanced wastewater treatment is currently provided at the Terminal Island Treatment Plant. Advanced treatment, which includes microfiltration and reverse osmosis, removes many of the impurities remaining after tertiary treatment and disinfection. Water treated with advanced treatment techniques has the potential to be used for seawater barriers and groundwater recharge. Exhibit 3S summarizes the level of treatment provided by each of the City's wastewater treatment plants.

The different IRP alternatives will result in different levels of wastewater treatment at the various plants providing recycled water. All four alternatives will provide advanced treatment at the Tillman Plant facility if dictated by future regulations.

Agency Coordination and Funding

The development of recycled water projects for LADWP's service area requires coordination with the following agencies and cities:

- Los Angeles Department of Public Works Bureau of Sanitation – operates the wastewater and water recycling plants for the City.
- City of Glendale – co-owns the LA/Glendale Plant with the City.
- West Basin MWD – treats full secondary treated water from the Hyperion Treatment Plant to Title 22 standards and then provides recycled water back to the City to meet Westside demands.
- Metropolitan Water District of Southern California – provides financial incentives for recycled water projects in southern California.
- To encourage recycled water use within the City, LADWP provides services to help potential customers with facility retrofits, provides financial incentives on water rates, and public education.

Exhibit 3R						
Summary of Existing, Planned, and Potential Recycled Water Supplies Used for Non-Potable Municipal & Industrial Purposes[1]						
	Volume (AFY)					
	2005	2010	2015	2020	2025	2030
Existing	1,950	1,950	1,950	1,950	1,950	1,950
Planned		15,000	18,000	20,000	25,000	29,000
Sub-Total	1,950	16,950	19,950	21,950	26,950	30,950
Potential				20,050 to 34,150	15,050 to 29,150	11,050 to 25,150
Sub-Total with Potential [2]				42,000 to 56,100	42,000 to 56,100	42,000 to 56,100

[1] These recycled water supplies offset the demand for imported water within LADWP's service area, but do not include recycled water used for environmental benefits or delivered to West Basin MWD (see Exhibit 3K).

[2] Represent the potential recycled water supplies that could be available with implementation of the City's Integrated Resources Plan (IRP).

Exhibit 3S				
Wastewater Treatment Operations				
		Influent Flow (MGD)		
Treatment Plant	Location	Average	Maximum	Treatment Provided
Hyperion/West Basin	Playa Del Rey, CA	350	450	Full Secondary/Tertiary; Title 22 standards
Donald C. Tillman	Van Nuys, CA	52	64	Tertiary; Title 22 standards
LA/Glendale	Los Angeles, CA	17	20	Tertiary; Title 22 standards
Terminal Island	San Pedro, CA	16	30	Tertiary; Title 22 standards Advanced Treatment for 5 MGD
Total		435	564	

Capital costs for planned recycled water projects can be financed by the sources identified below, as well as other sources as they become available.

- Water Rate Adjustment – The City Ordinance includes rate adjustments to fund conservation and recycling projects (see Appendix C).
- MWD Local Resources Program Incentive – To qualify, proposed recycled water projects by member agencies must cost more than projected MWD treated, non-interruptible water rates and reduce potable water needs. Since founding MWD with other municipal water utilities in 1928, the City has been a member agency of MWD and is therefore considered for rebates of up to $250/AF offered under the program.
- Other Funding – LADWP will seek other State and Federal assistance when funds become available. For example, water bonds like Propositions 40 and 50 can provide funding for critical multi-benefit recycling projects.

LADWP will continue its efforts to take advantage of available opportunities to develop and maximize the use of recycled water in the most efficient and cost-effective manner for the City.

Implementation Challenges

As expected for any emerging water resource in California, implementation of LADWP's recycled water program has been very challenging. The most formidable challenge has been to using recycled water for recharge of the San Fernando groundwater basin. While scientific studies and similar applications have proven the safety and reliability of this use of recycled water, public perception and acceptability of this option was low, resulting in LADWP suspending operations of the East Valley Water Recycling Project in 2000.

Increasingly more stringent water quality regulations for recycled water and concerns regarding potential for trace amounts of presently unregulated compounds in recycled water (such as pharmaceuticals) also threatens the utility of this resource, and may result in requirements for costly treatment such as reverse osmosis.

LADWP believes in the safety and reliability of its recycled water program. Lessons learned from the past enforce the need for more extensive public outreach and education early in the planning process. By participating in the City's IRP for wastewater, recycled water, and stormwater, significant strides have been made to bring stakeholders to the table and engage in open discussions about the prudent path for the City's recycled water program.

LADWP will also continue to work with the regulatory agencies and other stakeholders to ensure recycled water quality criteria that are protective of the public's safety while minimizing the cost of implementation to the consumers.

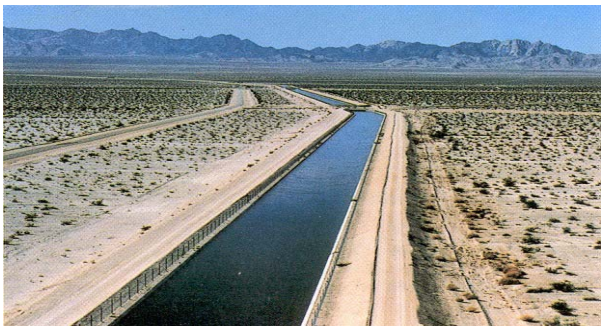
3.5 Metropolitan Water District of Southern California

Diamond Valley Lake

MWD is the largest water wholesaler for domestic and municipal uses in California. MWD owns and operates the Colorado River Aqueduct (CRA), and is a contractor for water from the California State Water Project (SWP). The City of Los Angeles purchases water from MWD to supplement its supplies from local groundwater, the LAA, and recycled water. The City is one of 26 MWD member public agencies.

LADWP has historically purchased MWD water to make-up the deficit between demand and other City supplies. The City has made significant investments in MWD and will continue to rely on the wholesaler to meet its current and future supplemental water needs.

The Colorado River



Colorado River Aqueduct

The State of California has a basic apportionment of 4.4 million AF of Colorado River water. Historically, California had been taking over a million AF more than its basic apportionment. This was allowed by the Bureau of Reclamation (who manages the river) under surplus provisions. California was also benefiting from apportioned, but unused water by Arizona and Nevada.

Although MWD's basic apportionment of Colorado River is 503,000 AF, MWD has historically (up until a few years ago) been able to use surplus and unused apportioned water to keep the CRA full at 1.2 million AF.

Over time, MWD and the State of California acknowledged that they would receive less Colorado River water in the future than they had in the past. Because of dry years on the Colorado River system and Arizona and Nevada using their full apportionment, the U.S. Secretary of Interior asserted that California must come up with a plan to live within its 4.4 million AF apportionment.

Therefore, users from California have developed California's Colorado River Water Use Plan (California Plan). The users included: MWD, the San Diego County Water Authority (SDCWA), Palo Verde Irrigation District (PVID), Imperial Irrigation District (IID), and Coachella Valley Water District. This plan identifies actions that California will take to operate within its 4.4 million AF entitlement. A critical component of this plan was completion of the Quantification Settlement Agreement (QSA), which established baseline water use for each California party with Colorado River water rights. Completion of the QSA facilitates the transfer of water from agricultural agencies to urban water suppliers by allowing water conserved on farm land to be made available for urban use.

Along with MWD's basic apportionment, MWD has developed a number of water supply programs, such as agricultural water transfers and storage programs. Currently developed programs will provide MWD with approximately 1.13 million AF by 2020. Proposed programs could add another 300,000 AFY. Exhibit 3T summarizes MWD's CRA supply by 2020.

Exhibit 3T
MWD's CRA Supply: 2020-2030
(Thousands of AF)

Supply Source	Annual Deliveries	Project Status
Basic Apportionment	503	Current
IID/MWD Conservation	85	Current
Coachella & All American Canal Lining Projects	78	Current
SDCWA/IID Transfer & MWD/SDCWA Exchange	200	Current
PVID Land Management Program	111	Current
Hayfield Groundwater Storage	150	Current
Sub-Total of Current Programs	1,127	
Lower Coachella Storage Program	150	Under Development
Chuckwalla Storage Program	150	Under Development

The State Water Project

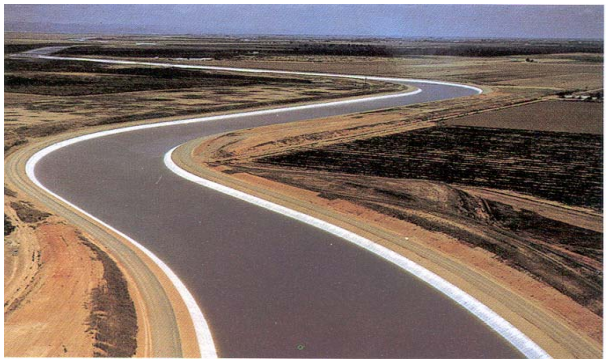
MWD began receiving water from the SWP in 1972. MWD is the largest contractor for water from the SWP, holding a contract for 2.01 million AF of the project's 4.23 million AF ultimate delivery capacity. Variable hydrology and environmental issues in the San Francisco Bay/Sacramento-San Joaquin River Delta (Bay-Delta) can reduce the quantity of water that the SWP delivers to MWD. MWD projects a minimum dry-year supply from the SWP of 650,000 AF, and average annual deliveries of 1.5 million AF. These amounts do not include water from transfer and storage programs along the SWP.

The Bay-Delta is a major waterway for water delivered to southern California. The Harvey O. Banks Pumping Plant, which is the primary feeder of water into the SWP, is located in the south delta. The Bay-Delta also serves as habitat for various species of fish, some of which have been placed on the endangered species list. The competing needs of the fishery population, agricultural, and urban users are exacerbated during dry years when water to meet the needs of both people and the environment is in short supply.

CALFED, an association of State and Federal agencies, has been working on balancing the competing needs and developing options to provide a long-term solution to the various Bay-Delta problems. CALFED has been attempting to implement actions that are consistent with the principles of the 1994 Bay-Delta Accord. These efforts seek to address restoration of the Bay-Delta ecosystem, water quality improvement, water supply enhancement, and assurance of long-term supply reliability for agricultural and urban uses.

The California Bay-Delta Authority was created in 2003 to oversee implementation and coordination of the program. The Bay-Delta Authority is led by the Governor of California and the United States Secretary of the Interior. Representatives from State and Federal agencies, the public, and the State Legislature make up the remaining membership of the group.

MWD's IRP goal is to receive a minimum of 650,000 AF during dry years from the State Water Project. MWD's policy objective includes receiving a yearly average of 1.5 million AF of supply, exclusive of transfers and storage programs along the State Water Project. Additional transfer and storage programs that are current or under development are projected to yield up to 445,000 AFY into MWD's service territory.



California Aqueduct

LADWP supports MWD in its efforts to receive the highest degree of water supply reliability and quality from the State Water Project.

Storage and Water Transfers

Since the completion of its first IRP in 1996, MWD has developed and implemented a number of storage projects and water transfers. These projects and programs have been beneficial in ensuring MWD's reliability despite reductions in CRA deliveries due to the implementation of the California Plan.

A summary of these projects and programs are as follows:

- Diamond Valley Reservoir – An 800,000 AF surface reservoir used for drought and emergency situations.
- Various Conjunctive Use Programs – A variety of groundwater conjunctive use and groundwater storage programs have been or are being developed between MWD and its member agencies that will provide up to 275,000 AF of dry-year yield.

- Palo Verde Irrigation District Land Management Program – A water transfer that can provide up to 111,000 AFY of supply for the CRA.
- Hayfield Storage Program, Mojave Desert – A groundwater conjunctive use project that can provide up to 150,000 AFY of supply for the CRA.
- Arvin-Edison Program, Kern County – A groundwater banking program that can provide up to 90,000 AFY to augment SWP supplies.
- Semitropic Program, Kern County – A groundwater banking and exchange program that can provide up to 107,000 AFY to augment SWP supplies.
- San Bernardino Valley MWD Program – A groundwater conjunctive use program that can provide up to 20,000 AFY.

A full list of MWD's storage projects and transfer programs can be found in MWD's 2003 IRP Update Report and MWD's 2005 Regional Urban Water Management Plan.

MWD Integrated Resources Plan

In July 2004, MWD approved its 2003 IRP Update report. The report, which updated the 1996 IRP, sought to accomplish the following goals: (1) review the goals and achievements of the 1996 IRP; (2) identify changed conditions for water resource development; and (3) update MWD's resource targets through 2025. MWD has subsequently updated its resource targets through 2030 to accommodate its member agencies that are required to develop water supply assessments for large developments, pursuant to California law.

The 2003 IRP update concluded that the resource targets identified in the 1996 IRP, taking into consideration changed conditions identified since that time, will continue to provide for 100 percent reliability through 2025. MWD's subsequent evaluations to extend the resource targets by an additional five years also concluded the same full reliability during average, single dry, and multiple dry years. MWD's long-term water resources planning through the IRP is more fully discussed in Chapter 4.

Local Resources Incentives

Local project assistance has been provided by MWD to its member agencies since 1982. Assistance is primarily in the form of funding, with MWD providing incentives to member agencies for developing conservation, water recycling, groundwater storage and replenishment, or by conjunctive use operations (i.e., the coordinated use of surface and groundwater supplies).

MWD has committed to providing financial incentives to nearly 80 projects in southern California that are expected to produce approximately 320,000 AFY by the year 2025. Additionally, MWD's seawater desalination incentive program will provide an incentive payment of up to $250 for each AF of water produced. This subsidy will assist member agencies planning to build seawater desalination facilities developing up to 150,000 AF of potable water annually. LADWP is one of the five member agencies with plans to develop a seawater desalination program. Coupled with MWD's local conservation subsidies and acquisition of imported water, the Local Resources Program is an effective option to keep up with increasing demands within the region.

Water Quality - MWD Supplies

Water quality is a central consideration in MWD's long-term water resources planning activities. There are many water quality issues of concern to MWD. These include salinity, disinfection by-products formed by disinfectants reacting with bromide and total organic carbon in SWP water, methyl tertiary butyl ether in groundwater, N-nitosodimethylamine in groundwater and treated surface waters, hexavalent chromium in groundwater, perchlorate in Colorado River and local groundwater supplies, arsenic, and radon.

MWD is proactive in preserving and improving the quality of water it serves to its member agencies. These activities are a key component of MWD's water supply reliability

efforts, and contain specific programs, activities, and actions that address the following issues:

- Installation of ozone treatment systems in order to address disinfection by-products (treatment systems will also address potential formation of bromates).
- Imported water source control and salinity reduction.
- Distribution system salinity management actions.
- Collaborative actions with other agencies.
- Local salinity management actions to protect groundwater and recycled water supplies.

Water quality impacts have been considered by MWD in developing its water supply mix reported in its 2004 IRP update. Additional information regarding MWD's water quality issues is available in MWD's 2005 Regional Urban Water Management Plan.

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Chapter 4

integrated resources planning

Chapter Four
Integrated Resources Planning

4.0 Overview

Integrated resources planning is a process that is being used by many water and wastewater providers to meet their future needs in the most effective way possible, and with the greatest public support. The planning process differs from traditional planning processes in that it incorporates:

- public stakeholders in an open, participatory process.
- multiple objectives such as reliability, cost, water quality, environmental stewardship, and quality of life.
- risk and uncertainty.
- partnerships with other agencies, institutions, and non-governmental organizations.

LADWP has been actively involved in integrated resources planning since 1993, when the MWD initiated the region's first IRP. LADWP was an active member of the technical workgroup that oversaw the development of alternatives and recommendations from MWD's IRP. In 1999, the City embarked on its first IRP for wastewater, stormwater and water supply. The LADWP is an active partner in this effort, working with the City's Bureau of Sanitation (BOS).

4.1 Integrated Resources Plan for the City of Los Angeles

The City is currently in the process of completing an IRP utilizing a unique approach of technical integration and community involvement to guide water resources policy decisions and facilities planning. The IRP recognizes the interrelationship of water, wastewater, and runoff management in forming a future vision for the City's water resources activities and functions. In the past, the City traditionally utilized single-purpose planning efforts for each agency, such as one plan for wastewater and a separate plan for water supply. With the IRP, the City can meet its long-term needs in a more cost-effective and sustainable way by addressing and integrating all its water resources. Additionally, the IRP is designed to meet multiple objectives, including evaluation of innovative supply opportunities that were once thought of as being too expensive. The City's LADWP and BOS are partners in this effort, joined by public stakeholders and other agencies.

The objectives for the IRP were developed by the City and public stakeholders, and represent the major reasons why the plan is being developed. These objectives are:

- Protect Public Health and Safety.
- Effectively Manage System Capacity.
- Protect the Environment.
- Enhance Cost Efficiency.
- Protect Quality of Life.
- Promote Education.

The IRP is being developed in three phases. The first phase set policy guidelines for managing the City's water resources for the next 20 years. The second phase represents the development of detailed facility plans for wastewater, stormwater, and recycled water. The recommended alternatives from these facility plans are being evaluated in the EIR process. The second phase of the IRP is anticipated to be completed by fall 2006. The third phase of the IRP will represent implementation of the facility plans, and will conduct detailed studies to support implementation.

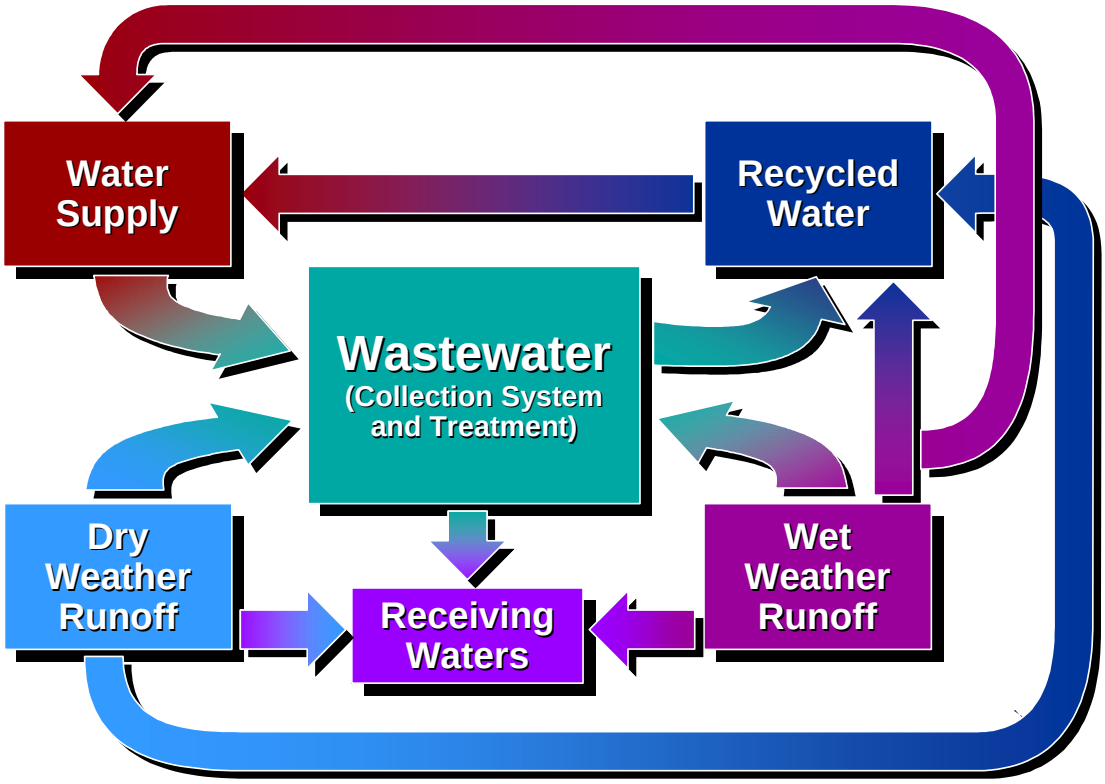
Integrated Watershed Approach

By taking an integrated watershed approach, the IRP identifies opportunities that would have normally not been identified if water, wastewater, and stormwater were planned separately. The IRP recognizes that all of the City's water resources are linked from a technical, social, and institutional aspect, as shown in Exhibit 4A.

The City's IRP has also assisted in identifying partnerships between City agencies for project implementation potentially leading to increases in outside funding from grants and low-interest loans.

An example is a potential partnership between the City's BOS and LADWP on the use of smart irrigation controllers. These irrigation controllers provide multiple benefits through water savings and dry weather urban runoff reduction. The reduction in dry weather runoff, in turn, will assist in compliance with new Total Maximum Daily Load (TMDL) requirements for urban runoff. An integrated partnership with the BOS Watershed Protection Division, which is charged with meeting new TMDL regulations for the City, and LADWP will allow the City to better position itself for grants and loans that typically prioritize projects that demonstrate multiple benefits.

Exhibit 4A
Interrelationships Between City's Water Resources



Stakeholder Involvement

A key element of the IRP is involvement of stakeholders (pictured) at the beginning and throughout the entire IRP process. Stakeholders represent a wide range of the City's interests including, but not limited to, community, business, and environmental organizations. Stakeholders were instrumental in development of the guiding principles and identification of innovative water resource opportunities.

During Phase 2, stakeholders participated in a Steering Group. Steering Group members regularly attended scheduled workshops and provided on-going input on the technical, environmental, and financial development of the IRP. Members provided necessary feedback to keep the facilities planning efforts aligned with the decision-making process. The Steering Group also considered key project issues in regards to the development of alternatives, such as facilities siting, implementation risks, and acceptability of costs that will invariably arise during the project.

IRP Alternatives

The IRP evaluated a broad range of integrated alternatives. Each alternative represented different combinations of wastewater treatment options, wastewater collection system options, recycled water options, conservation options, and dry and wet weather urban runoff management options.

Twenty-one (21) preliminary alternatives were created with different focuses, allowing stakeholders and decision-makers to see trade-offs in key planning objectives. Based on the evaluation of the preliminary alternatives, nine (9) hybrid alternatives were created that incorporated the best elements from the preliminary alternatives in order to improve overall performance. City staff recommended the top-scoring four (4) hybrid alternatives to be carried through to the EIR process. Public stakeholders concurred with staff recommendations. Exhibit 4B summarizes the four IRP alternatives now being evaluated in the EIR process.

Los Angeles River

The Los Angeles River (River) is a valuable resource to the City providing habitat as well as recreational and economic opportunities. Since the City's water reclamation plants were built, recycled water has been released to the River resulting in the development of significant environmental benefits from riparian habitat in the unlined portions of the River near Glendale, to regionally significant migratory shore bird habitat in Long Beach. As a result of the need to protect existing habitat and interest in habitat restoration and river revitalization, there will be a continued need for discharge of recycled water into the River.

IRP planning efforts established that a minimum of approximately 28-million gallons per day of recycled water will be released to the River from the Tillman Plant. This minimum amount is equivalent to water currently passing through Lake Balboa, the Japanese Gardens, and the Wildlife Lake in the Sepulveda Basin on its way to the River. The remainder of the recycled water produced by the City's water reclamation plants will be available for distribution by LADWP to recycled water customers.

Exhibit 4B
Los Angeles IRP Alternatives

Alternative 1 (Hyb1C) – Hyperion Expansion and Moderate Potential for Water Resources Projects

Wastewater
- Expand Hyperion Treatment Plant to 500 mgd
- Build new digester tanks at Hyperion
- Upgrade Tillman to advanced treatment
- Build 10 MG diurnal storage at LAG
- Build New Sewers:
  - Glendale-Burbank Interceptor Sewer (GBIS)
  - Northeast Interceptor Sewer (NEIS) Phase 2
  - Valley Spring Lane Interceptor Sewer (VSLIS); or build new buried wet weather storage at Tillman

Recycled Water
- Use up to 38,700 AFY (42,000 AFY including reuse of dry weather runoff) of recycled water for irrigation and industrial users; and provide baseline flows to LA River.

Conservation
- Increase efforts beyond planned 2020 levels

Dry Weather Runoff
- Reduce dry weather runoff by installing "Smart Irrigation" devices
- Divert dry weather runoff from coastal area, Browns Creek, Wilbur Wash, Limekiln Canyon, Caballero Canyon, Bull Creek, and Pacoima Wash to sewer system and convey to Hyperion for treatment.
- Divert dry weather runoff from Compton Creek and Ballona Creek and treat/beneficially use through a constructed wetlands or urban runoff plant

Wet Weather Runoff
- Onsite treatment/discharge or percolation for new or redeveloped areas
- Retrofit for onsite storage (cisterns) and beneficial use of runoff at schools and government properties
- Retrofit for onsite percolation of runoff at schools and government properties
- Onsite percolation of runoff in vacant lots, parks/open space, and abandoned alleys in the East Valley (moderate level of implementation)
- Regional recharge of runoff in spreading basins in the East Valley
- Urban runoff plants on the Westside.

Leadership Projects
- Full scale and pilot

Alternative 2 (Hyb2C) – Tillman and LAG Expansion and High Potential for Water Resources Projects

Wastewater
- Expand and upgrade Tillman to 80 mgd
- Expand and upgrade LAG to 30 mgd
- Build 10 MG diurnal storage at LAG
- Build new digester tanks at Hyperion
- Build New Sewers:
  - Glendale-Burbank Interceptor Sewer (GBIS)
  - Northeast Interceptor Sewer (NEIS) Phase 2
  - Valley Spring Lane Interceptor Sewer (VSLIS); or build new buried wet weather storage at Tillman

Recycled Water
- Use up to 49,900 AFY (53,000 AFY including reuse of dry weather runoff) of recycled water for irrigation and industrial users; and provide baseline flows to LA River.

Conservation
- Same as Alt 1

Dry Weather Runoff
- Reduce dry weather runoff by installing "Smart Irrigation" devices
- Divert dry weather runoff from coastal area to sewer system and convey to Hyperion for treatment
- Divert dry weather runoff from Browns Creek, Wilbur Wash, Limekiln Canyon, Caballero Canyon, Bull Creek, and Pacoima Wash to urban runoff plants or constructed wetlands for treatment and discharge back to creeks.
- Divert dry weather runoff from Compton Creek and Ballona Creek and treat/beneficially use through a constructed wetlands or urban runoff plant

Wet Weather Runoff
- Same as Alt 1

Leadership Projects
- Full scale and pilot

Alternative 3 (Hyb3B) – Tillman Expansion and Moderate Potential for Water Resources Projects

Wastewater
- Expand and upgrade Tillman to 100 mgd
- Build 10 MG diurnal storage at LAG
- Build new digester tanks at Hyperion
- Build New Sewers:
  - Glendale-Burbank Interceptor Sewer (GBIS)
  - Northeast Interceptor Sewer (NEIS) Phase 2
  - Valley Spring Lane Interceptor Sewer (VSLIS); or build new buried wet weather storage at Tillman

Recycled Water
- Use up to 40,100 AFY (43,000 AFY including reuse of dry weather runoff) of recycled water for irrigation and industrial users; and provide baseline flows to LA River.

Conservation
- Same as Alt 1

Dry Weather Runoff
- Reduce dry weather runoff by installing "Smart Irrigation" devices
- Divert dry weather runoff from coastal area to sewer system and convey to Hyperion for treatment.
- Divert dry weather runoff from Compton Creek and Ballona Creek and treat/beneficially use through a constructed wetlands or urban runoff plant

Wet Weather Runoff
- Onsite treatment/discharge or percolation for new or redeveloped areas.
- Onsite percolation of runoff in vacant lots, parks/open space, and abandoned alleys in the East Valley (high level of implementation)
- Urban runoff plants on the Westside.

Leadership Projects
- Full scale and pilot

Alternative 4 (Hyb3C) – Tillman Expansion and High Potential for Water Resources Projects

Wastewater
- Expand and upgrade Tillman to 100 mgd
- Build 10 MG diurnal storage at LAG
- Build new digester tanks at Hyperion
- Build New Sewers:
  - Glendale-Burbank Interceptor Sewer (GBIS)
  - Northeast Interceptor Sewer (NEIS) Phase 2
  - Valley Spring Lane Interceptor Sewer (VSLIS;) or build new buried wet weather storage at Tillman

Recycled Water
- Use up to 52,800 AFY (56,000 AFY including reuse of dry weather runoff) of recycled water for irrigation and industrial users; and provide baseline flows to LA River.

Conservation
- Same as Alt 1

Dry Weather Runoff
- Same as Alt 2

Wet Weather Runoff
- Same as Alt 1

Leadership Projects
- Full scale and pilot

LADWP has long been linked to the Los Angeles River for the City's original water supply and its current relationship to the potential for recycled water use. Presently, approximately 75 percent of the River flow during dry weather is comprised of recycled water from the Tillman Plant, the Los Angeles Glendale Water Reclamation Plant, and the City of Burbank's Water Reclamation Plant. LADWP is faced with the challenge of maximizing the use of recycled water to offset imported supplies while ensuring the minimum flow in the river is maintained to support habitat and River revitalization efforts.

Shortly after work on the IRP began, the Los Angeles City Council Ad Hoc Committee on the Los Angeles River (Ad Hoc Committee) was formed to study River revitalization. LADWP staff routinely attends Ad Hoc Committee meetings and functions, and continuously monitors River related activities.

In support of the IRP and River revitalization activities, LADWP has conducted studies of the River dry weather flow regime. The dry weather flow studies not only addressed development of recycled water and urban runoff projects identified by the IRP, but will serve as the foundation for development of future revitalization projects that might alter dry weather River flow or water quality. These studies have also investigated low flow and dry weather water quality attributes, habitat and biological issues, and concepts for potential projects that would enhance the River and adjacent areas. Several other agencies and stakeholders have also been involved with these studies including BOS, the United States Bureau of Reclamation, and the United States Army Corps of Engineers.

LADWP staff also actively participates on the City Department Los Angeles River Task Force, which was formed in response to instructions by the Ad Hoc Committee to:

- Inventory all current and future City Department projects, studies, and programs along the River.
- Assess opportunities for future funding, projects, and studies.
- Coordinate River related activities of City Departments and other agencies.

In addition, LADWP was also actively involved with the Los Angeles River Public Outreach Committee, which was formed in response to instructions by the Ad Hoc Committee to investigate funding and methods for providing quality information promoting care of the River, watershed management practices, water safety, and communicate to the public about current River activities and encourage their participation. This effort has resulted in development of a five year public education plan overview and a public information video. LADWP has also provided assistance to the City's Department of Public Works in the development of the North Atwater Park project (immediately adjacent to the River), including assessment of water supply options. This project includes expansion of North Atwater Park and restoration of North Atwater Creek.

LADWP is also funding the preparation of a Los Angeles River Revitalization Master Plan. This plan will address economic development opportunities, water quality, water resources, flood control, and recreation along the River. The plan will also discuss opportunities to improve access to the Los Angeles River and increase community awareness and pride.

LADWP recognizes the importance of the River as a resource that provides multiple benefits to the City. Through the advances of the IRP, efforts will be made to maximize the River's utility and to develop its potential water supply benefits.

Agency Coordination

LADWP is a partner with the Bureau of Sanitation in developing the IRP along with public stakeholders and other agencies. As with any integrated plan that extends beyond traditional departmental boundaries and government jurisdictions, close coordination is required with multiple City, state, and federal agencies including but not limited to, the Cities of Burbank, Glendale, County of Los Angeles, Caltrans, United States Army Corps of Engineers, United States Bureau of Reclamation, and City Parks and Recreation Department. Stakeholders include, but are not limited to, community, business, and environmental organizations.

Los Angeles River

LADWP is also actively involved in River planning efforts. LADWP is involved in the Ad Hoc Committee, is a member of the City Department Los Angeles River Task Force, and is involved with the Los Angeles River Public Outreach Committee. Other agencies participating include BOS, the United States Bureau of Reclamation, and the United States Army Corps of Engineers.

IRP Implications for City's Urban Water Management Plan

One of the primary purposes for developing the IRP was to explicitly consider the relationship between wastewater facility planning and other water resources issues, such as water supply and urban runoff. Implementation of the IRP may result in increased beneficial reuse of water, water conservation, and groundwater supplies. IRP alternatives examined ways in which to decrease potable water needs by expanding the City's recycled water program; increase water efficiency by installing smart irrigation devices that reduce irrigation demands; and increase groundwater resources by using wet weather runoff to recharge the aquifer. All of these options will have to be tested from a technical, institutional, and public acceptance perspective. The IRP has demonstrated that by integrating water resources planning for the City, more opportunities for water supply development can be identified.

4.2 MWD's Integrated Resources Plan

In 1993, MWD and its member agencies embarked on a three year process to develop Southern California's first IRP. Six main objectives for this plan were defined as:

- Supply and System Reliability
- Affordability
- Water Quality
- Diversity
- Environmental Issues
- Institutional Constraints

In order to meet these objectives, supply and conservation options that included everything from groundwater desalination, water transfers, Colorado River and SWP improvements, and new surface storage were evaluated. Complete portfolios, representing different combinations of supply and conservation options, were assembled. Based on extensive participation from water providers and other stakeholders as well as detailed evaluations, a "preferred resource mix" was recommended. The preferred resource mix balanced local and imported water supply projects with significant water conservation in order to best meet the needs of the region. This preferred resource mix also established regional targets for the development of water supply to be made by MWD, its member agencies, and retail water providers.

The 20-year plan was designed so that MWD and its member agencies would be able to meet their full service demands through 2020. MWD's Board of Directors formally adopted the IRP in January 1996.

MWD IRP Update

In 2001, the MWD Board of Directors developed a work plan to update the 1996 IRP in order to accommodate changed conditions and extend the targets through 2025. Specifically, the IRP Update has three main objectives: (1) review the resource development targets and implementation achievements of the 1996 IRP; (2) identify significant changed conditions for water resource development since the adoption of the 1996 IRP; and (3) evaluate the reliability of the IRP Preferred Resource Mix through 2020, adjust targets as needed to reflect changed conditions, and extend resource targets through 2025.

The results of the IRP Update analysis demonstrate that the resource targets of the 1996 IRP, factored in with the changed conditions discussed in this report, provide for 100 percent reliability in 2020 and up to 2025 (MWD, 2004). The most significant changed conditions include:

- Lower projected retail demands due primarily to conservation savings.
- Higher projected local water resource development.
- Lower projected dry-year MWD demands.
- Board revised targets for the SWP and Colorado River Aqueduct (CRA).
- More stringent water quality regulations.
- Recognition of implementation risks.

Although the current targets provide 100 percent reliability in 2020 and up to 2025, the IRP Update recommends a 10 percent supply buffer to take into account more stringent water quality regulations and resource implementation risk associated with development of projects. The 500,000 AF buffer is factored into the resource targets for local supplies (recycling, groundwater recovery and desalination) and Central Valley/SWP storage and transfer programs.

The IRP Update modified the resource targets to take into account the changed conditions and recommended buffer. A summary of the 1996 IRP targets and IRP Update targets are shown in Exhibit 4C.

Exhibit 4C

MWD's IRP Resource Targets

(values in AF)

IRP Resource Targets	1996 IRP 2020	IRP Update 2020	Change	IRP Update 2025
Conservation	882,000	1,028,000	+145,600	1,107,000
Local Projects[1]	500,000	750,000	+250,000 (buffer)[4]	750,000
Colorado River Aqueduct[2]	1,200,000	1,250,000	+50,000	1,250,000
State Water Project	593,000	650,000	+57,000	650,000
Groundwater Conjunctive Use	300,000	300,000	0	300,000
Central Valley/State Water Project Storage and Transfers	300,000	550,000	+250,000 (buffer)[4]	550,000
MWD Surface Water Storage[3]	620,000	620,000	0	620,000

[1] Includes recycled water, brackish groundwater desalination, and seawater desalination.
[2] Target for specific year types, the CRA is not intended to be full at all times.
[3] Represents the total amount that can be withdrawn from surface reservoirs.
[4] Buffer supply intended to make up for any shortfall in other resource targets.

Source: MWD (2004)

To demonstrate the reliability of the IRP Update and resource targets through 2025, MWD analyzed regional demands and supplies under dry weather conditions. Exhibit 4D shows regional water demands without conservation from 2005 to 2025 under dry weather. The graph also depicts the supply sources and water conservation identified in MWD's IRP Update. The 500,000 AF buffer is also shown, split between local and imported buffers. Under this scenario, MWD and its member agencies will be 100 percent reliable until at least 2025. MWD is extending its IRP analysis to 2030 to determine if it would need additional water supplies beyond 2025 planned targets.

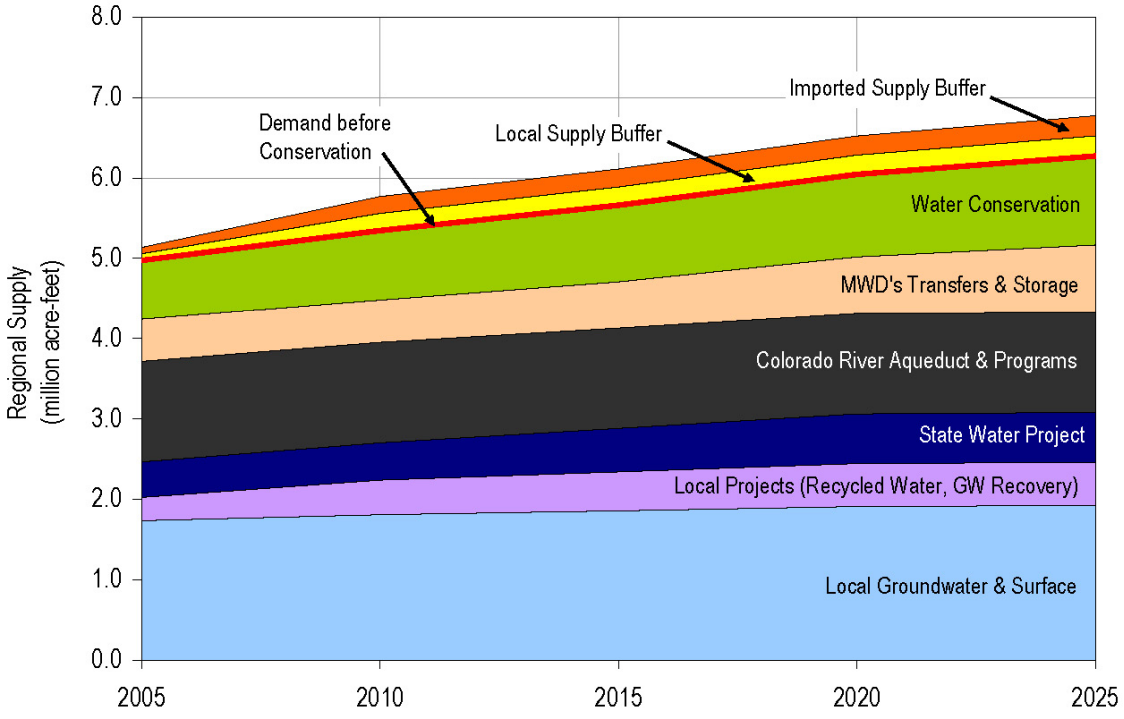
In addition, MWD examined two critical extended drought periods, 1928-34 and 1987-91. Demands were met in both of these conditions, using MWD's regional storage and drought management actions. In the 1928-34 drought condition, MWD's total regional storage of 4.0 million AF dropped to approximately 1.7 million AF by 2025. The 1987-92 drought condition had an ending regional storage level of approximately 1.5 million AF by 2025. This demonstrates that MWD would still have storage reserves even after an extended five year drought.

Stakeholder Participation

MWD's 1996 IRP was developed in concert with its member agencies. A technical workgroup was established that consisted of MWD staff, member agency and local retail agency managers, and groundwater basin managers. This workgroup met more than 35 times during the course of three years, and spent hundreds of hours reviewing analyses and providing guidance. LADWP was an active participant in this workgroup.

In addition, regional assemblies were held at critical milestones of the IRP development that provided a platform to collectively discuss strategic direction and regional water solutions. Participants of these assemblies included Board members, water agency managers, local retail water providers, groundwater basin managers, and invited public stakeholders. Six public forums and several member agency sponsored workshops attended by stakeholders from business, environmental, agricultural, and water interests were held throughout the IRP process. Finally, findings of the IRP Update were presented in April 2004 to a diverse group of stakeholders including elected officials, environmental groups, and the general public.

Exhibit 4D
Meeting Regional Water Needs through MWD's IRP



Agency Coordination

In preparation of MWD's IRP, all member agencies were closely involved, including LADWP. LADWP was involved with providing data and reviewing documents. Additionally, LADWP was an active member of the technical workgroup.

Funding MWD's IRP

In accordance with MWD's Board adoption of the IRP Update, a revised Long-Range Finance Plan (LRFP) was developed and approved by MWD's Board. The LRFP (2004) identifies MWD's planned capital improvement program (CIP) and operating expenses from 2005 to 2014.

The following summarizes the MWD's CIP and operating expenses needed to implement the IRP:

- Colorado River Supplies – costs for water supply will increase from the current $11.9 million to $64.9 million in 2014.
- State Water Project Supplies – costs for water supply will decrease from the current $475.2 million to $435.6 million in 2014.
- Capital Expenditures – between now and 2014, MWD will spend approximately $2.79 billion for projects such as Inland Feeder, oxidation retrofits and other treatment improvements, Central Pool Augmentation Project and San Diego Pipeline #6, Diamond Valley Lake recreation, and replacement/refurbishment.
- Demand Management & Local Projects – between now and 2014, MWD will provide approximately $646 million to its member agencies to help diversify the region's water supply.

MWD Water Rate Structure

MWD implemented a new water rate structure, effective January 1, 2003. The rate structure unbundled MWD's services for supply, conveyance, treatment, and power in order to facilitate a water transfer market.

In addition, a tiered pricing of supply was implemented to encourage local resource development and allow growth to pay more of its fair share.

A capacity peaking charge was also implemented to encourage MWD's member agencies to reduce peaks on MWD, thereby reducing the need for capital expansion.

Based on the expenditures identified in the LRFP, MWD's water rates are expected to increase. The following summarizes the projected water rate increases:

- Untreated Tier 1 Full Service Rate – water rates expected to increase from the current $331/AF to $414/AF by 2014.
- Untreated Tier 2 Full Service Rate – water rates expected to increase from the current $412/AF to $495/AF by 2014.
- Treatment Surcharge – This surcharge is added to the untreated rate for those member agencies buying treated water and is expected to increase from the current $112/AF to $150/AF by 2014.

IRP Implications for City's Urban Water Management Plan

As LADWP evaluates its water supply options, it is important to understand the significance of a reliable and cost-effective water supply from MWD. The City's water supply reliability is directly linked to MWD's reliability, and LADWP's local supply development uses the cost of MWD water as one of the benchmarks for feasibility evaluation. Through the IRP Update, MWD has shown that it will be able to meet the supplemental needs of all its member agencies reliably through 2025, even during prolonged drought events. MWD has also developed a plan to implement and finance the approved IRP targets.

4.3 Integrated Regional Water Management Plan

LADWP is participating in the development of an Integrated Regional Water Management (IRWM) Plan encompassing four watersheds in Los Angeles County. These watersheds include the Upper Los Angeles River, Lower Los Angeles River and San Gabriel River, north Santa Monica Bay, and South Bay. Stakeholders in each of these watersheds (such as other public agencies, non-profit, and environmental organizations) have joined together in a regional partnership to plan for and implement critical water projects.

The purpose of this effort is to create a regional plan that will integrate the various geographical areas with the water management strategies of each watershed. The basis of this planning effort involves using valuable information from numerous completed plans and studies, and synthesizing them in a way that demonstrates how to achieve the water resource goals of the region.

As part of the IRWM planning process, specific projects have been identified, prioritized, and submitted for Proposition 50 grant funding. Proposition 50, the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002, was passed by California voters in November 2002. It amended the California Water Code to authorize the State Legislature to appropriate $500 million for IRWM projects. The intent of the IRWM Grant Program is to encourage integrated regional strategies for management of water resources and to provide funding, through competitive grants, for projects that protect communities from drought, protect and improve water quality, and improve local water security by reducing dependence on imported water.

Draft IRWM plans, including proposed implementation projects, were submitted to the State as part of the Proposition 50 grant process in 2005. The plans must be adopted by regional stakeholders by January 1, 2007 in order to receive Proposition 50 funding.

The IRWM Grant Program is administered jointly by DWR and the State Water Resources Control Board and is intended to promote a new model for statewide water management. An IRWM Planning Grant of $1.5 million was awarded to the unified Los Angeles County region for the development of its IRWM plan. Once the final plan is adopted, the region will be eligible to receive up to $50 million in Proposition 50 grant funding, with additional funds potentially available in future funding cycles.

Projects that the City and Stakeholder Group have identified in each of the IRWM plan documents emphasize reducing dependence on imported water. Many of the projects include infiltration and runoff reuse and water conservation efforts. Following are three examples of projects proposed by the City:

- Strathern Pit Multi-use Project: This project includes the conversion of an existing 30 acre pit/landfill facility to a multi-purpose park with a retention basin and wetland. The benefits will include reduced flooding, increased conservation, recreational opportunities, and improved water quality for Sun Valley.
- North Atwater Creek Restoration and Water Quality Enhancement Project: This project expands the existing North Atwater Park by adding over five acres of new water quality improvement landscaping. The project restores an existing seasonal riparian stream tributary to the River, and also provides for a native upland wooded area, walk paths, picnic area, benches, and informational kiosk.
- Headworks Los Angeles River Wetlands and Water Protection Project: restoration of native vegetation at a 56-acre site featuring an uplands meadow habitat area above an underground water storage tank.

The holistic and coordinated nature of integrated planning through IRPs and IRWMs are key elements of a sustainable approach that is important to the success of long-term water resources planning in southern California.

Chapter 5

alternative water supplies

Chapter Five
Alternative Water Supplies

5.0 Overview

LADWP is moving forward with development of viable alternative water supply options to provide an adequate and reliable water supply for the City. In recent years, LADWP is actively investigating alternative supply options including water transfers, seawater desalination, and beneficial reuse of urban runoff. Such options, with proper planning, can supplement existing supplies and contribute toward fulfilling future demand under various conditions. Future challenges, which include increasing demands that must be met with limited supplies, warrant thoughtful consideration of these alternative resources.

Following is a discussion of each of the potential supply options described above, highlighting LADWP's progress in developing each alternative source of water. Factors that affect feasibility and influence potential implementation are also discussed, as well as advances that facilitate development of the resource option.

5.1 Water Transfers

Water transfers involve the lease or sale of water or water rights between consenting parties. Water Code Section 470 (The Costa-Isenberg Water Transfer Act of 1986) states that voluntary water transfers between water users can result in a more efficient use of water, benefiting both buyer and seller. The State Legislature further declared that transfers of surplus water on an intermittent basis can help alleviate water shortages, save capital outlay development costs, and conserve water and energy. This section of the Water Code also obligates the California Department of Water Resources (DWR) to facilitate voluntary exchanges and transfers of water.

The DWR is required to establish an ongoing program to facilitate the voluntary exchange or transfer of water and implement the various State laws that pertain to water transfers. In response to this mandate, DWR established an internal office dedicated specifically to water transfers in June 2001 and has developed various definitions and policies for transfers. Of particular importance are the rules protecting existing water rights. Water rights cannot be lost when they are transferred to another user if the transferor has an underlying right to the transferred water. DWR also developed three fundamental rules specifically regarding water transfers:

- There can be no injury to any legal user of water.
- There can be no unreasonable effect to fish and wildlife.
- There can be no unreasonable economic effects to the economy of the county of origin.

LADWP is planning to acquire water through transfers to replace a portion of LAA water used for environmental enhancements in the eastern Sierra Nevada. In the planning stages is an interconnection between the LAA and the SWP's California Aqueduct, located where the two aqueducts intersect in Antelope Valley, California, as shown below.

First Los Angeles Aqueduct crossing the California Aqueduct

LADWP is working with DWR, MWD, and Antelope Valley-East Kern Water Agency (AVEK) to finalize a four-way agreement for construction of a turnout to deliver water from the California Aqueduct into the LAA. This turnout will be located in AVEK's service territory. The turnout facility will be owned by DWR. MWD has consented to the transfer of water into its service territory. LADWP's current goal is to

transfer up to 40,000 AFY once the turnout facilities are in place.

Regionally, MWD has been active with water transfers, seeking and implementing agreements and cooperative arrangement opportunities to supplement southern California's water supply. MWD's water transfer activities are classified as *spot transfers*, *option transfers*, *core transfers*, *storage transfers*, or *exchanges.* Each activity is described briefly below.

- *Spot transfers* make water available through a contract entered into the same year that the water is delivered.
- *Option transfers,* through multi-year or single-year contracts, allow MWD to obtain water on an "as-needed" basis.
- *Core transfers* make water available through multi-year contracts that convey specific water entitlement to MWD each year.
- *Storage transfers* allow MWD to store and later recover available water that can then be transported immediately to southern California.
- *Exchange agreements* involve the transfer to MWD of another agency's entitlements in exchange for water entitled to MWD from another source.

MWD is in the process of developing and implementing transfer/storage projects in the Central Valley, and off-stream banking and dry year supplies of Colorado River water. Water transfers, including the programs highlighted below, are an important element of California's plan to reduce its use of Colorado River water to the State's basic apportionment of 4.4 million AFY. Current and potential MWD transfer, storage, and exchange agreements/activities include:

- Semitropic Storage Program, Kern County
- Arvin-Edison Water Transfer and Storage Program, Kern County
- Central Valley Water Exchange Program
- Desert Water Agency/Coachella Valley Water District Water Exchange Program
- Palo Verde Land Management, Crop Rotation, and Water Supply Program
- Hayfield Groundwater Storage Project (potential), Mojave Desert
- Colorado River Storage and Transfers Program (potential)

MWD's current water rate structure, adopted in 2002, includes a System Access Charge that will be assessed to every entity using MWD's conveyance and distribution system. The System Access Charge encourages development of a water transfer market by allowing access to the MWD distribution system at the same rate for water marketers and MWD's member agencies alike. MWD's water rate structure also incorporates a tiered rate format. The first tier price applies to fixed water contracts. The second tier price reflects the incremental cost for MWD to acquire additional supplies that are above the first tier contract base amount.

The City supports State-wide water transfer legislation that will ensure the efficient use of the State's limited water resources and provide safeguards to the environment, public facilities, water conservation efforts and local economies. LADWP will continue to develop a responsible water transfer program that can assist in replacing City supplies that have been lost due to environmental reallocation.

5.2 Seawater Desalination

Seawater desalination, the process of removing salts and other impurities from seawater, has reached an all-time high in terms of worldwide production capacity. This is partly driven by the fact that the cost to desalinate water has reached an all-time low due to technological and process advancements.

Of the more than 7,500 desalination plants in operation worldwide, 60 percent are located in the Middle East. The world's largest plant in Saudi Arabia produces 128 million gallons per day of desalted seawater. In contrast, 12 percent of the world's capacity is produced in the Americas, with most of the plants located in the Caribbean and Florida.

Desalination Technology

Technology to desalt seawater to produce potable water which meets or exceeds drinking water standards has been available for some time but has not been widely implemented primarily due to its high cost. Although the cost to desalinate seawater is still more expensive than obtaining water from conventional sources, continued research and development, as well as large scale projects, are being implemented in the United States and other parts of the world to improve technology and further reduce costs.

The two basic seawater desalination processes are: 1) use of the distillation process to evaporate water from salts; and 2) use of semi-permeable membranes (as shown) to filter the water while straining out the salts. While distillation has been the dominant seawater desalination technology (primarily in the Middle East), current worldwide desalination development is rapidly migrating toward membrane technology. Facilities using distillation are still prevalent in the Middle East. However, new plant installations are increasingly taking advantage of technological advancements (higher yield and lower energy requirements) in membrane-based process technology. Today, membrane filtration accounts for over half of the world's desalting capacity.

Recognizing the potential of seawater as a water resource, the California DWR, through a legislative mandate, convened a Desalination Task Force in 2002. The task force was responsible for making recommendations to the Legislature on potential opportunities, impediments, and the State's role in furthering desalination technology.

The task force was effective in providing a forum where stakeholders could convene and discuss critical issues related to desalination. Key seawater desalination issues that have been raised through the task force fall into six general categories: environmental, economic, permitting, engineering, planning, and coordination.

To assist in addressing these issues, the California Desalination Task Force has developed draft guidelines for developing environmentally and economically acceptable desalination projects. These include the following:

- Each project should be considered on its own merits.
- Sponsoring agencies should be determined early in the planning process.
- Public and permitting agencies should be engaged early in the planning process.
- Collaborative processes should be used to enhance support for project implementation.
- A feedback loop should be incorporated to allow for continuously revisiting and revising the project at each step of the planning process.
- Key decision points (e.g., costs, environmental acceptability) should be identified to test the general feasibility of the project as early in the planning process as possible.

With increasing demand for water and limited new supply options, the future value of seawater desalination as a part of California's water supply portfolio has become apparent. Within southern California, up to 133 million gallons per day of seawater desalination production capacity is possible by the year 2015. While this production represents less than five percent of the region's total water supplies, it is considered by water planners as an important part of the region's water supply portfolio.

For the City, seawater desalination is a resource that can offset supplies that have been committed from the LAA for environmental restoration in the eastern Sierra Nevada. LADWP has committed approximately forty percent of its historical average LAA supplies to benefit the eastern Sierra Nevada environment. While the City's landmark conservation programs have significantly reduced water demands, continuing growth in the City's population will necessitate the study of alternative water supplies, including seawater desalination. Development of a publicly and environmentally responsible seawater desalination program will contribute toward a long-term reliable water supply for the City.

MWD incorporated desalinated seawater as a new water supply source in its 2003 Integrated Resources Plan Update. To provide an incentive for the development of desalinated seawater, MWD offered subsidies of up to $250 for each acre-foot (326,000 gallons) of desalinated seawater produced. LADWP, Long Beach Water Department, West Basin Municipal Water District, Municipal Water District of Orange County, and San Diego County Water Authority submitted detailed proposals that qualified for the MWD funding. Each of these agencies serves coastal areas, and is looking to desalination as a means to further diversify and supplement their existing water supply sources.

LADWP Seawater Desalination Efforts

To determine the proper site location for a desalination plant, LADWP conducted a fatal flaw analysis at three City-owned coastal power generating facilities. Based on the findings from this analysis, LADWP will investigate development of a 12 to 25 million gallon-per-day desalination facility at the Scattergood Generating Station (pictured). This proposed full-scale project has qualified for MWD's grant funding of $250 per acre-foot of water produced. If determined economically and environmentally feasible, LADWP may develop a fully operational seawater desalination facility at the Scattergood Generating Station by the year 2015.

LADWP's current focus is on research and data collection, with plans to construct a pilot scale study facility at the Scattergood Generating Station. LADWP is also participating with California stakeholders through venues such as the MWD and the Desalination Task Force to develop desalination study projects within southern California.

The LADWP is supporting efforts to lower the capital and operating costs of producing desalinated ocean water. LADWP, the Long Beach Water Department (LBWD), and the United States Bureau of Reclamation are partnering in the construction of a 300,000 gpd prototype seawater desalination facility to complete testing of LBWD's proprietary two-stage nanofiltration process (using membranes that require lower operating pressures and thus, the potential for lower operating costs). LBWD successfully performed a 9,000-gpd bench-scale testing of this technology and now

plans to conduct tests on a larger scale. The facility is under construction at LADWP's Haynes Generating Station in Long Beach, and is scheduled to be operational by late 2005. If the technology proves to be successful and cost-effective, LADWP will have the option to use it at its proposed Scattergood Generating Station desalination facility.

LADWP has also partnered with the West Basin Municipal Water District and other agencies in the American Water Works Association Research Foundation Tailored Collaboration project, "Water Quality Implications for Large-Scale Applications of MF/RO Treatment for Seawater Desalination." A 30,000-gpd pilot facility in El Segundo, California, been in operation since May 2002 and is testing for various operational and water quality parameters.

A study to determine the optimum capacity of a future desalting facility at the Scattergood Generating Station has also been completed, as well as a study to determine potential impacts of discharging concentrate brine from the desalting process. The brine dilution modeling study was conducted by the Scripps Institute of Oceanography and was funded through a grant from the MWD.

Additionally, in an effort to develop an environmentally compatible project, LADWP has commenced discussion with the City's Bureau of Sanitation to evaluate the feasibility of discharging the desalted concentrate into Hyperion Wastewater Treatment Plant's 5-mile outfall. The study performed by the Scripps Institute of Oceanography found that there are potential environmental benefits to the Santa Monica Bay's marine biology due to improved salt balance if the effluent discharged by the Hyperion Wastewater Treatment Plant were to include brine from a desalination facility.

In a joint study by LADWP, LBWD, and West Basin Municipal Water District, preliminary sampling of raw seawater quality has been initiated at three potential seawater desalination sites - Scattergood Generating Station in Playa Del Rey, Haynes Generating Station in Long Beach, and El Segundo Power Generating Station. Water quality analysis on the seawater is performed at various times of the year to analyze quality variations during storm events when city surface runoffs drain into the ocean. The next step would be to collaborate with the California DHS on developing guidelines to ensure that product water from future desalting facilities will meet all State and Federal water quality regulations.

Outside grant funding is also a very important component in the full-scale implementation of seawater desalination. In addition to the grant commitment from MWD, LADWP is seeking to acquire other outside grant funds to lower the cost of desalinated water for its customers. LADWP has helped form the U.S. Desalination Coalition, whose primary goal is to seek Federal funding for advancing desalination. The U.S. Desalination Coalition currently has members from California, Florida, Hawaii, and Texas – states that plan to develop desalinated water as a resource. Through substantial input from the Coalition, a Federal bill has been introduced in Congress that would potentially provide grant funding to lower the cost of producing desalinated water. The goal in this effort is to bridge the gap between the cost of desalinating seawater and the cost of existing supplemental water supplies.

Finally, in a January 2005 Residential Water Customer Satisfaction Survey sponsored by the California Municipal Utilities Association and LADWP, seawater desalination received a mean score of 7.2 (on a scale of 0 to 10 with 0 being no support to 10 being very supportive) from residents within LADWP's service area. Statewide, residential customers gave seawater desalination a mean score of 6.7 in the same survey. The sentiment expressed in the survey suggests a high level of support for seawater desalination within LADWP's service area. This support will be critical in moving development of this resource forward as a new and innovative water supply for the City.

5.3 Enhanced Local Groundwater Basin Production

There are three groundwater basins near or within LADWP's service area which have additional groundwater potentially available. The Hollywood Basin, La Brea sub-area of the Central Basin, and Santa Monica Basin are unadjudicated basins, where water rights have not been legally established.

The Hollywood Basin yields approximately 3,500 AFY. Groundwater extracted from this basin is used by the City of Beverly Hills. With financial assistance from MWD, Beverly Hills commenced operation of a 1,270 gallon per minute groundwater treatment facility in 2003 that processed water from the 15-square mile basin to assist in fulfilling its municipal water needs.

The Santa Monica Basin is comprised of the Coastal, Charnock and Crestal sub-basins. The Coastal and Charnock sub-basins are utilized by the City of Santa Monica for its municipal water supply. Currently, there is no pumping activity at the Crestal sub-basin. Although the potential yield of the Crestal sub-basin is estimated to be approximately 3,000 AFY, extensive water contamination would require substantial treatment prior to use.

The groundwater in the Hollywood, La Brea, and Santa Monica basins exhibits poor water quality and would require significant treatment prior to distribution. At this time, the relatively high costs involved with developing these supplies make them economically unattractive. LADWP will continue to follow the progress of studies relating to these and other basins, and will pursue this supplemental source of water supply when economically feasible.

5.4 Beneficial Reuse of Urban Runoff

Urban runoff is a relatively untapped alternative water supply for the City. By managing runoff and beneficially reusing it, the City can essentially reduce its dependence on imported water. As part of the Los Angeles IRP process, further described in Chapter 4, the City investigated the beneficial reuse of urban runoff.

Both dry and wet weather runoff can be beneficially used. Dry weather runoff is any runoff that occurs in the absence of rainfall, while wet weather runoff is any runoff that occurs as a direct result of rainfall. Wet weather runoff represents a significantly larger volume of water than dry weather runoff.

Dry Weather Runoff Options

The beneficial use option for dry weather runoff consists of capturing runoff, treating it and then reusing it. For dry weather flow, most of the runoff could potentially be diverted directly to beneficial use, particularly during the summer months when demands for non-potable water are high (due to the higher irrigation demands in the summertime). The level of treatment of the runoff before being beneficially used would be determined by the ultimate use of the water.

An example of a similar type of project that reuses runoff is the Santa Monica Urban Runoff Recycling Facility (SMURRF), which provides approximately 500,000 gallons per day of runoff for reuse, which is approximately 400 AFY (based on 270 days, as SMURRF operates only during the dry season, assumed to be 9 months). This facility is located outside LADWP's service area, but is an example of the types of facilities envisioned within LADWP's service area. Exhibit 5A shows the SMURRF process flow diagram.

To evaluate additional potential demand for non-potable sources such as urban runoff, LADWP's top users were analyzed. From this analysis, a large number of potential customers have been identified who could beneficially use treated runoff. These users include public parks, cemeteries, golf courses, and homeowners associations. Additionally, a portion of recycled water demand could be supplied by treated runoff. The most common use of the non-potable water will be for irrigation, which means demand for beneficial reuse water would be the highest during the dry season.

A computer modeling analysis was performed based on the recycled water demands in the City and the available dry weather runoff. Based on the data, the model determined which of the recycled water demands could be realistically met through treated runoff. The dry weather runoff available for reuse throughout the City is estimated at 97 million gallons per day (approximately 26,000 million gallons per year). Exhibit 5B identifies the amount of this runoff that could, after treatment, be used to meet the recycled water demands.

Exhibit 5A
SMURRF Process Flow Diagram

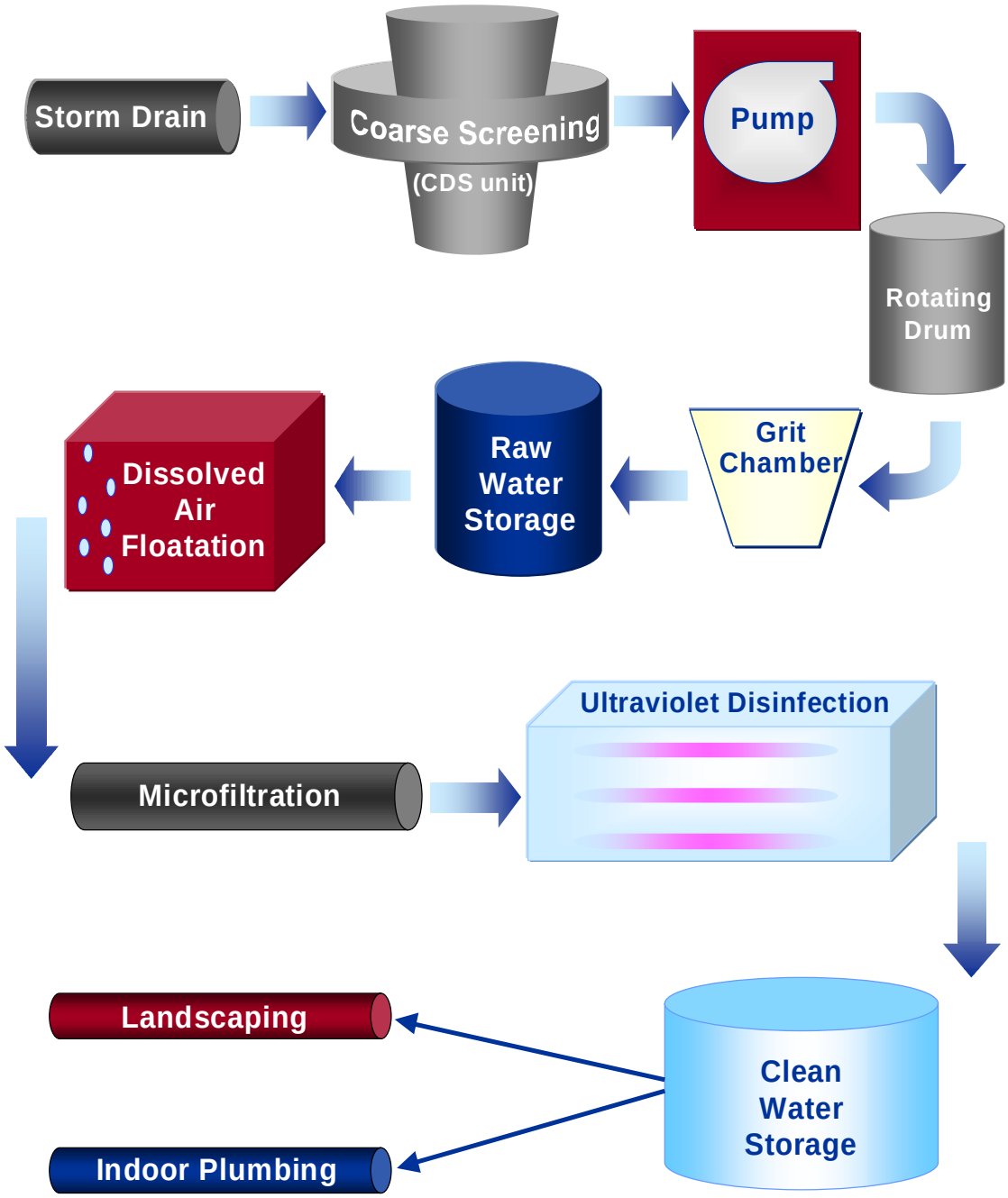


Exhibit 5B		
Potential Non-Potable Water Demands Met with Dry Weather Treated Runoff		
Service Area	Total Demand Served	
	(AFY)	(million gallon per year)
Aliso Wash	1,400	460
Canoga	3,250	1,050
Reseda	2,900	950
Tujunga / Burbank	9,050	2,950
LA River Reach 3	1,100	360
Dominguez Channel	8,500	2,770
Compton Creek	1,450	470
Ballona	10,850	3,530
Verdugo Wash	100	30
LA River/Arroyo	9,600	3,130
Total	48,200	15,700

Source: City of Los Angeles Integrated Resources Plan, Facilities Plan, Volume 3: Runoff Management

Wet Weather Runoff Options

Cisterns

Cisterns are water conservation devices that store diverted runoff from roof areas and other impervious surfaces. This stored runoff can provide a source of chemically untreated water for gardens and compost, free of most sediment and dissolved salts. Because residential irrigation can account for up to 40 percent of domestic water consumption, water conservation measures can be utilized to reduce demands, especially during hot summer months.

An analysis on the effect of installing cisterns in all single-family and multi-family residences in the City was conducted as part of the IRP. The analysis was based on projected household demands, irrigation needs, and historical rainfall data. The results of this study showed that the effect of installing cisterns at all residences in the City would result in the potential maximum capture of approximately 440 million gallons in cisterns for each design storm event of 0.45 inches. This provides a substantial amount of water conservation and reduction in potable water demands within the City.

Treatment and Beneficial Use

As is detailed in the dry weather runoff section above, treatment and beneficial use is an option for wet weather runoff as well. The ability to beneficially use wet weather runoff will greatly depend on the seasonal storage capacity. As for dry weather runoff, the primary beneficial use of runoff is to meet irrigation demands. Therefore, to meet these demands (which are typically non-existent during rain events and low throughout the rainy season), the wet weather runoff would need to be stored until the demand exists. This can be done through a regional and/or a localized approach.

A regional approach to seasonal storage could include the use of out-of-service reservoirs for seasonal storage. A localized approach would be to construct distributed underground storage facilities, locally located in open spaces, parks, schools, etc. throughout the City. These can be installed in new/redevelopment projects as well as retrofit locations. There are several types of underground storage facilities that can be considered. Exhibit 5C demonstrates a modular storage media that holds the runoff in a honeycomb-like box under the ground. The

Exhibit 5C
Construction of Underground Cistern for Stormwater Capture

(Photo courtesy of TreePeople)

storage media has approximately 95 percent voids, so almost all of the storage volume would be filled with water. The maximum depth is 8 feet, which translates to approximately 2.44 million gallons per acre of water storage potential. The containers can also be constructed to be impermeable to prohibit infiltration.

According to studies conducted during the development of the City of Los Angeles IRP, the City currently has an estimated open space area of 6,000 acres, which includes parks, open space, and vacant lots. School sites are also a potential option for installing modular storage media under playgrounds and athletic fields. The total school area in the City is approximately 6,000 acres. Assuming that only 25 percent of this area has no buildings or other structures, this equals approximately 1,500 acres of potentially suitable land. Additionally, there are approximately 900 abandoned or no longer maintained alleys of various unknown dimensions that could potentially be converted to underground storage facilities. In the process of conversion, these areas could also be rebuilt to enhance the environment. Exhibit 5D summarizes the approximate underground storage potential throughout the City.

The City has the potential to store a considerable volume of wet weather runoff in order to meet the potential future regulations if the underground storage options were utilized. This stored water could then be drawn down and beneficially used during the dry weather months.

Neighborhood Recharge

Neighborhood recharge involves installing recharge facilities in portions of vacant urban lots, abandoned alleys, and City parklands, where the soil is highly permeable. This option involves installing underground storage (such as a honeycomb shaped device shown in Exhibit 5C, but without the lining which would prevent infiltration). This would allow the runoff to be stored underground, while still maintaining a safe area above ground for human activity. The runoff would be pumped or would flow by gravity to the site where it would be collected temporarily until it is able to infiltrate.

The amount of runoff that could be managed by neighborhood recharge was determined by assuming that only the east San Fernando Valley (Valley) area has soil that is appropriate for infiltration (though there may be other areas within the City that could be usable for recharge with smaller-scale projects). Based on an analysis of the City's Geographical Information System, the maximum total area available for neighborhood recharge facilities is approximately 831 acres, which includes vacant urban lots, abandoned alleys, and 25 percent of City parklands. Assuming an infiltration rate of 2 feet per day, the maximum runoff that could potentially be managed by recharge facilities would be 550 million gallons per day.

Regional Recharge

This option considers regional recharge of captured wet weather runoff into the Valley groundwater basin. Based on the aforementioned soil characteristics, only the Valley Basin has been analyzed. The regional recharge option focuses on large scale projects to capture and infiltrate runoff from large areas within the City.

Based on the assumption to recharge only in the eastern part of the Valley, only flows from the Valley are being considered. The total runoff generated in the Valley from the 0.45 inch storm event is 4,000 AF (1,300 million gallons) watershed wide, and 2,900 AF (750 million gallons) for the City only. This amount could potentially be conserved and used to augment groundwater recharge. These amounts account for the runoff from the 0.45 inch storm only. As this represents approximately 25 percent of the total annual runoff generated in the City, there is a great deal more runoff available to recharge. Once the capture, storage, and diversion facilities are in place, flows from storms that exceed 0.45 inches could be diverted as well.

Though the focus of regional recharge is wet weather runoff, dry weather runoff may be captured as well if the facilities were in place.

Exhibit 5D

Underground Storage Potential Throughout the City

Land Use	Quantity	Potential Storage Volume[1] (million gallons)
Open space	6,000 acres	15,000
Schools (assume only ~ 25 percent suitable land)	1,500 acres	4,000
Alleys	900 count	Unknown
Total Potential Volume		19,000

Note: 1. Maximum storage potential shown assumes 4.22 million gallons of storage per acre of land. Actual usable volume may be less.
Source: City of Los Angeles Integrated Resources Plan, Facilities Plan, Volume 3: Runoff Management

5.5 Graywater

Graywater is untreated household waste water which has not come into contact with toilet waste. It includes used water from bathtubs, showers, bathroom wash basins, and water from clothes washing machines and laundry tubs. Graywater may be reused for other purposes, especially landscape irrigation.

The Graywater Systems for Single-Family Residences Act of 1992 legally incorporated the use of graywater as part of the California Plumbing Code. In September 1994, the City approved an ordinance that permitted the installation of graywater systems in residential homes. The California DWR has prepared a graywater guidebook that can assist homeowners in putting graywater to use in a residential landscape. The guidebook is helpful in describing the necessary steps that need to be taken, from investigating the local permitting process, inspection, approval, and proper use, monitoring, and maintenance of an installed graywater system.

Unlike recycled water that must comply with regulatory health standards, graywater does not. Therefore, graywater should only be used for subsurface irrigation to minimize health concerns associated with surface use. Furthermore, the potentially high cost of installation and maintenance and lack of widespread public interest has limited implementation of graywater systems. The use of graywater systems is most compatible with new developments to minimize cost and optimize system design.

5.6 Cooperative Efforts to Increase Supply

TreePeople

Not all adaptations of technology occur on a large-scale basis. Projects to demonstrate promising new technology can impact future planning processes. LADWP has continued its partnership with TreePeople in a collaborative effort to incorporate various environmentally friendly and water-wise processes into urban planning and design.

Two environmentally sustainable projects redeveloped the parking and outdoor play and learning areas at local schools. One project (shown in Exhibit 5C) stores and uses runoff from the campus while the other project has direct recharge capability. Design components included removal of nonpermeable asphalt surfaces and subsequent replacement with natural vegetation surface (grass), as well as installation of stormwater collection systems and groundwater recharge capability.

Los Angeles and San Gabriel Rivers Watershed Council

As part of an ongoing study, the Los Angeles and San Gabriel Rivers Watershed Council (LASGRWC) is conducting a Water Augmentation Study (WAS). The WAS is a long-term research project led by the LASGRWC to explore the potential for reducing surface water pollution and increasing local water supplies by increasing infiltration of urban stormwater runoff. The project began in 2000 in collaboration with representatives from academia and from federal, state and local public and regulatory agencies. LADWP, along with eight public agencies, have joined in a Memorandum of Understanding and formed a Technical Advisory Committee (TAC) to support the WAS. The study will bring scientific evidence to bear on the feasibility and benefits of stormwater capture for infiltration, including impacts on groundwater quality and assessing appropriate and most favorable geographic, geologic, and hydrologic conditions for infiltration.

The WAS just completed a four year program to monitor the fate and transport of runoff-borne pollutants at selected sites in the Los Angeles region, by measuring stormwater quality at the surface and as it infiltrates through the soil to groundwater. Data collected to date indicate that there is no significant degradation of groundwater quality from the infiltration of stormwater-borne pollutants at monitored sites.

The next phase of the WAS will incorporate demonstration projects that will retrofit one or more small neighborhoods with state of the art Best Management Practices to address stormwater infiltration as well as water conservation, pollution reduction and treatment, flooding, and habitat restoration. The study will also assess the overall technical and financial feasibility of utilizing infiltration techniques to capture stormwater for groundwater recharge. A runoff-infiltration model was developed to predict the amount of additional water that could be available for deep percolation if infiltration is increased. The overall goals of the WAS are to evaluate costs and benefits of implementation, and determine the most effective strategy for developing this potentially significant source of water for southern California.

Los Angeles River Revitalization Plan

LADWP, along with other City departments and local and Federal government agencies, are key participants in the Los Angeles River Revitalization Plan efforts. In its current state, the River has for the most part been lined with concrete for flood protection. Three interrelated elements will come together to form the basis of the plan: 1) environmental and water quality; 2) economic and community revitalization; and 3) hydrology and hydraulics. Once complete, the plan will serve as a catalyst for economic development, new parks and habitat, and opportunities to enhance water quality and water resources. The plan will build upon past efforts and will seek to build a consensus among the numerous stakeholders, including the public. By creating wetlands that clean stormwater runoff before it enters the river, the plan will seek to improve water quality and assist the City in implementing the Regional Water Quality Control Board's Total Maximum Daily Load Goals for specified pollutants. The plan will identify ways to coordinate stormwater clean-up with the creation of both neighborhood and regional parks.

Sun Valley Watershed Management Plan

The City of Los Angeles Department of Public Works is an active member of the Sun Valley Stakeholders Group, led by the Los Angeles County Department of Public Works

Los Angeles River

(LACDPW), who prepared the Sun Valley Watershed Management Plan in 2004. Sun Valley, located in the Valley approximately 14 miles northwest of downtown Los Angeles, is not served by a major flood control system even though it is highly developed. Therefore, stormwater runoff causes flooding even during minor rainfall events. The mission statement as defined by the Stakeholders is:

"…to solve the local flooding problem while retaining all stormwater runoff from the watershed, increasing water conservation, recreational opportunities, wildlife habitat, and reducing stormwater pollution."

In order to meet the goal of the mission statement, the Stakeholders identified the following primary objectives:

- Reduce Local Flooding
- Increase Water Conservation
- Increase Recreational Opportunities in the Watershed
- Increase Wildlife Habitat
- Improve Water Quality
- Provide Additional Environmental Benefits
- Increase Multiple Agency Participation

Each of these objectives included additional specific goals as well. Under the objective to increase water conservation, the Stakeholders identified two additional specific goals which include 1) maximizing opportunities for infiltration BMPs where feasible (e.g. recharge basins,

dry wells, etc.), and 2) reducing current use of potable water by supplying stormwater runoff instead, where feasible (e.g. gravel processing wash water, landscape irrigation, etc.)

Ultimately, the plan provides four final sample alternatives for meeting the objectives. Each of the four alternatives has project components that include infiltration basins, constructed wetlands, tree planting, and storm drains. The Sun Valley watershed plan also calls for participation of individual property owners in good watershed practices.

Included in the four alternatives are a combination pilot project, five phase 1 projects, and eleven phase 2 projects. The following are examples of a few of the seventeen projects related to water conservation:

- Sun Valley Park Pilot Project – manage stormwater runoff and associated surface-street flooding via infiltration; capture and infiltrate up to a 50-yr design storm; drain a sub area of approximately 25 acres of residential property and 20 acres of park; and include a settling treatment unit prior to infiltration.

- Tuxford Green – decrease flooding at the Tuxford Street and San Fernando Road intersection, which has a chronic problem of flooding; improve stormwater quality; provide irrigation supply to the proposed landscaping improvement projects at the intersection; and eliminate upstream flooding by installing collector drains in the upstream streets and a cistern for irrigation.

- Sun Valley Middle School – alleviate flooding by converting the sports area of the school to a detention and infiltration area to manage runoff from the school grounds and nearby upstream neighborhood.

- Cal Mat Pit – utilize the landfill's 30-acre stormwater retention site to capture the runoff from 200 acres of surrounding residential area; provide significant flood protection, water reuse, infiltration, habitat creation, and recreational uses.

5.7 Summary of Alternative Water Supplies

The range of potential water supply, the unit cost, risks and other benefits of these alternative water supplies are presented in Exhibit 5E.

LADWP recognizes the value of alternative water supplies to offset unanticipated changes to supply or demand. Strategic water planning necessarily includes continuous monitoring of existing and future alternative water resources in preparation of these needs. Future changes in operational requirements and potential threats to water supply, such as drought and other resource depletions, may require that LADWP utilize alternative resources, such as those described in this chapter.

Exhibit 5E				
Alternative Water Supplies Being Explored by LADWP				
Alternative Water Supplies	Potential Water Yield (AFY)	Unit Cost ($/AF)	Implementation Risks	Additional Benefits
Smart Irrigation	25,000	290	Requires customer to install and use properly.	Reduces the amount of pollution being carried to the ocean and waterways.
Urban Runoff Plants	5,000	3,500	Water users may need incentives to use supply.	Reduces the amount of pollution being carried to the ocean and waterways.
Cisterns [1]	8,000	2,100	Requires customer to maintain device.	Reduces the amount of pollution being carried to the ocean and waterways, and hedges against climate change.
Neighborhood Recharge [2]	12,000	2,900	Requires protection of groundwater quality.	Reduces the amount of pollution being carried to the ocean and waterways, and hedges against climate change.
Regional Recharge [3]	10,000	Cost undetermined	Requires protection of groundwater quality.	Reduces the amount of pollution being carried to the ocean and waterways, and hedges against climate change.
Seawater Desalination [4]	25,000	1,080	Regulatory compliance may be challenging.	Replaces water committed to the environment. Hedges against climate change.
Water Transfer	40,000	Cost negotiated between parties	Wheeling and other institutional issues must be addressed.	Replaces water committed to the environment.

Source: City of Los Angeles Integrated Resources Plan (2004)

For Comparison Purposes:
Local Groundwater Pumping Unit Cost = $150/AF
MWD Tier 1 Water Supply Unit Cost = $453/AF
MWD Tier 2 Water Supply Unit Cost = $549/AF

Notes:

[1] Capturing and reusing stormwater on-site for schools and government only.

[2] Groundwater recharge of stormwater for open spaces, parks, abandoned alleys on land where the soil is highly permeable.

[3] Groundwater recharge of stormwater in the East Valley using existing recharge system.

[4] Yield shown here is based on LADWP's optimization study.

Chapter 6

water service reliability assessment

Chapter Six
Water Service Reliability Assessment

6.0 Overview

Providing for a reliable water supply in a semiarid climate is challenging. This is mainly due to the fact that surface water supply from the LAA and MWD vary substantially due to hydrology. To mitigate against the variability of surface supplies, LADWP has made significant investments in groundwater, recycled water, and water conservation. These supplies and demand-side management provide a "hedge" against droughts and variability of surface water.

Climate change can also impact surface supplies from the LAA and MWD. Although the science has not yet determined definitive impacts on Colorado River and SWP supplies, most scientists believe that climate change could alter the seasonality of precipitation for the West—meaning more water could fall during the spring rather than winter. For California, that could mean the loss of water storage in the form of snowpack. When the majority of precipitation falls in winter, California's mountains store this water as snow and slowly release it into streams, reservoirs, and groundwater basins during spring and summer.

In the years to come, LADWP will be developing additional local supplies to further hedge against the uncertainties of surface water.

Climate Change

Evidence continues to accumulate that the global climate may be changing as a result of increasing atmospheric greenhouse gas concentrations. The close linkage between climate and the hydrologic cycle implies that climate changes can be expected to have a variety of impacts on water resources.

Various research efforts have been conducted to determine the impacts of climate change on water supplies in the western United States. The various regional climate models have resulted in the general conclusion that rises in greenhouse gases will cause temperatures to increase. Even without changes in precipitation, these temperature increases are likely to cause reductions in snowpack levels and surface runoff.

Since many of LADWP's water supplies originate hundreds of miles away, some observations can be made using the results of the climate research conducted for the western United States. Using recent climate models, there is general consensus among researchers that if greenhouse gases continue to grow, average temperatures will increase globally over the next century. Some of the impacts from this climate change could be seen as early as the next twenty years. Climate models that assume the least temperature rises predict that average temperatures in the western United States will increase by 2.5ºC (4°F) over the next hundred years. The potential implications that this may have to LADWP's water supply would be in the form of operational adjustments to address potential shifts in the timing and volume of runoff.

Eastern Sierra Nevada snow survey

At the regional level, these temperature increases may: (1) reduce snowpack levels, with possibly greater impacts at lower mountain elevations; (2) shift to an earlier period the timing of spring runoff; (3) increase water demands for outdoor watering; and (4) change precipitation falling as rainfall rather than snow, thereby reducing the natural reservoir storage that snowpack provides. However, there is no consensus whether annual total precipitation averages

will increase or decrease as a result of climate change, particularly in the eastern Sierra Nevada watershed.

Research to verify regional climate models and to better translate the results for local areas such as the City continues. At this point, LADWP is undertaking studies to analyze the operational and water supply impacts of potential shifts in the timing and quantity of runoff along the Los Angeles Aqueduct system. Such potential shifts may require LADWP to develop and enhance local water resources, increase the volume of reservoir storage to buffer the loss of natural reservoirs in snowpack, continue to encourage outdoor water conservation, and further expand its consumer education efforts.

While the impact of climate change on water supply has not been easy to discern, the impact of a warmer climate on water demands has been evident in Los Angeles. A weather normalization analysis has been performed by LADWP. This analysis shows that in 22 of the last 25 years, water use in the City has been higher than it would have been if normal rainfall and temperature occurred.

Cognizant of this pattern, an enhanced outdoor conservation program is being implemented within the City to address the potential increase in water use due to the warmer climate. Part of this program is the promotion of drought-tolerant, California native plants, which use less water. As part of its on-going conservation program efforts, LADWP will continue to educate its customers on the benefits of saving water in and outside their homes and businesses. Additional efforts to address the potential impacts of climate change include development of alternative supplies such as seawater desalination and beneficial reuse of stormwater, as discussed in Chapter 5.

There is still general uncertainty within the scientific community regarding the potential impacts of climate change for the City. LADWP will continue to monitor climate change research and will study potential actions to adapt to future changing conditions.

6.1 Reliability of Current and Future Water Supplies

Los Angeles Aqueducts

Water supply from the LAA can vary substantially from year to year due to hydrology. In very wet years, LAA supply can exceed 400,000 AFY. Normal year LAA supply is estimated to be approximately 276,000 AFY; while a critical dry year (defined as a repeat of a 1976/77 drought) can be as low as 95,000 AFY.

Groundwater

Groundwater is also affected by local hydrology. However, with conjunctive use management of groundwater (storing imported water in the groundwater basins during wet and normal years) groundwater production can actually be increased during dry years. LADWP operates its groundwater resources in this manner. On average, LADWP can pump its adjudicated right of approximately 107,000 AFY. But in dry years, LADWP can pump larger quantities of groundwater. For the purposes of a single–year drought analysis, 135,000 AF is assumed to be the City's local groundwater production. If successive dry years occur, LADWP would likely pump at greater-than-average levels for the first few dry years, then start pumping at lower levels in order to prevent groundwater overdraft. LADWP would then replenish the groundwater when wet or normal years follow the successive dry period.

Recycled Water

Recycled water is based on wastewater effluent flows, which do not vary significantly due to hydrology. Therefore, recycled water is fairly constant. This makes recycled water a good "drought-proof" supply. As such, LADWP will continue to expand its recycled water program in accordance with its goals and objectives of cost effectiveness, safety, and customer acceptance.

MWD Imported Water

Historically, water from MWD (like supplies from the LAA) has been subject to severe droughts (e.g., 1976/77 and 1987-1992). This is due to the fact that MWD's core sources of water supply are the Colorado River and SWP, both of

which are highly affected by hydrology. But after the 1987-1992 drought, MWD started to diversify its water supplies. Partnering with its member agencies, MWD launched the IRP in 1993. As a result of the resource targets in the IRP, MWD implemented a variety of projects and programs designed to reduce its dependency on imported water during droughts. These have included: (1) providing financial incentives for local projects and conservation; (2) increased surface storage via Diamond Valley Lake and use of the SWP terminus reservoirs; (3) groundwater storage programs in the Central Valley, Imperial Valley, and Coachella Valley; (4) short- and long-term water transfers; and (5) local groundwater storage programs with participating member agencies.

MWD's IRP update calls for further expanding all of these alternative supplies. To further guard against uncertainty, MWD is planning for the development of a 500,000 AF buffer supply to mitigate for any shortfall in future supply development. Implementation of MWD's IRP will provide sufficient water to its member agencies even during critically dry events from now until at least 2025.

As part of the implementation of MWD's IRP, MWD and its member agencies worked together to develop MWD's Water Surplus and Drought Management Plan (WSDM Plan). The WSDM Plan established broad water resource management strategies to ensure MWD's ability to meet full service demands at all times and provides principles for supply allocation if the need should ever arise. The WSDM Plan splits MWD's resource actions into two major categories: Surplus Actions and Shortage Actions. The Shortage Actions of the WSDM Plan are split into three sub-categories: Shortage, Severe Shortage, and Extreme Shortage. Under Shortage conditions, MWD will make withdrawals from storage and interrupt long-term groundwater basin replenishment deliveries. Under Severe Shortage conditions, MWD will call for extraordinary drought conservation in the form of voluntary savings from retail customers, interrupt 30 percent of deliveries to Agricultural Water Program users, call on its option transfer water, and purchase water on the spot market. Under Extreme Shortage conditions, MWD will equitably allocate supplies to its member agencies on the basis of agencies' needs. The overall objective of MWD's IRP and WSDM Plan is to ensure that shortage allocations of MWD water supplies are not required.

Other Supplies

Other planned and potential water supplies that LADWP is exploring include seawater desalination (in several phases), water transfer, additional recycled water, and the beneficial use of urban runoff (see Chapter 5). Development of these supplies could reduce the amount of water purchased from MWD.

These water supplies do present challenges of their own. Seawater desalination is, at present, a higher cost option when compared to other water supplies. Issues related to environmental compliance and permitting can present further challenges to the City. However, funding assistance from MWD, the state, and federal agencies can help reduce cost for the City. Furthermore, LADWP owns a coastal power plant and existing infrastructure to reduce the cost of this new, potential supply development.

Water transfer is also being developed to replace a portion of the City's LAA water that has been dedicated for environmental enhancement uses in the eastern Sierra Nevada. Water acquired through transfer would help increase water supply reliability for the City.

Further expanding recycled water beyond planned amounts can become very costly as potential customers are further away from treatment plants—requiring more extensive pipelines and pump stations.

The beneficial reuse of urban runoff presents a new opportunity for the City. The City must reduce pollutants in impaired receiving waters (rivers, creeks, and beaches in the Santa Monica and Los Angeles watersheds) as required by the Clean Water Act. By managing urban runoff during dry and wet periods, pollution will be reduced. Traditional ways of managing urban runoff would be to divert the runoff into existing wastewater treatment plants and/or build satellite treatment plants specifically designed to treat urban runoff.

During the City's IRP, stakeholders expressed the desire to examine other ways to manage runoff that would reduce pollution and provide for other benefits such as water supply and open space. These methods would involve local and regional storage of wet weather runoff for groundwater replenishment, on-site storage and recovery of wet weather runoff for irrigation using cisterns and other devices, and reuse of treated dry weather effluent for irrigation (much like recycled water). These options, although promising, have yet to be implemented on a large scale. Cost, reliability of the technology, and safety are just some of the potential implementation issues.

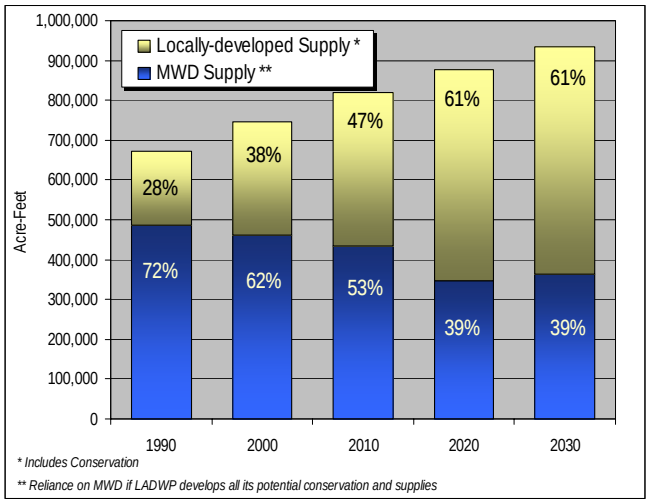
Service Area Reliability Assessment

To determine the overall service area reliability, LADWP defined three hydrologic conditions: average (or normal weather); single dry year (such as a repeat of the 1976/77 drought); and multi-dry year period (such as a repeat of the 1987-91 drought).

The reliability summary for year 2030 is shown in Exhibit 6A. For this summary, water conservation is shown as a supply source. Exhibit 6A shows that in a normal weather year approximately 66 percent of the total supply (estimated to be 897,200 AF) is from existing and planned locally-developed supplies. The potential supplies and additional potential conservation represent 14 percent. The remaining 20 percent of supply is imported water from MWD. Should the potential supplies not be developed due to cost, regulatory, technology, and/or customer acceptance, then the MWD portion of supply would represent 34 percent. During a dry year, existing and planned locally developed supplies represent 46 percent of the total (estimated to be 934,200 AF); while 15 percent is potential supplies and conservation. The remaining 39 percent is imported water from MWD.

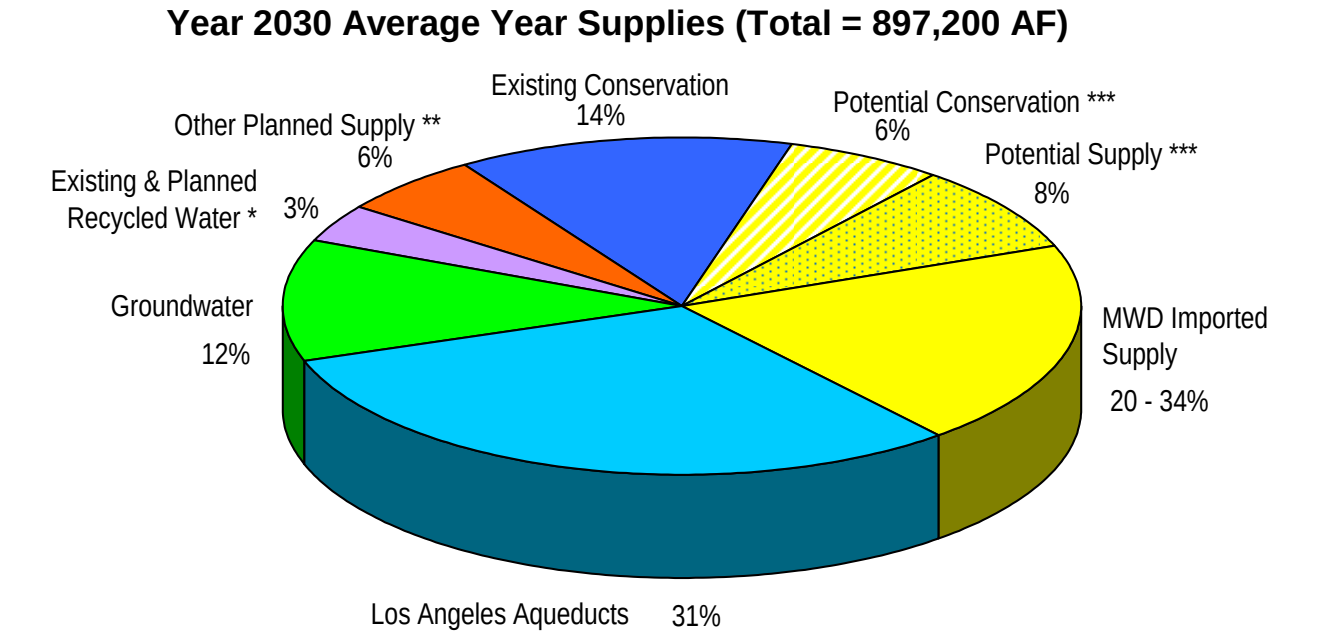
To put these percentages in context, the amount of water expected to be purchased from MWD during a dry year is steadily decreasing, despite a projected increase in water demand. Exhibit 6B shows the actual water demand and amount of MWD water purchased in 1990 (a very dry weather year). In this year, over 480,000 AF was purchased from MWD, representing 72 percent of the total supply. For each projected 10-year period, the amount of imported water expected to be purchased from MWD during a dry year is decreasing. If all of the potential supplies and conservation are developed by the year 2030, MWD water would make up just over 360,000 AF, or 39 percent of the City's total supply.

Exhibit 6B
Reliance on MWD Supplies During Dry Weather Years

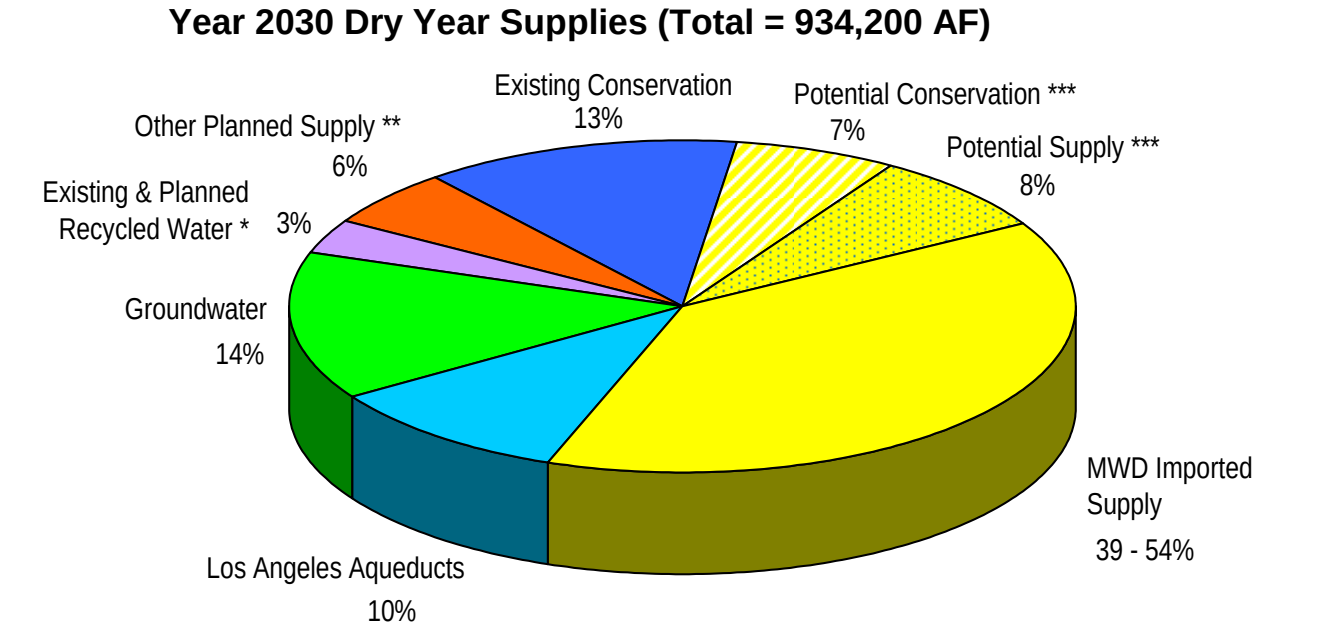


Exhibits 6C and 6D tabulate the service reliability assessment for average and single dry year conditions, respectively. Exhibits 6E through 6I show reliability assessments in five year increments (from 2006 to 2030), with each five year period assuming that a multiple dry year condition occurs. For these reliability tables, existing water conservation has been already subtracted from projected demands.

Exhibit 6A
LADWP Supply Reliability Summary for Year 2030



* For non-potable municipal & industrial purposes.
** Includes seawater desalination and water transfer.
*** Potential conservation may include smart irrigation and other measures; while potential supplies may include additional recycled water, additional seawater desalination, and beneficial reuse of urban runoff. However if these potential conservation measures and supplies are not developed due to cost, technology and/or customer acceptance, greater reliance on MWD would be needed.



* For non-potable municipal & industrial purposes.
** Includes seawater desalination and water transfer.
*** Potential conservation may include smart irrigation and other measures; while potential supplies may include additional recycled water, additional seawater desalination, and beneficial reuse of urban runoff. However if these potential conservation measures and supplies are not developed due to cost, technology and/or customer acceptance, greater reliance on MWD would be needed.

Exhibit 6C
Service Area Reliability Assessment for Average Year

Demand and Supply Projections (in acre-feet)	Average Weather Conditions				
	2010	2015	2020	2025	2030
Total Demand [1]	683,000	705,000	731,000	755,000	776,000
Existing Supplies					
Los Angeles Aqueduct	276,000	276,000	276,000	276,000	276,000
Groundwater	106,000	106,000	106,000	106,000	106,000
M&I Recycled Water	1,950	1,950	1,950	1,950	1,950
Subtotal	383,950	383,950	383,950	383,950	383,950
Planned Supplies					
M&I Recycled Water	15,000	18,000	20,000	25,000	29,000
Seawater Desalination (phase 1)	0	13,500	13,500	13,500	13,500
Water Transfer	30,000	40,000	40,000	40,000	40,000
Subtotal	45,000	71,500	73,500	78,500	82,500
MWD Water Purchases					
With Existing/Planned Supplies	254,050	249,550	273,550	292,550	309,550
Total Supplies	683,000	705,000	731,000	755,000	776,000
Difference (supply minus demand)	0	0	0	0	0
Other Potential Supplies					
M&I Recycled Water	0	0	34,050	29,150	25,000
Seawater Desalination (phase 2)	0	11,500	11,500	11,500	11,500
Beneficial Use of Urban Runoff	5,000	15,000	37,700	37,700	37,700
Potential Water Conservation	5,000	18,250	31,500	44,750	58,000
Subtotal	10,000	44,750	114,750	123,100	132,200
MWD Water Purchases					
If Other Potential Supplies are Developed	244,050	204,800	158,800	169,450	177,350
Total Supplies	683,000	705,000	731,000	755,000	776,000
Difference (supply minus demand)	0	0	0	0	0

[1] Projected with existing water conservation

Exhibit 6D
Service Area Reliability Assessment for Single Dry Year

Demand and Supply Projections (in acre-feet)	Single Dry Year (1977)				
	2010	2015	2020	2025	2030
Total Demand [1]	717,000	739,000	766,000	792,000	813,000
Existing Supplies					
Los Angeles Aqueduct	95,300	95,300	95,300	95,300	95,300
Groundwater	135,000	135,000	135,000	135,000	135,000
M&I Recycled Water	1,950	1,950	1,950	1,950	1,950
Subtotal	232,250	232,250	232,250	232,250	232,250
Planned Supplies					
M&I Recycled Water	15,000	18,000	20,000	25,000	29,000
Seawater Desalination (phase 1)	0	13,500	13,500	13,500	13,500
Water Transfer	30,000	40,000	40,000	40,000	40,000
Subtotal	45,000	71,500	73,500	78,500	82,500
MWD Water Purchases With Existing/Planned Supplies	439,750	435,250	460,250	481,250	498,250
Total Supplies	717,000	739,000	766,000	792,000	813,000
Difference (supply minus demand)	0	0	0	0	0
Other Potential Supplies					
M&I Recycled Water	0	0	34,050	29,150	25,000
Seawater Desalination (phase 2)	0	11,500	11,500	11,500	11,500
Beneficial Use of Urban Runoff	5,000	15,000	37,700	37,700	37,700
Potential Water Conservation	0	15,250	30,500	45,750	61,000
Subtotal	5,000	41,750	113,750	124,100	135,200
MWD Water Purchases If Other Potential Supplies are Developed	434,750	393,500	346,500	357,150	363,050
Total Supplies	717,000	739,000	766,000	792,000	813,000
Difference (supply minus demand)	0	0	0	0	0

[1] Projected with existing water conservation

Exhibit 6E
Service Area Reliability Assessment for Multi-Dry Year Period (2006-2010)

Demand and Supply Projections (in acre-feet)	Multi Dry Year (1987-1991)				
	2006	2007	2008	2009	2010
Total Demand [1]	697,800	702,200	706,600	711,000	717,000
Existing Supplies					
Los Angeles Aqueduct	135,500	106,800	109,100	63,200	120,300
Groundwater	135,000	106,000	106,000	100,000	95,000
M&I Recycled Water	1,950	1,950	1,950	1,950	1,950
Subtotal	272,450	214,750	217,050	165,150	217,250
Planned Supplies					
M&I Recycled Water	0	0	2,500	7,500	10,000
Seawater Desalination	0	0	0	0	0
Water Transfer	0	0	20,000	30,000	40,000
Subtotal	0	0	22,500	37,500	50,000
MWD Water Purchases					
With Existing/Planned Supplies	425,350	487,450	467,050	508,350	449,750
Total Supplies	697,800	702,200	706,600	711,000	717,000
Difference (supply minus demand)	0	0	0	0	0

Other Potential Supplies					
M&I Recycled Water	0	0	0	0	0
Seawater Desalination (phase 2)	0	0	0	0	0
Beneficial Use of Urban Runoff	0	0	500	1,000	5,000
Potential Water Conservation	0	0	0	0	0
Subtotal	0	0	500	1,000	5,000
MWD Water Purchases					
If Other Potential Supplies are Developed	425,350	487,450	466,550	507,350	444,750
Total Supplies	697,800	702,200	706,600	711,000	717,000
Difference (supply minus demand)	0	0	0	0	0

[1] Projected with existing water conservation

Exhibit 6F
Service Area Reliability Assessment for Multi-Dry Year Period (2011-2015)

Demand and Supply Projections (in acre-feet)	Multi Dry Year (1987-1991)				
	2011	2012	2013	2014	2015
Total Demand [1]	721,400	725,800	730,200	734,600	739,000
Existing Supplies					
Los Angeles Aqueduct	135,500	106,800	109,100	63,200	120,300
Groundwater	135,000	106,000	106,000	100,000	95,000
M&I Recycled Water	1,950	1,950	1,950	1,950	1,950
Subtotal	272,450	214,750	217,050	165,150	217,250
Planned Supplies					
M&I Recycled Water	10,000	12,000	14,000	16,000	18,000
Seawater Desalination	0	0	0	0	13,500
Water Transfer	40,000	40,000	40,000	40,000	40,000
Subtotal	50,000	52,000	54,000	56,000	71,500
MWD Water Purchases With Existing/Planned Supplies	398,950	459,050	459,150	513,450	450,250
Total Supplies	721,400	725,800	730,200	734,600	739,000
Difference (supply minus demand)	0	0	0	0	0
Other Potential Supplies					
M&I Recycled Water	0	0	0	0	0
Seawater Desalination (phase 2)	0	0	0	0	11,500
Beneficial Use of Urban Runoff	6,000	8,000	10,000	12,000	15,000
Potential Water Conservation	3,050	6,100	9,150	12,200	15,250
Subtotal	9,050	14,100	19,150	24,200	41,750
MWD Water Purchases If Other Potential Supplies are Developed	389,900	444,950	440,000	489,250	408,500
Total Supplies	721,400	725,800	730,200	734,600	739,000
Difference (supply minus demand)	0	0	0	0	0

[1] Projected with existing water conservation

Exhibit 6G
Service Area Reliability Assessment for Multi-Dry Year Period (2016-2020)

Demand and Supply Projections (in acre-feet)	Multi Dry Year (1987-1991)				
	2016	2017	2018	2019	2020
Total Demand [1]	744,400	749,800	755,200	760,600	766,000
Existing Supplies					
Los Angeles Aqueduct	135,500	106,800	109,100	63,200	120,300
Groundwater	135,000	106,000	106,000	100,000	95,000
M&I Recycled Water	1,950	1,950	1,950	1,950	1,950
Subtotal	272,450	214,750	217,050	165,150	217,250
Planned Supplies					
M&I Recycled Water	18,000	18,000	18,000	18,000	20,000
Seawater Desalination	13,500	13,500	13,500	13,500	13,500
Water Transfer	40,000	40,000	40,000	40,000	40,000
Subtotal	71,500	71,500	71,500	71,500	73,500
MWD Water Purchases With Existing/Planned Supplies	400,450	463,550	466,650	523,950	475,250
Total Supplies	744,400	749,800	755,200	760,600	766,000
Difference (supply minus demand)	0	0	0	0	0
Other Potential Supplies					
M&I Recycled Water	5,000	10,000	15,000	20,000	25,000
Seawater Desalination (phase 2)	11,500	11,500	11,500	11,500	11,500
Beneficial Use of Urban Runoff	16,000	20,000	25,000	30,000	37,700
Potential Water Conservation	18,300	21,350	24,400	27,450	30,500
Subtotal	50,800	62,850	75,900	88,950	104,700
MWD Water Purchases If Other Potential Supplies are Developed	349,650	400,700	390,750	435,000	370,550
Total Supplies	744,400	749,800	755,200	760,600	766,000
Difference (supply minus demand)	0	0	0	0	0

[1] Projected with existing water conservation

Exhibit 6H
Service Area Reliability Assessment for Multi-Dry Year Period (2021-2025)

Demand and Supply Projections (in acre-feet)	Multi Dry Year (1987-1991)				
	2021	2022	2023	2024	2025
Total Demand [1]	771,200	776,400	781,600	786,800	792,000
Existing Supplies					
Los Angeles Aqueduct	135,500	106,800	109,100	63,200	120,300
Groundwater	135,000	106,000	106,000	100,000	95,000
M&I Recycled Water	1,950	1,950	1,950	1,950	1,950
Subtotal	272,450	214,750	217,050	165,150	217,250
Planned Supplies					
M&I Recycled Water	21,000	22,000	23,000	24,000	25,000
Seawater Desalination	13,500	13,500	13,500	13,500	13,500
Water Transfer	40,000	40,000	40,000	40,000	40,000
Subtotal	74,500	75,500	76,500	77,500	78,500
MWD Water Purchases With Existing/Planned Supplies	424,250	486,150	488,050	544,150	496,250
Total Supplies	771,200	776,400	781,600	786,800	792,000
Difference (supply minus demand)	0	0	0	0	0
Other Potential Supplies					
M&I Recycled Water	25,000	25,000	25,000	25,000	25,000
Seawater Desalination (phase 2)	11,500	11,500	11,500	11,500	11,500
Beneficial Use of Urban Runoff	37,700	37,700	37,700	37,700	37,700
Potential Water Conservation	33,550	36,600	39,650	42,700	45,750
Subtotal	107,750	110,800	113,850	116,900	119,950
MWD Water Purchases If Other Potential Supplies are Developed	316,500	375,350	374,200	427,250	376,300
Total Supplies	771,200	776,400	781,600	786,800	792,000
Difference (supply minus demand)	0	0	0	0	0

[1] Projected with existing water conservation

Exhibit 6I
Service Area Reliability Assessment for Multi-Dry Year Period (2026-2030)

Demand and Supply Projections (in acre-feet)	Multi Dry Year (1987-1991)				
	2026	2027	2028	2029	2030
Total Demand [1]	796,200	800,400	804,600	808,800	813,000
Existing Supplies					
Los Angeles Aqueduct	135,500	106,800	109,100	63,200	120,300
Groundwater	135,000	106,000	106,000	100,000	95,000
M&I Recycled Water	1,950	1,950	1,950	1,950	1,950
Subtotal	272,450	214,750	217,050	165,150	217,250
Planned Supplies					
M&I Recycled Water	25,000	26,000	27,000	28,000	29,000
Seawater Desalination	13,500	13,500	13,500	13,500	13,500
Water Transfer	40,000	40,000	40,000	40,000	40,000
Subtotal	78,500	79,500	80,500	81,500	82,500
MWD Water Purchases With Existing/Planned Supplies	445,250	506,150	507,050	562,150	513,250
Total Supplies	796,200	800,400	804,600	808,800	813,000
Difference (supply minus demand)	0	0	0	0	0
Other Potential Supplies					
M&I Recycled Water	25,000	25,000	25,000	25,000	25,000
Seawater Desalination (phase 2)	11,500	11,500	11,500	11,500	11,500
Beneficial Use of Urban Runoff	37,700	37,700	37,700	37,700	37,700
Potential Water Conservation	48,800	51,850	54,900	57,950	61,000
Subtotal	123,000	126,050	129,100	132,150	135,200
MWD Water Purchases If Other Potential Supplies are Developed	322,250	380,100	377,950	430,000	378,050
Total Supplies	796,200	800,400	804,600	808,800	813,000
Difference (supply minus demand)	0	0	0	0	0

[1] Projected with existing water conservation

6.2 Water Shortage Contingency Plan

As required by the Act, a water shortage contingency plan was developed by the City to provide for a sufficient and continuous supply of water in case of a water supply shortage in the service area. There are two scenarios that can cause a water shortage: 1) a severe hydrologic drought affecting surface and groundwater supplies and 2) a catastrophic event that severs major conveyance and/or distribution pipelines serving water to the City. The following discusses LADWP's compliance with the Act as outlined in Section 10632 (a) through (i) of the California Water Code.

Stages of Action – 10632 (a)

The City has stages of action that can be undertaken in response to water supply shortages, including up to a 50 percent reduction in water supply. "Prohibited Uses" of water are in effect at all times within the City. These prohibited uses, defined in article 10632 (d), are intended to eliminate waste and increase public awareness of the need to conserve water. There are further stages of compounding actions in addition to the prohibited uses that might be imposed, depending on the severity of the shortage, as follows:

Severe Shortage (15 to 20 percent)

- Wash cars only with bucket or hand-held hose with shut-off valves; restrict frequency of landscape irrigation to two times per week.
- Reduce water used for street cleaning.
- Develop a large industrial customer incentive program that provides a monetary credit for all water reduction beyond a specified goal.

Critical Shortage (20 to 35 percent)

- Eliminate municipal public water uses (such as street cleaning) not required for health or safety unless tank truck water supply of recycled water is being used.
- Irrigate public parks and landscape areas only with recycled water.

Super Critical Shortage (35 to 50 percent)

- Commercial car washes must use recycled water in both the soap and rinse cycles; eliminate private irrigation of turf and landscaped areas except by drip irrigation systems or buckets.
- Require all water used for construction to be recycled water.

Driest Three-Year Supply – 10632 (b)

In the event that three consecutive dry-years curtailing the City's LAA System deliveries should follow the 2005 water supply conditions, LADWP will rely on increased groundwater pumping and purchases from MWD to meet City water demands. This particular sequence is quantified in Exhibit 6J, including relevant assumptions.

Exhibit 6J
Driest Three-Year Water Supply Sequence

Supply & Demand (Acre-Feet)	Current Conditions	Followed by repeat of Driest Three Consecutive Years (1959-61 hydrology)		
	2005	2006	2007	2008
Los Angeles Aqueduct	393,500	168,100	74,700	72,300
Local Groundwater	106,000	135,000	106,000	100,000
Recycled Water	1,950	1,950	1,950	1,950
Water Transfer	0	0	0	20,000
MWD Water	178,550	392,750	519,550	512,350
Total Supply	680,000	697,800	702,200	706,600
Demand (with Conservation)	680,000	697,800	702,200	706,600
Deficit (Demand less Supply)	0	0	0	0

Assumptions:
1. Driest three consecutive years on record in LAA watershed (1959-61) averaged 57% of normal runoff.
2. LAA deliveries reflect increased releases for environmental restoration in the Owens Valley & Mono Basin.
3. Dry year demands are 5 percent greater than normal demands.
4. Planned water transfer delivery of 20,000 AF by 2008.
5. MWD's Water Surplus and Drought Management Plan actions sufficient to meet City demands.

During such severe drought periods, the City's supplemental water supplier, MWD, may use an allocation strategy that is consistent with the framework developed in its Water Surplus and Drought Management (WSDM) Plan. Developed by MWD with substantial input from its member agencies, the

WSDM Plan provides for a needs-based allocation strategy, and establishes priorities for the use of MWD's water supplies to achieve 100 percent retail reliability.

Following are actions that could be taken by MWD in accordance with their WSDM Plan to augment its water supplies prior to implementation of any drought allocation action:

1. Draw on Diamond Valley Lake storage
2. Draw on out-of-region storage in Semitropic and Arvin-Edison Groundwater Banks
3. Reduce/suspend local groundwater replenishment deliveries
4. Draw on contractual groundwater storage programs in MWD's service area
5. Draw on State Water Project terminal reservoir storage (per Monterey Agreement)
6. Call for voluntary conservation and public education
7. Reduce deliveries from MWD's Interim Agricultural Water Program
8. Call on water transfer options contracts
9. Purchase transfers on the spot market
10. Allocate imported water if necessary

Catastrophic Supply Interruption Plan – 10632 (c)

LADWP has Emergency Response Plans (ERPs) in place to restore water service for essential use in the City if a disaster should result in the temporary interruption of water supply. Department personnel responsible for water transportation, distribution, and treatment have established ERPs to guide the assessment, prioritization, and repair process of City facilities that have incurred damage during a disaster. Citywide, an Emergency Operations Center (EOC) serves as a centralized point for citywide management of information about disasters and for coordination of all available resources. The EOC supports the City's Emergency Operations Organization to achieve its mission of saving lives, protecting property, and returning the City to normal operations in the event of a disaster. LADWP coordinates its efforts with the EOC to resume water supply service after a catastrophic event.

Mandatory Water Use Prohibitions – 10632 (d)

The Los Angeles City Municipal Code Chapter XII, Article I sets forth an Emergency Water Conservation Plan that contains provisions known as Prohibited Uses. These prohibited uses contain six wasteful water use practices that are permanently prohibited for all City customers. These prohibited uses are intended to eliminate waste and increase public awareness of the need to conserve water. During times of shortage, education and enforcement of the following provisions will be increased:

1. No hose-washing of hard surfaces such as walkways, driveways, or parking areas.
2. No water shall be used to clean, fill, or maintain levels in decorative fountains unless such is part of a recirculating system.
3. No restaurant, hotel, cafe, cafeteria, or other public place where food is sold shall serve drinking water to any customer unless expressly requested.
4. Water leaks must be repaired in a timely manner.
5. No lawn, landscape, or other turf area shall be watered between the hours of 10:00 a.m. and 5:00 p.m. from April through September, and between 11:00 a.m. and 3:00 p.m. from October through March (subject to Council approval). These restrictions do not apply to licensed nurseries, gardeners, and drip irrigation systems.
6. No watering in such a manner causing excess water to run-off onto an adjoining sidewalk, driveway, street, gutter or ditch.

In addition to the Prohibited Uses outlined above, the City may implement the stages of actions as the severity of water shortage changes as described in Section 10632 (a).

Consumption Reduction Methods during Water Shortages – 10632 (e)

Short-Term Actions. During drought or emergency conditions, LADWP's existing rate structure (enacted in 1993) serves as a basis for further reducing consumption. First tier water allotments are reduced during shortages by the degree of the shortage. For single-family residential users, the adjusted first tier allotments apply for the entire year. For other users, the adjusted first tier allotments apply only during the high season (June 1 through October 31). Details of LADWP's water rate structure are provided in Appendix C – Water Rate Ordinance.

Additional measures can be phased in as the dry cycle continues to provide some immediate demand reductions and increase public awareness of the need to conserve water. Included among these measures are water conservation public service announcements (through television and/or radio), billboard ads, flyer distributions, and conservation workshops. LADWP also actively participates in public exhibits to disseminate water conservation information within its service area. Conservation is a permanent and long-term application used within the City to counter the potentially adverse impacts of water supply shortages.

State law further regulates distribution of water in extreme drought conditions. Section 350-354 of the California Water Code states that when a governing body of a distributor of a public water supply declares a water shortage emergency within its service area, water will be allocated to meet needs for domestic use, sanitation, fire protection, and other priorities. This will be done equitably and without discrimination between customers using water for the same purpose(s).

Long-Term Actions. LADWP's long-range water conservation program is driven by the need to continuously increase water use efficiency. This will reduce demand, extend supply, and therefore, provide greater reliability. Dry cycle experiences, public trust responsibilities, and regulatory mandates have raised the level of awareness within the City for the need to approach demand reduction from a permanent and long-term perspective.

LADWP will continue to maintain and increase its existing conservation programs, and pursue the development of new and innovative programs. Emphasis continues to be placed on hardware conservation (ultra-low-flush toilet replacements, high-efficiency washing machine rebates, etc.) which result in permanent per capita water use reduction. Substantial efforts are also being placed on saving water outdoors, which is an area of large water savings potential within the City. It should, however, be recognized that the ability to achieve water reduction during droughts by requesting additional voluntary measures is likely to be more difficult in the future. As customers adjust to a conservation ethic and adopt permanent measures to reduce water use, their water demands harden and become less susceptible to voluntary conservation.

Penalties for Excessive Use – 10632 (f)

The Los Angeles City Municipal Code Section 121.10 sets penalties for violations of prohibited uses outlined in Section 10632 (d). The penalties consist of a written warning for the first violation, a $50 surcharge for the second violation, a $100 surcharge for the third violation, and a $150 surcharge for the fourth violation. A flow-restrictor or possible shutoff may be imposed after four or more violations.

Analysis and Effects on Revenues and Expenditures of Reduced Sales during Shortages – 10632 (g)

The City's Water Rate Ordinance, adopted in June 1995 and last amended in June 2004, provides a remedy to the impact of reduced water sales on revenues in the form of a Water Revenue Adjustment Factor (Adjustment). The Adjustment recovers any shortage in revenue due to variation in water sales. It is intended to support a fiscal year revenue target that is deemed sufficient to cover LADWP's essential expenses. The formula takes into account target and actual

revenues as well as projected water sales to determine the appropriate Adjustment.

The Adjustment is currently limited to $.18 per hundred-cubic-feet. It cannot exceed this limit unless the Board of Water and Power Commissioners determines that a surcharge in excess of $0.18 per hundred-cubic-feet is financially required and approval from the Los Angeles City Council is obtained. The Board of Water and Power Commissioners also has the authority to reduce the factor to less than the formula-calculated amount.

A billing factor is calculated each quarter and is added to the standard commodity charge. The factor is set to zero if a negative value is calculated. A Water Revenue Adjustment Account is maintained and updated each month by LADWP. This account is adjusted quarterly.

The City's Water Rate Adjustment Factor ensures that the required funds are available to fund Department activities aimed at providing continuous water service to Los Angeles water users, even during periods of low water sales.

Water Shortage Contingency Resolution or Ordinance – 10632 (h)

A draft water shortage contingency resolution is shown in Exhibit 6K. Moreover, the City's Water Rate Ordinance No. 170435 has specific provisions for LADWP's Board of Water and Power Commissioners, through a resolution, to determine the degree of shortage and apply corresponding commodity charges in case of a water shortage (see Section 10632 (e) and Appendix C – Water Rate Ordinance). If a water shortage is declared, certified copies of the resolution will be transmitted to the offices of the Mayor and of the Los Angeles City Clerk, and the Los Angeles City Council for final approval. Yet to be exercised, this particular water shortage act is included under Section 3 – General Provisions, Article P – Shortage Year Rates of the City's Water Rate Ordinance.

Methodology to Determine Actual Water Use Reductions during Shortages – 10632 (i)

Water use is monitored closely by LADWP throughout its service area regardless of the supply conditions. With 100 percent of its over 700,000 service connections metered, there is a high degree of accountability on the quantity of water used within the Los Angeles service area. Information from meter reads is collected for billing and accounting purposes, with reports prepared on a monthly basis from the data compiled.

LADWP also uses a spreadsheet model to estimate conservation efforts within the City since the early 1990s. The model estimates City water demand without conservation efforts using population and weather variables. The conservation effort is derived by comparing estimated pre-conservation demand with actual demand. Conservation efforts derived from this model are shown in Chapter 2, Exhibit 2B.

6.3 Water Supply Assessments

In 1994, the California Legislature enacted Water Code section 10910 (Senate Bill 901), which requires cities and counties, as part of the California Environmental Quality Act review, to request the applicable public water system to assess whether the system's projected water supplies were sufficient to meet a proposed development's anticipated water demand. The intent was to link the land use and water supply planning processes to ensure that developers and water supply agencies communicate early in the planning process. However, a study of projects approved by local planning agencies revealed that numerous projects were exempted due to loopholes in the statute, and that the intent of the legislation has largely gone unfulfilled.

Exhibit 6K
Draft Water Shortage Contingency Resolution

BE IT RESOLVED that the Board of Water and Power Commissioners (Board) recognizes that a Water Shortage Contingency Plan has been prepared and incorporated into the City of Los Angeles 2005 Urban Water Management Plan pursuant to the Urban Water Management Planning Act; the Urban Water Management Plan is on file with the Secretary of the Board; this Board has reviewed and considered the information and recommendations contained in this document, and makes the following findings and determinations:

1. The water supply available to the City of Los Angeles is insufficient to meet the City's normal water supply needs; and

2. The Department of Water and Power has developed a Water Shortage Contingency Plan for the City of Los Angeles that complies with all the requirements of the Urban Water Management Planning Act; and

3. The Urban Water Management Plan has been developed, adopted, and implemented pursuant to Article 3, Sections 10640 through 10645 of the Urban Water Management Planning Act; and

4. The Water Shortage Contingency Plan includes stages of action that can be taken in response to water supply shortages, including up to a 50 percent reduction in water supply, a driest three-year water supply scenario, mandatory water use prohibitions, and penalties for non-compliance; and

5. The Water Shortage Contingency Plan identifies both short-term and long-term actions to maximize water use efficiency and minimize the effects of the current drought as well as future water supply shortages.

BE IT FURTHER RESOLVED that this Board has adopted the Water Shortage Contingency Plan as incorporated in the Urban Water Management Plan, and declares the provisions of the Water Shortage Contingency Plan in full force and effect during the duration of this period of water shortage.

I HEREBY CERTIFY that the foregoing is a full, true, and correct copy of the resolution adopted by the Board of Water and Power Commissioners of the City of Los Angeles at its meeting held _____.

_____
Board Secretary

Subsequently, California Senate Bill 610 and Senate Bill 221, modeled after Senate Bill 901, amended state law, effective January 1, 2002 to ensure that the original intent of the legislation is fulfilled. Senate Bills 610 and 221 are companion measures which seek to promote more collaborative planning between local water suppliers and cities and counties. They improve the link between information on water supply availability and certain land use decisions made by cities and counties. Both statutes require detailed information regarding water availability to be provided to the city and county decision-makers prior to approval of specified large development projects. Both statutes also require this detailed information be included in the administrative record that serves as the evidentiary basis for an approval action by the city or county on such projects. Both measures recognize local control and decision making regarding the availability of water for projects and the approval of projects.

Both bills also contained provisions that effectively mandated compliance with the Water Code requirements for water supply assessments. Under Senate Bill 610, water assessments must be furnished to local governments for inclusion in any environmental documentation for certain

projects (as defined in Water Code 10912(a)) subject to the California Environmental Quality Act. Under Senate Bill 221, approval by a city or county of certain residential subdivisions requires an affirmative written verification of sufficient water supply.

As of 2005, LADWP has been requested to develop over 25 water supply assessments. A significant amount of the data required in water supply assessments is contained in this Urban Water Management Plan. Therefore, the water supply assessments rely significantly on data presented in this Water Plan, as well as a supplemental water reliability report prepared by the City's supplemental water supplier, the MWD.

LADWP's Water Plan uses a service area-wide method in developing City water demand projections. This methodology does not rely on individual development demands to determine area-wide growth. Rather, the growth in water use for the entire service area was considered in developing long-term water projections for the City of Los Angeles to the Year 2030. The driving factors for this growth are demographics, weather, and conservation. LADWP used anticipated growth in the various customer class sectors as provided by the Southern California Association of Governments (SCAG). The data used was based on SCAG's 2003 Regional Transportation Plan Forecast.

Water supply planning will be based on meeting these long-term demands. An important part of this planning process is for LADWP to work collaboratively with the MWD to ensure that the City of Los Angeles' anticipated water demands are incorporated into MWD's long-term water resources development plan. This is a continuous regional effort that includes all of MWD's member agencies, and has resulted in reliable supplemental water supplies for the City from MWD. As previously discussed, MWD has and continues to provide assurances that there is a reliable supply to meet water demands.

LADWP's water supply assessments have concluded that adequate water supplies would be available to meet the estimated water demands of the proposed developments during normal, single-dry, and multiple-dry water years, as well as existing and planned future uses of the City's water system. As required by State law, each of the assessments performed by LADWP has been approved by its Board of Commissioners. LADWP will continue to perform water supply assessments as part of its long-term water supply planning efforts for its service area.

6.4 Financing

Capital cost to finance the delivery of water supply to LADWP's service area is supported through customer-billed water rates. The LADWP Board of Commissioners sets the rates subject to approval of the Los Angeles City Council by ordinance.

The LADWP Board of Commissioners is obligated by the City Charter to establish water rates and collect charges in an amount sufficient to service the water system indebtedness and to meet its expenses of operation and maintenance.

The water service rate structure contains water procurement adjustments under which the cost of purchased water, including water purchased from MWD, demand-side management programs such as water conservation programs, and reclaimed water projects are recovered. In addition, the rate structure contains a water quality improvement adjustment to recover expenditures to upgrade and equalize water quality throughout the City of Los Angeles and to construct facilities to meet state and federal water quality standards, including the payment of debt service on bonds issued for such purposes.

LADWP's capital program expenditures are either financed through the sale of revenue bonds or the cost of the program is transferred to LADWP customers through rate adjustments.

Appendix A
Urban Water Management Planning Act

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CALIFORNIA WATER CODE

Urban Water Management Planning Act

Established: AB 797, Klehs, 1983
Amended: AB 2661, Klehs, 1990
AB 11X, Filante, 1991
AB 1869, Speier, 1991
AB 892, Frazee, 1993
SB 1017, McCorquodale, 1994
AB 2853, Cortese, 1994
AB 1845, Cortese, 1995
SB 1011, Polanco, 1995
AB 2552, Bates, 2000
SB 553, Kelley, 2000
SB 610, Costa, 2001
AB 901, Daucher, 2001
SB 672, Machado, 2001
SB 1348, Brulte, 2002
SB 1384, Costa, 2002
SB 1518, Torlakson, 2002
AB 105, Wiggins, 2004
SB 318, Alpert, 2004

CALIFORNIA WATER CODE DIVISION 6
PART 2.6. URBAN WATER MANAGEMENT PLANNING

CHAPTER 1. GENERAL DECLARATION AND POLICY

10610. This part shall be known and may be cited as the "Urban Water Management Planning Act."

10610.2.

(a) The Legislature finds and declares all of the following:

(1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.

(2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.

(3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.

(4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.

(5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.

(6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.

(7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.

(8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.

(9) The quality of source supplies can have a significant impact on water management strategies and supply reliability.

(b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.

10610.4. The Legislature finds and declares that it is the policy of the state as follows:

(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.

(b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.

(c) Urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies.

CHAPTER 2. DEFINITIONS

10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.

10611.5. "Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.

10612. "Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.

10613. "Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

10614. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.

10615. "Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

10616. "Public agency" means any board, commission, county, city and county, city, regional agency, district, or other public entity.

10616.5. "Recycled water" means the reclamation and reuse of wastewater for beneficial use.

10617. "Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

CHAPTER 3. URBAN WATER MANAGEMENT PLANS

Article 1. General Provisions

10620.

(a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.

(c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.

(d)

(1) An urban water supplier may satisfy the requirements of this part by participation in area-wide, regional, watershed, or basin-wide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

(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.

(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.

(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

10621.

(a) Each urban water supplier shall update its plan at least once every five years on or before December 31, in years ending in five and zero.

(b) Every urban water supplier required to prepare a plan pursuant to this part shall notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.

(c) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

Article 2. Contents of Plans

10630. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

(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.

(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 described in subdivision (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:

(1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.

(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 the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

(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 use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(1) An average water year.
(2) A single dry water year.
(3) Multiple dry water years.

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 supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(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.
(I) Agricultural.

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(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 multi-family 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 prohibition.
(N) Residential ultra-low-flush toilet replacement programs.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and non-economic factors, including environmental, social, health, customer impact, and technological factors.

(2) Include a cost-benefit analysis, identifying total benefits and total costs.

(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.

(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

(h) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

(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.

(j) Urban water suppliers that are members of the California Urban Water Conservation Council and submit annual reports to that council in accordance with the "Memorandum of Understanding Regarding Urban Water Conservation in California," dated September 1991, may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g).

(k) Urban water suppliers that rely upon a wholesale agency for a source of water, shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c), including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

10631.5. The department shall take into consideration whether the urban water supplier is implementing or scheduled for implementation, the water demand management activities that the urban water supplier identified in its urban water management plan, pursuant to Section 10631, in evaluating applications for grants and loans made available pursuant to Section 79163. The urban water supplier may submit to the department copies of its annual reports and other relevant documents to assist the department in determining whether the urban water supplier is implementing or scheduling the implementation of water demand management activities.

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:

(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.

(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.

(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.

(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.

(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.

(f) Penalties or charges for excessive use, where applicable.

(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, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

(h) A draft water shortage contingency resolution or ordinance.

(i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

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. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(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.

(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.

(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, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(d) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(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.

(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, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

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 water management strategies and supply reliability.

Article 2.5 Water Service Reliability

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 state, regional, or local agency population projections within the service area of the urban water supplier.

(b) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

(c) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

(d) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

Article 3. Adoption and Implementation of Plans

10640. Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630). The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

10641. An urban water supplier required to prepare a plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.

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 within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

10644.

(a) An urban water supplier shall file with the department and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be filed with the department and any city or county within which the supplier provides water supplies within 30 days after adoption.

(b) The department shall prepare and submit to the Legislature, on or before December 31, in the years ending in six and one, a report summarizing the status of the plans adopted pursuant to this part. The report prepared by the department shall identify the outstanding elements of the individual plans. The department shall provide a copy of the report to each urban water supplier that has filed its plan with the department. The department shall also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans submitted pursuant to this part.

10645. Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

CHAPTER 4. MISCELLANEOUS PROVISIONS

10650. Any actions or proceedings to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:

(a) An action or proceeding alleging failure to adopt a plan shall be commenced within 18 months after that adoption is required by this part.

(b) Any action or proceeding alleging that a plan, or action taken pursuant to the plan, does not comply with this part shall be commenced within 90 days after filing of the plan or amendment thereto pursuant to Section 10644 or the taking of that action.

10651. In any action or proceeding to attack, review, set aside, void, or annul a plan, or an action taken pursuant to the plan by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.

10652. The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

10653. The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the State Water Resources Control Board and the Public Utilities Commission, for the preparation of water management plans or conservation plans; provided, that if the State Water Resources Control Board or the Public Utilities Commission requires additional information concerning water conservation to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban

water demand management plan prepared to meet federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

10654. An urban water supplier may recover in its rates the costs incurred in preparing its plan and implementing the reasonable water conservation measures included in the plan. Any best water management practice that is included in the plan that is identified in the "Memorandum of Understanding Regarding Urban Water Conservation in California" is deemed to be reasonable for the purposes of this section.

10655. If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.

10656. An urban water supplier that does not prepare, adopt, and submit its urban water management plan to the department in accordance with this part, is ineligible to receive funding pursuant to Division 24 (commencing with Section 78500) or Division 26 (commencing with Section 79000), or receive drought assistance from the state until the urban water management plan is submitted pursuant to this article.

10657.

(a) The department shall take into consideration whether the urban water supplier has submitted an updated urban water management plan that is consistent with Section 10631, as amended by the act that adds this section, in determining whether the urban water supplier is eligible for funds made available pursuant to any program administered by the department.

(b) This section shall remain in effect only until January 1, 2006, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2006, deletes or extends that date.

Appendix B
Urban Water Management Plan Checklist

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2005 Urban Water Management Plan Requirements Checklist

Checklist organized according to Water Code Sections

Page Number in Plan	Water Code Section	Location in Guide	Items to Address
4-6, 4-9, 4-10	10620 (d)(1)	Page 2	Participate in area wide, regional, watershed, or basin wide urban water management planning
3-29 through 3-31, 4-6, 4-9, 4-10, 5-11 through 5-14	10620 (d)(2)	Page 2	Describe coordination of its plan with other appropriate agencies in the area
2-1 through 2-13, 3-10 through 3-12, 5-1 through 5-13	10620 (f)	Page 2	Describe water management tools and options used by the entity that will maximize resources and minimize the need to import water from other regions
Appendix D	10621 (a)	Page 4	Update plan every five years on or before December 31, in years ending in five and zero
Appendix D	10621 (b)	Page 4	Notify any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments
Appendix D		Page 4	Consult with and obtain comments from any city or county that receives notice
1-3	10631 (a)	Page 8	Provide current and projected population for water service area in 5-year increments to 20 years
1-1		Page 8	Identify sources of population data
1-4		Page 8	Describe climate characteristics that affect water management
1-1, 1-3		Page 8	Describe other demographics that affect water management
3-1 through 3-35, 5-1 through 5-14	10631 (b)	Page 10	Identify existing and planned water supply sources
6-13		Page 10	Provide current water supply quantities in 5-year increments to 20 years
6-6		Page 10	Provide planned water supply quantities in 5-year increments to 20 years
Not Applicable	10631 (b) (1)	Page 12	Attach copy of any groundwater management plans adopted, including plans adopted pursuant to Part 2.75 or any other specific authorization for groundwater management
3-7 through 3-16	10631 (b) (2)	Page 12	A description of any groundwater basins or basin from which the urban water supplier pumps groundwater
Appendix F		Page 12	If the groundwater basin is adjudicated attach a copy of the order or decree
Not Applicable		Page 12	For basins that are not adjudicated, state whether basins are in overdraft.
Not Applicable		Page 12	If basin is in overdraft or projected to be in overdraft describe plan to eliminate overdraft
3-8, 3-9		Page 12	Quantify legal pumping amounts from basin
3-8	10631 (b) (3)	Page 12	Detailed description and analysis of location, amount, and sufficiency of water pumped for past five years
3-7 through 3-16, 6-2, 6-6	10631 (b) (3)	Page 12	Detailed description and analysis of location, amount, and sufficiency for 20 year projection of water to be pumped

Page Number in Plan	Water Code Section	Location in Guide	Items to Address
6-1 through 6-6	10631 (c) (1)	Page 14	Describe reliability of water supply and vulnerability to seasonal or climatic shortage for average water year
6-1 through 6-5, 6-7	10631 (c) (2)	Page 14	Describe reliability of water supply and vulnerability to seasonal or climatic shortage for single dry water year,
6-1 through 6-5, 6-8 through 6-12	10631 (c) (3)	Page 14	Describe reliability of water supply and vulnerability to seasonal or climatic shortage for multiple dry water years,
6-1 through 6-5	10631 (c)	Page 14	Describe reliability of water supply due to seasonal or climatic shortages
6-1 through 6-5	10631 (c)	Page 14	Describe vulnerability of water supply due to seasonal or climatic shortages
6-1 through 6-5	10631 (c)	Page 14	Describe plans to supplement or replace inconsistent sources with alternative sources or DMMs
3-32 through 3-34, 5-1 through 5-3	10631 (d)	Page 16	Describe opportunities for exchanges or water transfers on a short-term or long-term basis, include proposed quantities and terms of agreement
1-6	10631 (e) (1-3)	Page 18	Identify and quantify past water use by sector
1-7, 1-10		Page 18	Identify and quantify current water use by sector
1-10		Page 18	Identify and quantify projected water use by sector in five-year increments to 20 years
Not Applicable		Page 20	Identify and quantify past, current, and projected water use over five-year increments by sales to other agencies to twenty years
1-10, 3-22, 3-26, 3-30,		Page 20	Identify and quantify past, current, and projected water use over five-year increments by additional water uses and losses to twenty years
2-4 through 2-12	10631 (f)	Page 24	See 10631 (j)
2-4 through 2-12	10631 (g)	Page 40	See 10631 (j)
2-8 through 2-12, 3-22 through 3-30, 4-1 through 4-6, 5-1 through 5-14, 6-2 through 6-12	10631 (h)	Page 42	Description of water supply projects and water supply programs that may be undertaken to meet total projected water use with a timeline for each project. Quantify each proposed project's normal-year supply, single dry-year supply, and multi-dry year supply.
5-3 through 5-5	10631 (i)	Page 44	Describe opportunities for development of desalinated water (ocean, brackish water)
2-4 through 2-12	10631 (j)	Page 22	Provide annual report from CUWCC identifying water demand management measures being implemented or scheduled for implementation to satisfy requirements (f) and (g)
6-6 through 6-12	10631 (k)	Page 46	Provide wholesale agency with water use projections for that source of water in five-year increments to twenty years
3-32 through 3-35, 6-6 through 6-12		Page 46	Wholesaler provided information identifying and quantifying existing and planned sources of water available to supplier over five-year increments to twenty years

Page Number in Plan	Water Code Section	Location in Guide	Items to Address
4-6 through 4-10, 6-2, 6-4		Page 46	Information from wholesaler describing reliability of wholesale supplies and amount to be delivered during normal, single-dry, and multiple-dry years, including factors resulting in inconsistency and information or plans to supplement or replace water sources that are not reliable
2-4	10631.5	Page 48	Include 2003-2004 or 2005 Annual Report submitted to CUWCC and CUWCC coverage report
6-13	10632 (a)	Page 50	Provide an urban water contingency plan analysis with stages of action to be taken in response to a water supply shortage
6-13		Page 50	Provide water supply conditions for each stage
6-13		Page 50	Provide in plan a 50% supply shortage
6-13, 6-14	10632 (b)	Page 52	Estimate the minimum water supply available for each of the next three years based on the driest three-year historic sequence by source
6-13, 6-14	10632 (c)	Page 54	Provide a catastrophic supply interruption plan for non-drought related events looking at vulnerability of each source, delivery and distribution systems and actions to minimize impacts of supply interruption
6-14, 6-15	10632 (d)	Page 56	List mandatory prohibitions against specific water use practices during water shortages and stage when they become mandatory
6-15	10632 (e)	Page 56	List consumption reduction methods in the most restrictive stages up to a 50% reduction, stage when the method takes place, and projected reduction by method
6-15	10632 (f)	Page 56	List excessive use charges or penalties and stages when they take effect
6-15, 6-16	10632 (g)	Page 58	Describe how planned consumption reduction methods, penalties and prohibitions are likely to impact revenues.
6-15, 6-16		Page 58	Describe how water shortage plan is likely to impact expenditures
6-15, 6-16		Page 58	Describe measures to overcome reduced revenues and increased expenditures
6-16, 6-17	10632 (h)	Page 60	Provide a draft water shortage contingency resolution or ordinance
6-16	10632 (i)	Page 60	Describe mechanisms to determine actual reductions on a weekly or daily basis
3-29	10633	Page 62	Identify coordination of the recycled water plan with other agencies
3-16 through 3-19, 3-21, 3-25 through 3-27	10633 (a)	Page 64	Describe wastewater collection and treatment systems in supplier area including amount collected and treated and quantify volumes
3-17 through 3-19, 3-25 through 3-27	10633 (b)	Page 64	Describe methods of wastewater disposal and treatments levels and quantify amounts meeting recycled water standards
3-17 through 3-21, 3-30	10633 (c)	Page 64	Describe current uses of recycled water, including type, place and quantities
3-22 through 3-31	10633 (d)	Page 66	Describe and quantify potential uses of recycled water and explain technical and economic feasibility

Page Number in Plan	Water Code Section	Location in Guide	Items to Address
3-21 through 3-30	10633 (e)	Page 66	Describe projected use of recycled water in surface area at 5-year intervals to 20 years and compare actual use of recycled water to previous projections
3-19	10633 (f)	Page 66	Describe actions that might be taken to encourage recycled water use and projected results
3-22 through 3-31	10633 (g)	Page 66	Provide recycled water use optimization plan that includes actions to facilitate use
3-7, 3-11 through 3-16, 3-29, 3-35	10634	Page 68	Analyze and describe how water quality affects water management strategies and supply reliability for each source of water in five-year increments for twenty years
6-6	10635 (a)	Pages 70-74	Compare projected normal water supply to projected normal water use over the next twenty years, in 5-year increments
6-7		Pages 70-74	Compare projected single-dry year supply to projected single-dry year supply use over the next twenty years, in 5-year increments
6-8 through 6-12		Pages 70-74	Compare projected multiple-dry year supply to projected multiple-dry year supply over the next twenty years, in 5-year increments (for following fiver year periods: 2006-2010, 2011-2015, 2016-2020, 2021-2025)
**	10635 (b)	Page 74	Provide Water Service Reliability section of UWMP to cities and counties within which it provides water supplies within 60 days of UWMP submission to DWR
**	10642	Page 78	Attach copy of adopted resolution to UWMP
Appendix D		Page 78	Encouragement involvement of social, cultural and economic community groups
Appendix D		Page 78	Plan available for public inspection
Appendix D		Page 78	Provide proof of public hearing
Appendix D		Page 78	Provide meeting notice to any city or county it supplies water within
3-21	10643	Page 78	Review recycled water plan in 2000 UWMP and discuss whether it is being implemented as planned
2-5		Page 78	Discuss whether BMPs in CUWCC BMP Annual Reports submitted in 2000 UWMP were implemented as planned
**	10644	Page 78	Provide 2005 UWMP to DWR and cities and counties within supplier area within 30 days of adoption
**	10645	Page 78	Provide documentation showing where plan will be available for public review during normal business hours 30 days after submittal to DWR

** To be enclosed with transmittal letter to DWR.

Appendix C
Water Rate Ordinance

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Los Angeles

Water Rates

June 1, 1995

Amended July 28, 1997,
February 4, 2000 and June 20, 2004

Los Angeles Department of Water and Power

Ordinance No. 170435

As Amended by Ordinance No. 171639,
Ordinance No. 173017, and Ordinance 175964

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* Amended July 28, 1997

** Amended February 4, 2000

*** Amended June 20, 2004

ZIP Codes

90001	90007	90022	90033	90059	90744
90002	90011	90023	90037	90061	91331
90003	90015	90031	90044	90063	91340
90006	90017	90032	90058	90065	91352

Application of this schedule shall be subject to rules and regulations adopted by the Board of Water and Power Commissioners.

P. SHORTAGE YEAR RATES

When the Board of Water and Power Commissioners, by resolution, finds and determines that the water supply available to the City of Los Angeles is insufficient to meet the City's normal water supply, it shall determine the degree of shortage and apply the corresponding commodity charges stated below, instead of the otherwise applicable commodity charges.

Certified copies of such resolution shall be transmitted to the offices of the Mayor and of the City Clerk, and the Council. At any time within such period as may be specified in said resolution, which shall not be less than fifteen days from and after the receipt of such certified copies at such offices respectively, the Mayor, by writing, or the Council, by majority vote, may disapprove such resolution. If neither the Mayor nor the Council shall so disapprove said resolution within the period so specified, the same shall take effect upon the expiration of said period and shall be applicable to charges commencing on the first day of the billing cycle after the expiration of the period prescribed in the resolution. If the Mayor shall disapprove said resolution within said period, he shall forthwith advise the Council and the Board, in writing, of such disapproval. The Council shall thereupon consider such disapproval in the same manner as upon the reconsideration of an ordinance notwithstanding the veto of the Mayor, and if upon such consideration the Council shall, by the votes of two-thirds of the whole Council, determine that the Mayor's disapproval should be overruled, such disapproval by the Mayor shall be of no effect, and the said resolution of the Board shall forthwith take effect and shall be applicable to charges commencing on the first day of the billing cycle after the action by the Council overruling the Mayor's disapproval and the expiration of the period prescribed in the resolution.

The following commodity rates shall be substituted into the appropriate corresponding schedule and shall continue during the time that a water shortage determined by the Board of Water and Power Commissioners remains in effect.

1. Schedule A - Single-Dwelling Unit Residential Customers

a. The first tier usage block shall be reduced by the degree of the shortage and shall be billed at the rate specified in Section 2.A.3.a.
b. Second Tier Usage

Usage above the first tier usage block as prescribed in Section 3.P.1.a above shall be billed as follows:

Commodity Charge	Rate Per Hundred Cubic Feet
10% Shortage	
Low Season - November 1 through May 31	$3.70
High Season - June 1 through October 31	$3.70
15% Shortage	
Low Season - November 1 through May 31	$4.44
High Season - June 1 through October 31	$4.44
20% Shortage	
Low Season - November 1 through May 31	$5.18
High Season - June 1 through October 31	$5.18
25% Shortage	
Low Season - November 1 through May 31	$6.05
High Season - June 1 through May 31	$6.05

2. Schedule B - Multi-Dwelling Unit Residential Customers

Commodity Charge	Rate Per Hundred Cubic Feet
10% Shortage	
a. Up to 115% of Adjusted First Tier Usage Block	$1.14
b. Usage above 115% of Adjusted First Tier Usage Block	$3.70

Commodity Charge	Rate Per Hundred Cubic Feet
15% Shortage	
c. Up to 115% of Adjusted First Tier Usage Block	$1.14
d. Usage above 115% of Adjusted First Tier Usage Block	$4.44
20% Shortage	
e. Up to 110% of Adjusted First Tier Usage Block	$1.14
f. Usage above 110% of Adjusted First Tier Usage Block	$5.18
25% Shortage	
g. Up to 110% of Adjusted First Tier Usage Block	$1.14
h. Usage above 110% of Adjusted First Tier Usage Block	$6.05

3. Schedule C – Commercial and Industrial Customers

Commodity Charge	Rate Per Hundred Cubic Feet
10% Shortage	
a. Up to 115% of Adjusted First Tier Usage Block	$1.21
b. Usage above 115% of Adjusted First Tier Usage Block	$3.70
15% Shortage	
c. Up to 115% of Adjusted First Tier Usage Block	$1.21
d. Usage above 115% of Adjusted First Tier Usage Block	$4.44

Commodity Charge	Rate Per Hundred Cubic Feet
20% Shortage	
e. Up to 110% of Adjusted First Tier Usage Block	$1.21
f. Usage above 110% of Adjusted First Tier Usage Block	$5.18
25% Shortage	
g. Up to 110% of Adjusted First Tier Usage Block	$1.21
h. Usage above 110% of Adjusted First Tier Usage Block	$6.05

4. Schedule F - Publicly-Owned Grounds; Publicly-Sponsored Agricultural, Horticultural, and Floricultural Uses, Streets and Drainage Facilities; Community Gardens and Youth Sports

Commodity Charges	Rate Per Hundred Cubic Feet
10% Shortage	

The following rates are applicable to Group 2.F.1.a, 2.F.1.b(1) and 2.F.1.c uses:

a. First Tier Usage Block	$0.743
Effective July 1, 2001	$0.866
Effective July 1, 2003	$0.989

The first tier usage block shall be the monthly consumption per service connection during the corresponding month of fiscal year 1990-91.

The following rates are applicable to Group 2.F.1.b(2) and 2.F.1.d uses:

b. First Tier Usage Block	$0.694
Effective July 1, 2001	$0.768
Effective July 1, 2003	$0.842
Effective July 1, 2005	$0.916
Effective July 1, 2007	$0.989

The first tier usage block shall be the monthly consumption per service connection during the corresponding month of fiscal year 1990-91.

	Rate Per Hundred Cubic Feet
c. Second Tier Usage	
Usage above the first tier usage block as prescribed in Section 3.P.4.a and 3.P.4.b above	$3.70

15% Shortage

The following rates are applicable to Group 2.F.1.a, 2.F.1.b(1) and 2.F.1.c uses:

d. First Tier Usage Block	$0.743
Effective July 1, 2001	$0.866
Effective July 1, 2003	$0.989

The first tier usage block shall be the monthly consumption per service connection during the corresponding month of fiscal year 1990-91.

The following rates are applicable to Group 2.F.1.b(2) and 2.F.1.d uses:

e. First Tier Usage Block	$0.694
Effective July 1, 2001	$0.768
Effective July 1, 2003	$0.842
Effective July 1, 2005	$0.916
Effective July 1, 2007	$0.989

The first tier usage block shall be the monthly consumption per service connection during the corresponding month of fiscal year 1990-91.

f. Second Tier Usage	
Usage above the first tier usage block as prescribed in Section 3.P.4.d and 3.P.4.e above	$4.44

20% Shortage

The following rates are applicable to Group 2.F.1.a, 2.F.1.b(1) and 2.F.1.c uses:

g. First Tier Usage Block	$0.743
Effective July 1, 2001	$0.866
Effective July 1, 2003	$0.989

The first tier usage block shall be the monthly consumption per service connection during the corresponding month of fiscal year 1990-91.

The following rates are applicable to Group 2.F.1.b(2) and 2.F.1.d uses:

	Rate Per Hundred Cubic Feet
h. First Tier Usage Block	$0.694
Effective July 1, 2001	$0.768
Effective July 1, 2003	$0.842
Effective July 1, 2005	$0.916
Effective July 1, 2007	$0.989

The first tier usage block shall be the monthly consumption per service connection during the corresponding month of fiscal year 1990-91.

i. Second Tier Usage

Usage above the first tier usage block as prescribed in Section 3.P.4.g and 3.P.4.h above $5.18

25% Shortage

The following rates are applicable to Group 2.F.1.a, 2.F.1.b(1) and 2.F.1.c uses:

j. First Tier Usage Block	$0.743
Effective July 1, 2001	$0.866
Effective July 1, 2003	$0.989

The first tier usage block shall be the monthly consumption per service connection during the corresponding month of fiscal year 1990-91.

The following rates are applicable to Group 2.F.1.b(2) and 2.F.1.d uses:

k. First Tier Usage Block	$0.694
Effective July 1, 2001	$0.768
Effective July 1, 2003	$0.842
Effective July 1, 2005	$0.916
Effective July 1, 2007	$0.989

The first tier usage block shall be the monthly consumption per service connection during the corresponding month of fiscal year 1990-91.

l. Second Tier Usage

Usage above the first tier usage block as prescribed in Section 3.P.4.j and 3.P.4.k above $6.05

m. Those who have completed an audit of their facilities in accordance with a Department-approved manual on large turf water audits and have implemented the "Best Management Practices for Turf Irrigation" as approved by the Board of Water and Power Commissioners to the satisfaction of the Department, shall be entitled to receive 100 percent of their water at the first tier rate.

For service connections for which a first tier usage block has not been established, an audit shall be completed to establish the first tier usage block. "

5. Adjustments and credits pursuant to General Provisions F, G, H, I, K and L shall be applied to the commodity charges set forth in this General Provision P in the same manner that they apply to the commodity charge set forth in Rate Schedules A, B, C, D, E and F, inclusive.

6. When the Board of Water and Power Commissioners determines that the water supply available to the City of Los Angeles is either sufficient, or if not sufficient, is better able to meet the City's normal water supply, it shall, by resolution, either terminate the implementation of these shortage year rates or determine the lesser degree of shortage and apply the applicable commodity charges stated above instead of the commodity charges theretofore implemented pursuant to this Provision P. Such determination shall become effective upon publication of the resolution.

Q. RESALE OF WATER AND SUBMETERED CUSTOMERS

1. The resale of water by Department customers is prohibited. Any resale of water will be cause for termination of service.

2. Notwithstanding the foregoing prohibition, master-metered residential facilities and mobile home parks where individual single dwelling units are submetered, and commercial facilities where individual commercial units are submetered, may pass through their costs for water service subject to the following billing conditions:

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Appendix D
Notice of Meeting and Public Comments

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PUBLIC NOTICES

An advertisement campaign for public workshops seeking input on the 2005 update of the LADWP Urban Water Management Plan was held in October and November 2004. A workshop announcement (see next pages) was published in the following publications on the dates shown below:

Media Publication	**Publication Date(s)**
San Fernando Valley Sun	October 28 and November 4
Los Angeles Daily News	November 6, 8, 13, and 15
Los Angeles Times	November 17
Los Angeles Downtown News	November 15

A second advertisement campaign for public workshops seeking comments on the draft version of the 2005 update of the LADWP Urban Water Management Plan was held in August 2005. A workshop announcement (see next pages) was published in the following publications on the dates shown below:

Media Publication	**Publication Date(s)**
Wave and Independent	August 4
Los Angeles Daily News	August 3
Los Angeles Times	August 3
Los Angeles Downtown News	August 8

E-mail Notification

Notification was sent to all City of Los Angeles Neighborhood Councils seeking public comment on the draft 2005 LADWP Urban Water Management Plan at two workshops held in August 2005 and via written comment by September 16, 2005. The e-mailed announcement is included in the following pages.

Internet Posting

Requests for comments on the draft 2005 LADWP Urban Water Management Plan and attendance at the August 2005 workshops were also posted on the front page of the LADWP internet website at www.ladwp.com.

A Reliable Water Supply for Your Future

Please join the Los Angeles Department of Water and Power (LADWP) at a public workshop to share your views and concerns regarding L.A.'s water supply so that they may be considered as the city's Urban Water Management Plan is updated.

Workshops will be held:

Wednesday, November 10, 2004
6 p.m. to 8 p.m.
Marvin Braude Constituent
Service Center
6262 Van Nuys Blvd., Van Nuys

Wednesday, November 17, 2004
6 p.m. to 8 p.m.
LADWP John Ferraro Building
15th Floor Board Room
111 N. Hope Street
Downtown Los Angeles

The City of Los Angeles 2000 Urban Water Management Plan is posted on LADWP's web site at www.ladwp.com.

For more information, please contact Mr. Alvin Bautista at (213) 367-0800.

"Water for Life, Power to LA"

Los Angeles Department of Water & Power

YOUR INPUT IS NEEDED AT A PUBLIC WORKSHOP!

DEVELOPING LOS ANGELES' WATER RESOURCES

The Los Angeles Department of Water and Power (LADWP) will host two public workshops to receive input on of the City of Los Angeles' draft Urban Water Management Plan (Water Plan). The Water Plan outlines LADWP's long-term plans to manage the City's water resources. Public input received from the workshop will be considered in finalizing LADWP's year 2005 Water Plan update. State law requires all large California urban water agencies to prepare a Water Plan and provide an update every five years.

The efficient and effective management of water resources is very important. Please join us at one of the following meetings to share your comments, and assist LADWP in developing a Water Plan that would benefit the City with high-quality, reliable, and low-cost water supplies through sound water resources planning for many years to come.

WORKSHOPS WILL BE HELD:

Tuesday, August 16, 2005
6 p.m. – 8 p.m.
DWP John Ferraro Bldg.
15th Floor Board Room
111 N. Hope Street
Downtown Los Angeles

Tuesday, August 23, 2005
6 p.m. – 8 p.m.
Marvin Braude Constituent
Service Center
6262 Van Nuys Blvd.
Van Nuys

The draft Water Plan is posted on LADWP's web site at www.ladwp.com. Written comments are due by September 16, 2005 to:

LADWP
111 N. Hope Street, Room 1460
Los Angeles, CA 90012
Attn: Alvin Bautista

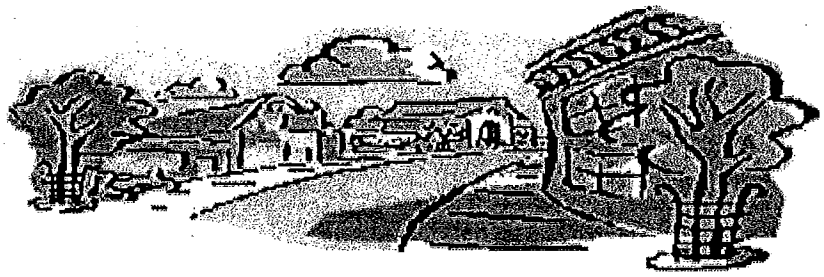
For questions, please call 213-367-0800.

Los Angeles LA DWP Department of Water & Power

"Water for Life, Power to LA"

Los Angeles LADWP Department of Water and Power

We're Working For LA!



Neighborhood Council

MOU Notification

July 12, 2005

You are receiving this notification under guidelines established by the LADWP-Neighborhood Council MOU. LADWP will provide notifications of significant matters or proposed actions by the Board of Water and Power Commission. Such actions include, but are not limited to, major policies or programs; changes in major policies or programs; significant projects, such as those requiring environmental impact documents; the upcoming fiscal year draft budget; and any proposed rate action.

In addition to these email notifications, all notifications are posted on the LADWP website at www.ladwp.com/nc.

NOTICE OF PUBLIC WORKSHOPS, AUG. 16 AND AUG. 23

PLANNING FOR LOS ANGELES' WATER RESOURCES

LADWP will host two public workshops to receive input on the City of Los Angeles' draft 2005 Urban Water Management Plan (Water Plan) update. Public input received from the workshop will be considered in finalizing the Water Plan. State law requires all large California urban water agencies to prepare a Water Plan and provide an update every five years. The mandated submittal date for the Water Plan is December 31, 2005.

The efficient and effective management of water resources is important to all of us. Please join us at one of the following meetings to share your views and concerns, and assist LADWP in developing a Water Plan that would benefit the City with high-quality, reliable, and low-cost water supplies through sound water resources planning for the future.

Information for both workshops are as follows:

Tuesday, August 16, 2005
6 p.m. – 8 p.m.
LADWP John Ferraro Building
15th Floor Board Room
111 N. Hope Street
Downtown Los Angeles

Tuesday, August 23, 2005
6 p.m. – 8 p.m.
Marvin Braude Constituent Service Center
6262 Van Nuys Blvd.
Van Nuys

About LADWP's Urban Water Management Plan:
The Water Plan addresses requirements under California Water Code Sections 10610 through 10657. A key element of the Water Plan is discussion of the management and development of water resources, as well as efforts relating to efficient use of water. The Water Plan discusses existing and future water conservation measures, water recycling, and management of the City's groundwater basins. In addition, the Water Plan offers a discussion on the status of Los Angeles' imported water sources, water quality issues, and projections of future water supply and demand for the City.

The draft Water Plan will be available for review on LADWP's website, www.ladwp.com, after July 29, 2005.

Written comments are due September 16, 2005 to:

LADWP

111 N. Hope Street, Room 1460
Los Angeles, CA 90012
Attn: Alvin Bautista

Additional workshops can be provided as requested in the month of August.

If you have any questions, please call Mr. Alvin Bautista at (213) 367-0800.

Note: LADWP uses the DONE email database to send information to NC Presidents and Board members. If you wish to be removed from that database please contact DONE or your DONE representative.

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PUBLIC COMMENTS

WORKSHOP PUBLIC COMMENTS

Following is a summary of questions, comments received, as well as LADWP responses at public meetings on the City of Los Angeles Draft 2005 Urban Water Management Plan (UWMP) held on August 16 and 23, 2005.

DESALINATION

Q: What is the status of desalination for LADWP?
A: LADWP is in the planning stages for desalination, and is planning a pilot study to evaluate the feasibility of this resource. Seawater desalination's impacts on the environment, permitting, cost, and other issues will be evaluated before moving forward. A detailed discussion of LADWP's seawater desalination program can be found in Chapter 5.2 on pages 5-3 through 5-5.

Q: Desalination requires a lot of capital funding. Is that in the budget right now?
A: Seawater desalination in the City is not expected to be online until approximately 2015. LADWP is still in the early stages of desalination development. The funding required to implement desalination in the City will be ascertained when a specific project has been approved. LADWP has qualified to receive grant funding from the Metropolitan Water District of Southern California (MWD), and is seeking federal and other opportunities to help fund desalination and bring the cost in line with other City water resources.

Q: Is LADWP partnering with other agencies in desalination?
A: LADWP is partnering with the MWD, West Basin Municipal Water District, and the City of Long Beach in research for desalination. LADWP is also partnering (i.e. received financial assistance) with the California Department of Water Resources and the United States Bureau of Reclamation on its proposed pilot project at Scattergood Generating Station.

Q: There is concern with co-locating a desalination plant at a power plant. Are there other sources and supplies besides seawater that can be turned to and protect the environment? Desalination is also an expensive option and environmentally questionable.
A: LADWP is aware of these concerns, and will do what is prudent and feasible to implement seawater desalination in an environmentally and cost conscious manner. Desalination is one of several alternative supply options that LADWP is considering in order to diversify the City's water resources. Even if LADWP completes its desalination goals, it would constitute approximately 3 to 4 percent of the City's water supply.

Comment: Desalination may decrease the reliance on imported water from the Sierras and Colorado River – possible benefits. But there are negative aspects. Conservation and additional recycled water are both less expensive than desalination and do not have the adverse environmental impacts. Be aware that desalination does not have great support in the environmental community and that there will be political static on this issue. I urge you to be aware of that.

Comment: I support continued Research and Development on desalination.

Q: Is the desalination distillation process dependent on the cost of energy (whereas membrane filtration is less energy intensive)?
A: Both distillation and membrane filtration processes are energy-intensive. However, significant improvements in membrane filtration have made it the treatment of choice for modern applications and it makes sense for LADWP to go in that direction.

Q: Do you have an energy cost model as you think about things like that?
A: Yes. As part of its due diligence, LADWP has conducted an optimization study and found that there are substantial benefits of being the only public utility in California that owns a coastal generating facility. LADWP has its own power, land, and nearby water infrastructure. These are public resources that are unique for LADWP.

Substantial information in potential cost projections for implementing desalination in the City was obtained from LADWP's optimization study. Based on these projections, it is anticipated that seawater desalination will be a cost-competitive source of supply for the City.

CONSERVATION

Comment: In general, the Department has made significant strides since 1990, particularly in the conservation field, as noted in the statistic that water demand is the same as twenty years ago.

Comment: I would like to commend you on what you've done so far [in water conservation] but I would like you to continue to work closely with non-governmental agencies and organizations and work with them to distribute low-flush toilets, and on multi-family and industrial programs. I think there is real value there. There are other opportunities to continue to show leadership. LADWP does not get enough credit for what it does and that is why I think LADWP will be able to maintain the lower water demand levels.

Comment: I would like to thank LADWP very much for continuing to improve the quality of low-flush toilets. When they first came out, they didn't flush. And the sprinklers are much better now. The showerheads are some of the best you can get. Thank you very much.

Comment: I would like to see LADWP implement a separate outside water meter. In the San Fernando Valley, where outside water use is such a high percentage, people get stuck with a higher tier rate of water in the summer. It was a challenge going through your service center and getting it processed. I would like to see if that could be facilitated and more people made aware of how they could get meters and make it easier for people to understand.

I would also encourage the greater use of graywater. The ordinance is about twelve years old and I recommend updating it. I would like to see more value for graywater and perhaps provide more incentives.
A: LADWP is working with others to better understand what additional research needs to be done on issues such as the risks and necessary levels of treatment necessary for graywater. Graywater is addressed in Chapter 5.5 on page 5-11.

RECYCLED WATER

Q: I understand the decision to not operate the East Valley Recycling Project (EVRP) is political. What is LADWP's current position on the EVRP?
A: Since the decision to suspend the EVRP, LADWP has focused on extending its recycled water infrastructure for irrigation and industrial use. With public support and approval from the City's leadership, there may be opportunities to investigate groundwater recharge with recycled water in the future. An extensive discussion of water recycling is found in Chapter 3.4 on pages 3-16 through 3-31.

Q: What is the percentage of recycled water supply based on?
A: The projections shown in the UWMP are based on the alternatives provided in the City of Los Angeles Bureau of Sanitation (BOS) IRP. As part of the IRP, LADWP is continuously working with the BOS to determine potential recycling opportunities within the City.

Q: Who prioritizes the recycling budget?
A: LADWP staff recommends it and the LADWP Board of Water and Power Commissioners approves it.

Q: What is staff basing its recommendations on? Who determines whether recycled water is or is not important, dump it in the ocean or give it 50% of funding?
A: LADWP's experience with the EVRP illustrates why cost is not the only issue. That project was funded, built, and ready to operate but was halted by political and public pressure.

The basic parameters used in preparing recommendations for water resources development are: safety, reliability, public acceptability, cost, and environmental sensitivity. A final decision on recycling implementation rests with the Board of Water and Power Commissioners.

Comment: I just want to offer support for reclaimed water and groundwater recharge. In addition, I feel a dam is unlikely in any urban area for many of the reasons mentioned already.

Q: What is the water that goes into the Los Angeles River? Is it treated water?
A: The water that goes into the Los Angeles River is recycled water that has been treated at a tertiary level and meets most drinking water standards. There are also non-point sources (such as urban runoff) that are very poor quality and are the focus of today's water quality efforts.

Comment: We have an obligation to clean water before it goes into the ocean. Solutions like cisterns should be considered before major infrastructure projects.

METROPOLITAN WATER DISTRICT

Q: Does MWD concur that they can deliver water to us in a single-year and multi-year drought?
A: Through the Integrated Resources Plan efforts, MWD and its member agencies have developed a resources plan that anticipates future water needs, including single and extended year droughts.

Q: How reliable is the MWD supply?
A: MWD's Integrated Resources Plan projects that they will be able to meet 100 percent of its member's needs. They look at worst-case drought scenarios and plan to meet demands with all existing and planned supplies. LADWP and the 25 other member agencies coordinate closely with MWD on all major water projections. A discussion of MWD's IRP is on page 3-34.

Q: Water from the Colorado River is getting spread out over more states and more people. How truly reliable is it as a water resource? What gives you so much confidence in MWD in getting Colorado River supplies?
A: California's Colorado River water supply has indeed been reduced to its basic entitlement of 4.4 million acre feet. To compensate, the region has made investments in other areas such as the Diamond Valley Lake (with 800,000 acre-feet of storage) and other water supply programs (described in Exhibit 3T). MWD also has a tremendous conservation program and a water transfer program including long-term agreements with agricultural interests. The MWD water supply portfolio is diverse and is not limited to the Colorado River. A discussion of MWD projects is in Chapter 3.5 on pages 3-32 through 3-35.

Comment: The most cost effective water supplies in the future are local sources – reclamation, etc. I think it sends a better public message and provides a better cost than purchasing expensive MWD water. I know that maximizing these local resources is a challenge.

STORMWATER AND INTEGRATED RESOURCES PLANNING

Q: In the various groundwater basins, do you inject water in surplus years? Do you have a water bank system available in the San Fernando Valley or Owens Valley?
A: In wet years like this year, LADWP works closely with the County of Los Angeles in operating spreading grounds to try and capture stormwater. LADWP is seeking to maximize groundwater capture within the City. Groundwater spreading in the Owens Valley is primarily done when the capacity of the Los Angeles Aqueduct system is exceeded during wet years.

LADWP is working closely with Los Angeles County to enhance spreading basins to capture more water. The goal is to capture as much stormwater in the short-term as possible, but there is a shortage of new space for spreading basins. There are alternatives such as cisterns, porous pavement, and other options to capture more water. New regulations and building codes also will discourage runoff from properties and will require the capture of more rainwater, rather than letting it run to the ocean.

Q: How does the City wastewater program IRP compare with the UWMP? Is the IRP more specific or detailed?
A: The IRP and the UWMP are complementary documents. LADWP partnered with the BOS in the development of the IRP. The IRP process is seeking to find out how Los Angeles can make the most efficient use of stormwater spreading grounds and how to maximize the use of recycled water. The IRP also discusses local neighborhood solutions through local resource development.

The graphs in the UWMP are based on what the IRP shows as potential for new local sources of water. Funding issues are still a challenge, but LADWP will work with BOS and other stakeholders to implement feasible options. Chapter 4 of the UWMP is dedicated to the IRP process and addresses all facets of integrating water issues in Los Angeles.

Q: What is being done to further conserve local surface runoff?
A: LADWP is working with the County of Los Angeles to capture additional surface runoff. Discussions have also taken place on how to better coordinate operations of the County-owned spreading facilities. This issue is addressed in Chapter 5 on pages 5-6 through 5-10.

Comment: I would like to see more publicity in the newspaper for efforts like the City saving ten percent of its needs through stormwater retention. You often get the impression [in the media] that nobody is doing anything. When important things get accomplished, it would be nice to let the public know.

Comment: I think it is important to include a discussion of stormwater capture as a potential water supply and of the additional benefits of this captured water. I would reference studies by the Los Angeles San Gabriel River Watershed Council that addressed this issue.

FINANCES

Q: Does the UWMP have a financial component?
A: There are no financial reporting requirements in the UWMP. There is a requirement for cost/benefit analysis for certain demand management measures. However, LADWP has met the need for this analysis because it is compliant with all the California Urban Water Conservation Council Best Management Practices requirements. The UWMP is a policy planning level document, focusing more on water supply reliability issues. For most of the supplies LADWP has committed to in this plan, it believes it can achieve

those goals with current funding. For potential supplies, LADWP will need to pursue additional funding mechanisms.

Comment: If water is so expensive, why are you allowing all this growth to go on in the City? To me it seems ridiculous to be buying expensive water to allow such growth. I think the City should be providing more of the resources, not funding growth and purchasing expensive water. As a homeowner and taxpayer I am concerned about this.

I think LADWP should be saying: we are going to provide a certain amount of water based on the resources and a budget, and not go beyond our means.

Comment: A missing number is what does the increase in City revenues do to the increase in the tax base? You have to pay more for water, but overall you still benefit in terms of the overall City budget. We have not seen that number, so we cannot tell if you're being wise or foolish.

Comment: This issue is most dependent on the political atmosphere.

Comment: If it makes sense from an overall social standpoint to have development in Los Angeles, then there is no point in attacking LADWP if the incremental cost of water for that development happens to be higher than what we have been paying.

SECURITY

Q: What is the LADWP doing as far as security of the City's water system is concerned?
A: Security is a high priority in LADWP's day-to-day operations. LADWP has completed a vulnerability assessment in accordance with federal legislation mandating assessments by all utilities serving more than 100,000 customers. LADWP is in the process of implementing many of the recommendations from this assessment. This includes increasing the security at its essential facilities to try to minimize the risk from terrorist attacks and/or natural disasters. A Catastrophic Supply Interruption Plan is addressed in Chapter 6 on page 6-13.

GENERAL

Q: Will the Owens Valley/Mono Basin commitments be sustained, or will there be a decrease over time?
A: The environmental water commitments in the Owens Valley and Mono Basin will be sustained over time, as required by regulatory mandates. A discussion of Owens Valley and Mono Basin supplies is found in Chapter 3.2 on pages 3-5 through 3-7.

Q: What kind of outreach was done to publicize this meeting?
A: As was done for similar public workshops in November 2004 (both downtown Los Angeles and in the San Fernando Valley), LADWP placed advertisements in the major

newspapers including the Los Angeles Times, Los Angeles Daily News, and Los Angeles Downtown News. LADWP also e-mailed all 97 Neighborhood Councils and placed information about the workshops in the Neighborhood Council newsletter. The workshop is also mentioned on the front page of the LADWP website. In addition, LADWP notified a large database of interested stakeholders who have been part of the Integrated Resources Plan (IRP) process for the City's wastewater program. LADWP has been partnering with the Bureau of Sanitation throughout the development of the IRP and many of the parties involved in the IRP are kept updated on both drinking water and wastewater issues.

LADWP would also be interested in any suggestions you have to bring in more public input.

Q: Is it true that we cannot account for the water labeled non-revenue? Given the shortage of water, even 6 or 7 percent non-revenue sounds like a lot. What efforts are being made to target and reduce these losses?
A: LADWP is continually working to reduce non-revenue water losses. Over the last few decades, LADWP has aggressively gone after leaks and lined nearly all of its pipes to reduce and eliminate leaks. LADWP has also implemented and sustained a water meter replacement program, as meter-read errors are a major cause of non-revenue water. In 2002, LADWP conducted a detailed analysis of non-revenue water in our system and it noted that faulty meters are the prime culprit. As water meters age, they underestimate the flow of water. LADWP is now targeting meters of large customers through a project instituted in the last several months to correct meter errors.

Non-revenue water also includes water that evaporates from reservoirs, as well as water from hydrants used to fight fires. It should be noted that LADWP's non-revenue rate is lower than the industry average of 16 percent, and the American Waterworks Association recommended rate of ten percent.

Q: On the graph showing Projected Water Supply in a Normal Year, local wells show 19 percent in the 2000 plan for 2020, but then show 14 percent in the 2005 plan for 2030. Why is there a change?
A: The groundwater recharge component of the East Valley Recycling Project was included in the figure from 2000. It was removed in the estimate of the 2005 update.

Q: What happens to the UWMP versus the IRP? Does the state review the document? What does the state do? Does it then sit on a shelf for five years?
A: The UWMP is a water resources planning document that is reviewed by the state to determine if it complies with all necessary legal requirements. It sets the framework for the City to develop water resources. The UWMP is also a reference document for use in conducting water supply assessments for all new large developments in the City as required by state law.

Q: Has LADWP been correct in its water demand projections in earlier UWMPs?
A: Yes, in the last ten years LADWP has been very accurate.

Q: What are LADWP's plans as far as water transfers are concerned?
A: LADWP is pursuing water transfers to augment Los Angeles Aqueduct supplies that have been committed for environmental restoration in the Owens Valley and Mono Basin. LADWP plans to utilize an interconnection between the Los Angeles Aqueduct and the State Water Project in the Antelope Valley to transfer non-State Water Project water from willing sellers in the Central Valley. Water transfers are addressed in Chapter 3.5 on pages 3-33 and 3-34.

WRITTEN PUBLIC COMMENTS

Following are responses to written correspondences (attached) from the Mono Lake Committee, TreePeople, and The Los Angeles & San Gabriel Rivers Watershed Council on the City of Los Angeles Draft 2005 Urban Water Management Plan (UWMP). The comments are in bold and the responses in italic fonts.

Mono Lake Committee

Water Conservation Should be in Supply Portfolio Graph
LADWP water supply reliability summary chart has been amended to include water conservation in the water balance.

Bar Graph of Ranges for Water Supply Options
Exhibit 5E has been incorporated in Chapter 5 to show potential ranges of alternative water supply options. This table includes anticipated unit costs, implementation risks, and additional benefits that are associated with each alternative water supply.

Summary on Cost/Unit and Other Value Considerations
See answer to previous comment.

Recycled Water Supplies Exhibit ES-F Unclear
Explanations have been provided in Exhibit ES-F for clarification purposes. Recycled water used for environmental and recreational purposes, as well as recycled water provided to other water agencies, are shown in Exhibit 3K.

Chapter 1 Long Term Projects for Demand Reduction VERY Light
The projected water landscape, cooling tower, and ultra-low-flush toilet program savings shown in Exhibit 1I were based on a projection of hardware saturation within LADWP's service area. For instance, in the case of large landscape irrigation, the known available landscape area based on LADWP's billing records were accounted for, and a landscape irrigation efficiency program savings estimate was derived to develop the savings projections. LADWP will continue to aggressively pursue outdoor water savings opportunities through incentive programs for its customers.

Re-label Exhibit 1L-TAP
LADWP is committed to implementing landscape water-saving programs, as outlined in Chapter 2, Water Conservation. The Technical Assistance Program (TAP) does not extend to single family residential customers.

Leak Detection Not an Area of Focus
Minimizing water loss due to system leaks is very important to LADWP. A paragraph has been added in Chapter 1, Section 1.2, describing LADWP's efforts to minimize non-revenue water, along with a goal to achieve this within its service area.

Chapter 2.1: What is the range of the conservation goal?
In Chapter 2, Section 2.1, LADWP has expanded its long-term water conservation goal from 15% to 20% to demonstrate its continuing commitment to water use efficiency.

Chapter 2.5, p. 2-11: Landscape Task Force
Chapter 2, Section 2.5 has been expanded to provide a discussion on LADWP's efforts in the state's Landscape Task Force.

Chapter 2.7: Demand Hardening is NOT relevant
Chapter 2, Section 2.7 has been revised to provide a balanced discussion, reflecting viewpoints from the state through the Department of Water Resources' Bulletin 160, and the Pacific Institute regarding demand hardening.

Chapter 3.2, page 3-5: reductions in water exports from the Mono Basin have been more than made up by conservation programs
This comment has been acknowledged on page 3-5.

Chapter 3.4: a strong leader outside LADWP
This comment is an opinion and is duly noted.

Chapter 3.5, page 3-32: Doesn't LADWP prefer a reliable water supply…Doesn't LADWP also prefer CalFed investments in water quality in the region as a high or even higher priority…
Last paragraph of State Water Project section revised to reflect water supply reliability and water quality as LADWP priorities in supporting MWD efforts in this area.

Chapter 3.5, page 3-33: MWD will have to control the ph of the water during ozonation with acid additions in order to avoid forming bromate
First bullet in Water Quality – MWD Supplies section was revised and text added to reflect that the treatment systems will also address the potential formation of bromates.

Chapter 5: comparative information on potential yield, costs, risks, and multiple benefits
This information has been added in Chapter 5.

Chapter 5.6: Water Augmentation Study
Incorporated suggested text by the Los Angeles and San Gabriel Rivers Watershed Council that provides greater detail, including findings-to-date from the Water Augmentation Study.

Chapter 6, Water Service Reliability: I do not agree that Exhibit 6A portfolio makes a strong case for long-term reliability
This comment is an opinion and is duly noted.

<u>TreePeople</u>

ES-10 Amend paragraph 4, line 5 and paragraph 5, line 6...
Suggestions taken and both paragraphs have been amended.

ES-11 Beneficial Use of Urban Runoff
This comment on the Executive Summary is more fully explained in Chapter 5, Section 5.4 – Beneficial Reuse of Urban Runoff. The fact that beneficial reuse of urban runoff is a relatively untapped alternative supply for the City was acknowledged, and the reader directed to Chapter 5 for more details on this topic.

ES-13 Water conservation as part of the 2030 water supply graph
Exhibit 6A has been amended to include water conservation in the water balance. Service area reliability tables have also been modified to incorporate planned conservation to meet LADWP's increased conservation goal of 20%.

1-8 Projections for long-term demand reduction seem quite conservative
The significant hardware-based savings increase of 70 percent reported is due largely to continuing savings from existing showerhead replacements, which were not included in the Year 2000 Water Plan estimates. Additionally, a recently added installation service component of the ULF Toilet Distribution Program is also a large contributing factor in this increase. In Chapter 2, Section 2.1, LADWP has expanded its long-term water conservation goal from 15% to 20% to demonstrate its continuing commitment to water use efficiency.

2-10 Landscape Category comments
These comments have been addressed with the addition of the last three paragraphs in the Landscape Category section of Chapter 2.

2-11 LADWP participation in the state's Landscape Task Force
Discussion of LADWP's efforts in this task force has been added in the Landscape Category section of Chapter 2.

3-10 Groundwater Recharge
Flood control facilities are the primary means to divert captured stormwater for groundwater recharge, as explained in the Groundwater Replenishment and Strategies section.

3-15 Water Recycling
Discussion has been added in Groundwater Recharge Potential section to explain LADWP's challenges in promoting the use of recycled water, as well as plans for addressing them.

5-10 Neighborhood Recharge
Discussion has been added on recharge potential for individual parcels in Section 5.4 Beneficial Reuse of Urban Runoff.

5-11 Project clarification
Comment noted and projects clarified in second paragraph of Section 5.6, Cooperative Efforts to Increase Supply.

5-12 Water Augmentation Study
Incorporated suggested text by the Los Angeles and San Gabriel Rivers Watershed Council that provides greater detail, including findings-to-date from the Water Augmentation Study.

5-13 Sun Valley Watershed Management Plan
Second stakeholder goal re-written as suggested. Noted that Sun Valley watershed plan also calls for good watershed practices from individual property owners.

<u>The Los Angeles & San Gabriel Rivers Watershed Council</u>

1. Wet Weather Runoff Options
Exhibit 5D has been clarified to note that the actual usable volume for underground storage throughout the City may be less than the values shown on the table. Additionally, in the second paragraph of the Neighborhood Recharge section, an explanation has been added to include other areas within the City that could be usable for smaller-scale recharge projects.

2. Los Angeles Basin Water Augmentation Study
Suggested language for the Los Angeles and San Gabriel Rivers Watershed Council efforts regarding this study has been incorporated in this section.

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COMMITTEE
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September 5, 2005

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ALVIN BALITISTA
SEP 13 2005
DATE

To: Mr. James B. McDaniel
COO – Water System
Los Angeles Department of Water and Power
Box 51111
Los Angeles, CA 90051-5700

Fr: Frances Spivy-Weber, 310-316-0041/frances@monolake.org Frances

RE: City of Los Angeles DRAFT 2005 Urban Water Management Plan

Dear Jim,

Thank you, Jim, for this opportunity to comment on the City of Los Angeles DRAFT 2005 Urban Water Management Plan. As you know, the Mono Lake Committee and its 15,000 members are extremely interested in the City's management of its water resources, and we are committed to working with LADWP and the City to meet the human, economic, and environmental needs here in Los Angeles and in the Eastern Sierra.

I am a fan of Urban Water Management Plans (UWMP) and applaud LADWP for updating its UWMP annually. I am also pleased to see that the Department is working on an Integrated Resources Plan for wastewater, storm water and water supply to be completed in 2006. To me, these actions underscore the Department's recognition that the future will be quite different from the past, and that it is essential to plan for an uncertain future with many more options for meeting water supply and water quality demands.

Overall, I found the 2005 UWMP filled with evidence that the Department is planning to diversity its portfolio of water supplies; is collaborating with other Los Angeles City agencies, the Metropolitan Water District of Southern California (MWD), LA County, and neighboring water districts; and is taking steps to be able to adopt a watershed approach to local water management. The direction of these actions is a good one..

Following are comments that I think will make the DRAFT URMP a stronger final document for decision-makers to use and a more accurate statement about LADWP's vision for the future.

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Water Conservation Should be in Supply Portfolio Graph
I strongly recommend you include a segment for water conservation in Exhibit ES-1, *LADWP Water Supply Portfolio for Year 2030*. This is important because those who read the document should have in one place the supply options that LADWP will rely on to meet future demand. Each of the elements in the chart, including conservation, represents different ways to meet water supply demand. Leaving conservation out of the chart sends a message that one of the most cost-effective elements will not play an important role in meeting future needs. I know this is not true, but I would be hard pressed to defend your water conservation program using this graph. Use Exhibit 4D, MWD's IRP graph as a guide.

Bar Graph of Ranges for Water Supply Options
I recommend that you include a bar graph that shows ranges for LADWP's water supply options, including conservation. By doing this you inform the reader about both risks and opportunities associated with each supply element. If you do not have enough data to estimate ranges, then please plan to remedy this in the update next year.

Summary on Cost/Unit and Other Value Considerations
I recommend that you have a discussion, particularly in the summary section of the UWMP, which compares the cost per unit and other considerations for meeting Los Angeles water needs. It is important that decision-makers know the cost-effectiveness of elements, such as conservation; the multiple benefits and cost-effectiveness to the City of recycling and storm-water and dry-weather runoff capture and reuse; and the role local projects play as a hedge against climate change and natural disasters that could disrupt imported supplies. This discussion should be repeated in Chapter 5, Alternative Water Supplies, where the trade-offs among the supply options are not at all clear.

Recycled Water Supplies Exhibit ES-F Unclear
The text on Recycled Water states that "the City recycles almost 65,000 acre-feet per year," with break-out numbers for environmental and recreational purposes; Griffith Park; and Hyperion sales/buy back with West Basin MWD. Exhibit ES-F and 3-Q, however, appear to say only the Griffith Park numbers are real today. Exhibit 3-J seems more accurate.

Chapter 1 Long Term Projects for Demand Reduction VERY Light
LADWP has had such sterling success with indoor conservation that I can understand those projects showing only modest increases out thirty years. I do not, however, understand why more is not expected from the landscape program—single family and large landscapes; the cooling tower program; CII dual flush toilets, etc. The draft admits that the "hardware-based water savings estimates included in the 2000 Water Plan have been

exceeded by nearly 70%..." and this Water Plan seems to be heading in the same direction. In addition, Chapter 4 points to using the IRP to increase supply from projects that "were once thought of as being too expensive." I don't understand the reluctance to be bolder in this plan.

Re-label Exhibit 1L-TAP
It is confusing to use the Technical Assistance Program label to cover a program that has so much potential for water savings as single family residential landscapes. Over the next 30 years, it is hard to believe family homes will not be an important focus.

Leak Detection Not an Area of Focus
While you include leaks, "unaccounted/system loss" in Exhibit 1F, it is not counted in any other program graph or chart as a target for reduction. Is this source of water loss trivial? If so, say so; if not, please describe the program and the numerical water savings goal associated with solving this problem.

Chapter 2.1: What is the range of the conservation goal?
The document says there is a water conservation goal of 15% or greater. What is the range for conservation beyond 15%?

Chapter 2.5, p. 2-11: LADWP's Conservation Staff have been participating this year in a statewide **Landscape Task Force**, which will issue recommendations this fall for ways to achieve additional, substantial changes in landscape water use. While the outcome of this Task Force is too late to be included in this UWMP, the Task Force potential should be referenced.

Chapter 2.7: **Demand Hardening is NOT relevant** to the Conservation Measures considered in this plan. The Conservation measures described in the UWMP are so far from approaching the threshold of demand hardening that it seems old fashioned, at best, and a backhanded effort to dampen a more aggressive conservation program, at worst, to include the concept in the document. Please delete.

Chapter 3.2, page 3-5: The **reductions in water exports from the Mono Basin have been more than made up by conservation programs** that were stimulated by AB444 funds, which the State of California gave to LADWP to offset the loss of water from Mono. Isn't it time to acknowledge this connection? I think so.

Chapter 3.4. Only if LADWP is joined by the Mayor and City Council will the water recycling goals be met. In addition, partnership with City Agencies and neighbors is essential. This chapter shows there is a lot to work with, but the program will need **a strong leader outside LADWP**.

Chapter 3.5, page 3-32: LADWP should state conditions on the last paragraph on the State Water Project stating that "LADWP supports MWD in activities to receive...quantities that are commensurate with MWD's contractual obligation to the project?" **Doesn't LADWP prefer a reliable water supply** over an increased supply from the Delta for MWD, which this statement seems to indicate? **Doesn't LADWP also prefer CalFed investments in water quality in the region as a high or even higher priority** than increased supply from the Delta?

Chapter 3.5, page 3-33: The first bullet under Water Quality – MWD Supplies is not quite right. MWD plans to install ozone treatment in all of its five plants. Only the Jensen plant has 100% State Project water; the other plants vary the amounts of State water they use. It should be noted, also, that while ozone reduces the need for chlorinated disinfectants as well as improving for taste and odor, **MWD will have to control the ph of the water during ozonation with acid additions in order to avoid forming bromate** through an interaction between ozonation and bromide, which is present in imported State Project and Central Valley Project water.

Chapter 5. The alternative water supplies listed—transfers, seawater desalination, enhanced local groundwater basin production, beneficial reuse of urban runoff, graywater, and cooperative efforts to increase supply—needs a table laying out **comparative information on potential yield, costs, risks, and multiple benefits.** This information is essential for the City and its constituents to be able to make an informed choice about where to focus its financial and staff support. For example, the transfer option makes the City even more dependent on Delta water, a risky investment at best. The beneficial reuse of urban stormwater and dryweather run-off offers a large amount of new water, and current studies to determine the safety of that water are offering very promising results (see below).

Chapter 5.6, While the LA and San Gabriel Rivers Watershed Council **Water Augmentation Study** is a ten-year study, it has already yielded some **promising findings** and these should be noted in the UWMP. Contact the Council for this information.

Chapter 6, Water Service Reliability. I agree that LADWP will be able to supply high quality water to its future citizens. **I do not agree that Exhibit 6A portfolio makes a strong case for long-term reliability**. There is much, too much dependence on imported water from MWD. Fortunately, there are active, on-going programs with LADWP and programs on the drawing board that can change the portfolio as soon as next year. These should be the features in your 2006 UWMP update.

9/19/05 ✓ Tom Erb for necessary attention
km c: Jim McDaniel

9/22/05 - Copies to D. Pettijohn
mm A. Bautista

WATER SYSTEM
SEP 19 2005
EXECUTIVE OFFICE

WATER RESOURCES
BUSINESS UNIT
SEP 19 2005

September 15, 2005

Mr. James B. McDaniel
Chief Operating Officer, Water Systems
Los Angeles Department of Water & Power
111 N. Hope Street, Room 1460
Los Angeles, CA 90012

Reference: Comments on 2005 Draft Urban Water Management Plan

Dear Mr. McDaniel:

Thank you for the opportunity to provide comments on DWP's draft 2005 Urban Water Management Plan (UWMP). Our comments refer to Chapter 5, Alternative Water Supplies.

1. In section 5.4, the discussion of Wet Weather Runoff Options references studies conducted as part of the IRP. The potential volume of stormwater that could be captured using cisterns, underground storage, and neighborhood recharge as stated assumes 100% utilization of available area and 100% capture of the design storm. It should be noted that these volumes are potential maximums, but in reality may be substantially less. Similarly, the assumption that only the east San Fernando Valley has suitable soils for infiltration is generally true on a large scale, but there are many other areas that could be usable for recharge with smaller-scale projects.

2. With respect to the discussion of the Watershed Council's Water Augmentation Study in section 5.6 of the UWMP, we would like to proposed revised language to describe this study. Recently we completed our four year water quality monitoring program, which shows no significant impacts on groundwater quality from the intentional infiltration of urban stormwater under a variety of site conditions. We are also developing, in partnership with TreePeople, a plan to retrofit an existing neighborhood to demonstrate better stormwater management techniques for existing infrastructure.

   We respectfully submit the following revised language for inclusion in the UWMP:

   The *Los Angeles Basin Water Augmentation Study* (WAS) is a long-term research project led by the Los Angeles & San Gabriel Rivers Watershed Council, to explore the potential for reducing surface water pollution and increasing local water supplies by increasing infiltration of urban storm water runoff. The project began in 2000 in collaboration with representatives from academia and from federal, state and local public and regulatory agencies. LADWP, along with eight other agencies, have joined in a Memorandum of Understanding and formed a Technical Advisory Committee to support the WAS. The study will bring scientific evidence to bear on the feasibility and benefits of storm water capture for infiltration, including impacts on groundwater quality and assessing appropriate and most favorable geographic, geologic and hydrologic conditions for infiltration. The WAS just completed a four year program to monitor the fate and transport of runoff-borne pollutants at selected sites in the Los Angeles region, by measuring storm water quality at the surface and as it infiltrates through the soil to groundwater. Data collected to date indicate that there is no significant degradation of groundwater quality from the infiltration of storm water-borne pollutants at monitored sites. Groundwater quality has generally

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improved for most constituents at sites with shallow groundwater. The next phase of the WAS will incorporate demonstration projects that will retrofit one or more small neighborhoods with state of the art Best Management Practices to address storm water infiltration as well as water conservation, pollution reduction and treatment, flooding, and habitat restoration. The study will also assess the overall technical and financial feasibility of utilizing infiltration techniques to capture storm water for groundwater recharge. A runoff-infiltration model was developed to predict the amount of additional water that could be available for deep percolation if infiltration is increased. The overall goals of the WAS are to evaluate the costs and benefits of implementation, and determine the most effective strategy for developing this potentially significant source of water for southern California.

As project manager for the WAS, we greatly appreciate DWP's long-term commitment and participation in this study. Thank you again for the opportunity to provide comments on the draft UWMP. Please feel free to contact me at (213) 229-9947 should you have any questions.

Sincerely,

Suzanne Dallman

Suzanne Dallman
Technical Director

Cc: Alvin Bautista, LADWP
Nancy L.C. Steele, D. Env., LASGRWC

WATER SYSTEM
SEP 20 2005
EXECUTIVE OFFICE

9/20/05 Tom Erb for necessary attention
km c: Jim McDaniel

TREEPEOPLE

September 15, 2005

9/22/05 - Copies to D. Pettijohn
mm A. Bautista

WATER RESOURCES
BUSINESS UNIT
SEP 20 2005

Mr. James B. McDaniel
Chief Operating Officer, Water System
Los Angeles Department of Water and Power
Box 51111
Los Angeles, CA 90051-5700

RE: City of Los Angeles' Draft 2005 Urban Water Management Plan

Dear Mr. McDaniel,

We appreciate the opportunity to review and comment on your department's Draft 2005 Urban Water Management Plan. The sustainable management of urban watersheds is a primary focus of TreePeople's work and we share DWP's interest in reducing water demand and finding creative ways to meet it. The beneficial use of stormwater runoff is a particularly promising area and we look forward to promoting it in cooperation with DWP and other agencies.

The advantages of such cooperation are evident to us and we congratulate the department on its collaboration on the city's Integrated Resources Plan, as well as on the steps it is taking with other city and county agencies and neighboring water districts toward a true watershed approach to local water management.

Following are comments, keyed to page numbers, that we hope will make the final plan more useful to decision-makers and more reflective of your department's vision for the future.

ES-10 Emend paragraph 4, line 5 to read "... decrease potable water needs by expanding the City's recycled water program **and encouraging rainwater harvesting;**"

Paragraph 5, line 6 "...along with other benefits such as... **flood control.**"

ES-11 Beneficial Use of Urban Runoff

Explain the options for making use of stormwater runoff, how the options either directly or indirectly reduce demand for imports and the fact that this is a virtually untapped resource. It might be clearer if two basic options – storage and

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nonpotable use, or treatment and direct recharge – were laid out first, followed by an explanation of which is suitable for each type of runoff.

ES-13 Water conservation is one of the most cost-effective ways to meet future demands and should be included in the graph of the 2030 supply portfolio.

1-8 The projections for long-term demand reduction seem quite conservative. If hardware-based water savings estimates from the 2000 Water Plan have been exceeded by nearly 70%, why is more not expected from the single-family landscape program; the cooling tower program; CII dual-flush toilets, etc.?

2-10 Landscape Category

Stress potential for use of nonpotable water for irrigation (sources: treated wastewater, stormwater runoff, harvested rainwater). This is discussed under 3.4 Water Recycling, but should appear here as well.

Mention rainwater harvesting for residential/institutional irrigation
Hall House, Open Charter, garden/garden examples.

Mention potential for groundwater recharge with captured storm and irrigation runoff (encourage simple practices that redirect flow and increase permeable surface area).

2-11 Mention the participation of LA DWP staff members in the state's Landscape Task Force and the group's potential for reducing landscape water use.

3-10 Groundwater Recharge

Explain the actual source of "native" water and how it gets to the spreading grounds.

Mention potential to increase recharge with captured stormwater runoff and DWP involvement in Sun Valley project (discussed in detail in Chapter 5).

3-15 Water Recycling
Discuss the challenges DWP has faced in promoting the use of recycled water and any plans for addressing them.

5-10 Before discussing neighborhood recharge, add discussion of recharge potential on individual parcels, q.v. Santa Monica requirements for new or remodeled homes, Hall House flow redirection and aboveground detention; add to Exhibit 5D or create a separate table

Under Neighborhood Recharge, the assumption about areas of the city suitable for infiltration seems unduly conservative. In addition, perc tests at Sun Valley Park (500 gallons/square foot/day, 25 times the rate in the nearby spreading grounds) suggest that soils in the area that *is* under consideration may have a higher infiltration rate than indicated. (Stacie Nakao, LACDPW)

5-11 Paragraph 8, line 7: One project (illustrated on page 5-9) stores and uses campus runoff; the other has direct recharge capability.

5-12 The Water Augmentation Study has already yielded some promising findings and these should be noted in the plan. The Watershed Council can provide details.

5-13 The second stakeholder goal (first paragraph) is confusing as written; perhaps emend as follows:

2) reduce current use of potable water by supplying stormwater runoff instead where feasible (e.g., for gravel processing, landscape irrigation, etc.)

The Sun Valley watershed plan also calls for the participation of individual property owners in good watershed practices. This is a major opportunity for DWP to assert its leadership in developing alternative supplies and promoting conservation, reuse, smart irrigation and appropriate landscaping.

Thanks again for the chance to review the draft, and congratulations on completing it.

Sincerely,

Rebecca Drayse
T.R.E.E.S. Project Manager
(818) 623-4867

cc: Alvin Bautista

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Appendix E
References

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Appendix F
Groundwater Basin Adjudications

- **San Fernando Basin – Judgment 650079**
- **Sylmar Basin – Judgment 650079**
- **Eagle Rock Basin – Judgment 650079**
- **West Coast Basin – Judgment 506806**
- **Central Basin – Judgment 786656**

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SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

THE CITY OF LOS ANGELES, Plaintiff, vs. CITY OF SAN FERNANDO, ET AL. Defendants.	)	No. 650079 JUDGMENT

There follows by consecutive paging Recitals (page 1), Definitions and List of Attachments (pages 1 to 6), Designation of Parties (page 6), Declaration re Geology and Hydrology (pages 6 to 12), Declaration of Rights (pages 12 to 21), Injunctions (pages 21 to 22), Continuing Jurisdiction (page 23), Watermaster (pages 23 to 29), Physical Solution (pages 29 to 34), and Miscellaneous Provisions (pages 34 to 35), and Attachments (pages 36 to 46). Each and all of said several parts constitute a single integrated Judgment herein.

1. RECITALS

This matter was originally tried before the Honorable Edmund M. Moor, without jury, commencing on March 1, 1966, and concluding with entry of Findings, Conclusions and Judgment on March 14, 1968, after more than 181 trial days. Los Angeles appealed from said judgment and the California Supreme Court, by unanimous opinion, (14 Cal. 3d 199) reversed and remanded the case; after trial of some remaining issues on remand, and consistent with the opinion of the Supreme Court, and pursuant to stipulations, the Court signed and filed Findings of Fact and Conclusions of Law. Good cause thereby appearing,

IT IS ORDERED, ADJUDGED AND DECREED:

2. DEFINITIONS AND ATTACHMENTS

2.1 Definitions of Terms. As used in this Judgment, the following terms shall have the meanings herein set forth:

[1] Basin or Ground Water Basin -- A subsurface geologic formation with defined boundary conditions, containing a ground water reservoir, which is capable of yielding a significant quantity of ground water.

[2] Burbank -- Defendant City of Burbank.

[3] Crescenta Valley -- Defendant Crescenta Valley County Water district.

[4] Colorado Aqueduct -- The aqueduct facilities and system owned and operated by MWD for the importation of water from the Colorado River to its service area.

[5] Deep Rock -- Defendant Evelyn M. Pendleton, dba Deep Rock Artesian Water Company.

[6] Delivered Water -- Water utilized in a water supply distribution system, including reclaimed water.

[7] Eagle Rock Basin -- The separate ground water basin underlying the area shown as such on Attachment "A".

[8] Extract or Extraction -- To produce ground water, or its production, by pumping or any other means.

[9] Fiscal Year -- July 1 through June 30 of the following calendar year.

[10] Foremost -- Defendant Foremost Foods Company, successor to defendant Sparkletts Drinking Water Corp.

[11] Forest Lawn -- Collectively, defendants Forest Lawn Cemetery Association, Forest Lawn Company, Forest Lawn Memorial-Park Association, and American Security and Fidelity Corporation.

[12] Gage F-57 -- The surface stream gaging station operated by Los Angeles County Flood Control District and situated in Los Angeles Narrows immediately upstream from the intersection of the Los Angeles River and Arroyo Seco, at which point the surface outflow from ULARA is measured.

[13] Glendale -- Defendant City of Glendale.

[14] Ground Water -- Water beneath the surface of the ground and within the zone of saturation.

[15] Hersch & Plumb -- Defendants David and Eleanor A. Hersch and Gerald B. and Lucille Plumb, successors to Wellesley and Duckworth defendants.

[16] Import Return Water -- Ground water derived from percolation attributable to delivered imported water.

[17] Imported Water -- Water used within ULARA, which is derived from sources outside said watershed. Said term does not include inter-basin transfers wholly within ULARA.

[18] In Lieu Storage -- The act of accumulating ground water in a basin by intentional reduction of extractions of ground water which a party has a right to extract.

[19] Lockheed -- Defendant Lockheed Aircraft Corporation.

[20] Los Angeles -- Plaintiff City of Los Angeles, acting by and through its Department of Water and Power.

[21] Los Angeles Narrows -- The physiographic area northerly of Gage F-57 bounded on the east by the San Rafael and Repetto Hills and on the west by the Elysian Hills, through which all natural outflow of the San Fernando Basin and the Los Angeles River flow en route to the Pacific Ocean.

[22] MWD -- The Metropolitan Water District of Southern California, a pubic agency of the State of California.

[23] Native Safe Yield -- That portion of the safe yield of a basin derived from native waters.

[24] Native Waters -- Surface and ground waters derived from precipitation within ULARA.

[25] Overdraft -- A condition which exists when the total annual extractions of ground water from a basin exceed its safe yield, and when any temporary surplus has been removed.

[26] Owens-Mono Aqueduct -- The aqueduct facilities owned and operated by Los Angeles for importation to ULARA water from the Owens River and Mono Basin watersheds easterly of the Sierra-Nevada in Central California.

[27] Private Defendants -- Collectively, all of those defendants who are parties, other than Glendale, Burbank, San Fernando and Crescenta Valley.

[28] Reclaimed Water -- Water which, as a result of processing of waste water, is made suitable for and used for a controlled beneficial use.

[29] Regulatory Storage Capacity -- The volume of storage capacity of San Fernando Basin which is required to regulate the safe yield of the basin, without significant loss, during any long-term base period of water supply.

[30] Rising Water -- The effluent from a ground water basin which appears as surface flow.

[31] Rising Water Outflow -- The quantity of rising water which occurs within a ground water basin and does not rejoin the ground water body or is not captured prior to flowing past a point of discharge from the basin.

[32] Safe Yield – The maximum quantity of water which can be extracted annually from a ground water basin under a given set of cultural conditions and extraction patterns, based on the long-term supply, without causing a continuing reduction of water in storage.

[33] San Fernando -- Defendant City of San Fernando.

[34] San Fernando Basin -- The separate ground water basin underlying the area shown as such on Attachment "A".

[35] Sportsman's Lodge -- Defendant Sportsman's Lodge Banquet Association.

[36] Stored Water -- Ground water in a basin consisting of either (1) imported or reclaimed water which is intentionally spread, or (2) safe yield water which is allowed to accumulate by In Lieu Storage. Said ground waters are distinguished and separately accounted for in a ground water basin, notwithstanding that the same may be physically commingled with other waters in the basin.

[37] Sylmar Basin -- The separate ground water basin underlying the area indicated as such on Attachment "A".

[38] Temporary Surplus – The amount of ground water which would be required to be removed from a basin in order to avoid waste under safe yield operation.

[39] Toluca Lake -- Defendant Toluca Lake Property Owners Association.

[40] ULARA or Upper Los Angeles River Area – The Upper Los Angeles River watershed, being the surface drainage area of the Los Angeles River tributary to Gage F-57.

[41] Underlying Pueblo Waters -- Native ground waters in the San Fernando Basin which underlie safe yield and stored waters.

[42] Valhalla -- Collectively, Valhalla Properties, Valhalla Memorial Park, Valhalla Mausoleum Park.

[43] Van de Kamp -- Defendant Van de Kamp's Holland Dutch Bakers, Inc.

[44] Verdugo Basin -- The separate ground water basin underlying the area shown as such on Attachment "A".

[45] Water Year -- October 1 through September 30 of the following calendar year.

Geographic Names, not herein specifically defined, are used to refer to the places and locations thereof as shown on Attachment "A".

2.2 List of Attachments. There are attached hereto the following documents, which are by this reference incorporated in this Judgment and specifically referred to in the text hereof:

"A" -- Map entitled "Upper Los Angeles River Area", showing Separate Basins therein.

"B" -- List of "Dismissed Parties".

"C" -- List of "Defaulted Parties".

"D" -- List of "Disclaiming Parties".

"E" -- List of "Prior Stipulated Judgments."

"F" -- List of "Stipulated Non-Consumptive or Minimal-Consumptive Use Practices."

"G" -- Map entitled "Place of Use and Service Area of Private Defendants."

"H" -- Map entitled "Public Agency Water Service Areas."

[Attachments B-H are available upon request from LADWP – UWMP Note 2005]

3. PARTIES

3.1 Defaulting and Disclaiming Defendants. Each of the defendants listed on Attachment "C" and Attachment "D" is without any right, title or interest in, or to any claim to extract ground water from ULARA or any of the separate ground water basins therein.

3.2 No Rights Other Than as Herein Declared. No party to this action has any rights in or to the waters of ULARA except to the extent declared herein.

4. DECLARATION RE GEOLOGY AND HYDROLOGY

4.1 Geology.

4.1.1 ULARA. ULARA (or Upper Los Angeles River Area), is the watershed or surface drainage area tributary to the Los Angeles River at Gage F-57. Said watershed contains a total of 329,000 acres, consisting of approximately 123,000 acres of valley fill area and 206,000 acres of hill and mountain area, located primarily in the County of Los Angeles, with a small portion in the County of Ventura. Its boundaries are shown on Attachment "A". The San Gabriel Mountains form the northerly portion of the watershed, and from them two major washes--the Pacoima and the Tujunga--discharge southerly. Tujunga Wash traverses the valley fill in a southerly direction and joins the Los Angeles River, which follows an easterly course along the base of the Santa Monica Mountains before it turns south through the Los Narrows. The waters of Pacoima Wash as and when they flow out of Sylmar Basin are tributary to San Fernando Basin. Lesser tributary washes run from the Simi Hills and the Santa Susana Mountains in the

westerly portion of the watershed. Other minor washes, including Verdugo Wash, drain the easterly portion of the watershed which consists of the Verdugo Mountains, the Elysian, San Rafael and Repetto Hills. Each of said washes is a non-perennial stream whose flood flows and rising waters are naturally tributary to the Los Angeles River. The Los Angeles River within ULARA and most of said tributary natural washes have been replaced, and in some instances relocated, by concrete-lined flood control channels. There are 85.3 miles of such channels within ULARA, 62% of which have lined concrete bottoms.

4.1.2 San Fernando Basin. San Fernando Basin is the major ground water basin in ULARA. It underlies 112,047 acres and is located in the area shown as such on Attachment "A". Boundary conditions of the San Fernando Basin consist on the east and northeast of alluvial contacts with non-waterbearing series along the San Rafael Hills and Verdugo Mountains and the Santa Susana Mountains and Simi Hills on the northwest and west and the Santa Monica Mountains on the south. Water-bearing material in said basin extends to at least 1000 feet below the surface. Rising water outflow from the San Fernando Basin passes its downstream and southerly boundary in the vicinity of Gage F-57, which is located in Los Angeles Narrows about 300 feet upstream from the Figueroa Street (Dayton Street) Bridge. The San Fernando Basin is separated from the Sylmar Basin on the north by the eroded south limb of the Little Tujunga Syncline which causes a break in the ground water surface of about 40 to 50 feet.

4.1.3 Sylmar Basin. Sylmar Basin underlies 5,565 acres and is located in the area shown as such on Attachment "A". Water-bearing material in said basin extends to depths in excess of 12,000 feet below the surface. Boundary conditions of Sylmar Basin consist of the San Gabriel Mountains on the north, a topographic divide in the valley fill between the Mission Hills and San Gabriel Mountains on the west, the Mission Hills on the southwest, Upper Lopez Canyon Saugus Formation on the east, along the east bank of Pacoima Wash, and the eroded south limb of the Little Tujunga Syncline on the south.

4.1.4 Verdugo Basin. Verdugo Basin underlies 4,400 acres and is located in the area shown as such on Attachment "A". Boundary conditions of Verdugo Basin consist of the San Gabriel Mountains on the north, the Verdugo Mountains on the south and southwest, the San

Rafael Hills on the southeast and the topographic divide on the east between the drainage area that is tributary to the Tujunga Wash to the west and Verdugo Wash to the east, the ground water divide on the west between Monk Hill-Raymond Basin and the Verdugo Basin on the east and a submerged dam constructed at the mouth of Verdugo Canyon on the south.

4.1.5 Eagle Rock Basin. Eagle Rock Basin underlies 807 acres and is located in the area shown as such on Attachment "A". Boundary conditions of Eagle Rock Basin consist of the San Rafael Hills on the north and west and the Repetto Hills on the east and south with a small alluvial area to the southwest consisting of a topographic divide.

4.2 Hydrology.

4.2.1 Water Supply. The water supply of ULARA consists of native waters, derived from precipitation on the valley floor and runoff from the hill and mountain areas, and of imported water from outside the watershed. The major source of imported water has been from the Owens-Mono Aqueduct, but additional supplies have been and are now being imported through MWD from its Colorado Aqueduct and the State Aqueduct.

4.2.2 Ground Water Movement. The major water-bearing formation in ULARA is the valley fill material bounded by hills and mountains which surround it. Topographically, the valley-fill area has a generally uniform grade in a southerly and easterly direction with the slope gradually decreasing from the base of the hills and mountains to the surface drainage outlet at Gage F-57. The valley fill material is a heterogeneous mixture of clays, silts, sand and gravel laid down as alluvium. The valley fill is of greatest permeability along and easterly of Pacoima and Tujunga Washes and generally throughout the eastern portion of the valley fill area, except in the vicinity of Glendale where it is of lesser permeability. Ground water occurs mainly within the valley fill, with only negligible amounts occurring in hill and mountain areas. There is no significant ground water movement from the hill and mountain formations into the valley fill. Available geologic data do not indicate that there are any sources of native ground water other than those derived from precipitation. Ground water movement in the valley fill generally follows the surface topography and drainage except where geologic or man-made impediments occur or where the natural flow has been modified by extensive pumping.

4.2.3 Separate Ground Water Basins. The physical and geologic characteristics of each of the ground water basins, Eagle rock, Sylmar, Verdugo and San Fernando, cause impediments to inter-basin ground water flow whereby there is created separate underground reservoirs. Each of said basins contains a common source of water supply to parties extracting ground water from each of said basins. The amount of underflow from Sylmar Basin, Verdugo Basin and Eagle Rock Basin to San Fernando Basin is relatively small, and on the average has been approximately 540 acre feet per year from the Sylmar Basin; 80 acre feet per year from Verdugo Basin; and 50 acre feet per year from Eagle Rock Basin. Each has physiographic, geologic and hydrologic differences, one from the other, and each meets the hydrologic definition of "basin". The extractions of water in the respective basins affect the other water users within that basin but do not significantly or materially affect the ground water levels in any of the other basins. The underground reservoirs of Eagle Rock, Verdugo and Sylmar Basins are independent of one another and of the San Fernando Basin.

4.2.4 Safe Yield and Native Safe Yield. The safe yield and native safe yield, stated in acre feet, of the three largest basins for the year 1964-65 was as follows:

Basin	Safe Yield	Native Safe Yield
San Fernando	90,680	43,660
Sylmar	6,210	3,850
Verdugo	7,150	3,590

The safe yield of Eagle Rock Basin is derived from imported water delivered by Los Angeles. There is no measurable native safe yield.

4.2.5 Separate Basins -- Separate Rights. The rights of the parties to extract ground water within ULARA are separate and distinct as within each of the several ground water basins within said watershed.

4.2.6 Hydrologic Condition of Basins. The several basins within ULARA are in varying hydrologic conditions, which result in different legal consequences.

4.2.6.1 San Fernando Basin. The first full year of overdraft in San Fernando Basin was 1954-55. It remained in overdraft continuously until 1968, when an injunction

herein became effective. Thereafter, the basin was placed on safe yield operation. There is no surplus ground water available for appropriation or overlying use from San Fernando Basin.

4.2.6.2 Sylmar Basin. Sylmar Basin is not in overdraft. There remains safe yield over and above the present reasonable beneficial overlying uses, from which safe yield the appropriative rights of Los Angeles and San Fernando may be and have been exercised.

4.2.6.3 Verdugo Basin. Verdugo Basin was in overdraft for more than five consecutive years prior to 1968. Said basin is not currently in overdraft, due to decreased extractions by Glendale and Crescenta Valley on account of poor water quality. However, the combined appropriative and prescriptive rights of Glendale and Crescenta Valley are equivalent to the safe yield of the Basin. No private overlying or appropriative rights exist in Verdugo Basin.

4.2.6.4 Eagle Rock Basin. The only measure water supply to Eagle Rock Basin is import return water by reason of importations by Los Angeles. Extractions by Foremost and Deep Rock under the prior stipulated judgments have utilized the safe yield of Eagle Rock Basin, and have maintained hydrologic equilibrium therein.

5. DECLARATION OF RIGHTS

5.1 Right to Native Waters.

5.1.1 Los Angeles River and San Fernando Basin.

5.1.1.1 Los Angeles' Pueblo Right. Los Angeles, as the successor to all rights, claims and powers of the Spanish Pueblo de Los Angeles in regard to water rights, is the owner of a prior and paramount pueblo right to the surface waters of the Los Angeles River and the native ground waters of San Fernando Basin to meet its reasonable beneficial needs and for its inhabitants.

5.1.1.2 Extent of Pueblo Right. Pursuant to said pueblo right, Los Angeles is entitled to satisfy its needs and those of its inhabitants within its boundaries as from time

to time modified. Water which is in fact used for pueblo right purposes is and shall be deemed needed for such purposes.

5.1.1.3 Pueblo Right -- Nature and Priority of Exercise. The pueblo right of Los Angeles is a prior and paramount right to all of the surface waters of the Los Angeles River, and native ground water in San Fernando Basin, to the extent of the reasonable needs and uses of Los Angeles and its inhabitants throughout the corporate area of Los Angeles, as its boundaries may exist from time to time. To the extent that the Basin contains native waters and imported waters, it is presumed that the first water extracted by Los Angeles in any water year is pursuant to its pueblo right, up to the amount of the native safe yield. The next extractions by Los Angeles in any year are deemed to be from import return water, followed by stored water, to the full extent of Los Angeles' right to such import return water and stored water. In the event of need to meet water requirements of its inhabitants, Los Angeles has the additional right, pursuant to its pueblo right, withdraw temporarily from storage Underlying Pueblo Waters, subject to an obligation to replace such water as soon as practical.

5.1.1.4 Rights of Other Parties. No other party to this action has any right in or to the surface waters of the Los Angeles River or the native safe yield of the San Fernando Basin.

5.1.2 Sylmar Basin Rights.

5.1.2.1 No Pueblo Rights. The pueblo right of Los Angeles does not extend to or include ground waters in Sylmar Basin.

5.1.2.2 Overlying Rights. Defendants Moordigian and Hersch & Plumb own lands overlying Sylmar Basin and have a prior correlative right to extract native waters from said Basin for reasonable beneficial uses on their said overlying lands. Said right is appurtenant to said overlying lands and water extracted pursuant thereto may not be exported from said lands nor can said right be transferred or assigned separate and apart from said overlying lands.

5.1.2.3 Appropriative Rights of San Fernando and Los Angeles. San Fernando and Los Angeles own appropriative rights, of equal priority, to extract and put to reasonable beneficial use for the needs of said cities and their inhabitants, native waters of the Sylmar Basin in excess of the exercised reasonable beneficial needs of overlying users. Said appropriative rights are:

San Fernando	3,580 acre feet
Los Angeles	1,560 acre feet.

5.1.2.4 No Prescription. The Sylmar Basin is not presently in a state of overdraft and no rights by prescription exist in said Basin against any overlying or appropriative water user.

5.1.2.5 Other Parties. No other party to this action owns or possesses any right to extract native ground waters from the Sylmar Basin.

5.1.3 Verdugo Basin Rights.

5.1.3.1 No Pueblo Rights. The pueblo right of Los Angeles does not extend to or include ground water in Verdugo Basin.

5.1.3.2 Prescriptive Rights of Glendale and Crescenta Valley. Glendale and Crescenta Valley own prescriptive rights as against each other and against all private overlying or appropriative parties in the Verdugo Basin to extract, with equal priority, the following quantities of water from the combined safe yield of native and imported waters in Verdugo Basin:

Glendale	3,856 acre feet
Crescenta Valley	3,294 acre feet.

5.1.3.3 Other Parties. No other party to this action owns or possesses any right to extract native ground waters from the Verdugo Basin.

5.1.4 Eagle Rock Basin Rights.

5.1.4.1 No Pueblo Rights. The pueblo right of Los Angeles does not extend to or include ground water in Eagle Rock Basin.

5.1.4.2 No Rights in Native Waters. The Eagle Rock Basin has no significant or measurable native safe yield and no parties have or assert any right or claim to native waters in said Basin.

5.2 Rights to Imported Waters.

5.2.1 San Fernando Basin Rights.

5.2.1.1 Rights to Recapture Import Return Water. Los Angeles, Glendale, Burbank and San Fernando have each caused imported waters to be brought into ULARA and to be delivered to lands overlying the San Fernando Basin, with the result that percolation and return flow of such delivered water has caused imported waters to become a part of the safe yield of San Fernando Basin. Each of said parties has a right to extract from San Fernando Basin that portion of the safe yield of the Basin attributable to such import return waters.

5.2.1.2 Rights to Store and Recapture Stored Water. Los Angeles has heretofore spread imported water directly in San Fernando Basin. Los Angeles, Glendale, Burbank and San Fernando each have rights to store water in San Fernando Basin by direct spreading or in lieu practices. To the extent of any future spreading or in lieu storage of import water or reclaimed water by Los Angeles, Glendale, Burbank or San Fernando, the party causing said water to be so stored shall have a right to extract an equivalent amount of ground water from San Fernando Basin. The right to extract waters attributable to such storage practices is an undivided right to a quantity of water in San Fernando Basin equal to the amount of such Stored Water to the credit of any party, as reflected in Watermaster records.

5.2.1.3 Calculation of Import Return Water and Stored Water Credits. The extraction rights of Los Angeles, Glendale, Burbank and San Fernando in San Fernando Basin in any year, insofar as such rights are based upon import return water, shall only extend to the amount of any accumulated import return water credit of such party by reason of imported water delivered after September 30, 1977. The annual credit for such

import return water shall be calculated by Watermaster based upon the amount of delivered water during the preceding water year, as follows:

Los Angeles:	20.8% of all delivered water (including reclaimed water) to valley fill lands of San Fernando Basin.
San Fernando:	26.3% of all imported and reclaimed water delivered to valley-fill lands of San Fernando Basin.
Burbank:	20.0% of all delivered water (including reclaimed water) to San Fernando Basin and its tributary hill and mountain areas.
Glendale:	20.0% of all delivered water (including reclaimed water) to San Fernando Basin and its tributary hill and mountain areas (i.e., total delivered water, [including reclaimed water], less 105% of total sales by Glendale in Verdugo Basin and its tributary hills).

In calculating Stored Water credit, by reason of direct spreading of imported or reclaimed water, Watermaster shall assume that 100% of such spread water reached the ground water in the year spread.

5.2.1.4 Cumulative Import Return Water Credits. Any import return water which is not extracted in a given water year shall be carried over, separately accounted for, and maintained as a cumulative credit for purposes of future extractions.

5.2.1.5 Overextractions. In addition to extractions of stored water, Glendale, Burbank or San Fernando may, in any water year, extract from San Fernando Basin an amount not exceeding 10% of such party's last annual credit for import return water, subject, however, to an obligation to replace such overextraction by reduced extractions during the next succeeding water year. Any such overextraction which is not so replaced shall constitute physical solution water, which shall be deemed to have been extracted in said subsequent water year.

5.2.1.6 Private Defendant. No private defendant is entitled to extract water from the San Fernando Basin on account of the importation of water thereto by overlying public entities.

5.2.2 Sylmar Basin Rights.

5.2.2.1 Rights to Recapture Import Return Waters. Los Angeles and San Fernando have caused imported waters to be brought into ULARA and delivered to lands overlying the Sylmar Basin with the result that percolation and return flow of such delivered water has caused imported waters to become a part of the safe yield of Sylmar Basin. Los Angeles and San Fernando are entitled to recover from Sylmar Basin such imported return waters. In calculating the annual entitlement to recapture such import return water, Los Angeles and San Fernando shall be entitled to 35.7% of the preceding water year's imported water delivered by such party to lands overlying Sylmar Basin. Thus, by way of example, in 1976-77, Los Angeles was entitled to extract 2370 acre feet of ground water from Sylmar Basin, based on delivery to lands overlying said Basin of 6640 acre feet during 1975-76. The quantity of San Fernando's imported water to, and the return flow therefrom, in the Sylmar Basin in the past has been of such minimal quantities that it has not been calculated.

5.2.2.2 Rights to Store and Recapture Stored Water. Los Angeles and San Fernando each have the right to store water in Sylmar Basin equivalent to their rights in San Fernando Basin under paragraph 5.2.1.2 hereof.

5.2.2.3 Carry Over. Said right to recapture stored water, import return water and other safe yield waters to which a party is entitled, if not exercised in a given year, can be carried over for not to exceed five years, if the underflow through Sylmar Notch does not exceed 400 acre feet per year.

5.2.2.4 Private Defendants. No private defendant is entitled to extract water from within the Sylmar Basin on account of the importation of water thereto by overlying public entities.

5.2.3 Verdugo Basin Rights.

5.2.3.1 Glendale and Crescenta Valley. Glendale and Crescenta Valley own appropriative and prescriptive rights in and to the total safe yield of Verdugo Basin, without regard as to the portions thereof derived from native water and from delivered imported waters, notwithstanding that both of said parties have caused waters to be imported and delivered on lands overlying Verdugo Basin. Said aggregate rights are as declared in Paragraph 5.1.3.2 of these Conclusions.

5.2.3.2 Los Angeles. Los Angeles may have a right to recapture its import return waters by reason of delivered import water in the Basin, based upon imports during and after water year 1977-78, upon application to Watermaster not later than the year following such import and on subsequent order after hearing by the Court.

5.2.3.3 Private Defendants. No private defendant, as such, is entitled to extract water from within the Verdugo Basin on account of the importation of water thereto by overlying public entities.

5.2.4 Eagle Rock Basin Rights.

5.2.4.1 Los Angeles. Los Angeles has caused imported water to be delivered for use on lands overlying Eagle Rock Basin and return flow from said delivered imported water constitutes the entire safe yield of Eagle Rock Basin. Los Angeles has the right to extract or cause to be extracted the entire safe yield of Eagle Rock Basin.

5.2.4.2 Private Defendants. No private defendants have a right to extract water from within Eagle Rock Basin, except pursuant to the physical solution herein.

6. INJUNCTIONS

Each of the parties named or referred to in this Part 6, its officers, agents, employees and officials is, and they are, hereby ENJOINED and RESTRAINED from doing or causing to be done any of the acts herein specified:

6.1 Each and Every Defendant -- from diverting the surface waters of the Los Angeles River or extracting the native waters of SAN FERNANDO BASIN, or in any manner interfering with the prior

and paramount pueblo right of Los Angeles in and to such waters, except pursuant to the physical solution herein decreed.

6.2 Each and Every Private Defendant -- from extracting ground water from the SAN FERNANDO, VERDUGO, or EAGLE ROCK BASINS, except pursuant to physical solution provisions hereof.

6.3 Defaulting and Disclaiming Parties (listed in Attachments "C" and "D") -- from diverting or extracting water within ULARA, except pursuant to the physical solution herein decreed.

6.4 Glendale -- from extracting ground water from SAN FERNANDO BASIN in any water year in quantities exceeding its import return water credit and any stored water credit, except pursuant to the physical solution; and from extracting water from VERDUGO BASIN n excess of its appropriative and prescriptive right declared herein.

6.5 Burbank -- from extracting ground water from SAN FERNANDO BASIN in any water year in quantities exceeding its import return water credit and any stored water credit, except pursuant to the physical solution decreed herein.

6.6 San Fernando -- from extracting ground water from SAN FERNANDO BASIN in any water year in quantities exceeding its import return water credit and any stored water credit, except pursuant to the physical solution herein decreed.

6.7 Crescenta Valley -- from extracting ground water from VERDUGO BASIN in any year in excess of its appropriative and prescriptive right declared herein.

6.8 Los Angeles -- from extracting ground water from SAN FERNANDO BASIN in any year in excess of the native safe yield, plus any import return water credit and stored water credit of said city; provided, that where the needs of Los Angeles require the extraction of Underlying Pueblo Waters, Los Angeles may extract such water subject to an obligation to replace such excess as soon as practical; and from extracting ground water from VERDUGO BASIN in excess of any credit for import return water which Los Angeles may acquire by reason of delivery of imported water for use overlying said basin, as hereinafter confirmed on application to Watermaster and by subsequent order of the Court.

6.9 Non-consumptive and Minimal Consumptive Use Parties. The parties listed in Attachment "F" are enjoined from extracting water from San Fernando Basin, except in accordance with practices specified in Attachment "F", or pursuant to the physical solution herein decreed.

7. CONTINUING JURISDICTION

7.1 Jurisdiction Reserved. Full jurisdiction, power and authority are retained by and reserved to the Court for purposes of enabling the Court upon application of any party or of the Watermaster by motion and upon at least 30 days' notice thereof, and after hearing thereon, to make such further or supplemental orders or directions as may be necessary or appropriate, for interpretation, enforcement or carrying out of this Judgment, and to modify, amend or amplify any of the provisions of this Judgment or to add to the provisions thereof consistent with the rights herein decreed; provided, however, that no such modification, amendment or amplification shall result in a change in the provisions of Section 5.2.1.3 or 9.2.1 hereof.

8. WATERMASTER

8.1 Designation and Appointment.

8.1.1 Watermaster Qualification and Appointment. A qualified hydrologist, acceptable to all active public agency parties hereto, will be appointed by subsequent order of the Court to assist the Court in its administration and enforcement of the provisions of this Judgment and any subsequent orders of the Court entered pursuant to the Court's continuing jurisdiction. Such Watermaster shall serve at the pleasure of the Court, but may be removed or replaced on motion of any party after hearing and showing of good cause.

8.2 Powers and Duties.

8.2.1 Scope. Subject to the continuing supervision and control of the Court, Watermaster shall exercise the express powers, and shall perform the duties, as provided in this Judgment or hereafter ordered or authorized by the Court in the exercise of the Court's continuing jurisdiction.

8.2.2 Requirement for Reports, Information and Records. Watermaster may require any party to furnish such reports, information and records as may be reasonably necessary to determine compliance or lack of compliance by any party with the provisions of this Judgment.

8.2.3 Requirement of Measuring Devices. Watermaster shall require all parties owning or operating any facilities for extraction of ground water from ULARA to install and maintain at all times in good working order, at such party's own expense, appropriate meters or other measuring devices satisfactory to the Watermaster.

8.2.4 Inspection by Watermaster. Watermaster shall make inspections of (a) ground water extraction facilities and measuring devices of any party, and (b) water use practices by any party under physical solution conditions, at such times and as often as may be reasonable under the circumstances to verify reported data and practices of such party. Watermaster shall also identify and report on any new or proposed new ground water extractions by any party or non-party.

8.2.5 Policies and Procedures. Watermaster shall, with the advice and consent of the Administrative Committee, adopt and amend from time to time Policies and Procedures as may be reasonably necessary to guide Watermaster in performance of its duties, powers and responsibilities under the provisions of this judgment.

8.2.6 Data Collection. Watermaster shall collect and verify data relative to conditions of ULARA and its ground water basins from the parties and one or more other governmental agencies. Where necessary, and upon approval of the Administrative Committee, Watermaster may develop supplemental data.

8.2.7 Cooperation With Other Agencies. Watermaster may act jointly or cooperate with agencies of the United States and the State of California or any political subdivisions, municipalities or districts (including any party) to secure or exchange data to the end that the purpose of this Judgment, including its physical solution, may be fully and economically carried out.

8.2.8 Accounting for Non-consumptive Use. Watermaster shall calculate and report annually the non-consumptive and consumptive uses of extracted ground water by each party listed in Attachment "F".

8.2.9 Accounting for Accumulated Import Return Water and Stored Water. Watermaster shall record and verify additions, extractions and losses and maintain an annual and cumulative account of all (a) stored water and (b) import return water in San Fernando Basin. Calculation of losses attributable to Stored Water shall be approved by the Administrative Committee or by subsequent order of the Court. For purposes of such accounting, extractions in any water year by Glendale, Burbank or San Fernando shall be assumed to be first from accumulated import return water, second from stored water, and finally pursuant to physical solution; provided, that any such city may, by written notice of intent to Watermaster, alter said priority of extractions as between import return water and stored water.

8.2.10 Recalculation of Safe Yield. Upon request of the Administrative Committee, or on motion of any party and subsequent Court order, Watermaster shall recalculate safe yield of any basin within ULARA. If there has been a material long-term change in storage over a base period (excluding any effects of stored water) in San Fernando Basin the safe yield shall be adjusted by making a corresponding change in native safe yield of the Basin.

8.2.11 Watermaster Report. Watermaster shall prepare annually and (after review and approval by Administrative Committee) cause to be served on all active parties, on or before May 1, a report of hydrologic conditions and Watermaster activities within ULARA during the preceding water year. Watermaster's annual report shall contain such information as may be requested by the Administrative Committee, required by Watermaster Policies and Procedures or specified by subsequent order of this Court.

8.2.12 Active Party List. Watermaster shall maintain at all times a current list of active parties and their addresses.

8.3 Administrative Committee.

8.3.1 Committee to be Formed. An Administrative Committee shall be formed to advise with, request or consent to, and review actions of Watermaster. Said Administrative Committee

shall be composed of one representative of each party having a right to extract ground water from ULARA, apart from the physical solution. Any such party not desiring to participate in such committee shall so advise Watermaster in writing.

8.3.2 Organization and Voting. The Administrative Committee shall organize and adopt appropriate rules and regulations to be included in Watermaster Policies and Procedures. Action of the Administrative Committee shall be by unanimous vote of its members, or of the members affected in the case of an action which affects one or more basins but less than all of ULARA. In the event of inability of the Committee to reach a unanimous position, the matter may, at the request of Watermaster or any party, be referred to the Court for resolution by subsequent order after notice and hearing.

8.3.3 Function and Powers. The Administrative Committee shall be consulted by Watermaster and shall request or approve all discretionary Watermaster determinations. In the event of disagreement between Watermaster and the Administrative Committee, the matter shall be submitted to the Court for review and resolution.

8.4 Watermaster Budget and Assessments.

8.4.1 Watermaster's Proposed Budget. Watermaster shall, on or before May 1, prepare and submit to the Administrative Committee a budget for the ensuing water year. The budget shall be determined for each basin separately and allocated between the separate ground water basins. The total for each basin shall be allocated between the public agencies in proportion to their use of ground water from such basin during the preceding water year.

8.4.2 Objections and Review. Any party who objects to the proposed budget, or to such party's allocable share thereof, may apply to the Court within thirty (30) days of receipt of the proposed budget from Watermaster for review and modification. Any such objection shall be duly noticed to all interested parties and heard within thirty (30) days of notice.

8.4.3 Notice of Assessment. After thirty (30) days from delivery of Watermaster's proposed budget, or after the order of Court settling any objections thereto, Watermaster shall serve notice on all parties to be assessed of the amount of assessment and the required payment schedule.

8.4.4 Payment. All assessments for Watermaster expenses shall be payable on the dates designated in the notice of assessment.

8.5 Review of Watermaster Activities.

8.5.1 Review Procedures. All actions of Watermaster (other than budget and assessment matters, which are provided for in Paragraph 8.4.2) shall be subject to review by the Court on its own motion or on motion by any party, as follows:

8.5.1.1 Noticed Motion. Any party may, by a regularly noticed motion, apply to the court for review of any Watermaster's action. Notice of such motion shall be served personally or mailed to Watermaster and to all active parties.

8.5.1.2 De Novo Nature of Proceedings. Upon the filing of any such motion, the Court shall require the moving party to notify the active parties of a date for taking evidence and argument, and on the date so designated shall review de novo the question at issue. Watermaster's findings or decision, if any, may be received in evidence at said hearing, but shall not constitute presumptive or prima facie proof of any fact in issue.

8.5.1.3 Decision. The decision of the Court in such proceeding shall be an appealable supplemental order in this case. When the same is final, it shall be binding upon the Watermaster and all parties.

9. PHYSICAL SOLUTION

9.1 Circumstances Indicating Need for Physical Solution. During the period between 1913 and 1955, when there existed temporary surplus waters in the San Fernando Basin, overlying cities and private overlying landowners undertook to install and operate water extraction, storage and transmission facilities to utilize such temporary surplus waters. If the injunction against interference with the prior and paramount rights of Los Angeles to the waters of the San Fernando and Eagle Rock Basins were strictly enforced, the value and utility of those water systems and facilities would be lost or impaired. It is appropriate to allow continued limited extraction from the San Fernando and Eagle Rock Basins by parties other than Los Angeles, subject to assurance that Los Angeles will be compensated for any cost, expense or loss incurred as a result thereof.

9.2 Prior Stipulated Judgments. Several defendants heretofore entered into separate stipulated judgments herein, during the period June, 1958 to November, 1965, each of which judgments was subject to the court's continuing jurisdiction. Without modification of the substantive terms of said prior judgments, the same are categorized and merged into this judgment and superseded hereby in the exercise of the Court's continuing jurisdiction, as follows:

9.2.1 Eagle Rock Basin Parties. Stipulating defendants Foremost and Deep Rock have extracted water from Eagle Rock Basin, whose entire safe yield consist of import return waters of Los Angeles. Said parties may continue to extract water from Eagle Rock Basin to supply their bottled drinking water requirements upon filing all required reports on said extraction with Watermaster and Los Angeles and paying Los Angeles annually an amount equal to $21.78 per acre foot for the first 200 acre feet, and $39.20 per acre foot for any additional water extracted in any water year.

9.2.2 Non-consumptive or Minimal-consumptive Operations. Certain stipulating defendants extract water from San Fernando Basin for uses which are either non-consumptive or have a minimal consumptive impact. Each of said defendants who have a minimal consumptive impact has a connection to the City of Los Angeles water system and purchases annually an amount of water at least equivalent to the consumptive loss of extracted ground water. Said defendants are:

Non-Consumptive

Walt Disney Productions

Sears, Roebuck & Co.

Minimal-Consumptive

Conrock Co., for itself and as successor to California Materials Co.; Constance Ray White and Lee L. White; Mary L. Akmadzich and Peter J. Akmadzich

Livingston Rock & Gravel, for itself and as successor to Los Angeles Land & Water Co.

The nature of each said defendant's water use practices is described in Attachment "F". Subject to required reports to and inspections by Watermaster, each said defendant may continue extractions for said purposes so long as in any year such party continues such non-consumptive or minimal-consumptive use practices.

9.2.3 Abandoned Operations. The following stipulating defendants have ceased extracting water from San Fernando Basin and no further need exists for physical solution in their behalf:

Knickerbocker Plastic Company, Inc.

Carnation Company

Hidden Hills Mutual Water Company

Southern Pacific Railroad Co.

Pacific Fruit Express Co.

9.3 Private Defendants. There are private defendants who installed during the years of temporary surplus relatively substantial facilities to extract and utilize ground waters of San Fernando Basin. Said defendants may continue their extractions for consumptive use up to the indicated annual quantities upon payment of compensation to the appropriate city wherein their use of water is principally located, on the basis of the following physical solution:

9.3.1 Private Defendants and Appropriate Cities. Said private defendants and the cities to which their said extractions shall be charged and to which physical solution payment shall be made are:

		Annual Quantities (acre feet)
Los Angeles	- Toluca Lake	100
	Sportsman's Lodge	25
	Van de Kamp	120
Glendale	- Forest Lawn	400
	Southern Service Co.	75
Burbank	- Valhalla	300
	Lockheed	25

Provided that said private defendants shall not develop, install or operate new wells or other facilities which will increase existing extraction capacities.

9.3.2 Reports and Accounting. All extractions pursuant to this physical solution shall be subject to such reasonable reports and inspection as may be required by Watermaster.

9.3.3 Payment. Water extracted pursuant hereto shall be compensated for by annual payment to Los Angeles, and as agreed upon pursuant to paragraph 9.3.3.2 to Glendale and Burbank, thirty days from day of notice by Watermaster, on the following basis:

9.3.3.1 Los Angeles. An amount equal to what such party would have paid had water been delivered from the distribution system of Los Angeles, less the average energy cost of extraction of ground water by Los Angeles from San Fernando.

9.3.3.2 Glendale or Burbank. An amount equal to the sum of the amount payable to Los Angeles under paragraph 9.4 hereof and any additional charges or conditions agreed upon by either such city and any private defendant.

9.4 Glendale and Burbank. Glendale and Burbank have each installed, during said years of temporary surplus, substantial facilities to extract and utilize waters of the San Fernando Basin. In addition to the use of such facilities to recover import return water, the distribution facilities of such cities can be most efficiently utilized by relying upon the San Fernando Basin for peaking supplies in order to reduce the need for extensive new surface storage. Glendale and Burbank may extract annual quantities of ground water from the San Fernando Basin, in addition to their rights to import return water or stored water, as heretofore declared, in quantities up to:

Glendale	5,500 acre feet
Burbank	4,200 acre feet;

provided, that said cities shall compensate Los Angeles annually for any such excess extractions over and above their declared rights at a rate per acre foot equal to the average MWD price for municipal and industrial water delivered to Los Angeles during the fiscal year, less the average energy cost of extraction of ground water by Los Angeles from San Fernando Basin during the preceding fiscal year. Provided, further, that ground water extracted by Forest Lawn and Southern Service Co. shall be included in the amount taken by Glendale, and the amount extracted by Valhalla and Lockheed shall be

included in the amount taken by Burbank. All water taken by Glendale or Burbank pursuant hereto shall be charged against Los Angeles' rights in the year of such extractions.

In the event of emergency, and upon stipulation or motion and subsequent order of the Court, said quantities may be enlarged in any year.

9.5 San Fernando. San Fernando delivers imported water on lands overlying the San Fernando Basin, by reason of which said city has a right to recover import return water. San Fernando does not have water extraction facilities in the San Fernando Basin, nor would it be economically or hydrologically useful for such facilities to be installed. Both San Fernando and Los Angeles have decreed appropriative rights and extraction facilities in the Sylmar Basin. San Fernando may extract ground water from the Sylmar Basin in a quantity sufficient to utilize its San Fernando Basin import return water credit, and Los Angeles shall reduce its Sylmar Basin extractions by an equivalent amount and receive an offsetting entitlement for additional San Fernando Basin extractions.

9.6 Effective Date. This physical solution shall be effective on October 1, 1978, based upon extractions during water year 1978-79.

10. MISCELLANEOUS PROVISIONS

10.1 Designation of Address for Notice and Service. Each party shall designate the name and address to be used for purposes of all subsequent notices and service herein by a separate designation to be filed with Watermaster within thirty (30) days after Notice of Entry of Judgment has been served. Said designation may be changed from time to time by filing a written notice of such change with the Watermaster. Any party desiring to be relieved of receiving notices of Watermaster activity may file a waiver of notice on a form to be provided by Watermaster. Thereafter such party shall be removed from the Active Party list. For purposes of service on any party or active party by the Watermaster, by any other party, or by the Court, of any item required to be served upon or delivered to such party or active party under or pursuant to the Judgment, such service shall be made personally or by deposit in the United States mail, first class, postage prepaid, addressed to the designee and at the address in the latest designation filed by such party or active party.

10.2 Notice of Change in Hydrologic Condition -- Sylmar Basin. If Sylmar Basin shall hereafter be in a condition of overdraft due to increased or concurrent appropriations by Los Angeles and San Fernando, Watermaster shall so notify the Court and parties concerned, and notice of such overdraft and the adverse effect thereof on private overlying rights shall be given by said cities as prescribed by subsequent order of the Court, after notice and hearing.

10.3 Judgment Binding on Successors. This Judgment and all provisions thereof are applicable to and binding upon not only the parties to this action, but also upon their respective heirs, executors, administrators, successors, assigns, lessees and licensees and upon the agents, employees and attorneys in fact of all such persons.

10.4 Costs. Ordinary court costs shall be borne by each party, and reference costs shall be borne as heretofore allocated and paid.

DATED: _____, 1979.

_____
Judge of the Superior Court

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Rcd 3-16-92

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An Association, Including A
Professional Corporation
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Attorneys for Defendant,
Dominguez Water Corporation

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

CALIFORNIA WATER SERVICE COMPANY, et al., Plaintiffs vs. CITY OF COMPTON, et al., Defendants.	NO. 506,806 AMENDED JUDGMENT (DECLARING AND ESTABLISHING WATER RIGHTS IN THE WEST COAST BASIN, IMPOSING A PHYSICAL SOLUTION THEREIN AND ENJOINING EXTRACTIONS THEREFROM IN EXCESS OF SPECIFIED QUANTITIES.)

EXHIBIT 1

INTRODUCTION

The above - entitled matter came on regularly for further trial before the Honorable George Francis, Judge of the Superior Court of the State of California, assigned by the Chairman of the Judicial Council to sit in this case, on Friday the 21st day of July, 1961. Thereupon plaintiffs filed a dismissal of the action as to certain defendants named in the Complaint and in the Amended Complaint herein who are not mentioned or referred to in Paragraph III of this Judgment, and the further trial of the action proceeded in respect to the remaining parties.

The objections to the Report of Referee and to all supplemental Reports thereto, having been considered upon exceptions thereto filed with the Clerk of the Court in the manner of and within the time allowed by law, were overruled.

Oral and documentary evidence was introduced, and the matter was submitted to the Court for decision. Findings of Fact, Conclusions of Law and Judgment herein have heretofore been signed and filed.

Pursuant to the reserved and continuing jurisdiction of the Court under the Judgment herein, certain amendments to said Judgment and temporary Orders have heretofore been made and entered.

Continuing jurisdiction of the Court under said Judgment is currently assigned to the HONORABLE JULIUS M. TITLE.

The motion of defendant herein, DOMINGUEZ WATER CORPORATION, for further amendments to the Judgment, notice thereof and of the hearing thereon having been duly and regularly given to all parties, came on for hearing in Department 48 of the

above-entitled Court on_____, 1979, at 1:30 o'clock P.M., before said HONORABLE JULIUS M. TITLE. Defendant, DOMINGUEZ WATER CORPORATION, was represented by its attorneys, Helm, Budinger & Lemieux, and Ralph B. Helm. Various other parties were represented by counsel of record appearing on the Clerk's records. Hearing thereon was concluded on that date. The within "Amended Judgment" incorporates amendments and orders heretofore made to the extent presently operable and amendments pursuant to said last mentioned motion. To the extent this Amended Judgment is a restatement of the Judgment as heretofore amended, it is for convenience in incorporating all matters in one document, it is not a readjudication of such matters and is not intended to reopen any such matters. As used hereinafter the word "Judgment" shall include the original Judgment as amended to date.

NOW, THEREFORE, IT IS HEREBY ORDERED, ADJUDGED AND DECREED AS FOLLOWS:

I.

Existence of Basin and Boundaries Thereof.

There exists in the County of Los Angeles, State of California, an underground water basin or reservoir known and hereinafter referred to as "West Coast Basin","West Basin" or the "Basin", and the boundaries thereof are described as follows:

> Commencing at a point in the Baldwin Hills about 1300 feet north and about 100 feet west of the intersection of Marvale Drive and Northridge Drive; thence through a point about 200 feet northeasterly along Northridge Drive from the

intersection of Marvale and Northridge Drives
the base of the escarpment of the Potrero fau
thence along the base of the escarpment of th
Potrero fault in a straight line passing thro
a point about 200 feet south of the intersect
of Century and Crenshaw Boulevards and exten
about 2650 feet beyond this point to the sou
end of the Potrero escarpment; thence from
southerly end of the Potrero escarpment in a
passing about 700 feet south of the intersec
of Western Avenue and Imperial Boulevard and
400 feet north of the intersection of El Seg
Boulevard and Vermont Avenue and about 1700
south of the intersection of El Segundo Boul
and Figueroa Street to the northerly end of
escarpment of the Avalon-Compton fault at a
on said fault about 700 feet west of the int
section of Avalon Boulevard and Rosecrans Av
thence along the escarpment of the Avalon-Co
fault to a point in the Dominguez Hills loca
about 1300 feet north and about 850 feet wes
the intersection of Central Avenue and Victo
Street; thence along the crest of the Domin
Hills in a straight line to a point on Alam
Street about 2900 feet north of Del Amo Bou
as measued along Alameda Street; thence in
straight line extending through a point loc
Del Amo Boulevard about 900 feet west of th

Pacific Electric Railway to a point about 100 feet north and west of the intersection of Bixby Road and Del Mar Avenue; thence in a straight line to a point located about 750 feet west and about 730 feet south of the intersection of Wardlow Road and Long Beach Boulevard at the escarpment of the Cherry Hill fault; thence along the escarpment of the Cherry Hill fault through the intersection of Orange Avenue and Willow Street to a point about 400 feet east of the intersection of Walnut and Creston Avenues; thence to a point on Pacific Coast Highway about 300 feet west of its intersection with Obispo Avenue; thence along Pacific Coast Highway easterly to a point located about 650 feet west of the intersection of the center line of said Pacific Coast Highway with the intersection of the center line of Lakewood Boulevard; thence along the escarpment of the Reservoir Hill fault to a point about 650 feet north and about 700 feet east of the intersection of Anaheim Street and Ximeno Avenue; thence along the trace of said Reservoir Hill fault to a point on the Los Angeles - Orange County line about 1700 feet northeast of the Long Beach City limit measured along the County line; thence along said Los Angeles - Orange County line in a southwesterly direction to the shore line of the Pacific Ocean; thence in a northerly and westerly direction along

the shore line of the Pacific Ocean to the intersection of said shore line with the southerly end of the drainage divide of the Palos Verdes Hills; thence along the drainage divide of the Palos Verdes Hills to the intersection of the northerly end of said drainage divide with the shore line of the Pacific Ocean; thence northerly along the shore line of the Pacific Ocean to the intersection of said shore line with the westerly projection of the crest of the Ballona escarpment; thence easterly along the crest of the Ballona escarpment to the mouth of Centinela Creek; thence easterly from the mouth of Centinela Creek across the Baldwin Hills in a line encompassing the entire watershed of Centinela Creek to the point of beginning.

All streets, railways and boundaries of Cities and Counties hereinabove referred to are as the same existed at 12:00 o'clock noon on August 20, 1961.

The area included within the foregoing boundaries is approximately 101,000 acres in extent.

II.

Definitions:

1. Basin, West Coast Basin and West Basin, as these terms are interchangeably used herein, mean the ground water basin underlying the area described in Paragraph I hereof.

2. A fiscal year, as that term is used herein, is a twelve month period beginning July 1 and ending June 30.

3. A water purveyor, as that term is used in Paragraph XII hereof, means a party which sells water to the public, whether a regulated public utility, mutual water company or public entity, which has a connection or connections for the taking of imported water through The Metropolitan Water Distric of Southern California, through West Basin Municipal Water District, or access to such imported water through such connect and which normally supplies at least a part of its customers' water needs with such imported water.

4. A water year, as that term is used herein, is a twe month period beginning October 1 and ending September 30, unti it is changed to a "fiscal year," as provided in Paragraph XVI hereof.

III.

Declaration of Rights - Water Rights Adjudicated.

Certain of the parties to this action have no right to extract water from the Basin. The name of each of said parti is listed below with a zero following his name, and the absen of such right in said parties is hereby established and decla Certain of the parties to this action and/or their successors interest (through September 30, 1978) are the owners of right extract water from the Basin, which rights are of the same le force and effect and without priority with reference to each and the amount of such rights, stated in acre-feet per year, inafter referred to as "Adjudicated Rights" is listed below ing such parties' names, and the rights of the last-mentione parties are hereby declared and established accordingly. Pr however, that the Adjudicated Rights so declared and establi

shall be subject to the condition that the water, when used, shall be put to beneficial use through reasonable methods of use and reasonable methods of diversion; and provided further that the exercise of all of said Rights shall be subject to a pro rata reduction, if such reduction is required, to preserve said Basin as a common source of water supply.

PARTY AND SUCCESSOR, IF ANY		ADJUDICATED RIGHT IN ACRE FEET, ANNUALLY
LERMENS, EVELYN (Formerly Alfred Lermens)		0.7
LENZINER, EMMA L. sued as Mrs. E.L. Leuziner		1.4
LINDERMAN, ABRAHAM Second West Coast Basin Judgment		0
LISTON, LAWRENCE Sold to R. Harris and L. Harris	0.7 -0.7	0
LITTLE, WILLIAM Sold to Watt Industrial Properties	0.1 -0.1	0
LIZZA, PAT		0
LOCHMAN, ERNEST C.		0
LOCHMAN, WALTER Second West Coast Basin Judgment		
LONG, BEN Persilla Long, sued as Pricilla Long		0
LONG, JOHN		0
LONG BEACH, CITY OF		0.7
LOPEZ, FRANK		3.7
LOPEZ, MANUEL one Rudolph E. Lopez		0
LOS ANGELES, CITY OF		1503.0
LOS ANGELES CITY SCHOOL DISTRICT		0
LOS ANGELES COUNTY (ALONDRA PARK) Successor to Los Angeles County Flood Control District	28.7 39.0	67.7
LOS ANGELES COUNTY FLOOD CONTROL DISTRICT Successor in part to A.H. Smith et al Sold to Los Angeles County-Alondra Park	37.6 1.4 -39.0	0

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(818) 793-9400 or (213) 385-4345

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

CENTRAL AND WEST BASIN WATER REPLENISHMENT DISTRICT, etc., Plaintiff, v. CHARLES E. ADAMS, et al., Defendants. CITY OF LAKEWOOD, a municipal corporation, Cross-Complaint, v. CHARLES E. ADAMS, et al., Cross-Defendants.	No. 786,656 SECOND AMENDED JUDGMENT (Declaring and establishing water rights in Central Basin and enjoining extractions therefrom in excess of specified quantities.)

The above-entitled matter duly and regularly came on for trial in Department 73 of the above-entitled Court (having been transferred thereto from Department 75 by order of the presiding Judge), before the Honorable Edmund M. Moor, specially assigned Judge, on May 17, 1965, at 10:00 a.m. Plaintiff was represented by its attorneys BEWLEY, KNOOP,

LASSLEBEN & WHELAN, MARTIN E. WHELAN, JR., and EDWIN H. VAIL, JR., and cross-complainant was represented by its attorney JOHN S. TODD. Various defendants and cross-defendants were also represented at the trial. Evidence both oral and documentary was introduced. The trial continued from day to day on May 17, 18, 19, 20, 21 and 24, 1965, at which time it was continued by order of Court for further trial on August 25, 1965, at 10:00 a.m. in Department 73 of the above-entitled Court; whereupon, having then been transferred to Department 74, trial was resumed in Department 74 on August 25, 1965, and then continued to August 27, 1965 at 10:00 a.m. in the same Department. On the latter date, trial was concluded and the matter submitted. Findings of fact and conclu-sions of law have heretofore been signed and filed. Pursuant to the reserved and continuing jurisdiction of the court under the judgment herein, certain amendments to said judgment and temporary orders have heretofore been made and entered. Continuing jurisdiction of the court for this action is currently assigned to HON. FLORENCE T. PICKARD. Motion of Plaintiff herein for further amendments to the judgment, notice thereof and of the hearing thereon having been duly and regularly given to all parties, came on for hearing in Department 38 of the above-entitled court on MAY 6, 1991 at 8:45 a.m. before said HONORABLE PICKARD. Plaintiff was represented by its attorneys LAGERLOF, SENECAL, DRESCHER & SWIFT, by William F. Kruse. Various defendants were represented by counsel of record appearing on the Clerk's records. Hearing thereon was concluded on that date. The within "Second Amended Judgment" incorporates amendments and orders heretofore made to the extent presently operable and amendments pursuant to said last mentioned motion. To the extent this Amended judgment is a restatement of the judgment as heretofore amended, it is for convenience in incorporating all matters in one document, is not a readjudication of such matters and is not intended to reopen any such matters. As used hereinafter the word "judgment" shall include the original judgment as amended to date. In connection with the following judgment, the following terms, words, phrases and clauses are used by the Court with the

following meanings:

"Administrative Year" means the water year until operation under the judgment is converted to a fiscal year pursuant to Paragraph 4, Part I, p. 53 hereof, whereupon it shall mean a fiscal year, including the initial 'short fiscal year' therein provided.

"Allowed Pumping Allocation" is that quantity in acre feet which the Court adjudges to be the maximum quantity which a party should be allowed to extract annually from Central Basin as set forth in part I hereof, which constitutes 80% of such party's Total Water Right.

"Allowed Pumping Allocation for a particular Administra- tive year" and "Allowed Pumping Allocation in the following Administrative year" and similar clauses, mean the Allowed Pumping Allocation as increased in a particular Administrative year by an authorized carryovers pursuant to Part III, Subpart A of this judgment and as reduced by reason of any over-extractions in a previous Administrative year.

"Artificial Replenishment" is the replenishment of Central Basin achieved through the spreading of imported or reclaimed water for percolation thereof into Central Basin by a governmental agency.

"Base Water Right" is the highest continuous extractions of water by a party from Central Basin for a beneficial use in any period of five consecutive years after the commencement of over-draft in Central Basin and prior to the commencement of this action, as to which there has been no cessation of use by that party during any subsequent period of five consecutive years. As employed in the above definition, the words "extractions of water by a party" and "cessation of use by that party" include such extractions and cessations by any predecessor or predecessors in interest.

"Calendar Year" is the twelve month period commencing January 1 of each year and ending December 31 of each year.

"Central Basin" is the underground water basin or reservoir underlying Central Basin Area, the exterior boundaries of which Central Basin are the same as the exterior boundaries of Central Basin Area.

"Central Basin Area" is the territory described in Appendix "1" to this judgment, and is a segment of the territory comprising Plaintiff District.

"Declared water emergency" shall mean a period commencing with the adoption of a resolution of the Board of Directors of the Central and West Basin Water Replenishment District declaring that conditions within the Central Basin relating to natural and imported supplies of water are such that, without implementation of the water emergency provision of this Judgment, the water resources of the Central Basin risk degradation. In making such declaration, the Board of Directors shall consider any information and requests provided by water producers, purveyors and other affected entities and may, for that purpose, hold a public hearing in advance of such declaration. A Declared Water Emergency shall extend for one (1) year following such resolution, unless sooner ended by similar resolution.

"Extraction", "extractions", "extracting", "extracted", and other variations of the same noun and verb, mean pumping, taking, diverting or withdrawing ground water by any manner or means whatsoever from Central Basin.

"Fiscal year" is the twelve (12) month period July 1 through June 30 following.

"Imported Water" means water brought into Central Basin Area from a non-tributary source by a party and any predecessors in interest, either through purchase directly from The Metropolitan Water District of Southern California or by direct purchase from a member agency thereof, and additionally as to the Department of Water and Power of the City of Los Angeles, water brought into Central Basin area by that party by means of the Owens River Aqueduct.

"Imported Water Use Credit" is the annual amount, computed on a calendar year basis, of imported water which any party and any predecessors in interest, who have timely made the

required filings under Water Code Section 1005.1, have imported into Central Basin Area in any calendar year and subsequent to July 9, 1951, for beneficial use therein, but not exceeding the amount by which that party and any predecessors in interest reduces his or their extractions of ground water from Central Basin in that calendar year from the level of his or their extractions in the preceding calendar year, or in any prior calendar year not earlier than the calendar year 1950, whichever is the greater.

"Natural Replenishment" means and includes all processes other than "Artificial Replenishment" by which water may become a part of the ground water supply of Central Basin.

"Natural Safe Yield" is the maximum quantity of ground water, not in excess of the long term average annual quantity of Natural Replenishment, which may be extracted annually from Central Basin without eventual depletion thereof or without otherwise causing eventual permanent damage to Central Basin as a source of ground water for beneficial use, said maximum quantity being determined without reference to Artificial Replenishment.

"Overdraft" is that condition of a ground water basin resulting from extractions in any given annual period or periods in excess of the long term average annual quantity of Natural Replenishment, or in excess of that quantity which may be extracted annually without otherwise causing eventual permanent damage to the basin.

"Party" means a party to this action. Whenever the term "party" is used in connection with a quantitative water right, or any quantitative right, privilege or obligation, or in connection with the assessment for the budget of the Watermaster, it shall be deemed to refer collectively to those parties to whom are attributed a Total Water Right in Part I of this judgment.

"Person" or "persons" include individuals, partner-ships, associations, governmental agencies and corporations, and any and all types of entities.

"Total Water Right" is the quantity arrived at in the same manner as in the

computation of "Base Water Right", but including as if extracted in any particular year the Imported Water Use Credit, if any, to which a particular party may be entitled.

"Water" includes only non-saline water, which is that having less than 1,000 parts of chlorides to 1,000,000 parts of water.

"Water Year" is the 12-month period commencing October 1 of each year and ending September 30th of the following year.

In those instances where any of the above-defined words, terms, phrases or clauses are utilized in the definition of any of the other above-defined words, terms, phrases and clauses, such use is with the same meaning as is above set forth.

NOW THEREFORE, IT IS ORDERED, DECLARED, ADJUDGED AND DECREED WITH RESPECT TO THE ACTION AND CROSS-ACTION AS FOLLOWS:

I. DECLARATION AND DETERMINATION OF WATER RIGHTS OF PARTIES; RESTRICTION ON THE EXERCISE THEREOF.[1]

1. Determination of Rights of Parties.

(a) Each party, except defendants, The City of Los Angeles and Department of Water and Power of the City of Los Angeles, whose name is hereinafter set forth in the tabulation at the conclusion of Subpart 3 of Part 1, and after whose name there appears under the column "Total Water Right" a figure other than "0", was the owner of and had the right to extract annually groundwater from Central Basin for beneficial use in the quantity set forth after that party's name under said column "Total Water Right" pursuant to the Judgment as originally entered herein. Attached hereto as Appendix "2" and by this reference made a part hereof as though fully set forth are the water rights of parties and successors in interest as they existed as

[1]headings in the judgment are for purposes of reference and the language of said headings do not constitute, other than for such purpose, a portion of this judgment.

of the close of the water year ending September 30, 1978 in accordance with the Watermaster Reports on file with this Court and the records of the Plaintiff. This tabulation does not take into account additions or subtractions from any Allowed Pumping Allocation of a producer for the 1978-79 water year, nor other adjustments not representing change in fee title to water rights, such as leases of water rights, nor does it include the names of lessees of landowners where the lessees are exercising the water rights. The exercise of all water rights is subject, however, to the provisions of this Judgment is hereinafter contained. All of said rights are of the same legal force and effect and are without priority with reference to each other. Each party whose name is hereinafter set forth in the tabulation set forth in Appendix "2" of this judgment, and after whose name there appears under the column "Total Water Right" the figure "0" owns no rights to extract any ground water from Central Basin, and has no right to extract any ground water from Central Basin.

(b) Defendant The City of Los Angeles is the owner of the right to extract fifteen thousand (15,000) acre feet per annum of ground water from Central Basin. Defendant Department of Water and Power of the City of Los Angeles has no right to extract ground water from Central Basin except insofar as it has the right, power, duty or obligation on behalf of defendant The City of Los Angeles to exercise the water rights in Central Basin of defendant The City of Los Angeles. The exercise of said rights are subject, however, to the provisions of this judgment hereafter contained, including but not limited to, sharing with other parties in any subsequent decreases or increases in the quantity of extractions permitted from Central Basin, pursuant to continuing jurisdiction of the Court, on the basis that fifteen thousand (15,000) acre feet bears to the Allowed Pumping Allocations of the other parties.

(c) No party to this action is the owner of or has any right to extract ground water from Central Basin except as herein affirmatively determined.

2. Parties Enjoined as Regards Quantities of Extractions.

(a) Each party, other than The State of California and The City of Los Angeles and Department of Water and Power of The City of Los Angeles, is enjoined and restrained in any Administrative year commencing after the date this judgment becomes final from extracting from Central Basin any quantity of Water greater than the party's Allowed Pumping Allocation as hereinafter set forth next to the name of the party in the tabulation appearing in Appendix 2 at the end of this Judgment, subject to further provisions of this judgment. Subject to such further provisions, the officials, agents and employees of The State of California are enjoined and restrained in any such Administrative year from extracting from Central Basin collectively any quantity of water greater than the Allowed Pumping Allocation of The State of California as hereinafter set forth next to the name of that party in the same tabulation. Each party adjudged and declared above not to be the owner of and not to have the right to extract ground water from Central Basin is enjoined and restrained in any Administrative year commencing after the date this judgment becomes final from extracting any ground water from Central Basin, except as may be hereinafter permitted to any such party under the Exchange Pool provisions of this judgment.

(b) Defendant The City of Los Angeles is enjoined and restrained in any Administrative year commencing after the date this judgment becomes final from extracting from Central Basin any quantity of water greater than fifteen thousand (15,000) acre feet, subject to further provisions of this judgment, including but not limited to, sharing with other parties in any subsequent decreases or increases in the quantity of extractions permitted from Central Basin by parties, pursuant to continuing jurisdiction of the Court, on the basis that fifteen thousand (15,000) acre feet bears to the Allowed Pumping Allocations of the other parties. Defendant Department of Water and Power of The City of Los Angeles is enjoined and restrained in any Administrative year commencing after the date this judgment becomes final from

extracting from Central Basin any quantity of water other than such as it may extract on behalf of defendant The City of Los Angeles, and which extractions, along with any extractions by said City, shall not exceed that quantity permitted by this judgment to that City in any Administrative year. Whenever in this judgment the term "Allowed Pumping Allocation" appears, it shall be deemed to mean as to defendant The City of Los Angeles the quantity of fifteen thousand (15,000) acre feet.

10. Effect of this Amended Judgment on Orders Filed Herein. This Second Amended Judgment shall not abrogate such rights of additional carry-over of unused water rights as may otherwise exist pursuant to orders herein filed June 2, 1977 and September 29, 1977.

THE CLERK WILL ENTER THIS SECOND AMENDED JUDGMENT FORTHWITH.

DATED: May 6, 1991

/s/ Florence T. Packard
Judge of the Superior Court

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