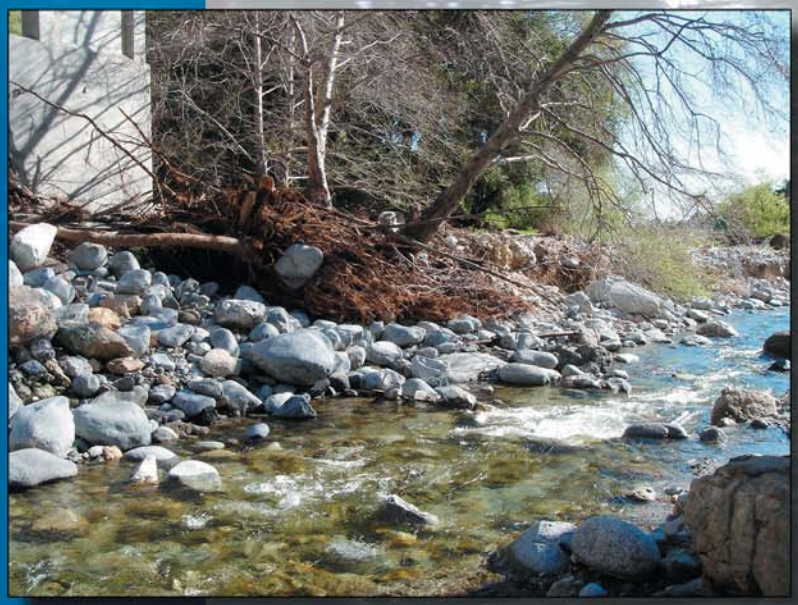


City of Pasadena

2005 Urban Water Management Plan

December 2005

RMC
Water and Environment

CITY OF PASADENA

2005 URBAN WATER MANAGEMENT PLAN

December 2005

City of Pasadena
2005 Urban Water Management Plan
Contact Sheet

Date plan submitted to the Department of Water Resources: **12/31/05**

Name of person preparing this plan: Brad Boman, Engineering Manager

Phone: **(626) 744-4278**

Fax: **(626) 744-4670**

E-mail address: **bboman@cityofpasadena.net**

The Water supplier is a: **Municipality**

The Water supplier is a: **Retailer**

Utility services provided by the water supplier include: **Water**

Is This Agency a Bureau of Reclamation Contractor? **No**

Is This Agency a State Water Project Contractor? **No**

Photos courtesy Pasadena Water and Power Department
and Pasadena Convention and Visitors Bureau

Table of Contents

Executive Summary 1

Chapter 1 Introduction

1.1 Background 4
- Current Water Management Plan 4
- Summary of Changes in Urban Water Management Act since 2000 5

1.2 Agency Coordination 7
- Coordination within the City 7
- Interagency Coordination 7

1.3 Plan Updates 8

1.4 Public Participation 9

1.5 UWMP Adoption 9

Chapter 2 Supplier Service Area

2.1 Service Area Description 12

2.2 Climate 14

2.3 Other Demographic Factors 14
- Land Use and Housing 15

2.4 Current and Projected Population 15

Chapter 3 Water Supply

3.1 Local Surface Water 19
- Arroyo Seco 19
- Eaton Canyon 20
- Devil's Gate Tunnel 20

3.2 Groundwater 20
- PWP Groundwater Management in the Basin 20
- Raymond Basin Description 20
  - Hydrology 21
  - Adjudication of the Raymond Basin 22
  - The Raymond Basin Management Board (RBMB) 22
- Groundwater Production 23
- Groundwater Spreading 23
  - Determination of Spreading Credits 24
  - Factors Affecting Spreading 25
- Long Term Storage in the Basin 25
- Future Groundwater Use 26

3.3 Imported Water – Metropolitan Water District (MWD) 26
- Sources of MWD Water 27
  - Colorado River Aqueduct (CRA) 27
  - State Water Project (SWP) 28

3.4 Current and Projected Water Supplies 28
- Current MWD Supply Contract 29
- Spreading Basin Expansion – Hahamongna Watershed Park Project 30

3.5 Transfer or Exchange Opportunities 30

3.6 Desalinated Water 31

3.7 Coordination with MWD 31

Chapter 4 Water Demand

4.1 Overview of Water Use 34
- Residential Sector 34
- Commercial Sector 35
- Governmental Sector 35

4.2 Past, Current and Projected Water Use 35
- Future Water Demand Analysis 37

Development and Land Use 37
Unit Demand Factors 37
4.3 Sales to Other Agencies 39

Chapter 5 Demand Management and Conservation
5.1 Demand Management Measures 42
5.2 PWP Water Conservation Program 43
5.3 Best Management Practices 43
BMP 1 Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers 45
BMP 2 Residential Plumbing Retrofit 45
BMP 3 System Water Audits, Leak Detection and Repair 46
BMP 4 Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections 46
BMP 5 Large Landscape Conservation Programs and Incentives 46
BMP 6 High Efficiency Washing Machine Rebate Programs 47
BMP 7 Public Information Programs 47
BMP 8 School Education Programs 47
BMP 9 Conservation Programs for Commercial, Industrial and Institutional (CII) Accounts 48
BMP 10 Wholesale Agency Assistance Programs 49
BMP 11 Conservation Pricing 50
BMP 12 Conservation Coordinator 50
BMP 13 Water Waste Prohibition 50
BMP 14 Residential ULFT Replacement Programs 50
5.4 Parks and Natural Resources Division Conservation Efforts 50
Ongoing Conservation Measures 50
Drought Water Use Reduction Plan 51
5.5 Future Water Supply Projects 51

Chapter 6 Water Supply Reliability
6.1 Reliability Considerations 54
Causes of Unreliability 54
Legal 55
Water Quality 55
Climate 55
6.2 Climate Effects on Reliability 56
Historical Dry Year Supply 56
6.3 PWP Local Supply Vulnerability 57
Surface Water Spreading 57
Groundwater 57
6.4 Vulnerability of MWD Supply 57
MWD Contractual Obligations 58
Factors Resulting in Inconsistent Supply 58
Legal 58
Environmental 58
Water Quality 59
Infrastructure 59
Climatic 59
6.5 MWD Plans for Assuring Supply 59
MWD Integrated Resources Plan (IRP) 60
Conclusions 61
6.6 PWP Plans for Assuring Supply 61
Raymond Basin Conjunctive Use Program (RBCUP) 62
Recycled Water 62

Chapter 7 **Water Quality Impacts on Reliability**
7.1 Water Quality Impacts 64
Imported Water 64
Groundwater 64
7.2 Implications for Water Management 65

Chapter 8 **Wastewater and Recycled Water**
8.1 Coordination 69
8.2 Wastewater Quantity, Quality and Current Issues 69
Los Angeles-Glendale Water Reclamation Plant (LAGWRP) 70
Recycled Water System Agreement between Pasadena and Glendale 71
8.3 Wastewater Disposal and Recycled Water Uses 71
8.4 Potential and Projected Use 71
Technical and Economic Feasibility 72
Projected Use of Recycled Water 72
Proposed Actions to Encourage Use of Recycled Water 73
Recycled Water Optimization Plan 73

Chapter 9 **Supply and Demand Comparison**
9.1 Imported Water – Regional Supply and Demand Comparisons 76
Implications for PWP 77
9.2 PWP Normal and Dry Year Supply and Demand Comparison 78
Methodology 78
Normal Year 78
Single Dry Year 79
9.3 Multiple Dry Year Supply and Demand Comparison 80
Multiple Dry Year Projected Supply 80
Multiple Dry Year Projected Demand 80
Multiple Dry Year Projected Supply and Demand Comparison 80
2006-2010 Multiple Dry Year Period 81
2011-2015 Multiple Dry Year Period 82
2016-2020 Multiple Dry Year Period 83
2021-2025 Multiple Dry Year Period 84
2026-2030 Multiple Dry Year Period 85
9.4 Conclusions 86

Chapter 10 **Water Shortage Contingency Plan**
10.1 Stages of Action 88
10.2 Estimate of Minimum Supply for Next Three Years 89
10.3 Catastrophic Supply Interruption Plan 89
10.4 Prohibitions, Consumption Reduction Methods and Penalties 90
Mandatory Prohibitions on Water Wasting 91
Consumption Reduction Methods 91
Penalties and Charges 91
10.5 Analysis of Revenue Impacts of Reduced Sales during Shortages 92
Revenues and Expenditures during a Drought 92
Measures to Overcome Revenue and Expenditure Impacts 92
10.6 Draft Ordinance and Use Monitoring 93
Reduction Measuring Mechanisms 93

Chapter 11 **Adoption and Implementation of the UWMP**
11.1 Public Participation and UWMP Adoption 96
11.2 Review of Implementation of 2000 UWMP 96
11.3 2005 UWMP Delivery to DWR and California State Library 96

APPENDICES

Appendix A: Notice of a Public Meeting on the 2005 Urban Water Management Plan
Appendix B: Resolution for the Adoption of the 2005 Urban Water Management Plan
Appendix C: 1984 Raymond Basin Judgment
Appendix D: Calculation of Spreading Credits in the Raymond Basin
Appendix E: MWD Purchase Order for Imported Water Supply
Appendix F: CUWCC BMP Coverage and Status Reports: 2003-2004
Appendix G: Water Shortage Procedures

List of Tables

Table 1-1 Summary of Changes for the 2005 UWMP 6
Table 1-2 Agency Coordination and Public Involvement 8

Table 2-1 Climate 14
Table 2-2 Population - Current and Projected 16

Table 3-1 2000-2005 Groundwater Production 20
Table 3-2 Groundwater Supply Components 23
Table 3-3 PWP Spreading Basin Operations 24
Table 3-4 PWP Long Term Storage Account Balances 26
Table 3-5 Projected Groundwater Production from the Raymond Basin (2010-2030) 26
Table 3-6 Current and Projected Water Supplies 29
Table 3-7 MWD Supply Rate Structure and Prices 30
Table 3-8 Seasonal Pattern of Supply Purchases from MWD (CY 2004) 30
Table 3-9 Interconnections with Neighboring Agencies 31
Table 3-10 Comparison between MWD Source Projections and PWP Demand Projections 32

Table 4-1 Current and Projected Water Use 36
Table 4-2 Number of Connections by Customer Type 36
Table 4-3 Potential Development in PWP Service Area 37
Table 4-4 Water Duty Factors 38

Table 5-1 Best Management Practices (BMPs) and CUWCC Reporting Status for PWP 44
Table 5-2 Residential Surveys Completed (1994-2004) 45
Table 5-3 Low Flow Devices Distributed by PWP (1991-2004) 45
Table 5-4 Pre-Screening System Audits 46
Table 5-5 Public Information Events in 2004 47
Table 5-6 Water Saving Devices Rebate and Direct Installation Programs for CII Customers 48

Table 6-1 Factors Resulting in Inconsistent PWP Supply 55
Table 6-2 PWP Supply Reliability 56
Table 6-3 Factors Resulting in Inconsistent MWD Supply 58
Table 6-4 MWD Supply Reliability - Normal and Dry Year Supplies 59

Table 8-1 Coordination with Other Agencies for Recycled Water Plan Development 69
Table 8-2 Recycled Water Uses - Actual and Potential 72
Table 8-3 Recycled Water Uses - 2000 Projection Compared with 2005 Actual 72
Table 8-4 Projected Use of Recycled Water in the Service Area 73
Table 8-5 Methods to Encourage Recycled Water Use 73

Table 9-1 MWD Multiple Dry-Year Supply Capability and Projected Demands 77
Table 9-2 PWP Projected Normal Year Supply and Demand Comparison 78
Table 9-3 (a) Projected Single Dry Year Water Supply 79
Table 9-3 (b) Projected Single Dry Year Water Demand 79
Table 9-3 (c) Projected Single Dry Year Supply and Demand Comparison 79
Table 9-4 (a) 2006-2010 Multiple Dry Year Projected Supply 81
Table 9-4 (b) 2006-2010 Multiple Dry Year Projected Demand 81
Table 9-4 (c) 2006-2010 Multiple Dry Year Projected Supply and Demand Comparison 81
Table 9-5 (a) 2011-2015 Multiple Dry Year Projected Supply 82
Table 9-5 (b) 2011-2015 Multiple Dry Year Projected Demand 82
Table 9-5 (c) 2011-2015 Multiple Dry Year Projected Supply and Demand Comparison 82
Table 9-6 (a) 2016-2020 Multiple Dry Year Projected Supply 83
Table 9-6 (b) 2016-2020 Multiple Dry Year Projected Demand 83

Table 9-6 (c) 2016-2020 Multiple Dry Year Projected Supply and Demand Comparison 83
Table 9-7 (a) 2021-2025 Multiple Dry Year Projected Supply 84
Table 9-7 (b) 2021-2025 Multiple Dry Year Projected Demand 84
Table 9-7 (c) 2021-2025 Multiple Dry Year Projected Supply and Demand Comparison 84
Table 9-8 (a) 2026-2030 Multiple Dry Year Projected Supply 85
Table 9-8 (b) 2026-2030 Multiple Dry Year Projected Demand 85
Table 9-8 (c) 2026-2030 Multiple Dry Year Projected Supply and Demand Comparison 85

Table 10-1 Water Rationing Stages and Reduction Goals 89
Table 10-2 Estimate of Minimum Supply for Next Three Years 89
Table 10-3 Possible Actions in the Event of a Catastrophe 90
Table 10-4 Mandatory Prohibitions 91
Table 10-5 Consumption Reduction Methods 91

List of Figures

Figure 2-1 PWP Service Area and Well Locations 13
Figure 2-2 Historical and Projected Service Area Population 16

Figure 3-1 Major Components of PWP Water Supply 18
Figure 3-2 Historical PWP Water Production 19
FIgure 3-3 Raymond Basin Boundaries 21
Figure 3-4 PWP Spreading Grounds 24
Figure 3-5 Diverted Surface Runoff and Spreading Credits Received by PWP: 1994-2004 25
Figure 3-6 MWD Member Agencies Map 27
Figure 3-7 2005 Water Production 28

Figure 4-1 Historical and Projected Water Demand 38

FIgure 8-1 Recycled Water Planning 68
Figure 8-2 LAGWRP Wastewater Treatment and Available Recycled Water 70
Figure 8-3 Current Disposal of Treated Effluent at LAGWRP 71

Figure 9-1 Supply versus Demand, Storage 2006-2010 81
Figure 9-2 Supply versus Demand, Storage 2011-2015 82
FIgure 9-3 Supply versus Demand, Storage 2016-2020 83
Figure 9-4 Supply versus Demand, Storage 2021-2025 84
Figure 9-5 Supply versus Demand, Storage 2026-2030 85

List of Abbreviations

AF	Acre-Feet
AFY	Acre-Feet per Year
ASR	Aquifer Storage Recovery
AWWA	American Water Works Association
BMP	Best Management Practices
cfs	Cubic Feet Per Second
CII	Commercial, Industrial and Institutional
CUWCC	California Urban Water Conservation Council
CY	Calendar Year
DU	Dwelling Unit
DWR	Department of Water Resources
CIMIS	California Irrigation Management Information System
CRA	Colorado River Aqueduct
DHS	Department of Health Services
DIP	Delta Improvements Package
DMM	Demand Management Measure
EPA	Environmental Protection Agency
ETo	Evapotranspiration
FY	Fiscal Year
GIS	Geographic Information Systems
gpm	Gallons per Minute
gpd	Gallons per Day
HEW	High Efficiency Washing Machine
IRP	Integrated Resources Plan
JPL	Jet Propulsion Laboratory
LACSD	County Sanitation Districts of Los Angeles County
LAGWRP	Los Angeles-Glendale Water Reclamation Plant
LTS	Long Term Storage
MAF	Million Acre Feet
MCL	Maximum Contaminant Level
mgd	Million Gallons per Day
MOU	Memorandum of Understanding
MSL	Mean Sea Level
MWD	Metropolitan Water District
PNR	Parks and Natural Resources
PWP	Pasadena Water and Power
RBCUP	Raymond Basin Conjunctive Use Program
RBMB	Raymond Basin Management Board
RUWMP	Regional Urban Water Management Plan
RWFS	Recycled Water Feasibility Study
RTP	Regional Transportation Plan
SCADA	Supervisory Control and Data Acquisition Systems
SCAG	Southern California Association of Governments
SWP	State Water Project
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
UAC	Utilities Advisory Commission
ULFT	Ultra Low Flush Toilet
UWMP	Urban Water Management Plan
VOC	Volatile Organic Compounds
WBIC	Weather Based Irrigation Controller
WSMP	Water Systems Master Plan
WSP	Water Shortage Plan

Acknowledgements

The 2005 Urban Water Management Plan was a collaborative effort that involved a number of Pasadena Water and Power staff. The knowledge, experience and contributions from the following individuals were instrumental in the preparation of the plan.

Keith Ban
Brad Boman
Cathy Chang
Joseph Hernandez
Roumiana Karakanova
Shan Kwan
Nancy Long
Cielo Martinez
Jane Raftis
Timothy Roe
Gary Takara

Executive Summary

The City of Pasadena Water and Power Department (PWP) has prepared this 2005 Urban Water Management Plan (UWMP) to comply with the Urban Water Management Planning Act, California Water Code Sections 10610 through 10657. This UWMP updates the last Urban Water Management Plan submitted in 2000. Updates are required every five years by Section 10621 of the California Water Code. This UWMP documents the planning that has been accomplished by PWP staff. It includes an overview of current and projected water supplies and demands, and a description of the local water system. The UWMP also includes a description of water conservation and water management activities that PWP currently conducts or has planned for the next five years. It also addresses the topics of reliability and impacts of water quality considerations on water supply. Where possible, the UWMP has been integrated with other regional and inter-city planning efforts to ensure a coordinated approach to water management.

PWP serves water to approximately 167,000 persons through 37,500 service connections. Normalized annual production is approximately 38,000 acre-feet, which includes water served to customers within the City of Pasadena, in unincorporated areas outside the city, and water that is primarily used for municipal purposes. Approximately 15% of PWP's customers live outside of City limits. It is forecasted that overall customer (meter count) growth will be approximately 0.14% per year and weather normalized water demand growth will be 0.65% per year.

PWP's water is obtained from three sources: surface water, local groundwater derived from the Raymond Basin (40%) and imported water (60%) purchased from the Metropolitan Water District of Southern California (MWD). For groundwater production, PWP owns and operates 17 wells. Currently, there are 27 interconnections with neighboring water agencies to enhance the reliability of the water system and for use in case of an emergency. The water distribution system consists of 500 miles of various sizes of pipeline ranging from two inches to 42 inches in diameter, 20 booster stations, 23 zones, and 22 storage reservoirs with a total capacity of 110 million gallons. MWD has five service connections to PWP's system.

The Raymond Basin, which underlies the City of Pasadena, is the most important local resource for PWP. It is an adjudicated (pumping rights have been established by a court of law) groundwater basin with an annual groundwater production of about 30,000 acre-feet per year. The Raymond Basin has significant potential to store imported water to protect against seasonal and long-term drought conditions. Currently, it is estimated that the Raymond Basin contains 1,000,000 acre-feet of groundwater storage, which is approximately 16 times the annual water demand of residents living over the Basin. The unused storage capacity of the Basin is estimated at 400,000 acre-feet, 1/4 to 1/2 of which is anticipated to be usable for conjunctive use (storing imported water for later retrieval). Local water demand from all Basin residents is approximately 60,000 acre-feet per year.

There have been a number of important developments since 2000. In January 2002, the California Department of Health Services reduced the notification level for perchlorate, prompting PWP to close 7 production wells. This is in addition to another well that had been closed in 1997 for high perchlorate levels. Although two wells have since been constructed, there have been some difficulties extracting the full complement of allowed groundwater. In the near future, it is expected that two treatment plants will become operable, which will allow at least 8 wells to resume groundwater production. With the 2 additional wells now in place, the reopening of the offline wells would create redundancy and increase system reliability.

A critical component of PWP's future water management plans is the Raymond Basin Conjunctive Use Program (RBCUP). PWP is moving forward in reviewing plans for the RBCUP, which is a conjunctive use partnership with MWD and Foothill Municipal Water District. When implemented, this would provide increased reliability by allowing PWP to withdraw stored water in the Raymond Basin to replace imported

water during periods of MWD delivery curtailment. The RBCUP would provide critical capital improvement upgrades to PWP facilities needed to carry out the requirements of the program.

A general plan for expansion of spreading basins in the Arroyo Seco was completed and incorporated into the 2002 Hahamongna Watershed Park Master Plan. This plan would increase the spreading area by over 60%, allowing more groundwater production through recharge and recovery. A recent agreement was finalized with the Raymond Basin Management Board which will increase the amount of pumping rights available from spreading surface water in the Arroyo Seco basins beginning in Fiscal Year 2006.

In recent dry years, the water conservation program has received renewed focus and has proven its value in garnering substantial water savings via education and outreach, direct install programs, rebates, and pilot programs.

PWP has described its water supply and demand situation in the UWMP. PWP plans to continue undertaking the following activities over the next five years to enhance the reliability of its water system:

- Ongoing rehabilitation of reservoirs and booster stations. Conduct seismic analysis for reservoirs to determine their compliance with current design codes for earthquake loads.
- Replace and upgrade water system infrastructure such as water mains, domestic and fire services, and fire hydrant installations.
- Enhance waterworks planning and design through distribution system computer modeling.
- Monitor and provide high quality water to customers through perchlorate and VOC treatment plants.
- Upgrade and enhance the water system's reliability through both working and emergency interconnections with neighboring water agencies.
- Manage in an efficient and prudent manner, Pasadena's surface and subsurface Basin water - rights to effectively utilize the capacity of the Raymond Basin.
- Continue to investigate the expansion of local groundwater storage capacity via participation in the RBCUP.
- Explore the potential of providing reclaimed water for further non-potable uses.
- Monitor and maintain high levels of pumping efficiency at booster pump stations and wells.
- Continue energetic efforts towards promoting water conservation practices through water conservation programs that involve low water-use technologies and programs to maximize the efficient use of limited water resources.
- Expand the Supervisory Control and Data Acquisition (SCADA) system.
- Upgrade and enhance security of facilities and infrastructure.

In summary, the City of Pasadena and the PWP is committed to the efficient use of water resources. The City Council has adopted as a strategic goal that "Pasadena be a City that responsibly manages its environmental resources and utilizes technology to improve the quality of life, focusing on such areas as water quality, water and energy conservation, and waste management." This UWMP directly supports this goal.

• Introduction

Chapter 1 Introduction

1.1 Background

This 2005 Urban Water Management Plan (UWMP) for the City of Pasadena (City) was prepared to meet the requirements of the Urban Water Management Planning Act (Act) which is defined under Water Code sections 10610-10657. The Act became effective January 1, 1984 and requires urban water suppliers providing municipal water directly or indirectly to more than 3,000 customers, or supplying more than 3,000 acre feet of water annually, to prepare, adopt and submit an UWMP to the California Department of Water Resources (DWR) every five years. The UWMP should document current and projected water demand, supplies and source reliability, as well as conservation and drought contingency measures. The City of Pasadena Water and Power Department (PWP) has previously submitted plans in 1985, 1990, 1995 and 2000 and presents this 2005 update. In addition to complying with the Act requirements, this UWMP serves to communicate PWP's continuing efforts to ensure adequate water supplies for its customers.

Current Water Management Plan

PWP has a comprehensive water management plan that utilizes a number of water management tools to maximize available water resources. By making effective use of local supply and storage options and taking steps to manage demand, PWP builds in system flexibility and reduces its dependence on imported water. The current components of PWP water management are summarized here.

PWP relies on a combination of local resources and imported water to meet its needs. The most important local resource is an extensive groundwater basin - the Raymond Basin. Groundwater withdrawals account for 30%-40% of annual supply. PWP also takes advantage of groundwater storage opportunities in the basin. Currently, PWP maintains over one year worth of water supply in the Basin in a storage account. Interconnections are maintained with a number of neighboring agencies to allow for short term supply contingencies in the service area. PWP has a very active demand management program that incorporates both best management practices and an increasing block rate pricing structure to encourage efficient use of available supplies by users. To supplement its groundwater supply, PWP receives imported water from the Metropolitan Water District (MWD). PWP is a member agency of MWD and cooperates in efforts to establish a regional water management plan that will ensure that all of the needs of the MWD member agencies can be met.

PWP is taking additional steps to increase its local groundwater supply and storage capabilities. A plan to increase its spreading grounds capacity would increase the amount of groundwater supply available from spreading surface runoff. An important project is the development of a conjunctive use program in partnership with MWD and the Foothill Municipal Water District. This cooperative effort would

increase the total storage available to PWP and create additional system flexibility by allowing the buildup of additional groundwater storage reserves when imported water is plentiful. From a regional perspective, conjunctive use programs will allow MWD to manage its imported water supplies more efficiently, which will yield benefits to all MWD member agencies. Finally, PWP is actively exploring the future use of recycled water and has prepared a feasibility study for implementation in the service area.

PWP has an effective water management plan that maximizes locally available resources. By taking steps to reduce demand, optimize the use of groundwater and increase storage, PWP can reduce the overall usage of imported water, as well as be prepared to cut back imported water use when needed.

Summary of Changes in the Urban Water Management Act since 2000

Due to additional legislative requirements, the 2005 Urban Water Management Plan (UWMP) contains important new areas of emphasis. The following are some of the important changes in the Urban Water Management Planning Act that have occurred from 2000 to the present.

Table 1-1: Summary of Changes for the 2005 UWMP

New for the 2005 UWMP	Water Code
Water Quality Considerations	
New legislative findings concerning water quality	§ 10610.2, (a)(4) – (a)(9), (b)
Maximization of Local Resources	
A description of water management tools that maximize local resources and minimize imported water supplies must be provided	§10620 (f)
Notifications/Filings	
Cities and counties within the service area must be notified that a plan or plan amendment is being prepared	§10621 (b)
Cities and counties within the service area must be notifed of the time and place of the public hearing on plan adoption	§10642
The UWMP plan or plan amendment must be filed with the California State Library and all cities and counties within the service area within 30 days of adoption	§10644 (a)
Groundwater	
Additional information must be provided on groundwater where groundwater is identified as an existing or planned water source	§10631(b)
Water Demand Management Measures	
There is a revised listing of water demand management measures that must be described (CUWCC members may still elect to submit their conservation annual reports to meet this requirement)	§10631 (f)(1)
20 year Planning Horizon	
A description of specific water supply projects and implementation schedules to meet projected demands over the 20-year planning horizon must be provided	§10631 (h)
A description of water quality over the 20-year planning horizon must be provided	§10634
Data Sharing between Agencies	
A new requirement for data sharing between contracting water suppliers (i.e., wholesale, intermediate, and retail agencies) and a provision allowing suppliers to rely on information provided by a wholesale agency	§10631 (k)
Recycled Water	
A description of quantities of recycled water must be provided	§ 10633 (b)
UWMP Compliance Consequences for Funding	
There is a new provision allowing DWR to consider a water supplier's achievements and implementation plans for water conservation when evaluating applications for grants and loans	§10631.5
For a water supplier that does not comply with the Urban Water Management Planning Act, DWR will make that supplier ineligible to receive Prop 204 or Prop 13 funding	§10656
There is a new provision allowing DWR to consider a water supplier's compliance with the plan requirements in determining the eligibility of receiving any funds from DWR-administered programs	§10657

1.2 Agency Coordination

Law

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

Coordination within the City

PWP staff coordinated the development of this UWMP with the Parks and Natural Services (PNR) Division of the City's Public Works Department. The introduction of a City-wide Geographic Information Systems (GIS) enterprise system will further improve coordination among departments. The digital landbase for this system was completed in 2001. Under the 2003 GIS Master Plan, all PWP utility infrastructure will be incorporated into the digital landbase map by Fiscal Year (FY) 2008. This will expedite future planning decisions within the City (including ones involving water management), because they will be based on reference to common database.

Interagency Coordination

PWP coordinated the development of this plan with a number of agencies. Table 1-2 summarizes the efforts Pasadena has taken to include various agencies and citizens in its planning process.

Table 1-2: Agency Coordination and Public Involvement

Entities	Coordination and Public Involvement Actions				
	Provided information	Received Notification of Draft Plan	Received and/or Commented on Draft Plan	Attended public meetings[1]	Received adoption notice
MWD	✓	✓			✓
LACSD[2]	✓	✓			✓
RBMB[3]		✓	✓		
Cal American Water Company		✓			
Citizen Groups		✓		✓	✓
Public		✓		✓	✓
Public Library					✓

[1]A courtesy public hearing was held on October 18, 2005. A formal public hearing was held on December 12, 2005
[2]County Sanitation Districts of Los Angeles County
[3] Raymond Basin Management Board

1.3 UWMP Updates

This UWMP updates the 2000 UWMP. Since 2000, PWP has been involved with a number of planning efforts that may impact its future water management:

- 2002 Hahamongna Watershed Park Master Plan
- 2002 Water System Master Plan (WSMP)
- 2005 Recycled Water Feasibility Study (RWFS)

Each of these documents contains valuable analyses and projections that greatly aid PWP's water management planning. The important findings and conclusions from those reports will be incorporated where appropriate in the UWMP.

1.4 Public Participation

Law

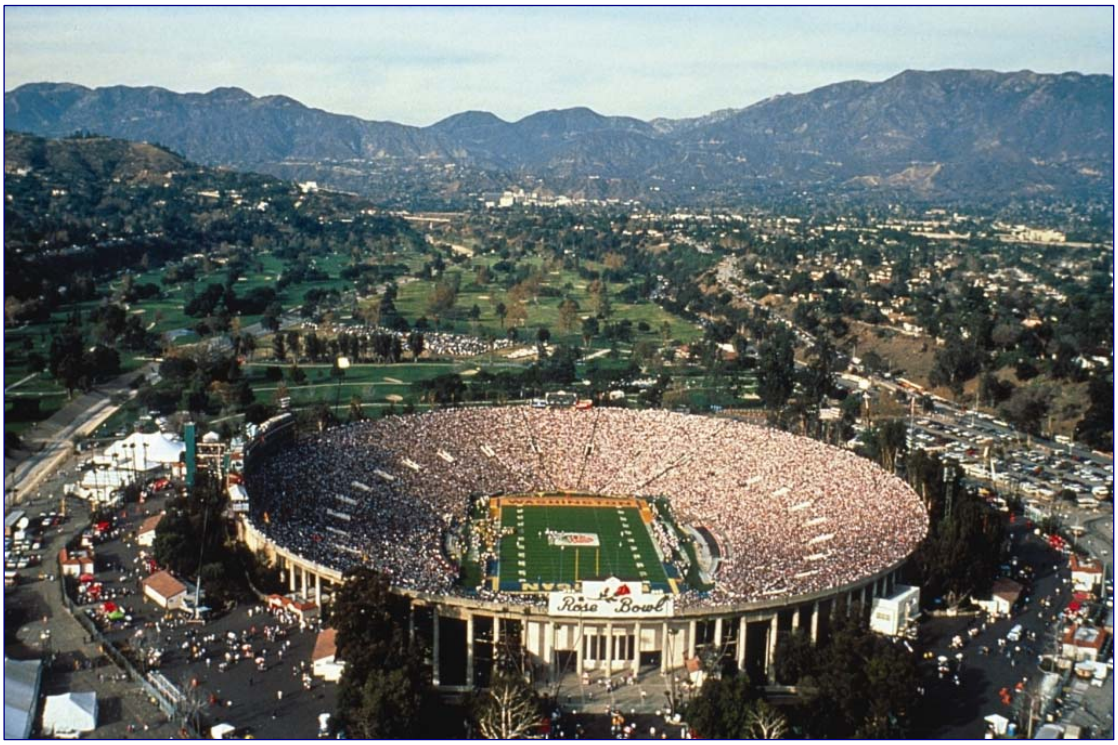
> *10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for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

The City has actively encouraged community participation in its urban water management planning efforts since the first UWMP was developed in 1985. For the 2005 UWMP, a courtesy public meeting was held on October 18, 2005 to present the Draft UWMP prior the City Council's consideration at a formal public hearing. A legal public notice for the adoption and official public hearing was published in the local newspapers in accordance with the provisions of Section 6066 of the California Government Code (Appendix A). Copies of the Draft UWMP were made available at the Central Library and online at PWP's website during the review period.

1.5 UWMP Adoption

The 2005 UWMP was submitted for adoption by the City Council on December 12, 2005. Appendix B contains a copy of the Agenda Report with signed minutes of the City Council meeting. This UWMP includes all information necessary to meet the requirements of California Water Code Division 6, Part 2.6 (Urban Water Management Planning).

This page intentionally left blank



• Supplier Service Area

Chapter 2 Supplier Service Area

Law

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

2.1 Service Area Description

The service area for PWP includes neighboring unincorporated areas to the north and southeast, as well as the City itself (Figure 2-1). The City covers nearly 23 square miles and is located in Los Angeles County and within the northwestern portion of the San Gabriel Valley. It is bounded to the west by the cities of Los Angeles and Glendale, on the south by the cities of South Pasadena and San Marino, on the east by the cities of Arcadia and Sierra Madre, and on the north by the unincorporated community of Altadena and by the San Gabriel Mountains. In 2005, the total population within the service area was approximately 167,000 people. PWP delivers water through approximately 37,500 service connections.

The City was incorporated in 1886 and became a freehold charter city in 1901. It has a Council-Manager form of government. The City provides its residents with power, water, and solid waste collection and disposal services. Wastewater collection is provided by the City and treatment is provided by the County Sanitation Districts of Los Angeles County (LACSD).

Figure 2-1: PWP Service Area and Well Locations

2.2 Climate

The City's climate is sub-tropical and semi-arid. Average daytime temperature is 76^0 Fahrenheit (24^0 Celsius) annually. The average nighttime temperature is 54^0 F (12^0 C.). The overall average temperature is 66^0 F (19^0 C). The highest recorded temperature was 113^0 F (45^0 C.) on June 17, 1917, while the lowest was 21^0 F (-6^0 C) on January 7, 1913. The average yearly rainfall is 20 inches (51 centimeters). During the winter months of December through March, it is sunny or partly sunny 75% of the time. It has snowed at least three times in the City's history. Information about temperature, humidity, precipitation, wind, fog and cloud conditions is gathered by the National Oceanic and Atmospheric Administration's National Weather Service at the Pasadena Station (Table 2-1).

Table 2-1: Climate

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Standard Monthly Average Evapotranspiration[1] (ETo)	1.59	2.45	3.64	4.74	5.31	6.06	6.75	6.66	5.01	3.95	2.73	2.31	51.81
Period of Record: 12/1/1927 to 3/31/2005[2]													
Average Max. Temperature (F)	66.8	68.4	70.4	74.0	76.8	81.6	88.6	89.5	87.6	81.1	73.9	67.8	77.2
Average Min. Temperature (F)	43.0	44.6	46.3	49.2	52.8	56.2	60.4	61.1	59.4	54.2	47.5	43.6	51.5
Average Total Precipitation (in.)	4.26	4.67	3.40	1.46	0.37	0.15	0.03	0.11	0.35	0.69	1.86	3.02	20.39
Average Total Snowfall (in.)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

[1]California Irrigation Management Information System website

[2]Western Regional Climate Center historical data for Pasadena (station 046719)

2.3 Other Demographic Factors

In the mid-1940s and early 1950s, a housing shortage spurred an era of new housing construction in the City. By 1947, retail sales in the City showed a steady increase and the opening of a Bullocks department store heralded what was to become an exclusive shopping area on South Lake Avenue. The 1970s were a period of economic revitalization, primarily under direction of the Pasadena Redevelopment Agency. Large corporations relocated their headquarters to the City, the Conference Center was built, and the Plaza Pasadena retail shopping mall was completed. Millions of square feet of office space were created, as well as many new condominium projects and commercial buildings. In the 1980s, population growth accompanied development. Between 1980 and 1990, the population increased

by 11%. This growth then slowed substantially. From 1990 to 2000, the population grew by only 2,300 people. As much of the City now approaches development build out, no significant spikes in population or corresponding water use is forecasted for future years and population growth is expected to remain fairly steady.

Land Use and Housing

The City's General Plan describes land use characteristics and housing trends within the PWP service area. Nearly 58% of acreage is devoted to residential uses of varying densities. An additional 9% of the land is allocated to commercial uses, including offices, restaurants and retail stores. Only 2% of the land is used for industrial purposes, such as manufacturing and warehousing. The remaining 31% of the land is distributed among open space/parks, institutional uses, or is vacant. Approximately 800 acres, or 7% of the total land in the city, is currently vacant or used for surface parking. However, some 400 of these acres are in the hillside areas of the City and may not be easily developable due to topographical constraints. Therefore, absorbing new development and growth will largely involve redeveloping underutilized parcels and renovating existing structures. Since 1970, the housing mix has shifted gradually from single-family to multi-family residences. Single-family homes have decreased both in total number and as a percentage of total housing. At the same time, there has been a significant increase in multi-family dwellings, particularly developments containing five or more units per structure. This trend is expected to continue given high land values, the lack of buildable land for single-family homes, and the serious shortage of housing throughout the region.

2.4 Current and Projected Population

Current population within the City stands at approximately 141,000 people. The service area encompasses an additional 26,000 people who live outside the City limits, which brings the total service area population to 167,000 people. The service area is comprised mainly of residential units, with a small percentage of commercial and municipal users. Area employment is approximately 95,000 people and is mainly in service, financial and retail sectors.

Since 1950 population growth has averaged about 0.5% per year. Population projections for the service area through 2030 are shown in Table 2-2. These were forecasted by using Year 2000 census population figures, then projecting forward with growth trends predicted by the Southern California Association of Governments (SCAG). This mirrors the method followed in the WSMP.

Table 2-2: Population - Current and Projected[1]

	2005	2010	2015	2020	2025	2030
City of Pasadena	141,100	145,400	149,600	155,000	160,501	166,198
Outside City In Service Area	26,400	27,800	29,500	31,600	32,722	33,883
Total Service Area Population	**167,500**	**173,200**	**179,100**	**186,600**	**193,223**	**200,081**

[1] Projections based on 2000 census populations and SCAG Regional Transportation Plan (RTP-04) projected growth trends

Figure 2-2 shows the historical population trend extended to the year 2030 with the above projections.

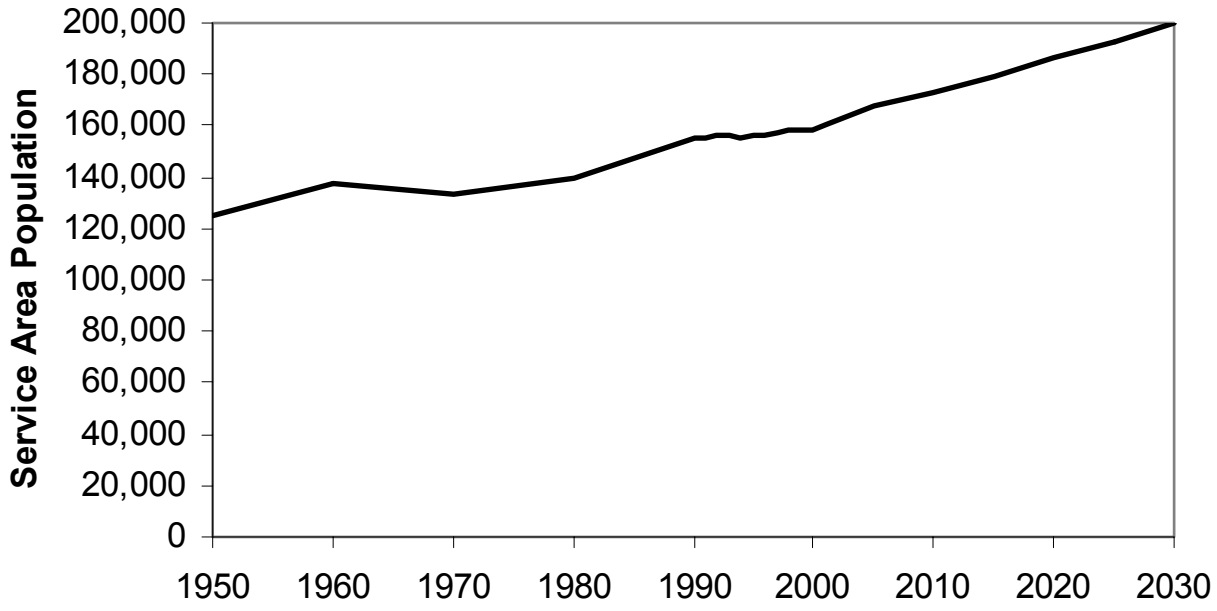


Figure 2-2
Historical and Projected
Service Area Population

• Water Supply

Chapter 3 Water Supply

Law

> *10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:*
>
> *10631 (b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments [to 20 years or as far as data is available.]*

The City has a variety of water sources available, including groundwater, local surface water, and imported water. Additional water supplies are also available through optional short term water exchanges with neighboring agencies. Water supply consists of 40% groundwater and 60% imported water (Figure 3-1), although the exact proportion can vary from year to year. Before 1994, the supply included a local surface water component. PWP attempts to maximize its groundwater use each year and then utilize imported water to meet any remaining demand. The average PWP total yearly production over the last 10 years was 37,094 acre-ft per year (AFY).

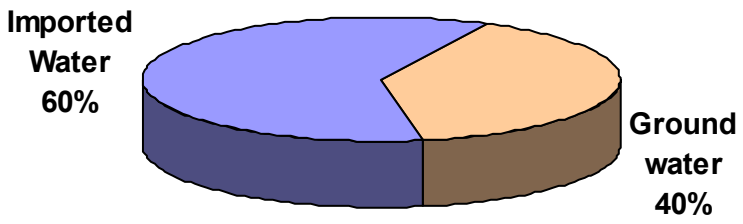
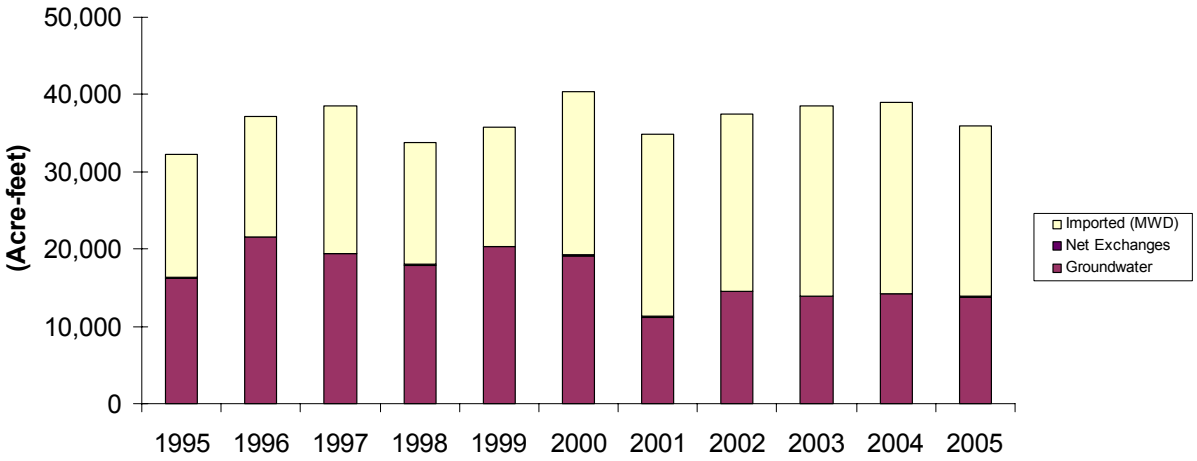


Figure 3-1
Major Components of PWP Water Supply

The historical breakdown of water supply sources for PWP is shown below in Figure 3-2. There is some variation in the composition of water supply from year to year, but overall the proportions remain fairly similar. A main source of variation is the amount of groundwater available from spreading operations, which will be discussed below.



Source: PWP Production reports

Figure 3-2
Historical PWP Water Production

3.1 Local Surface Water

PWP diverts surface water runoff from two streams that flow within its service area. Although this water can be treated and used directly for water supply, PWP currently diverts and spreads the water in spreading basins, where it percolates into the ground. By doing so, PWP acquires spreading credits which can then be used to pump groundwater at a later time. Details of spreading operations are provided in Section 3.2.

Arroyo Seco

The larger of the streams is the Arroyo Seco, which lies on the northwest side of the City. PWP has a longstanding right to divert up to 25 cubic feet per second (cfs) from this source. The Arroyo Seco is a continuous stream, with large seasonal variations in flow. On average, 95 percent of total annual precipitation occurs between November and April. There are also significant year to year differences that are caused by the climatic and precipitation variability.

From 1970-1993, PWP was able to provide treatment to Arroyo Seco flow at the Behner Water Treatment Facility (Behner). This allowed direct supply to the distribution system. Behner had a 7.7 cfs operating capacity with actual treatment flows varying between 0.8 and 7 cfs. The plant was typically on-line during the months of November through June. The average flow rate treated during this period was 4.1 cfs. Annually, Behner was able to deliver an average of 2,100 AFY of treated water to PWP's supply. In June, 1993, Behner was decommissioned because of increasingly stringent water quality standards. Since then, diverted stream water has been used only for spreading.

Eaton Canyon

The second stream is in Eaton Canyon, which lies in the eastern portion of the City. It is bounded by the San Gabriel Mountains on the north and the east, Altadena Drive on the west, and New York Drive on the south. PWP has the right to divert up to 8.9 cfs from this source, all of which is used for spreading.

Devil's Gate Tunnel

PWP has a right to divert 1.82 cfs from the Devil's Gate Tunnel which is located next to the Arroyo Seco spreading basins. There is also a pre-1914 right that allows much greater diversion. The quality of water emanating from the tunnel is more suitable for agricultural use and is therefore now used in the Arroyo Seco for landscape uses. The right to divert the Devil's Gate Tunnel water was granted by license issued in 1986 by the State Water Resources Control Board (SWRCB).

3.2 Groundwater

Groundwater is a major component in PWP's water supply. The contribution from groundwater pumping over the last 5 years is shown in Table 3-1.

Table 3-1: 2000-2005 Groundwater Production (AFY)

	2000	2001	2002	2003	2004	2005
Groundwater Production	19,100	11,200	14,600	12,800	14,700	13,723
% of Total PWP Supply	47%	32%	39%	34%	37%	38%

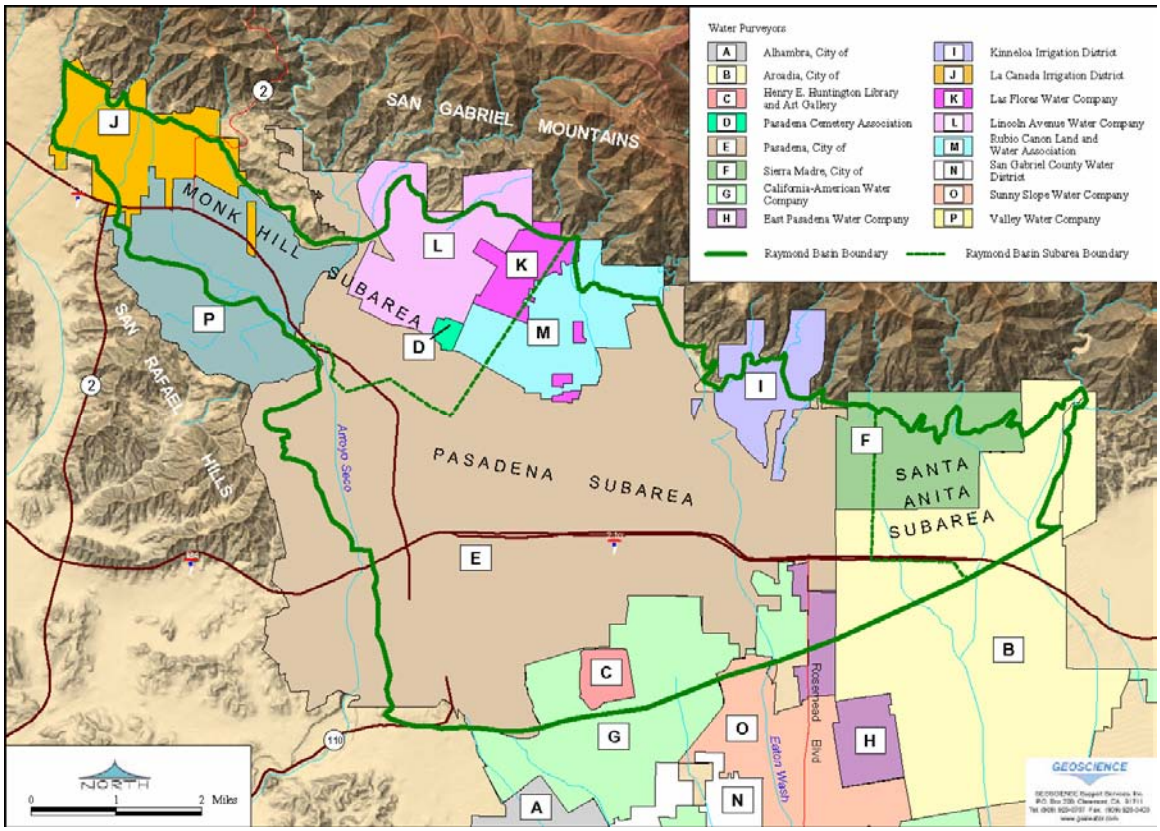
Source: PWP Production reports

PWP Groundwater Management in the Basin

Groundwater production is obtained from a large aquifer that underlies the City and surrounding region (Figure 3-3). This aquifer is called the Raymond Basin (Basin). The Basin is adjudicated, which means that there is a legal agreement that governs the withdrawal of groundwater from it. PWP has groundwater pumping rights within the Basin, and is credited with additional pumping rights for percolating surface water during spreading operations. PWP can also utilize the Basin for long term supply storage. PWP manages these components of supply and storage within the Basin to maximize groundwater production, thereby reducing its dependence on imported water.

Raymond Basin Description

The Basin is located in the eastern portion of the Los Angeles County. It is an alluvial valley approximately 40 square miles in area underlain by deposits of gravel, sand, silt, and clay. Basin hydrology, adjudication and regional management are all important aspects that can impact the Basin as a source of supply for PWP.



Used with permission of Geoscience

Figure 3-3
Raymond Basin Boundaries

Hydrology

The Basin alluvium is the principal water-bearing unit in the Raymond Basin. It yields water to wells readily and well yields range from a few hundred to several thousand gallons per minute (gpm). The alluvium is bordered by much more impervious bedrock. The alluvial valley slopes to the south, ranging in elevation from 2,000 feet above mean sea level (MSL) to between 500 and 700 feet MSL at the Raymond Fault.

Three hydrologic subdivisions have been defined in the Raymond Basin: The Monk Hill Subarea, the Pasadena Subarea, and the Santa Anita Subarea. (see Figure 3-3). These sub areas have been defined on the basis of groundwater flow patterns.

Groundwater levels in the Basin fluctuate in response to recharge and discharge from various sources. Groundwater levels rise over the basin when recharge exceeds discharge, and fall when the opposite occurs.

Sources of recharge or input to the alluvial aquifer include the following:

- Recharge from precipitation
- Recharge from irrigation
- Artificial recharge from spreading grounds
- Subsurface inflow from bedrock areas

Groundwater leaves the alluvial aquifer by:

- Subsurface outflow
- Pumping
- Surface outflow

Adjudication of the Raymond Basin

The Basin was the first to be adjudicated in California. Under the adjudication, a court of law determined that 16 parties (Users) had the right to extract water. The court then allocated the quantities that each user was allowed to pump. These pumping rights are referred to as decreed rights. This decision is based on a judgment of "safe yield", which is a determination of how much pumping is sustainable and avoids overdrafting the aquifer. For the Basin, the safe yield was determined to be originally 21,900 AFY but was modified in 1955 to 30,662 AFY. The four largest holders of water rights hold a total of 22,514 acre-feet (AF) which corresponds to almost 75 percent of the Basin adjudicated rights.

The adjudication order is called the Raymond Basin Judgment (Judgment). The City's decreed right is 12,807 AFY. This represents 42% of the total decreed rights allotted within the Basin. The Judgment has been modified three times. The latest version is included in Appendix C. The authority to administer the Basin and resolve future disputes and make binding judgments is vested in a Basin Watermaster.

The Raymond Basin Management Board (RBMB)

The City understands the critical role of the Basin as a local water supply source. Along with the other Users, it has taken an active role in securing greater local control of Basin management. To represent the collective interests of the Users, the Raymond Basin Management Board (RBMB) was formed. The RBMB is comprised of representatives appointed by the producers within the Basin. Originally, it acted in an advisory capacity to DWR, which was the designated Watermaster. In 1984, the Judgment was amended to appoint the RBMB as the Watermaster, who is now responsible for overseeing the implementation of the adjudication provisions. The City has taken the lead in securing consensus for the various Judgment amendments. Each amendment has given the producers more flexibility in the management of the Basin. The Users, through the RBMB, are now well positioned to participate in expanded groundwater storage programs that will enhance the value and reliability of the groundwater resources.

Groundwater Production

The primary component of groundwater production for PWP has been its 12,807 AFY decreed right. In 1974, the Judgment was modified to credit Users with additional pumping rights each year based on spreading surface water diversions in the Arroyo Seco and Eaton Canyon. These additional rights are called spreading credits. PWP can annually produce groundwater in the amount of its decreed right plus an amount equal to the spreading credits it received for the year. The decreed right has remain unchanged since the Judgment. Spreading credits vary each year but on average PWP has received 4,128 AFY since 1994. Decreed rights and spreading credits combined account for over 16,000 AFY of available supplies during an average year. This is summarized in Table 3-2.

Table 3-2: Groundwater Supply Components

Raymond Basin	Pumping (AFY)
Decreed Right	12,807
Avg. Spreading Credit[1]	4,128
Total	**16,935**

[1]From 1994-2004

PWP currently maintains 17 wells in the Raymond Basin with a combined capacity of 51 cfs or 36,900 AFY. Seven wells are currently operating with a combined production capacity of 21 cfs or 15,200 AFY. Eight wells are out of service due to water quality issues and two are out of service due to other operational issues.

Groundwater Spreading

The Arroyo Seco speading grounds are located in the western part of the service area in the Monk Hill Basin (Figure 3-4). In the Arroyo Seco, water is diverted to spreading grounds consisting of 14 basins with a total wetted area of 13.5 acres.

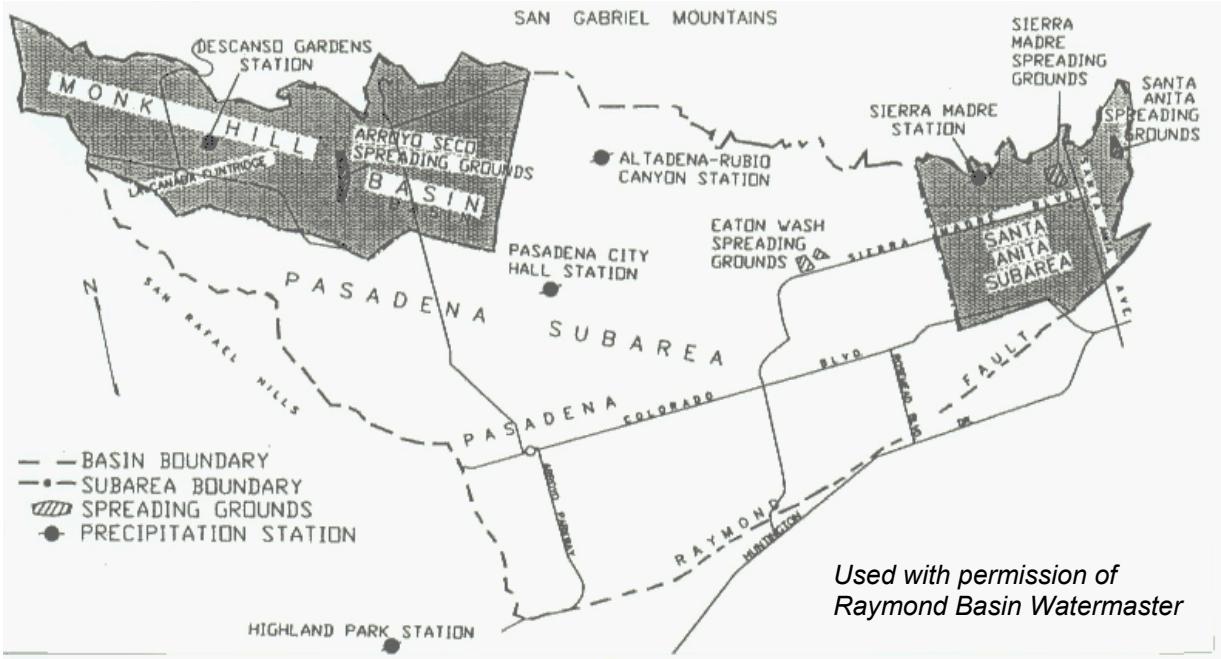


Figure 3-4:
PWP Spreading Grounds

The Eaton Canyon Spreading area is located in the north east region of the City. Spreading in Eaton Canyon is done in the spreading basins downstream from the dam. The operational characteristics of each spreading area are shown in Table 3-3.

Table 3-3: PWP Spreading Basin Operations

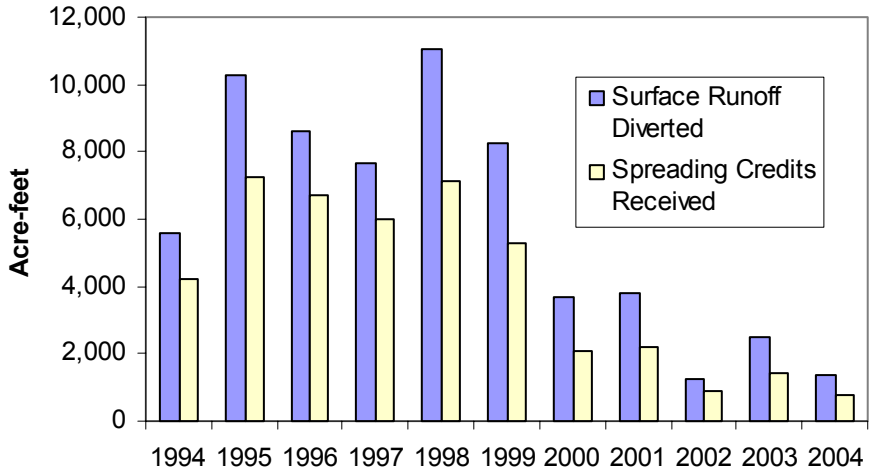
Facility	Storage Capacity (AF)	Percolation Rate[1] (cfs)	Intake Capacity (cfs)
Arroyo Seco Spreading Grounds	30	18-20	75
Eaton Canyon Spreading Grounds	525	14	200

[1]Los Angeles County Department of Public Works (LACDPW). Values are for long term percolation.

Determination of Spreading Credits

Because some of the water spread in the Arroyo Seco and Eaton Canyon basins is for the benefit of all Basin members, PWP receives partial credit for water diverted and spread in these basins. The amount of actual credits received has been determined by a formula that is set by the RBMB. Figure 3-5 shows the amount of spreading credits received by PWP versus the amount of actual runoff diverted for the Arroyo Seco and Eaton Canyon combined. There is a great deal of variability in the amount of surface runoff and spreading credits received from year to year. In FY 2006, a modified formula will be utilized for the Arroyo Seco that credits PWP with 60% of the water spread in the original 12 spreading basins and 80% of the water spread in any additional spreading basins (Appendix D). This will effectively increase

the amount of credits that PWP receives from spreading in the Arroyo Seco. To determine spreading credits in Eaton Canyon, PWP determines the amount of water flowing down the canyon and subtracts dam overflow. PWP then receives 80% of this amount.



Source: RBMB Annual Reports

Figure 3-5
Diverted Surface Runoff and Spreading Credits Received by PWP: 1994-2004

Factors Affecting Spreading

The amount of spreading credits available each year varies with the amount of storm runoff. Two operational considerations that affect spreading are the presence of suspended solids and basin holding capacity. Suspended solids can line the bottom of the spreading basins and reduce percolation rates. Basin holding capacity is a measure of how much water can be detained and allowed to percolate into the ground. If holding capacity is not sufficient, then runoff will overflow and that water will be lost.

Long Term Storage in the Basin

In 1993, the RBMB in cooperation with the City and MWD, undertook a major project to investigate the storage potential of the Basin. Analysis revealed that at least 100,000 AF of possible storage space is available. This increased storage will enable all Users to better meet seasonal demand variations as well as provide reserves to overcome longer periods of drought. Long term storage (LTS) policies were adopted and storage allocations granted among the Basin users. PWP's LTS accounts have a maximum allowed capacity of 38,500 AF. PWP has one account for its exclusive use and another cooperative account with MWD. These accounts are further subdivided by region into the Monk Hill and Pasadena Subareas (shown in Figure 3-4). Users can also enter into lease agreements among

themselves for additional storage space. At the end of FY 2005, PWP maintained 44,900 AF in storage in the combined accounts plus leased storage. The storage allotments are shown in Table 3-4.

Table 3-4: PWP Long Term Storage Account Balances (AFY)

Subarea	PWP Account	PWP/MWD Account	Total
Monk Hill	10,826	2,688	**13,514**
Pasadena	13,395	17,991	**31,386**
Total	**24,221**	**20,679**	**44,900**
Source: Watermaster Service in the Raymond Basin, Sept 2005 RBMB			

Future Groundwater Use

In future years, The Raymond Basin will continue to be the primary groundwater source for PWP. Projections for groundwater production are shown in Table 3-5. The amount of decreed groundwater is projected to remain the same for the next 20 years. The amount available from spreading credits will vary from year to year, but is assumed to maintain the historical average.

Table 3-5: Projected Groundwater Production from the Raymond Basin (2010-2030)

	2010	2015	2020	2025	2030
Decreed right	12,807	12,807	12,807	12,807	12,807
Spreading Credits (Based on 11 year average)	4,128	4,128	4,128	4,128	4,128
Total	16,550	16,550	16,550	16,550	16,550
% of Local Groundwater versus Total Water Supply	38%	38%	36%	35%	35%

3.3 Imported Water - Metropolitan Water District (MWD)

PWP receives wholesale imported water from the Metropolitan Water District (MWD). On average, MWD deliveries account for about 60% of PWP's water supply in a given year. MWD is a public agency organized in 1928 by vote of the electorate of several Southern California cities, including the City, following adoption of the original Metropolitan Water District Act by the California legislature. MWD currently has full authority to set rates and policies necessary to provide a dependable water supply to its member agencies. MWD's service area includes portions of Los Angeles, Orange, Riverside, San

Bernardino, San Diego, and Ventura Counties and covers approximately 5,200 square miles (Figure 3-6). It provides between 45 to 60 percent of the water used in its service area. MWD serves a population of approximately 18 million people.

Figure 3-6: MWD Member Agencies Map

Sources of MWD Water

MWD obtains its supply from two sources of imported water, the Colorado River Aqueduct (CRA) and the California State Water Project (SWA).

Colorado River Aqueduct (CRA)

MWD contracted with the United States Secretary of the Interior in the early 1930's for an allotment of 1,212,000 AF of Colorado River water a year. In 1963, California lost a portion of its entitlement to the State of Arizona by a US Supreme Court decision. In March 1985, the Central Arizona project began supplying water to Arizona by diverting Colorado River water from Lake Havasu. This reduced MWD's dependable Colorado River water supply to less than 550,000 AF per year. Water allocated under other miscellaneous rights (30,000 AF) and conveyance losses (10,000 AF) further lowers this figure to 510,000 AF per year.

State Water Project (SWP)

The SWP is the other major source for MWD. It currently supplies approximately 1 million AF a year to MWD. The SWP taps supplies available from the Sacramento-San Joaquin Delta (Delta) at the Harvey O. Banks Pumping Plant (Banks) and transports the water 444 miles to the Southern California region via the California Aqueduct. Contractually, MWD is entitled to 2,011,500 AFY, however two factors may prevent this total entitlement from being met in the foreseeable future. First, certain proposed SWP facilities have not yet been built; and second, all SWP water must pass through the ecologically sensitive Bay-Delta system. In recent years, pumping at Banks has been limited for hydrologic and/or environmental considerations in the Bay-Delta.

3.4 Current and Projected Water Supplies

In 2005, PWP's supplies totaled 35,902 AF. 21,975 AF was from imported water, 13,723 AF was from groundwater and there was a small contribution of 204 AF from local exchanges (Figure 3-7).

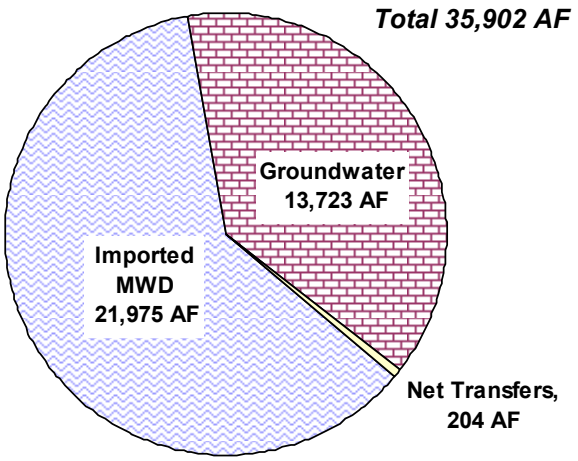


Figure 3-7
2005 Water Production

PWP does not anticipate major changes in its water supply sources. The current and projected amount of water supplies for PWP is shown in Table 3-6. Imported water projections are based on figures provided by PWP to MWD for incorporation into modeling developed for the MWD Draft 2005 Regional Urban Water Management Plan (RUWMP). MWD used a comprehensive forecast model (MWD-MAIN) based upon information provided by its member agencies to determine its future water supply demands. PWP groundwater decreed pumping rights are projected to remain the same and PWP intends to pump its full entitlement. Since supply from spreading credits is highly variable, the average of spreading credits received since 1994 is used to project spreading credits and is assumed not to change. Beginning in the year 2020, PWP is assuming that 700 AFY of water supply will be available from recycled water. In 2005, there was 204 AF of water received in 2005 from a combination of sales and exchanges with local agencies. These types of transactions are considered temporary and will not affect projected water supplies in the long term.

Table 3-6: Current and Projected Water Supplies (AFY)

Water Supply Sources	2005	2010	2015	2020	2025	2030
Purchased from wholesaler (Imported Water from MWD)	21,975	23,407	24,741	25,374	26,709	28,043
Groundwater[1]	13,723	12,807	12,807	12,807	12,807	12,807
Extracted Spreading Credits[2]	-	4,128	4,128	4,128	4,128	4,128
Storage Losses	-	(385)	(385)	(385)	(385)	(385)
Sales, Transfers and Exchanges	204	0	0	0	0	0
Recycled Water	0	0	0	700	700	700
Total	35,902	39,957	41,291	42,624	43,959	45,293

[1]City of Pasadena decreed right (2005 figure is for actual total production and includes some pumping from spreading credits)

[2]Spreading credits originating from surface water diversions at Arroyo Seco and Eaton Canyon. Based on average from 1994-2004.

Note: for 2005, spreading credits are included in "Groundwater Production" as final accounting by RBMB is not yet complete

Current MWD Supply Contract

PWP has contracted with MWD for deliveries under a purchase order arrangement (Appendix E). Under the contract, MWD charges for water supply under a two-tiered rate structure (Table 3-7). PWP has the right to purchase up to 90% of their initial base demand at Tier 1 rates. Initial base demand is calculated as the maximum firm demand for MWD water over a 10-year period since 1989. Tier 1 rates are set by MWD to recover its costs of maintaining a reliable supply. Any amount higher than 90% of base demand is charged at higher Tier 2 rates to encourage efficient utilization of local resources and include MWD's costs for developing additional supplies.

Table 3-7: MWD Supply Rate Structure and Prices

Quantity (AFY)	Price	Supply Rate
0-21,179	$433/AF	Tier 1
21,179+	$524/AF	Tier 2

Note:
1. PWP Initial Base Demand = 23,533 AF
2. Rate information is derived from *Rates and Charges Effective Jan 1, 2005*

PWP purchases a higher percentage of its imported water during drier months as shown in Table 3-8.

Table 3-8: Seasonal Pattern of Supply Purchases from MWD (CY 2004)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Percentage of total MWD water purchased	6%	5%	6%	7%	10%	10%	12%	12%	12%	8%	7%	5%

Spreading Basin Expansion - Hahamongna Watershed Park Project

A potential for increase in future supply comes from the plan to expand the Arroyo Seco spreading basins. The spreading basins are located in the Hahamongna Watershed Park. The park is located in the Arroyo Seco canyon and extends north from the dam at Devil's Gate Dam to the mouth of the canyon. The park encompasses about 250 acres. There has been widespread interest in pursuing coordinated projects within the park that would serve multiple goals such as recreation, flood control and improved spreading. A program of planned development was initiated and culminated in the Hahamongna Watershed Park Master Plan. Part of this plan is to expand the spreading facilities by enlarging four spreading basins and constructing three additional spreading basins. Two spreading basins would be combined and three basins would be decommissioned. The total spreading area would increase from 13.5 acres to approximately 21.3 acres - a net gain of approximately 7.8 acres. PWP estimates that this could increase spreading credits by about 60% each year.

3.5 Transfer or Exchange Opportunities

Law

> *10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:*
>
> *10631 (d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.*

The City maintains a network of interconnections with a number of neighboring cities and water

agencies. These allow both the receipt and delivery of water. At the current time, PWP has standing agreements with the Lincoln Avenue Water Company and Cal-American Water company for delivery of water. These agreements do not have a significant impact on PWP water supply and are not anticipated to last longer than 5 years. Table 3-9 summarizes the PWP system interconnections with neighboring agencies. Some interconnections are classified as working connections while others are for emergency use only.

Table 3-9: Interconnections with Neighboring Agencies

# Inter-connections	Agency
4	Foothill Municipal Water District
4	Kinneloa Irrigation Company
4	Lincoln Avenue Water Company
3	Cal-American Water Company
3	Valley Water Company
2	City of Sierra Madre
2	City of South Pasadena
2	Rubio Canyon Water Company
1	East Pasadena Water Company
1	Metropolitan Water District

3.6 Desalinated Water

PWP is not investigating the use of desalination as there is no readily available source of water for which this would be practical. However, MWD is encouraging the exploration of desalinated ocean water for some of its member agencies. MWD is also cooperating with the Bureau of Reclamation on researching desalination technologies. If successful, these efforts would benefit all of the MWD member agencies by decreasing the overall demand on imported water.

3.7 Coordination with MWD

PWP cooperated with MWD in the development of the 2005 MWD RUWMP. As part of this planning process, there was a two-way exchange of information to ensure that PWP's future water supply needs are integrated into MWD's planning. Initially, PWP provided MWD with a realistic estimate of its future water demands and available local supplies. MWD utilized the information provided by PWP and other member agencies and employed a forecasting model (MWD-MAIN) to conduct its own regional water management planning. Details of the analysis can be found in the MWD RUWMP. After the

completion of this analysis, MWD provided PWP with firm supply projections to 2030. MWD forecasts that it will be able to meet these projected supply allocations even in the event of a historical multiple dry year period. The demand projections provided by PWP to MWD and the supply projections provided by MWD to PWP are compared in Table 3-10. The amount that MWD projects for firm delivery to PWP is actually higher than the imported water need that PWP forecasted because MWD did not take into account the spreading credits generated by PWP. Since the amount of spreading credits each year is highly variable, this is a conservative assumption that will ensure that MWD can deliver adequate supply even in years when PWP cannot generate its average amount of spreading credits.

Table 3-10: Comparison between MWD Source Projections and PWP Demand Projections (AFY)

MWD Supply Sources	2010	2015	2020	2025	2030
Source Projections provided by MWD	29,000	29,900	31,600	32,800	33,500
Demand Projections provided by PWP	23,407	24,471	25,374	26,709	28,043
Difference	**5,593**	**5,429**	**6,226**	**6,091**	**5,457**

• Water Demand

Chapter 4 Water Demand

Law

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

10631 (e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:

(A) Single-family residential; (B) Multifamily; (C) Commercial; (D) Industrial; (E) Institutional and governmental; (F) Landscape; (G) Sales to other agencies; (H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof; and (I) Agricultural.

(2) The water use projections shall be in the same 5-year increments to 20 years or as far as data is available.

4.1 Overview of Water Use

Water use in PWP's service area is two-thirds residential and one-third commercial/industrial. Currently, the City identifies and bills customers on the basis of street address and the meter size. A disadvantage to this is that the City is unable to distinguish an industrial customer from a large landscape customer or a hotel. However, PWP is taking steps to remedy this through implementation of improved billing systems and the incorporation of a GIS approach to gather better information about the system. This will help better define the demand profile.

Residential Sector

In the City of Pasadena and its outlying service area, single family residential customers average 3.0 persons per connection. Multi-family residential customers average 2.2 persons per housing unit, and average 10 units per multi-family complex. Total system per capita water use (excluding agricultural water use) averages 170 gallons per capita per day. Water efficiency improvements appear to be reducing per capita water use.

Commercial Sector

The City has a complex mix of commercial customers, ranging from markets, restaurants, antique stores, insurance offices, beauty shops, and gas stations to multi-story office buildings, regional shopping centers, and high-volume restaurants and other facilities serving the visitor population. The sector is growing at about 2% per year, driven particularly by the need for services by the increasing permanent population. Businesses for the growing tourist industry are also contributing. This trend is expected to continue through 2030.

Governmental Sector

The City has a stable institutional/governmental sector, primarily local government, schools, visitor serving public facilities, and a major hospital facility. This sector will keep pace with the growth of the city.

4.2 Current and Projected Water Use

Table 4-1 illustrates current and projected water use from 2005 - 2030 in AFY. Since 1990, new connections are being added at a rate about 0.15% per year. However, water demand has tended to fluctuate based on seasonal variations and the implementation of conservation measures. Unaccounted water losses average about 10% of total production. The projections for total water demand were developed in the 2002 Water Systems Master Plan (WSMP). The methodology that was utilized is described in the following section. In Table 4-1, the total projected water demands are broken down into different water use sectors to match historical proportions that are based on meter size.

Table 4-1: Current and Projected Water Use (AFY)

Water Use Sectors	2005	2010	2015	2020	2025	2030
Single family residential	19,276	21,577	22,297	23,017	23,738	24,458
Multi-family residential & commercial /municipal/industrial	12,306	13,585	14,039	13,792	14,246	14,700
Institutional	1,143	1,199	1,239	1,278	1,319	1,359
Sales, transfers, exhanges	204	0	0	0	0	0
Recycled Water - Landscape use	0	0	0	700	700	700
Unaccounted-for system losses	2,973	3,596	3,716	3,837	3,956	4,076
Total	**35,902**	**39,957**	**41,291**	**42,624**	**43,959**	**45,293**

Table 4-2 summarizes the current categories of service connections, as well as projections to 2030 based on water demand projections. The assignment of service connections to customer type is based on assumptions tied to meter size. PWP is taking steps to improve its ability to identify usage by user type.

Table 4-2: Number of Connections by Customer Type

Customer Type	2005	2010	2015	2020	2025	2030
Single family residential	32,140	32,728	32,974	33,222	33,470	33,720
Multi-family residential	3,758	3,827	3,855	3,884	3,913	3,943
Commercial /institutional	1,184	1,206	1215	1,224	1,233	1,242
Municipal	254	258	261	263	265	267
Total	**37,336**	**38,019**	**38,305**	**38,593**	**38,881**	**39,172**

Future Water Demand Analysis

As part of the WSMP, PWP conducted a detailed analysis to project water demand trends in the PWP service area. The analysis incorporated key elements from the 1994 City General Plan, which lays out the future development plans and limits for the City. Water demand growth was determined by accounting for the size and location of future developments within the service area and then factoring in specific demand factors determined by historical billing data and surveys. The projected water demands are thus based on a very thorough examination of the City's potential growth and actual historical demand.

Development and Land Use

Four categories were identified where future development could occur: known developments; Specific Plan regions (as identified by the General Plan); vacant parcels, and under-utilization of land use. First, the amount of total additional potential development allowed within the constraints for the General Plan was determined to define the upper buildout limit. This is shown in Table 4-3. Realistic estimates of the annual growth to approach this limit were then determined.

Unit Demand Factors

To estimate future water production requirements from the development and land use projections, water duty factors were determined. A water duty factor is defined as the average water use of a particular land use type (given in gallons per day (gpd) or AF per acre per year). The duty factors were developed by taking statistically representative samples of existing customers.

Table 4-3: Potential Development in PWP Service Area

Methodology	Additional Residential Growth [Dwelling Units (DU)]	Additional Non-Residential
Known Development	4,400	2.7 million sq. feet
Specific Plan	5,000	9.3 million sq. feet
Vacant Parcels	1,400	14.6 acres
Under-utilization	31,200	None
Total	**42,000**	**12.0 million sq. ft. plus 14.6 acres**

The samples were based on large regions of commercial and single-family residential areas, four office buildings and fifteen multi-family residential complexes (condominiums and apartments). The water duty factors derived based on this analysis are shown in Table 4-4.

Table 4-4: Water Duty Factors

Land Use Designation	Duty Factor	Duty Factor (AFY-acre)
Commercial	2,000 gal/day/acre	2.24
Commercial	0.065 gal/day/sq. ft. office	-
Industrial	600 gal/day/acre	0.67
Recreational	3,000 gal/day/acre	3.36
Multi-Family Residential	190 gal/day/acre	-
Multi-Family Residential (MF12; 2 Dwelling Unit (DU) /lot)	2,280 gal/day/acre	2.55
Multi-Family Residential (16 DU/acre)	3,040 gal/day/acre	3.41
Multi-Family Residential (32 DU/acre)	6,080 gal/day/acre	6.81
Multi-Family Residential (48 DU/acre)	9,120 gal/day/acre	10.22
Single-Family Residential (1-2 DU/acre)	2,500 gal/day/acre	2.80
Single-Family Residential (4-6 DU/acre)	1,800 gal/day/acre	2.02

By taking the projected land use areas and multiplying by the duty factors corresponding to a particular use, a projection of total water demand can be made. These projections are shown in Figure 4-1. Both an average-year demand and high-year demand scenario was determined based on different base year demand assumptions. The average-year projected water demand is used for the basis of projected demands in Table 4-1. To confirm the land use projection, a separate projection was performed based solely on population growth. The land use methodology and the population methodology agreed to within 1%.

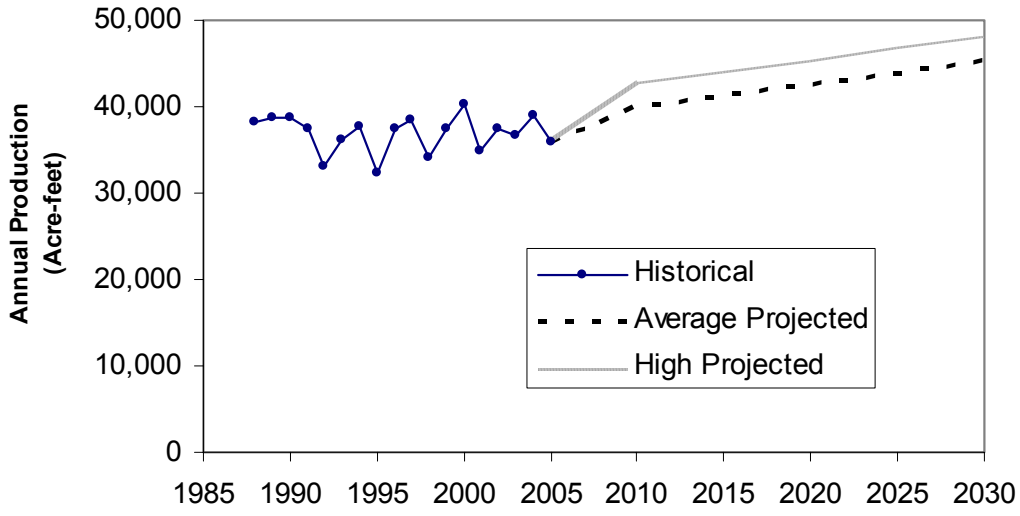


Figure 4-1: Historical and Projected Water Demand

4.3 Sales to Other Agencies

PWP participates in short term exchanges through interconnections with neighboring agencies. PWP acts as both a supplier and receiver of water. The net annual amount of water delivered or received is relatively small and has no significant effect on PWP's ability to meet demand.

This page intentionally left blank

• Demand Management and Conservation

Chapter 5 Demand Management and Conservation

5.1 Demand Management Measures

Law

> *10631 (f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:*
>
> > *(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures*
>
> *10631 (i) Urban water suppliers that are members of the California Urban Water Conservation Council and submit annual reports to the 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 [10631] (f) and (g).*

The Act identifies fourteen demand-management measures (DMMs) for urban water suppliers to address (Section 10631 (f)). The City is a member of the California Urban Water Conservation Council (CUWCC). As an alternative to reporting on the DMMs, CUWCC members have signed a Memorandum of Understanding (MOU) agreeing to implement water conservation programs through a series of Best Management Practices (BMPs). To satisfy the requirements of the Act, Council members have the option to implement a series of defined Best Management Practices (BMPs) and can submit their most recent BMP Annual Reports with their UWMP. Therefore, in accordance with Section 10631 (f), the City has filed the 2003 and 2004 BMP reports with the CUWCC (Appendix F). The City has, in good faith, tried to address and comply with all of the BMP targets listed in the CUWCC MOU where applicable.

5.2 PWP Water Conservation Program

The PWP water conservation program is dedicated to maximizing water conservation for the benefit of its customers. It achieves this by managing the efforts for implementing BMPs, and also through a very proactive effort with community involvement via events and presentations, education, rebate programs and cooperative efforts with MWD to encourage water conservation. The water conservation program philosophy is set forth in the following goals:

- PWP commits to performing due diligence in the evaluation of water conservation technology, training, via pilot programs, research, and partnerships with other water agencies as well as the MWD, CUWCC, and DWR.
- PWP is dedicated to the reduction of water demand by implementing effective water conservation programs.
- PWP will continue to provide education and outreach in order to impact the behavior of customers and promote water conservation methods.
- PWP will continue to enhance working relationships with other water agencies, other cities, MWD, DWR, and CUWCC. By being actively involved in committees and working with other agencies, PWP is confident that water conservation methods will continue to thrive.
- PWP will continue to evaluate water conservation programs on an individual basis. PWP commits to support the most efficient and innovative technology available to the community.

5.3 Best Management Practices

In 1991, a general consensus was reached over urban water conservation measures. More than 150 water agencies and public interest groups signed a Memorandum of Understanding (MOU) agreeing to implement water conservation programs through BMPs (Table 5-1). BMPs include the installation of water-saving plumbing fixtures in new construction, water metering , water audits and public information programs. DWR estimates that implementation of urban BMPs could reduce annual water demand by 1.5 million AF by 2020. As a member of the CUWCC and a signatory to the MOU, PWP is committed to maximizing water conservation through the effective use of these BMPs in its service area. The BMP status reports for PWP are included in Appendix F. A description of PWP's efforts under each BMP is provided following the table.

Table 5-1: Best Management Practices (BMPs) and CUWCC Reporting Status for PWP

BMP	Title	BMP Form Complete	
		2003	2004
1	WATER SURVEY PROGRAMS FOR SINGLE-FAMILY RESIDENTAL AND MULTI-FAMILY RESIDENTIAL UNITS	✓	✓
2	RESIDENTIAL PLUMBING RETROFIT	✓	✓
3	SYSTEM WATER AUDITS, LEAK DETECTION AND REPAIR	✓	✓
4	METERING WITH COMMODITY RATES FOR ALL NEW CONNECTIONS AND RETROFIT OF EXISTING CONNECTIONS	✓	✓
5	LARGE LANDSCAPE CONSERVATION PROGRAMS AND INCENTIVES	✓	✓
6	HIGH EFFICIENCY WASHING MACHINE REBATE PROGRAMS	✓	✓
7	PUBLIC INFORMATION PROGRAMS	✓	✓
8	SCHOOL EDUCATION PROGRAMS	✓	✓
9	CONSERVATION PROGRAMS FOR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL (CII) ACCOUNTS	✓	✓
10	WHOLESALE AGENCY ASSISTANCE PROGRAMS	N/A	N/A
11	CONSERVATION PRICING	✓	✓
12	CONSERVATION COORDINATOR	✓	✓
13	WATER WASTE PROHIBITION	✓	✓
14	RESIDENTIAL ULFT REPLACEMENT PROGRAMS	✓	✓

BMP 1 Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers

PWP offers water surveys for residential customers in the form of audits. In the early 1990's, there was an aggressive residential audit program. Then, audits were designed to assist customers to convert to the use of low flow toilets and showerheads. Today, audits are primarily performed in response to high bill complaints or special circumstances. An inside survey checks for leaks and identifies opportunities for the installation of low flow devices within the residence. An outside survey examines the customer's irrigation schedule and practices to determine any changes that could lead to increased water savings. The customer is provided with an information packet as well as an evaluation and recommended actions. Since 1994, PWP has completed a total of 18,297 residential water surveys for both single-family and multi-family customers (Table 5-2).

Table 5-2: Residential Surveys Completed (1994-2004)

Customers	# Completed
Single-Family Residential	7,725
Multi-Family Residential	10,572
Total	**18,297**

BMP 2 Residential Plumbing Retrofit

As one method to reduce demand, PWP encourages the replacement of water use fixtures in residences with low-flow devices such as low flow showerheads, high efficiency toilets and faucet aerators. In support of this, the City adopted an ordinance which prohibits the sale of showerheads that are not considered low flow devices. By 2004, it was estimated that 87% of single family households and 85% of multi family residences had low flow showerheads. PWP's marketing strategy to encourage the use of low flow devices involves public education as well as a low flow device distribution program. Table 5-3 summarizes the low flow devices that PWP has distributed.

Table 5-3: Low Flow Devices Distributed by PWP (1991-2004)

Low Flow Device	# Distributed
Low Flow Showerheads	14,249
Toilet Dams	6,049
Toilet Flappers	1,155
Faucet Aerators	2,750
Total	**24,203**

BMP 3 System Water Audits, Leak Detection and Repair

To identify any significant leaks in its delivery system, PWP conducts annual audits by comparing total metered sales with total supply entering the system. Any significant differences indicate a need for identifying and repairing leaks in the system. A goal of 90% or higher represents a reasonable level of delivery. Table 5-4 shows the results of pre-screen audits since inception of the program.

Table 5-4: Pre-Screening System Audits

Report year	Pre-screening result (Metered Sales/Total Supply)
1999	94%
2000	94%
2001	100%
2002	97%
2003	99%
2004	89%

BMP 4 Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections

PWP requires meters for all new connections in the service area. Customers are billed by volume of use. At the current time, only 1% of accounts are unmetered. (400 unmetered accounts out of 38,000 total)

BMP 5 Large Landscape Conservation Programs and Incentives

This BMP focuses on the larger commercial, industrial and institutional (CII) customers which have large landscape irrigation needs. With such customers, PWP has focused both on promoting awareness of water saving opportunities and providing conservation devices. To date, landscape water use surveys have been provided for over 700 CII accounts (69% of CII accounts identified in 1999 which was established as a "base year" for a reference benchmark). PWP has also conducted landscape training courses for interested customers.

PWP hosted a water forum for customers that included demonstrations of water saving Weather Based Irrigation Controllers (WBICs). Each of these electronic controllers contains extensive information on soil types, landscape slopes, plant materials and sprinkler application rates and determines the minimum amount of water to be applied to replace the water that is lost by evaporation and transpiration. Since the plants are getting just the amount that they need, water wastage from runoff is minimized. In 2005, PWP offered a pilot program for installation of WBICs for commercial customers.

BMP 6 High Efficiency Washing Machine Rebate Programs

High Efficiency Washing Machines (HEW) use up to 50% less water and 50% less energy. PWP encourages their use by offering rebates to customers who purchase them. The rebate applies to HEWs that have a water factor less than 6.0 (water factor is defined as gallons per cycle). To date, over 1,500 rebates have been awarded.

BMP 7 Public Information Programs

PWP has a very active public information and awareness program. An annual calendar of events and public information opportunities is maintained where PWP staff can provide up to date information on water conservation issues and practices. For example, in 2004 PWP utilized advertising, public service announcements, newsletters, media events and participated in public speaking opportunities (Table 5-5). A conservation demonstration garden has also been in development and was unveiled officially in 2005. The 2.5 acre Arlington Garden showcases mediterranean climate plants and the beauty of water-saving landcapes to promote the use of similar landscapes by its customers.

Table 5-5: Public Information Events in 2004

Description	# of Events
Paid Advertising	46
Public Service Announcements	3
Newsletters/Brochures	26
Demonstration Garden	1
Media Events	37
Speaker's Bureau presentations	12

PWP also offers professional and residential landscape classes throughout the year. These classes teach water consumers better watering habits for landscapes and introduces them to alternative landscaping design possibilities. PWP hosts information booths at numerous community events that inform the public about water conservation, current rebate programs and educational opportunities.

BMP 8 School Education Programs

Water conservation awareness begins at an early age. In light of this, information is presented about water conservation to school age children at various events and upon request from schools. Water conservation messages are printed on various materials, coloring books, pens and pencils and stuffed toys depending on the age level of the participants. The premise of these programs is that water aware children will grow up to be water saving adults.

BMP 9 Conservation Programs for Commercial, Industrial and Institutional (CII) Accounts

To better understand the pattern of CII water usage, CII accounts have been identified and ranked according to water use. PWP has completed water surveys for the majority of its CII accounts. These surveys consist of a site visit, a water use evaluation and recommendations for the use of water saving devices and practices. PWP also provides a number of educational and informational opportunities to its CII customers, some of which have been detailed under BMP 5.

CII customers are offered a number of rebates sponsored by PWP and/or MWD for the purchase of a variety of water conservation devices. There are also direct installation programs for some of these devices that require professional installation. In addition to providing a valuable service for the customer, the direct installation program provides confirmation of proper installation which will maximize water savings. Over 2,000 devices have been installed under this program. Table 5-6 shows the water saving devices that have been supported through rebates and/or direct installation for CII customers. A short description of each technology follows.

Table 5-6: Water Saving Devices Rebate and Direct Installation Programs for CII Customers

Water Saving Device	Rebates	Direct Installation
Pre-Rinse Kitchen Sprayers	✓	✓
Cooling Tower Conductivity Controllers	✓	
Hospital X-ray Film Processing Recirculating System	✓	
Dual-Flush Toilets	✓	✓
Water Pressurized Broom	✓	✓
Zero Consumption Urinal	✓	✓
High Efficiency Washing Machines	✓	
Ultra Low Flow Toilet and Urinal Fixtures	✓	✓

- Pre-Rinse Kitchen Sprayers utilize a higher velocity stream to make dish rinsing more efficient. The high velocity sprayers use about 1.6 gallons per minute compared to 2-6 gallons per minute with the standard spray devices they replace. Estimated annual savings per kitchen sprayer is 75,000 gallons.

- Cooling Tower Conductivity Controllers help maintain cooling system efficiency. By accurately transmitting information to the valves that control the amount of blow down (water drained from the cooling tower reservoir) and subsequent makeup water, a conductivity controller can dramatically reduce water use as well as operating expenses. With proper management, the estimated savings average 800,000 gallons annually.

- Hospital X-Ray Film Processor Recirculating Systems reduce water usage over older non-recirculating film processors by recycling the water through the system rather than disposing of it after each use. An average film processing X-ray system can use almost 800,000 gallons of water per year, so water savings can be significant.

- Dual-Flush Toilets have two levers or buttons, one to flush for liquids and the other for solids. The liquid flush option uses half the water used in today's standard low-flush toilet. The dual-flush toilet operates at 1.6 gallons per flush for solids and 0.8 gallons per flush for liquids. Average additional water savings measure 2,250 gallons per year per toilet.

- Water Pressurized Brooms replace traditional hose nozzles used to clean large hardscape surface areas at commercial and industrial facilities. They use a series of small nozzles to direct multiple high-intensity water sprays in front of the “broom”. A typical hose and nozzle uses 8 – 18 gallons per minute compared to a pressurized water broom uses 2.8 gallons of water per minute. The average water savings is approximately 50,000 gallons per year per location.

- High Efficiency Washing Machines have been described under the residential plumbing retrofit BMP. For commercial water users, the water factor must be 9.5 or less.

- Zero Consumption Urinals utilize a chemical barrier in place of water for flushing. Zero consumption urinals have a potential water savings of 35,000 gallons annually.

BMP 10 Wholesale Agency Assistance Programs

PWP is not a wholesaler of water, so it is exempt from the requirements of this BMP.

BMP 11 Conservation Pricing

The goal of conservation pricing is to provide incentives for customers to reduce water usage. PWP charges customers for water use by volume. It also has a pricing structure that increases the price per unit of water at higher levels of water use.

BMP 12 Conservation Coordinator

As a key element of its water conservation program, PWP has assigned a dedicated Conservation Coordinator who is a certified Water Conservation Practitioner. This certificate is issued by the American Water Works Association (AWWA) and attests to the fact that the holder has proven qualification in the field of water conservation.

BMP 13 Water Waste Prohibition

This BMP requires enactment and enforcement of measures prohibiting activities such as gutter flooding and single pass uses of water in car washes, commercial laundry systems and fountains. At the current time, there is no general ordinance prohibiting these specific activities. However there are prohibitions against water wasting during times of declared water shortages under Chapter 13.10 of the City of Pasadena municipal code.

BMP 14 Residential ULFT Replacement Programs

Ultra Low Flow Toilet (ULFT) fixtures use significantly less water annually than non-ULFT models. Through an existing co-sponsored agreement with MWD, PWP is providing a rebate to its residential water customers who purchase and install ULFTs. This program has been very successful and the service area is nearing the saturation point for ULFT installation. Because of this, the program will be phased out.

5.4 Parks and Natural Resources Division Conservation Efforts

In addition to residential and CII accounts, there have been efforts to minimize the City's internal water usage. For example, the Parks and Natural Resources Division (PNR) of the City has implemented water management improvements throughout the City's parks, the Arroyo Seco, the landscaped areas of public buildings and facility sites, and roadway medians and parkways. Some recent efforts are described below.

Ongoing Conservation Measures

- Under the City Wide Central Irrigation Project, adopted and implemented in FY 2002, a central irrigation control system was installed that monitors irrigation and water usages in City parks and landscapes. The system communicates with irrigation controllers equipped with appropriate hardware that can monitor irrigation water usage.

- A dedicated program coordinator position was created to manage the irrigation system. The main responsibilities of this position are to operate and manage the centralized irrigation system. The coordinator also implements a water-efficient irrigation budget program by performing irrigation system audits, and through irrigation scheduling based on daily environmental data.
- Special weather gauges were installed at Victory and Brookside Parks, the two weather zones in the City. They monitor rain and evapotranspiration, and relay this information to the control system via a local radio station and modem. Using this real time information, optimal irrigation schedules are computed by the system, which then remotely operates the individual irrigation controllers to provide the minimal amount of water at each site to ensure adequate landscape irrigation.
- In FY 2005, a new irrigation technician was hired to assist with the irrigation maintenance in City parks and medians.
- The irrigation systems of several park athletic fields, including Victory Park, Villa Park, Allendale Park, Jefferson Park, Brenner Park and Central Park have been redesigned and retrofitted to use more efficient and uniform sprinklers.

Drought Water Use Reduction Plan

PNR has a staged plan to reduce irrigation uses during a period of water conservation. Irrigation in the following categories will be reduced in the following order:

1) Median strips, Greenbelts, shrub and groundcover plantings at facility sites.
2) Passive (not athletic) areas including libraries and passive park areas.
3) Athletic turf areas and active turf areas.
4) Highly visible public areas.
5) In the event of severe water use restriction every effort will be made to save trees including hand watering with a water truck if necessary.

5.5 Future Water Supply Projects

PWP does not have any future water supply projects anticipated for completion in the immediate future. The Hahamongna Watershed Park Project (discussed in Chapter 3) could increase water supply by expanding the capacity of PWP's spreading basins. However, at the current time, there is no firm schedule for completion of the project.

This page intentionally left blank

• Water Supply Reliability

Chapter 6 Water Supply Reliability

Law

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

6.1 Reliability Considerations

Reliability is a measure of a water service system's expected success in managing water shortages. The costs of demand management or supply augmentation options to reduce the frequency and severity of shortages are now high enough that city planners must look more carefully at the costs of unreliability to make the best possible estimate of the net benefit of taking specific actions. To plan for long-term water supply reliability, PWP staff examine an increasingly wide array of supply augmentation and demand reduction options to determine the best courses of action for meeting water service needs. Such options are generally evaluated using the water service reliability planning approach. Reliability planning requires information about: (1) the causes, expected frequency and severity of shortages; (2) how additional water management measures are likely to affect the frequency and severity of shortages; (3) how available contingency measures can reduce the impact of shortages when they occur.

Causes of Unreliability

The three main sources of PWP supply are groundwater, surface water and imported water. Each of these sources is subject to a number of factors than can result in supply inconsistency. These include legal, environmental, water quality and climate considerations (Table 6-1). Each of these

considerations and the potential effects on PWP water supply are reviewed below. The reliability of MWD imported water will be addressed separately in Section 6.4. Events of a catastrophic nature such as earthquakes, chemical spills, acts of terrorism and power outages can also impact reliability and result in water supply shortages. PWP is well prepared to respond to such events. Planning for catastrophic events is documented in Section 10.3 of this UWMP.

Table 6-1: Factors Resulting in Inconsistent PWP Supply

Supply Source	Legal	Environ -mental	Water Quality	Climatic
Groundwater	✓		✓	✓
Imported Water (MWD)	✓	✓	✓	✓
Surface Water		✓		✓

Legal

Groundwater supplies are subject to legal issues regarding competing pumping rights for users within a basin. Since the Raymond Basin is adjudicated and pumping rights have been previously allocated under a court administered agreement, its pumping rights are secure. PWP does not anticipate any supply inconsistencies from legal factors.

Water Quality

Water quality issues can affect the supply of both local groundwater and surface water. An ongoing potential problem is the prospect of groundwater contamination by VOCs, perchlorate and nitrate. The presence of such compounds can cause the shutdown of wells thus decreasing supply. PWP has shut down 8 wells due to perchlorate contamination and has taken action to construct additional wells to replace the lost production. At the same time, it is aggressively pursuing perchlorate treatment so that the wells can be brought back on-line. PWP anticipates that all 8 wells will be back in production no later than 2008. PWP does not anticipate supply inconsistencies from water quality issues.

Climate

All water supply sources will be directly affected by climate. Dry years may directly impact imported water and local surface water. Groundwater supply would be affected by an extended drought, as pumping would become more difficult as groundwater levels may drop due to less recharge entering

the basin. PWP is aware that climate contributes substantially to supply inconsistency and must be considered an integral element in reliability planning.

6.2 Climate Effects on Reliability

For California, climate is one of the most important factors in a reliable water supply. The amount of rainfall and snowpack - which ultimately becomes runoff - can vary greatly from year to year. There can be significant runoff one year, followed by a critically dry year the next. There are also clusters of wet and dry years. The unpredictability of this runoff is the main contribution to unreliability of water supply in California. California has experienced two recent periods of drought. Most recently, from 1987-1992 more than 10 million Californians - one third of the state's population - were subject to mandatory water conservation or rationing due to drought conditions. By early 1991, an estimated three-fourths of the residents were under rationing and conservation mandates to reduce water use. The reliability of water resources in California are significantly impacted by climate factors. Dry periods are inevitable and any water management plan must address the certainty that a dry period will occur.

Historical Dry Year Supply

To provide a conservative basis for reliability planning, PWP examined its historical production record and identified the driest single year (1995) and driest multi-year period (1991-93). Driest years were defined based on lowest levels of water supply production. Total water supply from all sources (groundwater and imported) was tallied for the single year and each year in the the multi year period and shown in Table 6-2.

Table 6-2: PWP Supply Reliability (AFY)

Average / Normal Water Year	Single Dry Water Year (1995)	Multiple Dry Water Years		
		1991	1992	1993
36,518[1]	32,318	36,861	31,665	34,294
% of Normal	87%	101%	87%	95%

[1]Average Production from 1994-2005

During those years, there was production from treated surface water, however, to be conservative, those numbers were not included as PWP does not presently use surface runoff for supply. In the driest year, actual supply was about 13% less than the average supply. These dry year periods will be used as worst case supply scenarios for the later section focusing on Supply and Demand Comparisons (Chapter 9).

6.3 PWP Local Supply Vulnerability

PWP's two local supply sources - surface water and groundwater are both vulnerable to drought conditions. Groundwater is also vulnerable to contamination. This section will address the vulnerability of the Arroyo Seco and Eaton Canyon surface water spreading operations and of the groundwater supply in the Raymond Basin. The vulnerability of PWP's imported source - MWD water - will be addressed separately in the next section.

Surface Water Spreading

PWP currently utilizes its surface water - which is mainly storm runoff - for groundwater recharge. The surface water supplies are vulnerable mainly due to variations in runoff. The reliability of surface runoff and hence the supply available from spreading credits will be vulnerable to local climate conditions that create low rainfall and runoff.

Groundwater

Groundwater is vulnerable to extended drought conditions because of the possibility of overdraft. Overdraft occurs when the amount water withdrawn from an aquifer exceeds the amount recharged. This affects water supply reliability in two ways. The first is simply that the overall supply in the aquifer is not being replenished and will eventually be depleted. The second effect is that it becomes increasingly difficult to pump groundwater as the water level drops. Thus, increasingly more energy is required to pump the same volume of water. Some wells may drop out of production if they are not deep enough. During normal years, in the adjudicated Raymond Basin, the risk from overdraft is minimized as the total withdrawals from all users are monitored closely and kept within a "Safe Yield", which is determined by the Watermaster. During a series of dry years, there is the possibility of decreasing yields available from the Basin. The Safe Yield for the Raymond Basin is currently set at 30,622 AF, which has remained constant since 1956.

The reliability of groundwater supplies can also be affected by contamination. Contamination directly affects supply by forcing the closure of wells that are in the zone of contamination. More specific effects of water quality on reliability are covered in Section 7.

6.4 Vulnerability of MWD Water Supply

MWD supplies approximately 2,000,000 AF of the 4,000,000 AF of total water used within its service area. MWD projects increasing demands on the water it supplies, due to growth throughout the entire service area and possible losses of local supplies by certain other member agencies. Such increased demand for MWD water, coupled with a reduction in MWD's existing water supplies could reduce the amount of water available to MWD to supply the City. In anticipation of future demands and

the prospect of decreasing supplies, MWD is taking a number of proactive steps to prepare itself and its member agencies to ensure adequate supplies.

MWD Contractual Obligations

The Metropolitan Water District Act provides a preferential entitlement for the purchase of water by each of the MWD agencies. This preferential right is based on the ratio of all payments made to MWD by each agency compared to total payments made by all member agencies on tax assessment and otherwise, except purchases of water, toward the capital cost and operating expense of MWD. Based upon such formula, as of June 30, 2000, the City had a statutory preferential right to 1.24% of MWD's total supply. However, MWD has never used this criteria in allocating water. Moreover, if a shortage should arise, legal issues exists as to whether certain Constitutional and California Water Code provisions would be invoked to supercede the MWD Act and require reasonable allocation of water in time of shortage.

Factors Resulting in Inconsistent Supply

The major factors affecting the reliability of MWD water are related to its two major sources - State Water Project (SWP) water and Colorado River Aqueduct (CRA) water (Table 6-3).

Table 6-3: Factors Resulting in Inconsistent MWD Supply

MWD Supply Source	Legal	Environ -mental	Water Quality	Infra-structure	Climate
SWP	✓	✓	✓	✓	✓
CRA	✓	✓	✓		✓

Legal

One potential legal issue affecting MWDs CRA supply is the 4.4 million acre feet (MAF) limit that could be eventually imposed on California's use of CRA water. This overall limit could also affect MWD's share of CRA water.

Environmental

There are many issues that impact the reliability of the SWP water supply. Bay-Delta water quality is a critical issue. Requirements to minimize salinity at certain period of the year to protect

endangered fish such as Delta Smelt and Salmon can impact the amount of pumping at Banks Pumping Plant. Lower water levels in the Colorado River have also prompted environmental concerns.

Water Quality

Water quality issues can threaten existing supplies through contamination, or water quality standards may become more stringent because of changing regulations or discovery of a previously unknown risk. High salinity levels are a major concern for both CRA and SWP supplies.

Infrastructure

Another potential factor is the aging infrastructure of the SWP system. The failure of levees in the Delta can disrupt SWP operations, as evidenced in the recent Jones Tract failure in 2004. The California Aqueduct is also susceptible to flooding, which could impact water quality. MWD relies on the successful implementation of a number of programs, both locally and outside the region for maintaining an adequate water supply into the future. If some of these programs do not meet their expected contribution to IRP goals within the expected timeframes, then there is the risk of unreliable supplies.

Climatic

For MWD supply sources, climatic factors also emerge as an important source of unreliability. MWD conducted thorough planning assuming dry year scenarios. For its own RUWMP, MWD also identified the driest single and multi year period. The average water year was shown based on the average of 1922-2004 hydrologies. The single dry year period was assumed to be 1977 and the multiple dry year period was 1990-92. This is shown in Table 6-4.

Table 6-4: MWD Supply Reliability - Normal and Dry Year Supplies (AFY)

MWD Sources	Normal Year	Single Dry Year (1977)	Multiple Dry Water Years (1990-92 Hydrology) Average
Colorado River	711,000	722,000	742,000
SWP	1,772,000	777,000	912,000
In-Basin Storage	0	840,000	482,000
TOTAL	2,483,000	2,339,000	2,136,000

6.5 MWD Plans for Assuring Supply

MWD has conducted an analysis of its ability to supply water in the face of climatic uncertainties. Although MWD's projections assure that adequate water supply will be available under historical drought

conditions, it continues taking proactive steps to ensure that there are alternative sources and contingency plans if there are supply shortages. A major component of this is the Integrated Resource Plan (IRP).

MWD's Integrated Resources Plan (IRP)

MWD has taken steps to ensure the reliability of its supplies and to secure alternate supplies through development of the IRP. The hallmark of the IRP is that it stresses a planning approach that involves cooperative efforts by MWD and its member agencies to come up with comprehensive, regionally based solutions to ensuring reliable water supplies in the future. It involves developing a flexible resource mix that can use a variety of water supply alternatives under different conditions. The guiding principles used to develop the IRP are:

- Provide 100% reliability in water deliveries through 2025 even under the worst case drought scenario
- Balance additional investments in imported water with investments in local resource development and conservation.
- A commitment by MWD to a resource development and financial strategy that is flexible and provides for the financial security for MWD and its member agencies.

It was recognized from the beginning that the IRP would require regular updating to reflect the revised projections of needs and the actual progress made toward the achievement of resource goals. Since the IRP was adopted in 1996, three significant issues have developed: defining operational plans that will manage water during both surplus and drought conditions, incorporating member agency proposals for imported water transfers using Metropolitan's system, and expanding and standardizing Metropolitan's role in developing and obtaining innovative, non-traditional water supplies and storage options.

With respect to regulating and maximizing supply within its service area, MWD provides its member agencies with program assistance to expand current groundwater storage to meet future regional needs. Expanded use of Southern California's groundwater and surface water storage is being accomplished through technical assistance to member agencies in five major areas: water rates, local projects, cooperative conjunctive use studies with member agencies, legislative and regulatory advocacy, and research and development funding

The 1996 IRP has been successful in addressing many of the reliability issues discussed earlier through the planning and construction of local projects. Since the process began, many of the resources identified to meet Southern California water needs have been implemented, are in construction or are in

the final stages of negotiations. One notable example is the completion and filling of Diamond Valley Lake. This is an 825,000 acre-foot reservoir that doubles the region's surface storage for drought protection, emergency reserves and seasonal regulation. MWD has constructed Diamond Valley Lake to better manage its water supplies between wet and dry years. The reservoir, located near Hemet in southwestern Riverside County, provides increased terminal storage for SWP and Colorado River supplies. Diamond Valley Lake provides the entire region with a six-month emergency supply after an earthquake or other disaster. It also provides water supply for drought protection and peak summer demands.

MWD is also dealing directly with SWP reliability issues by taking efforts to ensure implementation of the Delta Improvements Package (DIP). The DIP is a set of linked actions that would provide improved water quality in the Delta. The successful implementation of this program would allow SWP pumping at Banks Pumping Plant in the Delta to be increased from 6680 to 8500 cfs. This would enable MWD to achieve its 2020 supply goals set in the IRP.

The IRP will continue to mature as additional water resource programs are realized. To meet Southern California's future water requirements, resources such as Bay/Delta improvements for SWP supply, additional local projects, conservation and additional water transfers will need to be developed.

Conclusions

MWD is taking a proactive stance in ensuring a reliable water supply by working externally with other interested agencies to assure reliable imported supplies and internally within the region with its member agencies to ensure that alternative storage and sources exist in the event of inconsistent imported water supply. If a drought, similar to the one ending in 1992, occurred in the near future, MWD anticipates that it would be able to meet all demands using the supply improvements without the need for mandatory cutbacks. Those additional supplies also would spare Southern California from buying alternative, more expensive supplies.

The MWD IRP, updated in 2004, projects a 100% reliability in supply to its member agencies. This projection has been reaffirmed in the 2005 RUWMP. In addition to these assurances, PWP is also prepared to utilize other local sources of water.

6.6 PWP Plans for Assuring Supply

The occurrence of a severe dry period or drought at some point is a virtual certainty in California. In that event, it is likely that imported water deliveries would be curtailed. The increased emphasis on DMMs and water conservation would be the first steps that PWP would take to reduce overall demand. In addition, PWP is taking proactive steps now to ensure that it has the capacity to replace any reduced imported supplies with local sources stored in the Raymond Basin.

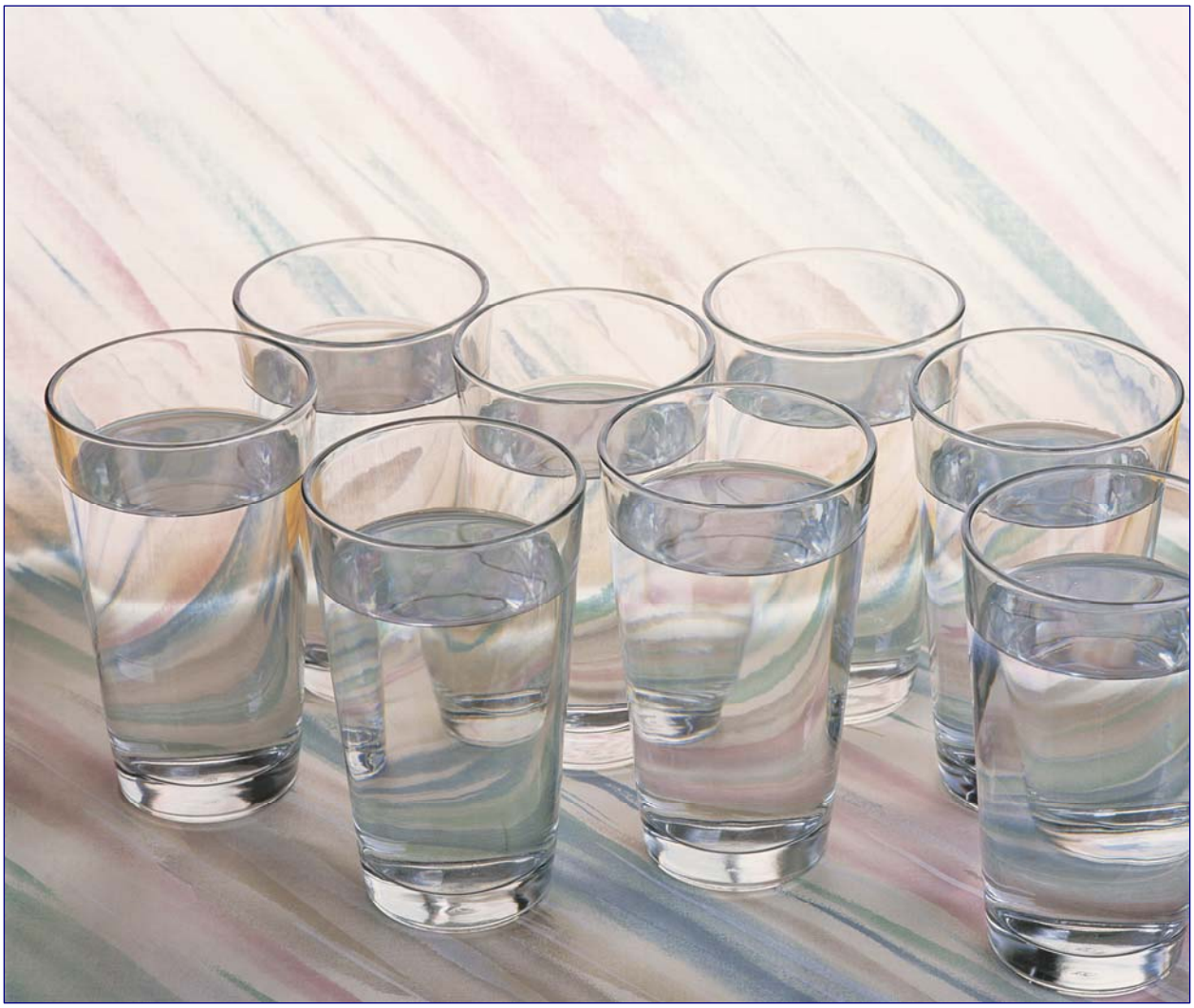
Raymond Basin Conjunctive Use Program (RBCUP)

The RBCUP is a partnership between PWP, the Foothill Municipal Water District and MWD. The RBCUP is an important program that would provide direct benefits to PWP as well as regional benefits in the event of a drought. The main benefit of the RBCUP to PWP would be an increase in supply reliability. Under the proposed agreement, MWD would be allocated 75,000 AF of storage in the Raymond Basin. Of this amount, 66,000 AF would be allotted to PWP and 9,000 AF to the Foothill Municipal Water District. During normal years, MWD can ask PWP to store up to 16,500 AFY (25% of 66,000 AF) via in-lieu delivery, direct storage (injection or spreading) or a combination of both. In-lieu delivery means that PWP will accept additional imported water from MWD up to its pumping rights for the year in lieu of producing groundwater. The amount that is stored will be credited to PWP in its portion of the MWD account. During dry years, MWD can ask PWP to produce up to 22,000 AFY from groundwater from its MWD account. Thus, the RBCUP creates an alternative source of MWD water in the event of cutbacks in surface water deliveries. PWP's own local storage in the Basin would also be increased because currently 20,679 AF of water is stored for MWD in PWPs LTS account. The RBCUP would transfer MWD's stored water into the separate MWD account, thus freeing up storage which PWP could use exclusively. In effect, this allows additional storage of imported water during wet years with the ability to reduce demand on MWD's surface water deliveries during dry periods.

A critical element of the RBCUP is the construction of PWP capital improvement projects that will allow increased groundwater production. Currently, PWP has sufficient capacity to extract its decreed right, however, during periods of higher rainfall where spreading credits would be higher, it would have problems extracting the full amount of groundwater pumping rights. As part of the RBCUP, MWD will fund additional wells and groundwater perchlorate treatment plants to increase extraction capacity from the Raymond Basin. PWP anticipates the installation of 4 aquifer storage recovery (ASR) wells and the construction of additional perchlorate treatment facilities.

Recycled Water

The RBCUP would result in a much higher level of reliability during the next decade, but water resources will need to be developed to meet the demands beyond the next 10 years. The increased use of recycled water is another method to replace potentially inconsistent imported water supplies. PWP has already begun the exploration of recycled water use through a series of feasibility studies. In the near future, PWP may consider exploratory steps towards the utilization of recycled water to augment a portion of its supply. This is detailed in Section 8.



• Water Quality Impacts on Reliability

Chapter 7 Water Quality Impacts on Reliability

7.1 Water Quality Impacts

Water quality is an important consideration because water that does not meet health standards is effectively lost as a source of supply. The quality of surface water can be affected by salinity, point sources (upstream discharges) and agricultural runoff, while groundwater supplies are threatened by contamination from disposal and seepage of a variety of pollutants. In a region such as Southern California, groundwater contamination can cause loss of significant supply and increase the demand of imported water.

Imported Water

A major challenge to MWD in ensuring high quality water to its member agencies is the issue of salinity. Water from the CRA generally contains high levels of salinity. In 1999, MWD developed a Salinity Management Policy to address this issue. The main objective of the policy is to achieve a salinity goal of 500 mg/L, which is done by blending CRA water with lower salinity SWP water. MWD is actively encouraging its member agencies to develop local storage options to help mitigate the effect of a period of high salinity (such as during a period of reduced blending), as well as taking steps to control salinity in its sources.

Groundwater

In the Raymond Basin, groundwater quality has been impacted by a variety of chemical contaminants including volatile organic compounds (VOCs), perchlorate, nitrate and arsenic. VOCs are man made compounds that were commonly used as solvents, degreasers and dry-cleaning agents. Perchlorate was used as a component in rocket fuel and fertilizer. Nitrates can come from a variety of sources including fertilizer, landfills and septic tanks. Finally, arsenic, which is a naturally occuring chemical can also be found in groundwater. All of these compounds can have negative health impacts and all have maximum contaminant levels (MCLs) which have been set by the Environmental Protection Agency (EPA), with the exception of perchlorate, which currently has a notification level set by DHS (There is ongoing discussion for a perchlorate MCL).

VOCs exceeding MCL levels were found in a number of wells in an isolated area in the northwest region of the basin. The Jet Propulsion Laboratory (JPL) which was responsible for the contamination, financed the VOC Treatment Plant to treat the contaminated water with two air stripping towers. However, due to perchlorate contamination found in the same area, the wells that pumped into the treatment plant have been shut down.

Perchlorate has had the largest impact on water quality in the Raymond Basin in recent years. Out of 17 PWP wells, 8 are offline due to perchlorate levels that exceed the DHS notification level. Many of these wells are the same ones that experienced VOC contamination. To contend with the effect of well closures on water supply, PWP constructed two new wells in the central eastern portion of its service away from the perchlorate contamination. Currently, with the wells in service, PWP can pump a maximum of 21 cfs or 15,200 AFY, which would be more than sufficient to pump in excess of anticipated demand.

7.2 Implications for Water Management

Water quality can adversely affect water management by reducing available supply sources and reliability. PWP has not been adversely affected from well closures as two new wells were brought on line to replace the lost production capacity. However, with the other wells offline, there is reduced system redundancy and local overdraft is also a possibility. Further well closures due to water quality concerns would ultimately reduce groundwater production. Conversely, cleanup efforts at the contaminated sites may allow some wells to return to service, which would increase the reliability of groundwater production. For example, PWP has been pursuing the construction of two perchlorate treatment systems that would allow it to bring all of its closed wells back on line. In the Pasadena Subarea, PWP will be constructing an ion-exchange treatment system that can remove perchlorate to levels below the notification level. This would allow 4 wells to resume pumping operations by 2007. In addition, negotiations with JPL are expected to lead to a second ion exchange treatment system which would allow another four wells in the Monk Hill Subarea to resume pumping operations by 2007. Combined, these systems will return 8 wells to service. This will allow PWP staff to rotate wells and reduce stress on the eastern end of the service area where much of the current pumping is being performed. The recent perchlorate contamination issues demonstrate that water quality concerns can impact water supply. By aggressively pursuing groundwater treatment solutions, PWP will avoid any long term effects on its water supply.

This page intentionally left blank

• Wastewater and Recycled Water

Chapter 8 Wastewater and Recycled Water

PWP views recycled water as a viable water supply source and effective way to reduce the future need for imported water. In June, 1991, City Council directed PWP to "evaluate and pursue the use of reclaimed water as a future resource with its system". This initiated a series of studies and assessments that have laid solid groundwork for the use of recycled water within the PWP service area:

- Preliminary Reclaimed Water Users Study (MWH, 1992)
- City of Pasadena Reclaimed Water System Incremental Analysis Report for Joint Project with the City of Glendale (ASL Consulting Engineers, 1992)
- Reclaimed Water System Participation Agreement No. 15,075 (between the City and Glendale, 1993)
- Pasadena-Glendale Reclaimed Water Reservoir Options (1994)
- Report on Groundwater Quality Impact Assessment (MWH, 1995)
- Water Reclamation Program Review Memorandum (ASL Consulting Engineers, 2000)
- Phase 1 Reclaimed Water Feasibility Study (MWH, 2003)
- Recycled Water Feasibility Study (MWH, 2005)

Through these documents, much of the preliminary planning, market assessment and cost evaluation of recycled water alternatives have been performed. A source of recycled water has been secured from the City of Glendale (Glendale) through 2017. This section will describe the planning that PWP has accomplished and provide a description of the future options that PWP has available to initiate the use of recycled water in its service area. Figure 8-1 illustrates critical stages in the planning process for recycled water use.

Figure 8-1
Recycled Water Planning

The first step in the process is to identify sources of recycled water and the quantities in which it is available. Then, potential users are identified and the associated demand quantified. With these two

pieces of information, the next step of optimization takes place which examines different alternatives, cost benefits analysis and determines strategies for overcoming barriers to implementation of recycled water. In all stages, coordination with agencies and local entities is essential to achieve a realistic and effective recycled water plan.

8.1 Coordination

PWP coordinated with LACSD and Glendale to determine the availability of recycled water from their wastewater treatment system. To assess the potential demand for recycled water, PWP contacted numerous local industries, recreational facilities and public agencies within the service area. The use of recycled water would ultimately reduce the annual demands on imported water and groundwater, so PWP has also informed MWD and RBMB of its planning efforts. Table 8-1 shows specific public agencies that PWP coordinated with or provided information to in the process of recycled water planning.

Table 8-1: Coordination with Other Agencies for Recycled Water Plan Development

Agency	Informed	Participated
MWD	✓	
LACSD		✓
Glendale		✓
CALTRANS		✓
Pasadena Department of Public Works		✓
RBMB	✓	

8.2 Wastewater Quantity, Quality and Current Uses

The City does not operate its own wastewater treatment plant. Wastewater treatment is performed by LACSD, which serves 78 cities in Los Angeles County as part of a confederation of independent special districts. In 1991, PWP studied the possibility of bringing recycled water to the Pasadena area from two sources: Los Angeles/Glendale Water Reclamation Plant (LAGWRP) in the Los Angeles and Whittier Narrows/San Jose Creek Wastewater Treatment Plants near Whittier. An economic feasibility study was conducted by comparing the two alternatives. Based upon the study, it was determined that it would be more economical to bring reclaimed water from LAGWRP.

Los Angeles-Glendale Water Reclamation Plant (LAGWRP)

The LAGWRP is a 20 mgd tertiary treatment plant that serves the east San Fernando Valley area, including the cities of Glendale, Burbank, La Crescenta, La-Canada-Flintridge and portions of Los Angeles. It is owned jointly by Glendale and Los Angeles. The wastewater is collected from domestic, commercial and industrial sources. The LAGWRP is one of four wastewater treatment plants that serve the City of Los Angeles. The wastewater system for Los Angeles has a total of 6,500 miles of sewer pipeline. On average 19,000 AFY is collected within the area served by LAGWRP. The treatment system consists of bar screens, sedimentation, activated sludge, secondary clarification, coagulation, filtration and chlorination. All of the treated effluent meets the California Department of Health Services (DHS) Title 22 standards, which regulate the quality, treatment and use of reclaimed water. About 4,000 AFY (20%) of the wastewater treated at the plant is recycled to various users for irrigation, golf courses, parks and cemeteries. 15% of the influent is lost within the treatment system, which leaves approximately 14,000 AFY available for further reuse (Figure 8-2). In order to reduce nitrogen concentrations in the Los Angeles River, LAGWRP is undergoing a nitrification/denitrification project. This will reduce the treatment capacity to 15 mgd when completed.

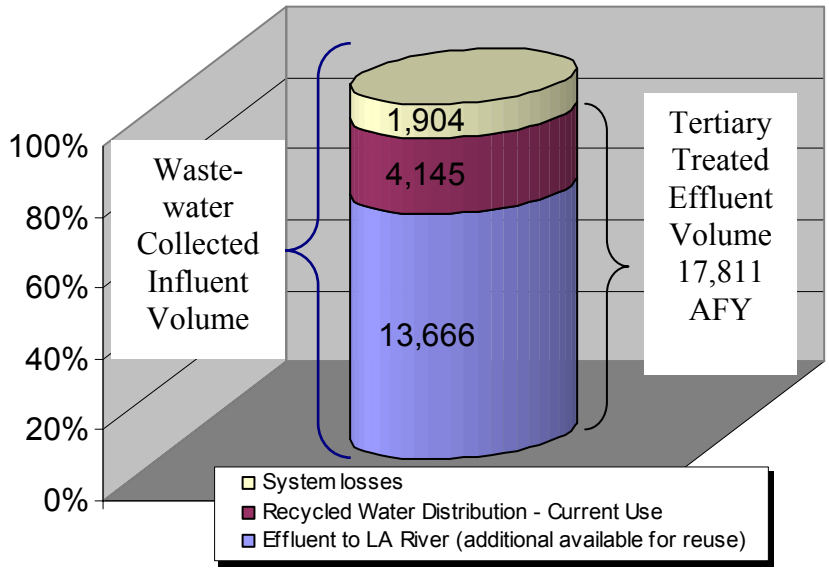


Figure 8-2
LAGWRP Wastewater Treatment and Available Recycled Water

Recycled Water System Participation Agreement between Pasadena and Glendale

In 1993, Pasadena and Glendale signed the *Reclaimed Water System Participation Agreement No. 15,075.* This contract entitled the City to 6,000 AFY of recycled water at an instantaneous maximum rate of 6,255 gallons per minute (gpm) and defined LAGWRP as the source of this water. The contract terminates on December 31, 2017, however the City has the right to extend the agreement terms for an additional 25 years.

8.3 Wastewater Disposal and Recycled Water Uses

All of the water treated at LAGWRP meets DHS Title 22 standards. Currently, approximately 4,000 AFY of this reclaimed water is used for a variety of recycled water reuses (Figure 8-3). These include irrigating two golf courses in Los Angeles' Griffith Park, supplying cooling water to a Glendale power plant, and irrigating landscaping along the Golden State Freeway. The remainder of the effluent is disposed in the Los Angeles River.

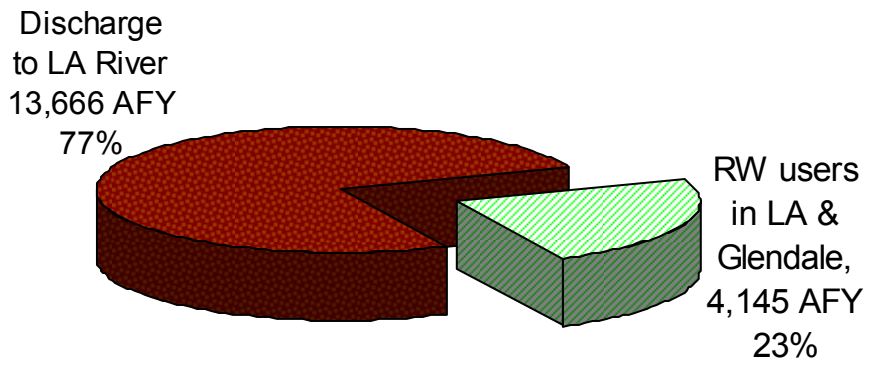


Figure 8-3
Current Disposal of Treated Effluent at LAGWRP

8.4 Potential and Projected Uses

The 2005 *Recycled Water Feasibility Study* (RWFS) identified 55 potential customers for the use of recycled water within the PWP service area. Almost all of the potential uses in the service area are for irrigation. The total potential demand was 2,462 AFY. No projections for future demand were made. Since most of the uses are for irrigation, it is reasonable to assume that the potential demands will remain similar in the future. Although not under consideration at this time, a potential industrial customer could be

the PWP Glenarm Steam Plant, which was estimated in 1992 to have a potential recycled water use of 250 AFY.

Technical and Economic Feasibility

It is technically feasible to serve the potential recycled water users identified in the PWP service area. Economically, estimated costs for delivering recycled water ranged from $690 per AF to $2,270 per AF, depending on the quantity served. A large portion of these costs were due to capital costs that would be incurred by PWP. If outside funding could be secured, this would reduce the cost per AF. Any use of recycled water would directly reduce the use of imported water from MWD, so if the costs of MWD imported water increase, this would increase the economic feasibility of recycled water use.

Projected Use of Recycled Water

One potential option identified in the RWFS was an option to deliver 699 AFY to 4 customers in the Arroyo Seco area. It would involve the construction of a 5 mile long pipeline from the point of connection to the Glendale recycled water system to the users in the Arroyo seco vicinity. The four potential users in this option are identified below in Table 8-2.

Table 8-2: Recycled Water Uses - Actual and Potential (AFY)

Customer	Treatment Level	2005	Potential
Brookside Golf Course	Tertiary	0	572
Rose Bowl Stadium	Tertiary	0	13
Brookside Park	Tertiary	0	107
Defender's Park	Tertiary	0	7
Total		**0**	**699**

PWP projected in the 2000 UWMP that 300 AFY of recycled water would be delivered within the Service area (Table 8-3).

Table 8-3: Recycled Water Uses - 2000 Projection Compared with 2005 Actual (AFY)

Type of use	2000 Projection for 2005	2005 actual use
Landscape	300	0
Total	300	0

The projected use has not yet occurred as PWP has been involved in conducting extensive feasibility analysis since 2000 to obtain a clearer picture of the costs and benefits involved. Due to lack of capital funds and the high cost of recycled water, at the current time PWP is not actively pursuing the use of recycled water. There are other projects in progress which will achieve the same goals as recycled water

projects of reducing imported water needs and increasing reliability, but in a more cost effective manner. PWP is currently evaluating other funding options. At such point that developing a recycled water program is feasible, the system shown in Table 8-2 would be a reasonable starting point. A conservative projection could see construction complete and deliveries beginning in the year 2020 (Table 8-4).

Table 8-4: Projected Future Use of Recycled Water in Service Area (AFY)

	2010	2015	2020	2025	2030
Projected Recycled Water Use	0	0	700	700	700

Proposed Actions to Encourage Use of Recycled Water

The surveys of potential customers conducted in the RWFS revealed specific concerns about implementing recycled water use. The most important concerns were about the costs of additional onsite infrastructure, the salt content of the recycled water and reliability. One key perceived advantage of recycled water for the potential users was the reduced cost. PWP has identified certain actions that can be proposed to encourage the use of recycled water and overcome the barriers to implementation. These are identified in Table 8-5.

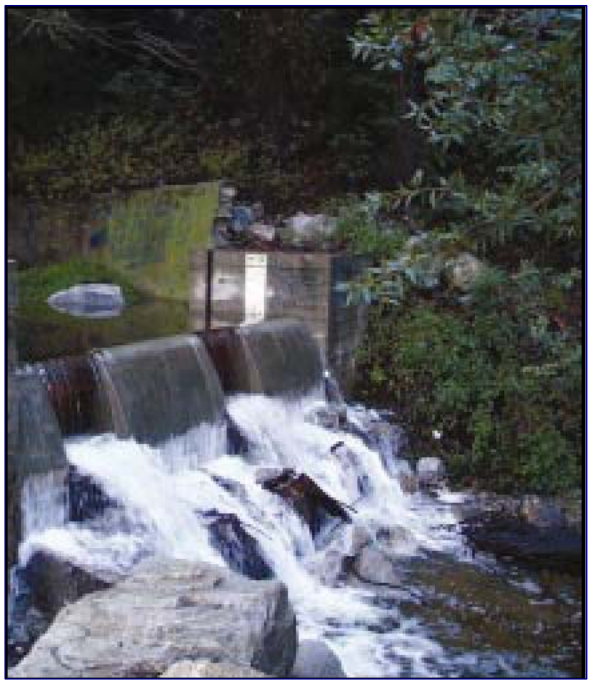
Table 8-5: Methods to Encourage Recycled Water Use

Methods	Methods Used
Lowered costs	✓
Public education	✓
Guarantee recycled water quality	✓
Ensure recycled water supply reliability	✓

Recycled Water Optimization Plan

PWP has put great effort into making the maximum use of recycled water in its service area a possibility. It has already secured a source of reclaimed water. In the process of contacting potential users, it has encouraged and promoted the use of recycled water. Most users have given consent and accepted the possible use of recycled water. Alternatives have been developed to allow flexibility and allow PWP to choose the most suitable option based on economic considerations. The only real obstacle at the present time is the lack of funding. As these other projects are completed and resources become available, then PWP will be in position to ramp up quickly towards implementation of its recycled water system plans.

This page intentionally left blank



• Supply and Demand Comparison

Chapter 9 Supply and Demand Comparison

Law

> *10635 (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 25 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from the state, regional, or local agency population projections within the service area of the urban water supplier.*

To ensure adequate quantities of supply for the future, supply and demand comparisons were conducted for a variety of different scenarios. The historical dry year (1995) and multiple dry year period (1991-93) was identified in Table 6-2. The water supply patterns during those periods will be compared against future projected demands to identify potential deficits and determine if PWP has sufficient resources and demand management contingencies to meet a historical drought period in the future. Three scenarios will be examined: 1) The normal year scenario 2) a single dry year scenario and 3) a three year drought scenario. This is done to verify that PWP has the capability to meet future water demands under normal and dry conditions and to provide a quantitative assessment of the ability of different resources (groundwater, surface spreading, imported water and storage) to meet a variety of supply/demand scenarios. This will allow for improved planning and provide a basis for identifying potential needs.

9.1 Imported Water - Regional Supply and Demand Comparisons

MWD conducted its own supply and demand comparison as part of its required RUWMP. To forecast urban water demands in its service area, MWD developed and utilized the MWD-MAIN Water Use Forecasting System. MWD-MAIN features statistical models that have been adapted to conditions in Southern California. The statistical portion of the model incorporates projections of demographic and economic variables from regional planning agencies (e.g. SCAG) into statistically estimated water demand models to produce forecasts of water demand. In addition to the imported supplies, a key element of MWD planning includes current and future regional water supply projects that provide in basin storage. Table 9-1 shows the results of MWD's modeling projections for a multiple dry year period.

Table 9-1: MWD Multiple Dry-Year Supply Capability and Projected Demands (AFY)[1] (Repeat of 1990-92 Hydrology)

	2010	2015	2020	2025	2030
CURRENT SUPPLIES					
Colorado River	722,000	699,000	699,000	699,000	699,000
California Aqueduct	912,000	912,000	912,000	912,000	912,000
In-Basin Storage	482,000	480,000	463,000	449,000	449,000
SUPPLIES UNDER DEVELOPMENT					
Colorado River	95,000	460,000	400,000	400,000	400,000
California Aqueduct	330,000	215,000	299,000	299,000	299,000
In-Basin Storage	78,000	103,000	103,000	103,000	103,000
Transfers to other agencies	0	(35,000)	(35,000)	(35,000)	(35,000)
MAX SUPPLY CAPABILITY	2,619,000	2,834,000	2,841,000	2,827,000	2,827,000
MAX SUPPLY CAPABILITY w/CRA Max of 1.25 MAF[2]	2,619,000	2,776,600	2,741,000	2,719,000	2,719,000
TOTAL DEMANDS ON MWD	2,376,000	2,389,000	2,317,000	2,454,000	2,587,000
SURPLUS	**243,000**	**377,000**	**424,000**	**265,000**	**132,000**

[1]From the MWD RUWMP (September, 2005)
[2]Maximum CRA deliveries limited to 1.25 million acre feet (MAF)

Implications for PWP

As can be seen from the table above, the resource mix of MWD will be more than sufficient to respond to future regional demands, even during historical dry year scenarios. Thus, even during a dry period, MWD projects that the delivery of imported water to PWP would not be adversely affected (with an assumed amount of conservation). The supply and demand projections were based on assumptions about expected supply capability for various resource programs under development. In the event that some of these assumptions are incorrect and imported water supplies during a drought are less than MWD's projections (for example, MWD supplies were curtailed during the 1987-1992 drought) PWP has conducted its own supply and demand analysis assuming a reduced quantity of imported water available during drought years. The details of this analysis are presented in the remainder of this chapter.

9.2 PWP Normal and Dry Year Supply and Demand Comparison

Methodology

Supply and demand projections were developed in Chapter 3 (Water Supply) and Chapter 4 (Water Demand). Projections were based on thorough analysis of the service area characteristics and available water sources. In this section, a supply versus demand comparison is performed to verify that PWP can meet future demand under a variety of scenarios.

Normal Year

Table 9-2 compares current and projected water supply and demand during a normal year. The normal year is based on the water use projections in Table 4-1. Supply projections are taken from Table 3-6 and compared to demand totals taken from Table 4-1. For the normal year projections, it was found that projected supply actually exceeded projected demand. Thus, in average precipitation years, the City of Pasadena will have sufficient water to meet its customers' needs through 2030. Table 9-2 shows that supply exactly matches demand because PWP will take just the amount of imported water from MWD to fulfill its needs.

Table 9-2: Projected Normal Year Supply and Demand Comparison (AFY)

	2010	2015	2020	2025	2030
Supply totals	39,957	41,291	42,624	43,959	45,293
Demand totals	39,957	41,291	42,624	43,959	45,293
Difference	**0**	**0**	**0**	**0**	**0**

Single Dry Year

1995 was identified as the driest year in recent record based on PWP production. The single dry year scenario investigates the effect of an isolated single dry period similar to 1995 occurring in the future. Supply is set at the 1995 production level (Table 9-3 (a)). Demand is taken from Table 4-1 and assumes that conservation would reduce the future demand by 15% (Table 9-3 (b)). In the event of a historical single year drought, PWP would experience a shortage during that year. However, any deficit experienced during these periods would be met by pumping water from the LTS.

Table 9-3 (a): Projected Single Dry Year Water Supply (AFY)

	2010	2015	2020	2025	2030
Supply	32,318	32,318	32,318	32,318	32,318
% of projected normal	81%	78%	76%	73%	71%

Table 9-3 (b): Projected Single Dry Year Water Demand (AFY)

	2010	2015	2020	2025	2030
Demand	33,963	35,097	36,230	37,365	38,497
% of projected normal	85%	85%	85%	85%	85%

Table 9-3 (c): Projected Single Dry Year Supply and Demand Comparison (AFY)

	2010	2015	2020	2025	2030
Supply totals	32,318	32,318	32,318	32,318	32,318
Demand totals	33,963	35,097	36,230	37,365	38,497
Difference	(1,645)	(2,779)	(3,912)	(5,047)	(6,179)
Difference as % of Supply	5%	8%	12%	16%	19%
Difference as % of Demand	5%	8%	11%	13%	16%

9.3 Multiple Dry Year Supply and Demand Comparison

The multiple dry year period supply and demand comparison examines the effect of a historical multiple dry period occurring in the future. The five sets of tables and figures that follow illustrate these comparisons at five year increments from 2006 to 2030. The historical dry year period was identified as the three period from 1991-93. The supply production numbers for this period are shown in Table 6-2. In each five year increment, it is assumed that the dry period will take place in the last three years of each period. The "normal" supply and demand numbers for each year were determined by following the same projections as shown in Tables 3-6 and Table 4-1. Conservation measures that will result in a 15% demand reduction are assumed to occur beginning the fourth year of each five year increment.

Multiple Dry Year Projected Supply

Tables 9-4 (a) through 9-8 (a) show that projected supply is equivalent to normal year supply in the first two years of each period and then follows the historical three year dry period pattern beginning the third year.

Multiple Dry Year Projected Demand

Tables 9-5 (b) through 9-8 (b) show that the demand is equivalent to normal year projected demand during the first 3 years and then is reduced by 15% to reflect assumed conservation during the last 2 years.

Multiple Dry Year Projected Supply and Demand Comparison

The comparison between supply and demand is shown in Tables 9-4 (c) through Tables 9-8 (c). During years when projected supply is greater than projected demand, the supply is adjusted to just meet demand and there is no annual deficit. In years where demand exceeds supply, the annual difference will be considered withdrawn from the LTS account (shown as "Pumped From Storage") and subtracted from the LTS balance. Figures 9-1 through Figure 9-6 show the trends for supply, demand and storage for each five year increment.

2006-2010 – Multiple Dry Year Period

Table 9-4(a): 2006-2010 Multiple Dry Year Projected Supply (AFY)

	2006	2007	2008	2009	2010
Supply	38,890	39,157	36,861	31,665	34,294
% of projected normal	100%	100%	94%	80%	86%

Table 9-4 (b): 2006-2010 Multiple Dry Year Projected Demand (AFY)

	2006	2007	2008	2009	2010
Demand	38,890	39,157	39,423	33,736	33,963
% of projected normal	100%	100%	100%	85%	85%

Table 9-4 (c): 2006-2010 Multiple Dry Year Projected Supply and Demand Comparison

	2006	2007	2008	2009	2010
Supply totals	38,890	39,157	36,861	31,665	34,294
Demand totals	38,890	39,157	39,423	33,736	33,963
Difference	**0**	**0**	**(2,562)**	**(2,071)**	**331**
Pumped from (to) Storage	**0**	**0**	**2,562**	**2,071**	**(331)**
ANNUAL NET DEFICIT	**0**	**0**	**0**	**0**	**0**
Long Term Storage Balance	**24,221**	**24,221**	**21,659**	**19,587**	**19,919**
Difference as % of Supply	0%	0%	(7%)	(6%)	-
Difference as % of Demand	0%	0%	(6%)	(6%)	-

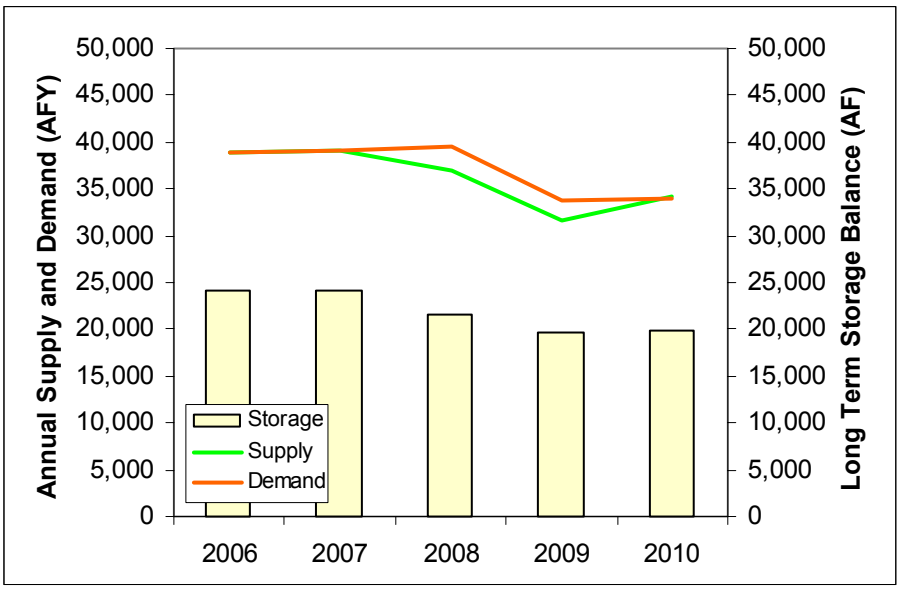


Figure 9-1
Supply versus Demand, Storage
2006-2010

2011-2015 Multiple Dry Year Period

Table 9-5 (a): 2011-2015 Multiple Dry Year Projected Supply (AFY)

	2011	2012	2013	2014	2015
Supply	40,224	40,491	36,861	31,665	34,294
% of projected normal	100%	100%	90%	77%	83%

Table 9-5 (b): 2011-2015 Multiple Dry Year Projected Demand (AFY)

	2011	2012	2013	2014	2015
Demand	40,224	40,491	40,757	34,870	35,097
% of projected normal	100%	100%	100%	85%	85%

Table 9-5 (c): 2011-2015 Multiple Dry Year Projected Supply and Demand Comparison

	2011	2012	2013	2014	2015
Supply totals	40,224	40,491	36,861	31,665	34,294
Demand totals	40,224	40,491	40,757	34,870	35,097
Difference	**0**	**0**	**(3,896)**	**(3,205)**	**(803)**
Pumped from (to) Storage	**0**	**0**	**3,896**	**3,205**	**803**
ANNUAL NET DEFICIT	**0**	**0**	**0**	**0**	**0**
Long Term Storage Balance	**24,221**	**24,221**	**20,325**	**17,120**	**16,317**
Difference as % of Supply	0%	0%	(11%)	(10%)	2%
Difference as % of Demand	0%	0%	(10%)	(9%)	2%

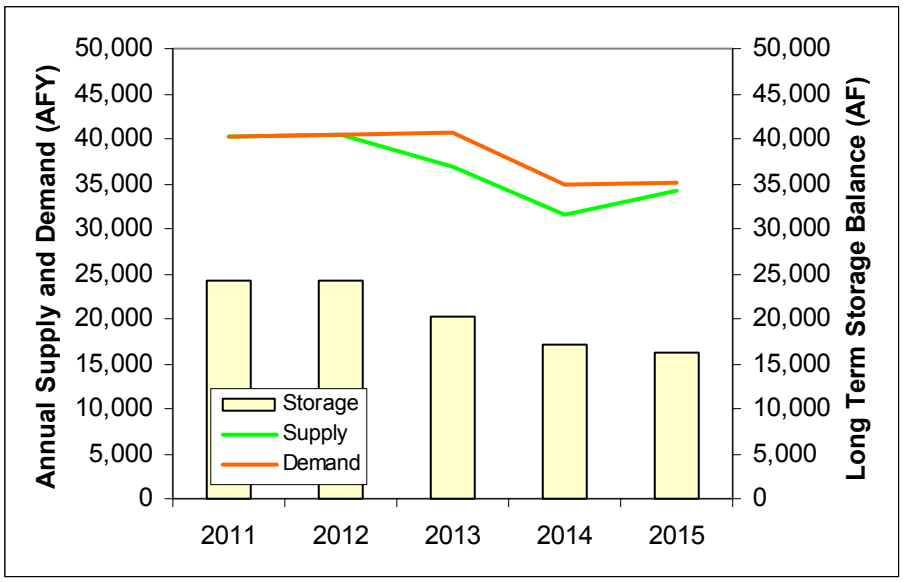


Figure 9-2
Supply versus Demand, Storage
2011-2015

2016-2020 Multiple Dry Year Period

Table 9-6 (a): 2016-2020 Multiple Dry Year Projected Supply (AFY)

	2016	2017	2018	2019	2020
Supply	41,559	41,826	36,861	31,665	34,294
% of projected normal	100%	100%	88%	75%	80%

Table 9-6 (b): 2016-2020 Multiple Dry Year Projected Demand (AFY)

	2016	2017	2018	2019	2020
Demand	41,559	41,826	42,092	36,005	36,232
% of projected normal	100%	100%	100%	85%	85%

Table 9-6 (c): 2016-2020 Multiple Dry Year Projected Supply and Demand Comparison (AFY)

	2016	2017	2018	2019	2020
Supply totals	41,559	41,826	36,861	31,665	34,294
Demand totals	41,559	41,826	42,092	36,005	36,232
Difference	**0**	**0**	**(5,231)**	**(4,340)**	**(1,938)**
Pumped from (to) Storage	**0**	**0**	**5,231**	**4,340**	**1,938**
ANNUAL NET DEFICIT	**0**	**0**	**0**	**0**	**0**
Long Term Storage Balance	**24,221**	**24,221**	**18,990**	**14,650**	**12,712**
Difference as % of Supply	0%	0%	(14%)	(14%)	(6%)
Difference as % of Demand	0%	0%	(12%)	(12%)	(5%)

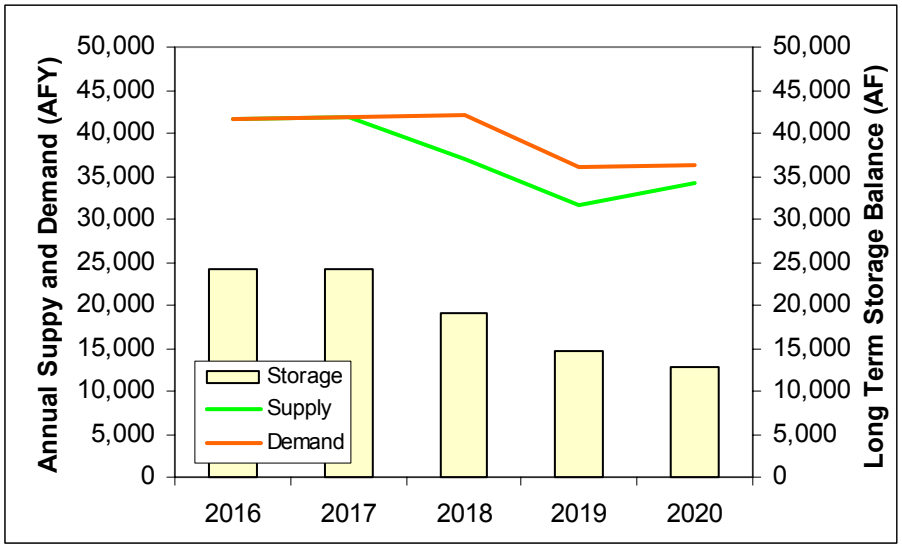


Figure 9-4
Supply versus Demand, Storage
2016-2020

2021-2025 Multiple Dry Year Period

Table 9-7 (a): 2021-2025 Multiple Dry Year Projected Supply (AFY)

	2021	2022	2023	2024	2025
Supply	42,891	43,158	36,861	31,665	34,294
% of projected normal	100%	100%	85%	72%	78%

Table 9-7(b):2021-2025 Multiple Dry Year Projected Demand (AFY)

	2021	2022	2023	2024	2025
Demand	42,891	43,158	43,424	37,137	37,364
% of projected normal	100%	100%	100%	85%	85%

Table 9-7 (c): 2021-2025 Multiple Dry Year Projected Supply and Demand Comparison (AFY)

	2021	2022	2023	2024	2025
Supply totals	42,891	43,158	36,861	31,665	34,294
Demand totals	42,891	43,158	43,424	43,691	43,957
Difference	**0**	**0**	**(6,563)**	**(5,472)**	**(3,070)**
Pumped from Storage	**0**	**0**	**6,563**	**5,472**	**3,070**
ANNUAL NET DEFICIT	**0**	**0**	**0**	**0**	**0**
Long Term Storage Balance	**24,221**	**24,221**	**17,658**	**12,186**	**9,116**
Difference as % of Supply	0%	0%	(18%)	(17%)	(9%)
Difference as % of Demand	0%	0%	(15%)	(12%)	(7%)

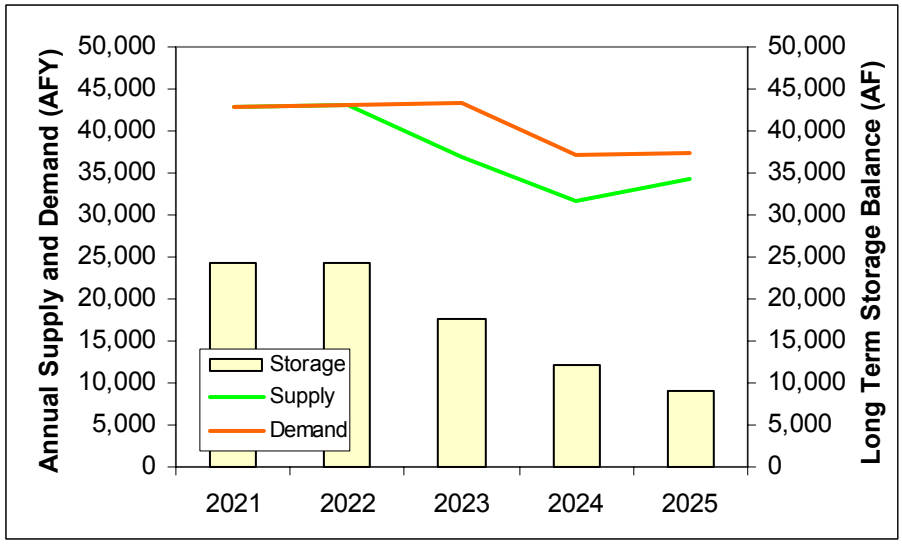


Figure 9-5
Supply versus Demand, Storage
2021-2025

2026-2030 Multiple Dry Year Period

Table 9-8 (a): 2026-2030 Multiple Dry Year Projected Supply (AFY)

	2026	2027	2028	2029	2030
Supply	44,226	44,493	36,861	31,665	34,294
% of projected normal	100%	100%	82%	70%	76%

Table 9-8 (b): 2026-2030 Multiple Dry Year Projected Demand (AFY)

	2026	2027	2028	2029	2030
Demand	44,226	44,493	44,759	38,272	38,499
% of projected normal	100%	100%	100%	85%	85%

Table 9-8 (c): 2026-2030 Multiple Dry Year Projected Supply and Demand Comparison (AFY)

	2026	2027	2028	2029	2030
Supply totals	44,226	44,493	36,861	31,665	34,294
Demand totals	44,226	44,493	44,759	38,272	38,499
Difference	**0**	**0**	**(7,898)**	**(6,607)**	**(4,205)**
Pumped from Storage	**0**	**0**	**7,898**	**6,607**	**4,205**
ANNUAL NET DEFICIT	**0**	**0**	**0**	**0**	**0**
Long Term Storage Balance	**24,221**	**24,221**	**16,323**	**9,716**	**5,511**
Difference as % of Supply	0%	0%	(22%)	(21%)	(12%)
Difference as % of Demand	0%	0%	(18%)	(17%)	(11%)

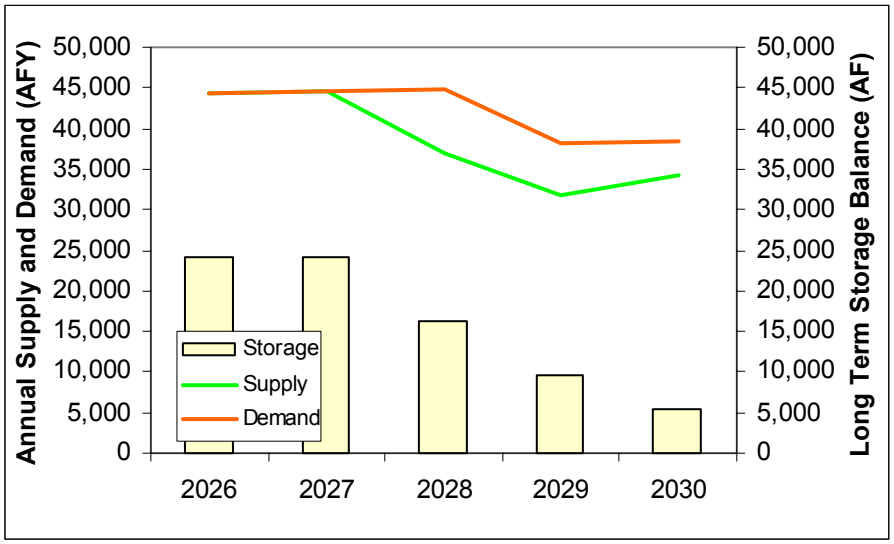


Figure 9-6
Supply versus Demand ,Storage
2026-2030

9.4 Conclusions

Based on the supply and demand comparisons, PWP will have sufficient supply to meet the projected demand over the next twenty-five years. Its ability to meet demands during a multiple dry year period is based on the storage reserve it maintains in the Raymond Basin. During a time of drought, it can draw on this reserve to supplement its supply. In the previous comparisons, the scenarios showed that the storage reserve would be drawn down over the course of a three year dry period. In the final multiple year analysis from 2026-2030, the LTS reached 5,511 AF. Thus, although there is enough projected supply and storage available under these scenarios, it is important that PWP take steps to boost its reserves. There are a number of critical actions that PWP is planning to take to provide additional assurance that it will be able to maintain deliveries:

- In the short term, PWP will restore most of the out-of-service wells into production by installing perchlorate treatment systems.
- In the long term, PWP will expedite its participation in the RBCUP as this will allow it to store more water in the Basin. Once the RBCUP agreement is in place, PWP plans to maximize its filling of the LTS.
- PWP will cooperate with the watershed planning efforts in the Arroyo Seco to develop the plan to increase the capacity of its spreading basins.

The comparisons in Chapter 9 are based on the assumption that MWD would be forced to curtail its deliveries during a drought. In reality, MWD has performed its own multiple dry year analysis and has determined that it would be able to maintain deliveries to its member agencies even in the event of a historical multiple dry year period. However, by taking the critical actions above PWP will ensure that it can reliably maintain its own supply in the event that MWD experiences delays in implementing its IRP, as well as providing a buffer against uncertainty.

Save
Water

Chapter 10 Water Shortage Contingency Plan

The City's water shortage contingency plan is located in its municipal code in Chapter 13.10 (Appendix G) entitled "Water Shortage Procedures" (Procedures). These Procedures specify voluntary and mandatory provisions to minimize the effect of a water shortage to the customers of the City and to extend the available water supply to reduce hardship during time of water shortage. The Procedures can be activated when the City Council, after a public hearing, makes the decision that a water shortage condition exists. This is defined as when the existing and/or projected water supply available to the City is not anticipated to meet the ordinary water requirements of its service area customers.

10.1 Stages of Action

Law

> *10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:*
>
> *10632 (a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply and an outline of specific water supply conditions which are applicable to each stage.*

In the event of an extended dry period or drought, the City is prepared to proceed through a series of progressively more restrictive stages of water demand reduction. These stages are contained in three separate sections of the Procedures which are termed Water Shortage Plans I, II and III. This staged approach allows a flexible response to short and long term fluctuations in water supply. In the first stage, voluntary cutbacks are requested on certain water intensive activities. In the second stage, restrictions on these activities become mandatory. The third stage calls for all customers to reduce their total usage by a certain percentage, regardless of the type of use. This stage consists of 5 phases that call for increasing mandatory reductions starting at 15% and proceeding in steps to achieve up to 50% water usage reductions. The Water Shortage Plans (WSPs) are summarized in Table 10-1. The City Council decides which WSP is most appropriate based on recommendations from PWP and the Utilities Advisory Commission (UAC).

Table 10-1: Water Rationing Stages and Reduction Goals

Stage	Shortage Condition	Customer Reduction Goal	Type of Rationing Program
Water shortage plan I	1-15%	Up to 15%	Voluntary
Water shortage plan II	1-15%	Up to 15%	Mandatory
Water shortage plan III			
Phase 1	15%	15% or greater	Mandatory
Phase 2	15-20%	20% or greater	Mandatory
Phase 3	20-25%	25% or greater	Mandatory
Phase 4	25-35%	35% or greater	Mandatory
Phase 5	35-50%	50% or greater	Mandatory

10.2 Estimate of Minimum Supply for Next Three Years

The driest three year period was identified as 1991-1993. Table 10-2 shows the estimated minimum water supply for the next three years if a similar dry year period were to occur during that time.

Table 10-2: Estimate of Minimum Supply for the Next Three Years

Source	Normal	2006	2007	2008
Groundwater	15,275	14,143	11,039	8,172
Imported water (MWD)	21,242	22,718	20,626	26,122
Total	**36,518**	**36,861**	**31,665**	**34,294**

10.3 Catastrophic Supply Interruption Plan

In addition to climatic variations, PWP can be affected by events of a catastrophic nature that can drastically affect water supply and/or operations necessary for delivery of clean, safe water. Some specific scenarios that could lead to catastrophic effects on water supply would be: 1) region wide power outage, 2) earthquake, 3) water contamination and 4) loss of imported water. PWP prepares for such events by establishing written plans for a variety of contingencies, operating a water quality laboratory for faster water quality sampling results, implementing security upgrades, maintaining alternate power sources and communications equipment, and having well defined points of contact and chains of command during emergencies.

PWP has established an emergency response plan and contingency plan to respond to catastrophic events that interrupt the delivery of water to its service area. In addition to preparing for specific types of events, PWP is also prepared to deal with the individual consequences of such events such as power loss, degradation to water quality and loss of communications. Table 10-3 lists possible actions that PWP can take in the event of a catastrophe. The goal of PWP emergency planning is to maintain as much clean, safe supply of water to meet the basic needs of customers and to mitigate the negative effects of an interruption to water supply as much as possible.

Table 10-3: Possible Actions in the Event of a Catastrophe

Catastrophe	Summary of Possible Actions
Regional Power Outage	1) Resort to alternative means of inter-PWP communications 2) Restore local power to pumps, boosters and water treatment facilities 3) Recommend the use of boiled water 4) Call for immediate customer reductions in use 5) Check for availability of water from neighboring agencies through emergency interconnections 6) Establish and maintain communications with MWD
Earthquake	1) Resort to alternative means of inter-PWP communications (if power is lost) 2) Restore local power to pumps, boosters and water treatment facilities (if power is lost) 3) Check for structural damage to reservoirs, boosters, pumps and wells 4) Recommend the use of boiled water 5) Call for immediate customer reductions in use 6) Check for availability of water from neighboring agencies through emergency interconnections 7) Establish and maintain communications with MWD
Water Contamination	1) Recommend the use of boiled water 2) Consider increased disinfection 3) Check for availability of uncontamined water from neighboring agencies through emergency interconnections 4) Establish and maintain communications with MWD
Loss of imported water	1) Call for immediate customer reductions in use 2) Check for availability of water from neighboring agencies through emergency interconnections 3) Establish and maintain communications with MWD

10.4 Prohibitions, Consumption Reduction Methods and Penalties

Law

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

10632 (e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

10632 (f) Penalties or charges for excessive use, where applicable.

Mandatory Prohibitions on Water Wasting

The Procedures include prohibitions on various wasteful water uses such as lawn watering during mid-day hours, washing sidewalks and driveways with potable water, and allowing plumbing leaks to go uncorrected more than 24 hours after customer notification. The mandatory prohibitions are summarized below in Table 10-4.

Table 10-4: Mandatory Prohibitions

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
Hosing or washing sidewalks, walkways, driveways, parking areas or other paved surfaces	WSP II
Cleaning, filling, or maintaining levels in decorative fountains, ponds, lakes, and similar structures (unless equipped with water recycling system)	WSP II
Serving drinking water, unless upon request in restaurants, hotels, cafes and cafeterias	WSP II
Allowing water to leak from any facility	WSP II
Allowing water to runoff into adjoining streets, sidewalks, parking lots or alleys from defective sprinklers or excessive watering	WSP II
Landscape watering more than once every three days	WSP II
Landscape watering between 10am and 5 pm	WSP II
Refilling a swimming pool emptied after commencement of water shortage	WSP II

Consumption Reduction Methods

Table 10-5 lists the consumption reduction methods that are proscribed by the WSPs.

Table 10-5: Consumption Reduction Methods

Examples of Consumption Reduction Methods	Stage When Method Takes Effect
Education Program	All WSPs
Voluntary Rationing	WSP I
Water Use Prohibitions	WSP II
Mandatory Rationing	WSP II & III

Penalties and Charges

There are penalties for violating the mandatory provisions of any of the WSPs once they are in effect. Following a public hearing as provided in Section 13.10.035, the board of directors shall establish a schedule of penalties, up to and including reduction or termination of service, to be assessed for the violation of any of the provisions of the WSPs that are implemented. Monetary penalties imposed under this section shall be collected by adding the penalty amount to the customer's water bill and shall be payable at the same time and in the same manner as such bills, or by such other method of collection and payment as established by the department.

10.5 Analysis of Revenue Impacts of Reduced Sales during Shortages

Law

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

Revenues and Expenditures during a Drought

During a drought, PWP anticipates some uncertainty of cash flow. Revenue will be reduced due to lowered water sales. The loss in revenue would be partially offset by the lowered costs of purchasing less water. However, there are overhead costs that remain constant and some costs may actually increase during a drought. For instance, operations and maintenance costs might actually increase due to additional labor and non-labor expenses that would be incurred as a result of the implementation of a drought program.

Measures to Overcome Revenue and Expenditure Impacts

To prepare for the financial impact of a drought, PWP maintains a cash reserve which is equivalent to about 30 days of water service revenues. It is in the process of increasing this to 60-90 days worth of reserves. PWP also can modify its water rate structure to recover its costs and remain financially viable. In general, the water rate structure is designed to recover the costs of service. During a drought period, PWP could implement a special surcharge or conduct a revised cost of service study to allow the recovery of all additional costs associated with providing water service during a drought period.

10.6 Draft Ordinance and Use Monitoring

Reduction Measuring Mechanisms

Law

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

PWP uses the following mechanisms to monitor reductions in use. Under normal water supply conditions, potable water production figures are recorded daily. Weekly totals for well production, MWD purchases, and spreading are tabulated and calculated by the Water Engineering Division. The information is stored on a computer network file that is accessible to all staff that have access to the network. Monthly totals are reported and recorded in the same manner with a separate file established for monthly production values. The information is submitted to the Water Department Manager and incorporated into the water supply report.

During all stages of the water shortage, an electronic spreadsheet will be used to compare current weekly production figures with projected base weekly figures. This data will be submitted to the Water Engineering Manager for analysis to verify that the reduction goal is being met. Monthly reports will be submitted as usual and will also be submitted to the General Manager. If reduction goals are not met, the General Manager will notify the City Council so that corrective action can be taken. Depending on the type of emergency shortage, production figures can be reported to the Water Engineering Manager on an hourly basis. Weekly reports will be made to the General Manager and subsequently to the City Council. PWP also has a Supervisory Control Data and Acquisition (SCADA) system that displays and stores data including instantaneous production figures.

This page intentionally left blank

• Adoption and Implementation of UWMP

Chapter 11 Adoption and Implementation of UWMP

11.1 Public Participation and UWMP Adoption

The UWMP was made available for public inspection at the Central Library and on the PWP website. A courtesy public hearing was held on October 18, 2005. A formal public hearing was held on December 12, 2005.

11.2 Review of Implementation of 2000 UWMP

Implementation of proposed or planned actions of the 2000 UWMP was addressed in this 2005 UWMP.

11.3 2005 UWMP Delivery to DWR and California State Library

Copies of the UWMP were provided to DWR and the California State Library.

This page intentionally left blank

APPENDICES

APPENDIX A NOTICE OF PUBLIC HEARING ON THE 2005 URBAN WATER MANAGEMENT PLAN

APPENDIX B RESOLUTION FOR THE ADOPTION OF THE 2005 URBAN WATER MANAGEMENT PLAN

APPENDIX C 1984 RAYMOND BASIN JUDGEMENT

APPENDIX D CALCULATION OF SPREADING CREDITS IN THE RAYMOND BASIN

APPENDIX E MWD PURCHASE ORDER FOR IMPORTED WATER SUPPLY

APPENDIX F CUWCC BMP COVERAGE AND STATUS REPORTS: 2003-2004

APPENDIX G WATER SHORTAGE PROCEDURES

This page intentionally left blank

APPENDIX A

NOTICE OF PUBLIC HEARING ON

THE 2005 URBAN WATER MANAGEMENT PLAN

This page intentionally left blank

NOTICE OF A PUBLIC HEARING

for

2005 URBAN WATER MANAGEMENT PLAN

in the

City of Pasadena, California

A public hearing is scheduled for December 12, 2005 at the City Council meeting at the Pasadena Senior Center, Multi-Purpose Room, 85 E. Holly, Pasadena, California for the 2005 Urban Water Management Plan (Plan) beginning at 8:00 pm. This public hearing will be an opportunity to address any issues the public may have prior to the adoption of the Plan by the City Council.

The Plan consists of the following topics: Supply Service Area, Water Supply and Demand Comparison, Demand Management and Conservation, Water Supply Reliability, Water Quality Impacts on Reliability, Wastewater and Recycled Water, and Water Shortage Contingency Plan.

Copies of the draft Plan are available at the Central Library and online at www.PWPweb.com (click on "Your Water").

CYNTHIA J. KURTZ

City Manager

Note: This notice was published in the Pasadena Star-News on November 28, 2005 and December 5, 2005. Ad no. 180167.

This page intentionally left blank

APPENDIX B

RESOLUTION FOR THE ADOPTION

OF THE 2005 URBAN WATER MANAGEMENT PLAN

This page intentionally left blank

I hereby certify that the foregoi
document is a full, true and co
copy of Resolution 8
on file in the office of the City C
of the city of Pasadena, Calif.
Sr. Asst. City Clerk

RESOLUTION NO. 8546

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF PASADENA ADOPTING THE 2005 URBAN WATER MANAGEMENT PLAN

WHEREAS, the California Legislature enacted the Urban Water Management Planning Act (California Water Code, Sections 10610 through 10657) during the 1983-1984 Regular Session, and as amended subsequently, which requires that every urban water supplier that provides water to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually shall prepare and adopt an urban water management plan; and

WHEREAS, the City of Pasadena (City) is an urban supplier of water providing water to a population of 167,000; and

WHEREAS, the Plan shall be periodically reviewed at least once every five years, and that the City shall make any amendments or changes to its Plan which are indicated by the review; and

WHEREAS, the Plan must be adopted by December 31, 2005, after public review and hearing, and filed with the California Department of Water Resources within thirty days of adoption; and

WHEREAS, the City has therefore, prepared and circulated for public review a draft Urban Water Management Plan, and a properly noticed public hearing regarding said Plan was held by the City Council on December 12, 2005; and

WHEREAS, the City did prepare and shall file said Plan with the California Department of Water Resources by December 23, 2005;

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Pasadena that:

1. The 2005 Urban Water Management Plan submitted concurrently herewith is hereby adopted and ordered filed with the City Clerk;
2. The City Manager is hereby authorized and directed to file the 2005 Urban Water Management Plan with the California Department of Water Resources within 30 days after this date on behalf of the City; and
3. The City Clerk is directed to attest her signature and affix the corporate seal of the City to said Plan.

Adopted at the regular meeting of the City Council on the 12th day of December, 2005 by the following vote:

AYES: Councilmembers Gordo, Haderlein, Holden, Little, Vice Mayor Madison, Mayor Bogaard

NOES: None

ABSENT: Councilmembers Streator, Tyler

ABSTAIN: None

Jane L. Rodriguez
JANE RODRIGUEZ, CITY CLERK

Approved as to form:

Scott D. Rasmussen
Scott D. Rasmussen
Assistant City Attorney

APPENDIX C

1984 RAYMOND BASIN JUDGEMENT

This page intentionally left blank

Victor Kaleta
City Attorney, Pasadena
City Hall
Pasadena, California 91109

BEST, BEST & KRIEGER
Arthur L. Littleworth
P. O. Box 1028
Riverside, California 92502
Telephone: (714) 686-1450
Special Counsel for Plaintiff

SUPERIOR COURT OF CALIFORNIA, COUNTY OF LOS ANGELES

CITY OF PASADENA, a municipal corporation, Plaintiff, vs. CITY OF ALHAMBRA, a municipal corporation, et al., Defendants.	NO. Pasadena C-1323 JUDGMENT (As Modified and Restated March 26, 1984)

The above-entitled action was brought by plaintiff, City of Pasadena, a municipal corporation, against City of Alhambra, a municipal corporation, City of Monrovia, a municipal corporation, City of Arcadia, a municipal corporation, City of Sierra Madre, a municipal corporation, City of South Pasadena, a municipal corporation, La Canada Irrigation District, San Gabriel County Water District, Lincoln Avenue Water Company, a corporation, The Las Flores Water Company, a corporation, Rubio Canon Land and Water Association, a corporation, Valley Water Company, a corporation, Flintridge Mutual Water Company, a corporation, California-Michigan Land and Water Company, a cor-

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

poration, Mira Loma Mutal Water Company, a corporation, El Campo Mutual Water Company, a corporation, Sunnyslope Water Company, a corporation, California Water and Telephone Company, a corporation, Crown City Ice Company, a corporation, Rancho Santa Anita, Inc., a corporation, Royal Laundry and Dry Cleaning Company, a corporation, Alice H. Graves, A. V. Wagner, Eugene E. Bean, Fred M. Wilcox, and Charles Hueston Hastings, Defendants, for the purpose of quieting the title of said plaintiff as against said defendants to the alleged prior and paramount right of said plaintiff to take, divert and use the waters within the area involved in the issues of the action situate in the County of Los Angeles, State of California, and to enjoin each defendant found to own a right to take or divert water from the Raymond Basin from taking therefrom, in any year, water in such volume as, when added to the amount which the other parties shall be adjudged and decreed to be entitled to take and divert, would result in a total annual diversion from said basin in excess of the average annual supply of water thereto; and on July 13, 1939, the above-entitled Court having issued its order directing said plaintiff to bring in and make parties to said action Ross M. Lockhard, Pasadena Cemetery Association, a corporation, Altadena Golf Club, a corporation, Henry E. Huntington Library and Art Gallery, a corporation, Bradbury Estate Company, a corporation, and East Pasadena Water Company, Ltd., a corporation, and said Court on the 8th day of November, 1939, having made its order declaring void the order to bring in new parties made July 13, 1939, insofar as East Pasadena Water Company, Ltd., is concerned, and said defendant having been dismissed from

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

this action; and

All said parties defendant having been duly served personally with summons and a copy of the complaint, and the issues having been joined; defendant Ross M. Lockhard having answered by his true name Ross M. Lockhart; and Robert A. Millikan, Archer Milton Huntington, Herbert Hoover, William B. Munro and Edwin P. Hubbell, Trustees of the Henry E. Huntington Library and Art Gallery answering for defendant Henry E. Huntington Library and Art Gallery, a corporation; defendants Bradbury Estate Company, a corporation, and Eugene E. Bean having disclaimed any right, title, interest or estate in and to the properties involved in this action, Charles Hueston Hastings, having answered by his true name Charles Heuston Hastings, and since the commencement of this action said defendant Charles Heuston Hastings having died and Ernest Crawford May as Executor of the Last Will and Testament of Charles Heuston Hastings, deceased, having been substituted for said decedent, and A. V. Wagner having answered and having asserted and claimed a right to water on his own behalf and on behalf of others claiming under and through him, and Canyon Mutual Water Company, a corporation, sued herein as Doe Corporation No. 1, having answered under its true name, and defendant Alice H. Graves having died since the commencement of this action, and Alice Graves Stewart and Katharine Graves Armstrong and Francis P. Graves being the heirs at law of said Alice H. Graves, deceased, and being the residuary legatees under the Last Will and Testament of Alice H. Graves, deceased, and having been substituted by stipulation as parties defendant for said

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

Alice H. Graves, and plaintiff since the commencement of this action having acquired the water rights owned and claimed by Jacob Bean Securities Company, a corporation, Alice Graves Stewart, Katharine Graves Armstrong and Francis P. Graves, exclusive of the rights of the last named individuals which are hereinafter set forth and defined, and plaintiff having duly filed its supplemental complaint with respect thereto, and the defendant City of Arcadia, since the commencement of this action, having acquired all water rights involved herein of the Rancho Santa Anita, Inc., a corporation, and said defendants having duly filed their supplemental answer with respect thereto, and First Trust and Savings Bank of Pasadena, a corporation, answering as successor in interest to defendant Altadena Golf Club, defendant Sunnyslope Water Company, a corporation, having stipulated that its true name is Sunny Slope Water Company, Chesley E. Osborn and Kathleen M. Osborn having been substituted as parties defendant in the place and stead of defendant Fred M. Wilcox, and Dell A. Schweitzer, executor of the estate of Fred M. Wilcox, deceased; motion of defendant City of South Pasadena for permission to file its amended answer disclaiming any interest or estate in the water and/or water rights in the Raymond Basin as described in plaintiff's complaint, having been granted, and said defendant, City of South Pasadena, having been dismissed from this action, subject to the obligation of said defendant to pay certain costs, plaintiff and certain defendants having jointly filed herein their motion that reference should be made to the Division of Water Resources, Department of Public

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

Works, State of California, as referee; after hearing thereon, following notice duly served on all defendants not parties to said motion, said Division of Water Resources having been appointed referee herein to investigate all of the physical facts involved herein, and seasonably to report to the Court thereon, and the said referee having filed its report herein and the objections thereto filed with it, a stipulation in writing having been entered into on the 29th day of September, 1943 by and between the attorneys for certain parties, to wit: City of Alhambra, City of Arcadia, California Water and Telephone Company, Canyon Mutual Water Company, Crown City Ice Company, El Campo Mutual Water Company, First Trust and Savings Bank of Pasadena, Flintridge Mutual Water Company, Francis P. Graves, Alice Graves Stewart and Katharine Graves Armstrong, being the heirs of Alice H. Graves, deceased, and being the residuary legatees under the Last Will and Testament of Alice H. Graves, deceased, Las Flores Water Company, Lincoln Avenue Water Company, Ross M. Lockhart, Ernest Crawford May, as Executor of the Last Will and Testament of Charles Heuston Hastings, deceased, Robert A. Millikan, Archer Milton Huntington, Herbert Hoover, William B. Munro and Edwin P. Hubbell, Trustees of the Henry E. Huntington Library and Art Gallery, Mira Loma Mutual Water Company, City of Monrovia, Chesley E. Osborn and Kathleen M. Osborn, Pasadena Cemetery Association, City of Pasadena, Royal Laundry and Dry Cleaning Company, Rubio Canon Land and Water Association, San Gabriel County Water District, City of Sierra Madre, Sunny Slope Water Company, Valley Water Company, A. V. Wagner and those

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

claiming under and through him, and said stipulation having been filed herein on the 24th day of November, 1943, requesting that a certain judgment be entered herein as between said parties, and stipulating that the amount of water pumped or otherwise taken by non-parties to this action in the Western Unit of the Raymond Basin Area as described in Paragraph I of the proposed judgment attached to said stipulation was 340 acre feet per year and that the amount of water pumped or otherwise taken by non-parties to this action in the Eastern Unit of said Raymond Basin Area was 109 acre feet per year, and the Court on November 24, 1943 having made its order making each and all of the terms and provisions of said proposed judgment immediately effective as to said stipulating parties, and on April 5, 1944 the Court having made its order appointing and authorizing the Division of Water Resources of the Department of Public Works of the State of California to act and serve herein as Watermaster in accordance with the provisions of the proposed judgment attached thereto and made a part thereof, and a stipulation between said stipulating parties and the defendant La Canada Irrigation District making the defendant La Canada Irrigation District a party to said stipulation for said judgment and order having been filed in this Court on April 28, 1944, and this Court on April 28, 1944 having ordered that during the pendency of this litigation or until further order of this Court the said defendant La Canada Irrigation District be made a party to the stipulation for judgment and order entered into on the 29th day of September, 1943 and filed on the 24th day of

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

November, 1943, and all objections and exceptions to the Report of Referee, except those of defendant California-Michigan Land and Water Company, having been withdrawn, and defendant Flintridge Mutual Water Company having assigned all its water rights involved herein to defendant Valley Water Company,

This cause came on regularly for hearing of the objections and exceptions of defendant California-Michigan Land and Water Company filed to the Report of Referee and the further trial of the cause between said defendant and the other parties on the 18th day of May, 1944 before the Honorable Frank C. Collier, judge presiding in Department Pasadena A of the above-entitled Court, the Court sitting without a jury; said hearing and trial were held on the following dates in the year 1944, to wit: May 18, May 19, May 23, May 24, May 25, May 31, June 1, June 2, June 6, June 7, June 8, July 20, August 7 and August 8. A. E. Chandler, Esq., Special Counsel, and Harold P. Huls, Esq., City Attorney, appearing as attorneys for plaintiff; Messrs. Goodspeed, McGuire, Harris & Pfaff by Richard C. Goodspeed, Esq., J. Donald McGuire, Esq., and Paul Vallee, Esq., appearing as attorneys for defendant California-Michigan Land and Water Company; Emmett A. Tompkins, Esq., City Attorney, and Kenneth K. Wright, Esq., appearing as attorneys for defendant City of Alhambra; Paul F. Garber, Esq., City Attorney, and Kenneth K. Wright, Esq., appearing as attorneys for defendant City of Monrovia; Kenneth K. Wright, Esq., appearing as attorney for defendant Ross M. Lockhart; Kenneth K. Wright, Esq., appearing

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

as attorney for defendant Flintridge Mutual Water Company; Kenneth K. Wright, Esq., appearing as attorney for defendant Valley Water Company; John C. Packard, Esq. and Kenneth K. Wright, Esq., appearing as attorneys for defendant El Campo Mutual Water Company; Messrs. Derthick, Cusack and Ganahl by W. J. Cusack, Esq., and Kenneth K. Wright, Esq., appearing as attorneys for defendant Crown City Ice Company; Messrs. Dunn & Sturgeon by Walter F. Dunn, Esq., Messrs. Chandler & Wright by Howard W. Wright, Esq., and Kenneth K. Wright, Esq., appearing as attorneys for defendants Francis Graves, Alice Graves Stewart and Katharine Graves Armstrong; Messrs. Bailie, Turner & Lake by Norman A. Bailie, Messrs. Cruickshank, Brooke & Dunlap by Robert H. Dunlap, Esq., and Kenneth K. Wright, Esq., appearing as attorneys for defendant Ernest Crawford May, as Executor of the Last Will and Testament of Charles Heuston Hastings, deceased; Messrs. Gibson, Dunn & Crutcher by Ira C. Powers, Esq., and Kenneth K. Wright, Esq., appearing as attorneys for defendants Robert A. Millikan, Archer Milton Huntington, Herbert Hoover, William B. Munro and Edwin P. Hubbell, trustees of the Henry E. Huntington Library and Art Gallery; Messrs. Anderson and Anderson by Trent G. Anderson, Esq., and Kenneth K. Wright, Esq., appearing as attorneys for defendant Rubio Canon Land and Water Association; Frank P. Doherty, Esq., and Kenneth K. Wright, Esq., appearing as attorneys for defendant La Canada Irrigation District; Messrs. Boyle, Holmes & Garrett by John W. Holmes, Esq., and Kenneth K. Wright, Esq., appearing as attorneys for defendant First Trust and Savings Bank of Pasadena; Walter F.

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

Dunn, Esq., City Attorney, and Kenneth K. Wright, Esq., appearing as attorneys for defendant City of Sierra Madre; Wilton W. Webster, Esq., and Kenneth K. Wright, Esq., appearing as attorneys for defendant Royal Laundry and Dry Cleaning Company; Messrs. Bacigalupi, Elkus & Salinger by Claude Rosenberg, Esq., and Kenneth K. Wright, Esq., appearing as attorneys for defendant California Water and Telephone Company; Kenneth K. Wright, Esq., appearing as attorney for defendant San Gabriel Valley Water Company; Messrs. Merriam, Rinehart & Merriam by Ralph T. Merriam, Esq., appearing as attorneys for defendant Pasadena Cemetery Association; Frederick G. Stoehr, Esq., appearing as attorney for defendant A. V. Wagner; Messrs. Potter and Potter, by Bernard Potter, Esq., appearing as attorneys for defendant Mira Loma Mutual Water Company; Gerald E. Kerrin, Esq. and James C. Bone, Esq., City Attorney, appearing as attorneys for defendant City of Arcadia; Laurence B. Martin, Esq., appearing as attorney for defendant Sunny Slope Water Company; Robert E. Moore, Esq., appearing as attorney for defendant Lincoln Avenue Water Company; Messrs. Hahn and Hahn by Edwin F. Hahn, Esq., appearing as attorneys for defendant The Las Flores Water Company; Messrs. Hahn and Hahn by Edwin F. Hahn, Esq., appearing as attorneys for defendants Chesley E. Osborn and Kathleen M. Osborn; and Messrs. Hahn and Hahn by Edwin F. Hahn, Esq., appearing as attorneys for defendant Canyon Mutual Water Company, and

All objections and exceptions to the Report of Referee filed by defendant California-Michigan Land and Water Company having been overruled by the Court with the exception

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

of objection 18 which was withdrawn by said defendant, and

Certain stipulations having been entered into by and between the parties and evidence both oral and documentary having been introduced and the cause having been submitted to the Court for its decision upon briefs, and briefs for the respective parties having been filed and considered, the Court, being fully advised in the premises, and having made its findings of fact and conclusions of law, and

The Court, by reason of the stipulation aforesaid and the findings of fact and conclusions of law, having rendered its Judgment on December 23, 1944, and such Judgment having been entered in Book 1491, page 84, on December 26, 1944, and

Pursuant to its reservation of jurisdiction in this case, and pursuant to appropriate motions, the Court having modified the Judgment on April 29, 1955; on January 17, 1974; and on June 24, 1974, and

Plaintiff having moved the Court for an order further modifying and restating the Judgment as modified, such motion having come on regularly for hearing on the 16th day of March, 1984, in Department A of the Northeast District of this Court, the Honorable Robert M. Olson, Judge, presiding; and notice of such motion having been duly served on all defendants and interested parties; and no objections to the granting of the motion having been filed or made at the hearing; and good cause having been shown, and the Court having therefore granted the motion, pursuant to the continuing jurisdiction of the Court,

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

IT IS HEREBY ORDERED, ADJUDGED AND DECREED that the Judgment in this case be modified and restated (including all transfers of rights and prior modifications which remain valid) as follows:

I

There exists in the County of Los Angeles, State of California, a field of groundwater, known and hereinafter referred to as the Raymond Basin Area, and subdivisions thereof herein designated the Eastern Unit and the Western Unit which are shown on the map attached hereto and hereby made a part hereof.

Under existing conditions, the safe yield of said Eastern Unit is 5,290 acre feet per year, and the safe yield of said Western Unit is 25,480 acre feet per year.

The amount of water pumped or otherwise taken by non-parties to this action in said Western Unit is less than 100 acre feet per year, and the amount of water pumped or otherwise taken by non-parties to this action in said Eastern Unit is zero acre feet per year.

The parties hereto pumping from wells or otherwise taking water for beneficial use from the ground in said subdivisions of said Raymond Basin Area are as shown in the table in Paragraph IV hereof.

/ / /

/ / /

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

II

As to those parties hereto who are taking or diverting water for beneficial use from any source contributing to the supply of water in the ground in said Raymond Basin Area, each of said parties has the right as against all parties other than the defendant California-Michigan Land and Water Company, no determination as to the existence of such right being made as against it, to continue to divert from such source for such use an amount of water measured by the maximum capacity of its diversion works and other facilities as the same existed at any time within five (5) years prior to October 1, 1937. That said maximum capacities of the said works and facilities of each of said parties in cubic feet per second are as follows:

La Canada Irrigation District (Snover Canyon)	1.20
Las Flores Water Company	0.50
Lincoln Avenue Water Company	6.59
Lockhart, Ross M.	1.20
May, Ernest Crawford, as Executor of the Last Will and Testament of Charles Heuston Hastings, deceased	0.26
Mira Loma Mutual Water company	0.81
Pasadena Cemetery Association	0.02
Pasadena, City of	
Arroyo Seco Including Millard Canyon	25.00
Eaton Canyon	8.90
Rubio Canon Land and Water Association	2.20
Sierra Madre, City of	6.00

Each of said parties, and each of their agents, employees, attorneys, and any and all persons acting by, through, or under them, or any of them, are and each of them is hereby forever enjoined and restrained from increasing its taking or diversion from such source beyond the amount of

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

such taking or diversion as measured by said maximum capacity of its diversion works and other facilities.

Each of the said parties, and their successors in interest, having diversion rights as set forth above in the Western Unit of the Raymond Basin Area shall have the right in its discretion to spread the surface water diverted pursuant to its respective right, and to recapture eighty percent (80%) thereof by pumping, subject to and upon the following terms and conditions.

(1) The water shall be spread for percolation into the underground in the existing water conservation facilities of the Los Angeles County Flood Control District, or in such additional spreading grounds as the parties may acquire or construct, or in any natural stream channels leading to such existing or future spreading grounds, provided that all such spreading locations shall be located within the Monk Hill Basin or Pasadena Subarea hydrologic subdivisions of the Western Unit of the Raymond Basin Area.

(2) A metering device, or devices, shall be installed and maintained by each diverting party at such party's expense to measure all amounts of water diverted by such party for spreading purposes. Such metering facilities, and the continued accuracy thereof, shall be subject to the approval of the Watermaster and the Los Angeles County Flood Control District, and all such measurements shall be available to them. The Watermaster, with such assistance as the Los Angeles County Flood Control District may provide, shall determine and account for all water diverted for spreading, the amount of water spread

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

and available for recapture, and the amount so recaptured, and shall include such determinations and accounting in its reports.

(3) In the event that the capacity of any of the spreading grounds of the Los Angeles County Flood Control District is fully utilized for the conservation of natural flows, and water diverted for spreading in such facilities cannot be percolated into the Basin and escapes therefrom, such quantity of water shall be subtracted from the amount diverted for spreading to determine the amount available for recapture. Such losses shall be divided among the parties diverting water for such spreading in proportion to the amounts diverted at the time the loss occurs.

(4) Each such party shall have the right to pump from any wells in the Monk Hill Basin an amount of water equal to eighty percent (80%) of the amount which it has diverted for such spreading therein and which is available for recapture, and the right to pump from any wells in the Pasadena Subarea an amount of water equal to eighty percent (80%) of the amount which it has diverted for such spreading therein and which is available for recapture. Such amounts pumped shall be in addition to the respective Decreed Rights of the parties as provided in the Judgment herein, as modified on April 29, 1955, and in addition to the amounts which can be pumped or otherwise taken under the provisions of Paragraph V hereof. Any amounts recaptured under the terms of this Paragraph shall be pumped in such a manner as not to injure other parties having rights under this Judgment. The effect of such pumping shall be monitored by the Watermaster, and the Watermaster shall report any such injury to the Court

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

for appropriate action.

(5) Any additional amounts allowed to be taken as provided in subparagraph (4) above shall be pumped by the end of the next accounting year utilized by the Watermaster following such diversions for spreading. If such pumping does not occur within this period of time, the right to take such amount of water shall be lost.

(6) For accounting purposes, the first water taken from the Western Unit of the Raymond Basin Area during any accounting year, by any party having made diversions for spreading purposes during the previous accounting year, shall be considered by the Watermaster as water pumped pursuant to subparagraph (4) above, unless such water was pumped during the same accounting year in which it was diverted and spread.

(7) The rights provided in subparagraph (4) above shall apply to all water diverted for spreading as required herein after May 1, 1973.

(8) The right to divert for spreading and recapture is an alternative, in whole or in part, to the right to make direct use of such diversions, and does not preclude the direct use of such water, provided that the total amount of water diverted, either for spreading or direct use, does not exceed the respective rights of the parties set forth above.

(9) These provisions concerning the right to spread and recapture by pumping remain subject to the continuing jurisdiction of the Court. Any additional costs incurred by the Watermaster in making determinations, accountings, reports, and monitoring of pumping as required in connection with such

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

spreading and recapture of water shall be paid by the parties diverting water for spreading in proportion to the amount of water which each party diverts for such purpose. Such costs shall be included as part "C" of the Watermaster's Annual Budget.

III

Each and all of the rights of the parties hereto to pump water from wells or otherwise take water from the ground in said Raymond Basin Area are of equal priority and of the same legal force and effect.

IV

Subject to the provisions of Paragraphs V, VI and XXI hereof, each party hereto is the owner of the right to pump water from wells or otherwise take water from the ground in each of said units in the amount set forth opposite the name of each party in the following table, which said right, for convenience, is designated the "present unadjusted right":

PRESENT UNADJUSTED RIGHTS TO TAKE
WATER IN RAYMOND BASIN AREA

Eastern Unit	Acre Feet Per Year
Arcadia, City of	2,527
Sierra Madre, City of	1,264

/ / /

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

Western Unit

Alhambra, City of	1,042
Arcadia, City of (including, as successor, the rights of the City of Monrovia)	2,141
California American Water Company (as successor to the California Water and Telephone Company, and including, as successor, the rights of the El Campo Mutual Water Company)	2,324
Crown City Ice Company	0
East Pasadena Water Company (as successor to the California-Michigan Land and Water Company)	521
Henry E. Huntington Library and Art Gallery (as successor to Robert A. Millikan, et al., Trustees of the Henry E. Huntington Library and Art Gallery)	265
Kinneloa Irrigation District (as successor to the rights of Francis P. Graves, et al.; Ross M. Lockhart; A. V. Wagner; Mira Loma Mutual Water Company; Canyon Mutual Water Company; and Chesley E. and Kathleen M. Osborn)	522
La Canada Irrigation District	101
Las Flores Water Company	252
Lincoln Avenue Water Company	573
May, Ernest Crawford, as Executor of the Last Will and Testament of Charles Heuston Hastings, deceased	0
Milum Textile Services Company (as successor to Royal Laundry and Dry Cleaning Company)	111
Pasadena Cemetery Association	92
Pasadena, City of (including, as successor, the rights of the First Trust and Savings Bank of Pasadena)	12,946

/ / /

Rubio Canon Land and Water Association	1,234
San Gabriel County Water District	1,103
Sunny Slope Water Company	1,575
Valley Water Company (including, as successor, the rights of the Flintridge Mutual Water Company)	806

The total of said rights in the Eastern Unit is 3,791 acre feet per year, and the total of said rights in the Western Unit is 25,608 acre feet per year.

V

In order to maintain and protect the supply of water in the ground in said Raymond Basin Area, it is necessary that the respective parties to this action be limited in the exercise of their respective present unadjusted rights, and the right, so limited, in acre feet per year, of each party to pump water from wells or otherwise take water from the ground, in the Western Unit, is as set forth in the table at the end of this Paragraph V, and in the Eastern Unit as set forth in Paragraph VI hereof. Said right, for convenience, is designated the "decreed right." In said Western Unit the amount of the decreed right of each party hereby is determined by reducing the present unadjusted right of each party as tabulated in Paragraph IV hereof, in the proportion that the safe yield of said unit, less the water taken therein by non-parties hereto, bears to the aggregate of such rights of the parties hereto in said unit. Each of said parties and

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

each of their agents, employees, attorneys, and any and all persons acting by, through, or under them, are and each of them is, subject to the terms of Paragraph XXI hereof, hereby forever enjoined and restrained on and after July 1, 1944, as to all parties other than California-Michigan Land and Water Company, and on and after July 1, 1945 as to said California-Michigan Land and Water Company, from pumping or otherwise taking from the ground in said Western Unit more water than its decreed right in this Paragraph determined; provided that a party may exceed its decreed right to the extent that it has acquired and exercises the decreed right of any other party, or as may become necessary in the case of an emergency or temporarily for other reasonable cause as determined by the Watermaster, taking into account the basin supply, quality conditions, the impact on other parties, and subject to such conditions as the Watermaster may impose, including whether or not such excess extractions must be made up in future years; and provided, however, that any of the parties to this action may take in any twelve-month period beginning July 1 for its own beneficial use, and for the release of water for use by other parties or persons pursuant to and in accordance with the Raymond Basin Area Water Exchange Agreement for 1943 and amendment thereto, hereinafter referred to, attached hereto and hereby made a part hereof, an amount not exceeding one hundred ten percent (110%) of its decreed right as fixed herein, plus any amount of allowable underpumping as hereinafter provided. Any such extractions in excess of a party's decreed right (not including any emergency or temporary

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

extractions authorized by the Watermaster) shall be made up in the following year, and the amount of water which a party may take under its decreed right in that year shall be reduced by an equivalent amount. If a party in any twelve-month period, beginning July 1, takes less than its decreed right, or less than the amount allowed after reduction for any excess extractions, the amount of such underpumping, but not exceeding ten percent (10%) of its decreed right or such additional amount as the Watermaster may allow for an emergency or other reasonable cause, may be carried over and taken during the next succeeding year. The yearly period from July 1 to June 30 hereby is adopted and shall be used in the administration and enforcement of this Judgment.

DECREED RIGHTS TO TAKE WATER FROM THE GROUND
IN SAID WESTERN UNIT IN ACRE FEET PER YEAR

	Acre Feet Per Year
Alhambra, City of	1,031
Arcadia, City of (including, as successor, the rights of the City of Monrovia)	2,118
California American Water Company (as successor to the California Water and Telephone Company, and including, as successor, the rights of the El Campo Mutual Water Company)	2,299
East Pasadena Water Company (as successor to the California-Michigan Land and Water Company)	515
Henry E. Huntington Library and Art Gallery (as successor to Robert A. Millikan, et al., Trustees of the Henry E. Huntington Library and Art Gallery)	262

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

Kinneloa Irrigation District (as successor to the rights of Francis P. Graves, et al.; Ross M. Lockhart; A. V. Wagner; Mira Loma Mutual Water Company; Canyon Mutual Water Company; and Chesley E. and Kathleen M. Osborn)	516
La Canada Irrigation District	100
Las Flores Water Company	249
Lincoln Avenue Water Company	567
Milum Textile Services Company (as successor to Royal Laundry and Dry Cleaning Company)	110
Pasadena Cemetery Association	91
Pasadena, City of (including, as successor, the rights of the First Trust and Savings Bank of Pasadena)	12,807
Rubio Canon Land and Water Association	1,221
San Gabriel County Water District	1,091
Sunny Slope Water Company	1,558
Valley Water Company (including, as successor, the rights of the Flintridge Mutual Water Company)	797
Total Western Unit	25,332

VI

The decreed right of each party hereto in said Eastern Unit is as follows:

City of Arcadia, 3,526 acre feet per year;

City of Sierra Madre, 1,764 acre feet per year.

Each of said parties, and each of their agents, employees, attorneys and any and all persons acting by, through, or under them, are and each of them is subject to

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

the terms of Paragraph XXI hereof, hereby forever enjoined and restrained on and after July 1, 1944, as follows:

(1) From pumping or otherwise taking from the ground in said Eastern Unit more water than its decreed right in this Paragraph determined; provided that a party may exceed its decreed right to the extent that it has acquired and exercises the decreed right of any other party, or as may become necessary in the case of an emergency or temporarily for other reasonable cause as determined by the Watermaster, taking into account the basin supply, quality condition, the impact on other parties, and subject to such conditions as the Watermaster may impose, including whether or not such excess extractions must be made up in future years; and provided, however, that any of the parties to this action may take in any twelve-month period beginning July 1 for its own beneficial use, and for the release of water for use by other parties or persons pursuant to and in accordance with the Raymond Basin Area Water Exchange Agreement for 1943 and amendment thereto, hereinafter referred to, attached hereto and hereby made a part hereof, an amount not exceeding one hundred ten percent (110%) of its decreed right as fixed herein, plus any amount of allowable underpumping as hereinafter provided. Any such extractions in excess of a party's decreed right (not including any emergency or temporary extractions authorized by the Watermaster) shall be made up in the following year, and the amount of water which a party may take under its decreed right in that year shall be reduced by an equivalent amount. If a party in any twelve-month

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

period, beginning July 1, takes less than its decreed right, or less than the amount allowed after reduction for any excess extractions, the amount of such underpumping, but not exceeding ten percent (10%) of its decreed right or such additional amount as the Watermaster may allow for an emergency or other reasonable cause, may be carried over and taken during the next succeeding year.

(2) From pumping or otherwise taking water from the ground in said Eastern Unit in any year within one-half mile of its western boundary in an amount which, in addition to other extractions, would be in excess of the average amount pumped or taken in said one-half mile zone during the period 1927-28 to 1937-38, to wit: 88 acre feet per annum, the half mile being measured along a perpendicular erected on the boundary between said unit and said Western Unit as shown on the map attached hereto.

(3) From pumping or otherwise taking water from the ground in said Eastern Unit in any year in excess of the average amount pumped or taken therein during the period 1927-28 to 1937-38, to wit: 3,261 acre feet per annum, during any year in which static groundwater level measurements, made at the time of maximum high water table in the spring season of each year, show that the average water table elevation in the area between Foothill Boulevard and Raymond Fault and between a line 300 feet west of Rosemead Boulevard and a line 100 feet east of Michillinde Avenue, less any increase in such elevation that is attributable to any groundwater storage program, is higher than that at the Arcadia group of

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

wells designated as such on said map attached hereto and located west of the intersection of Orange Grove and Santa Anita Avenues in the City of Arcadia, this limitation to apply only when the water table elevation at said group is less than 500 feet above sea level, United States Geological Survey datum.

VII

There is now and, so long as the requirements in subparagraphs 2 and 3 of Paragraph VI hereof are fulfilled and maintained, there will be no material movement of water across the boundary between the Western Unit and the Eastern Unit.

VIII

Nothing in this Judgment contained shall be deemed to modify the rights as between the defendants City of Sierra Madre and City of Arcadia as set forth in that certain Judgment entitled "The City of Sierra Madre, a municipal corporation, et al., vs. The City of Arcadia, a municipal corporation," No. 209747 in the Superior Court of the State of California, in and for the County of Los Angeles, entered on the 22nd day of April, 1930, but in the exercise of such rights each of said parties shall be subject to the express provisions of Paragraph VI hereof.

/ / /

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

IX

A Watermaster shall be appointed by this Court to serve at the pleasure of the Court to administer and enforce the provisions of this Judgment, the Raymond Basin Area Water Exchange Agreement of 1943 and amendment thereto, attached hereto and made a part hereof, and the instructions and orders of this Court, and if any such provisions, instructions or orders of the Court, or any order, rule or direction of such Watermaster, made in accordance with and for the enforcement of this Judgment and said Agreement and amendment thereto, shall have been disobeyed or disregarded, said Watermaster hereby is empowered and authorized to report promptly to the Court such fact and the circumstances connected therewith and leading thereto.

A violation of any provision of this Judgment, or attached Agreement and amendment thereto, or order, instruction, rule or direction of the Court or of the Watermaster, shall be punished in such manner as the Court may direct.

The compensation of said Watermaster shall be fixed by an order or orders which the Court hereafter from time to time may make.

X

There is hereby established a Raymond Basin Management Board (sometimes hereafter called "Board") which shall be the Watermaster. The Board shall have all of the rights,

and shall carry out all of the responsibilities, of the Watermaster as provided in this Judgment. In addition, in order to implement sound water management practices within the framework of the rights of the parties as determined herein, the Board shall have the powers set forth in Paragraph XII.

XI

The Board shall be organized and constituted as follows:

(1) Each party holding a decreed right of 1,000 acre feet or more shall appoint one member to the Board.

(2) The parties within each subarea, namely, Monk Hill Subarea, Pasadena Subarea, and the Eastern Unit, who each hold decreed rights of less than 1,000 acre feet shall together appoint a member from each respective subarea. The appointment for each subarea shall be by majority vote, with each such party having one vote.

(3) No party shall have the right to appoint, or to participate in the appointment of, more than one member to the Board.

(4) Board members shall have broad engineering or management experience in the operation of a water utility or groundwater basin.

(5) Each member shall be appointed for a term of one year, or until replaced. Members shall serve at the pleasure of the appointing party, parties or body. No member

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

shall be appointed by or represent more than one party or group of parties. The Board shall select its own officers. A quorum of the Board shall consist of six members, and the Board may act by a majority of those members present at a meeting. The Board shall meet at least quarterly, and all parties to the action may attend. Minutes of the Board meetings shall be kept and sent to all parties in the action. The Board shall have the power to adopt such by-laws, rules and regulations, not inconsistent with the terms of this Judgment, as may be necessary for its own organization and operation.

XII

The powers and responsibilities of the Raymond Basin Management Board, as Watermaster and otherwise, shall be exercised with a view toward protecting the long-term quantity and quality of the groundwater supply; utilizing the groundwater storage capacity of the basin for the maximum advantage of the parties, without however causing significant adverse impact upon any party; integrating to the extent feasible the use of surface and groundwater supplies so as to reduce costs, improve reliability of supply, and to protect against drought; and to encourage the parties to cooperate in the utilization of their respective water rights and water systems for the mutual good. The Board shall have power:

(1) To contract with the California Department of Water Resources, or with any other competent person or firm,

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

to perform all or part of the Watermaster functions.

(2) To determine the amount of storage capacity that is available in the basin from time to time for groundwater storage programs.

(3) To allocate such storage capacity among the parties, and to provide for its use and the recapture of equivalent amounts of stored water. The Board may approve, condition or disapprove proposed water storage programs, and imported, nontributary water shall not be stored in the basin without the Board's approval. Approved programs shall include provisions for the duration of allowed storage of water, for determination of losses, for the rates and places of recapture, and for such other conditions as may be necessary to prevent operational problems for other parties, including degradation of water quality.

(4) To control the direct recharge into the basin of imported, non-tributary water.

(5) To issue such rules and regulations as may be necessary in order to account properly for sales, leases, exchanges or other transfers among the parties of decreed rights and the use of water. The Board shall attempt to facilitate, not restrict, such transfers, including efforts to develop agreements for the production and distribution of water through facilities of other parties where such practices promote efficiency and sound water management. This policy shall extend to the use of stored water where consistent with the policies of The Metropolitan Water District of Southern California with respect to the use of supplemental water

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

which it provides.

(6) To conduct studies or undertake other activities for the common benefit of the parties in the operation of the Raymond Basin Area; to obtain engineering, legal and other professional services in such connection; and, in addition to the Watermaster budget procedures, to assess the parties in an equitable manner and as may be necessary to pay the costs of the Board's operations, which assessments shall be paid by the parties. Payment shall be enforced in the same manner as provided in Paragraph XV for the annual budget, although the actual apportionment of costs may differ from the method provided in Paragraph XV. All actions of the Board, including any assessments imposed, shall be subject to review by the Court, pursuant to the procedures of Paragraph XVII.

XIII

Each party hereto at its own expense shall:

(1) Measure and keep records of all its diversions from any source contributing to the supply of water in the ground, of its importations of water, and of its production of water from the ground in the Raymond Basin Area, subject to the approval of the Watermaster as to equipment and methods;

(2) Measure and keep records of its production and distribution in such manner as to show its use in, transfers within, and exports of water from the Raymond Basin Area, or any subdivision thereof, as required by the Watermaster;

/ / /

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

(3) Measure and record the depth to the water table in all wells owned or operated by it within the Raymond Basin Area once a month, or as required by the Watermaster.

Any party owning any facilities for the diversion from any source contributing to the supply of the water in the ground in the Raymond Basin Area, or for pumping or otherwise taking water from the ground in said area, at its own expense shall install and at all times maintain in good working order reliable measuring devices and facilities for testing said devices and shall keep records of its diversions and production through the use of such devices and facilities as may be required by the Watermaster; that upon failure of any such party to install such devices and facilities on or before such day as the Watermaster shall fix, after due notice from the Watermaster so to do, the Watermaster shall give the Court notice of such failure for proper action in the premises.

XIV

In addition to other duties herein provided, the Watermaster shall:

(1) Supervise the collection, assembly and presentation of the records and other data required of the parties; such records and other data to be open to inspection by any party or its representative during normal business hours.

(2) Require all parties hereto to operate their respective wells in a manner which will accomplish the stated

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

purposes of said Agreement and amendment thereto, and will effectuate this Judgment without placing undue burden on any party; study separately pumping patterns in the Monk Hill Basin, Pasadena Subarea, and the Eastern Unit, and report recommendations thereon not less than twice each year; such report shall recognize the right of each party to pump its decreed right, but shall include recommendations as to whether more or less water should be pumped from individual wells; such recommendations shall be calculated to minimize interference among parties, to conserve energy, expense and local water supplies, and to provide for the most efficient and equitable use of groundwater in the Raymond Basin Area; such recommendations shall be advisory only, and shall not be binding upon the parties unless confirmed by order of this Court.

(3) Establish an ongoing program to monitor water quality in the Raymond Basin Area.

(4) Prepare a tentative annual budget for the fiscal year commencing July 1, separately stating the anticipated expense for administering the provisions of said Agreement and amendment thereto for the release and receipt of water, and the anticipated expense of the administration of the other provisions of said Agreement and amendment thereto and of enforcing this Judgment. The Watermaster shall serve said tentative budget upon each of the parties on or before May 1 of each year. If any party has any objection to said tentative budget, or any suggestions with respect thereto, it shall present the same in writing within ten (10) days after

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

service thereof upon it. Thereafter, the Watermaster shall prepare a final budget and serve the same upon each party. If any party objects to said final budget it may make written objection thereto by filing its objection with this Court within fifteen (15) days after service of the same upon it, after first having served such objection upon each party hereto, and shall bring such objection on for hearing before this Court within fifteen (15) days after such filing, or at such time as the Court may direct.

If no objection to said budget be made as herein provided, it shall be the annual budget for the particular year involved. If objection to such budget be filed with this Court as herein provided, then the annual budget shall be determined by the order of this Court.

(5) Make an annual report on or before September 1 of each year to the parties hereto of the scope of the Watermaster's work during the preceding fiscal year and a statement of receipts and expenditures in appropriate detail, segregated as to the items attributable to the administration of the provisions of said Agreement and amendment thereto respecting the release and receipt of water, and as to the items attributable to the administration of the other provisions of said Agreement and amendment thereto and to the enforcement of this Judgment.

/ / /

/ / /

/ / /

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

XV

The cost of enforcing this Judgment or any order or direction of this Court or of the Watermaster (other than those with respect to the release and receipt of water in accordance with the provisions of said Agreement and amendment thereto) shall be borne by the parties in proportion to their respective decreed rights as determined in Paragraphs V and VI of this Judgment, and the Watermaster shall assess such cost to each party accordingly.

Payment thereof shall be made by each party within thirty (30) days after the annual budget shall have become final and the service on such party by the Watermaster of a statement of the amount due. If payment be not made within said thirty (30) days, such payment shall be delinquent and the Watermaster shall add a penalty of ten percent (10%) thereof to said statement, and the amount of said statement plus said penalty thereupon shall be due and payable. Payment required of any party hereunder or under the terms of said Agreement and amendment thereto may be enforced by execution issued out of this Court or as may be provided by any order hereinafter made by this Court. All payments and penalties received by the Watermaster, except payments received on account of the release and receipt of water, shall be deposited by the Watermaster in a fund which shall be designated "The Watermaster Service Fund" and shall be expended for the administration of the Agreement and amendment thereto and the enforcement of this Judgment in accordance with the annual

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

budgets herein provided for. Any money remaining at the end of any year shall be available for use the following year for such Watermaster service. Money collected or received by the Watermaster in connection with the release and receipt of water under the provisions of said Agreement and amendment thereto shall be deposited by him in a special deposit fund and paid out by him in accordance with the provisions of said Agreement and amendment thereto.

XVI

Any Watermaster ceasing to perform Watermaster service hereunder immediately upon such cessation shall deposit with the clerk of this Court all funds in his possession collected from the parties in accordance with this Judgment or said Agreement and amendment thereto, and forthwith shall serve upon the parties hereto and file with this Court his final account and report, and shall deliver to his successor, or as the Court may direct, all property and all records or certified copies thereof.

XVII

Any party having objection to any determination or finding made by the Watermaster, other than as provided in subparagraph (4) of Paragraph XIV hereof, may make the same in writing to the Watermaster within thirty (30) days after the making of such determination or finding after first

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

having served a copy of such objection upon each party, and within thirty (30) days thereafter the Watermaster shall consider said objection and shall amend or affirm his finding or determination; any party objecting thereto within thirty (30) days thereafter may file its objections with this Court, bringing the same on for hearing before said Court within sixty (60) days thereafter, or at such time as the Court may direct, after first having served said objection upon each party. The Court may affirm, modify, amend or overrule any such finding or determination of the Watermaster.

XVIII

Within thirty (30) days after the appointment of the Watermaster, each of the parties shall file with the Watermaster and serve on each party the name and address of the person to whom any notice, demand, request, objection or the submission of any budget and the annual report is to be made or given, and each of said parties may change the name and address of said person from time to time by filing said changed name and address with the Watermaster and by serving a copy thereof upon each of the parties hereto.

Any notice, demand, request, objection or the submission of a budget and the annual report required or authorized by this Judgment or said Agreement and amendment thereto to be given or made to or served upon any party or the Watermaster, shall be delivered or mailed by registered mail postage prepaid to the person so designated at the

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

address last filed with the Watermaster. Such service by mailing shall be complete at the time of the deposit in the United States mail.

Notice of any other motion or proceeding herein may also be given by service upon the person and at the address filed with the Watermaster, in the manner designated in this Paragraph, provided that certified or registered mail may be used. If any party or successor in interest has failed to make such filing with the Watermaster, notice may be mailed to the address which the Watermaster uses for such party or successor.

XIX

The agreement entered into by certain parties, entitled "Raymond Basin Area Water Exchange Agreement of 1943" and amendment thereto, a copy of which is attached hereto, and each and all of its terms and provisions be, and the same is and are hereby fully approved, and said Agreement and amendment thereto is hereby expressly made a part of this Judgment to the same purpose and effect as though said Agreement and amendment thereto were at this point fully herein written and set forth at length; provided, however, that California-Michigan Land and Water Company, Sunny Slope Water Company, and Ernest Crawford May, as Executor of the Last Will and Testament of Charles Heuston Hastings, deceased, who are not parties to said Agreement or amendment thereto, shall not be bound by nor required to perform any of the provisions

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

thereof, nor pay any part of the cost of administering or enforcing said Agreement or amendment thereto; that the power of the Court is hereby expressly made to underlie all of the terms and provisions of said Agreement and amendment thereto and the enforcement thereof, and that the parties thereto, and each thereof, are hereby ordered to perform fully said Agreement and amendment thereto and all of its said terms and provisions.

No taking of water by any party under the provisions of said Agreement and amendment thereto concerning the release and receipt of water in any amount in excess of its decreed right to pump or otherwise take water from the ground in the Raymond Basin Area shall constitute a taking adverse to any other party; nor shall any party have the right to plead the statute of limitations or an estoppel against any other party by reason of its said taking of water in the Raymond Basin Area pursuant to a request for the release of water; nor shall such release of water by any party constitute a forfeiture or abandonment by such party of any part of its decreed right to water; nor shall such release in any wise constitute a waiver of such right, although such water, when released under the terms of said Agreement and amendment thereto, may be devoted to the public use of others; nor shall such release of water by any such party in any wise obligate any party so releasing to continue to release or furnish water to any other party or its successor in interest, or to the public generally, or to any part thereof, otherwise than as provided in Article IV of said Agreement and amendment thereto.

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

XX

In the event any party shall serve upon the parties and file with the Watermaster and with the Court a declaration of forfeiture or abandonment of its decreed right, or any part thereof, said party shall be relieved of the payment of further costs of administering the provisions of said Agreement and amendment thereto and enforcing this Judgment applicable to the right so forfeited or abandoned; provided that said relief from said further costs shall not become effective until the beginning of the next fiscal year for which a budget has not become final; and provided that said party making such forfeiture or abandonment shall pay to the Watermaster its proportion of such costs to the effective date of such relief from costs. The amount of water so abandoned or forfeited shall be available immediately for use by the parties in the proportions set forth in Paragraphs V and VI hereof, pending the time that any review shall have been made as provided for in Paragraph XXI hereof.

XXI

The Court hereby reserves jurisdiction and authority upon application of any party hereto, or upon its own motion, to review (1) its determination of the safe yield of either or both of said units of the Raymond Basin Area, or (2) the rights, in the aggregate, of all of the parties in either or both of said units as affected by the abandonment or forfeiture

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

of any right, in whole or in part, decreed herein, and by the abandonment or forfeiture of any right by any other person or entity, and, in the event material change be found or any such abandonment or forfeiture be established, to adjudge that the decreed right of each party to pump or otherwise take water from the ground in the Raymond Basin Area shall be changed proportionately in the same manner as originally fixed herein; provided, however, that notice of such review shall be served on all parties at least thirty (30) days prior thereto and that the review of its determination of the safe yield of either or both of said units of the Raymond Basin Area shall be had not more frequently than at five (5) year intervals after the date hereof. Except as provided herein, and except as rights decreed herein may be abandoned or forfeited by nonuser, in whole or in part, each and every right decreed herein hereby is fixed as of the date hereof.

XXII

The Court hereby reserves jurisdiction and authority at any time, upon application of any party, the Watermaster, or upon its own motion, to make such modifications of, or such additions to, the provisions of this Judgment, or to make such further order or orders, as may be necessary or desirable for the adequate enforcement, protection or preservation of the rights of the respective parties as declared in this Judgment or as provided in said Agreement and amendment thereto. The Court further reserves jurisdiction to make any

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

other and/or additional orders of sufficient kind and nature to protect the waters in said Raymond Basin Area or any portion thereof from contamination of the groundwater supply from cesspool effluent or surface waters.

XXIII

The defendant California-Michigan Land and Water Company is entitled to become a party to the Raymond Basin Area Water Exchange Agreement of 1934 and thereby become entitled to receive water upon the same terms and conditions provided in said Agreement with respect to the several parties thereto.

XXIV

The defendant Bradbury Estate Company, a corporation, and Eugene E. Bean be and they hereby are dismissed without costs.

XXV

None of the parties is entitled to recover its costs as against any other party.

DATED: March 26, 1984

/s/ Robert M. Olson
JUDGE OF THE SUPERIOR COURT

LAW OFFICES OF
BEST, BEST & KRIEGER
4200 ORANGE STREET
POST OFFICE BOX 1028
RIVERSIDE, CALIFORNIA 92502

APPENDIX D

CALCULATION OF SPREADING CREDITS IN THE RAYMOND BASIN

This page intentionally left blank

Attachment A

Raymond Basin Management Board

Calculation of Spreading Credits in the Arroyo Seco and Millard Canyon

Proposal for Consideration

July 9, 2003

1. The right to divert for spreading and recapture is an alternative, in whole or in part, to the right to make direct use of such diversions, and does not preclude the direct use of such water, provided that the total amount of water diverted, either for spreading or direct use, does not exceed the Parties rights set forth in the Judgment.

2. The City of Pasadena and Lincoln Avenue Water Company shall have the right to recapture 60% of water it diverts for spreading less any water that escapes therefrom the existing former Los Angeles County Flood Control District's spreading basins, and recapture 80% for water that spreads into Pasadena Spreading Basins 1 & 2 (formerly known as Sludge Ponds 1 and 2) or any future spreading basins.

3. The remaining 40% of the water spread through Pasadena and Lincoln's diversions shall be apportioned to parties having pumping rights in the Western Unit of the Raymond Basin (which consists of the Monk Hill Subarea and the Pasadena Subarea). The water shall be divided in proportion to each party's percentage of annual decreed water rights in the Western Unit.

4. For accounting purposes, the first water taken from the Western Unit of the Raymond Basin during any accounting year, by any party receiving spreading credits during the previous accounting year, shall be considered by the Watermaster as water pumped.

5. This spreading credit apportionment scenario shall be run through the computer model that is to be completed by Geoscience as part of the Baseline Water Management Study. All the above provisions shall applied only if the computer model shows that this spreading and pumping practice will produce no harmful effects to Parties of the Raymond Basin.

6. The water levels in the Western Unit will be continuously monitored and analyzed by the Raymond Basin Watermaster to determine if there are any harmful effects to the water levels.

7. The new spreading credit methodology will be reviewed by the Raymond Basin Management Board's legal counsel and any necessary legal action will be brought to the Board for consideration and approval.

8. If the Board prior to July 1, 2004 approves the new spreading methodology, spreading credits under the new spreading methodology shall be accounted for retroactively to July 1, 2003.

This page intentionally left blank

APPENDIX E

MWD PURCHASE ORDER FOR

IMPORTED WATER SUPPLY

This page intentionally left blank

COPY

PURCHASE ORDER FOR IMPORTED WATER SUPPLY TO BE PROVIDED BY THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

PURCHASER: **City of Pasadena**	**TERM** 10 years
INITIAL BASE DEMAND: **23,532.8** acre-feet	**EFFECTIVE DATE:** January 1, 2003
INITIAL TIER 1 ANNUAL MAXIMUM: **21,179.5** acre-feet	
PURCHASE ORDER COMMITMENT: **141,196.8** acre-feet	

Definitions of capitalized terms used in this Purchase Order are provided in Attachment 1. Terms used in this Purchase Order and not defined in Attachment 1 are defined in Metropolitan's Administrative Code.

COMMITMENT TO PURCHASE.

In consideration of Purchaser's commitment to purchase System Water pursuant to this Purchase Order, Metropolitan agrees to sell such System Water to Purchaser at the Tier 1 Supply Rate each year in an amount up to the Tier 1 Annual Maximum. System Water sold to Purchaser (excluding deliveries of System Water made under the Interim Agricultural Water Program and Long-term Seasonal Storage Service) in an amount greater than the Tier 1 Annual Maximum shall be sold to the Purchaser at the Tier 2 Supply Rate. In connection with the receipt of System Water, the Purchaser also agrees to pay all other applicable rates and charges, as established by Metropolitan from time to time in accordance with Section 4304 of the Administrative Code. The rates and charges applicable to System Water as of the Effective Date are shown in Attachment 2.

Purchaser agrees to purchase System Water from Metropolitan during the Term in an amount (excluding deliveries of System Water, made under the Interim Agricultural Water Program and Long-term Seasonal Storage Service) not less than the Purchase Order Commitment.

Purchaser recognizes and agrees that Metropolitan has relied and will, during the term of this Purchase Order, rely on this commitment by Purchaser in setting its rates and charges, planning and providing its capital facilities and developing its water supply, management and reliability programs. If Purchaser's applicable System Water purchases during the Term are less than the Purchase Order Commitment, Purchaser agrees to pay Metropolitan an amount equal to the difference between the Purchase Order Commitment and Purchaser's applicable System Water purchases during the Term times the average of the Tier 1 Supply Rate in effect during the Term. The Purchaser agrees to pay such amount to Metropolitan within the next regular billing cycle following the reconciliation of all certifications for special programs that the Purchaser may participate in (e.g. Interim Agricultural Water Program, Long-term Seasonal Storage Service). The Purchaser may elect to pay such amount in twelve equal monthly payments over the course of the next twelve months beginning with the first regular billing cycle

following the reconciliation of all outstanding certifications for special programs. If the Purchaser elects to pay such amount over the course of the next twelve months following the regular billing cycle any outstanding balance shall bear interest at Metropolitan's then current investment portfolio average yield. All other amounts payable under this Purchase Order shall be billed and paid in accordance with the Administrative Code.

The Purchaser further recognizes that this Purchase Order is entered into for the direct benefit of the holders and owners of Metropolitan's Bonds issued from time to time under the Act and the Bond Resolutions, and the income and revenues derived from this Purchase Order will be pledged for the purposes set forth in the Bond Resolutions, including the payment of principal of and interest on such Bonds.

RENEWAL:

Prior to but not later than December 31, 2010, the Purchaser may provide a non-binding written notice to Metropolitan of the Purchaser's determination to extend this Purchase Order. Upon the receipt of such notice, the Board of Directors of Metropolitan (the "Board") shall determine whether Metropolitan will continue to provide System Water to member agencies by Purchase Order. If the Board so determines, the Purchaser and Metropolitan shall amend this Purchase Order to include an extended term and/or to include such other terms and conditions as may be mutually agreed by the parties. If the Purchaser elects not to renew this Purchase Order it will terminate upon the expiration of the Term.

WATER SERVICE:

Conditions of water service by Metropolitan to the Purchaser, including but not limited to (i) delivery points, (ii) water delivery schedules, and (iii) water quality, will be determined in accordance with Chapter 5 (Section 4500 through 4514, inclusive, as applicable) of Metropolitan's Administrative Code.

In accordance with its Administrative Code, Metropolitan shall use its reasonable best efforts to supply System Water in the quantities requested by the Purchaser, but is not obligated to dedicate any portion of System capacity for the conveyance, distribution, storage or treatment of System Water for the benefit of the Purchaser or any other member agency. Metropolitan shall use its reasonable best efforts to deliver the Base Demand when needed by the Purchaser during the Term; provided however, there shall be no default under this Purchase Order if Metropolitan fails to deliver water to the Purchaser in accordance with any such schedule of deliveries during the Term.

By execution of this Purchase Order, the Purchaser recognizes and agrees that it acquires no interest in or to any portion of the System or any other Metropolitan facilities, or any right to receive water delivered through the System, excepting the right to purchase up to Purchaser's Tier 1 Annual Maximum at the Tier 1 Supply Rate provided that System Water is available. This Purchase Order governs pricing of the System Water delivered to the Purchaser pursuant to this Purchase Order and does not confer any entitlement to receive System Water.

System Water provided to the Purchaser under the terms of this Purchase Order shall be subject to reduction in accordance with the shortage allocation provisions of the Water Surplus and Drought Management Plan (the "WSDM Plan") or other such policies and principles governing the allocation of System Water as adopted by the Board.

In the event that Metropolitan's Board determines to reduce, interrupt or suspend deliveries of System Water (excluding deliveries of System Water made under the Interim Agricultural Water Program and Long-term Seasonal Storage Service) any outstanding balance of the Purchase Order Commitment at the end of the Term shall be reduced by the reduction in System Water made available to the Purchaser under this Purchase Order.

MISCELLANEOUS:

This Purchase Order will be interpreted, governed and enforced in accordance with the laws of the State of California.

This Purchase Order will apply to and bind the successors and assigns of the Purchaser and Metropolitan.

No assignment or transfer of the rights of the Purchaser under this Purchase Order will be valid and effective against Metropolitan or the Purchaser without the prior written consent of Metropolitan and the Purchaser.

If at any time during the Term, by reason of error in computation or other causes, there is an overpayment or underpayment to Metropolitan by the Purchaser of the charges provided for under this Purchase Order, which overpayment or underpayment is not accounted for and corrected in the annual re-determination or reconciliation of said charges, the amount of such overpayment or underpayment shall be credited or debited, as the case may be, to the Purchaser. .Metropolitan will notify the Purchaser in writing regarding the amount of such credit or debit, as the case may be. In no case will credits or debits for charges provided for under this Purchase Order be administered beyond the limit for billing adjustments as specified in Metropolitan's Administrative Code.

IN WITNESS WHEREOF, this Purchase Order is executed by the duly authorized officers of the Metropolitan Water District of Southern California and [Purchaser], to be effective January 1, 2003.

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

By: _____
Ronald R. Gastelum
Chief Executive Officer

CITY OF PASADENA

By: _____
[Title] ~~Phyllis E. Currie~~ Cynthia J. Kurtz
~~General Manager~~ City Manager

APPROVED AS TO FORM:
This 11 day of Oct, 20 02
By _____
Assistant City Attorney

APPROVED AS TO FORM AND CONTENT:

_____
General Counsel

_____
General Counsel

By: _____

By: _____

ATTEST: 10/17/02

_____
JANE L. RODRIGUEZ, CMC
CITY CLERK

Attachment 1
Purchase Order for Imported Water Supplies
DEFINITIONS

"Act" means the Metropolitan Water District Act, California Statutes 1969, Chapter 209, as amended and supplemented from time to time.

"Base Demand" means the greater of (i) the Initial Base Demand or (ii) the ten-year rolling average of the Purchaser's Firm Demand, measured on a fiscal year basis.

"**Bonds**" means water revenue bonds or notes issued under the Bond Resolutions.

"**Bond Resolutions**" means Resolution No. 8329 or Resolution No. 8322, both as amended and supplemented, or any other resolution authorizing the issuance of bonds, notes or other obligations secured by Metropolitan's water sales revenues.

"**Effective Date**" means the effective date of this Purchase Order as specified above.

"**Firm Demand**" means the Purchaser's purchases of non-surplus System Water supplies, including full-service and seasonal shift deliveries.

"**Initial Base Demand**" means the Purchaser's highest annual Firm Demand on Metropolitan in any fiscal year during the period from fiscal year 1989/90 through fiscal year 2001/02. In accordance with procedures set forth in Metropolitan's Administrative Code, the Initial Base Demand will be revised to reflect certified and verified deliveries under the Interim Agricultural Water Program and Long-term Seasonal Storage Service Program as such certifications affect the Initial Base Demand.

"Metropolitan" means The Metropolitan Water District of Southern California.

"Purchase Order Commitment" means 60% of the Initial Base Demand times 10. Deliveries of System Water made under the Interim Agricultural Water Program and Long-term Seasonal Storage Service, will not count toward the Purchase Order Commitment.

"Purchase Order" means this Purchase Order.

"Purchaser" means the member public agency specified above, a duly organized [city/water district/county water authority] of the State of California.

"System" means the properties, works and facilities of Metropolitan necessary for the supply, development, storage, conveyance, distribution, treatment or sale of water.

"System Water" means water supplies developed by Metropolitan and delivered to the Purchaser through the System or other means (e.g. conjunctive use storage).

"Term" means the term of this Purchase Order as specified above.

"Tier 1 Annual Maximum" means an amount equal to 90% of the Base Demand.

"Tier 1 Supply Rate" means Metropolitan's per-acre-foot Tier 1 Supply Rate, as determined from time to time by Metropolitan's Board of Directors. The initial Tier 1 Rate is $73/AF.

"Tier 2 Supply Rate" means Metropolitan's per-acre-foot Tier 2 Supply Rate, as determined from time to time by Metropolitan's Board of Directors. The initial Tier 2 Rate is $154/AF.

"Water Surplus and Drought Management Plan (WSDM)" means Metropolitan's policy and procedures for managing supplies and drought conditions as adopted by the Board from time to time.

Attachment 2
Purchase Order for Imported Water Supplies
RATES AND CHARGES

	Effective January 1, 2003
Tier 1 Supply Rate ($/af)	$73
Tier 2 Supply Rate ($/af)	$154
System Access Rate ($/af)	$141
System Power Rate ($/af)	$89
Water Stewardship Rate ($/af)	$23
Untreated Long-term Storage Water Rate ($/af)	$233
Untreated Interim Agricultural Water Program ($/af)	$236
Treated Long-term Storage Water Rate ($/af)	$290
Treated Interim Agricultural Water Program ($/af)	$294
Treatment Surcharge ($/af full-service)	$82
Readiness-to-Serve Charge ($millions)	$80.0
Capacity Reservation Charge ($/cfs)	$6,100
Peaking Surcharge ($/cfs)	$18,300

City of Pasadena

Purchase Order Information

Purchase Order Period:	**CY2003 – CY2012**
Years Remaining in Period:	**10**
Purchase Order Volume (af):	**141,197**
Base Firm Demand (af):	**23,533**
Tier 1 Maximum Annual Volume (af):	**21,180**

Capacity Reservation Information

Calendar Year:	**2003**
Capacity Reservation (cfs):	**33.5**
CRC Billing Preference:	**Monthly**

Invoice Distribution List

pcurrie@ci.pasadena.ca.us
gtakara@ci.pasadena.ca.us

This page intentionally left blank

APPENDIX F

CUWCC BMP COVERAGE AND

STATUS REPORTS: 2003-2004

This page intentionally left blank

Reported as of 10/

BMP 01 Coverage: Water Survey Programs for Single-Family and Multi-Family Residential Customers

Reporting Unit: **City of Pasadena**

Reporting Period: **03-04**

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

A Reporting Unit (RU) must meet three conditions to satisfy strict compliance for BMP 1.

Condition 1: Adopt survey targeting and marketing strategy on time

Condition 2: Offer surveys to 20% of SF accounts and 20% of MF units during report period

Condition 3: Be on track to survey 15% of SF accounts and 15% of MF units within 10 years of implementation start date.

Test for Condition 1

City of Pasadena to Implement Targeting/Marketing Program by: 1999

	Single-Family	Multi-Family
Year City of Pasadena Reported Implementing Targeting/Marketing Program:		
City of Pasadena Met Targeting/Marketing Coverage Requirement:	NO	NO

Test for Condition 2

			Single-Family	Multi-Family
Survey Program to Start by:	1998	Residential Survey Offers (%)	0.21%	0.11%
Reporting Period:	03-04	Survey Offers ≥ 20%	NO	NO

Test for Condition 3

	Completed Residential Surveys	
	Single Family	Multi-Family
Total Completed Surveys 1999 - 2004:	495	13
Past Credit for Surveys Completed Prior to 1999 (Implementation of Reporting Database):	7,230	10,559
Total + Credit	7,725	10,572
Residential Accounts in Base Year	30,541	2,824

City of Pasadena Survey Coverage as % of Base Year Residential Accounts	25.29%	374.36%
Coverage Requirement by Year 7 of Implementation per Exhibit 1	7.90%	7.90%
City of Pasadena on Schedule to Meet 10-Year Coverage Requirement	YES	YES

BMP 1 COVERAGE STATUS SUMMARY:
Water supplier has not met one or more coverage requirements for this BMP.

Reported as of 10/

BMP 02 Coverage: Residential Plumbing Retrofit

Reporting Unit: **City of Pasadena**

Reporting Period: **03-04**

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

An agency must meet one of three conditions to satisfy strict compliance for BMP 2.

Condition 1: The agency has demonstrated that 75% of SF accounts and 75% of MF units constructed prior to 1992 are fitted with low-flow showerheads.

Condition 2: An enforceable ordinance requiring the replacement of high-flow showerheads and other water use fixtures with their low-flow counterparts is in place for the agency's service area.

Condition 3: The agency has distributed or directly installed low-flow showerheads and other low-flow plumbing devices to not less than 10% of single-family accounts and 10% of multi-family units constructed prior to 1992 during the reporting period.

Test for Condition 1

		Single-Family		Multi-Family	
Report Year	Report Period	Reported Saturation	Saturation > 75%?	Reported Saturation	Saturation > 75%?
1999	99-00	76.00%	YES	76.00%	YES
2000	99-00	77.00%	YES	77.00%	YES
2001	01-02	78.00%	YES	78.00%	YES
2002	01-02	80.00%	YES	80.00%	YES
2003	03-04	83.00%	YES	82.00%	YES
2004	03-04	87.00%	YES	85.00%	YES

Test for Condition 2

Report Year	Report Period	City of Pasadena has ordinance requiring showerhead retrofit?
1999	99-00	YES
2000	99-00	YES
2001	01-02	YES
2002	01-02	YES
2003	03-04	YES
2004	03-04	YES

Test for Condition 3

Reporting Period: 03-04

1992 SF Accounts	Num. Showerheads Distributed to SF Accounts	Single-Family Coverage Ratio	SF Coverage Ratio > 10%
27,486	2,194	8.0%	NO
1992 MF Accounts	**Num. Showerheads Distributed to MF Accounts**	**Multi-Family Coverage Ratio**	**MF Coverage Ratio > 10%**

2,542	491	19.3%	YES

BMP 2 COVERAGE STATUS SUMMARY:
Water supplier is meeting coverage requirements for this BMP.

Reported as of 10/

BMP 03 Coverage: System Water Audits, Leak Detection and Repair

Reporting Unit: **City of Pasadena**

Reporting Period: **03-04**

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

An agency must meet one of two conditions to be in compliance with BMP 3:

Condition 1: Perform a prescreening audit. If the result is equal to or greater than 0.9 nothing more needs be done.

Condition 2: Perform a prescreening audit. If the result is less than 0.9, perform a full audit in accordance with AWWA's Manual of Water Supply Practices, Water Audits, and Leak Detection.

Test for Conditions 1 and 2

Report Year	Report Period	Pre-Screen Completed	Pre-Screen Result	Full Audit Indicated	Full Audit Completed
1999	99-00	NO	93.8%	No	NO
2000	99-00	NO	94.0%	No	NO
2001	01-02	YES	108.5%	No	NO
2002	01-02	NO	97.1%	No	NO
2003	03-04	YES	98.6%	No	NO
2004	03-04	YES	89.3%	Yes	NO

BMP 3 COVERAGE STATUS SUMMARY:
Water supplier is meeting coverage requirements for this BMP.

Reported as of 10/

BMP 04 Coverage: Metering with Commodity Rates for all New Connections and Retrofit of Existing

Reporting Unit:	Reporting Period:
City of Pasadena	**03-04**

MOU Exhibit 1 Coverage Requirement

No exemption request filed	
Agency indicated "at least as effective as" implementation during report period?	No

An agency must be on track to retrofit 100% of its unmetered accounts within 10 years to be in compliance with BMP 4.

Test for Compliance

Total Meter Retrofits Reported through 2004	
No. of Unmetered Accounts in Base Year	400
Meter Retrofit Coverage as % of Base Year Unmetered Accounts	
Coverage Requirement by Year 6 of Implementation per Exhibit 1	42.0%
RU on Schedule to meet 10 Year Coverage Requirement	NO

BMP 4 COVERAGE STATUS SUMMARY:
Water supplier has not met one or more coverage requirements for this BMP.

Reported as of 10/

BMP 05 Coverage: Large Landscape Conservation Programs and Incentives

Reporting Unit: **City of Pasadena**

Reporting Period: **03-04**

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

An agency must meet three conditions to comply with BMP 5.

Condition 1: Develop water budgets for 90% of its dedicated landscape meter accounts within four years of the date implementation is to start.

Condition 2: (a) Offer landscape surveys to at least 20% of its CII accounts with mixed use meters each report cycle and be on track to survey at least 15% of its CII accounts with mixed use meters within 10 years of the date implementation is to start OR (b) Implement a dedicated landscape meter retrofit program for CII accounts with mixed use meters or assign landscape budgets to mixed use meters.

Condition 3: Implement and maintain customer incentive program(s) for irrigation equipment retrofits.

Test for Condition 1

Year	Report Period	BMP 5 Implementation Year	No. of Irrigation Meter Accounts	No. of Irrigation Accounts with Budgets	Budget Coverage Ratio	90% Coverage Met by Year 4
1999	99-00	1	400			NA
2000	99-00	2	400			NA
2001	01-02	3	400			NA
2002	01-02	4	400			No
2003	03-04	5	400			No
2004	03-04	6	305			No

Test for Condition 2a (survey offers)

Select Reporting Period:	03-04
Large Landscape Survey Offers as % of Mixed Use Meter CII Accounts	0.1%
Survey Offers Equal or Exceed 20% Coverage Requirement	NO

Test for Condition 2a (surveys completed)

Total Completed Landscape Surveys Reported through	
Credit for Surveys Completed Prior to Implementation of Reporting Database	757
Total + Credit	757
CII Accounts in Base Year	1,095
RU Survey Coverage as a % of Base Year CII Accounts	69.1%
Coverage Requirement by Year of Implementation per Exhibit 1	6.3%
RU on Schedule to Meet 10 Year Coverage	

Requirement YES

Test for Condition 2b (mixed use budget or meter retrofit program)

Report Year	Report Period	BMP 5 Implementation Year	Agency has mix-use budget program	No. of mixed-use budgets
1999	99-00	1	NO	
2000	99-00	2	NO	
2001	01-02	3	NO	
2002	01-02	4	NO	
2003	03-04	5	NO	
2004	03-04	6	NO	

Report Year	Report Period	BMP 4 Implementation Year	No. of mixed use CII accounts	No. of mixed use CII accounts fitted with irrig. meters
1999	99-00	1		
2000	99-00	2		
2001	01-02	3		
2002	01-02	4		
2003	03-04	5		
2004	03-04	6		

Test for Condition 3

Report Year	Report Period	BMP 5 Implementation Year	RU offers financial incentives?	No. of Loans	Total Amt. Loans
1999	99-00	1	NO		
2000	99-00	2	NO		
2001	01-02	3	NO		
2002	01-02	4	NO		
2003	03-04	5	NO		
2004	03-04	6	NO		

Report Year	Report Period	No. of Grants	Total Amt. Grants	No. of rebates	Total Amt. Rebates
1999	99-00				
2000	99-00				
2001	01-02				
2002	01-02				
2003	03-04				
2004	03-04				

BMP 5 COVERAGE STATUS SUMMARY:
Water supplier has not met one or more coverage requirements for this BMP.

Reported as of 10/

BMP 06 Coverage: High-Efficiency Washing Machine Rebate Programs

Reporting Unit: **City of Pasadena**

Reporting Period: **03-04**

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

An agency must meet one condition to comply with BMP 6.

Condition 1: Offer a cost-effective financial incentive for high-efficiency washers if one or more energy service providers in service area offer financial incentives for high-efficiency washers.

Test for Condition 1

Year	Report Period	BMP 6 Implementation Year	Rebate Offered by ESP?	Rebate Offered by RU?	Rebate Amount
1999	99-00	1	YES	NO	
2000	99-00	2	YES	NO	
2001	01-02	3	YES	NO	
2002	01-02	4	YES	YES	100.00
2003	03-04	5	YES	YES	150.00
2004	03-04	6	YES	YES	200.00

Year	Report Period	BMP 6 Implementation Year	No. Rebates Awarded	Coverage Met?
1999	99-00	1		NO
2000	99-00	2		NO
2001	01-02	3		NO
2002	01-02	4	211	YES
2003	03-04	5	571	YES
2004	03-04	6	722	YES

BMP 6 COVERAGE STATUS SUMMARY:
Water supplier is meeting coverage requirements for this BMP.

Reported as of 10/

BMP 07 Coverage: Public Information Programs

Reporting Unit: **City of Pasadena**

Reporting Period: **03-04**

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period?	No

An agency must meet one condition to comply with BMP 7.

Condition 1: Implement and maintain a public information program consistent with BMP 7's definition.

Test for Condition 1

Year	Report Period	BMP 7 Implementation Year	RU Has Public Information Program?
1999	99-00	2	YES
2000	99-00	3	YES
2001	01-02	4	YES
2002	01-02	5	YES
2003	03-04	6	YES
2004	03-04	7	YES

BMP 7 COVERAGE STATUS SUMMARY:
Water supplier is meeting coverage requirements for this BMP.

Reported as of 10/

BMP 08 Coverage: School Education Programs

Reporting Unit: **City of Pasadena**

Reporting Period: **03-04**

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period?	No

An agency must meet one condition to comply with BMP 8.

Condition 1: Implement and maintain a school education program consistent with BMP 8's definition.

Test for Condition 1

Year	Report Period	BMP 8 Implementation Year	RU Has School Education Program?
1999	99-00	2	YES
2000	99-00	3	YES
2001	01-02	4	YES
2002	01-02	5	YES
2003	03-04	6	YES
2004	03-04	7	YES

BMP 8 COVERAGE STATUS SUMMARY:
Water supplier is meeting coverage requirements for this BMP.

Reported as of 10/

BMP 09 Coverage: Conservation Programs for CII Accounts

Reporting Unit: **City of Pasadena**

Reporting Period: **03-04**

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

An agency must meet three conditions to comply with BMP 9.

Condition 1: Agency has identified and ranked by use commercial, industrial, and institutional accounts.

Condition 2(a): Agency is on track to survey 10% of commercial accounts, 10% of industrial accounts, and 10% of institutional accounts within 10 years of date implementation to commence.
OR
Condition 2(b): Agency is on track to reduce CII water use by an amount equal to 10% of baseline use within 10 years of date implementation to commence.
OR
Condition 2(c): Agency is on track to meet the combined target as described in Exhibit 1 BMP 9 documentation.

Test for Condition 1

Year	Report Period	BMP 9 Implementation Year	Ranked Com. Use	Ranked Ind. Use	Ranked Inst. Use
1999	99-00	1	YES	YES	YES
2000	99-00	2	YES	YES	YES
2001	01-02	3	YES	YES	YES
2002	01-02	4	YES	YES	YES
2003	03-04	5	YES	YES	YES
2004	03-04	6	YES	YES	YES

Test for Condition 2a

	Commercial	Industrial	Institutional
Total Completed Surveys Reported through 2004	510	100	0
Credit for Surveys Completed Prior to Implementation of Reporting Databases	317		
Total + Credit	827	100	
CII Accounts in Base Year	1,070	5	20
RU Survey Coverage as % of Base Year CII Accounts	77.3%	2000.0%	
Coverage Requirement by Year 6 of Implementation per Exhibit 1	4.2%	4.2%	4.2%
RU on Schedule to Meet 10 Year Coverage Requirement	YES	YES	NO

Test for Condition 2a

Performance

Year	Report Period	BMP 9 Implementation Year	Performance Target Savings (AF/yr)	Performance Target Savings Coverage	Target Savings Coverage Requirement	Coverage Requirement Met
1999	99-00	1			0.5%	NO
2000	99-00	2			1.0%	NO
2001	01-02	3			1.7%	NO
2002	01-02	4	253	2.2%	2.4%	NO
2003	03-04	5	41	0.3%	3.3%	NO
2004	03-04	6	55	0.5%	4.2%	NO

Test for Condition 2c

Total BMP 9 Surveys + Credit	927
BMP 9 Survey Coverage	84.7%
BMP 9 Performance Target Coverage	0.5%
BMP 9 Survey + Performance Target Coverage	85.1%
Combined Coverage Equals or Exceeds Coverage Requirement?	YES

BMP 9 COVERAGE STATUS SUMMARY:
Water supplier is meeting coverage requirements for this BMP.

Reported as of 10/

BMP 11 Coverage: Conservation Pricing

Reporting Unit: **City of Pasadena**

Reporting Period: **03-04**

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

---

An agency must meet one condition to comply with BMP 11.

Agency shall maintain rate structure consistent with BMP 11's definition of conservation pricing. Implementation methods shall be at least as effective as eliminating non-conserving pricing and adopting conserving pricing. For signatories supplying both water and sewer service, this BMP applies to pricing of both water and sewer service. Signatories that supply water but not sewer service shall make good faith efforts to work with sewer agencies so that those sewer agencies adopt conservation pricing for sewer service.

a) Non-conserving pricing provides no incentives to customers to reduce use. Such pricing is characterized by one or more of the following components: rates in which the unit price decreases as the quantity used increases (declining block rates);rates that involve charging customers a fixed amount per billing cycle regardless of the quantity used; pricing in which the typical bill is determined by high fixed charges and low commodity charges.

b) Conservation pricing provides incentives to customers to reduce average or peak use, or both. Such pricing includes: rates designed to recover the cost of providing service; and billing for water and sewer service based on metered water use. Conservation pricing is also characterized by one or more of the following components: rates in which the unit rate is constant regardless of the quantity used (uniform rates) or increases as the quantity used increases (increasing block rates); seasonal rates or excess-use surcharges to reduce peak demands during summer months; rates based upon the longrun marginal cost or the cost of adding the next unit of capacity to the system.

Test for Condition 1

Year	Report Period	RU Employed Non Conserving Rate Structure	RU Meets BMP 11 Coverage Requirement
1999	99-00	NO	YES
2000	99-00	NO	YES
2001	01-02	NO	YES
2002	01-02	NO	YES
2003	03-04	NO	YES
2004	03-04	NO	YES

BMP 11 COVERAGE STATUS SUMMARY:

Water supplier is meeting coverage requirements for this BMP.

Reported as of 10/

BMP 12 Coverage: Conservation Coordinator

Reporting Unit: **City of Pasadena**

Reporting Period: **03-04**

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

Agency shall staff and maintain the position of conservation coordinator and provide support staff as necessary.

Test for Compliance

Report Year	Report Period	Conservation Coordinator Position Staffed?	Total Staff on Team (incl. CC)
1999	99-00	NO	
2000	99-00	NO	
2001	01-02	YES	1
2002	01-02	YES	1
2003	03-04	YES	1
2004	03-04	YES	1

BMP 12 COVERAGE STATUS SUMMARY:
Water supplier is meeting coverage requirements for this BMP.

Reported as of 10/

BMP 13 Coverage: Water Waste Prohibition

Reporting Unit: **City of Pasadena**

Reporting Period: **03-04**

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

---

An agency must meet one condition to comply with BMP 13.

Implementation methods shall be enacting and enforcing measures prohibiting gutter flooding, single pass cooling systems in new connections, non-recirculating systems in all new conveyer car wash and commercial laundry systems, and non-recycling decorative water fountains.

Test for Condition 1

Agency or service area prohibits:

Year	Gutter Flooding	Single-Pass Cooling Systems	Single-Pass Car Wash	Single-Pass Laundry	Single-Pass Fountains	Other	RU has ordinance that meets coverage requirement
1999	no	no	no	no	no	no	NO
2000	no	no	no	no	no	no	NO
2001	no	no	no	no	no	no	NO
2002	no	no	no	no	no	no	NO
2003	no	no	no	no	no	no	NO
2004	no	no	no	no	no	no	NO

BMP 13 COVERAGE STATUS SUMMARY:
Water supplier has not met one or more coverage requirements for this BMP.

Reported as of 10/

BMP 14 Coverage: Residential ULFT Replacement Programs

Reporting Unit: **City of Pasadena**

MOU Exhibit 1 Coverage Requirement

A Reporting Unit (RU) must meet one of the following conditions to be in compliance with BMP 14.

Condition 1: Retrofit-on-resale (ROR) ordinance in effect in service area.

Condition 2: Water savings from toilet replacement programs equal to 90% of Exhibit 6 coverage requirement.

An agency with an exemption for BMP 14 is not required to meet one of the above conditions. This report treats an agency with missing base year data required to compute the Exhibit 6 coverage requirement as out of compliance with BMP 14.

Status: Water supplier is meeting coverage requirements for this BMP. as of 2004

Coverage Year	BMP 14 Data Submitted to CUWCC	Exemption Filed with CUWCC	ROR Ordinance in Effect	Exhibit 6 Coverage Req'mt (AF)	Toilet Replacement Program Water Savings* (AF)
1998	Yes			47.60	6993.68
1999	Yes	No	No	137.06	8391.22
2000	Yes	No	No	263.18	9745.19
2001	Yes	No	No	421.25	11063.22
2002	Yes	No	No	607.00	12340.52
2003	Yes	No	No	816.60	13579.09
2004	Yes	No	No	1046.56	14776.22
2005	No	No	No	1293.76	
2006	No	No	No	1555.38	
2007	No	No	No	1828.89	

*NOTE: Program water savings listed are net of the plumbing code. Savings are cumulative (not annual) between 1991 and the given year. Residential ULFT count data from unsubmitted forms are NOT included in the calculation.

BMP 14 COVERAGE STATUS SUMMARY:
Water supplier is meeting coverage requirements for this BMP.

Water Supply & Reuse

Reporting Unit: **City of Pasadena**

Year: **2003**

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type
MWD	24580.57	Imported
City of Pasadena	12774.19	Groundwater
Interconnections	151.68	Imported

Total AF: 37506.44

Reported as of 10/

Accounts & Water Use

Reporting Unit Name:	Submitted to	Year:
City of Pasadena	CUWCC **02/28/2005**	**2003**

A. Service Area Population Information:

1. Total service area population 162000

B. Number of Accounts and Water Deliveries (AF)

Type	Metered		Unmetered	
	No. of Accounts	Water Deliveries (AF)	No. of Accounts	Water Deliveries (AF)
1. Single-Family	29384	21788	0	0
2. Multi-Family	0	0	0	0
3. Commercial	8460	13910	0	0
4. Industrial	0	0	0	0
5. Institutional	271	1293	0	0
6. Dedicated Irrigation	0	0	0	0
7. Recycled Water	0	0	0	0
8. Other	0	0	0	0
9. Unaccounted	NA	0	NA	0
Total	38115	36991	0	0
	Metered		**Unmetered**	

Reported as of 10/

BMP 01: Water Survey Programs for Single-Family and Multi-Family Residential Customers

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2003**

A. Implementation

1. Based on your signed MOU date, 01/15/1992, your Agency STRATEGY DUE DATE is:	01/14/1994
2. Has your agency developed and implemented a targeting/ marketing strategy for SINGLE-FAMILY residential water use surveys?	no
a. If YES, when was it implemented?	
3. Has your agency developed and implemented a targeting/ marketing strategy for MULTI-FAMILY residential water use surveys?	no
a. If YES, when was it implemented?	

B. Water Survey Data

Survey Counts:	Single Family Accounts	Multi-Family Units
1. Number of surveys offered:	25	1
2. Number of surveys completed:	25	1
Indoor Survey:		
3. Check for leaks, including toilets, faucets and meter checks	yes	no
4. Check showerhead flow rates, aerator flow rates, and offer to replace or recommend replacement, if necessary	no	yes
5. Check toilet flow rates and offer to install or recommend installation of displacement device or direct customer to ULFT replacement program, as neccesary; replace leaking toilet flapper, as necessary	yes	yes
Outdoor Survey:		
6. Check irrigation system and timers	yes	no
7. Review or develop customer irrigation schedule	yes	no
8. Measure landscaped area (Recommended but not required for surveys)	no	no
9. Measure total irrigable area (Recommended but not required for surveys)	no	no
10. Which measurement method is typically used (Recommended but not required for surveys)		None
11. Were customers provided with information packets that included evaluation results and water savings recommendations?	yes	yes
12. Have the number of surveys offered and completed, survey results, and survey costs been tracked?	yes	yes
a. If yes, in what form are surveys tracked?		spreadsheet

b. Describe how your agency tracks this information.

Audit results are transferred to an excel spreadsheet format that includes customer & property information, water useage and existing fixtures. Irrigation timing devices are also noted.

C. Water Survey Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	35000	25000
2. Actual Expenditures	780	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Audits are primarily due to high bill complaints or special circumstances as there is not staff available to complete audits. As we move into outside water saving devices our intent is to incorporate more individual water saving analysis. Expenditures do not include admin & staffing costs. Management and city council strongly promote and support water conservation. Participation in city sponsored events, provided water conservation items such as water bucket conservation kits, literature, local newsletters and website support. We added the H2ouse.com link to the PWP website but are not currently tracking the activity at that site.

Reported as of 10/

BMP 02: Residential Plumbing Retrofit

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2003**

A. Implementation

1. Is there an enforceable ordinance in effect in your service area requiring replacement of high-flow showerheads and other water use fixtures with their low-flow counterparts? yes

   a. If YES, list local jurisdictions in your service area and code or ordinance in each:

   City of Pasadena code emulates State code which does not permit the sale of non low flow showerheads.

2. Has your agency satisfied the 75% saturation requirement for single-family housing units? yes

3. Estimated percent of single-family households with low-flow showerheads: 83%

4. Has your agency satisfied the 75% saturation requirement for multi-family housing units? yes

5. Estimated percent of multi-family households with low-flow showerheads: 82%

6. If YES to 2 OR 4 above, please describe how saturation was determined, including the dates and results of any survey research.

   Calculated as a percentage of the number distributed at events, surveys and door to door since 1990 vs. total households per annual report and census.

B. Low-Flow Device Distribution Information

1. Has your agency developed a targeting/ marketing strategy for distributing low-flow devices? yes

   a. If YES, when did your agency begin implementing this strategy? 6/1/1991

   b. Describe your targeting/ marketing strategy.

   Water surveys for single and mult-family homes that include retrofits. Event education and distribution. Special projects ie: renovation of mult-family units, small amount of community based organization distribution and tie in with home energy audit programs.

Low-Flow Devices Distributed/ Installed	SF Accounts	MF Units
2. Number of low-flow showerheads distributed:	862	335
3. Number of toilet-displacement devices distributed:	0	0
4. Number of toilet flappers distributed:	870	138
5. Number of faucet aerators distributed:	921	137

6. Does your agency track the distribution and cost of low-flow devices? yes

   a. If YES, in what format are low-flow devices tracked? Spreadsheet

   b. If yes, describe your tracking and distribution system :

   Spreadsheets are kept for surveys and event handouts. Specific account numbers and/or addresses are not recorded.

C. Low-Flow Device Distribution Expenditures

	This Year	Next Year
1. Budgeted Expenditures	12000	10000
2. Actual Expenditures	7459	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Showerheads are included in water conservation bucket kits as well as distributed as an individual item.

Reported as of 10/

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2003**

A. Implementation

1. Has your agency completed a pre-screening system audit for this reporting year?	yes
2. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
a. Determine metered sales (AF)	36991
b. Determine other system verifiable uses (AF)	0
c. Determine total supply into the system (AF)	37507
d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.99
3. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
4. Did your agency complete a full-scale audit during this report year?	no
5. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	no
6. Does your agency operate a system leak detection program?	no
a. If yes, describe the leak detection program:	

B. Survey Data

1. Total number of miles of distribution system line.	512
2. Number of miles of distribution system line surveyed.	52

C. System Audit / Leak Detection Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Pasadena water is implementing a Capital Improvment Program that includes the upgrading or replacing of water mains throughout the distribution system.

Reported as of 10/

BMP 04: Metering with Commodity Rates for all New Connections and Retrofit of Existing

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2003**

A. Implementation

1. Does your agency require meters for all new connections and bill by volume-of-use?	yes
2. Does your agency have a program for retrofitting existing unmetered connections and bill by volume-of-use?	no
a. If YES, when was the plan to retrofit and bill by volume-of-use existing unmetered connections completed?	0
b. Describe the program:	
3. Number of previously unmetered accounts fitted with meters during report year.	0

B. Feasibility Study

1. Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters?	no
a. If YES, when was the feasibility study conducted? (mm/dd/yy)	
b. Describe the feasibility study:	
2. Number of CII accounts with mixed-use meters.	0
3. Number of CII accounts with mixed-use meters retrofitted with dedicated irrigation meters during reporting period.	0

C. Meter Retrofit Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No
a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	

E. Comments

Reported as of 10/

BMP 05: Large Landscape Conservation Programs and Incentives

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2003**

A. Water Use Budgets

1. Number of Dedicated Irrigation Meter Accounts:	400
2. Number of Dedicated Irrigation Meter Accounts with Water Budgets:	0
3. Budgeted Use for Irrigation Meter Accounts with Water Budgets (AF):	0
4. Actual Use for Irrigation Meter Accounts with Water Budgets (AF):	0
5. Does your agency provide water use notices to accounts with budgets each billing cycle?	no

B. Landscape Surveys

1. Has your agency developed a marketing / targeting strategy for landscape surveys?	no
a. If YES, when did your agency begin implementing this strategy?	
b. Description of marketing / targeting strategy:	
2. Number of Surveys Offered.	1
3. Number of Surveys Completed.	1
4. Indicate which of the following Landscape Elements are part of your survey:	
a. Irrigation System Check	yes
b. Distribution Uniformity Analysis	yes
c. Review / Develop Irrigation Schedules	yes
d. Measure Landscape Area	yes
e. Measure Total Irrigable Area	yes
f. Provide Customer Report / Information	yes
5. Do you track survey offers and results?	no
6. Does your agency provide follow-up surveys for previously completed surveys?	no
a. If YES, describe below:	

C. Other BMP 5 Actions

1. An agency can provide mixed-use accounts with ETo-based landscape budgets in lieu of a large landscape survey program. Does your agency provide mixed-use accounts with landscape budgets?	no
2. Number of CII mixed-use accounts with landscape budgets.	0
3. Do you offer landscape irrigation training?	yes
4. Does your agency offer financial incentives to improve landscape water use efficiency?	no

Type of Financial Incentive:	Budget (Dollars/	Number Awarded to Customers	Total Amount Awarded

	Year)		
a. Rebates	0	0	0
b. Loans	0	0	0
c. Grants	0	0	0

5. Do you provide landscape water use efficiency information to new customers and customers changing services? yes

a. If YES, describe below:

6. Do you have irrigated landscaping at your facilities? yes

a. If yes, is it water-efficient? no

b. If yes, does it have dedicated irrigation metering? no

7. Do you provide customer notices at the start of the irrigation season? no

8. Do you provide customer notices at the end of the irrigation season? no

D. Landscape Conservation Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	1200	

E. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

F. Comments

Dedicated landscape meters and an entire system upgrade is in the planning as well as a citywide central irrigation controller. Notices are sent in bills with a general message about cutting back on irrigation. All large landscape customers were surveyed in the early 1990's. Surveys included graywater and reclaimed water evaluation and planning. Number of Dedicated Irrigation Meter Accounts is a staff estimate but is not documented on our data base. Our system does not track AF sold by irrigation meters.

Reported as of 10/

BMP 06: High-Efficiency Washing Machine Rebate Programs

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2003**

A. Implementation

1. Do any energy service providers or waste water utilities in your service area offer rebates for high-efficiency washers? yes

   a. If YES, describe the offerings and incentives as well as who the energy/waste water utility provider is.

   PWP offers aa $200 rebate for all high efficiency washers. Additionally customers were eligible for an Energy Star rebate.

2. Does your agency offer rebates for high-efficiency washers? yes
3. What is the level of the rebate? 150
4. Number of rebates awarded. 571

B. Rebate Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	25000	30000
2. Actual Expenditures	88200	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 10/

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2003**

A. Implementation

1. Does your agency maintain an active public information program to promote and educate customers about water conservation? yes

a. If YES, describe the program and how it's organized.

Public relations manager maintains annual calandar and adjusts as needed. Account managers work with individual accounts and the department staff work as a team to plan and participate in events and meetings in order to provide up to date information on water conservation issues and practices.

2. Indicate which and how many of the following activities are included in your public information program.

Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	28
b. Public Service Announcement	yes	4
c. Bill Inserts / Newsletters / Brochures	yes	26
d. Bill showing water usage in comparison to previous year's usage	yes	
e. Demonstration Gardens	yes	1
f. Special Events, Media Events	yes	36
g. Speaker's Bureau	yes	12
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	100000	90000
2. Actual Expenditures	67939	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Expenditures do not include any admin or consultant costs.

Reported as of 10/

BMP 08: School Education Programs

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2003**

A. Implementation

1.Has your agency implemented a school information program to promote water conservation? yes

2. Please provide information on your school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	0	320	0
Grades 4th-6th	yes	0	1280	0
Grades 7th-8th	no	0	0	0
High School	yes	0	110	0

3. Did your Agency's materials meet state education framework requirements? no

4. When did your Agency begin implementing this program? 1/1/1995

B. School Education Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	50000	50000
2. Actual Expenditures	32567	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

We do not have a formal program - we present information to school age children at events and upon request from schools. Expenditures do not include admin/staff time. The number of students reached was arrived at by reviewing attendance records at events attended by students. Water conservation messages are distributed at all events where children are in attendance. The conservation messages are printed on various materials coloring books, pens & pencils and stuffed toys depending on the age level of the participants.

Reported as of 10/

BMP 09: Conservation Programs for CII Accounts

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2003**

A. Implementation

1. Has your agency identified and ranked COMMERCIAL customers according to use?	yes
2. Has your agency identified and ranked INDUSTRIAL customers according to use?	yes
3. Has your agency identified and ranked INSTITUTIONAL customers according to use?	yes

Option A: CII Water Use Survey and Customer Incentives Program

4. Is your agency operating a CII water use survey and customer incentives program for the purpose of complying with BMP 9 under this option?	yes

CII Surveys	Commercial Accounts	Industrial Accounts	Institutional Accounts
a. Number of New Surveys Offered	0	0	0
b. Number of New Surveys Completed	0	0	0
c. Number of Site Follow-ups of Previous Surveys (within 1 yr)	0	0	0
d. Number of Phone Follow-ups of Previous Surveys (within 1 yr)	0	0	0

CII Survey Components	Commercial Accounts	Industrial Accounts	Institutional Accounts
e. Site Visit	no	no	no
f. Evaluation of all water-using apparatus and processes	no	no	no
g. Customer report identifying recommended efficiency measures, paybacks and agency incentives	no	no	no

Agency CII Customer Incentives	Budget ($/Year)	No. Awarded to Customers	Total $ Amount Awarded
h. Rebates	100000	1229	91790
i. Loans	0	0	0
j. Grants	0	0	47861
k. Others	0	0	35901

Option B: CII Conservation Program Targets

5. Does your agency track CII program interventions and water savings for the purpose of complying with BMP 9 under this option?	yes
6. Does your agency document and maintain records on how savings were realized and the method of calculation for estimated savings?	yes
7. Estimated annual savings (AF/yr) from site-verified actions taken by agency since 1991.	12.48
8. Estimated annual savings (AF/yr) from non-site-verified actions taken by agency since 1991.	112.33

B. Conservation Program Expenditures for CII Accounts

	This Year	Next Year
1. Budgeted Expenditures	200000	266000
2. Actual Expenditures	252344	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Dollar amounts in incentives; Grants - include Prop 13 funds awarded to Customers for zero consumption urinals. Others: includes cost of dual flush toilets and waterbrooms for direct install programs (product cost only). Implementation costs for granat program and direct install programs are included in actual expenditures figure. Some expenditures were made in FY 2003 and installations completed in FY 2004. AFY savings were provided by MWD - they do not reflect their annual report figures and are not in line with past accumulated water savings.

Reported as of 10/

BMP 09a: CII ULFT Water Savings

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2003**

1. Did your agency implement a CII ULFT replacement program in the reporting year? If No, please explain why on Line B. 10. — Yes

A. Targeting and Marketing

1. What basis does your agency use to target customers for participation in this program? Check all that apply.
   - Consumption ranking
   - Service area zones
   - Potential savings
   - CII Sector or subsector

   a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

   Direct install has shown to be the most effective avenue for customer acceptance. Outside support is required due to staffing limitations. Direct install is most cost effective for customers and credibility is greater than through a rebate/voucher program.

2. How does your agency advertise this program? Check all that apply.
   - Direct letter
   - Newsletter
   - Telephone
   - Web page
   - Newspapers
   - Other print media
   - Trade shows and events

   a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

   Our monthly newsletter to our business customers and print ads have gotten the best response rate.

B. Implementation

1. Does your agency keep and maintain customer participant information? (Read the Help information for a complete list of all the information for this BMP.) — Yes
2. Would your agency be willing to share this information if the CUWCC did a study to evaluate the program on behalf of your agency? — No
3. What is the total number of customer accounts participating in the program during the last year ? — 8

CII Subsector	Number of Toilets Replaced			
4.	**Standard Gravity Tank**	**Air Assisted**	**Valve Floor Mount**	**Valve Wall Mount**
a. Offices	0	0	0	0
b. Retail / Wholesale	0	0	0	0
c. Hotels	0	0	0	0
d. Health	0	0	0	0
e. Industrial	0	0	0	0

f. Schools: K to 12	0	0	0	0
g. Eating	0	0	0	0
h. Government	0	0	0	0
i. Churches	0	0	0	0
j. Other	0	0	0	0

5. Program design.

Rebate or voucher
Direct installation

6. Does your agency use outside services to implement this program? Yes

a. If yes, check all that apply.

Consultant

7. Participant tracking and follow-up.

Site Visit

8. Based on your program experience, please rank on a scale of 1 to 5, with 1 being the least frequent cause and 5 being the most frequent cause, the following reasons why customers refused to participate in the program.

a. Disruption to business	3
b. Inadequate payback	4
c. Inadequate ULFT performance	1
d. Lack of funding	2
e. American's with Disabilities Act	3
f. Permitting	1
g. Other. Please describe in B. 9.	5

9. Please describe general program acceptance/resistance by customers, obstacles to implementation, and other isues affecting program implementation or effectiveness.

Customers unfamiliar with new technology (ie dual flush toilets).

10. Please provide a general assessment of the program for this reporting year. Did your program achieve its objectives? Were your targeting and marketing approaches effective? Were program costs in line with expectations and budgeting?

We presented new technology information at our Water Forum targeting the multi-family market sector.Our best success to date has been with inserts in the local newspaper with the ad placement on the front and the rebate application on the reverse side. We have also marketed to plumbers and local retailers and publicized heavily in local journals. Rebates were doubled for approximately 6 months which more than doubled the participation rate.

C. Conservation Program Expenditures for CII ULFT

1. CII ULFT Program: Annual Budget & Expenditure Data

	Budgeted	Actual Expenditure
a. Labor	0	26000
b. Materials	50000	30990

c. Marketing & Advertising	60000	48000
d. Administration & Overhead	70000	132159
e. Outside Services	0	16770
f. Total	180000	253919

2. CII ULFT Program: Annual Cost Sharing

a. Wholesale agency contribution	11160
b. State agency contribution	0
c. Federal agency contribution	0
d. Other contribution	0
e. Total	11160

D. Comments

Budget and expenditure figures were allocated using a different method than used in past years.

Reported as of 10/

BMP 11: Conservation Pricing

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2003**

A. Implementation

Rate Structure Data Volumetric Rates for Water Service by Customer Class

1. Residential

a. Water Rate Structure	Increasing Block Seasonal
b. Sewer Rate Structure	Uniform
c. Total Revenue from Volumetric Rates	$12544954
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$3511122

2. Commercial

a. Water Rate Structure	Increasing Block Seasonal
b. Sewer Rate Structure	Uniform
c. Total Revenue from Volumetric Rates	$8887930
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$2364296

3. Industrial

a. Water Rate Structure	Increasing Block
b. Sewer Rate Structure	Uniform
c. Total Revenue from Volumetric Rates	$0
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0

4. Institutional / Government

a. Water Rate Structure	Increasing Block Seasonal
b. Sewer Rate Structure	Uniform
c. Total Revenue from Volumetric Rates	$882598
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$765964

5. Irrigation

a. Water Rate Structure	Increasing Block
b. Sewer Rate Structure	Uniform
c. Total Revenue from Volumetric Rates	$0
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0

6. Other

a. Water Rate Structure	Increasing Block Seasonal
b. Sewer Rate Structure	Uniform
c. Total Revenue from Volumetric Rates	$0

d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0

B. Conservation Pricing Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

2002 data was inaccurate. 2003 data is more accurate with 2004 being the most accurate.

Reported as of 10/

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2003**

A. Implementation

1. Does your Agency have a conservation coordinator?	yes
2. Is this a full-time position?	no
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ?	
4. Partner agency's name:	
5. If your agency supplies the conservation coordinator:	
a. What percent is this conservation coordinator's position?	75%
b. Coordinator's Name	Jane Raftis
c. Coordinator's Title	Account Manager
d. Coordinator's Experience and Number of Years	Certified Water Conservation Practioner - 4
e. Date Coordinator's position was created (mm/dd/yyyy)	7/1/2001
6. Number of conservation staff, including Conservation Coordinator.	1

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	206000	212000
2. Actual Expenditures	259728	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 10/

BMP 13: Water Waste Prohibition

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2003**

A. Requirements for Documenting BMP Implementation

1. Is a water waste prohibition ordinance in effect in your service area? no

   a. If YES, describe the ordinance:

2. Is a copy of the most current ordinance(s) on file with CUWCC? no

   a. List local jurisdictions in your service area in the first text box and water waste ordinance citations in each jurisdiction in the second text box:

B. Implementation

1. Indicate which of the water uses listed below are prohibited by your agency or service area.

   a. Gutter flooding no

   b. Single-pass cooling systems for new connections no

   c. Non-recirculating systems in all new conveyor or car wash systems no

   d. Non-recirculating systems in all new commercial laundry systems no

   e. Non-recirculating systems in all new decorative fountains no

   f. Other, please name no

2. Describe measures that prohibit water uses listed above:

   None

Water Softeners:

3. Indicate which of the following measures your agency has supported in developing state law:

   a. Allow the sale of more efficient, demand-initiated regenerating DIR models. no

   b. Develop minimum appliance efficiency standards that:

      i.) Increase the regeneration efficiency standard to at least 3,350 grains of hardness removed per pound of common salt used. no

      ii.) Implement an identified maximum number of gallons discharged per gallon of soft water produced. no

   c. Allow local agencies, including municipalities and special districts, to set more stringent standards and/or to ban on-site regeneration of water softeners if it is demonstrated and found by the agency governing board that there is an adverse effect on the reclaimed water or groundwater supply. no

4. Does your agency include water softener checks in home water audit programs? no

5. Does your agency include information about DIR and exchange-type water softeners in educational efforts to encourage replacement of less efficient timer models? no

C. Water Waste Prohibition Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Reported as of 10/

BMP 14: Residential ULFT Replacement Programs

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2003**

A. Implementation

	Single-Family Accounts	Multi-Family Units
1. Does your Agency have program(s) for replacing high-water-using toilets with ultra-low flush toilets?	yes	yes

Number of Toilets Replaced by Agency Program During Report Year

Replacement Method	SF Accounts	MF Units
2. Rebate	331	75
3. Direct Install	0	0
4. CBO Distribution	0	0
5. Other	0	0
Total	**331**	**75**

6. Describe your agency's ULFT program for single-family residences.

Rebates were paid @$120/unit - During the first week of July then reverted to $60/unit through Feb. Mar through June PWP offered $100/unit as an added incentive. Program advertised on Website, local newspapers,city publications,billboards,bus shelters,point of sale and events. Three dual flush toilets are included in these totals are were rebated at $200 each. They replaced non ULFTs.

7. Describe your agency's ULFT program for multi-family residences.

Same as Single family with the addition of marketing efforts targeted toward local plumbers.

8. Is a toilet retrofit on resale ordinance in effect for your service area? no

9. List local jurisdictions in your service area in the left box and ordinance citations in each jurisdiction in the right box:

City of Pasadena	None

B. Residential ULFT Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	60000	35000
2. Actual Expenditures	35620	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Expenditures reflect rebate $'s only no administrative costs are included.

Reported as of 10/

Water Supply & Reuse

Reporting Unit: **City of Pasadena**

Year: **2004**

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type
MWD	24716.13	Imported
City of Pasadena	14708.96	Groundwater
Interconnections	378.91	Imported

Total AF: 39804

Reported as of 10/

Accounts & Water Use

Reporting Unit Name:	Submitted to	Year:
City of Pasadena	CUWCC **02/28/2005**	**2004**

A. Service Area Population Information:

1. Total service area population 162025

B. Number of Accounts and Water Deliveries (AF)

Type	Metered		Unmetered	
	No. of Accounts	Water Deliveries (AF)	No. of Accounts	Water Deliveries (AF)
1. Single-Family	28808	20947	0	0
2. Multi-Family	0	0	0	0
3. Commercial	8249	13373	0	0
4. Industrial	0	0	0	0
5. Institutional	259	1243	0	0
6. Dedicated Irrigation	0	0	0	0
7. Recycled Water	0	0	0	0
8. Other	0	0	0	0
9. Unaccounted	NA	0	NA	0
Total	37316	35563	0	0
	Metered		**Unmetered**	

Reported as of 10/

BMP 01: Water Survey Programs for Single-Family and Multi-Family Residential Customers

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2004**

A. Implementation

1. Based on your signed MOU date, 01/15/1992, your Agency STRATEGY DUE DATE is:	01/14/1994
2. Has your agency developed and implemented a targeting/ marketing strategy for SINGLE-FAMILY residential water use surveys?	no
a. If YES, when was it implemented?	
3. Has your agency developed and implemented a targeting/ marketing strategy for MULTI-FAMILY residential water use surveys?	no
a. If YES, when was it implemented?	

B. Water Survey Data

Survey Counts:	Single Family Accounts	Multi-Family Units
1. Number of surveys offered:	40	2
2. Number of surveys completed:	40	2
Indoor Survey:		
3. Check for leaks, including toilets, faucets and meter checks	yes	no
4. Check showerhead flow rates, aerator flow rates, and offer to replace or recommend replacement, if necessary	yes	yes
5. Check toilet flow rates and offer to install or recommend installation of displacement device or direct customer to ULFT replacement program, as neccesary; replace leaking toilet flapper, as necessary	yes	yes
Outdoor Survey:		
6. Check irrigation system and timers	yes	no
7. Review or develop customer irrigation schedule	yes	no
8. Measure landscaped area (Recommended but not required for surveys)	yes	no
9. Measure total irrigable area (Recommended but not required for surveys)	yes	no
10. Which measurement method is typically used (Recommended but not required for surveys)	Odometer Wheel	
11. Were customers provided with information packets that included evaluation results and water savings recommendations?	yes	yes
12. Have the number of surveys offered and completed, survey results, and survey costs been tracked?	yes	yes
a. If yes, in what form are surveys tracked?	spreadsheet	

b. Describe how your agency tracks this information.

Audit results are transferred to an excel spreadsheet format that includes customer & property information, water useage and existing fixtures. Irrigation timing devices are also noted.

C. Water Survey Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	25000	35000
2. Actual Expenditures	2220	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Audits are primarily due to high bill complaints or special circumstances as there is not staff available to complete audits. As we move into outside water saving devices our intent is to incorporate more individual water saving analysis. Expenditures do not include admin & staffing costs. Staff has completed audit and water conservation training. Management and city council strongly promote and support water conservation. Participation in city sponsored events, provided water conservation items such as water bucket conservation kits, literature, local newsletters and website support. Outdoor surveys vary depending on the whether it is conducted by staff or an outide consulting firm. Some of the cost of outside consulting firms was paid out of the power side budget since the audits conducted were for both water and electric issues. We are supplementing audit activity with outdoor landscaping classes and a link to the H2ouse.com website for customer conducted home audits.

Reported as of 10/

BMP 02: Residential Plumbing Retrofit

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2004**

A. Implementation

1. Is there an enforceable ordinance in effect in your service area requiring replacement of high-flow showerheads and other water use fixtures with their low-flow counterparts? yes

   a. If YES, list local jurisdictions in your service area and code or ordinance in each:

   City of Pasadena code emulates State code which does not permit the sale of non low flow showerheads.

2. Has your agency satisfied the 75% saturation requirement for single-family housing units? yes

3. Estimated percent of single-family households with low-flow showerheads: 87%

4. Has your agency satisfied the 75% saturation requirement for multi-family housing units? yes

5. Estimated percent of multi-family households with low-flow showerheads: 85%

6. If YES to 2 OR 4 above, please describe how saturation was determined, including the dates and results of any survey research.

   Calculated as a percentage of the number distributed at events, surveys and door to door since 1990 vs. total households per annual report and census.

B. Low-Flow Device Distribution Information

1. Has your agency developed a targeting/ marketing strategy for distributing low-flow devices? yes

   a. If YES, when did your agency begin implementing this strategy? 6/1/1991

   b. Describe your targeting/ marketing strategy.

   Water surveys for single and mult-family homes that include retrofits. Event education and distribution. Special projects ie: addressing home owners associations and tie in with home energy audit programs. We are waiting for the results of the CUWCC flapper study before committing more funds/staff to future distribution.

Low-Flow Devices Distributed/ Installed	SF Accounts	MF Units
2. Number of low-flow showerheads distributed:	1332	156
3. Number of toilet-displacement devices distributed:	1200	0
4. Number of toilet flappers distributed:	782	10
5. Number of faucet aerators distributed:	2432	60

6. Does your agency track the distribution and cost of low-flow devices? yes

   a. If YES, in what format are low-flow devices tracked? Spreadsheet

   b. If yes, describe your tracking and distribution system :

   Spreadsheets are kept for surveys and event handouts. Specific account

numbers and/or addresses are not recorded. Showerheads are distributed at water audits as needed, events and at targeted meetings such as homeowners association meetings to reach the multi-family market sector.

C. Low-Flow Device Distribution Expenditures

	This Year	Next Year
1. Budgeted Expenditures	10000	0
2. Actual Expenditures	11914	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Showerheads are included in water conservation bucket kits as well as distributed as an individual item. We have quite a bit of inventory left from last year's purchases & do not anticipate any expenditures next year.

Reported as of 10/

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2004**

A. Implementation

1. Has your agency completed a pre-screening system audit for this reporting year?	yes
2. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
a. Determine metered sales (AF)	35563
b. Determine other system verifiable uses (AF)	0
c. Determine total supply into the system (AF)	39804
d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.89
3. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
4. Did your agency complete a full-scale audit during this report year?	no
5. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	no
6. Does your agency operate a system leak detection program?	no
a. If yes, describe the leak detection program:	

B. Survey Data

1. Total number of miles of distribution system line.	512
2. Number of miles of distribution system line surveyed.	52

C. System Audit / Leak Detection Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Reported as of 10/

BMP 04: Metering with Commodity Rates for all New Connections and Retrofit of Existing

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2004**

A. Implementation

1. Does your agency require meters for all new connections and bill by volume-of-use?	yes
2. Does your agency have a program for retrofitting existing unmetered connections and bill by volume-of-use?	no
a. If YES, when was the plan to retrofit and bill by volume-of-use existing unmetered connections completed?	0
b. Describe the program:	
3. Number of previously unmetered accounts fitted with meters during report year.	0

B. Feasibility Study

1. Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters?	no
a. If YES, when was the feasibility study conducted? (mm/dd/yy)	
b. Describe the feasibility study:	
2. Number of CII accounts with mixed-use meters.	0
3. Number of CII accounts with mixed-use meters retrofitted with dedicated irrigation meters during reporting period.	0

C. Meter Retrofit Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No
a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	

E. Comments

Reported as of 10/

BMP 05: Large Landscape Conservation Programs and Incentives

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2004**

A. Water Use Budgets

1. Number of Dedicated Irrigation Meter Accounts:	305
2. Number of Dedicated Irrigation Meter Accounts with Water Budgets:	0
3. Budgeted Use for Irrigation Meter Accounts with Water Budgets (AF):	0
4. Actual Use for Irrigation Meter Accounts with Water Budgets (AF):	0
5. Does your agency provide water use notices to accounts with budgets each billing cycle?	no

B. Landscape Surveys

1. Has your agency developed a marketing / targeting strategy for landscape surveys?	no
a. If YES, when did your agency begin implementing this strategy?	
b. Description of marketing / targeting strategy:	
2. Number of Surveys Offered.	0
3. Number of Surveys Completed.	0
4. Indicate which of the following Landscape Elements are part of your survey:	
a. Irrigation System Check	yes
b. Distribution Uniformity Analysis	no
c. Review / Develop Irrigation Schedules	yes
d. Measure Landscape Area	yes
e. Measure Total Irrigable Area	yes
f. Provide Customer Report / Information	yes
5. Do you track survey offers and results?	no
6. Does your agency provide follow-up surveys for previously completed surveys?	no
a. If YES, describe below:	

C. Other BMP 5 Actions

1. An agency can provide mixed-use accounts with ETo-based landscape budgets in lieu of a large landscape survey program. Does your agency provide mixed-use accounts with landscape budgets?	no
2. Number of CII mixed-use accounts with landscape budgets.	0
3. Do you offer landscape irrigation training?	yes
4. Does your agency offer financial incentives to improve landscape water use efficiency?	no

Type of Financial Incentive:	Budget (Dollars/	Number Awarded to Customers	Total Amount Awarded

	Year)		
a. Rebates	0	0	0
b. Loans	0	0	0
c. Grants	0	0	0

5. Do you provide landscape water use efficiency information to new customers and customers changing services? yes

a. If YES, describe below:

Our focus has been on education rather than programs. We have conducted landscape training courses and hosted a water forum for MF customers that included demonstrations of irrigation controllers. We are preparing for a pilot program in 2005 to install weather based controllers at selected sites throughout Pasadena. We also post the link to the BeWaterWise website for irrigation info on our PWP website and promote the watering index at events.

6. Do you have irrigated landscaping at your facilities? yes

a. If yes, is it water-efficient? no

b. If yes, does it have dedicated irrigation metering? no

7. Do you provide customer notices at the start of the irrigation season? no

8. Do you provide customer notices at the end of the irrigation season? no

D. Landscape Conservation Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	25000
2. Actual Expenditures	8000	

E. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

F. Comments

Our focus has been on education rather than programs. We have conducted landscape training courses and hosted a water forum for MF customers that included demonstrations of irrigation controllers. We are preparing for a pilot program in 2005 to install weather based controllers at selected sites throughout Pasadena.

Reported as of 10/

BMP 06: High-Efficiency Washing Machine Rebate Programs

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2004**

A. Implementation

1. Do any energy service providers or waste water utilities in your service area offer rebates for high-efficiency washers? yes

   a. If YES, describe the offerings and incentives as well as who the energy/waste water utility provider is.

   PWP offers aa $200 rebate for all high efficiency washers. Additionally customers were eligible for an Energy Star rebate. PWP offered an additional $100 bonus rebate during Water Awareness month and for participants at our March Water Forum (MF customers)

2. Does your agency offer rebates for high-efficiency washers? yes
3. What is the level of the rebate? 200
4. Number of rebates awarded. 722

B. Rebate Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	30000	30000
2. Actual Expenditures	149500	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

PWP participated in the Water Awareness Campaign by donating 1 HEW.

Reported as of 10/

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2004**

A. Implementation

1. Does your agency maintain an active public information program to promote and educate customers about water conservation? yes

a. If YES, describe the program and how it's organized.

Public relations manager maintains annual calandar and adjusts as needed. Account managers work with individual accounts and the department staff work as a team to plan and participate in events and meetings in order to provide up to date information on water conservation issues and practices

2. Indicate which and how many of the following activities are included in your public information program.

Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	46
b. Public Service Announcement	yes	3
c. Bill Inserts / Newsletters / Brochures	yes	26
d. Bill showing water usage in comparison to previous year's usage	yes	
e. Demonstration Gardens	yes	1
f. Special Events, Media Events	yes	37
g. Speaker's Bureau	yes	12
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	90000	90000
2. Actual Expenditures	72171	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Expenditures include primarily direct costs related to events and program support. They do not include admin and staff costs. Advertising costs are not tracked by specific programs.

Reported as of 10/

BMP 08: School Education Programs

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2004**

A. Implementation

1.Has your agency implemented a school information program to promote water conservation? yes

2. Please provide information on your school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	0	730	0
Grades 4th-6th	yes	0	1430	0
Grades 7th-8th	no	0	0	0
High School	yes	0	0	0

3. Did your Agency's materials meet state education framework requirements? no

4. When did your Agency begin implementing this program? 1/1/1995

B. School Education Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	50000	50000
2. Actual Expenditures	27571	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

We do not have a formal program - we present information to school age children at events and upon request from schools. Expenditures do not include admin/staff time. The number of students reached was arrived at by reviewing attendance records at events attended by students. Water conservation messages are distributed at all events where children are in attendance. The conservation messages are printed on various materials coloring books, pens & pencils and stuffed toys depending on the age level of the participants.

Reported as of 10/

BMP 09: Conservation Programs for CII Accounts

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2004**

A. Implementation

1. Has your agency identified and ranked COMMERCIAL customers according to use?	yes
2. Has your agency identified and ranked INDUSTRIAL customers according to use?	yes
3. Has your agency identified and ranked INSTITUTIONAL customers according to use?	yes

Option A: CII Water Use Survey and Customer Incentives Program

4. Is your agency operating a CII water use survey and customer incentives program for the purpose of complying with BMP 9 under this option?	yes

CII Surveys	Commercial Accounts	Industrial Accounts	Institutional Accounts
a. Number of New Surveys Offered	0	0	0
b. Number of New Surveys Completed	0	0	0
c. Number of Site Follow-ups of Previous Surveys (within 1 yr)	0	0	0
d. Number of Phone Follow-ups of Previous Surveys (within 1 yr)	0	0	0

CII Survey Components	Commercial Accounts	Industrial Accounts	Institutional Accounts
e. Site Visit	no	no	no
f. Evaluation of all water-using apparatus and processes	no	no	no
g. Customer report identifying recommended efficiency measures, paybacks and agency incentives	no	no	no

Agency CII Customer Incentives	Budget ($/Year)	No. Awarded to Customers	Total $ Amount Awarded
h. Rebates	100000	826	86910
i. Loans	0	0	0
j. Grants	0	0	35266
k. Others	0	0	13565

Option B: CII Conservation Program Targets

5. Does your agency track CII program interventions and water savings for the purpose of complying with BMP 9 under this option?	yes
6. Does your agency document and maintain records on how savings were realized and the method of calculation for estimated savings?	yes
7. Estimated annual savings (AF/yr) from site-verified actions taken by agency since 1991.	16.93
8. Estimated annual savings (AF/yr) from non-site-verified actions taken by agency since 1991.	152.41

B. Conservation Program Expenditures for CII Accounts

	This Year	Next Year
1. Budgeted Expenditures	301000	302500
2. Actual Expenditures	310283	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Dollar amounts in incentives; Grants - include Prop 13 funds awarded to Customers for zero consumption urinal retrofits. Others: includes cost of dual flush toilets and waterbrooms for direct install programs (product cost only). Implementation costs for granat program and direct install programs are included in actual expenditures figure. Some expenditures were made in FY 2003 and installations completed in FY 2004. AFY savings were provided by MWD - they do not reflect their annual report figures and are not in line with past accumulated water savings.

Reported as of 10/

BMP 09a: CII ULFT Water Savings

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2004**

1. Did your agency implement a CII ULFT replacement program in the reporting year? If No, please explain why on Line B. 10. — Yes

A. Targeting and Marketing

1. What basis does your agency use to target customers for participation in this program? Check all that apply.
   - Consumption ranking
   - Service area zones
   - Potential savings
   - CII Sector or subsector

   a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

   Direct install has shown to be the most effective avenue for customer acceptance. Outside support is required due to staffing limitations. Direct install is most cost effective for customers and credibility is greater than through a rebate/voucher program.

2. How does your agency advertise this program? Check all that apply.
   - Direct letter
   - Newsletter
   - Telephone
   - Web page
   - Newspapers
   - Other print media
   - Trade shows and events

   a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

   Our monthly newsletter to our business customers and print ads have gotten the best response rate. Account Managers assigned to larger commercial customers were able to generate interest in our programs and discuss opportunities and issues on a one-to-one basis.

B. Implementation

1. Does your agency keep and maintain customer participant information? (Read the Help information for a complete list of all the information for this BMP.) — Yes
2. Would your agency be willing to share this information if the CUWCC did a study to evaluate the program on behalf of your agency? — No
3. What is the total number of customer accounts participating in the program during the last year ? — 52

CII Subsector	Number of Toilets Replaced			
4.	Standard Gravity Tank	Air Assisted	Valve Floor Mount	Valve Wall Mount
a. Offices	0	0	0	0
b. Retail / Wholesale	0	0	3	0
c. Hotels	0	0	0	0

d. Health	0	0	0	0
e. Industrial	0	0	0	0
f. Schools: K to 12	0	0	0	0
g. Eating	0	0	122	0
h. Government	0	0	0	0
i. Churches	0	0	0	0
j. Other	0	0	0	0

5. Program design.

Rebate or voucher
Direct installation

6. Does your agency use outside services to implement this program? Yes

a. If yes, check all that apply.

Consultant

7. Participant tracking and follow-up.

Telephone
Site Visit

8. Based on your program experience, please rank on a scale of 1 to 5, with 1 being the least frequent cause and 5 being the most frequent cause, the following reasons why customers refused to participate in the program.

a. Disruption to business	3
b. Inadequate payback	4
c. Inadequate ULFT performance	1
d. Lack of funding	2
e. American's with Disabilities Act	3
f. Permitting	1
g. Other. Please describe in B. 9.	0

9. Please describe general program acceptance/resistance by customers, obstacles to implementation, and other isues affecting program implementation or effectiveness.

Customer acceptance has increased but obstacles remain in with the cost of direct install programs. Direct install is preferable but requires outside vendors/consultants and greatly increases the cost of programs. We have found that even utilitizing the services of outside vendors, excessive staff support is required. Our field experience is that market potential is not what previous forcasts had indicated. In particular, outside plumbing services have added additional challenges to adminstration of programs.

10. Please provide a general assessment of the program for this reporting year. Did your program achieve its objectives? Were your targeting and marketing approaches effective? Were program costs in line with expectations and budgeting?

Program costs were not in line with water savings. We found that current staffing levels were not adequate to administer programs and offer customer support. Market potential dictated additional targeting methods, staff time and advertising costs in order to reach goals. Existing rebate programs have not been an adequate incentive for significant participation on the part of our commercial

customers. In most cases, we went over budget in order to provide programs to customers.

C. Conservation Program Expenditures for CII ULFT

1. CII ULFT Program: Annual Budget & Expenditure Data

	Budgeted	Actual Expenditure
a. Labor	0	14000
b. Materials	0	985
c. Marketing & Advertising	15000	11000
d. Administration & Overhead	75000	137620
e. Outside Services	0	4850
f. Total	90000	168455

2. CII ULFT Program: Annual Cost Sharing

a. Wholesale agency contribution	12540
b. State agency contribution	0
c. Federal agency contribution	0
d. Other contribution	0
e. Total	12540

D. Comments

The cost of programs and low response rate resulted in funds and staff time focused on other programs with a higher cost/water savings ratio. We are exploring new technologies that are becoming available.

Reported as of 10/

BMP 11: Conservation Pricing

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2004**

A. Implementation

Rate Structure Data Volumetric Rates for Water Service by Customer Class

1. Residential

a. Water Rate Structure	Increasing Block Seasonal
b. Sewer Rate Structure	Uniform
c. Total Revenue from Volumetric Rates	$13889915
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$3586437

2. Commercial

a. Water Rate Structure	Increasing Block Seasonal
b. Sewer Rate Structure	Uniform
c. Total Revenue from Volumetric Rates	$9840816
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$2415011

3. Industrial

a. Water Rate Structure	Increasing Block
b. Sewer Rate Structure	Uniform
c. Total Revenue from Volumetric Rates	$0
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0

4. Institutional / Government

a. Water Rate Structure	Increasing Block Seasonal
b. Sewer Rate Structure	Uniform
c. Total Revenue from Volumetric Rates	$977222
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$782394

5. Irrigation

a. Water Rate Structure	Increasing Block
b. Sewer Rate Structure	Uniform
c. Total Revenue from Volumetric Rates	$0
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0

6. Other

a. Water Rate Structure	Increasing Block Seasonal
b. Sewer Rate Structure	Uniform
c. Total Revenue from Volumetric Rates	$0

d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources $0

B. Conservation Pricing Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 10/

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2004**

A. Implementation

1. Does your Agency have a conservation coordinator?	yes
2. Is this a full-time position?	no
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ?	
4. Partner agency's name:	
5. If your agency supplies the conservation coordinator:	
a. What percent is this conservation coordinator's position?	75%
b. Coordinator's Name	Jane Raftis
c. Coordinator's Title	Account Manager
d. Coordinator's Experience and Number of Years	Certified Water Conservation Practioner - 5
e. Date Coordinator's position was created (mm/dd/yyyy)	7/1/2001
6. Number of conservation staff, including Conservation Coordinator.	1

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	212000	176000
2. Actual Expenditures	262000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 10/

BMP 13: Water Waste Prohibition

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2004**

A. Requirements for Documenting BMP Implementation

1. Is a water waste prohibition ordinance in effect in your service area? no

   a. If YES, describe the ordinance:

2. Is a copy of the most current ordinance(s) on file with CUWCC? no

   a. List local jurisdictions in your service area in the first text box and water waste ordinance citations in each jurisdiction in the second text box:

B. Implementation

1. Indicate which of the water uses listed below are prohibited by your agency or service area.

   a. Gutter flooding no

   b. Single-pass cooling systems for new connections no

   c. Non-recirculating systems in all new conveyor or car wash systems no

   d. Non-recirculating systems in all new commercial laundry systems no

   e. Non-recirculating systems in all new decorative fountains no

   f. Other, please name no

2. Describe measures that prohibit water uses listed above:

   None

Water Softeners:

3. Indicate which of the following measures your agency has supported in developing state law:

   a. Allow the sale of more efficient, demand-initiated regenerating DIR models. no

   b. Develop minimum appliance efficiency standards that:

      i.) Increase the regeneration efficiency standard to at least 3,350 grains of hardness removed per pound of common salt used. no

      ii.) Implement an identified maximum number of gallons discharged per gallon of soft water produced. no

   c. Allow local agencies, including municipalities and special districts, to set more stringent standards and/or to ban on-site regeneration of water softeners if it is demonstrated and found by the agency governing board that there is an adverse effect on the reclaimed water or groundwater supply. no

4. Does your agency include water softener checks in home water audit programs? no

5. Does your agency include information about DIR and exchange-type water softeners in educational efforts to encourage replacement of less efficient timer models? no

C. Water Waste Prohibition Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Reported as of 10/

BMP 14: Residential ULFT Replacement Programs

Reporting Unit:	BMP Form Status:	Year:
City of Pasadena	**100% Complete**	**2004**

A. Implementation

	Single-Family Accounts	Multi-Family Units
1. Does your Agency have program(s) for replacing high-water-using toilets with ultra-low flush toilets?	yes	yes

Number of Toilets Replaced by Agency Program During Report Year

Replacement Method	SF Accounts	MF Units
2. Rebate	131	96
3. Direct Install	0	0
4. CBO Distribution	0	0
5. Other	0	0
Total	**131**	**96**

6. Describe your agency's ULFT program for single-family residences.

Due to our saturation level we are not offering enhanced rebates over the amount reimbursed by MWD. We continue to run advertisements in local newspapers and on our website.

7. Describe your agency's ULFT program for multi-family residences.

Same as Single family with the addition of marketing efforts targeted toward local plumbers.

8. Is a toilet retrofit on resale ordinance in effect for your service area? no

9. List local jurisdictions in your service area in the left box and ordinance citations in each jurisdiction in the right box:

City of Pasadena None

B. Residential ULFT Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	35000	10000
2. Actual Expenditures	15860	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Expenditures reflect rebate $'s only no administrative costs are included

Reported as of 10/

This page intentionally left blank

APPENDIX G

WATER SHORTAGE PROCEDURES

This page intentionally left blank

CITY OF PASADENA

MUNICIPAL CODE

Chapter 13.10 WATER SHORTAGE PROCEDURES

13.10.010 Short title.

This chapter shall be known as the city of Pasadena "water shortage procedures". (Ord. 6275 § 1 (part), 1988)

13.10.015 Policy and purpose.

It is declared that because of the conditions prevailing in the city of Pasadena and in the areas of this state and elsewhere from which the city obtains its water supplies, the general welfare requires that the water resources available to the city be put to the maximum beneficial use to the extent to which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interests of the people of the city and for the public welfare. The purpose of this chapter is to provide water shortage procedures with voluntary and mandatory provisions to minimize the effect of a water shortage to the customers of the city and, by means of this chapter, to adopt provisions that will significantly reduce the consumption of water over an extended period of time thereby extending the available water required for the customers of the city while reducing the hardship of the city and the general public to the greatest extent possible. (Ord. 6275 § 1 (part), 1988)

13.10.020 Definitions.

As used in this chapter:
A. "Base period" means that period of time over which the base is computed.
B. "Base" means the amount of water used on a customer's premises during the corresponding billing period in the calendar year preceding the water shortage period, as established by the department. In event a base cannot be established using actual recorded amounts of water used on a customer's premises during the corresponding billing period in the calendar year preceding the water shortage period, the department shall assign a base. For purposes of assigning such base, the department may consider water usage data applicable to similarly situated customers or data for such customer's premises before or after the water shortage period. The department shall have the further discretion to adjust a customer's base in the event the customer's use of the premises is substantially different from the previous use thereof during the base period.
C. "Billing unit" means the unit amount of water used to apply water rates for the purposes of calculating commodity charges for customer water usage and equals 100 cubic feet or 748 gallons of water.
D. "Customer" means any person, persons, association, corporation, or governmental agency supplied and billed for water service by the department.
E. "Department" means the water and power department of the city of Pasadena.
F. "Process water" means water used to manufacture, alter, convert, clean, heat or cool a product or the equipment used for such purposes; water used for plant and equipment washing and for transporting raw materials and products; and water used to grow trees or plants for sale or installation.
G. "Water shortage" means a condition in which the existing or projected water supply available to the city is not anticipated to meet the ordinary water requirements of customers of the department. This condition may be the result of factors including but not

limited to voluntary or mandatory curtailment of Pasadena's water allocation from the metropolitan water district, emergency conditions, and/or failure of the city's or its supplier's water distribution systems.
H. "Water shortage period" means the period beginning on the effective date of the board of directors' implementation of a water shortage plan as provided in this chapter and ending on the date of the board's finding that a water shortage no longer exists. (Ord. 6425 § 1, 1991; Ord. 6275 § 1 (part), 1988)

13.10.025 Authorization.

The various officers, departments, commissions, and agencies of the city are authorized and directed to implement the applicable provisions of this chapter upon the effective date hereof. (Ord. 6275 § 1 (part), 1988)

13.10.030 Application.

The provisions of this chapter shall apply to all customers and property served water by the department wherever situated, and shall also apply to all property and facilities owned, maintained, operated, or under the jurisdiction of the various officers, departments, commissions, and agencies of the city. (Ord. 6275 § 1 (part), 1988)

13.10.035 Water shortage plan implementation.

The department shall monitor and evaluate the projected supply and demand for water by its customers. In the event of a water shortage, the department shall recommend to the board of directors such water shortage plan or plans as provided in this chapter which permit the department to prudently plan for and supply water to its customers. The utility advisory commission shall review the department's recommendation. Prior to implementation of a water shortage plan as provided in this chapter, the board of directors shall hold a public hearing for the purposes of determining whether a water shortage exists and the water shortage plan or plans which may be appropriate to address the water shortage. Notice of the time and place of said public hearing shall be published not less than 10 days before the hearing in a newspaper of general circulation within the city. The board of directors may, upon finding that a water shortage exists, order implementation of such water shortage plan or plans as provided in this chapter which it deems appropriate to address the water shortage. Said order shall be made by public proclamation and shall be published one time only in a daily newspaper of general circulation and shall become effective immediately upon such publication. The provisions of Section 13.10.050 shall take effect with the first full billing period commencing on or after the effective date of the board of directors' public proclamation. At any time during the water shortage period, the board of directors may discontinue any plan or may implement another plan as provided in this chapter. Upon a finding by the board of directors that a water shortage no longer exists, any water shortage plan then in effect shall terminate. (Ord. 6289 § 1 (part), 1988: Ord. 6275 § 1 (part), 1988)

13.10.040 Water shortage plan I.

All persons and customers of the department shall, on a voluntary basis, reduce water usage by taking the following water conservation measures:
A. Refrain from hosing or washing sidewalks, walkways, driveways, parking areas or other paved surfaces;
B. Refrain from cleaning, filling, or maintaining levels in decorative fountains, ponds, lakes, and similar structures unless such structure is equipped with a water recycling system;

C. Refrain from serving drinking water, unless at the express request of a customer, in all restaurants, hotels, cafes, cafeterias, or other public places where food is sold, served or offered for sale;
D. Promptly repair all leaks from indoor and outdoor plumbing fixtures, including but not limited to sprinkler systems;
E. Refrain from allowing water to run off landscape areas into adjoining streets, sidewalks, parking lots or alleys;
F. Refrain from allowing water to run off into adjoining streets, sidewalks, parking lots or alleys while washing vehicles;
G. Refrain from landscape watering more often than once every 3 days;
H. Refrain from landscape watering between the hours of 10:00 a.m. and 5:00 p.m.;
I. Refrain from filling or refilling a swimming pool. (Ord. 6289 § 1 (part), 1988: Ord. 6275 § 1 (part), 1988)

13.10.045 Water shortage plan II.

A. No customer of the department shall use or allow the use of water from the department to hose or wash sidewalks, walkways, driveways, parking areas or other paved surfaces.
B. No customer of the department shall use or allow the use of water from the department to fill or maintain levels in decorative fountains, ponds, lakes, and similar structures unless such structure is equipped with a water recycling system.
C. No restaurant, hotel, cafe, cafeteria, or other public place where food is sold, served, or offered for sale shall serve drinking water from the department unless at the express request of its customer.
D. No customer of the department shall allow water from the department to leak from any facility on his premises or on premises under his control or fail to effect a timely repair of any such leak.
E. No customer of the department shall cause or allow the use of water from the department to run off landscape areas into adjoining streets, sidewalks, parking lots or alleys due to incorrectly directed or maintained sprinklers or excessive watering.
F. No customer of the department shall use or allow the use of water from the department for landscape watering more often than once every 3 days.
G. No customer of the department shall use or allow the use of water for landscape watering between the hours of 10:00 a.m. and 5:00 p.m.
H. No customer of the department shall use or allow the use of water from the department to refill a swimming pool emptied after the commencement of a water shortage period. (Ord. 6289 § 1 (part), 1988)

13.10.050 Water shortage plan III.

A. Phase 1. No customer shall use or allow the use of water from the department for any purpose in an amount in excess of 85 percent of that customer's base, except that process water may be used to the extent of 95 percent of that customer's base.
B. Phase 2. No customer shall use or allow the use of water from the department for any purpose in an amount in excess of eighty 80 percent of that customer's base, except that process water may be used to the extent of 90 percent of that customer's base.
C. Phase 3. No customer shall use or allow the use of water from the department for any purpose in an amount in excess of 75 percent of that customer's base, except that process water may be used to the extent of 85 percent of that customer's base.
D. Phase 4. No customer shall use or allow the use of water from the department for any purpose in an amount in excess of 65 percent of that customer's base.
E. Phase 5. No customer shall use or allow the use of water from the department for any purpose in an amount in excess of 50 percent of that customer's base.
F. Nothing contained in this section shall be deemed to require any customer of the department to reduce his consumption of water provided by the department to an amount

less than 20 billing units bi-monthly at each meter during any billing period. (Ord. 6425 § 2, 1991; Ord. 6289 § 1 (part), 1988: Ord. 6275 § 1 (part), 1988)

13.10.055 Exception.

The prohibited uses of water from the department provided in this chapter are not applicable to that use of water necessary for public health and safety or for essential governmental services such as police, fire, and emergency services. Nothing contained in this chapter shall be construed to require the department to curtail the supply of water to any customer when, in the discretion of the department, such water is required by that customer to maintain an adequate level of public health and safety. (Ord. 6275 § 1 (part), 1988)

13.10.060 Additional water shortage measures.

The board of directors may order implementation of other water conservation measures additional to those set forth in Sections 13.10.040, 13.10.045 and 13.10.050. Such additional water shortage measures shall be implemented in the manner provided in Section 13.10.035. (Ord. 6289 § 2 (part), 1988: Ord. 6275 § 1 (part), 1988)

13.10.065 Penalties.

A. It shall be a violation for any customer to fail to comply with any of the provisions of Sections 13.10.045 or 13.10.050 while the same shall be in effect. Following public hearing as provided in Section 13.10.035, the board of directors shall establish a schedule of penalties, up to and including reduction or termination of service, to be assessed for the violation of any of the provisions of Sections 13.10.045 and 13.10.050.
B. Monetary penalties imposed under this section shall be collected by adding the same to the customer's water bill and shall be payable at the same time and in the same manner as such bills, or by such other method of collection and payment as established by the department.
C. The penalties applicable upon violation of additional water shortage measures implemented in accordance with Section 13.10.060 and the manner in which notice of such violation shall be given shall be set forth in the order implementing such additional water conservation measures. Said order shall also specify the applicability, if any, of Section 13.10.075 and 13.10.085 to such violations. (Ord. 6425 § 3, 1991: Ord. 6289 § 2 (part), 1988: Ord. 6275 § 1 (part), 1988)

13.10.070 Notices of violation.

The department shall give notice of violation to any customer committing a violation of any of the provisions of Sections 13.10.045 and 13.10.050. Said notice shall contain, in addition to the facts of the violation, a statement of the possible penalties for each violation and a statement informing the customer of his right to a hearing on the merits of the alleged violation. Notice of violation of Section 13.10.095 shall be given in the following manner:
1. By giving written notice thereof to the customer personally; or
2. If the customer be absent from or unavailable at the premises at which the violation occurred, by leaving a copy with some person of suitable age and discretion at said premises and sending a copy through the regular mail to the address at which customer is normally billed by the department; or
3. If a person of suitable age or discretion cannot be found, then by affixing a copy in a conspicuous place at the premises at which the violation occurred and also sending a copy

through the regular mail to the address at which customer is normally billed by the department.
Notice of violation of Section 13.10.050 shall be given by sending a copy through the regular mail to the address at which the customer is normally billed by the department. (Ord. 6289 § 2 (part), 1988: Ord. 6275 § 1 (part), 1988)

13.10.075 Right to hearing--Stay.

Any customer receiving a notice of violation of any of the provisions of Sections 13.10.045 or 13.10.050 shall have a right to a hearing by the general manager of the department, or his designee, on the merits of the alleged violation upon that customer's written request to the department. Customer's written request for a hearing must be received by the department within 10 days of the date of notification of the violation or customer's right to a hearing shall be deemed waived. Customer shall be deemed notified of a violation upon the personal delivery of the notice to customer or, if personal delivery is not given, the date on which the notice is placed in the regular mail. Customer's timely written request for a hearing shall automatically stay the imposition of penalty until the general manager, or his designee, renders a decision. No other or further stay shall be granted by the department. The department shall issue regulations to govern the contents of the request for hearing and the manner in which such hearings may be conducted. (Ord. 6289 § 2 (part), 1988: Ord. 6275 § 1 (part), 1988)

13.10.080 Reservation of rights.

The rights of the department hereunder shall be cumulative to any other right of the department to discontinue service. All moneys collected pursuant to the penalty provisions of Section 13.10.065 shall be deposited in the water fund. (Ord. 6275 § 1 (part), 1988)

13.10.085 Application for relief.

A customer may file with the department an application for relief from the department's application of the provisions of Section 13.10.050. The department shall have the power to take such steps as it deems reasonable and to set up such procedures as it considers necessary to resolve such application for relief. In determining whether to grant relief and the nature of the relief to grant, the department shall take into consideration all factors relevant to the customer's water usage including, but not limited to:
A. Whether any additional reduction in the customer's water consumption will result in unemployment;
B. Whether additional members have been added to the customer's household;
C. Whether any additional landscaped property has been added to the customer's property subsequent to the base period;
D. Changes in vacancy factors in multi-family housing;
E. Increased number of employees in commercial, industrial and governmental offices;
F. Increased production requiring increased process water;
G. Water uses during new construction;
H. Adjustments to water use caused by emergency, health or safety hazards;
I. First filling of a permit-constructed swimming pool;
J. Water use necessary for reasons related to family illness or health; and
K. Whether the customer had, prior to the water shortage, taken measures to reduce his water consumption to the greatest extent possible.
Relief shall be granted only on a showing by the customer that he has achieved the maximum practical reduction in water consumption in his residential, commercial, industrial, agricultural or governmental water consumption, as the case may be, other than in the specific areas in which relief is being sought. No relief shall be granted to any

customer who, when requested by the department, fails to provide the department with information necessary for the department to resolve that customer's application for relief. (Ord. 6289 § 3, 1988: Ord. 6275 § 1 (part), 1988)

13.10.090 Willful misrepresentation.

Notwithstanding any other provision of law, and in addition thereto, and not in lieu thereof, any willful misrepresentation of a material fact by any person to the department, made for the purpose of securing relief from the provisions of this chapter for any customer, is unlawful. A violation of this section shall be punishable by a fine not exceeding the sum of $500, or by imprisonment in the county jail for a period not to exceed 6 months, or by both such fine and imprisonment. (Ord. 6275 § 1 (part), 1988)

13.10.095 Reduction in water supplied.

If any customer fails to comply with any provision of this chapter, the department may reduce the amount of water provided to that customer to the level which that customer would be using said water if he were complying with the provisions of this chapter. The provisions of this section shall be applied in lieu of, or in addition to, any other penalties provided in this chapter, in the discretion of the department, and shall be applied without regard to the status or nature of the customer. (Ord. 6275 § 1 (part), 1988)

13.10.100 Reports.

At the written request of the general manager of the department, all commercial and industrial customers of the department using 25,000 billing units per year or more shall submit a water conservation plan to the department on a form and with a content approved by the department. These users shall thereafter submit quarterly reports to the department on the progress of their conservation plans. (Ord. 6275 § 1 (part), 1988)

13.10.105 Public nuisance.

In addition to the penalties provided in this chapter, any condition caused or permitted to exist in violation of any of the provisions of this chapter shall be deemed a public nuisance and may be, by the city, summarily abated as such, and each day such condition continues shall be regarded as a new and separate offense. (Ord. 6275 § 1 (part), 1988)