



REPORT TO COUNCIL 21

City of Sacramento

915 I Street, Sacramento, CA 95814-2604
www.CityofSacramento.org

Public Hearing
November 14, 2006

Honorable Mayor and
Members of the City Council

Title: Urban Water Management Plan 2005 Update

Location/Council District: Citywide

Recommendation: 1) Conduct a public hearing on the 2005 update of the City's Urban Water Management Plan, 2) close the public hearing, and 3) adopt a **Resolution** adopting the Urban Water Management Plan 2005 update.

Contact: Dan Sherry, Supervising Engineer, 808-1419, Jim Peifer, Senior Engineer, 808-1416

Presenters: Jim Peifer, Senior Engineer

Department: Utilities

Division: Engineering

Organization No: 3332

Description/Analysis

Issue: The California Water Code § 10620 requires that each urban water supplier prepare and adopt an Urban Water Management Plan (UMWP). Once adopted, Water Code § 10620 requires that the UWMP be updated every five years in years ending in five or zero.

In general, the UWMP provides information on water demands projected over the next 20 years, and evaluates if there are sufficient water supplies to meet demands. The City's last UWMP update was adopted in 2001.

Policy Considerations: The adoption of the UWMP is consistent with the Council focus areas of Public Safety, Economic Development, and Sustainability and Livability by planning for and ensuring a Safe and Reliable Water Supply.

Environmental Considerations: The California Environmental Quality Act (CEQA) does not apply to the preparation and adoption of Urban Water Management Plans, as indicated in Section 15282(v) of the CEQA Guidelines.

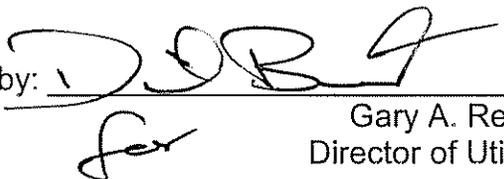
Rationale for Recommendation: Water Code § 10620 requires a water supplier

to update and adopt its Urban Water Management Plan every five years.

Financial Considerations: The adoption of the UWMP has no direct fiscal impact. However, completion of the update will allow the City to qualify for future applications for State administered grants and loans.

Emerging Small Business Development (ESBD): Not applicable.

Respectfully Submitted by: 
David L. Brent
Engineering Manager

Approved by: 
Gary A. Reents
Director of Utilities

Recommendation Approved:


bon Ray Kerridge
City Manager

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4 Draft UWMP	(provided as separate booklet)

Background

The Urban Water Management Plan is a document which discusses a water purveyor's long term water resource plans to ensure adequate water supplies to meet existing and future demands for water.

The California Water Code § 10620 requires that each urban water supplier prepare and adopt an Urban Water Management Plan (UMWP). Once adopted, Water Code § 10620 requires that the UWMP be updated every five years in years ending in five or zero. As defined in the Water Code, an "urban water supplier" is a supplier, either publicly or privately owned, that provides water to more than 3,000 customers, or supplies more than 3,000 acre-feet of water annually on a wholesale or retail basis or both. Currently, the City provides water service to approximately 131,000 connections and in 2005 served approximately 135,600 acre-feet of water.

The City's first plan was prepared in 1991, and the City's most recent UWMP update was adopted on December 18, 2001.

In general, the UWMP 2005 update considers projected water supply demands in the City and areas outside the City that are within the places of use for the City's American River water right permits; the latter areas are served by other water purveyors that receive or may obtain wholesale water service from the City. The UWMP update indicates that the City has sufficient water supplies to accommodate these projected demands over the next 20 years, assuming that existing levels of water conservation are maintained. The UWMP assumes for planning purposes that additional surface water treatment capacity will be constructed as needed to accommodate projected future demands.

The Water Code requires that the UWMP be available for public review and hearing. A draft copy of the UWMP 2005 update was made available for review at the Central Sacramento Library, and on the City's website at <http://www.cityofsacramento.org/utilities/urbanwater/index.html>. Copies of the draft UWMP also were provided to the County of Sacramento, Sacramento Suburban Water District, California American Water, and the Sacramento Regional County Sanitation District.

A copy of the draft UWMP also is on file and available for public review in the Office of the City Clerk. Since the draft UWMP was circulated, revisions have been made by City staff to correct various items in the draft document and to address comments received from the Sacramento Regional County Sanitation District. These revisions are recommended for inclusion in the final UWMP, and are shown on the errata pages attached to this report. Within 30 days after adoption, the adopted UWMP must be filed with the Department of Water Resources, the California State Library, and the County of Sacramento.

RESOLUTION NO.

Adopted by the Sacramento City Council

**ADOPTION OF THE
URBAN WATER MANAGEMENT PLAN 2005 UPDATE**

BACKGROUND

- A. California Water Code § 10620 requires that an urban water supplier prepare and adopt an Urban Water Management Plan. Once adopted, the Water Code requires that the Urban Water Management Plan be updated every five years.
- B. The City's most recent Urban Water Management Plan update was adopted on December 18, 2001.
- C. The City has prepared the 2005 update to its Urban Water Management Plan, consisting of the draft Urban Water Management Plan circulated for public review, modified to include the revisions attached to the staff report for this item.
- D. The City Council has held a public hearing on the Plan as required under Water Code § 10642.

**BASED ON THE FACTS SET FORTH IN THE BACKGROUND, THE CITY COUNCIL
RESOLVES AS FOLLOWS:**

- Section 1. The City Council adopts the City's Urban Water Management Plan 2005 update, and directs the Director of Utilities to file copies of the Plan with the State Department of Water Resources, the California State Library, and the County of Sacramento. If the State Department of Water Resources requires any revisions prior to acceptance of the Urban Water Management Plan, any such Plan revisions shall be approved by the Director of Utilities prior to resubmittal.

Attachment 3

Revisions to Draft Urban Water Management Plan
Attached as a PDF file separately

CHAPTER 2. PLAN PREPARATION, COORDINATION AND ADOPTION

PLAN PREPARATION

On December 12, 2005, the City of Sacramento authorized West Yost Associates (WYA) to prepare the City's UWMP 2005 Update. The information contained herein is based on data obtained from City staff, data included in available water supply planning documents and review and update of data contained in the City's 2001 UWMP.

Review of the City's 2001 UWMP indicated that the implementation plan and schedule of action items by the City through 2005 was accomplished. Updated implementation plans and schedules for on-going and/or future actions are provided in this 2005 UWMP.

PUBLIC INVOLVEMENT

It is the City's policy to encourage public participation when adopting plans such as the Urban Water Management Plan. Therefore, the City sought public input while developing this updated UWMP. The updated Draft UWMP was available for public review prior to the scheduled Public Hearing, which was held on ~~[fill in date of public hearing]~~ November 14, 2006. During this review period, the Draft UWMP was available at the City's offices during normal business hours, distributed to interested parties (see below), and made available at the Central Sacramento public library (Located at 828 I Street, Sacramento, CA 95814). Notices for the Public Hearing were placed in a local newspaper (The Sacramento Bee) and posted at City offices. A copy of the notice for the Public Hearing is provided in Appendix B.

OTHER AGENCY INVOLVEMENT

The City regularly coordinates with County of Sacramento (County), the Regional Water Authority (RWA) and other water purveyors in Sacramento County regarding regional water supply issues. The City notified the County, the RWA and the City's wholesale customers (California American Water Company and Sacramento Suburban Water District) regarding the preparation of this UWMP 2005 Update, and Public Hearing, and distributed copies of the updated Draft UWMP for their review and comment. ~~Their applicable comments were then incorporated into the final adopted UWMP.~~ Following plan adoption, a copy of this 2005 UWMP (including Chapter 5. Water Supply Reliability) was provided to the County and the City's wholesale customers in accordance with the requirements of the UWMP Act.

PLAN ADOPTION

The City of Sacramento City Council adopted this updated UWMP on ~~[fill in date of plan adoption]~~, 2006 (see City Resolution in Appendix B). The City will submit the updated UWMP to the Department of Water Resources within 30 days after its adoption, as required by Section 10644 of the UWMP Act. This updated UWMP contains information required by the UWMP





Act, which is necessary to plan for the efficient use of urban water supplies within the City's water service area. ~~Prior to its adoption, the updated UWMP was reviewed by City Council members, the public and other interested parties.~~

CHAPTER 3. BACKGROUND

The purpose of this chapter is to provide a brief description of the City, including its history, documents governing its water use, service area, population, climate, and customer connections. This chapter also provides a brief description of the City's water supply and distribution system.

BRIEF INTRODUCTION

The City was founded in 1849 with a population of 9,087 people,¹ and in 1920, voters adopted a City Charter (municipal constitution) and a City Council-City Manager form of government; this form of government is still in use today. Today, the City's population is approximately 452,959. The City's Department of Utilities (DOU) is responsible for providing and maintaining water, sewer collection, storm drainage and flood control services for residents and businesses within the City Limits.²

The City has extensive surface water entitlements, consisting of five appropriative water right permits issued by the State Water Resources Control Board, pre-1914 rights and a water rights settlement contract with the Bureau of Reclamation. ~~These water rights allow the City to divert water from the Sacramento and American Rivers. Further discussions of these items are provided in Chapters 4 and 5.~~

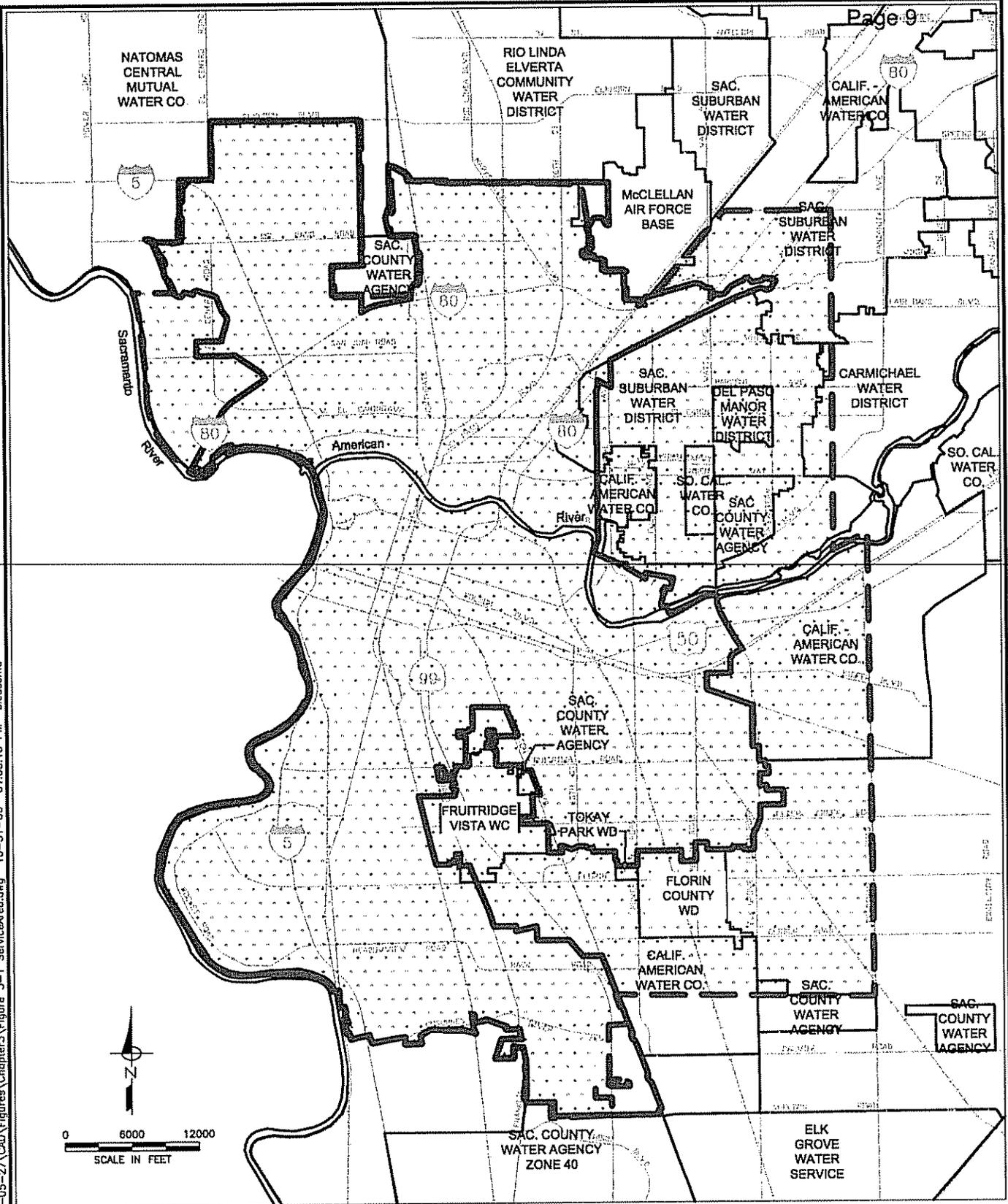
RESOURCE MAXIMIZATION AND IMPORT MINIMIZATION

Water management tools have been used by the City to maximize its water resources. The City has institutionalized water conservation by adopting City ordinances in 1967, becoming a signatory to the California Urban Water Conservation Council's (CUWCC) Memorandum of Understanding (MOU) in 1991, and approving the Water Forum Agreement in 2000.³

All three components have helped the City promote water conservation while managing increasing water demands due to extensive growth within the City's service area. By reducing the demand of current and future water customers, and assuring that all new system uses are efficient, the amount of water the City will need to meet potable water demands at buildout has been minimized.

CITY'S WATER SERVICE AREA

The City's current authorized place of use (POU) for water diverted ~~from~~under the City's Sacramento River water rights permit includes all the land within the City Limits, while the POU for water diverted ~~from~~under the City's American River water rights permits includes not only the City limits, but also portions of service areas of several other water purveyors. Figure 3-1 illustrates the City's POU for each surface water source.



LEGEND

-  AMERICAN RIVER PLACE OF USE
-  CITY LIMITS AND SACRAMENTO RIVER PLACE OF USE
-  OTHER WATER ENTITIES OUTSIDE CITY LIMITS

DRAFT FIGURE 3-1
City of Sacramento
PLACES OF USE



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CHAPTER 4. EXISTING AND PLANNED WATER SUPPLY SOURCES

The City obtains its water supply from two surface water sources (Sacramento and American Rivers) and groundwater pumped from the North American and South American subbasins of the Sacramento Valley Groundwater Basin. Consequently, the City has its own water entitlements, and does not receive any water supply from another water agency. The purpose of this chapter is to discuss the City's surface water entitlements to the Sacramento and American Rivers, and the availability and management of groundwater within the two subbasins.

SURFACE WATER ENTITLEMENTS

The City has surface water entitlements, consisting of five appropriative water right permits issued by the State Water Resources Control Board, pre-1914 rights and a water rights settlement contract with the Bureau of Reclamation. Table 4-1 summarizes the City's water right permits, including application number and priority date, permit number and issuance date, rate of diversion in cfs, annual limit in af, purpose of use, period of use, place of use, and the current deadline to perfect full use. Each water right permit is discussed in more detail below. Copies of the City's Bureau of Reclamation contract and water agreements are provided in Appendix C.

Surface water is currently diverted at two locations: Off the American River downstream from the Howe Avenue Bridge, and off the Sacramento River downstream of the confluence of the American and Sacramento Rivers. The City's current authorized POU for water diverted ~~from~~under the Sacramento River permit includes all the land within the City Limits, while the POU for water diverted ~~from~~under the American River permits includes not only the City limits, but also portions of service areas of several other water purveyors. Figure 4-1 illustrates the City's POU for ~~each surface~~these permits water source.

Sacramento River Water Rights

The City has pre-1914 and post-1914 appropriative rights for water from the Sacramento River. The City has used Sacramento River water since 1854 and claims a pre-1914 appropriative right to divert 75 cubic feet per second (cfs) from the Sacramento River.

The City's post-1914 Sacramento River permit (Permit 992) authorizes the City to take water from the Sacramento River by direct diversion, and has a priority date of March 30, 1920. Permit 992 authorizes the City to divert up to 81,800 acre-feet annually (afa) with a maximum flow of 225 cfs.

Permit 992 allows the City to use water diverted from the Sacramento River within the city limits of the City of Sacramento (see Figure 4-1), as this area changes from time to time through annexations.

Table 4-1. City of Sacramento State Water Right Permits Summary

Application Permit and License No.	Priority Date	River Source	Maximum Amount Specified		Purpose of Use	Period of Use	Place of Use	Deadline to Perfect by Full Use
			cfs	acre-ft/yr				
A. 1743 P. 992	3/30/1920	Sacramento	225 ^(a)	81,800 ^(c)	Municipal	Jan 1 to Dec 31	City of Sacramento	12/31/2004
A. 12140 P. 11358	10/29/1947	American			Municipal	Nov 1 to Aug 1	79,500 acres within and adjacent to City	12/1/2030
A. 12321 P. 11359	2/13/1948	Tributaries of American			Municipal	Year-round ^(d)	96,000 acres within and adjacent to City	12/31/2030
A. 12622 P. 11360	7/28/1948	Tributaries of American	675 ^(b)	245,000 ^(c)	Municipal	Year-round ^(d)	96,000 acres within and adjacent to City	12/31/2030
A. 16060 P. 11361	9/22/1954	Tributaries of American			Municipal	Nov 1 to Aug 1 ^(e)	79,500 acres within and adjacent to City	12/31/2030

(a) See Articles 9 and 10 of Contract No. 14-06-200-6497 dated 6-28-57 between City and U.S. bureau of Reclamation.
 (b) Combined total 675 cfs diversion. See Articles 9 and 10 of Contract No. 14-06-300-6497 dated 6-28-57 between City and U.S. Bureau of Reclamation.
 (c) Combined total 245,000 acre-ft/yr diversion. See above contract articles listed in footnote (b).
 (d) Year-round period for re-diversion of water previously diverted by SMUD Upper American River Reservoirs.
 (e) January 1 to December 31 (Municipal and Recreational); November 1 to August 1 (Industrial).



Bureau contract, in conjunction with the City’s water rights, provides the City with a very reliable and secure water supply.^a

Summary of Surface Water Entitlements

As discussed above, the City holds pre-1914 rights, as well as five permits to divert or divert water from the Sacramento and American Rivers. The 1957 settlement contract with the Bureau sets forth a diversion schedule (Schedule A) that assures, as well as limits, the total diversion available to City from the Sacramento and American Rivers.

Table 4-2 presents the City’s maximum allowed diversion, as specified in Schedule A, from the Sacramento and American Rivers combined, and the maximum allowed diversion from the American River by itself. The maximum allowed diversion from the Sacramento River is 81,800 afa during any year, but the total combined diversion from both rivers cannot exceed the total requirement specified in Schedule A.

Table 4-2. Maximum Annual Diversion Allowed to the Year 2030^(a)

Year	Maximum Diversion from the Sacramento River, afa ^(b)	Maximum Diversion from the American River, afa ^(c)	Maximum Combined Diversion, afa
2005	81,800	154,000	205,000
2010	81,800	170,500	227,500
2015	81,800	189,000	252,000
2020	81,800	208,500	278,000
2025	81,800	228,000	304,000
2030	81,800	245,000	326,800

- (a) Data obtained from Schedule A of the 1957 Water Rights Settlement Contract between the Bureau and the City.
- (b) The City may divert up to 81,800 afa from the Sacramento River as long as the total combined diversion from both the Sacramento and American Rivers does not exceed the Maximum Combined Diversion.
- (c) The City may divert up to the Maximum Diversion from the American River as long as the total combined diversion from both the Sacramento and American Rivers does not exceed the Maximum Combined Diversion.

^a The descriptions and discussion in this UWMP of the City’s water rights and water right settlement contract are provided solely for informational purposes, and nothing in this UWMP is intended to, nor shall any provision of this UWMP be interpreted, to modify or affect in any way such rights and contract.



different because the Central Basin boundary was developed from the Sacramento County groundwater model grid.⁶ However, the portion of the South American subbasin underlying the City of Sacramento, is considered to be the Central Basin.

Groundwater Quality

Groundwater underlying the City's service area generally meets primary and secondary drinking water standards for municipal water use, and is described as being calcium-magnesium-bicarbonate type water, with minor fractions of sodium-magnesium-bicarbonate.⁷ Due to high concentrations of iron and manganese in the lower aquifer system, the upper aquifer system is usually the preferred source of groundwater.⁸

The lower aquifer system also contains higher concentrations of total dissolved solids (TDS) than the upper aquifer. The TDS concentration in most wells is within secondary drinking water standards, but varies quite significantly throughout the area (from 21 to 657 mg/L, with an overall average of 221 mg/L).⁹ TDS concentrations exceed 2,000 milligrams per liter (mg/L) at depths of approximately 1,200 feet or greater.¹⁰ However, most wells do not extend into this poorer quality groundwater.

Groundwater Levels

As will be discussed in subsequent sections, the Sacramento Groundwater Authority (SGA) adopted the SGA Groundwater Management Plan (SGA GWMP) on December 11, 2003, to help establish a framework for maintaining a sustainable groundwater resource in the North American Subbasin (see Appendix D). ~~No groundwater management plan is currently available for the South American Subbasin. However,~~ The Water Forum and SCWA have recently completed a Central Sacramento County Groundwater Management Plan in February 2006 for an area approximately the same as the South American Subbasin.

Groundwater level trends for the North American Subbasin were obtained from the SGA GWMP. Groundwater level trends in the South American Subbasin were obtained from DWR Bulletin 118-3 Update 2003. Groundwater level trends are discussed separately for each subbasin below. Neither subbasin has been described to be in overdraft in DWR Bulletin 118, nor has Bulletin 118 projected either basin to become overdrafted with the current management of the subbasins.

Groundwater Level Trends in the North American Subbasin

A collection of municipalities, cities, water districts, agriculture, and private users overlying the subbasin have historically used groundwater from the North American Subbasin. The SGA GWMP evaluated the effect of groundwater pumping in the portion of the North American Subbasin located within Sacramento County, but north of the American River (i.e., within the SGA's planning area), by dividing the SGA's planning boundary into four separate general areas as follows:



- Western (bordered by the Sacramento River): “Long-term trends of increasing or decreasing groundwater levels are not evident in these wells, however, groundwater levels do fluctuate seasonally in each well.”¹¹
- North Central (bordered by the county line): “The general trend in this area is steeply declining groundwater levels until the early 1990s and then stabilized levels.”¹²
- South-Central (bordered by the American River): “The general trend in this area is gently to moderately declining groundwater levels over time.”¹³
- Eastern (bordered by the eastern foothills): “The general trend in this area is stable groundwater elevations near the American River and high elevations in the foothills, with declining groundwater levels away from the river and foothills.”¹⁴

The hydrographs used in the SGA GWMP, along with the location of the wells used to develop them, are presented in Appendix D of this UWMP.

The SGA GWMP also indicated that groundwater levels in southwestern Placer County and northern Sacramento County have generally decreased, with water levels in many wells declining at a rate of about one and one-half feet per year for the last 40 years or more.¹⁵ Water levels in wells located in Sutter and northern Placer Counties have generally remained stable; although, some wells located in southern Sutter County have declining water levels.¹⁶ Consequently, although there is a net depletion of stored groundwater, some areas (e.g., the Western area and areas near the City) have not experienced a significant decline in water levels.

Groundwater Level Trends in the South American Subbasin

A collection of municipalities, cities, water districts, agriculture, and private users overlying the subbasin have historically pumped groundwater from the South American Subbasin. As described in Bulletin 118-3 Update 2003, eighteen long-term hydrographs developed by DWR indicate that groundwater elevations within the entire South American Subbasin have, in general, consistently declined by approximately 20 feet from the mid-1960's to about 1980, but recovered by about 10 feet from 1980 to 1983, where water levels remained stable until the 1987 to 1992 drought.¹⁷ During the drought, water levels declined by about 15 feet, but recovered to levels higher than those observed prior to the drought by 2000.¹⁸

There are two exceptions to these trends. The first involves wells in and adjacent to the City, where water levels fluctuated by less than 10 feet since the mid-1970s.¹⁹ The fluctuation is likely related to natural seasonal fluctuations. The other exception involves wells near Rancho Cordova, where water levels appear to have recovered less than other wells in the South American Subbasin.²⁰ The actual hydrographs developed by DWR were not available for review and are not included in this UWMP.

Groundwater Management

The number and type of groundwater users differs significantly between the subbasins. The North American Subbasin consists mainly of cities, water districts, and water agencies, while the



- ~~Central Sacramento County Groundwater Forum~~ Sacramento Central Groundwater Authority (CSCGFSCGA)
- Sacramento Water Forum
- RWA
- SMWA (currently the RWA)

The South American Subbasin consists of major water purveyors (such as Zone 40) and more than 6,000 private agricultural and residential users.²⁴ In 2002, the Central Sacramento County Groundwater Forum was formed to fulfill an element of the WFA, and was aimed at developing recommendations for the management of the Central Sacramento Groundwater Basin, which is a portion of the South American Subbasin. As described above, the City overlies a portion of the Central Sacramento Groundwater Basin, although, as noted previously, the City is not a major groundwater pumper in this area.

~~The CSCGFSCGA was formed on September 20, 2006, and is in the process of deciding how to best manage groundwater in the area, and may recommend a joint powers authority, similar to the Sacramento Groundwater Authority as a form of governance. The SCGA board is planning on adopting the Central Sacramento County Groundwater Management Plan in November 2006. Zone 40 has already completed a groundwater management plan for the portion of the subbasin in which it operates, and is currently in the process of amending it to include the entire area (i.e., all areas extending to the American River). Zone 40's revised groundwater management plan, and CSCGF recommendations regarding overall management responsibility are expected in the near future.~~²⁵

~~In February 2006~~ As discussed previously, the Central Sacramento County Groundwater Management Plan was completed in February 2006. Sections 3 and 4 of the plan are provided in Appendix D.

Sustainable Yield of the North and South American Subbasins

As will be discussed in more detail in Chapter 5, the Water Forum, which was formed in 1993, approved the WFA in January 2000. The WFA contains a groundwater management element that estimated and recommended an average annual sustainable yield for portions of both the North American and South American Subbasins.

The WFA estimated the sustainable yield for the North American Subbasin (i.e., those areas located north of the American River) at 131,000 afa, which is approximately equal to the year 1990 pumping amount.²⁶ The WFA estimated the sustainable yield for the South American Subbasin (i.e., those areas located south of the American River) at 273,000 afa, which was a negotiated quantity.²⁷

The City's actual groundwater pumpage is discussed in Chapter 6, while the City's plans for future groundwater pumping are discussed in Chapter 5.



example, in 2030, the City's total water entitlement will include 81,800 af of Sacramento River water and 245,000 af of American River water (based on Schedule A of the Settlement Contract). The present PSA Limitations would limit the City's diversions to the FWTP during a Conference Year to 50,000 af of water, leaving, in a Conference Year, an additional 195,000 af of American River entitlement that is either not used, or might be treated downstream at the SRWTP.

Assuming the SRWTP is shutdown for one month during the winter for maintenance, it can only treat approximately 164,000 af at its current capacity of 160 mgd (i.e., operates at 160 mgd continuously for 334 days). If the SRWTP treats the City's entire Sacramento River entitlement (81,800 af), then only 82,200 af of the remaining 195,000 af of American River entitlement could be treated at the SRWTP. Under this future Conference Year scenario, the City would lack the facilities necessary to divert and treat 112,800 afa of its American River entitlement.

The City is planning to construct a new water treatment plant on the Sacramento River in Natomas, north of the City's present SRWTP, to address the need for additional facility capacity to meet future needs. This proposed facility (referred to in this UWMP as the "proposed Natomas Water Treatment Plant", or "NWTP") presently is included in the Sacramento River Water Reliability Study project, a multi-agency project proceeding under the authority of the Bureau of Reclamation to develop new surface water supply facilities on the Sacramento River. City staff anticipates that the NWTP may be operational by 2012 within the next six to ten years.

It is also anticipated that the proposed NWTP will treat raw water diverted from the Sacramento River using the City's existing Sacramento River entitlements, subject to applicable regulatory approvals. Using the proposed NWTP for this purpose will allow the City to divert and treat additional water at the SRWTP under the City's American River entitlements to improve the City's surface water supply reliability.

For planning purposes in this UWMP, it was assumed that the proposed NWTP would be available for treating raw water diverted from the Sacramento River by the year 2012. This UWMP also assumes that the proposed NWTP would be constructed with sufficient capacity to treat the City's entire entitlement on the Sacramento River, or 81,800 afa, and that the SRWTP would be available to treat up to 164,000 af of water from the American River. The water supply treated at the NWTP would be available under all hydrologic conditions. The proposed NWTP capacity could be reduced if the City's PSA limitations are modified to remove or reduce the FWTP diversion limitations discussed above.

Summary of Surface Water Supply Reliability for this UWMP

As discussed previously, limits specified in the City-Bureau Settlement Contract set the City's maximum allowed diversions under the City water right permits (both rate of diversion and annual diversion), while limits presently in the PSA only affect diversions of American River water to the FWTP during specified conditions, and may change from year to year depending on hydrologic conditions (Normal, Normal with Hodge Flow, and Extremely Dry). The City also plans to construct the proposed NWTP so that additional diversions from the American River can be treated at the SRWTP.



162,740 af (245,000 af – 82,260 af), bringing the City's total supply to 326,800 afa (81,800 afa of Sacramento River water and 245,000 afa of American River water).

During an extremely dry year, the City could treat 81,800 afa of Sacramento River water at the proposed NWTP and up to 50,000 afa of American River water at the FWTP. In 2030, the City could then use the SRWTP to treat an additional 164,000 af of American River water, bringing the City's total supply to 295,800 afa (81,800 afa of Sacramento River water and 214,000 afa of American River water).

Consequently, in 2030 with all three water treatment plants available, the City could divert 100 percent of its ~~surface-water~~ Settlement Agreement diversion limit during a normal year, 100 percent of its diversion limit during a Hodge Flow year, and 91 percent (295,800 afa divided by 326,800 afa) of its diversion limit during an extremely dry year. Table 5-3 summarizes the available surface water supply for 2010 through 2030 in five-year increments, using the same methodology.

72-Year Annual Hydrologic Analysis

MWH Global previously conducted a 72-year annual hydrologic analysis on a monthly time step, by water year. For planning purposes in this UWMP, this data was realigned on a calendar year basis to determine the ability of the City to meet its water demands under all hydrologic conditions, with the currently available surface water supply sources and three water treatment plants operational.⁷ Using hydrologic condition information (e.g., year type and Hodge year condition), the evaluation found that extremely dry years only occurred twice: once in 1924 and again in 1977.

The evaluation also found that normal conditions with Hodge Flow Criteria governing every month occurred six times (1926, 1929, 1931, 1933, 1934, and 1990). A summary of the City's potential diversions during drought conditions is provided in Table 5-4; the historical 72-year annual (by month) hydrologic data developed and analyzed by the City and used in this UWMP is provided in Appendix E.

As shown in Table 5-3 and Table 5-4, the most severe limitations to the City's surface water supply happens during an extremely dry year, which corresponds with drought conditions that occurred in 1924 and 1977. For planning purposes, this UWMP assumes that 1977 is representative of the single-year drought condition.

Table 5-4 also indicates that the two-year period from 1933 to 1934 was the only time that the ~~City's drought conditions existed~~ Hodge Flow criteria governed every month for two consecutive years or more. For planning purposes, it was assumed that during a 3-year multiple year drought, that the first two years would consist of Hodge Flows governing every month (i.e., 1933 to 1934 conditions) and that the third year would be an Extremely Dry Year (i.e., 1977 conditions). These reliability-planning assumptions provide the City with sufficient conservatism to ensure adequate supplies during extreme hydrologic conditions that may occur in the future.

Table 5-3. Available Surface Water Supply During Normal and Drought Conditions, acre-feet^(a,b,c,d,e,f)

Year	Normal Year ^(d)				Normal Year with Hodge Flow Criteria ^(e)				Extremely Dry Year (Single Dry Year)				
	Water Treated at the NWTP	Water Treated at the SRWTP	Water Treated at the FWTP	% of Schedule A Delivered	Water Treated at the NWTP	Water Treated at the SRWTP	Water Treated at the FWTP	% of Schedule A Delivered	Water Treated at the NWTP	Water Treated at the SRWTP	Water Treated at the FWTP	% of Schedule A Delivered	Total Diversion
2010	0	81,800	145,700	100%	0	145,240	82,260	100%	0	164,013	50,000	94%	214,013
2015	81,800	0	170,200	100%	81,800	87,940	82,260	100%	81,800	120,200	50,000	100%	252,000
2020	81,800	0	196,200	100%	81,800	113,940	82,260	100%	81,800	146,200	50,000	100%	278,000
2025	81,800	16,831	205,369	100%	81,800	139,940	82,260	100%	81,800	164,013	50,000	97%	295,813
2030	81,800	39,631	205,369	100%	81,800	162,740	82,260	100%	81,800	164,013	50,000	91%	295,813

^(a) Diversions presented in this Table are for planning purposes only; the City may operate its water treatment plants differently.

^(b) Assumes the SRWTP is down for 31 days per year for maintenance during the winter.

^(c) Assumes the FWTP is down for 31 days per year for maintenance during the winter.

^(d) FWTP production is limited to 82,260 acre-feet during Hodge Years.

^(e) FWTP production is limited to 50,000 acre-feet during an extremely dry year.

^(f) A normal year in this UWMP is a year that is not extremely dry.

^(g) This UWMP assumes that Hodge Flow Criteria govern every month of the year.



Table 5-4. Occurrence of Historical Drought Conditions^(a)

Hydrologic Condition	Historical Drought Years
Normal with Hodge Flow Criteria Governing Every Month	1926, 1929, 1931, 1933, 1934 and 1990
Extremely Dry Year	1924 and 1977

^(a) Information in the table is based on monthly analysis data presented in Appendix E.

In hydrologic years when the City cannot meet its water demand with surface water due to diversion limits, supplemental water required to meet demands will be delivered from groundwater pumped from either the North or South American subbasins. The reliability of the groundwater supply is discussed below.

RELIABILITY OF THE CITY’S GROUNDWATER SUPPLIES

Existing regulations do not directly limit the use or expansion of groundwater pumping activities by the City; and as previously discussed in Chapter 4, the City desires to maintain the flexibility to utilize surface water, or a combination of surface water and groundwater to meet its potable water demands. For reliability planning purposes in this UWMP, it was assumed that the City would maximize the use of its surface water supplies, and use up to its maximum groundwater pumping capacity during drought periods.

The total firm pumping capacity of the City’s groundwater wells is approximately 30 mgd or about 33,600 afa, assuming that 90 percent of the City groundwater wells are available to operate continuously for 365 days per year. As will be discussed in Chapter 6, the City has historically pumped approximately 22,000 acre-feet; hence, it is assumed for purposes of this UWMP the City could pump anywhere from 22,000 afa to 33,600 afa. As noted previously, the City may use groundwater in the future, and retains the option to also increase its water supply and water supply reliability by increasing its groundwater pumping facilities.

Table 5-5 summarizes the City’s total future water supply (both surface and groundwater) during normal and drought years, and Table 5-6 summarizes the City’s total supply assuming the next three years are multiple dry years. The hydrologic conditions for 2006, 2007, and 2008, shown in Table 5-6, are indicative of a worst-case scenario, assuming hydrologic conditions in 2006 and 2007 are similar to actual historical conditions in 1933 and 1934, and hydrologic conditions in 2008 are a hypothetical extreme year (similar to actual conditions present in 1977). As shown in both tables, this UWMP assumes that the City diverts 81,800 afa from the Sacramento River. American River diversions were limited so that the City never exceeded its consistent with the total combined maximum diversion limit specified in Schedule A of the Settlement Contract (see Table 4-2).

Table 5-5. Assumed Total Future Water Supplies During Normal and Drought Conditions, acre-feet

Normal Years					
Supply Source	2010	2015	2020	2025	2030
Sacramento River	81,800	81,800	81,800	81,800	81,800
American River	145,700	170,200	196,200	222,200	245,000
Total Diversion	227,500	252,000	278,000	304,000	326,800
Groundwater	33,600	33,600	33,600	33,600	33,600
Total Water Supply	261,100	285,600	311,600	337,600	360,400

Normal Years with Hodge Flow Criteria Governing Every Month					
Supply Source	2010	2015	2020	2025	2030
Sacramento River	81,800	81,800	81,800	81,800	81,800
American River	145,700	170,200	196,200	222,200	245,000
Total Diversion	227,500	252,000	278,000	304,000	326,800
Groundwater	33,600	33,600	33,600	33,600	33,600
Total Water Supply	261,100	285,600	311,600	337,600	360,400

Single Drought Years (Extremely Dry)					
Supply Source	2010	2015	2020	2025	2030
Sacramento River	81,800	81,800	81,800	81,800	81,800
American River	132,213	170,200	196,200	214,013	214,013
Total Diversion	214,013	252,000	278,000	295,813	295,813
Groundwater	33,600	33,600	33,600	33,600	33,600
Total Water Supply	247,613	285,600	311,600	329,413	329,413



Table 5-6. Assumed Future Water Supplies Available During Multiple Dry Years, acre-feet

Supply Source	2006 (Year 1) ^(a)	2007 (Year 2) ^(a)	2008 (Year 3) ^(a)
Sacramento River ^(b)	81,800	81,800	81,800
American River ^(c)	127,700	132,200	132,213
Total Surface Water Diversion	209,500	214,000	214,013
Groundwater ^(d)	33,600	33,600	33,600
Total	243,100	247,600	247,613

- (a) Hydrologic conditions in Year 1, Year 2, and Year 3, are representative of actual conditions present in 1933, 1934, and 1977, respectively.
- (b) Maximum diversion is 81,800 afa from the Sacramento River per the 1957 Settlement Contract with the Bureau. For planning purposes, this UWMP assumes that the City uses this amount from the Sacramento River.
- (c) American River diversions limited to the difference between the diversion limit specified in Schedule A of the 1957 Settlement Contract with the Bureau and diversions taken from the Sacramento River.
- (d) Groundwater limited to 90% of the City's existing 33 mgd pumping capacity, or 30 mgd, assuming the wells were operated continuously for 365 days. This UWMP assumes that Aactual pumpage will vary from historical averages (22,000 af) to the maximum firm pumping capacity (33,600 af).

WATER QUALITY IMPACTS ON RELIABILITY

The purpose of this section is to discuss the quality of the City's surface water and groundwater supplies, and the potential impacts water quality may have on supply reliability. Water quality for each of the City's sources of supply and its potential impact on reliability are discussed below.

Surface Water Quality

In May of 1991, the City, Sacramento County Water Resources Division, and the Sacramento Regional County Sanitation District (SRCSD) formed the Sacramento Coordinated Water Quality Monitoring Program (CMP).⁸ The CMP has monitored long-term ambient water quality in both the Sacramento and American Rivers since 1992.⁹ The latest water quality results from December 1992 to June 2003, show that water in both rivers consistently met applicable water quality regulations.¹⁰

Water quality in both rivers can be influenced by a combination of other factors, including higher turbidity during storm events, irrigated agriculture, livestock, urban runoff, and contamination due to other point sources. These influencing factors can impact water quality parameters (e.g., turbidity, coliforms, Giardia and Cryptosporidium, organic carbon, volatile and semi-volatile organic compounds, arsenic, and hexavalent chromium). However, raw water quality is routinely monitored by the City, and the water treatment plants are designed to produce drinking water that meets all applicable drinking water quality regulations.



The City does not expect any surface water supply changes prior to 2030 due to water quality.

Groundwater Quality

Groundwater underlying the City's service area generally meets primary and secondary drinking water standards for municipal water use, and is described as being a calcium-magnesium-bicarbonate type water, with minor fractions of sodium-magnesium-bicarbonate.¹¹ Due to high concentrations of iron and manganese in the lower aquifer system, the upper aquifer system is usually the preferred source of municipal groundwater supply.¹²

The lower aquifer system also contains higher concentrations of TDS than the upper aquifer. The TDS concentration in most wells is within secondary drinking water standards, but varies quite significantly throughout the area (from 21 to 657 mg/L, with an overall average of 221 mg/L).¹³ TDS concentrations exceed 2,000 mg/L at depths of approximately 1,200 feet or greater.¹⁴ However, most wells do not extend into this poorer quality groundwater.

There are also over 200 leaking underground storage tank (LUST) sites and several "principal" groundwater contaminant plumes near the City.¹⁵ The source for the principal plumes are the former Southern Pacific and Union Pacific Railyards (located about a half mile west of the Capitol Building), McClellan Air Force Base (AFB), the former Mather AFB, and the Aerojet site in Rancho Cordova.¹⁶ The combined primary contaminants of concern from these sites include: benzene; methyl-tertiary butyl ether (MTBE); trichloroethene (TCE); tetrachloroethene (PCE); cis-1,2-dichloroethene (DCE); 1,4-dioxane; 1,2-dichloroethane; carbon tetrachloride; perchlorate; and n-nitrosodimethylamine (NDMA).¹⁷

In addition to ambient water quality or potential contaminants, the City's groundwater supply is also subject to future regulation. Future regulations regarding arsenic, radon, or other chemicals of concern could potentially limit the City's groundwater supply in the future. As discussed previously in Chapter 4, the City is participating in several groups to help develop mechanisms to manage and protect the Sacramento area's groundwater resources.

There is no information available which identifies any groundwater supply changes prior to 2030 due to water quality.

OTHER POTENTIAL WATER SUPPLY OPPORTUNITIES

As will be shown in Chapter 7, the City has sufficient water supply entitlements to meet projected water demands during various hydrologic conditions to the year 2030 and therefore, is not currently seeking additional surface water supply. However, as discussed previously, the City does not have sufficient diversion or treatment capacity to use 100 percent of its ultimate surface water entitlements during all hydrologic conditions. In addition to planning for the construction of a new water treatment plant, the City is also evaluating the feasibility of recycled water. Both are discussed in more detail below.



New Water Treatment Plant

As discussed above, the City is currently planning to construct a new water treatment plant on the Sacramento River in Natomas. The proposed NWTP would treat raw water diverted from the Sacramento River using the City’s existing entitlements. Using the proposed NWTP to treat Sacramento River water will allow the City’s SRWTP to treat additional water diverted under the City’s American River entitlements that would not be diverted at the FWTP during periods when the City’s current PSA Limitations apply. As discussed previously, this UWMP assumes that the proposed NWTP will be operational by 2012, and will have the capacity to treat the City’s existing Sacramento River entitlement (81,800 af)¹. This entitlement is available under all hydrologic conditions. Table 5-7 presents the maximum water supply available from the NWTP during multiple-dry years.

Table 5-7. Available Supply from the NWTP during Multiple-Dry Years (DWR Table 17)

Project Name	Normal Year, af	Single-Dry Year, af	Multiple-Dry Year 1, af	Multiple-Dry Year 2, af	Multiple-Dry Year 3, af
NWTP	81,800	81,800	81,800	81,800	81,800

Potential Recycled Water Use

As will be discussed in more detail in Chapter 10, the SRCSD, in partnership with the SCWA began delivering recycled water to the Elk Grove/Laguna area in April 2003.¹⁸ The treatment facility can produce up to 5 mgd of recycled water to meet the irrigation needs of street medians, commercial landscaping, parks, and schools, and produced a total of 550 acre-feet of recycled water in 2004.¹⁹

The SRCSD is in the process of expanding this recycled water system, and looking for additional partners. The City is participating in an advisory committee developed by the SRCSD, which ~~had its first meeting on December 15, 2005~~began meeting in December 2005. Participation in the committee provides the City the opportunity to consider the feasibility of a future partnership.

¹ As noted above, the proposed NWTP capacity could be reduced in the City’s PSA limitations are reduced.

CHAPTER 6. PAST, PRESENT, AND PROJECTED WATER DEMANDS

The City currently serves as both a water retailer and water wholesaler. The City also treats and wheels (delivers) water to other entities. The purpose of this Chapter is to describe the City's past and present water demands, present total projected water demands, then discuss the methodology used to develop demands by customer type.

PAST AND PRESENT WATER DEMANDS

The City meets its water demands using a combination of surface water supplied by two existing surface water treatment plants, and City owned groundwater wells. Table 6-1 presents the City's historical water production between 1985 and 2005 from all of its water supply sources, which includes water produced between 1986 and 1989 from a water treatment plant that is no longer in operation (i.e., Riverside Water Treatment Plant).

As shown in Table 6-1, the City's water demand has increased from 105,861 af in 1985 to 139,000 af in 2005, representing a 31 percent increase over the last 20 years. Table 6-1 also indicates that historically, the City has maintained approximately an 82 percent to 18 percent surface water to groundwater ratio.

Figure 6-1 compares the City's per capita demand to water use from 1985 through 2005. As shown on Figure 6-1, the average per capita demand over the past 20 years is approximately 282 gallons per capita per day (gpcd), and ranged from a low of 252 gpcd in 1993 to a high of 304 gpcd in 1987. Figure 6-1 also indicates that per capita demands dropped well below the average between 1989 and 1995, likely due to drought conditions that existed between 1987 and 1992, and returned to historic averages between 1996 and 2004.

From 2004 to 2005, the City's per capita demand decreased by approximately 7 percent. This decrease may be attributable to the City's water conservation measures (see Chapter 8) and/or higher than average rainfall in 2005 (22.17 inches of rainfall in 2005 versus a historical average of 17.24 inches of rainfall).¹

Unaccounted-for water (UAFW) includes many uses, such as street sweepers, hydrant testing, construction, and fires, and leaks. A city the age of Sacramento typically has an UAFW rate of 10 percent or higher depending on the condition of older pipelines in the system.

PROJECTED WATER DEMANDS

Water demands were projected for the City through buildout of its water service area for both its retail and wholesale/wheeling customers. The methodology used and actual water demand projections by customer type are described below.



already achieved some water conservation savings, estimated to be in the range of perhaps 0 to 15 percent since 1986. It is unclear what long term conservation rates may be, and more data and analysis would need to be collected to determine the long term effectiveness of conservation measures currently used by the City, or measures currently undefined, but adopted in the future.

The Water Forum adopted an overall conservation rate goal of 25.6 percent by the year 2030 with the implementation of selected best management practices. Components of these goals may be found on pages 345 and 348 of the Water Forum Agreement.

To “bookend” the range of future conservation levels that might occur, this UWMP examines rates between 0 percent and 25.6 percent although it is recognized that the 25.6 percent figure ~~assumes a dramatic increase in water conservation that may or may not~~ be feasible to achieve. The most recent water conservation data suggest that existing water conservation savings is about 7.5 percent, which is mid-range of the yearly water conservation savings observed since 1986, and close to water conservation savings observed in 2005. Water conservation is further discussed in Chapters 8 and 9.

For planning purposes, based on the foregoing discussion, water demands were projected assuming the following three conditions or scenarios:

- No long term conservation is achieved,
- The City maintains its recently observed rate of conservation of 7.5 percent through 2030; and
- The City achieves the Water Forum goal of 25.6 percent total conservation savings by 2030 in its water service area.

These three scenarios were generated by adjusting the aggregate unit demand factor (3.32 af/acre without conservation) to account for the various conservation conditions. Table 6-3- summarizes the unit demand factors used to project retail water demands.

Table 6-3. Aggregate Unit Demand Factors Used to Calculate Water Demands

Conservation Condition	Unit Demand Factor
No Conservation	3.32
Maintain Recently Observed 7.5% Rate of Conservation	3.07
Achieve Total of 25.6% Conservation	2.47

Projected Water Demands for the City’s Retail Customers

The acreage estimates provided in Table 6-2 were multiplied by the aggregate unit demand factors provided in Table 6-3 to calculate the City’s future retail water demands presented in Table 6-4 (the City’s retail water demands in 2030).

Table 6-4. Projected Retail Water Demands at Buildout, acre-feet

Location	Land Use Designation or Annexation	Acreage at Buildout ^(a)	No Conservation ^(b,c)	Conservation ^(b,d,e)	7.5% Conservation ^(b,f,g)	25.6% Conservation ^(b,f,g)	% of Subtotal ^(f)
City Limits	Single Family	30,506	101,300	93,700	75,300	48.3%	
	Multiple Family	3,904	13,000	12,000	9,600	6.2%	
	Commercial	14,069	46,700	43,200	34,800	22.3%	
	Industrial	1,837	6,100	5,600	4,500	2.9%	
	Institutional	3,384	11,200	10,400	8,400	5.4%	
	Landscape	9,414	31,300	28,900	23,300	14.9%	
	<i>Subtotal</i>	<i>63,114</i>	<i>209,600</i>	<i>193,800</i>	<i>155,900</i>	<i>100.0%</i>	
Future Annexation	Freepoint	742	2,500	2,300	1,800	8%	
	Natomas Joint Mission	6,829	22,700	21,000	16,900	76%	
	Panhandle	1,370	4,500	4,200	3,400	15%	
	<i>Subtotal</i>	<i>8,941</i>	<i>29,700</i>	<i>27,500</i>	<i>22,100</i>	<i>100.0%</i>	
Grand Total^(b)	72,100	239,300	221,300	178,000			
2005 Retail Water Demand^(f)			131,200	131,200	131,200		
% Increase			82%	69%	36%		

(a) Obtained from land use data provided by the City.
 (b) Rounded to the nearest 10 acre-feet.
 (c) Water demand calculated using the Water Forum unit water use factor of 2.47 with conservation removed, or 3.32 af/acre (2.47 / (1-.256)).
 (d) This assumes that the City is able to maintain its existing 7.5% conservation savings through year 2030 throughout its service area.
 (e) Water demand calculated using the no conservation unit factor (3.32 af/acre) with 7.5% conservation added, or 3.07 af/acre (3.32*925).
 (f) This assumes the City is able to achieve an additional 18.1% conservation savings by 2030 in its service area.
 (g) Water demand calculated using the Water Forum unit water use factor of 2.47 af/acre, which includes 25.6% conservation.
 (h) Rounded to the nearest 100 acre-feet.
 (i) Existing retail water demand calculated by taking total 2005 production (138,974 af, see Table 6-1), and subtracting existing total wholesale demand (7,806 af, see Table 6-5).
 (j) The percentage breakdown among the three conservation scenarios is identical due to the use of an aggregate demand factor.



As shown in Table 6-4, under the no conservation alternative, the City's water demands are projected to increase by 82 percent over existing water demands, ~~assuming the City loses the existing 7.5 percent water conservation savings already achieved.~~ If the City is able to maintain a water conservation savings of 7.5 percent, then demands are projected to increase by ~~only~~ 69 percent. Demands are projected to increase by 36 percent if a total of 25.6 percent water conservation savings is achieved.

Table 6-4 also indicates that within the present City Limits, Single Family accounts will make-up a majority of the water use (48 percent), followed by Commercial at 22 percent, and Landscape at 15 percent; the remainder of future demands within the City Limits will consist of Multiple Family, Industrial, and Institutional customers.

Wholesale/Wheeling Water Demand Projections

Table 6-5 presents the future demands for the City's existing and potential future wholesale/wheeling customers. As shown in Table 6-5, the City's wholesale/wheeling demands are projected to increase from approximately 7,800 af to 116,800 af if the City does not maintain existing conservation savings (no conservation alternative), to 108,000 af if it does maintain existing conservation savings, and to 87,000 af if it achieves a total water conservation savings of 25.6 percent.

Total Projected Water Demands at Buildout 2030

Table 6-6 presents the City's total projected water demands at buildout under each conservation scenario through the year 2030. Figure 6-3 illustrates the City's projected water demands under all three conservation scenarios. As shown in Table 6-6 and Figure 6-3, the City's total water demands, will increase from 131,200 af in 2005 to 356,200 in 2030 if no long term water conservation savings is realized, ~~and existing water conservation savings is not maintained.~~ If a water conservation level of 7.5 percent is maintained, these demands will increase to 308,300 af by 2030. If a conservation savings of 25.6 percent is achieved, total water demands will increase to 265,000 af by 2030.

Table 6-5. Projected Wholesale/Wheeling Water Demands in 2030, af (DWR Table 13)

Customer	Existing Demand ^(a)	25.6% Conservation					Projected Demand Without Conservation 2030	7.5% Existing Conservation Maintained 2030
		2010	2015	2020	2025	2030		
Airport/Metro Air Park	0	1,450	2,900	4,350	5,800	7,280 ^(c)	9,780	9,050
Area D Customers	0	1,450	2,900	4,350	5,800	7,340 ^(b)	9,870	9,130
California American Water Company - Parkway	2,679	4,230	5,780	7,330	8,880	10,520 ^(b)	14,140	13,080
California American Water Company - Rosemont	0	2,450	4,900	7,350	9,800	12,140 ^(b)	16,320	15,100
Fionn County Water District	0	450	900	1,350	1,800	2,300 ^(b)	3,090	2,860
Fruitridge Vista Water Company	0	950	1,900	2,850	3,800	4,730 ^(b)	6,360	5,880
Sacramento County Zone 40 - Wheeling	5,127	6,580	8,030	9,480	10,930	12,350 ^(d)	12,350	12,350
Sacramento County Zone 40 - Wholesale	0	2,350	4,700	7,050	9,400	11,820 ^(c)	15,890	14,700
Sacramento Suburban Water District - Arcade	0	3,750	7,500	11,250	15,000	18,670 ^(f)	25,090	23,210
Sacramento Suburban Water District - Northridge	0	1,050	2,100	3,150	4,200	5,350 ^(b)	7,190	6,650
Total	7,806	25,000	42,000	59,000	75,000	93,000	120,100	112,000

- (a) Obtained from data included in the City's Operational and Statistics Reports.
- (b) Based on unit demand factors from page 344 of the Water Forum Agreement. Factors include a conservation rate of 25.6 percent.
- (c) Demand from the Airport/Metro Air Park Wholesale/Wheeling Agreement and was assumed to have 25.6% conservation savings.
- (d) Demand from the Zone 40 Wheeling Agreement and was assumed to have 25.6% conservation savings.
- (e) Projected demand based on estimates provided by the County of Sacramento and was assumed to have 25.6% conservation savings.
- (f) Demand is from the Sacramento Suburban Water District Wholesale Agreement and was assumed to have 25.6% conservation savings.

Table 6-6. Total Existing and Projected Water Demands

Year	No Conservation		Existing 7.5% Conservation Maintained		Total of 25.6% Conservation Achieved		
	Retail Water Demand, af ^(a)	Wholesale Water Demand, af	Retail Water Demand, af	Wholesale Water Demand, af	Retail Water Demand, af	Wholesale Water Demand, af	Total Water Demand, af
2005	131,200 ^(b)	7,806	131,200	7,806	131,200	7,806	139,000
2010	152,700	30,300	149,200	28,800	140,700	24,800	165,500
2015	174,200	52,800	167,200	49,800	150,200	41,800	192,000
2020	195,700	75,300	185,200	70,800	159,700	58,800	218,500
2025	217,200	97,800	203,200	91,800	169,200	75,800	245,000
2030	239,300	120,100	221,300	112,000	178,000	93,000	271,000

^(a) 7.5% existing conservation removed from 2006-2030 demands.

^(b) Existing demands already include an estimated 7.5% conservation savings. Under the No Conservation alternative, it is assumed that this savings would not be achieved in years 2010-2030.



EXISTING AND FUTURE WATER DEMANDS BY CUSTOMER TYPE

As discussed previously, meters are not in place for all of the City’s customers and therefore, actual total water demands by customer type are not available. However, work completed as part of the City’s 2005 Water Distribution System Master Plan included estimating existing water demands in 2003 using available maps of existing land use. Table 6-7 presents 2003 water demands by customer type as determined in the City’s 2005 Water Distribution System Master Plan.

Table 6-7. 2003 Water Demands by Customer Type

Location	Land Use Designation or Wholesale/Wheeler	Demand, acre-feet	Percent of Subtotal
City Limits	Single Family	64,984	47.8%
	Multiple Family	10,073	7.4%
	Commercial	27,761	20.4%
	Industrial	4,699	3.4%
	Institutional ^(a)	2,248	1.7%
	Landscape	26,236	19.3%
	Subtotal	136,000	100%
Wholesale/Wheeling		4,281	
Grand Total		140,300	

^(a) The City does not maintain separate records for “governmental” water use, or estimate the water use for “governmental” purposes. Water demands for this “governmental” purposes are included in institutional demands.

Comparing Table 6-7 to Table 6-4 indicates that the portion of total demand within the current City Limits consisting of Single Family customers is expected to grow by 0.5 percent between 2003 and 2030 (i.e., from 47.8 percent in 2003 to 48.3 percent in 2030). Similarly, the portion of total demand within the current City Limits consisting of Multiple Family, Commercial, Industrial, and Institutional customers is also expected to grow. ~~Only~~ The portion of demand consisting of Landscape customers is expected to decrease.

For those retail customer classes within the current City Limits ~~and not included as part of potential annexation areas~~, the difference between the portion of total demand in 2003 and the portion of total demand in 2030 was used to estimate demands for years between 2003 and 2030. Demands for potential annexation areas and Wholesale/Wheeling Customers were estimated by interpolating between existing demands in 2005 and the projected demand in 2030. Table 6-8 summarizes the City’s existing and future water demands by customer type (under the 25.9 percent conservation alternative). The total demands presented in this chapter are used in Chapter 7 to compare with the City’s projected water supplies.

Table 6-8. Future Water Demands by Customer Type - 25.6% Conservation Achieved by City Retail Customers by 2030, af (DWR Table 12)

Year	Single Family	Multiple Family	Commercial	Industrial	Institutional	Landscape	Annexation Areas	Wholesale/ Wheeling	Total
2000	64,160	9,950	27,410	4,640	2,220	25,900	0	0	134,300
2005	62,740	9,600	26,970	4,480	2,530	24,890	0	7,810	139,000
2010	65,300	9,650	28,490	4,510	3,570	24,750	4,420	24,800	165,500
2015	67,870	9,690	30,050	4,530	4,680	24,540	8,840	41,800	192,000
2020	70,450	9,690	31,650	4,540	5,860	24,240	13,260	58,800	218,500
2025	73,040	9,680	33,290	4,530	7,120	23,860	17,680	75,800	245,000
2030	75,300	9,600	34,800	4,500	8,400	23,300	22,100	93,000	271,000



There are no current or projected water demands (or water required) for saline water intrusion barriers, groundwater recharge, or other forms of conjunctive use not defined in this Urban Water Management Plan. There are no existing or proposed agricultural demands in the City.

Additionally, future accounts were projected by adding the incremental number of accounts due to an increase in water demand (without conservation) to the previous year's number of accounts. For example, the incremental increase in water demand (without conservation) for the Single Family customer class between 2005 and 2010 is approximately 7,585 af; hence, the projected number of additional accounts is 13,790 (7,585 af/year divided by 0.55 af/account/yr), for a total of 127,640 accounts in 2010 after rounding.

The unit factor used to calculate the projected number of accounts was developed using estimated 2005 water use without conservation (see Table 6-6) and total number of existing accounts in 2005. Table 6-9 presents the unit factors calculated for 2005, while Table 6-10 presents the projected number of accounts by customer class. As shown in Table 6-10, the number of accounts within each customer class is projected to increase.

Projected Water Demands for Lower Income Households

The total number of existing low-income housing units within the City at the end of 2005 is approximately 14,830 units. Additionally, the City adopted an Inclusionary Housing Ordinance (Ordinance) on October 3, 2000 (see Appendix C); provisions of the ordinance are included in the Sacramento Municipal City Code, Chapter 17.190 Mixed Income Housing. The Ordinance generally requires that at least 15 percent of new units within residential developments in new growth areas consist of affordable housing.

Consequently, it was assumed that for years 2010 to 2030, 15 percent of the Single Family and Multiple Family units reported in Table 6-9 were assumed to be affordable housing units. The water demands for these units were estimated by using the unit factors previously presented in Table 6-9. Table 6-11 presents the projected number of affordable housing units along with their projected water demand.

Table 6-11. Projected Water Demands for Lower Income Households

Type	2005	2010	2015	2020	2025	2030
Accounts ^(a)	14,830	17,000	19,200	21,400	23,600	25,900
Water Demand, af ^(b)	8,600	9,900	11,100	12,400	13,700	15,000

^(a) Projected accounts that are for affordable housing were based on the City's existing Ordinance, which requires that any new development project ensure that 15% of its new residential units are affordable.

^(b) Water demand based on the unit factors presented in Table 6-9.

Figure 6-1. Historical Per Capita Water Demand

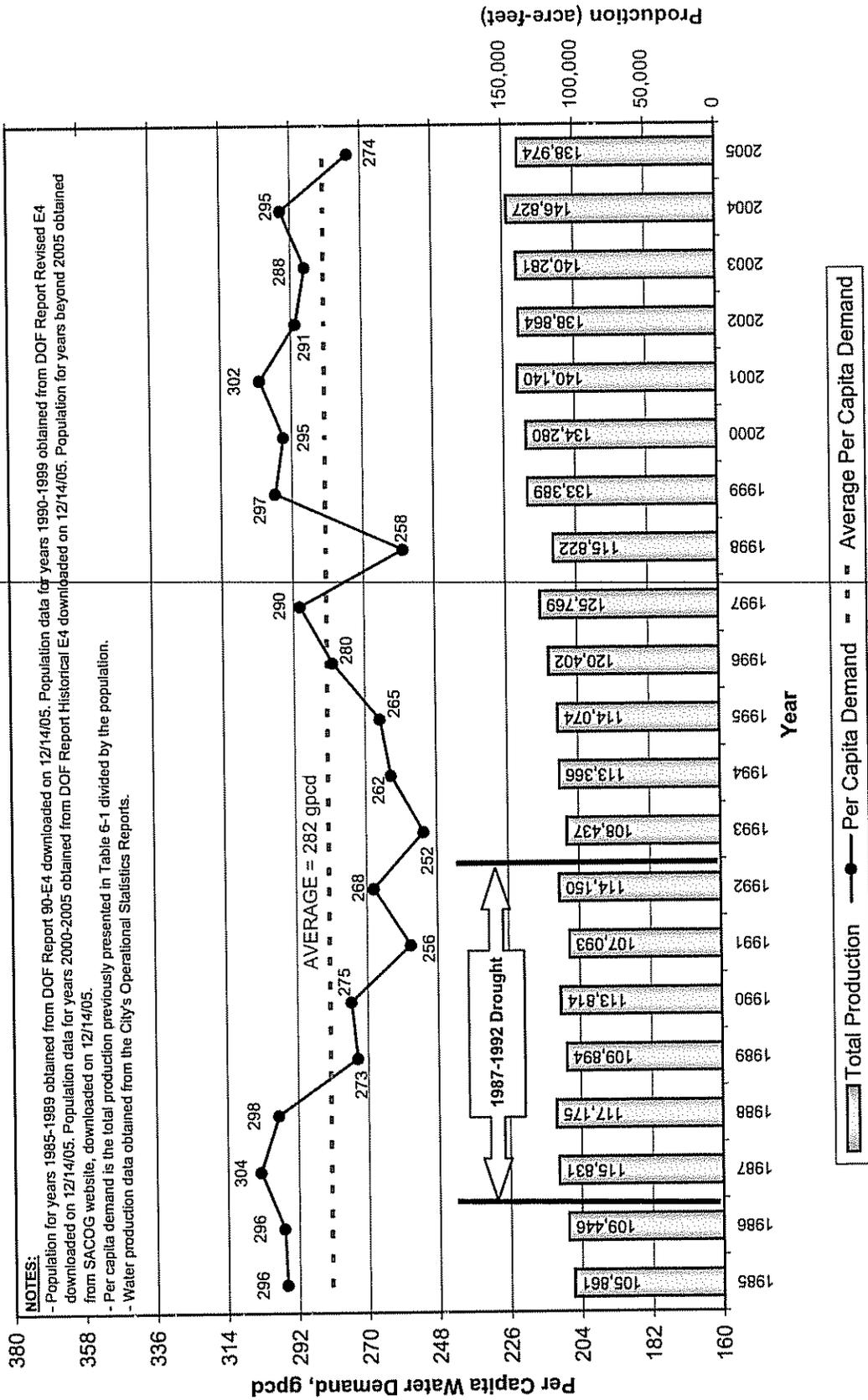
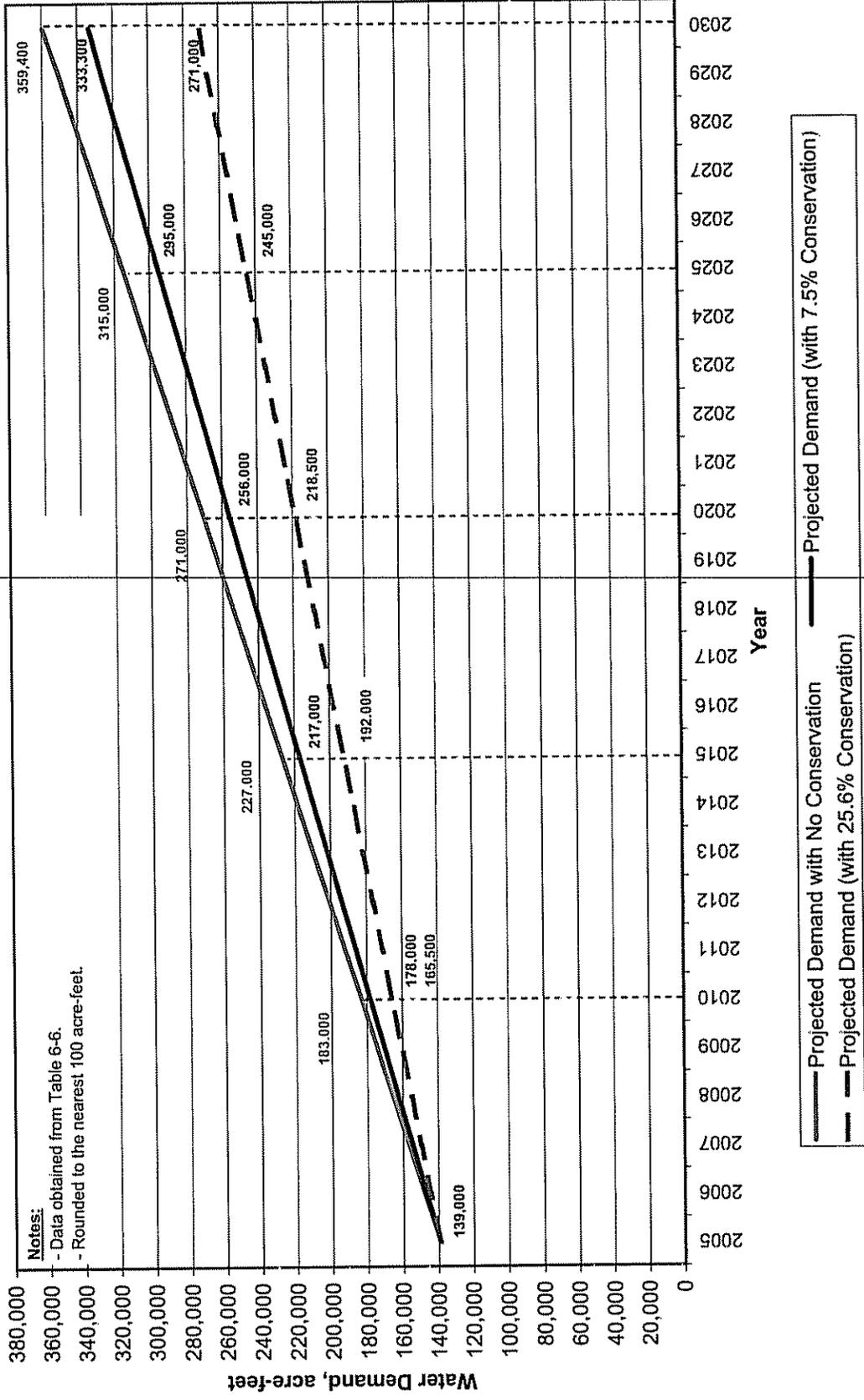


Figure 6-3. Projected Water Demands



CHAPTER 7. COMPARISON OF WATER SUPPLY AND DEMAND

The purpose of this chapter is to compare the City's available water supply under various hydrologic conditions to the City's projected water demands. The chapter begins with a comparison of the City's historical supply and demand, then compares the City's current supply and demand, and ends with a comparison of projected supply and demand.

COMPARISON OF HISTORICAL WATER SUPPLY AND DEMANDS

As described previously in Chapter 6, on average the City has used an 82 percent to 18 percent mixture of surface water and groundwater to meet the demands of its customers for several years. This supply mixture in conjunction with the two existing treatment plants (the SRWTP and the FWTP) has allowed the City to meet its customer demands without any mandatory rationing or interruption, even during the prolonged drought conditions present between 1987 and 1992.

COMPARISON OF SUPPLY AND DEMAND IN THE CURRENT YEAR

As shown in Table 7-1, the City has sufficient supply in the current year to meet its customer demands given all potential hydrologic conditions, under normal year, Hodge year and single dry year conditions, with and without conservation. For illustrative purposes, Table 7-1 shows the City has an adequate water supply without using any groundwater at current demand levels; this reinforces the reliability of the City's water supply in the current year.

COMPARISON OF PROJECTED SUPPLY AND DEMAND

A comparison was made between projected supply and demand during three hydrologic conditions. The first hydrologic condition assumed that years 2006, 2010, 2015, 2020, 2025, and 2030 were all normal years. The second supply condition assumed that those same years were all single dry years. The third condition assumed that a multiple drought period, consisting of three consecutive dry years, occurs at the beginning of each five year increment. All future supply and demand comparisons assume the proposed Natomas Water Treatment Plant (NWTP) is available by the year 2012.

Normal Year

Table 7-2 compares the City's projected supply and demand for normal years occurring in 2006, 2010, 2015, 2020, 2025, and 2030, assuming ~~the City does not maintain its existing conservation savings (i.e., no conservation), maintains its existing~~ conservation savings at 7.5 percent, and ~~achieves a total~~ conservation savings of 25.6 percent. As shown in Table 7-2, the City would need to pump approximately 9,000 af and 29,300 af of groundwater in 2025 and 2030, respectively, under the no conservation alternative. Both groundwater pumping quantities ~~required~~ are less than the City's existing pumping capacity of 33,600 af.

Table 7-1. Comparison of Current 2006 Water Supply and Demand in Normal and Single Dry Years, af (DWR Table 4,8)

Type	Source	Normal Year (2006)	Hodge Year (2006)	Single Dry Year (2006)
Water Supply	Sacramento River	81,800	81,800	81,800
	American River	127,700	127,700	127,700
	Groundwater ^(a)	0	0	0
	Total Supply	209,500	209,500	209,500
Water Demand (No Conservation)	Retail	135,500	135,500	135,500
	Wholesale/Wheeling	12,300	12,300	12,300
	Total Demand	147,800	147,800	147,800
	<i>Available Water</i>	<i>61,700</i>	<i>61,700</i>	<i>61,700</i>
Water Demand (7.5% Conservation)	Retail	134,800	134,800	134,800
	Wholesale/Wheeling	12,000	12,000	12,000
	Total Demand	146,800	146,800	146,800
	<i>Available Water</i>	<i>62,700</i>	<i>62,700</i>	<i>62,700</i>
Water Demand (25.6% Conservation)	Retail	133,100	133,100	133,100
	Wholesale/Wheeling	11,200	11,200	11,200
	Total Demand	144,300	144,300	144,300
	<i>Available Water</i>	<i>65,200</i>	<i>65,200</i>	<i>65,200</i>

^(a) City can use groundwater as needed; however, for UWMP planning purposes in this table, no groundwater was included in the City's total supply.

Table 7-2. Comparison of Projected Water Supply and Demand in Normal Years, af (DWR Table 4,7,8,9, 40,41,42)

Type	Source	Year						
		2006 (Current)	2010	2015	2020	2025	2030	
Water Supply ^(a)	Sacramento River	81,800	81,800	81,800	81,800	81,800	81,800	
	American River ^(b)	127,700	145,700	170,200	196,200	222,200	245,000	
	Groundwater ^(c)	0	0	0	0	0	0	
	Total Supply	209,500	227,500	252,000	278,000	304,000	326,800	
Water Demand (No Conservation)	Retail	135,500	152,700	174,200	195,700	217,200	239,300	
	Wholesale/Wheeling	12,300	30,300	52,800	75,300	97,800	120,100	
	Total Demand	147,800	183,000	227,000	271,000	315,000	359,400	
	Available Water	61,700	44,500	25,000	7,000	(11,000)	(32,600)	
Water Demand (7.5% Conservation)	Retail	134,800	149,200	167,200	185,200	203,200	221,300	
	Wholesale/Wheeling	12,000	28,800	49,800	70,800	91,800	112,000	
	Total Demand	146,800	178,000	217,000	256,000	295,000	333,300	
	Available Water	62,700	49,500	35,000	22,000	9,000	(6,300)	
Water Demand (25.6% Conservation)	Retail	133,100	140,700	150,200	159,700	169,200	178,000	
	Wholesale/Wheeling	11,200	24,800	41,800	58,800	75,800	93,000	
	Total Demand	144,300	165,500	192,000	218,500	245,000	271,000	
	Available Water	65,200	62,000	60,000	59,500	59,000	55,800	

^(a) Assumes the Natomas Water Treatment Plant is available by 2012.

^(b) City's American River entitlement increases each year according to its settlement contract with the Bureau.

^(c) City can use groundwater as needed; however, for UWMP planning purposes in this Table, no groundwater was included in the City's total supply.



Table 7-2 also indicates that under the 7.5 percent conservation alternative~~even if the City can maintain its existing conservation savings~~, the City must ~~also~~ pump approximately 2,500 af of groundwater by 2030. Under all conservation scenarios, the City has sufficient water supplies, using both surface water and groundwater, to meet projected water demands during a normal year.

Single Dry Year

Table 7-3 compares the City's projected supply and demand for single dry years occurring in 2006, 2010, 2015, 2020, 2025, and 2030, assuming ~~the City does not maintain its existing conservation savings (i.e., no conservation)~~, ~~maintains its existing conservation savings at~~ of 7.5 percent, and ~~achieves a total conservation savings of 25.6 percent~~.

As shown in Table 7-3, the City does not have sufficient water supplies to meet projected water demands beyond 2025 under the no conservation alternative during a single dry year, ~~even if it maximizes existing groundwater pumping capacity at 33,600 af. Table 7-3 also indicates that the City has just enough water supplies, including groundwater, (about a 100 af difference) to meet projected water demands beyond 2025 if it maintains its existing water conservation savings at 7.5 percent, and that it easily has sufficient supplies if larger conservation savings are achieved.~~

Multiple Dry Years

Table 7-4 compares the City's projected supply and demand for multiple (3) dry years ending in 2008, 2013, 2018, 2023, and 2028, assuming ~~the City does not maintain its existing conservation savings (i.e., no conservation)~~, ~~maintains its existing conservation savings at~~ of 7.5 percent, and ~~achieves a total conservation savings of 25.6 percent~~.

For planning purposes in this UWMP, multiple droughts were assumed to consist of three years: two consecutive years with Hodge Flow Criteria governing at all times, followed by a single dry year. As shown in Table 7-4, the City has sufficient water supply to meet the water demands of its customers in future multiple dry years through 2030 if it maintains or increases its existing conservation savings, but not if it does not maintain its existing conservation savings~~does not have sufficient water supplies to meet projected water demand under the no conservation alternative in the third year of the multiple drought period ending in 2028.~~

Summary

The City will continue with water conservation programs to reduce demand within the City. It is likely, but not certain that the City will archive a level of conservation that will make up the shortfalls discussed above. Measures that could increase supply, should the conservation measures not reduce demand sufficiently, could include increasing groundwater production facilities, or making modifications at the water treatment plants to maintain production in winter months (when plants are occasionally shut down), or a combination of both.

Table 7-3. Comparison of Projected Water Supply and Demand in Single Dry Years, af (DWR Table 8.9,43,44,45)

Type	Source	Year						
		2006 (Current)	2010	2015	2020	2025	2030	
Water Supply ^(a)	Sacramento River	81,800	81,800	81,800	81,800	81,800	81,800	
	American River ^(b)	127,700	132,213	170,200	196,200	214,013	214,013	
	Groundwater	0	0	0	0	17,187	33,600	
	Total Supply	209,500	214,013	252,000	278,000	313,000	329,413	
Water Demand (No Conservation)	Retail	135,500	152,700	174,200	195,700	217,200	239,300	
	Wholesale/Wheeling	12,300	30,300	52,800	75,300	97,800	120,100	
	Total Demand	147,800	183,000	227,000	271,000	315,000	359,400	
	Available Water	61,700	31,013	25,000	7,000	(2,000)	(29,987)	
Water Demand (7.5% Conservation)	Retail	134,800	149,200	167,200	185,200	203,200	221,300	
	Wholesale/Wheeling	12,000	28,800	49,800	70,800	91,800	112,000	
	Total Demand	146,800	178,000	217,000	256,000	295,000	333,300	
	Available Water	62,700	36,013	35,000	22,000	18,000	(5,887)	
Water Demand (25.6% Conservation)	Retail	133,100	140,700	150,200	159,700	169,200	178,000	
	Wholesale/Wheeling	11,200	24,800	41,800	58,800	75,800	93,000	
	Total Demand	144,300	165,500	192,000	218,500	245,000	271,000	
	Available Water	65,200	48,513	60,000	59,500	68,000	58,413	

^(a) Assumes the Natomas Water Treatment Plant is available by 2012.

^(b) City's American River entitlement increases each year according to its settlement contract with the Bureau.

Table 7-4. Comparison of Projected Water Supply and Demand in Multiple Dry Years of 1999-2010 (DWR Table 8.9,46-57)

Type	Source	2006 through 2010				
		2006 (Hodge)	2007 (Hodge)	2008 (Single Dry)	2009 (Normal)	2010 (Normal)
Water Supply	Sacramento River	81,600	81,600	81,600	81,600	81,600
	American River	127,700	132,200	132,213	141,200	145,700
	Groundwater	0	0	0	0	0
	Total Supply	209,300	214,000	214,013	223,000	227,300
Water Demand (No Conservation)	Retail	135,500	139,800	144,100	148,400	152,700
	Wholesale/Wheeling	12,300	16,800	21,300	25,800	30,300
	Total Demand	147,800	156,600	165,400	174,200	183,000
	Available Water	61,700	57,400	48,613	48,800	44,300
Water Demand (7.5% Conservation)	Retail	134,800	138,400	142,000	145,600	149,200
	Wholesale/Wheeling	12,000	16,200	20,400	24,600	28,800
	Total Demand	146,800	154,600	162,400	170,200	178,000
	Available Water	62,700	59,400	51,613	52,800	49,300
Water Demand (25.6% Conservation)	Retail	133,100	135,000	136,900	138,800	140,700
	Wholesale/Wheeling	11,200	14,600	18,000	21,400	24,800
	Total Demand	144,300	149,600	154,900	160,200	165,500
	Available Water	65,200	64,400	59,113	62,800	62,000

Type	Source	2011 through 2015				
		2011 (Hodge)	2012 (Hodge)	2013 (Single Dry)	2014 (Normal)	2015 (Normal)
Water Supply	Sacramento River	81,600	81,600	81,600	81,600	81,600
	American River	150,700	155,200	160,200	165,700	170,200
	Groundwater	0	0	0	0	0
	Total Supply	232,300	237,000	242,000	247,300	252,000
Water Demand (No Conservation)	Retail	157,000	161,300	165,600	169,900	174,200
	Wholesale/Wheeling	34,800	39,300	43,800	48,300	52,800
	Total Demand	191,800	200,600	209,400	218,200	227,000
	Available Water	40,700	36,400	32,600	29,400	27,000
Water Demand (7.5% Conservation)	Retail	152,800	156,400	160,000	163,600	167,200
	Wholesale/Wheeling	33,000	37,200	41,400	45,600	49,800
	Total Demand	185,800	193,600	201,400	209,200	217,000
	Available Water	46,700	43,400	40,600	38,800	37,000
Water Demand (25.6% Conservation)	Retail	142,600	144,500	146,400	148,300	150,200
	Wholesale/Wheeling	28,200	31,600	35,000	38,400	41,800
	Total Demand	170,800	176,100	181,400	186,700	192,000
	Available Water	61,700	60,900	60,600	60,800	60,000

Type	Source	2016 through 2020				
		2016 (Hodge)	2017 (Hodge)	2018 (Single Dry)	2019 (Normal)	2020 (Normal)
Water Supply	Sacramento River	81,600	81,600	81,600	81,600	81,600
	American River	175,700	180,700	186,200	191,700	196,200
	Groundwater	0	0	0	0	0
	Total Supply	257,300	262,300	267,800	273,300	277,800
Water Demand (No Conservation)	Retail	178,500	182,800	187,100	191,400	195,700
	Wholesale/Wheeling	57,300	61,800	66,300	70,800	75,300
	Total Demand	235,800	244,600	253,400	262,200	271,000
	Available Water	21,700	17,000	14,600	10,800	7,000
Water Demand (7.5% Conservation)	Retail	170,800	174,400	178,000	181,600	185,200
	Wholesale/Wheeling	54,000	58,200	62,400	66,600	70,800
	Total Demand	224,800	232,600	240,400	248,200	256,000
	Available Water	32,700	29,900	27,600	24,800	22,000
Water Demand (25.6% Conservation)	Retail	152,100	154,000	155,900	157,800	159,700
	Wholesale/Wheeling	45,200	48,600	52,000	55,400	58,800
	Total Demand	197,300	202,600	207,900	213,200	218,500
	Available Water	60,700	59,900	60,700	59,800	59,500

Type	Source	2021 through 2025				
		2021 (Hodge)	2022 (Hodge)	2023 (Single Dry)	2024 (Normal)	2025 (Normal)
Water Supply	Sacramento River	81,600	81,600	81,600	81,600	81,600
	American River	201,200	206,700	211,700	216,400	221,200
	Groundwater	0	0	2,100	6,100	9,600
	Total Supply	283,000	288,300	295,400	304,100	312,400
Water Demand (No Conservation)	Retail	200,000	204,300	208,600	212,900	217,200
	Wholesale/Wheeling	79,800	84,300	88,800	93,300	97,800
	Total Demand	279,800	288,600	297,400	306,200	315,000
	Available Water	3,200	1,000	1,800	2,200	2,600
Water Demand (7.5% Conservation)	Retail	188,800	192,400	196,000	199,600	203,200
	Wholesale/Wheeling	75,000	79,200	83,400	87,600	91,800
	Total Demand	263,800	271,600	279,400	287,200	295,000
	Available Water	19,200	16,900	16,200	17,100	18,000
Water Demand (25.6% Conservation)	Retail	161,800	163,500	165,200	167,000	168,800
	Wholesale/Wheeling	62,200	65,600	69,000	72,400	75,800
	Total Demand	224,000	229,100	234,200	239,400	244,600
	Available Water	59,200	59,400	61,200	61,800	62,000

Type	Source	2026 through 2030				
		2026 (Hodge)	2027 (Hodge)	2028 (Single Dry)	2029 (Normal)	2030 (Normal)
Water Supply	Sacramento River	81,600	81,600	81,600	81,600	81,600
	American River	226,700	231,700	236,700	241,700	246,700
	Groundwater	13,200	16,900	33,600	25,300	29,400
	Total Supply	321,500	330,200	351,900	348,600	357,700
Water Demand (No Conservation)	Retail	221,500	225,800	230,100	234,400	238,700
	Wholesale/Wheeling	102,300	106,800	111,300	115,800	120,300
	Total Demand	323,800	332,600	341,400	350,200	359,000
	Available Water	1,700	1,400	1,600	1,400	1,700
Water Demand (7.5% Conservation)	Retail	206,800	210,400	214,000	217,600	221,200
	Wholesale/Wheeling	96,000	100,200	104,400	108,600	112,800
	Total Demand	302,800	310,600	318,400	326,200	334,000
	Available Water	18,000	19,800	17,013	17,600	21,900
Water Demand (25.6% Conservation)	Retail	171,100	173,000	174,900	176,800	178,700
	Wholesale/Wheeling	79,200	82,600	86,000	89,400	92,800
	Total Demand	250,300	255,600	260,900	266,200	271,500
	Available Water	71,400	74,800	68,513	67,800	65,700

^(a) For planning purposes in this UWP, a multiple drought year period consists of three consecutive years: the first and second year are normal years with Hodge flow criteria governing every month of the year, and the third year is a single dry year (i.e. an extremely dry year). The multiple dry year period was assumed to start at the beginning of each five year segment.

^(b) Assumes the Natemas Water Treatment Plant is available by 2012.

^(c) City's American River entitlement increases each year according to its settlement contract with the Bureau; consequently, the increase in that year may be larger than the reduction due to hydrologic conditions, providing more surface water than the previous year even during a multiple-year drought condition.



Even though the City possesses a reliable long-term water supply, the City is committed to reducing the demand for potable water through conservation.

In 1991, the City became a signatory to the CUWCC's MOU Regarding Urban Water Conservation in California. The purpose of the MOU was to expedite implementation of reasonable water conservation measures in urban areas and to establish appropriate assumptions for use in calculating estimates of reliable future water conservation savings. The 1991 MOU originally listed sixteen BMPs for water conservation. In 1999, the MOU was revised to include fourteen BMPs. These fourteen BMPs are ~~the same as~~ substantially similar to the fourteen DMMs listed in the Urban Water Management Planning Act (see above). In accordance with the MOU, the City files annual reports with the CUWCC to report on BMP implementation. Copies of the City's CUWCC Annual Reports for 2003 and 2004 are contained in Appendix F of this UWMP.

The City is a member of the Sacramento Water Forum, which is comprised of water utilities, environmental and other groups interested in long-term management of Sacramento County's water resources. In April 2000, the members of the Sacramento Water Forum approved the Water Forum Agreement, which contains seven elements which all signatories to the Water Forum Agreement agreed to endorse and, where appropriate, participate in. The seven elements ~~include~~ are:

1. Increased surface water diversions
2. Actions to meet customers' needs while reducing diversion impacts in drier years
3. Support for an improved pattern of fishery flow releases from Folsom Reservoir
4. Lower American River habitat management element
5. Water conservation element
6. Groundwater management element
7. Water Forum successor element

The Water Conservation Element of the Water Forum Agreement was negotiated among all stakeholders and published in August 1997. The Water Conservation Element requires the development and implementation of a water conservation plan which includes fourteen BMPs.¹ These fourteen BMPs are similar to the DMMs listed in the Urban Water Management Planning Act and the BMPs listed in the CUWCC MOU. ~~Most of the BMPs contained in the City's Water Forum Water Conservation Plan (a copy of which is provided in Appendix G) were to be fully implemented by no later than the beginning of the fourth year after agreement signing.~~

The City is also a member of the RWA, which is a joint powers authority that serves and represents the interests of over twenty water providers and associated agencies in the greater Sacramento area. The RWA has a Water Efficiency Program, which is a large-scale effort designed to help participating agencies fulfill commitments to implement their Water Forum water conservation plans. The program provides services with oversight via an advisory committee. Through this regional effort, purveyors are better able to manage BMP implementation projects through coordination and training of staff, regional marketing of services to customers and leveraging resources. Program components include regional public



evaluated. Residents are generally provided with recommendations for improvements, plumbing retrofit kits and water conservation literature. Table 8-2 summarizes the number of surveys offered (advertised) and completed from 2001 through 2005.

Table 8-2. Number of Residential Surveys Offered and Completed^(a)

Type of Account	Survey Status	Calendar Year				
		2001	2002	2003	2004	2005
Single Family	Offered	0	104,406	107,112	110,867	113,850
	Completed	0	215	203	998	798
Multi-Family	Offered	0	10,371	10,928	10,768	10,800
	Completed	0	2	6	24	12

^(a) Source: City's CUWCC Annual Reports for 2001, 2002, 2003, and 2004. The 2005 data was provided by the City.

Implementation Schedule

- Program Start: January 2002
- Program Status: On-going. Offers made annually to single-family and multi-family residential customers. Program advertised using bill inserts and water conservation newsletter, "Water Spots".

Annual Budget/Expenditures

FY 2003/04: Budgeted: \$43,000 — Actual Expenditures: \$33,800

FY 2004/05: Budgeted: \$43,000

DMM 2: Residential Plumbing Retrofit

Corresponding BMPs

- CUWCC BMP 02: Residential Plumbing Retrofit
- Water Forum BMP 2: Plumbing Retrofit of Existing Residential Accounts

Description

Under this program, water-conserving devices such as high-quality low-flow showerheads, toilet-displacement devices, toilet flappers and faucet aerators are distributed to customers. Although the City's residential plumbing retrofit program is offered to all customers, the City's program targets neighborhoods built before 1991, and low or moderately low income areas.

Table 8-3 summarizes the number of low-flow devices distributed from 2001 through 2005.



Table 8-3. Number of Low-Flow Devices Distributed^(a)

Type of Account	Device Type	Calendar Year				
		2001	2002	2003	2004	2005
Single Family	Low-Flow Showerheads	300	300	3,382	3,038	1091
	Toilet-Displacement Devices	300	600	3,382	3,038	1091
	Toilet Flappers	0	0	0	0	0
	Faucet Aerators	600	1,500	6,764	6,076	2,182
Multi-Family	Low-Flow Showerheads	0	6	18	132	12
	Toilet-Displacement Devices	0	6	18	132	12
	Toilet Flappers	0	0	0	0	0
	Faucet Aerators	0	10	36	264	24

^(a) Source: City's CUWCC Annual Reports for 2001, 2002, 2003, and 2004. The 2005 data was provided by the City.

Implementation Schedule

- Program Start: 2001
- Program Status: Distribution of plumbing retrofit kits on-going

Annual Budget/Expenditures

FY 2003/04: Budgeted: \$35,000 — Actual Expenditures: \$18,633

FY 2004/05: Budgeted: \$35,000

DMM 3: System Water Audits, Leak Detection and Repair

Corresponding BMPs

- CUWCC BMP 03: System Water Audits, Leak Detection and Repair
- Water Forum BMP 3: Distribution System Water Audits, Leak Detection and Repair

Description

The City's approach for implementation of this DMM is different for the City's unmetered connections and metered connections. The City's infrastructure that delivers water to retail customers is the same as the infrastructure that delivers water to wholesale customers.

For unmetered connections, the City's program includes the following:



- An annually updated system map of type, size and age of pipes, pressures and leak history
- Installation of devices or use of other methods designed to identify areas with greater than 10 percent losses
- An on-going meter calibration and replacement program for all production and distribution meters
- An on-going leak detection and repair program focused on high probability leak areas identified by the system map (based on pipe age and material type)
- A complete system-wide leak detection program, repeated no less often than every ten years, unless there are special circumstances, such as age of system or planned main replacement

For metered connections, the City's program includes the following:

- An annual system water audit, determining the difference between production and sales (to determine quantity of unaccounted-for water)
- An annually updated system map of type, size and age of pipes, pressures and record of leaks and other historic data
- An on-going meter calibration and replacement program
- An on-going leak detection/repair program focused on high probability leak areas identified by the system map (based on pipe age and material type)
- A complete system-wide leak detection program, repeated when the system water audit determines losses to be greater than 10 percent, or when the losses are less than 10 percent if the program is determined to be cost effective

The City also encourages customers to report leaks and, in 2004, responded to approximately 2,000 leak repair calls from residential and commercial customers.²

Implementation Schedule

- Water System Audit: Conducted annually for areas with metered connections
- Leak Detection and Repair Program: On-going for both unmetered and metered connections
- System-wide Leak Detection/Repair Program: When water system audit determines losses to be greater than 10 percent, or when determined to be cost effective

Annual Budget/Expenditures

(Includes only costs for Water Conservation Office. Does not include budget or expenditures by General Distribution Operations and Maintenance which is not available at this time)

FY 2003/04: Budgeted: \$250,000 Actual Expenditures: \$731



Table 8-5. Number of Meter Retrofits Completed^(a)

Type of Account	Calendar Year				
	2001	2002	2003	2004	2005
Non-Residential	40	95	87	73	ND ^(b)
Residential (Voluntary)		47	18	84	N/A ^(c)

(a) Source: City's CUWCC Annual Reports for 2001, 2002, 2003, and 2004. Data on voluntary residential retrofits provided by City.

(b) ND = No data available.

(c) N/A = Not applicable. Voluntary retrofit program was discontinued on December 31, 2004.

Section 11 of the City Charter has now been completely superseded by State law, specifically the passage of SB 229 and AB 2572. Under Water Code Section 525, all new residential connections installed after January 1, 1992 have been provided with a meter. Since SB 229 did not require metered billing, however, these meters have been used for tracking purposes only and all residential customers are currently billed based on a monthly flat rate.

In 2004, AB 2572 enacted Water Code Section 527, that now requires an urban water supplier to: (1) install water meters on all service connections located within its service area on or before January 1, 2025; and (2) charge metered rates to customers that have water service connections for which meters have been installed, beginning not later than January 1, 2010 (provided that metered billing may be delayed for one annual seasonal cycle of water use for services being converted from flat rate to metered billing). AB 2572 became effective January 1, 2005.

The requirements of SB 229 and AB 2572 have superseded the prohibition specified in Section 11 of the City's Charter, because these state laws address a subject matter of statewide concern. In November 2005, the City adopted an ordinance (Ordinance No. 2005-090) amending the Sacramento Municipal Code (Chapter 13.04, Article III) to implement AB 2572. The estimated total cost to fully implement AB 2572 through January 1, 2025, is \$190 million. Ordinance No. 2005-090 became effective on December 1, 2005. A copy of Ordinance No. 2005-090 is provided in Appendix H.

Wholesale Water Deliveries

Wholesale water deliveries are metered and wholesale customers pay for water based on the amount they receive.

Implementation Schedule

- Non-Residential Water Meter Retrofit Program: On-going
- Billing at Commodity Rates: On-going for non-residential customers (see DMM 11)
- Voluntary Residential Water Meter Retrofit Program: Discontinued since the passage of AB 2572.



- Phased Meter Installation Program for All Service Connections that existed without Meters as of January 1, 2005: Scheduled for completion not later than January 1, 2025, in compliance with AB 2572.
- Metered Billing Rate Structure for All Service Connections with Meters: Being developed for implementation not later than January 1, 2010, in compliance with AB 2572.

Annual Budget/Expenditures

(Includes only costs for Water Conservation Office. Does not include budget or expenditures by General Distribution Operations and Maintenance which is not available at this time)

FY 2003/04: ~~Budgeted: \$568,000~~ Actual Expenditures: \$3,113

FY 2004/05: Budgeted: \$568,000

DMM 5: Large Landscape Conservation Programs and Incentives

Corresponding BMPs

- CUWCC BMP 05: Large Landscape Conservation Programs and Incentives
- Water Forum BMP 5: Large landscape water audits and incentives for CII and irrigation accounts
- Water Forum BMP 6: Landscape water conservation requirements for new and existing commercial, industrial, institutional and multi-family developments
- Water Forum BMP 12: Landscape water conservation for new/existing single family homes

Description

In 2003, the City started a large landscape conservation program. The City's program for large landscape conservation includes: conducting landscape surveys for customers with large landscapes (primarily parks, schools and golf courses), including irrigation system checks and review and development of irrigation schedules; providing landscape irrigation training; offering financial incentives to improve landscape water use efficiency; and providing information to customers regarding watering guidelines and regulations, and tips on landscape design, plant selection and other free programs.

Table 8-6 summarizes the number of large landscape surveys offered and completed from 2001 through 2005.



Table 8-6. Number of Large Landscape Surveys Offered and Completed^(a)

Survey Status	Calendar Year				
	2001	2002	2003	2004	2005
Offered	0	0	2,000	2,000	2,000
Completed	0	0	39	72	37

^(a) Source: City's CUWCC Annual Reports for 2001, 2002, 2003, and 2004. 2005 data provided by City.

The City has adopted water conserving landscape requirements which are specified in the City Municipal Code (Title 15 Building and Construction, Chapter 15.92 Landscaping Requirements for Water Conservation). These requirements define standards and procedures for the design, installation and management of landscapes in order to utilize available plant, water, land and human resources to the greatest benefit of the people of the City. A copy of the water conserving landscape requirements is provided in Appendix H of this UWMP.

Implementation Schedule

- Landscape Surveys: On-going
- Financial Incentives to Improve Landscape Water Use Efficiency: On-going
- Water Conserving Landscape Requirements: On-going

Annual Budget/Expenditures

FY 2003/04: Budgeted: \$10,000 — Actual Expenditures: \$21,396

FY 2004/05: Budgeted: \$25,000

DMM 6: High-Efficiency Washing Machine Rebate Programs

Corresponding BMPs

- CUWCC BMP 06: High-Efficiency Washing Machine Rebate Programs
- Water Forum Agreement: No corresponding BMP

Description

High-efficiency washing machines use about 50 percent less water than conventional machines, using only 20 to 30 gallons of water per load, compared to 40 to 45 gallons for conventional top-loading washers. The estimated annual savings for a typical household is about 5,000 gallons per year.



The City does not currently have its own residential rebate program, however, customers in the City's water service area may be eligible for rebates from either the area's electric utility, SMUD, or gas utility, Pacific Gas & Electric (PG&E). SMUD offers rebates of \$75 to \$125 for energy-efficient clothes washers for customers who have electric water heaters. PG&E offers rebates of \$35 to \$75 for energy-efficient clothes washers for customers who have gas water heaters. The City is currently planning to implement a pilot program in coordination with SMUD in 2006. For the pilot program, the City will provide a \$50 rebate in addition to the rebate provided by SMUD. SMUD will continue to administer the program.

For the last two years, the City has participated in CUWCC's LightWash Program, which offers washing machine rebates of up to \$400 for qualifying washing machines for multi-family or institutional common area laundry facilities, businesses with on-premise laundries or coin laundry stores. California energy utility ratepayers under the auspices of the California Public Utilities Commission primarily fund the program. The City provides partial funding. In fiscal year 2004, 20 commercial washing machine rebates were issued. In fiscal year 2005, 65 rebates were issued.³

Implementation Schedule

- SMUD Program: On-going
- PG&E Program: On-going
- City Pilot Program: To start in 2006
- City Participation in CUWCC's LightWash Program: Ended December 2005

Annual Budget/Expenditures

FY 2003/04: ~~Budgeted: \$0~~ — ~~Actual Expenditures: \$0~~

FY 2004/05: ~~Budgeted: \$10,000~~ — ~~Actual Expenditures: \$10,000~~

DMM 7: Public Information Programs

Corresponding BMPs

- CUWCC BMP 07: Public Information Programs
- Water Forum BMP 7: Public Information

Description

The City coordinates and participates with the California Water Awareness Campaign, Water Education Foundation and the RWA in developing and conducting its public information programs. Water conservation messages are conveyed to customers using utility bill inserts, displays at City Hall, employee classroom presentations, distribution of a semi-annual newsletter called "Water Spots", messages occurring on the July through September customer billing statements, radio advertisements, television appearances, presentations at community meetings and booths at various community events.



- Speaker's Bureau: On-going
- Demonstration gardens: On-going

Annual Budget/Expenditures

FY 2003/04: Budgeted: \$130,000 Actual Expenditures: \$41,868

FY 2004/05: Budgeted: \$130,000

DMM 8: School Education Programs

Corresponding BMPs

- CUWCC BMP 08: School Education Programs
- Water Forum BMP 8: School Education

Description

In 2002, the City's Water Conservation staff launched a school outreach program designed to teach children in second through sixth grades about the importance of water conservation. The hour-long program includes a water conservation video, various interactive activities and free materials such as activity booklets, stickers, pencils and water bottles.

Since 1995, the City has supported two school education programs. One is the Newspaper in Education (NIE) program which involves the Sacramento Bee newspaper and local teachers. The goal of the NIE program is to provide teachers, students and parents with innovative tools to teach and motivate students to learn while having fun with real life activities. Students have the opportunity to learn about the stock market, consumer math, advertising, environmental issues (including water conservation) and much more while discovering the connection between the classroom and the real world. The second program involves the Sacramento Theater Company, which performs skits at school assemblies regarding water conservation and stormwater issues.

Implementation Schedule

- School Outreach Program: On-going
- Support of NIE Program: On-going
- Support of Sacramento Theater Company assemblies: On-going

Annual Budget/Expenditures

FY 2003/04: Budgeted: \$40,000 Actual Expenditures: \$13,193

FY 2004/05: Budgeted: \$40,000



Annual Budget/Expenditures

FY 2003/04: ~~Budgeted: \$35,000~~ Actual Expenditures: \$23,489

FY 2004/05: Budgeted: \$35,000

~~DMM 9a: Commercial, Industrial and Institutional Ultra-Low Flow Toilet Replacement Program~~

Corresponding BMPS

- CUWCC BMP 09a: Commercial, Industrial and Institutional Ultra-Low Flow Toilet Replacement Program
- Water Forum BMP 16: Ultra-Low Flush Toilet Replacement Program for Non-Residential Customers

Description

In 2003, the City began a CII ultra-low flow toilet (ULFT) replacement program which involved rebates from both the City and the County Sanitation District. The City advertised the program by direct letter, bill inserts, newsletter, print media, trade shows and special events. To date, the program has not been successful, partially due to the fact that a building permit is required to replace commercial toilets. In 2003, no customers participated in the program.⁵ In 2004, 90 toilets were replaced and 570 toilets were replaced in 2005.

Implementation

- CII Ultra-Low Flow Toilet Replacement Program: On-going

Annual Budget/Expenditures

Budget and expenditure includes both commercial and residential ULFT programs.

FY 2003/04: ~~Budgeted: \$62,500~~ Actual Expenditures: \$8,929

FY 2004/05: Budgeted: Information not available

DMM 10: Wholesale Agency Programs

Corresponding BMPs

- CUWCC BMP 10: Wholesale Agency Programs
- Water Forum Agreement: No corresponding BMP

Description

As described in Chapter 6, the City's water system serves primarily retail customers, with ~~only 5-61.9 percent of current water demand attributable is provided to wholesale/wheeling~~



customers (see Table 6-6), although this percentage is anticipated to increase in future years as more wholesale water supply agreements are approved. Because the wholesaling/wheeling of water is such a small portion of the City's water enterprise, the City's staffing and financial resources are focused on the retail portion of the water enterprise. The City's wholesale/wheeling customers that currently receive water from the City are (California American (as successor to Citizens Utilities), Sacramento Suburban Water District, and the Sacramento County Water Agency (serving Zone 40 and Zone 50; and the Sacramento International Airport).) All of these entities are members of the Water Forum, and have recently implemented their own water conservation programs, which are being regionally coordinated through the RWA Regional Water Efficiency Program Advisory Committee, of which the City is a member.

Implementation

The City's wholesale water service agreements have a built-in conservation incentive since the wholesale water charges are determined based on the amount of water delivered at a metered rate. In addition, all of the City's wholesale customers administer their own retail water conservation programs as noted above. The City provides conservation assistance to its wholesale customers via participation in the RWA's Regional Water Efficiency Program (Program). The City pays annual dues to the RWA; a portion of the dues goes to funding the Program. The City actively participates in the Program, and the City's water conservation coordinator is the Chairperson of the Program Advisory Committee. The Program leverages resources (communications, financial, technical, and staff) of all purveyors to reach customers with repeated and consistent marketing messages and incentives that will motivate the customers to participate in BMP services.

The Program provides products and services that:

- Assist water suppliers to meet BMPs of the Water Forum, U.S. Bureau of Reclamation CVPIA and DWR UWMP commitments.
- Provide liaison with Water Forum Successor Effort compliance coordination and potential BMP updates.
- Attract residential, business and government customers to accept BMP services.
- Improve awareness of the need for Water Use Efficiency in the region.
- Prepare for potential CALFED Certification.

No wholesale programs currently planned by City.

Annual Budget/Expenditures

Dues paid by the City to the Program are presented in Table 8-9.

Table 8-9. RWA Dues from City

	2002 ^(a)	2003 ^(a)	2004 ^(b)	2004/05 ^(c)	2005/06 ^(c)



Dues paid by the City of Sacramento to the Regional Water Authority	\$14,040	\$33,600	\$16,800	\$34,009	\$34,009
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- (a) Calendar Year
- (b) First six months of Calendar Year 2004
- (c) Fiscal Year

None.

DMM 11: Conservation Pricing

Corresponding BMPs

- CUWCC BMP 11: Conservation Pricing
- Water Forum BMP 11: Conservation Pricing for Metered Accounts

Description

As described for DMM 4, only about 7 percent of the City's total customer accounts are metered and billed based on usage. This is primarily because the City Charter has, until recently superseded by State law (as discussed above), prohibited the metering of residential accounts. For the City's unmetered customers (primarily single-family and multi-family residential), the City currently bills a graduated flat monthly water rate based on the number of rooms in the residence. Non-residential unmetered customers are currently billed a flat monthly water rate depending on the type and size of establishment, although 76 percent of the City's non-residential accounts currently receive metered service, as indicated in Table 8-4.

For the City's metered customers (including commercial, industrial, institutional and irrigation), the City has a uniform water rate structure which includes a monthly basic service charge based on water meter size and a monthly water use charge based on actual monthly water use (see Table 8-109).



Table 8-109. City of Sacramento Water Rates for Metered Service for FY06^(a)

Water Meter Size	Monthly Basic Service Charge (\$/service)	Monthly Water Quantity Charge
5/8-inch	6.54	<ul style="list-style-type: none"> • For irrigation of landscaping on parks and medians owned and operated by the City: \$0.0968 per 100 cubic feet • For irrigation of landscaping at the Governor’s Mansion State Historic Park and Sutter’s Fort State Historic Park: \$0.3764 per 100 cubic feet • For emergency supply at the California State Fair and Exposition: \$0.6453 per 100 cubic feet (Monthly service charge: \$109) • For all other metered water services: \$0.6453 per 100 cubic feet • For water supply to operate SMUD cogeneration facilities: \$0.4082 per 100 cubic feet
3/4-inch	6.54	
1-inch	6.54	
1 1/2-inch	8.72	
2-inch	10.90	
3-inch	16.35	
4-inch	21.80	
6-inch	43.60	
8-inch	70.85	
10-inch	109.00	
12-inch	163.50	

^(a) Source: City of Sacramento Website: www.cityofsacramento.org, downloaded December 18, 2005.

Sewer service rates also have a similar structure. Unmetered residential and other customers are billed based on a flat monthly sewer rate based on the number of rooms in the residence or type and size of establishment. Metered customers are billed based on a uniform sewer rate structure based on water meter size and actual monthly water use (see Table 8-110).



Table 8-110. City of Sacramento Sewer Rates for Metered Services for FY06^(a)

Water Meter Size	Quantity of Sewage Allowed Without Additional Payment, cubic feet	Monthly Sewer Quantity Charge, \$ per 100 cubic feet of water use
5/8-inch	1,200	5.78
3/4-inch	1,700	8.19
1-inch	2,100	10.11
1 1/2-inch	3,700	17.82
2-inch	6,200	29.86
3-inch	12,500	60.19
4-inch	21,800	104.98
6-inch	50,000	240.78
8-inch	106,200	511.41
10-inch	168,700	812.39
12-inch	262,500	1,264.09

^(a) Source: City of Sacramento Website: www.cityofsacramento.org, downloaded December 18, 2005.

As described in DMM 4, State law requires installation of water meters on all new connections (Water Code Section 525), as well as the retrofit of all existing unmetered connections not later than January 1, 2025 (Water Code Section 527). Section 527 also requires that urban water suppliers charge metered rates to customers that have water service connections for which meters have been installed, beginning not later than January 1, 2010 (provided that metered billing may be delayed for one annual seasonal cycle of water use for services being converted from flat rate to metered billing).

Wholesale Water Deliveries

Wholesale water deliveries are charged on a volumetric basis.

Implementation

- Residential Accounts: Until recently, metering of residential accounts has been prohibited by City Charter; billed based on flat monthly rate.
- Non-Residential Accounts: Most billed based on actual water consumption based on uniform rate structure
- Metered Billing Rate Structure for All Service Connections with Meters: Being developed for implementation not later than January 1, 2010, in compliance with AB 2572.



Annual Budget/Expenditures

None As noted above, the estimated cost to implement AB 2572 is \$190 million.

DMM 12: Water Conservation Coordinator

Corresponding BMPs

- CUWCC BMP 12: Water Conservation Coordinator
- Water Forum BMP 12: Water Conservation Coordinator

Description

When the City signed the CUWCC MOU in 1991, the position of Utility Services Inspector was created to fulfill the duties of a Water Conservation position for the City's Department of Utilities. In 2000, the City recruited a Water Conservation Administrator. This full-time position was filled in March 2001. The Water Conservation Administrator manages the City's water conservation program and supervises a water conservation program staff of seven people, including the Utility Services Inspector, as well as clerical and field personnel.

The City provides conservation assistance to its wholesale customers via participation in the RWA Regional Water Efficiency Program ("Program") Advisory Committee. The City actively participates in the Program, and the City's water conservation coordinator is the Chairperson of the Program Advisory Committee.

Implementation Schedule

- Water Conservation Coordinator: On-going

Annual Budget/Expenditures

Only includes budget and expenditures for Water Conservation Coordinator position.

FY 2003/04: Budgeted: \$80,722 Actual Expenditures: \$83,758

FY 2004/05: Budgeted: \$83,144

DMM 13: Water Waste Prohibitions

Corresponding BMPs

- CUWCC BMP 13: Water Waste Prohibition
- Water Forum BMP 13: Water Waste Prohibition



Description

The Sacramento City Code (Title 13 Public Services, Chapter 13.04 Water Service System, Article XI Water Conservation) prohibits the waste or runoff of water, establishes various limits on outdoor water use, and specifies applicable penalties. The City originally adopted this ordinance in 1990 (Ordinance No. 90-017) and later revised it in 2001 (Ordinance No. 2001-033). A copy of the pertinent sections of the Municipal Code is provided in Appendix H.

The City also has a Water Waste hotline and responded to 1,009 water waste calls in 2004 and 879 calls in 2005.

Implementation Schedule

- Water waste prohibitions: On-going
- Additional drought restrictions: Would be enacted by the City if water supply conditions required additional conservation measures (see Chapter 9 Water Shortage Contingency Plan).

Annual Budget/Expenditures

FY 2003/04: Budgeted: \$47,978 Actual Expenditures: \$17,713
 FY 2004/05: Budgeted: \$49,417

DMM 14: Residential Ultra-Low Flush Toilet Replacement Programs

Corresponding BMPs

- CUWCC BMP 14: Residential Ultra-Low-Flush Toilet Replacement Program
- Water Forum BMP 13: Ultra-Low Flush Toilet Replacement Program For Residential Customers

Description

In 2003, the City started a residential ultra-low-flush toilet replacement program in coordination with RWA. This program encourages the installation of ultra-low-flush toilets in older homes by offering a rebate for each replaced toilet. Up to a \$125 rebate is available, \$75 from the City and \$50 from the Sanitation District. The program requires a pre-inspection and a post-inspection.

Table 8-12~~1~~ summarizes the number of residential toilet replacements from 2003 through 2005.

Table 8-12~~1~~. Number of Residential Toilet Replacements^(a)

Type of Account	Calendar Year				
	2001	2002	2003	2004	2005



Single-Family	0	0	103	197	573
Multi-Family	0	0	0	0	ND ^(b)

^(a) Source: City's CUWCC Annual Reports for 2001, 2002, 2003, and 2004.

^(b) ND = No data available.

Implementation Schedule

- Residential Ultra-Low Flush Toilet Retrofit Program: On-going

Annual Budget/Expenditures

FY 2003/04: Budgeted: \$75,000 Actual Expenditures: \$26,655

FY 2004/05: Budgeted: \$75,000

DETERMINATION SUMMARY OF DMM IMPLEMENTATION

As discussed above and as detailed in the City's BMP reports to the CUWCC (see Appendix F), the City has been actively implementing all of the DMMs to the extent allowed under the City Charter and as staffing and financial resources allow. Table 8-132 provides a summary of the City's implementation of the DMMs. In FY 2004/2005, the City's Water Conservation Department budgeted \$1,343,561 for water conservation programs.

Table 8-132. Summary of DMM Implementation

DMM No.	DMM Description	Implementation Status
1	Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers	Full Program in Place
2	Residential Plumbing Retrofit	Full Program in Place
3	System Water Audits, Leak Detection and Repair	Full Program in Place
4	Metering With Commodity Rates for All New Connections And Retrofit of Existing Connections	Full Program in Place for Non-Residential Accounts Only Until recently, City Charter has prohibited metering for Residential Accounts. In accordance with City Ordinance No. 2005-090, the City will develop and implement a phased program for water meter installation in accordance with State Water Code Section 527. ^(a)
5	Large Landscape Conservation Programs And Incentives	Full Program in Place
6	High-Efficiency Washing Machine Rebate	Full Program in Place by SMUD and PG&E.



DMM No.	DMM Description	Implementation Status
	Programs	City Pilot Program to be implemented in 2006, in conjunction with SMUD. ^(b) Participated in CUWCC's LightWash Program in 2004 and 2005.
7	Public Information Programs	Full Program in Place
8	School Education Programs	Full Program in Place
9	Conservation Programs for Commercial, Industrial and Institutional (CII) Accounts	Full Program in Place
9a	Commercial, Industrial and Institutional (CII) Ultra-Low-Flush Toilet Replacement Program	Full Program in Place Participation has been poor, primarily because permits are required for commercial toilet replacement
		<u>The City's wholesale water service agreements have a built-in conservation incentive since the wholesale water charges are determined based on the amount of water delivered at a metered rate. All of the City's wholesale customers administer their own retail water conservation programs which are being regionally coordinated through the RWA Regional Water Efficiency Program ("Program") Advisory Committee. The City provides conservation assistance to its wholesale customers via participation in the Program. The City pays annual dues to the RWA; a portion of the dues goes to funding the Program. The City actively participates in the Program, and the City's water conservation coordinator is the Chairperson of the Program Advisory Committee. The City does not have a water conservation program to assist wholesale/wheeling customers. However, the RWA assists with regional coordination of water conservation activities.</u>
10	Wholesale Agency Programs	
11	Conservation Pricing	Full Program in Place for Non-Residential Accounts Only Until recently, the City Charter has prohibited metering for Residential Accounts. In accordance with City Ordinance No. 2005-090, the City will develop and implement a metered rate structure for all metered accounts in accordance with State Water Code Section



DMM No.	DMM Description	Implementation Status
		527. ^(a)
12	Water Conservation Coordinator	Full Program in Place
13	Water Waste Prohibition	Full Program in Place
14	Residential Ultra-Low-Flush Toilet Replacement Program	Full Program in Place

(a) Full implementation of DMM 4 (Metering With Commodity Rates For All New Connections And Retrofit Of Existing Connections) and DMM 11 (Conservation Pricing) has, until recently, been restricted by the City Charter, which prohibited metering of residential connections. However, as discussed in DMM 4 above, the adoption of AB 2572 now mandates a phased meter installation program to be fully implemented by January 1, 2025, and metered billing for all metered connections beginning in 2010. Implementation of these requirements will fulfill the requirements of DMM 4 and DMM 11.

(b) The City is currently working on implementation of DMM 6 (High-Efficiency Washing Machine Rebate Programs), and plans to implement a pilot program in 2006 in conjunction with SMUD. Under the pilot program, the City will provide a rebate of \$50, in addition to the current SMUD rebate. SMUD will continue to administer the program.

As shown above, all DMMs are either being implemented or are scheduled for implementation.

EXISTING CONSERVATION SAVINGS

Because most of the City's water customers are not metered, it presently is not possible to quantify individual water savings by all customers. However, based on the City's annual water production, the City calculates its water conservation savings each year, comparing annual water production to water production in 1986 (a pre-drought year), adjusted based on current population. Table 8-134 provides a summary of estimated annual water conservation savings for the past five years.



Table 8-134. Estimated Annual Water Conservation Savings

Type of Account	Calendar Year				
	2001	2002	2003	2004	2005
Adjusted 1986 Water Production (adjusted for population), af ^(a,b)	137,695	141,654	144,614	147,564	150,408
Annual Water Production, af ^(c)	140,140	138,864	140,281	146,827	138,974
Percent Conserved ^(d)	0%	2.0%	3.0%	0.5%	7.6%

- (a) See Table 6-1 for historic water production data for 1986 (109,446 af).
- (b) See Table 3-2 for historic population data.
- (c) See Table 6-1 for historic water production data.
- (d) "Percent Conserved" is calculated based on comparison of annual production to 1986 production (adjusted for population increase).

As shown in Table 8-134, the estimated water conservation savings during the last five years has ranged from zero percent to 7.6 percent, when compared to historic 1986 water production. The effect of a 7.5% water conservation savings on the City's ability to reduce future demand is analyzed in Chapter 6 of this Plan.

EVALUATION OF DMMS NOT IMPLEMENTED

~~As shown above in Table 8-12, the City has full programs in place for most of the DMMS. The only DMMS which are not fully implemented are DMM 4, DMM 6, DMM 10 and DMM 11.~~

~~Full implementation of DMM 4 (Metering With Commodity Rates For All New Connections And Retrofit Of Existing Connections) and DMM 11 (Conservation Pricing) has, until recently, been restricted by the City Charter, which prohibited metering of residential connections. However, as discussed in DMM 4 above, the adoption of AB 2572 now mandates a phased meter installation program to be fully implemented by January 1, 2025, and metered billing for all metered connections beginning in 2010. As noted above, most of the City's non-residential water service accounts are metered and are billed based on metered usage. Implementation of these requirements will fulfill the requirements of DMM 4 and DMM 11.~~

~~The City is currently working on implementation of DMM 6 (High Efficiency Washing Machine Rebate Programs), and plans to implement a pilot program in 2006 in conjunction with SMUD. Under the pilot program, the City will provide a rebate of \$50, in addition to the current SMUD rebate. SMUD will continue to administer the program.~~

~~The City provides assistance to wholesale agencies via participation in the RWA's Regional Water Efficiency Program (Program). The City pays annual dues to the RWA; a portion of the dues goes to funding the Program. The City actively participates in the Program, and the City's water conservation coordinator is the Chairperson of the Program Advisory Committee. The strength of a Program is based on the benefits of leveraging resources (communications,~~



~~financial, technical, and staff) of all purveyors to reach customers with repeated and consistent marketing messages and incentives that will motivate the customers to participate in BMP services.~~

The Program provides products and services that:

- ~~Assist water suppliers to meet BMPs of Water Forum, U.S. Bureau of Reclamation CVPLA and DWR UWMP commitments.~~
- ~~Provide liaison with WFSE compliance coordination and potential BMP updates.~~
- ~~Attract residential, business and government customers to accept BMP services.~~
- ~~Improve awareness of the need for Water Use Efficiency in the region.~~
- ~~Prepare for potential CALFED Certification.~~

Dues paid by the City to the program are presented in Table 8-14.

Table 8-14. RWA Dues from City

	2002 ^(a)	2003 ^(a)	2004 ^(b)	2004/05 ^(c)	2005/06 ^(c)
Dues paid by the City of Sacramento to the Regional Water Authority	\$14,040	\$33,600	\$16,800	\$34,009	\$34,009

^(a)Calendar Year

^(b)First six months of Calendar Year 2004

^(c)Fiscal Year

~~The City's wholesale/wheeling customers California American, Sacramento Suburban Water District, Sacramento County Water Agency Zone 40 and Zone 50 have recently implemented their own water conservation programs, which are being regionally coordinated through the Program Advisory Committee.~~



Table 9-1. City of Sacramento Water Use Reduction Plan^(a)

Stage	Shortage Condition	Required Water Use Reduction
1	Up to 20 percent	10 to 20 percent
2	20 to 30 percent	30 percent
3	30 to 40 percent	40 percent
4	40 to 50 percent	50 percent

^(a) Source: 1991 Water Shortage Contingency Plan as documented in the City’s 2000 UWMP.

Each stage of the Reduction Plan is generally triggered by a water shortage condition. The triggers used to determine a stage of action are usually external to the City. Although highly unlikely, conservation triggers may include surface water diversion reductions mandated by the State Water Resources Control Board and/or the Bureau.

Stage 1 of the Reduction Plan will be triggered when it is anticipated that there will be a 20 percent reduction in the City’s water supply. Under this stage, the City will request customers to reduce water consumption by 10 to 20 percent, and will enact specific water use restrictions (see draft resolution in Appendix I). Subsequent Reduction Plan stages will be implemented if additional water supply reductions occur and will include enactment of additional water use ordinances and restrictions. Successive stages of the Reduction Plan will be declared only after exhausting efforts to make a prior stage successful. Stage 2 will be triggered by a reduction of water supplies up to 30 percent. Stage 3 will be triggered by a reduction of water supplies up to 40 percent. Stage 4 will be triggered by a reduction of water supplies up to 50 percent.

In some cases, however, it may be necessary for the City to skip stages of the Reduction Plan. This may occur during a natural disaster or when the health and safety of the persons within the City’s water service area are jeopardized. The Reduction Plan is designed to be flexible so that the City can respond to the specific situation occurring at a particular time.

Table 9-2 summarizes the key elements for each stage of the Reduction Plan and the requested customer actions. Appendix I contains a draft resolution which can be used to implement one or more stages of the Water Shortage Contingency Plan. The draft resolution is provided as a model, and the text of any resolution and/or ordinance actually adopted may vary from the draft provisions presented in Appendix I.

It should be noted that the actions included in each stage are cumulative, meaning that if Stage 2 of the Water Shortage Contingency Plan is implemented, all of the measures in Stages 1 and 2 shall be implemented. Likewise, if Stage 3 is implemented, all of the measures in Stages 1, 2 and 3 shall be implemented. If Stage 4 is implemented, all of the measures in Stages 1, 2, 3 and 4 shall be implemented.

~~The Reduction Plan presented herein is not intended to be construed as a binding legal document, but rather a comprehensive summary of water use reduction criteria that are built upon City~~



Table 9-2. Stages of Action for Water Shortages

Stage	Water Conservation Savings Goal	City Actions	Requested Customer Actions
Normal		<p>Current City Code^(a):</p> <ul style="list-style-type: none"> Water shall not be wasted due to leaky or faulty water fixtures (§3 04 840) Water shall not be allowed to become water waste runoff and to flow away over the surface of the ground. (§3 04 850) No person shall use water for the purpose of washing down sidewalks, driveways, or parking areas except to alleviate immediate fire or sanitation hazards (§3 04 860) Landscape irrigation shall be prohibited between the hours of 12:00 noon and 6:00 pm from the last Sunday in April to the last Sunday in October (§3 04 860) Residential and commercial locations bearing a street address ending in an odd number shall be permitted to irrigate only on Tuesday, Thursday and Saturday and locations bearing a street address in an even number shall be permitted to irrigate only on Wednesday, Friday and Sunday. There shall be no water irrigation on Mondays (§3 04 860) No person shall use City water for irrigation or the sprinkling of lawns through an automatic sprinkler for a period exceeding thirty (30) minutes or through a hose for a period exceeding two and one-half (2½) hours during each calendar day. (§3.04.860). 	
1	10 to 20%	<ul style="list-style-type: none"> Initiate public information campaign Ask customers for 10 to 20 percent use reduction Increase efficiency of system operations: <ul style="list-style-type: none"> Enforce hydrant use regulations Intensify leak detection and repair program Reduce watering of parks, cemeteries to designated days and hours Increase water waste patrols Require shut-off valves on all hoses Enforce 3 day/week outdoor irrigation schedule 	<ul style="list-style-type: none"> Landscape irrigation restrictions: <ul style="list-style-type: none"> Odd/even outdoor watering schedule No outdoor irrigation on Monday 12:00 noon to 6:00 pm prohibition during daylight savings period
2	20 to 30%	<ul style="list-style-type: none"> Limit outdoor irrigation to 2 days/week Allow car washing with bucket only Further limit park, cemetery, etc irrigation Further limit hours for outdoor irrigation Limit public water uses only to health and safety needs Main flushing allowed only for emergency purposes Intensified public education program 	<ul style="list-style-type: none"> Landscape irrigation restrictions: <ul style="list-style-type: none"> 2 day/week schedule Watering time reduced Cars washed with buckets only No washing down of paved surfaces
3	30 to 40%	<ul style="list-style-type: none"> Limit outdoor irrigation to 1 day/week, manual application Prohibit car washing Further limit park, cemetery, etc irrigation Further limit hours for outdoor irrigation Continue vigorous public information campaign Intensify leak detection program 	<ul style="list-style-type: none"> Landscape irrigation restrictions: <ul style="list-style-type: none"> 1 day/week schedule with manual application No car washing
4	40 to 50%	<ul style="list-style-type: none"> Prohibit outdoor irrigation of turf areas Further reduce park, cemetery, etc irrigation Prohibit irrigation of median strips 	<ul style="list-style-type: none"> Landscape irrigation restrictions: <ul style="list-style-type: none"> No residential turf watering No median strip watering Reduced irrigation to parks

^(a) Sacramento City Code (Title 13 Public Services, Chapter 13 04 Water Service System, Article KWater Conservation)



~~Municipal Code and ordinances, Department of Water Resources references, and common water industry practices. During a future drought, the draft resolution contained in Appendix I may be used as a model for the enactment of appropriate restrictions.~~

ESTIMATED MINIMUM WATER SUPPLY FOR NEXT THREE YEARS

The City has three sources of supply, American River water, Sacramento River water, and groundwater. As described in Chapter 5, the American River supply is subject to limitations applicable to diversions to the FWTP during extremely dry years and Hodge Flow conditions. The estimated minimum water supply for the next three years assumes a multiple dry year condition, as described in Chapter 5, consisting of two normal years with Hodge Flow Criteria governing every month and a third year with extremely dry year conditions, and are representative of actual conditions present in 1933, 1934 and 1977, respectively. Table 9-3 presents the estimated minimum water supply for the next three years.

Table 9-3. Estimated Minimum Water Supply for the Next Three Years (DWR Table 24)

Supply Source	Projected Minimum Water Supply, acre-feet		
	2006	2007	2008
American River ^(a)	127,700	132,200	132,213
Sacramento River ^(b)	81,800	81,800	81,800
Groundwater ^(c)	0	0	0
Total Supply	209,500	214,000	214,013
Projected Water Demand (Retail and Wholesale)^(d)			
Assuming No Conservation	147,700	156,400	165,100
Assuming 7.5% Conservation	146,600	154,200	161,800
Assuming 25.6% Conservation	144,100	149,200	154,300
Projected Supply Shortfall	No Shortfall Projected		

- (a) American River projected minimum water supply based on Fairbairn Water Treatment Plant diversion limitations due to extremely dry year and Hodge Flow conditions.
- (b) Sacramento River projected minimum water supply based on City's Sacramento River permit.
- (c) Table 9-3 demonstrates that the City has sufficient surface water supplies to accommodate demands, although the availability of groundwater enhances the City's overall water supply reliability and the City may and will likely use groundwater to satisfy demands.
- (d) See Chapter 6.

Also shown in Table 9-3 are the projected demands (for both the City's retail and wholesale customers) for the next three years (see Chapter 6). As shown, even if no water conservation is assumed for the next three years, the estimated minimum water supply is sufficient to meet the projected water demands and no supply shortfall is projected.



With the recent expansion of the FWTP, the treatment capacity is 200 mgd; however, diversions at the FWTP presently are subject to the Hodge Flow Conditions which would limit FWTP diversions to 100 mgd during certain drought conditions. As shown on Figure 9-1, if the SRWTP was out of service, the American River supply (treated at the FWTP), together with the groundwater supply of 30 mgd, would provide the City with 130 to 230 mgd of supply, which would be adequate to meet existing (2005) average day demands, but may not be adequate to meet existing (2005) maximum day demands. If such an event were to occur in the summer months, when demands were high, it may be necessary for the City to implement one or more stages of the Water Shortage Contingency Plan to notify customers of the need to reduce water use until the Sacramento River water supply could be restored.

If additional Sacramento River diversion and treatment capacity is constructed in the future, increased system redundancy from the Sacramento River would be available to assist in meeting water demands if the loss of the Sacramento River supply was due to a malfunction at the SRWTP, break in a major transmission main serving the SRWTP, or contamination downstream of the new Sacramento River facility. If the loss of the supply were due to contamination of the Sacramento River supply source, the City would need to rely on the American River supply and groundwater until the Sacramento River supply could be restored.

Area-Wide Electrical Power Failure

If an area-wide electrical power failure were to occur within the City's water service area, the City is well prepared to meet water demands through the use of electrical generators located at both of the water treatment plants and at each of the booster pump stations. None of the City's groundwater wells currently have backup power; however, the City is considering a Capital Improvement Project which would provide for emergency power facilities at up to half of the City's 32 municipal wells.

Earthquake

Water system infrastructure, including treatment plants, pump stations, storage tanks, and pipelines, can be damaged during a strong earthquake. The City's facilities have been constructed in accordance with the applicable building codes to minimize potential damage during an earthquake. However, ~~it is expected that some facilities~~ may could be damaged as the result of a strong earthquake. The City has planned for this potential outage scenario by constructing system redundancy into its water system. The City has two existing and one proposed water treatment plants, multiple storage facilities and looped distribution pipelines, to allow potentially damaged portions of the City's system to be quickly isolated and repaired.

Flood

The City of Sacramento is potentially at risk of flooding as a result of severe storms, large quantities of runoff from the Sierra Nevada, and/or failure of levees which protect the City from major flooding events. The Sacramento Area Flood Control Agency (SAFCA) was created in 1989 to address the Sacramento's area vulnerability to catastrophic flooding. Members of SAFCA include the City of Sacramento, the County of Sacramento, the County of Sutter, the American River Flood Control District and Reclamation District 1000. SAFCA's mission is to



provide the Sacramento region with increased flood protection along the American and Sacramento Rivers, with at least a 100-year level of flood protection as quickly as possible, while seeking a 200-year or greater level of protection over time. SAFCA's activities are funded from development fees and annual assessments imposed on benefiting properties in three separate districts in Sacramento and Sutter Counties. A number of flood protection projects have already been completed, including construction of new levees, repairs to existing levees, and bank protection and stabilization.

Even though the City's water system is vulnerable to the risk of flooding, the redundancy it has with two separate water treatment plants and two different surface water supply sources (the Sacramento and American Rivers) helps alleviate some of this risk. This redundancy will be further enhanced in the future ~~when~~ if a third water treatment plant (the proposed Natomas Water Treatment Plant) is constructed. Currently, if the SRWTP is out of service due to flooding, the FWTP may be available to meet City demands, and vice versa. It is possible that a single flooding event could impact both of the City's water treatment plants and other water system facilities; however, in such an instance, the City will respond as quickly as possible to restore water service for the City's residents.

MANDATORY PROHIBITIONS AND RESTRICTIONS

The Sacramento City Municipal Code contains a section on water conservation (Title 13 Public Services, Chapter 13.04 Water Service System, Article XI Water Conservation), which outlines the mandatory prohibitions and restrictions that are in place under normal water supply conditions in the City. These measures include the following:

- Water shall not be wasted due to leaky or faulty water fixtures. (§13.04.840).
- Water shall not be allowed to become water waste runoff and to flow away over the surface of the ground. (§13.04.850).
- No person shall use water for the purpose of washing down sidewalks, driveways, or parking areas except to alleviate immediate fire or sanitation hazards. (§13.04.860).
- Landscape irrigation shall be prohibited between the hours of 12:00 noon and 6:00 pm from the last Sunday in April to the last Sunday in October. (§13.04.860).
- Residential and commercial locations bearing a street address ending in an odd number shall be permitted to irrigate only on Tuesday, Thursday and Saturday and locations bearing a street address in an even number shall be permitted to irrigate only on Wednesday, Friday and Sunday. There shall be no water irrigation on Mondays. (§13.04.860).
- No person shall use City water for irrigation or the sprinkling of lawns through an automatic sprinkler for a period exceeding thirty (30) minutes or through a hose for a period exceeding two and one-half (2½) hours during each calendar day. (§13.04.860).



As discussed above, Table 9-2 lists the additional conservation measures associated with each conservation stage which would further restrict the allowable water uses and landscape irrigation practices.

WATER RATES AND PENALTIES FOR EXCESSIVE USE

Because most of the City's residential customers are unmetered and are billed for water use based on a monthly flat-rate, excessive use of water by an individual residential customer presently cannot be identified or billed. However, under AB 2572, this will change as the City implements its meter retrofit program and commences metered billing for metered residential connections on January 1, 2010. Excessive use by non-residential customers can be identified because approximately three-quarters of the City's non-residential connections are billed on a metered basis, and this percentage will increase under the City's ongoing commercial meter retrofit program. In addition, in the event any person violates any provisions of the City's mandatory water conservation measures (as outlined in the City's ~~Municipal Code~~ or any enacted ordinance implementing the Water Shortage Contingency Plan), the following shall apply:

- For the first violation, the person who committed the violation shall be issued a written notice stating the type of violation.
- For the second violation, the person who committed the violation shall be issued another written notice stating the type of violation, and the property owner, if different than the person who committed the violation, shall be issued a written notice.
- For the third violation, the person who committed the violation and the property owner, if different than the person who committed the violation, shall be issued a written notice, and the subject property water rates shall be increased to five times the normal monthly rates for the duration of the summer period from the time of third violation to September 15th and then said water rates shall return to their regular schedule.
- For the fourth violation, the person who committed the violation shall be issued a written notice stating the type of violation, and the property owner, if different than the person who committed the violation, shall be issued a written notice, and the regular water rates shall be permanently billed at five times the normal monthly rates, as long as the same property owner is recorded on the tax rolls. In the event of a new property ownership or occupancy, the subject water rates may revert to the regular rate schedule upon review and approval by the water waste appeals board.

REVENUE AND EXPENDITURE ANALYSIS

Potential Revenue Impacts

Because about 95 percent of the City's customers presently are unmetered and are billed based on a monthly flat rate (based on the number of rooms for residential customers), until the City



begins the transition to metered billing per AB 2572, potential revenue losses during a period aimed at achieving large water conservation savings are minimal. The flat rate structure, although not ~~an~~ as great an incentive to water conservation as metered billing, contributes to a stable revenue stream.

Once the City's customers become metered and are billed based on actual water use, there may be a revenue impact during a shortage condition as customers are requested to utilize less water. Under this case, in the future, the City would need to develop reserves to compensate for decreased revenue or consider rate increases during the water shortage.

Potential Expenditure Impacts

As discussed in Chapter 8, the City budgeted approximately \$1.3 million for water conservation programs in FY 2004/2005. Although there may be more intensive efforts made for water conservation during a drought period (i.e., more staff time for water waste patrols or increased media advertising for the need for conservation), expenditures are not expected to increase significantly during a drought period.

MECHANISMS FOR DETERMINING ACTUAL WATER USE REDUCTIONS

The City's aggregate water supply and system demands are accurately monitored and tracked at the City's two water treatment plants.

Metered customers (approximately 400 multi-family residential and 6,900 commercial customers) are billed based on actual water use and records are available on individual use. Also, although all residential customers are currently billed based on a monthly flat rate, approximately 11,700 single-family residential customers have a meter installed that is used to monitor actual water use. Residential metered billing will begin in 2010 as discussed above.

DRAFT WATER SHORTAGE CONTINGENCY RESOLUTION

A copy of a draft water shortage contingency resolution is provided in Appendix I. As previously noted, the draft resolution provides model language for enacting one or more stages of the City's Water Shortage Contingency Plan. Implementation of the resolution also may require amendments to the Sacramento City Code.

CHAPTER 10. RECYCLED WATER PLAN

The City currently collects and transports wastewater through two separate systems: the Combined Sewer System (CSS) and the Separated Sewer System (SSS) to deliver the sewage to the Sacramento Regional Wastewater Treatment Plant (SRWWTP) for treatment and disposal. The purpose of this chapter is to briefly describe both systems, including wastewater flow projections for the SRWWTP, and discuss current recycled water use and actions to encourage use of recycled water in the future.

The City's 2000 Urban Water Management Plan did not project the use of recycled water within the City of Sacramento.

DESCRIPTION OF WASTERWATER DISPOSAL AND TREATMENT SYSTEMS

Wastewater within the City is collected and transported through a CSS and an SSS. The CSS was constructed over 100 years ago, while the SSS was constructed in the 1970's. Both systems convey wastewater to the SRWWTP and are discussed in more detail below.

Combined Sewer System (CSS)

The older, central areas of the City are served by a collection system built well over 100 years ago that combines sewage with stormwater into a single network of pipes.¹ The approximate area of the City served by the CSS extends from the Sacramento River on the west, to 65th Street on the east, to the American River to the north, and to Sutterville Road to the south.² Figure 10-1 illustrates the approximate area served by the CSS.

~~The City discontinued expansion and construction of pipelines in the CSS in 1946. The CSS currently consists of two pumping stations, an off line storage facility (i.e., Pioneer Reservoir), and the City's Combined Wastewater Treatment Plant (CWTP). Each of these is discussed in more detail below.~~

CSS Pumping Stations

The CSS conveys sewage via two pump stations: Pump Station 1/1A and Pump Station 2/2A. Pump Station 1/1A consists of two buildings located at the southeast corner of U and Front Streets; the first building was constructed in 1908 and second building was constructed in 1956.³ The total theoretical capacity of Pump Station 1/1A is 150 mgd (actual capacity is about 130 mgd).⁴ Pump Station 1/1A is not normally used during the summer (i.e., during dry weather periods), and is only operated as needed during wet weather or large storm events.⁵

Pump Station 2 was constructed in 1914 at the southeast corner of Riverside Boulevard and 11th Avenue, and went through extensive modifications in 1938, 1977 and 2002 (added pump station 2A).⁶ Pump Station 2/2A is the primary pump station for the CSS, operated continuously throughout the year, and has a total capacity of 530 mgd.⁷



Pioneer Reservoir

The Pioneer Reservoir was constructed in 1978 along Front Street, adjacent to the Sacramento River, northwest of the Interstate 5 and 80-freeway interchange to provide 23 million gallons (MG) of temporary storage to reduce overflows to the Sacramento River.⁸ The Pioneer Reservoir is a pile-supported, covered, reinforced-concrete structure that encompasses an area of approximately 3.5 acres.⁹ The reservoir has a peak hydraulic capacity of 350 mgd.¹⁰

Combined Wastewater Treatment Plant (CWTP)

The CWTP, as illustrated on Figure 10-1, was constructed in 1954, east of Interstate 5, near Fruitridge Road.¹¹ The CWTP ~~only~~ provides primary treatment (i.e., a mechanical settling process that removes oil and about 50 percent of the settleable solids) and ~~disinfection, disinfection~~; it has a capacity of about 130 mgd.¹² This plant is only operated during very large storm events.

The City's normal operation at this facility is to convey a maximum of 60 mgd to the SRWWTP (see discussion on the SRWWTP in subsequent sections of this chapter).¹³ The 60 mgd of treatment capacity at the SRWWTP is sufficient to treat all of the CSS flows during dry weather or low-intensity storms.¹⁴

All of the flows from the CSS are treated by the SRWWTP; the City only uses the CWTP during large storm events. The City uses the basins at the CWTP to store wastewater until capacity becomes available at the SRWWTP, and then the stored volume is conveyed to the SRWWTP.

CSS Flow Available to Meet Recycled Water Demands

During Fiscal Year 2004/2005, the City's CSS ~~produced~~ collected and conveyed approximately 28,934 acre-feet of combined wastewater and stormwater runoff. ~~As discussed earlier,~~ ~~the~~ The City stopped expanding the CSS service area in 1946; hence, flows from the CSS are expected to remain constant in the future.

Any CSS effluent treated at the CWTP will not meet the quality standards for recycled water use, as the CWTP only consists of primary treatment. Additionally, the plant operates only very intermittently, as needed, during large storm events and therefore, does not provide a reliable supply to potential recycled water customers.

The City conveys its CSS effluent to the SRWWTP, which provides secondary treatment (e.g., activated sludge) and tertiary treatment. As will be discussed below, the flow from the City's CSS system is combined with flows from other areas in Sacramento County, including the City's SSS. A portion of this regionally-combined flow is already being processed using tertiary treatment and is delivered to meet recycled water demands.

Separated Sewer System (SSS)

In addition to the City's CSS, the City has an SSS that conveys wastewater into major trunk-sewer lines owned and operated by the County Sanitation District 1 (CSD-1), ~~which~~ then



conveys the wastewater to the SRWWTP. In general, the City maintains sewer lines within the City limits that are 12-inches in diameter or smaller, while CSD-1 maintains sewer lines that are larger than 12-inches in diameter, and all of the pump stations. Figure 10-1 illustrates the area served by the SSS.

All wastewater originating from the City and conveyed through either the SSS or the CSD-1 system, is delivered to the SRWWTP before it is discharged to the Sacramento River. An estimate of the annual quantity of wastewater generated by the City's SSS service area was not available for this UWMP.

Wastewater generated by the City is combined with wastewater flows from other areas of Sacramento County, and treated at the SRWWTP. Wastewater and recycled water flow projections for the SRWWTP are readily available and are discussed in subsequent sections of this Chapter.

~~Because the City conveys its wastewater to the SRWWTP, and therefore, this UWMP focuses on the SRWWTP and recycled water activities associated with the SRCSD. Subsequent sections provide a brief description of the SRWWTP, including its treatment system, followed by a discussion of existing and projected wastewater flows.~~

Description of the SRWWTP

The SRCSD owns and operates the SRWWTP, which treats and discharges wastewater generated by the Cities of Sacramento, Citrus Heights, Elk Grove, Rancho Cordova, Folsom, and urbanized areas of the County of Sacramento. The SRWWTP is located in Elk Grove, California, and is currently permitted to ~~discharge treat~~ an average dry weather flow (ADWF) of 181 mgd, and a daily peak wet weather flow of 392 mgd.¹⁵ and discharged an average day annual flow (ADAF) of 158 mgd (based on data obtained for the five year ADAF from 2001 to 2005). Figure 10-1 illustrates the location of the SRWWTP.

The SRWWTP provides secondary treatment consisting of mechanical bar screens, aerated grit removal, primary sedimentation, pure oxygen activated sludge aeration, secondary clarification, chlorine disinfection, and dechlorination.¹⁶ All treated wastewater is discharged to the Sacramento River. Additionally, treated wastewater must be diverted to existing emergency storage basins when a river-to-effluent dilution ratio of 14:1 cannot be maintained.¹⁷

~~The total projected ADWF in 2005 from the SRWWTP was estimated to be 174 mgd, which includes all cities conveying wastewater to the SRWWTP.~~¹⁸ This flow is projected to increase to 218 mgd by the year 2020.¹⁹ The wastewater flow projection was obtained from the SRCSD, and originated from the 2020 SRWWTP Master Plan; flow projections beyond 2020 were not available for this UWMP.

Table 10-1 illustrates ~~the existing and~~ projected wastewater flows for the SRWWTP. The portion of this flow available for recycled water use is discussed in subsequent sections.



Table 10-1. Existing and Projected Wastewater Flow from the SRWWTP, mgd^(a)

Year	Treatment	2005	2010	2015	2020	2025	2030
Flow Treated to Secondary Levels	Secondary	174 ^(b)	196 ^(b)	210 ^(b)	218 ^(b)	222 ^(c,b)	224 ^(c,b)

^(a) Quantities presented include wastewater conveyed by the City from its CSS and SSS, and wastewater generated by other cities and urbanized areas within Sacramento County.

^(b) Note Source—SRWWTP 2020 Master Plan EIR

^(c) Quantities presented for the year 2025 and 2030 were estimated by the City of Sacramento. The quantities were calculated by fitting a curve to year 2005 to 2020 flows and extrapolating the flow rates to 2025 and 2030.

EXISTING AND PROJECTED RECYCLED WATER USE

The SRCSD, in partnership with the SCWA, has developed a wastewater recycling program; Phase I was completed in 2003 and Phase II will be completed sometime between 2008 and 2010.²⁰ Each phase is discussed in more detail below, followed by a comparison of total wastewater generated to total recycled water delivered.

SRCSD Water Recycling Program – Phase I

Phase I consisted of a 5 mgd Water Reclamation Facility (WRF) designed and constructed by the SRCSD and located at the SRWWTP.²¹ In April 2003, the WRF began delivering recycled water to the Laguna West, Lakeside, and Stonelake communities in Elk Grove for landscape irrigation.²² The recycled water is delivered in partnership with the SCWA. SRCSD provides recycled water and SCWA retails the recycled water to its customers.²³

As of September 2005, the program has 40 user sites that include parks, schoolyards, commercial landscaping, and roadway medians; additional user sites are planned for connection in 2006.²⁴ Phase I recycled water usage has reached a peak operation of 3 mgd, average daily water recycling usage in the range of 1 to 1.5 mgd, and an annual quantity in the range of 1,100 to 1,700 acre-feet annually.²⁵ All operations are conducted in accordance with California Regional Water Quality Control Board (RWQCB) and Department of Health Services (DHS) recycled water standards and SRCSD's Master Reclamation Permit (WDR #97-146).²⁶

SRCSD Water Recycling Program – Phase II

Phase II consists of expanding the WRF from 5 mgd to 10 mgd, which is in accordance with SRCSD's Master Reclamation Permit (WDR #'s 97-146).²⁷ The planned WRF plant expansion from 5 mgd to 10 mgd will serve new areas of the Elk Grove/Laguna Community (East Franklin, and Laguna Ridge developments).²⁸ Similar to Phase I, SRCSD will provide recycled water and SCWA will retail the recycled water to its customers.²⁹ As mentioned earlier, Phase II is expected to be completed sometime between 2008 and 2010.



Total Existing and Projected Recycled Water Use

As discussed previously, the SRCSD, in partnership with the SCWA, has developed a water recycling program that currently provides up to 5 mgd of recycled water and will provide a total of 10 mgd of recycled water by 2010. Table 10-2 presents the projected wastewater flow generated at the SRWWTP and the delivery capacity for recycled water use. As will be discussed in subsequent sections, the SRCSD is working on a plan to increase recycled water use beyond 2010; however, the actual quantities to be used are still under review.

Table 10-2. Quantity of Wastewater Planned for Recycled Water Programs^(a), mgd (DWR Table 14,33,36)

Year	Treatment	2005	2010	2015	2020	2025	2030
Flow Treated to Secondary Levels ^(b)	Secondary	174	196	210	218	222 ^(c)	224 ^(c)
Quantity Available for Recycled Water	Tertiary	5	10 ^(a)	10 ^(a)	10 ^(a)	10 ^(a)	10 ^(a)
% of Total Used for Recycled Water		2.9%	5.1%	4.8%	4.6%	4.5%	4.5%

^(a) SRCSD is currently evaluating the expansion of recycled water production. Quantity of planned recycled water production may increase after completion of the studies.

^(b) Quantities presented include wastewater conveyed by the City from its CSS and SSS, and wastewater generated by other areas of Sacramento County.

^(c) ^(d) Quantities presented for the year 2025 and 2030 were estimated by the City of Sacramento. The quantities were calculated by fitting a curve to year 2005 to 2020 flows and extrapolating the flow rates to 2025 and 2030.

^(d)

ACTIONS TO ENCOURAGE USE OF RECYCLED WATER

The SRCSD is currently planning for recycled water projects beyond 2010, through the development of a Water Recycling Master Plan (WRMP) that uses a planning horizon of 2030.³⁰ The overall objective of the WRMP, which is expected to be completed by the end of 2006, is to increase the use of recycled water in the Sacramento Region to 30 or 40 mgd during peak irrigation months.³¹ Water recycling on the scale of 30 to 40 mgd will allow the SRCSD to better manage its effluent discharged to the Sacramento River and will help Sacramento area water purveyors; improve their water supply quantity and reliability in terms of irrigation and industrial water supply.³²

The SRCSD, as part of the WRMP effort, is planning significant outreach to stakeholders that could be associated with SRCSD's future water recycling plans.³³ Stakeholders to be contacted during the WRMP are expected to include, among others: Sacramento area water purveyors and users; land use planning authorities; land development leaders; and environmental interests.³⁴



The WRMP will culminate in the development of a SRCSD Water Recycling Master Plan document that is expected to contain numerous water recycling project alternatives that have been evaluated for future SRCSD implementation.³⁵

The City is participating in an advisory committee developed by the SRCSD as part of the WRMP effort, which had its first meeting on December 15, 2005. Participation in the committee provides the City the opportunity to consider the feasibility of a future partnership. Recycled water, if utilized within the City, would likely be used for irrigation purposes only.

Financial incentives, such as subsidized water pricing may encourage recycled water use within the City. Target areas for subsidized recycled water may include the Bartley Cavanaugh Golf Course, and public green spaces near the Regional Wastewater Treatment Plant, or other scalping plants/recycled water facilities in the future. More study needs to be conducted to determine the feasibility of utilizing recycled water. At this time the City has not made any commitment to utilize recycled water, but is working with the Sacramento Regional County Sanitation District to explore potential future usage.

For the purposes of this Urban Water Management Plan, no recycled water is projected to be used in the City. This may change in the future as studies progress and projects develop. Table 10-3 presents the current projections of recycled water that may be used in the City.

Table 10-3. Methods to Encourage Recycled Water Use (DWR Table 36)

	2010	2015	2020	2025	2030
Recycled Water Delivered Using Financial Incentives (Subsidized Pricing) in Acre-Feet	0 ^(a)				

(a) The SRCSD is currently evaluating the expansion of its recycled water production, which includes the potential to provide recycled water for the City of Sacramento. After the feasibility study for the water recycling project is completed, the SRCSD and the City of Sacramento may decide whether or not it would be feasible to provide recycled water for the City of Sacramento.

RESOLUTION NO. ____

Adopted by the Sacramento City Council

IMPLEMENTING STAGE [1][2][3][4] OF THE CITY OF SACRAMENTO WATER
SHORTAGE CONTINGENCY PLAN

BACKGROUND

A. The City of Sacramento has three water supply sources: American River water, Sacramento River water and groundwater. Normally, the City's water supplies are adequate to meet the City's retail and wholesale water demands. However, because of *[on-going drought conditions statewide][the required shutdown of the City's Fairbairn Water Treatment Plant/Sacramento River Water Treatment Plant due to _____][or describe other event]*, the Sacramento City Council has determined that it is necessary to enact water conservation measures and water use restrictions, in addition to those already included in the City Municipal Code (Chapter 13.04 Water Service System, Article XI Water Conservation), as authorized under City Code section _____, in order to reduce water use within the City's water service area.

B. On January 28, 1992, the Sacramento City Council adopted a Water Shortage Contingency Plan that included four water conservation stages for a reduction in water use of up to 50 percent.

<u>Water Conservation Stage</u>	<u>Water Use Reduction Goal</u>
Stage 1	10 to 20%
Stage 2	20 to 30%
Stage 3	30 to 40%
Stage 4	40 to 50%

Each water conservation stage includes specific water conservation measures and water use restrictions designed to conserve water. Implementation of the water conservation

5. Landscape irrigation shall be prohibited between the hours of *[insert hours-- §13.04.860 already prohibits irrigation between 12:00 noon and 6:00 pm]* from the last Sunday in April to the last Sunday in October.
6. The City Manager shall further reduce irrigation of parks and cemeteries to the following days and hours: *[describe reduced watering schedule]*
7. Car washing shall be prohibited.

Stage 4 includes the following water conservation measures and water use restrictions:

1. All of the provisions of Stages 1, 2 and 3 shall be implemented as stated above, unless otherwise modified by these Stage 4 provisions.
2. The City Manager shall continue the public information campaign to inform the City's water customers of the need for water conservation and the provisions enacted by this Resolution.
3. Outdoor irrigation of residential turf areas shall be prohibited.
4. Irrigation of median strips shall be prohibited.
5. The City Manager shall further reduce irrigation of parks and cemeteries to the following days and hours: *[describe reduced watering schedule]*

Section 4. That the City Manager is hereby authorized and empowered to delegate his or her authority hereunder to such assistants, deputies, officers, employees, or agents of the City as he or she shall designate, and to establish such rules, regulations, and procedures, and to prepare or furnish such forms, as he or she deems necessary or appropriate to carry out the provisions of this Resolution.

Section 5. That in the event any person shall violate any of the provisions of this Resolution, the violations and penalties set forth in ~~the Sacramento Municipal~~ City Code _____ shall apply.

