City of Santa Barbara
Long-Term Water Supply Plan
2011

Prepared by Water Resources Division,
Public Works Department

Adopted by the Santa Barbara City Council on June 14, 2011,
as Agenda Item No. 15

City Council:

Helene Schneider, Mayor
Grant House, Councilmember
Dale Francisco, Councilmember
Frank Hotchkiss, Councilmember
Michael Kathleen Self, Councilmember
Harwood “Bendy” White, Councilmember
Randy Rowse, Councilmember

Board of Water Commissioners:

Landon Neustadt, Chair
Barry Keller, Vice-Chair
Russell Ruiz, Commissioner
James Smith, Commissioner
Bill Thomas, Commissioner

(This page intentionally left blank)

City of Santa Barbara

Long-Term Water Supply Plan
2011

Introduction

The City of Santa Barbara provides water service to most properties within the City limits, as well as several unincorporated areas, including Mission Canyon and the Barker Pass. The service area is approximately 20 square miles with a population of approximately 91,416. The water utility is administered by the Water Resources Division of the Public Works Department. The City's potable water supply sources include surface water from Gibraltar Reservoir, Devils Canyon Creek, and Lake Cachuma; groundwater from City production wells and Mission Tunnel infiltration; State Water; and desalination. A separate recycled water system supplies treated wastewater, primarily for irrigation, to offset the need to use potable water. In addition, water conservation is a key component of water supply management due to its role in offsetting the need to develop new water supplies and reducing the demand on existing water supplies. The Water Fund budget for FY 2011 includes an Operating Budget of $31,301,242 and a Capital Program of $3,349,702, for a total budget of $34,650,944.

For the past 17 years, the water supply has been managed under the 1994 Long-Term Water Supply Program (1994 LTWSP). Important events at the time of the program's adoption included the recent end of the severe drought of 1987 to 1991, an extensive inventory and analysis of water supply alternatives, and the addition of recycled water, State Water, and desalination to the City's water supply portfolio. The program incorporated water demand estimates derived from the City's 1988 General Plan Update process and water conservation savings anticipated from a rapidly developing City Water Conservation Program. During the two decades since the drought, the City's normal year water system demand (including potable and recycled water demand) has dropped from a pre-drought amount of 16,300 AFY to 14,000 AFY, despite a population increase of approximately 5%. This is a significant consideration in the development of this updated plan and is discussed in detail in later sections.

The fundamental challenge for the City's water supply continues to be the ability to provide adequate water during an extended drought. However, the water supply situation may also be affected by potential climate change impacts on hydrology and sea level, new constraints on deliveries of State Water through the Sacramento-San Joaquin Delta, a statewide water supply deficit with an accompanying legislative mandate for water use reduction, new technologies and practices for conserving water, and increasing costs for water supply and operation of the water system.

The City has recently certified an Environmental Impact Report (EIR) for the *Plan Santa Barbara* process to update the City's General Plan. The document included an analysis

of the City's water supply, which was developed in conjunction with the City's Water Commission in preparation for a recommendation to update the 1994 LTWSP. On June 14, 2011, the City Council adopted this Long-Term Water Supply Plan as Agenda Item No. 15.

Terms and Concepts

A number of key terms and concepts play a role in water supply planning and are discussed below:

Planning Period: The period covered by this plan is from 2011 through 2030, intended to roughly correspond with the term of the anticipated General Plan update.

Water Production: Production is the amount of water treated and put into the City distribution system in order to serve City water customers, net of deductions for water that leaves the distribution system as transfers for other purposes. As such, production is a measure of the amount of water supply needed to serve City customers. Production is tracked separately for the potable and recycled distribution systems. The sum of these two is referred to as "system production."

Metered Sales: The City maintains 26,513 retail water meters that measure the water used from the distribution system by City water customers. The sum of usage on these meters is referred to as "metered sales." Due to system losses, distribution system flushing, and normal meter inaccuracy, this number is generally about 90% to 92% of the production amount.

Cloud Seeding: Clouds can be seeded with certain compounds that enhance the amount of precipitation generated. The City participates, with other Santa Barbara County agencies, in an annual cloud seeding program to augment precipitation and runoff into local reservoirs.

Marginal Cost: To evaluate the economic benefits of ordering more water from one supply over another, only those costs that vary with the amount of water delivered are considered. These are called the "marginal" costs, also referred to as "variable" costs. Fixed or "sunk" costs are not included since they are the same regardless of whether more water is taken from a given source. For example, State Water has substantial costs for debt service and fixed operation and maintenance, but it is only the variable costs for chemicals and electricity that influence the economics of ordering additional State Water.

Avoided Cost: The cost effectiveness of a water conservation measure is evaluated by comparing the cost of the measure to the marginal cost that is avoided as a result of implementing the conservation measure and reducing the amount of water supply required.

Critical Drought Period: A water supply is evaluated by how well it performs in meeting the target level of demand during the expected worst case water supply situation. For the Santa Barbara area, this worst case is an extended drought, characterized by multiple years of below average rainfall, resulting in minimal inflow to Lake Cachuma and declining reservoir levels. The historical critical drought period for Santa Barbara is the 5-year period of 1947 to 1951. The most recent drought of 1987-1991 was somewhat less severe. Importantly, any year following the filling and spilling of Lake Cachuma could be the first year of a critical drought period, but this generally doesn't become apparent until about the third year.

Conservation: The City's Water Conservation Program promotes ongoing efforts to improve water efficiency and reduce waste in ways that don't require lifestyle sacrifices on the part of customers. Examples include using a high efficiency clothes washer to do the job with less water, fixing leaks, replacing a conventional irrigation controller with a smart irrigation controller, and replacing lawn with water wise plants. This type of conservation can be counted on for long-term reduction in demand, which avoids the need to procure more water supplies with high marginal cost. For water supply planning, it is important to distinguish between these ongoing efforts, and planned short-term extraordinary demand reductions employed during an extended severe drought or other catastrophic water supply interruption.

Safety Margin: In addition to quantifiable estimates of water supply yield and projected water demand, there is the potential for unplanned and unquantifiable shortages in supply or increases in demand. The approach used in this plan is to make reasoned estimates of supply and demand for the planning period and then add a safety margin on top of the projected demand target to recognize that unexpected events will occur.

Planned Demand Reductions During Severe Drought: A water supply can be planned for 100% reliability (i.e., able to meet full demand under all circumstances). However, meeting this reliability standard can result in significant additional cost. Because there is short-term flexibility in water demand during extraordinary conditions, it is reasonable to count on such short-term reductions to some extent to reduce the cost of operating the water system. During the most recent severe drought of 1987-1991, it became necessary to seek extraordinary reductions of up to 50%, which came at some considerable expense to the community. This level of planned reduction was deemed excessive during the development of the 1994 LTWSP and an amount equal to 10% of target demand was adopted at that time. This percentage was referred to as the "acceptable shortage" in the 1994 LTWSP.

Water Supply Performance: A water supply plan is evaluated by whether it meets the established technical and policy goals during the planning period. Performance of the water supply is based on assumptions for anticipated deliveries from the various sources. For the City's plan, much of this information comes from the Santa Ynez River Hydrology Model (SYRHM), a computer model developed by the Santa Barbara County Water Agency. The model covers a 76-year period from 1918 to 1993. It uses historical weather and river flow data, along with current water supply facilities and

operational strategies, to simulate the long-term yield of the river in its current state. The purpose is to illustrate how our current water supply portfolio might perform over a future period that is similar to the past. This explains why, for example, the model results include yield from Lake Cachuma in years before the reservoir actually existed.

A second important element of the performance analysis is to evaluate the relative costs of various options for meeting the supply goals. The focus is on marginal costs for the supplies that are part of the various alternatives evaluated.

Current Water Supply Portfolio

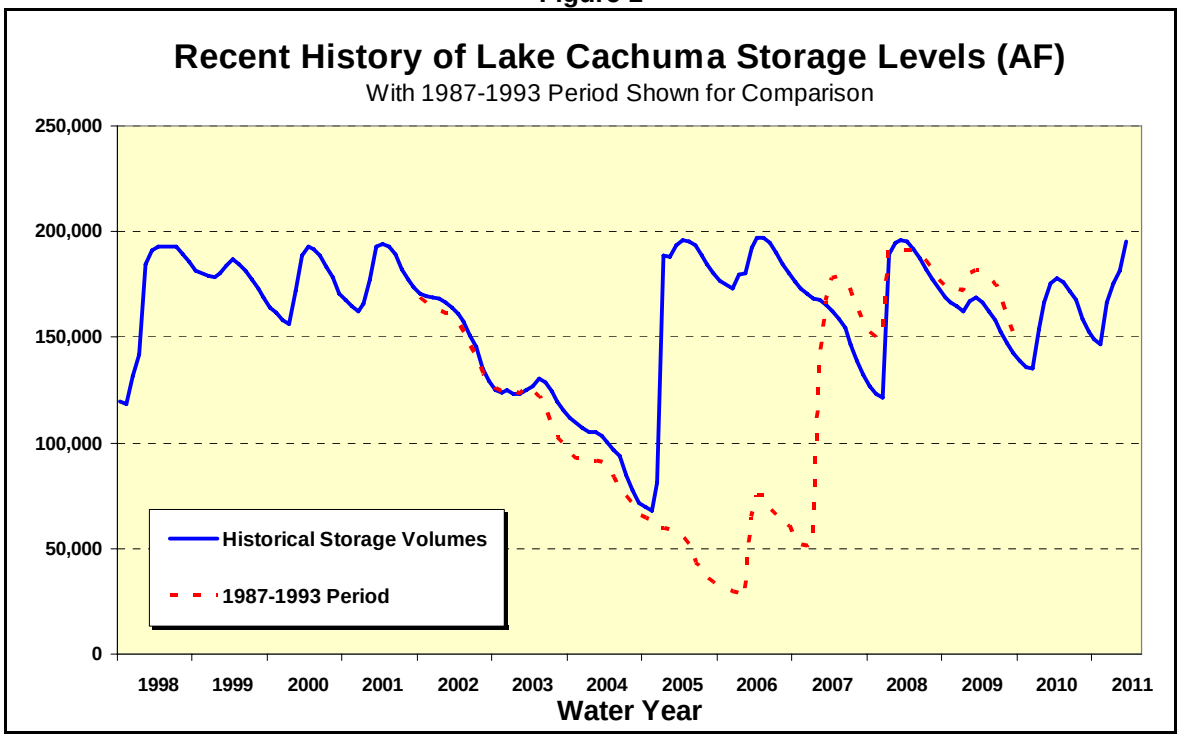
The City operates a diverse water supply. The various supply sources are summarized below. Additional discussion is included in the Final EIR for the *Plan Santa Barbara* process to update the City's General Plan.

Lake Cachuma

The federally-owned Cachuma Project on the Santa Ynez River supplies water to the City and four other member agencies. The most recent capacity survey (2008) estimated the storage capacity at 186,636 AF. The reservoir is currently operated to supply a total yield of 25,714 AFY to the five member agencies in most years. The City's current share of this annual yield is 8,277 AFY. In later years of extended dry periods (characterized by consecutive years of below average rainfall), storage typically drops below 100,000 AF and deliveries to member agencies are reduced. Historically the reservoir has filled and spilled an average of once every three years, but there occasionally are longer dry periods, the longest of which defines the critical drought period for planning purposes. Lake Cachuma is the City's primary water supply and the multi-year storage capacity provides an important buffer against dry periods. Figure 1 illustrates the recent history of storage levels at Lake Cachuma.

The lake is operated by the U.S. Bureau of Reclamation pursuant to orders of the State Water Resources Control Board (SWRCB) and in compliance with a Biological Opinion issued by the U.S. Fish and Wildlife Service (USFWS) for protection of steelhead trout, which were designated as endangered in the Lower Santa Ynez River in 2003. SWRCB is considering Lake Cachuma and Santa Ynez River water rights following a major hearing on the Cachuma Project conducted in November 2003. This was a continuation of SWRCB's long-standing review of the Cachuma Project in terms of its effects on downstream water users and on Public Trust resources (i.e., steelhead trout). The SWRCB ruling has been delayed pending completion of the necessary environmental documents.

Figure 1



For estimating future deliveries from Lake Cachuma during the planning period, the following assumptions were used:

- Alternative 3-C of the 2003 Cachuma Water Rights hearing Draft EIR, as modeled by the SYRHM was assumed. This includes a reservoir surcharge of 3-foot elevation (now in place) to provide additional water for fish releases and operation of the reservoir in compliance with the above mentioned Biological Opinion.

- Siltation has historically averaged about 332 AFY from the time of dam construction in 1953 until the most recent reservoir survey in 2008. Though options to control such siltation will be important, it should be assumed that this rate of siltation will continue, and would result in a 5% reduction in the reservoir capacity, and a roughly similar reduction in yield, by the end of the planning period. As a result, it could be estimated that normal year deliveries would be reduced from the current amount of 8,277 AFY to 7,863 AFY by the year 2030.

- Deliveries of Cachuma water during surplus (spill) conditions are not deducted from member agency annual entitlements, meaning that spill years usually result in some accumulation of water in excess of entitlement. The excess becomes "carryover" water that continues to be available until lost to spill or evaporation. This provides increased flexibility for members, but can not necessarily be expected to increase project yield above the amount modeled. Therefore, delivery estimates do not assume increased yield as a result of the carryover accounting of water accumulated during a spill condition.

Gibraltar Reservoir

In 1920, the City completed construction of Gibraltar Dam on the Santa Ynez River upstream of where Lake Cachuma was subsequently constructed. The dam formed Gibraltar Lake, with an initial storage capacity of 15,793 AF. Water is conveyed from Gibraltar Reservoir to the City through Mission Tunnel. From the beginning, siltation has been an issue, particularly following wildfires. In 1948, siltation had reduced the volume by about half and the dam was raised 23 feet to its current height of 1,400 feet above sea level. Prior to the 2007 Zaca Fire, which burned 60 percent of the Gibraltar watershed, the volume was 6,786 AF. Erosion since the fire, particularly the heavy rainfall of January 2008, has reduced the reservoir volume to 5,251 AF as of the June 2010 lake survey.

Since before the completion of Gibraltar Dam, the City has also diverted water from Devils Canyon Creek just downstream of the dam, with long-term average annual diversions of approximately 100 AFY. The City counts Devils Canyon diversions as part of its total allowable Gibraltar diversions.

As a result of the sale of the Juncal Dam site upstream of Gibraltar Reservoir and associated water rights in the early 1900's, the City receives an annual transfer of 300 AFY from the Montecito Water District. The water is transferred to the City's account at Lake Cachuma.

Current Gibraltar Reservoir operations are based on the 1989 Upper Santa Ynez River Operations Agreement (also known as the "Pass Through Agreement") by which the City agreed to defer a second enlargement of the reservoir in exchange for the right to receive a portion of its Gibraltar water through Lake Cachuma. The intent of this arrangement was to allow the City to stabilize the yield of Gibraltar so it would be consistent with the 1988 reservoir volume, while recognizing the interests of the Cachuma Project and other downstream users.

The City and other signatories to the Pass Through Agreement are currently working to implement the Pass Through mode of the agreement, which tracks the yield of a hypothetical "Base Reservoir" that is equal to the 1988 storage capacity of 8,567 AF, and operated under the procedures defined in the Pass Through Agreement. The Pass Through mode allows Gibraltar Reservoir diversions (including diversions to Mission Tunnel and the portion taken through Cachuma) up to the amount that could have been diverted under the "Base Reservoir" operations. Modeling done in 1989 indicated that long-term average yield of the Base Reservoir would be 5,160 AFY. Yield under the actual Pass Through operations can be expected to be somewhat less on average, due to potential losses associated with conveyance of water between Gibraltar and Cachuma, and spill and evaporation of Pass Through water at Cachuma.

Mission Tunnel

Mission Tunnel conveys water from Gibraltar Reservoir through the Santa Ynez Mountains to the City and was completed in 1910. Infiltration into the tunnel from watersheds on both sides of the mountains contributes to the City's water supply. Water supplies from infiltration to Mission Tunnel have varied from a low of 500 AFY in 1951 to a high of 2,375 AFY, with an average annual yield of 1,125 AFY based on analysis in the DEIR for the Cachuma Project water rights hearings.

State Water Project

The City is a participant in the State Water Project (SWP). Deliveries to Santa Barbara County participants are administered by the Central Coast Water Authority (CCWA). Project water is delivered into Lake Cachuma through the Coastal Branch of the State Aqueduct and two locally-operated pipeline extensions. The SWP contract defines the maximum amount each project contractor is entitled to request each year, which is referred to as the "Table A" amount, referring to the table of that name in the contract. The City's SWP Table A amount is 3,300 AFY and the City has a share of pipeline capacity to deliver that amount. However, deliveries of Table A amounts are subject to availability and delivery constraints.

The California Department of Water Resources produces the State Water Delivery Reliability Report every two years to assist project participants in estimating anticipated deliveries. The 2009 version (published August 2010) is the most recent. The report is based on analysis using the CALSIM II computer model developed by DWR and USBR to simulate Delta flows and predict available deliveries.

Deliveries are estimated for "current conditions" (2009) and "future conditions" (2029). Projections for this plan are based on the "future" conditions, but it is important to note that "future" conditions do not assume improvements in the ability to deliver water through the Delta. Key assumptions are listed below:

- Despite substantial efforts being made to address Delta delivery constraints, DWR's modeling assumes no improvements to the current conveyance system through the Delta. For example, there is no assumption that a Peripheral Canal or other form of "isolated facility" to convey water around or under the Delta will be in place.

- The beneficial effects of planned increases in SWP reservoir capacity are not assumed as a part of the analysis.

- Current constraints on exports, including federal biological opinions of December 2008 (Delta smelt) and June 2009 (salmon, steelhead, green sturgeon, and killer whale) are assumed to remain in place.

- The model does not assume any easing of delivery constraints associated with potential habitat improvements related to the ongoing development of the Delta Habitat Conservation and Conveyance Program, which targets the co-equal goals of ecosystem restoration and water supply conveyance.

- The model has been modified to include the projected future hydrological effects of climate change. The most important of these effects are the assumed continuation of sea level rise and a reduction in the amount of precipitation that falls as snow. The latter reduces the "storage" effect provided by snowpack and results in more concentrated runoff during winter and early spring, versus late spring and summer, which has the effect of reducing the amount of water available for delivery to SWP contractors.

Based on the above assumptions for future conditions, the 2009 report projects 6-year average annual dry period deliveries of 32% to 36% of Table A amount, median deliveries of 63%, and long-term average annual deliveries of 60%. The estimated long-term average continues a downward trend in DWR's previous biennial reports, as shown in Figure 2, reflecting the restrictions of the biological opinions and the projected effects of climate change. Given the number of variables associated with State Water Project deliveries, staff analysis for this plan assumes annual deliveries would be limited in all years to no more than 50% of Table A amounts, reflecting experience during 2008 and 2009. This results in an average annual predicted delivery of 46% of Table A amount (also shown in Figure 2).

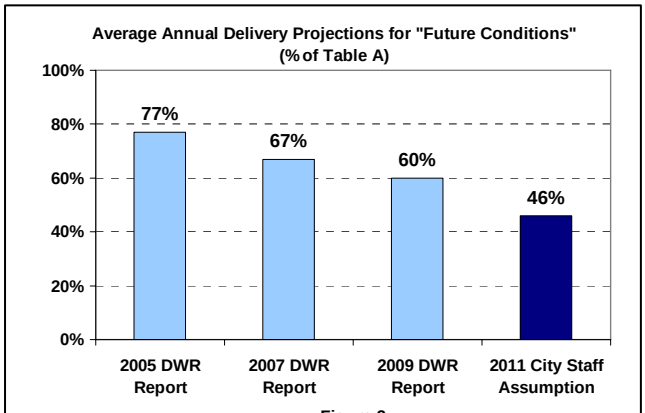


Figure 2

For comparison purposes, actual Table A availability for the past 5 years is shown in Figure 3. This period of 2005 to 2010 includes the recent statewide drought. Three of the five years were classified as "dry" or "critically dry." The period also includes significant new restrictions in SWP deliveries due to environmental and endangered species issues. The 57% average delivery amount for this period suggests that the assumption of 46% average annual deliveries is reasonably conservative.

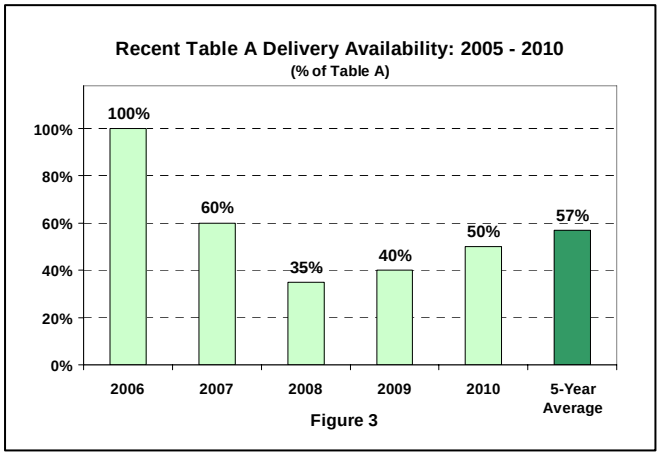


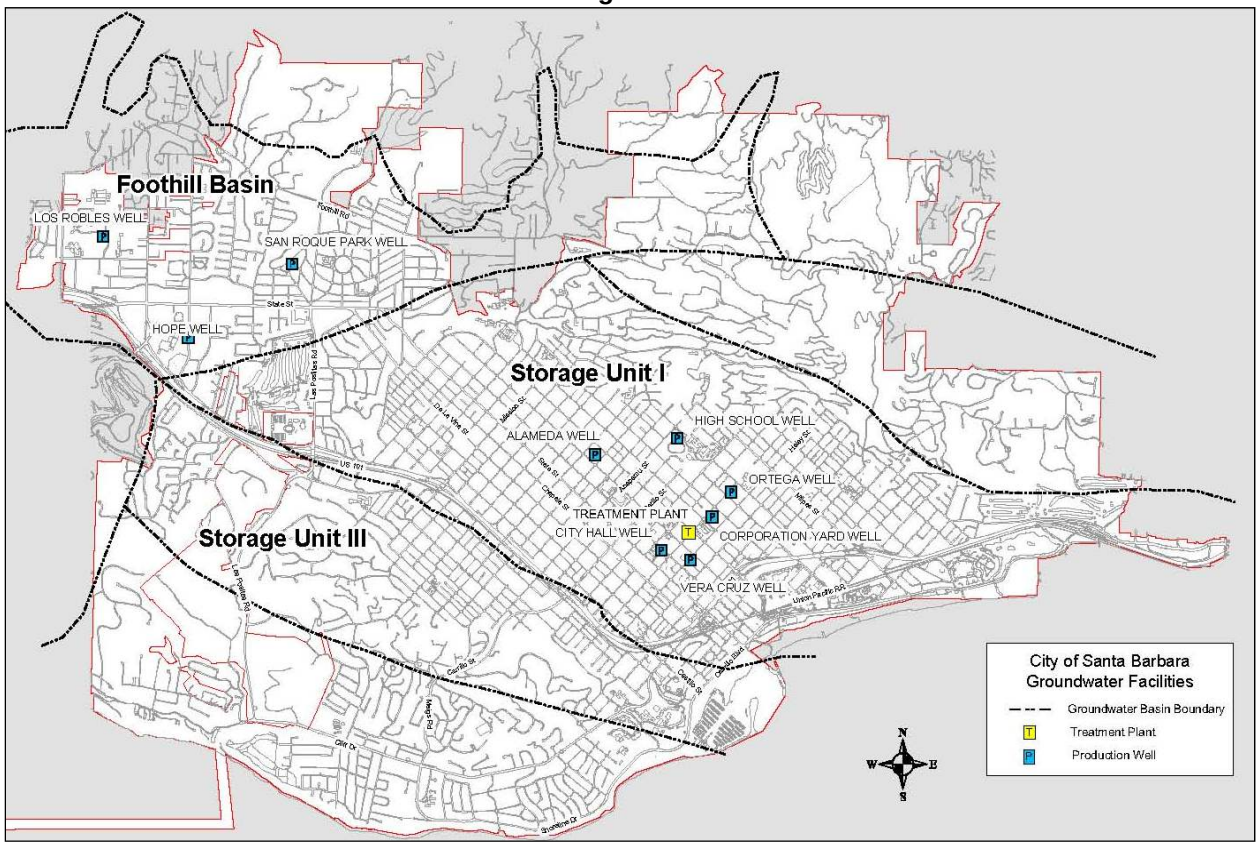
Figure 3

An additional important consideration is the ability of the SWP pipeline to convey non-project water to augment drought year supplies. These potential supplemental water supplies include the State's Dry Weather Water Purchase Program, purchase of unused Table A water available through San Luis Obispo County, or other open market water purchases, such as purchase of agricultural water.

Groundwater

City groundwater supplies are produced from two basins: Storage Unit No. 1 (downtown area) and the Foothill Basin (outer State Street area) as shown in Figure 4. The City conjunctively manages groundwater supplies, withdrawing water when needed and allowing recharge to occur following drought periods. A primary goal of this program is to attempt to utilize the perennial yield of the groundwater basins, while also managing the basins to maximize available storage to act as a back-up supply during drought periods.

Figure 4



The estimated long-term safe yield of these two basins is approximately 1,800 AFY. Extraction by private pumpers is estimated at 500 AFY. The City has six production wells in Storage Unit No. 1 and three in the Foothill Basin, though the wells are in need of varying degrees of maintenance or replacement. While the estimated total pumping capacity is approximately 4,500 AFY, a capacity of 4,150 AFY is assumed for planning

purposes. The total usable storage capacity of these two basins is estimated at 16,000 AF of City pumping. A third basin (Storage Unit No. 3 in the Las Positas Valley area) provides additional safe yield of approximately 100 AFY, but water quality is inferior and is not planned for use.

Seawater intrusion into Storage Unit No. 1 is a key issue because the groundwater basin is in contact with seawater that can flow into the basin during periods of heavy pumping. Under normal periods of little or no pumping, the groundwater flow is toward the ocean, which stops intrusion and pushes the seawater interface seaward. The City's Multiple Objective Optimization Model (developed by USGS) was used to estimate pumping levels that represent a compromise between maximizing production and minimizing seawater intrusion. The model results in total pumping of up to about 17,800 AF during the drought period, allowing some intrusion for the last portion of the drought. It should be noted that this modeling was based on one additional well in each basin, which may have implications for future capital program needs. In Storage Unit No. 1, the assumption was that new wells would be placed further inland to minimize intrusion.

Recycled Water

Recycled water is used in the City to irrigate over 400 acres of landscaped areas (including schools, parks, the zoo, and golf courses) and for toilet flushing in some public restrooms. The City system as currently configured has the capacity to treat and deliver approximately 1,400 acre-feet per year (AFY) of recycled water. Current connected recycled water demand is approximately 800 AFY, plus approximately 300 AFY process water used at the wastewater treatment plant, leaving about 300 AFY of additional capacity.

To meet a City goal of no more than 300 mg/L of chloride during irrigation season, approximately 300 AFY of potable water has historically been blended into the recycled water. This is because blending is the least costly solution and potable water is currently available for this use. A ten-year history of blend amounts is shown in Figure 5.

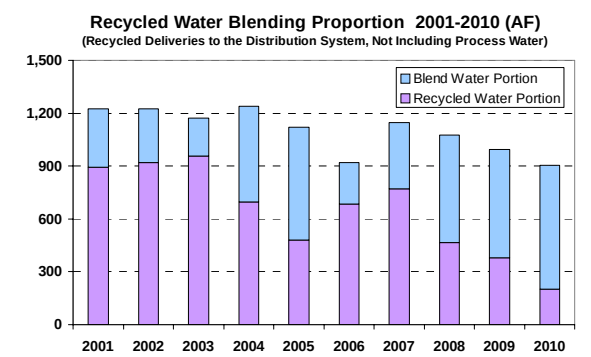


Figure 5

Secondary Process Issues: Beginning in 2004, due to challenges with the secondary treatment process, blending has increased recently to approximately 700 AFY to meet regulatory requirements. Improvements to the secondary process are being evaluated to address this recent increased use of potable water for blending. Once the secondary process is resolved, it is expected that the blend water component can be reduced.

Further Mineral Reduction: Mineral content suitable for irrigation purposes is an important part of fully utilizing the City's recycled water capacity and a standard other than the 300 mg/L chloride limit has been considered. Carollo Engineers identified an Environmental Protection Agency guideline of 1,000 mg/L of total dissolved solids (TDS) as a possible updated standard. A Carollo Engineers study on the recycled water filter rehabilitation project identified a conceptual project to meet this target without the need for blending. For a production rate of 1,910 AFY, the demineralization component was estimated to have a capital cost of $4.6 million. Annualized costs were estimated at approximately $652,000 (including the capital component) resulting in added unit cost of $341/AF of produced recycled distribution water. A blending alternative to meet the same standard is estimated to resulting in added unit cost of about $180/AF of produced water, assuming a cost of $600/AF for potable blend water. A modified blending alternative could involve blending only during the primary irrigation season, as is currently conducted to meet the chloride standard.

The recycled water system provides an important component of the City water supply, even with a partial potable water component for blending. In addition, the fact that users are signed up and connected to the separate recycled water system provides increased flexibility in how the City balances the economic and water supply aspects of this source of water.

Desalination

The Charles Meyer Desalination Facility was built in 1991 at an original capacity of 7,500 AFY and has a maximum hydraulic capacity of 10,000 AFY. Sale of a portion of this facility reduced current production capacity to a maximum of 3,125 AFY, which is also the capacity identified in the environmental analysis and permitting to convert the facility to permanent status in 1996. Due to reduced demand and relatively wet weather since 1992, the facility has been kept in long-term storage mode. However, the facility is permitted as a permanent part of the City water supply under a Coastal Development Permit approved by the City and the Coastal Commission. The City's current Regional Water Quality Control Board National Pollutant Discharge Elimination System (NPDES) permit for discharge from the City's wastewater treatment plant includes provisions for discharge of brine when the desalination facility is in operation.

The construction and operation of the Desalination Facility was approved by City voters in an advisory election held in 1991. No major technical barriers have been identified that would prevent reactivation of this facility to produce 3,125 AFY if needed. Although permit requirements would be subject to review by various regulatory agencies, the City has approval of all major permits required to operate this facility.

Reactivation of the facility at a capacity of 3,125 AFY was estimated by Carollo Engineers to cost $17.7 million. (An additional $2.5 million in distribution system improvements that would be required to operate the facility are already planned for construction due to their value in improving overall distribution of water throughout the

system). Operating costs are estimated to be $1,470 per AF, compared to variable costs of about $100 to $700 for other City water supplies. It should be noted that desalinated water includes a substantial energy component, estimated at 4,615 kilowatt-hours (kWh) per AF of produced water. This is lower than the original facility's energy use of 6,600 kWh per AF, but still well in excess of the energy requirements for other City water supplies. Should the need arise, reactivation is estimated to require about 16 months from the time of approval of any required permits.

Demand Management

Demand management (i.e., water conservation), provides a viable alternative to the high marginal costs of procuring new water supplies or increased deliveries from the more expensive existing supplies. Projected water demand is a key input assumption of the water supply planning process. Balancing the assumptions of projected water demand with the projected water conservation savings is necessary to develop an accurate water demand forecast. This section reviews the history of the City's water demand, summarizes current water conservation efforts, and discusses recent analysis and regulations that are relevant to the anticipated level of demand during the planning period.

Current Status

The total water system production is used to track the demand for water, since water is produced and put into the distribution system to match customer demand. The history of water demand from 1986 to present is shown in Figure 6 as a moving 12-month average.

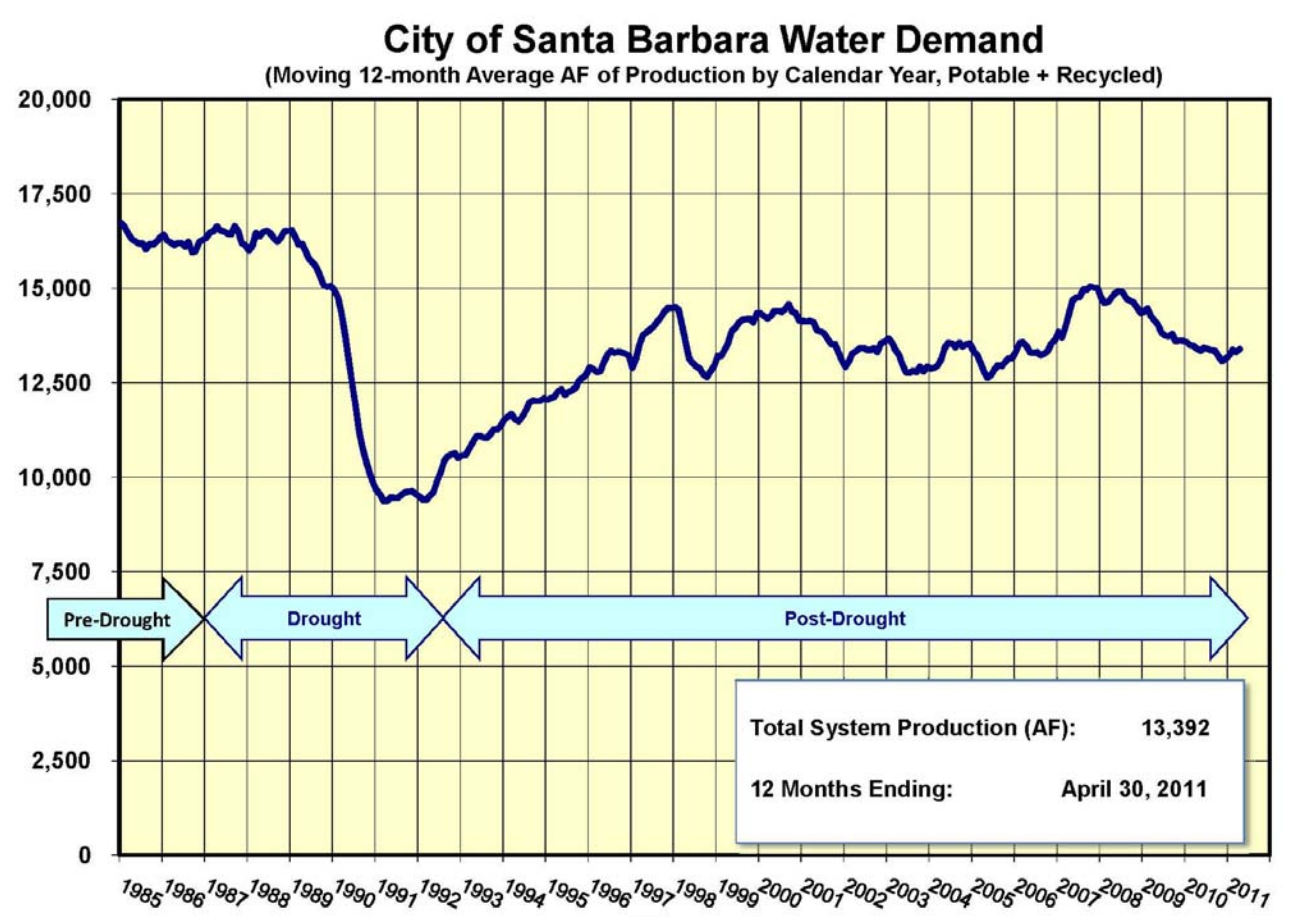


Figure 6

Moderate cutbacks in response to a Stage 1 Drought are evident during 1989 and response to the Drought Emergency is reflected in significant reductions during 1990. From 1992 to 1998, a steady post-drought recovery occurred, followed by a period of generally flat demand, but with significant fluctuations from year to year. To analyze this period of fluctuations, staff began tracking demand in relation to rainfall and evapotranspiration (ETo) data, as shown in Figure 7.

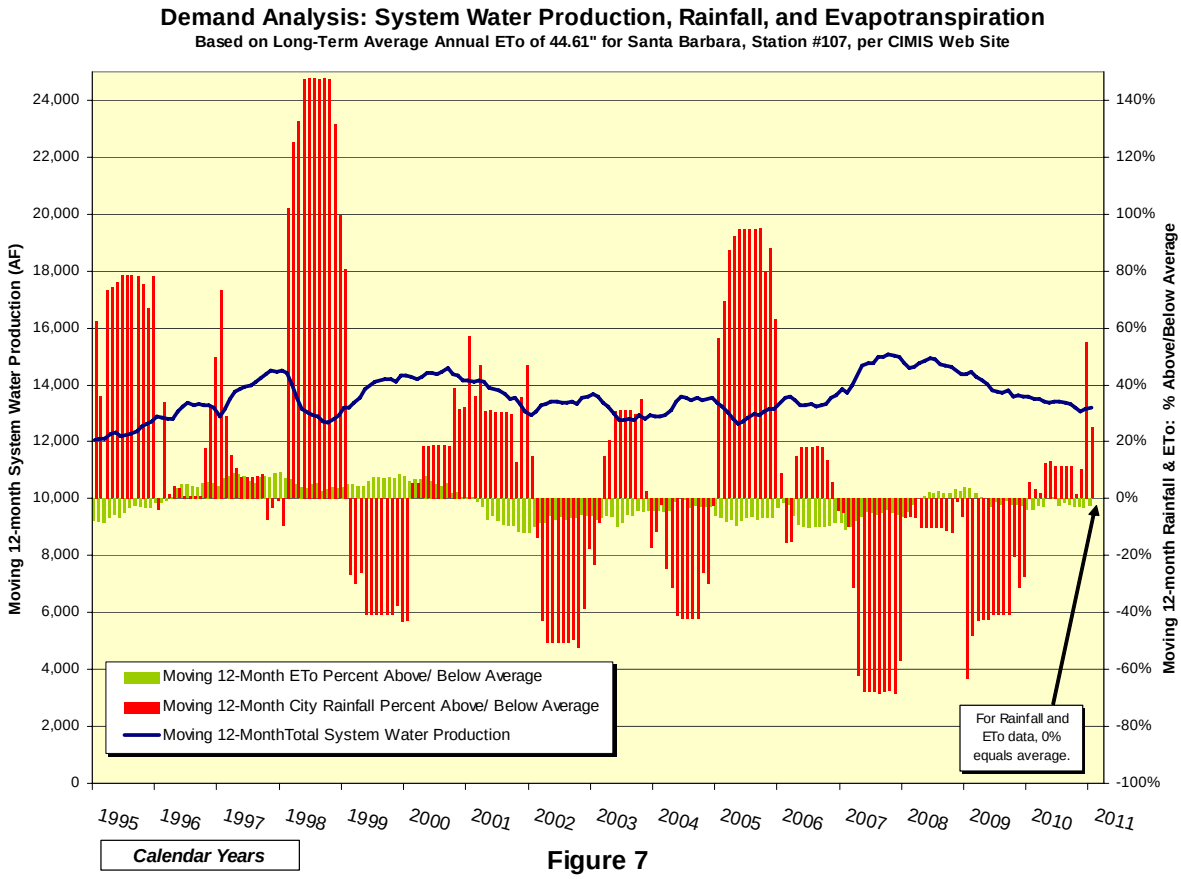


Figure 7

This information suggests that weather based fluctuations are the predominant effect on water demand. It is used to help estimate the "normal year" demand (i.e., approximately average rainfall), as the basis for planning water supply and estimating revenues.

Under the 1994 LTWSP, the City's water supply was planned to meet a total water system demand of 18,200 AFY. This number was derived as 17,900 AFY of demand projected during the 1989 update of the City's General Plan, plus a 10% safety margin, for a total of 19,700 AFY, minus an assumed "supply" of 1,500 AFY from new water conservation (some rounding included). Demand without safety margin for the end of the period was projected to be 16,400 AFY, including the assumed effects of water conservation. As the 1994 LTWSP planning period comes to an end, the normal year

demand is approximately 14,000 AFY, about 2,400 AFY less than projected. Demand for the 2010 water year, with rainfall about 12% above average, was 13,347 AFY.

The significant reduction in current demand compared to pre-drought levels can be attributed to a number of factors:

- An aggressive water conservation program;
- Less actual development than was projected;
- The cumulative effects of stricter plumbing codes and appliance standards on both new and existing development, and
- The relatively high cost of water, accentuated by the block rate pricing structure that charges a higher unit rate for higher levels of water usage.

The City's Water Conservation Program has developed into a comprehensive demand management effort. An important focus of the water conservation program has been to comply with, and to help shape, the Best Management Practices for Urban Water Conservation (BMPs) administered by the California Urban Water Conservation Council (CUWCC). These BMPs constitute the officially recognized standard for urban water conservation. Implementing the BMPs satisfies contractual requirements associated with the Cachuma Project. The BMPs have become a requirement for water utilities to remain eligible for state and federal loans and grants and Urban Water Management Plan acceptance. The City has been a signatory to the CUWCC Memorandum of Understanding Regarding Urban Water Conservation since 1992 and has worked with CUWCC to insure that the BMPs are practical and effective in achieving cost effective conservation savings.

Highlights of the water conservation program include:

- A broad selection of up-to-date print and on-line information on indoor and outdoor water conservation for both homes and businesses, including water wise plant selection, on-line irrigation scheduling tools, sustainable landscaping, high efficiency appliances, and water use awareness;

- Rebates for installation of water wise plants, smart irrigation controllers, and efficient irrigation systems, as well as high efficiency toilets, urinals, and clothes washers;

- A youth education program for elementary and secondary students, including classroom presentations, curriculum, treatment plant tours, and assemblies;

- The Green Gardener program, which trains landscape maintenance professionals in resource efficient and pollution prevention landscape maintenance practices;

- Practical guidelines and ordinances that reflect current technology for water conservation, including the City's Landscape Design Standards for Water Conservation;

- Targeted billing system analysis to reach customers with particularly high water usage, with an emphasis on providing site-specific landscape water budgets and real-time irrigation demand information; and

- A residential and commercial customer assistance program, providing free water check-ups to evaluate all water uses on the property and make recommendations for improved indoor efficiency, water wise plant selections, and irrigation system upgrades.

The current program is outlined in more detail in Appendix A (Water Conservation Program Summary).

City General Plan Growth Policies

Growth policies and projections analyzed for the City's General Plan update process (*Plan Santa Barbara*) were used as the basis for projecting water demand through the end of the planning period. Under proposed General Plan policies, development of up to 2,795 new dwelling units (DU) and 2.0 million square feet of new non-residential development are projected to occur within the City limits by the year 2030. Water demand for these projections is estimated as follows, based on recently updated aggregate demand factors for applicable customer classes:

Single Family Residential:	13% of 2,795 DU = 363 DU X .40 AFY/DU =	145 AFY
Multi-Family Residential:	87% of 2,795 DU = 2,432 DU X .16 AFY/DU =	389 AFY
Non-Residential:	2,000,000 ft^2 X .13 AFY per 1,000 ft^2 =	260 AFY

When 100 AFY of demand from projected added demand outside the current City limits is included (e.g. for annexations to the City), the result is a projected new demand of about 895 AFY. It is important to note that using current aggregate demand factors to project future demand can be expected to overestimate demand for new development. This is because new development will be subject to new codes and standards, while aggregate demand includes a significant portion of the building stock constructed under older standards.

State and Federal Requirements

A number of factors at the State and Federal levels will affect water demand in the future:

CUWCC BMP's: As noted above, the City's ongoing implementation of the BMP's can be expected to continue to exert a downward pressure on water use.

State & Federal Plumbing Codes: Currently, Federal plumbing and appliance efficiency standards require 1.6 gpf toilets, 1.0 gpf urinals, and 2.5 gpm showerheads. Effective 2014, all toilets and urinals sold in California will need to meet the new standards of 1.28 gallons per flush for toilets and 0.5 gallons per flush for urinals. This change will affect demand from new development, as well as demand from existing development as older fixtures are gradually replaced with models meeting the new standards. As required by the legislation, compliant models are already on sale in California at major retail and wholesale outlets. In addition, the California Green Building Standards have recently become effective and now essentially mandate the above standards for new construction. Additionally, after July 1, 2011, the 2010 California Plumbing code will require installations of 1.28 gpf toilets and .5 gpf urinals for all residential occupancy remodels. These include single family residential, dorms, hotels, apartments and basically any structure where overnight sleeping takes place.

S.B. 407 Fixture Replacement: Recent State legislation requires that new building owners be notified if the property does not have high efficiency fixtures. Implementation requirements are still unclear, but this can be expected to further the pace of conversion to high efficiency plumbing fixtures.

California's 20 X 2020 Requirement: In 2008, the Governor initiated a goal of 20% reduction in per capita urban water use by 2020. In 2009, the legislature adopted this goal into law by passing the Water Conservation Act of 2009 (SBx7-7). The penalty for non-compliance is ineligibility for State grants and loans. The focus is on public potable water distribution systems only. As such, the use of recycled water helps toward meeting the requirement. Targets were established by hydrologic regions, with several options for defining the baseline and the eventual 2020 target of per capita water use. The most suitable option for the City is "Method #3" in the legislation. This results in a baseline of 154 gallons per capita per day (GPCD) and a 2020 target of 117 GPCD. The 2009 potable per capita demand for the City was 130 GPCD, as calculated in compliance with the legislation.

Water Conservation Technical Evaluation

In preparing this plan, it was important to evaluate all of the above factors and determine to what extent additional water conservation could be relied upon during the planning period. This is in the context of meeting the State requirements of 20 X 2020

for per capita water use, meeting the CUWCC BMP requirements, and for properly identifying a cost effective role for water conservation in avoiding water supply costs.

Maddaus Water Management (MWM) is an engineering firm that is widely recognized as expert in estimating the costs and benefits of water conservation measures. MWM was hired to analyze the City's existing conservation program and use its proprietary Demand Management Decision Support System (DSS) to model current and potential conservation measures. The DSS also quantified the demand reduction effects of these measures along with the effects of plumbing codes and appliance standards. The process evaluated 92 potential measures which were screened for several factors to identify 23 that are most appropriate for Santa Barbara water customers. These 23 measures were inserted into the model, along with detailed information about the City's customer base and demand history. The project is described in more detail in the Executive Summary of the project report included as Appendix B (Water Conservation Technical Evaluation – Executive Summary). Key findings, including the effect of assumed development consistent with the Plan Santa Barbara process, are as follow:

- The 2030 demand would be expected to increase by 1,202 AFY (compared to the 2006 model reference point of 13,623 AFY) to 14,825 AFY, if the effects of already adopted plumbing codes and appliance standards were <u>not</u> considered. (It should be noted that this is not a projection that will actually occur, but it is a useful reference point to illustrate the ongoing effect of stricter codes and standards on both new and existing development.)

- The effects of the plumbing code and appliance standards are estimated to reduce 2030 demand by 919 AFY, to 13,906 AFY, not including the effects of conservation program activities and measures.

- Conservation Program B, which includes current conservation program measures along with those that together meet a utility benefit-cost ratio of 1.0, is estimated to reduce demand by an additional 498 AFY, to 13,408 AFY.

The benefit-cost ratio was calculated on the basis of an avoided cost of $600 per AF, which is an average of the variable costs associated with State Water Project Table A deliveries, groundwater produced from the Ortega Groundwater Treatment Plant, and deliveries of purchased water through the State Water Project during non-critical drought periods.

Figure 8

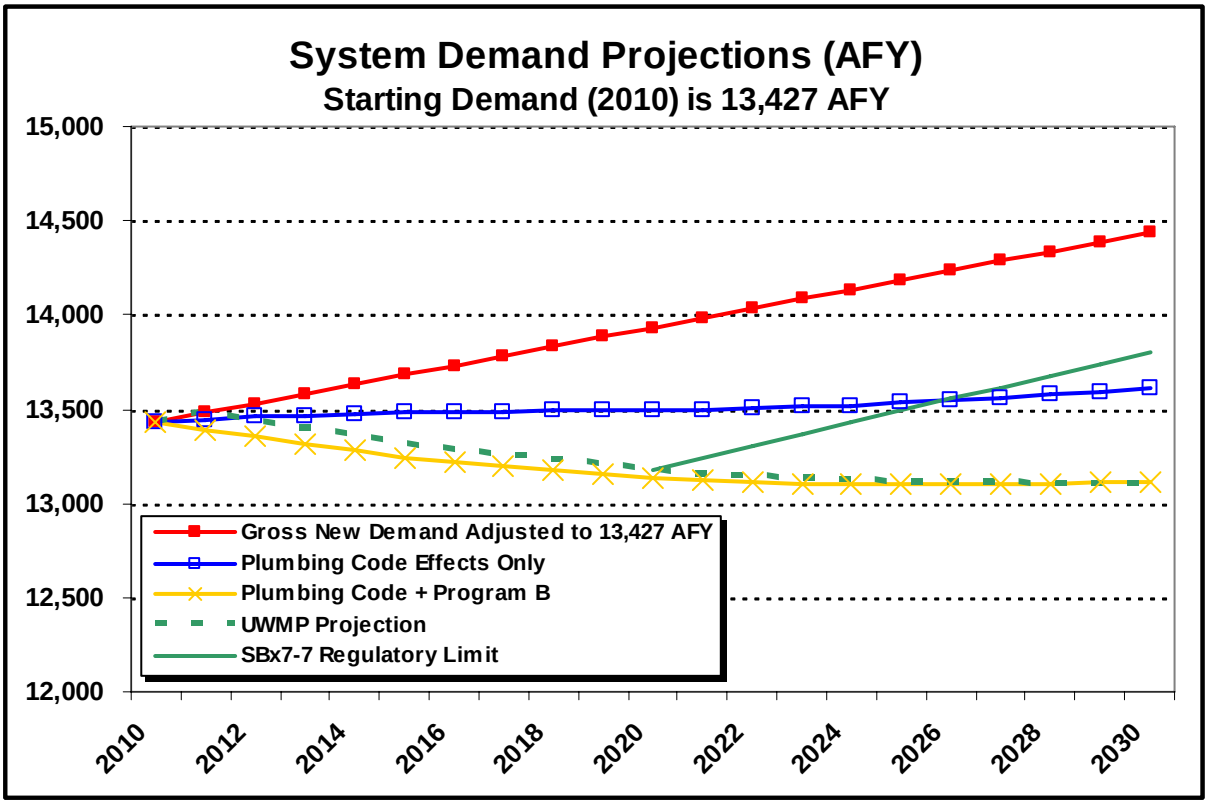


Figure 8 shows demand projections reflecting the various factors that will influence the City's actual water demand over the course of the planning period. These are based on the modeling results from the Maddaus report, adjusted to a reference point equal to the Fiscal Year 2010 total system demand of 13,427 AFY.

Primary Planning Issues

Given the water supply as described above, there are several key issues that shaped the water supply policies contained in this plan, as discussed below.

Planned Duration of Critical Drought Period

The critical drought period for the City's water supply occurs when there are multiple consecutive years of below average rainfall. This is due to the particular hydrology of the Santa Ynez River, where little or no inflow to Lake Cachuma typically occurs until at least average rainfall has occurred. When this condition of average or less rainfall continues for multiple years in succession, the storage level of Lake Cachuma drops and shortages in deliveries occur. Based on historical data, the critical drought period has had a duration of five years.

Climate change has the potential to impact the water supply, though it is still unclear whether this will have a significant effect during the planning period. To the extent information is available for the local area, overall rainfall amounts would be expected to be similar to recent history, but an increasing frequency of extreme rainfall events can be expected. This has the potential to result in an extended irrigation season with some associated increase in demand. From a water supply perspective, more concentrated rainfall events may have the benefit of increased inflow to Lake Cachuma. Guidance from the State planning agencies is that California can expect a 20% increase in both the frequency and the duration of dry periods. For the City's water supply this would suggest a critical drought period frequency of perhaps once every 30 years, instead of 40 years, and a duration of 6 years, instead of 5 years. Even though climate change impact information is incomplete and still undergoing critical review, the six-year drought period is a reasonable test and staff has used it for critical drought period analysis of the water supply.

Role of Desalination

The City's desalination facility is a vital resource as a back-up for potential prolonged drought and unforeseen interruptions of the water supply and would help mitigate the economic impact of such situations. It is also a reliable source of water, once in operation. However, as noted above, reactivation of the facility will result in significant costs, if only for the planning and design work that would be needed to start the process. In recent years, a dry period of only three years has been enough to trigger the start of planning to reactivate the facility in case of continuing dry weather. In 2004, after three years of drought, the storage level at Lake Cachuma had been reduced to about 70,000 AF out of 190,000 AF (37% of capacity) and the City was beginning this process of planning for reactivation.

As a result of discussion of this issue between staff and the Water Commission, the water supply has been modeled to stretch available Cachuma supplies over a potential 6-year drought period, with the goal of deferring the reactivation process, i.e. to plan for operation in the sixth year of a critical drought period instead of the fifth year. This would reduce the frequency of the planning and design effort, as well as reducing the likelihood that the substantial expense of actually reactivating the facility would be needed. This is another basis for the six-year critical drought period used in performance modeling.

Sedimentation Management at Reservoirs

Reservoirs on the Santa Ynez River are vulnerable to loss of storage capacity due to siltation, as are reservoirs throughout the west. Reduced storage capacity reduces the yield of a reservoir. At Gibraltar Reservoir, efforts to maintain storage capacity by dredging have had marginal impact and high cost. There has been some interest on the part of federal agencies to cooperate in vegetation management using controlled burns, but budget issues have made this unlikely to occur. Implementation of the Pass

Through provisions of the Upper Santa Ynez River Operations Agreement will essentially stabilize Gibraltar deliveries at a level close to historical amounts, despite continuing sedimentation. Still, an updated analysis of potential alternatives for managing sediment will be useful.

Efforts to control sedimentation at Lake Cachuma will require a joint effort among the Cachuma Project members, the downstream water users, and the various state and federal agencies that would have responsibility for permitting and/or implementing measures to address siltation. Issues related to such efforts are likely to be shared with numerous other reservoirs throughout the state, meaning that a coordinated statewide effort may be appropriate.

Groundwater Management

The City has initiated a three-year USGS study to update the groundwater flow and water quality models to allow more accurate management of groundwater. Better indicators of basin fullness are expected to be developed. More importantly, the modeling of seawater intrusion effects in Storage Unit No. 1 is expected to be made more accurate. This will guide placement of new wells in the basin, assist with scheduling well operation to minimize intrusion, and provide the ability to estimate the benefits of groundwater recharge for basin replenishment and creating barriers to seawater intrusion. In addition, the City should formalize its groundwater management role by developing a Groundwater Management Plan in accordance with State regulations.

Recycled Water Expansion

Recycled water is a relatively expensive source of water, but it is a reliable way to extend potable water supplies, thereby deferring the expense of procuring additional potable supplies. Additionally, increased recycled water connections will allow flexibility in meeting regulatory demand management requirements, such as the statewide requirement to reduce gross daily per capita water consumption. Current recycled water system capacity is 1,400 AFY, and current demand includes 800 AFY of retail demand and about 300 AFY of process water at EEWTP, for a total of 1,100 AFY. Carollo Engineers identified about 300 AFY of potential new users of recycled water, some adjacent to the existing system and some that could be served with extensions of the distribution system. These opportunities are being evaluated for their potential to cost effectively improve the reliability of the City's water supply and aid in meeting the state mandate on per capita water use. A caveat is that such expanded use will be more difficult to achieve if the mineral content is not reduced below that of the raw wastewater that feeds the recycled water system.

Water Supply Performance

The charts included as Appendix C are based on a worksheet developed by staff to simulate the City's water supply using the long-term model results from the Santa Ynez River Hydrology Model and other delivery assumptions as described above. An additional hypothetical year was added at the end of the 1947-1951 drought to simulate the 6-year critical drought period. For this sixth year, deliveries from Gibraltar, Mission Tunnel, and SWP are assumed to be the average of the preceding five years of drought. Cachuma is assumed to have negligible inflow during year six and the 5-year modeled yield is stretched out over the 6-year period. The charts illustrate how the City's water supplies would be used in the most cost effective manner to meet the projected demand during varying water supply conditions, ranging from very wet to very dry. The worksheet was used to explore the potential to defer the use of desalination at least until the sixth year of a drought. Three conditions are represented:

- The first represents "Current Conditions", with Cachuma entitlement of 8,277 AFY and no use of the safety margin.
- The second represents the near-term condition with Cachuma entitlement also at 8,277, but with a 10% safety margin included.
- The third represents 2030 conditions, with projected future Cachuma entitlement at 7,863 AFY and 10% safety margin included.

Planned demand reductions during the critical drought period are set at 10% in year 4, 15% in year 5, and 15% in year 6.

The worksheet uses a projected system demand of 14,000 AFY (plus safety margin as specified above), based on the combined effects of new development during the planning period, reductions in water use due to updated plumbing codes and appliance standards, the effects of the City's water conservation program, and the statutory requirement to meet a reduction in per capita daily water use by 2020.

A category called "Drought Supplies" is used to indicate water that would be used defer the use of desalination, either from unused State Water that is banked for use during dry periods or from the purchase of water during the critical drought period. The worksheet estimates that approximately 4,400 AF of unused State Water would be available for banking if contractual arrangements could be made to store the water for future use. Assuming a 50% deduction for the service of banking the water, about 2,200 AF of water would be available to meet the need for drought supplies. Water purchases would be pursued if additional water were needed. The desalination facility is proposed to remain a part of the City's water supply and would be used, if needed, to address shortages remaining after the use of banked water and purchased water.

The worksheet uses supplies as needed to meet the target demand according to the following sequence of priorities:

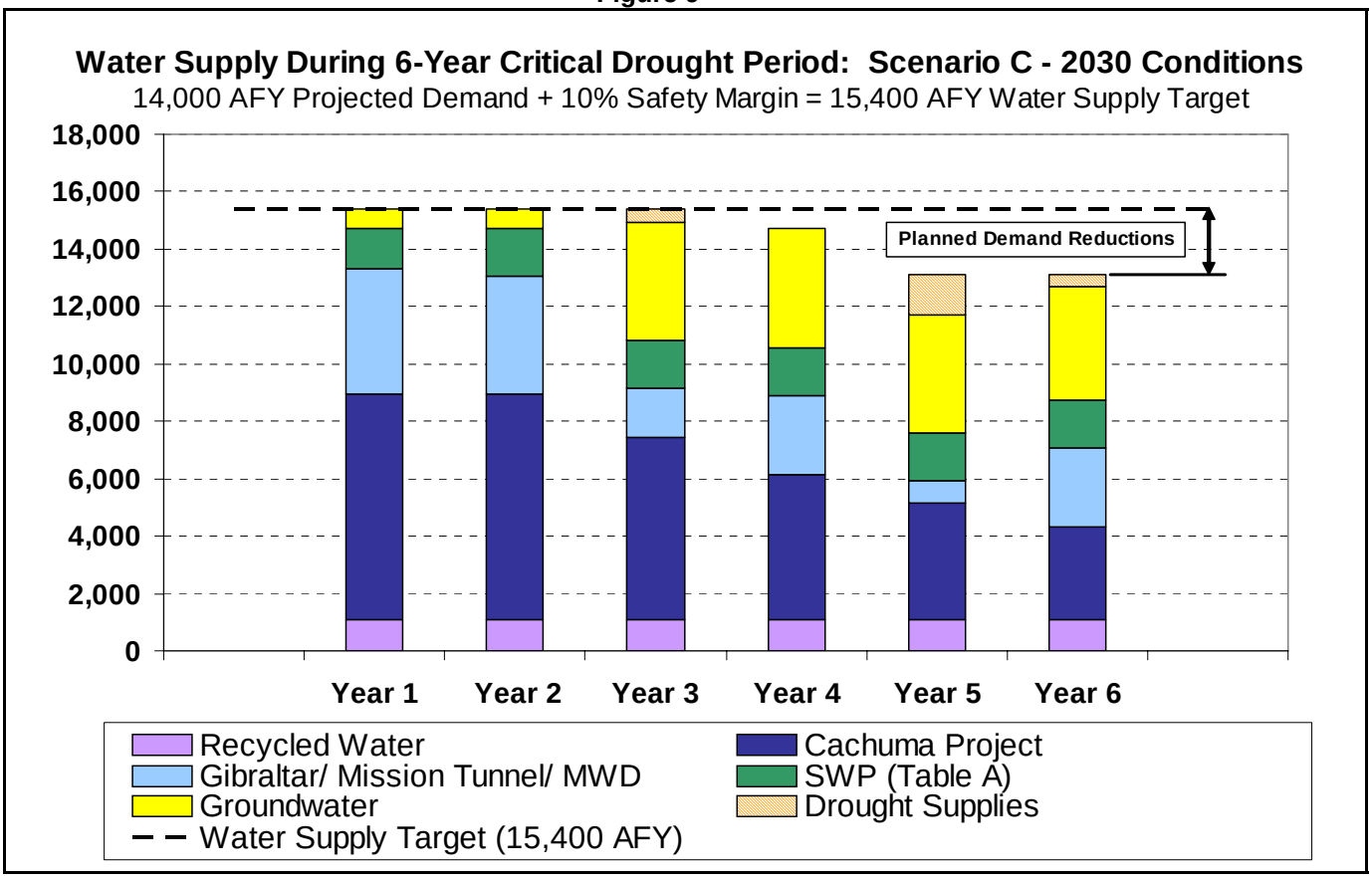
1. All available water from Gibraltar, Mission Tunnel and the Montecito Water District transfer, plus the 1,100 AFY of recycled water;
2. Minimum groundwater usage of 700 AFY;
3. The City's "exchange water" obligation of SWP Table A water (600 AFY);
4. Available Cachuma entitlement (except that remaining SWP Table A water is taken in year 2 and later to preserve available Cachuma water);
5. Remaining available SWP Table A water;
6. Added groundwater pumping up to the maximum amount of 4,150 AFY, subject to a cumulative pumping limit to minimize seawater intrusion;
7. Deliveries of "Drought Supplies" (banked water or purchased water to the extent available) through SWP facilities; and
8. Desalination (if necessary).

The worksheet is set up to take Planned Demand Reductions in years 4, 5, and 6 prior to taking delivery of Drought Supplies. The cumulative drawdown of available groundwater is tracked.

The water supply charts illustrate that the City's water supply can be met in most years with limited groundwater pumping, an average of only about 75% of available State Water, no drought supplies (banked water, purchased water, or desalination), and no need for extraordinary demand reductions. The real test of the water supply is the six-year critical drought period, beginning with model year 1947. Note that the sixth year is a hypothetical year that extends the historical 5-year drought to a 6-year drought. The 6-year critical drought period for 2030 Conditions (Scenario C) is highlighted in Figure 9. Key points illustrated include:

- Years 1 & 2: much like any non-drought year (mostly surface water, plus limited groundwater pumping);
- Year 3: Cachuma deliveries reduced to stretch remaining supplies; maximum groundwater pumping begins; small amount of Drought Supplies required;
- Year 4: First year of Planned Demand Reductions (4% of allowed 10%); further reduction at Cachuma is offset by some increased inflow at Gibraltar; no Drought Supplies required;
- Year 5: 15% Planned Demand Reductions; 1,364 AF of Drought Supplies taken; zero water delivered from Gibraltar; and
- Year 6: 15% Planned Demand Reductions; maximum pumping constrained slightly by the cumulative limit; some Drought Supplies required as a result; rainfall provides water from Gibraltar, but not enough to increase Cachuma deliveries.

Figure 9


Water Supply During 6-Year Critical Drought Period: Scenario C - 2030 Conditions
14,000 AFY Projected Demand + 10% Safety Margin = 15,400 AFY Water Supply Target
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Planned Demand Reductions
Year 1
Year 2
Year 3
Year 4
Year 5
Year 6
Recycled Water
Gibraltar/ Mission Tunnel/ MWD
Groundwater
Water Supply Target (15,400 AFY)
Cachuma Project
SWP (Table A)
Drought Supplies

Water Supply Policies

This plan has been developed to evaluate the adequacy and reliability of the City's water supply and provide a long-term view of how the City's water supplies will be managed. It is based on the best currently available projections and assumptions, and is to be considered a plan, not a prescription. New information or conditions may necessitate adjustments or new policy direction. Based on the information contained and referenced herein, the City's water supply management program will be guided by the following policies:

1. Safety Margin: A safety margin of 10% above projected demand will be used for planning purposes to accommodate unplanned increases in demand or decreases in available supply.

2. Demand Reductions During Drought: Planned short-term reductions of up to 15% in customer demand will be a part of the City's response during a critical drought period. Such reductions will be in addition to the ongoing promotion of long-term water use efficiency and will be achieved by measures such as restrictions on landscape irrigation and other water uses, a modified water rate structure, and intensive public information efforts to promote the community goal of reduced water use. This policy of planned cutbacks is established in recognition of short-term elasticity in customer demand that can be tapped during rare emergency conditions to avoid the cost of 100% reliability of the water supply.

3. Recycled Water: State and City regulations requiring use of recycled water where available will be implemented. Capacity in the City's recycled water system will be utilized to continue to serve existing connected demand plus an additional 300 AFY of expanded use, for a total of approximately 1,100 AFY, in addition to recycled water used for process water. The use of potable water for blending will be tracked and reported annually. A contingency plan for eliminating the need for blending will be developed for implementation based on economic, regulatory or water supply requirements. The City's goal is to be able to deliver recycled water to its customers, without blending, by the end of the planning period. Status of this goal will be reported at five-year intervals as a part of the City's Urban Water Management Plan updates.

4. Water Conservation: The City will operate a water conservation program aimed at minimizing the use of potable water supplies, meeting the requirements of the California Urban Water Conservation Council Best Management Practices, and achieving compliance with 20 X 2020 per capita water use limitations. Conservation measures will be evaluated for cost effectiveness based on avoided cost of additional water supplies.

5. Groundwater Management: Groundwater production capacity of at least 4,125 AFY will be maintained in Storage Unit No. 1 and the Foothill Basin to augment

depleted surface water supplies during a severe drought. Ongoing modeling will assess strategies for groundwater management, including optimal use of available recharge, injection of potable water for artificial recharge, and injection of recycled water as a barrier to sea water intrusion. Sites for new or replacement production wells will be evaluated with the goal of minimizing sea water intrusion. The City will develop a Groundwater Management Plan, consistent with state law, to provide for the orderly and responsible use of the City's groundwater resources.

6. Gibraltar Pass Through Operations: Pass Through operations will be implemented for storage of Gibraltar water in Lake Cachuma, pursuant to the 1989 Upper Santa Ynez Rive Operations Agreement. An updated analysis of sedimentation management will be conducted to assess whether efforts to arrest or reverse the sedimentation process at Gibraltar Reservoir are feasible.

7. Sedimentation Management at Lake Cachuma: To address ongoing reduction in capacity at Lake Cachuma due to sedimentation, the City will promote development of a long-term strategy to minimize sedimentation in conjunction with Cachuma Project Member Units and other appropriate parties and agencies, including state and federal agencies.

8. Water Banking: The City will investigate opportunities to bank unused State Water, with the goal of using this water to reduce the amount of drought water purchases that may be needed during a critical drought period, and deferring the potential need for production from the desalination facility at least until the sixth year of a critical drought period.

9. Desalination Facility: The City's desalination facility is an important component of the City's water supply, despite the significant cost of activating and operating the plant. The desalination facility will be retained as an official part of the City's water supply for use as may be needed during extended drought.

10. Water Supply Reliability: The City will adequately fund the maintenance, rehabilitation, and replacement of the water conveyance and distribution infrastructure to provide reliable delivery of the City's water supplies and prevent increased costs from deferred maintenance. In addition to planning for periodic droughts, the City will develop an emergency water supply plan to address catastrophic interruption of water supplies due to earthquake, South Coast Conduit failure, or other disaster that could interrupt the City's ability to convey water from the Santa Ynez River for a substantial period of time. The groundwater production capacity identified for drought response will also be maintained for response on short notice to such catastrophic interruptions.

11. Management of Water Fund Assets: Land and equipment assets purchased with Water Fund resources will be managed for the purpose of optimizing the economic and sustainable operation of the water system.

12. Monitoring and Reporting: Ongoing monitoring and reporting of the City's water supply status will be conducted, including annual reports to City Council on the near-term drought outlook, preparation of 5-year updates of the City's Urban Water Management Plan, and an update of this plan in approximately 2030, or sooner as may be appropriate.

Finding

Based on implementation of the above policies, the City's water supply is determined to be adequate to serve anticipated demand for the duration of the planning period.

(This page intentionally left blank)

Appendix A:

City of Santa Barbara
Water Conservation Program

Program Summary

(This page intentionally left blank)

City of Santa Barbara Public Works Department
Water Resources Division

WATER CONSERVATION PROGRAM SUMMARY
February 2011

The City of Santa Barbara is a long-term leader in water conservation. The City's Water Conservation Program began as a response to the drought in the late 1970's. In 1988, the Water Conservation Program was increased as a result of the recommendations from the City's Five-Year Water Policy Action Plan. As a result of the 1986-1991 California Drought, the City accelerated implementation of the Water Conservation Program.

The City's current Water Conservation Program is a combination of the City's commitment to carrying out the California Urban Water Conservation Council's (CUWCC) Best Management Practices and the City's dedication to water conservation as a element of the City's water supply plan. The City joined the CUWCC in January 1992 as a result of signing the Memorandum of Understanding Regarding Urban Water Conservation. Since that time, the City has been actively carrying out the Best Management Practices. Below is a description of the City's Water Conservation Program.

Foundational BMPs

BMP 1. Utility Operations Programs

BMP 1.1 Utility Operations Practices

1. Conservation Coordinator

The City's Water Conservation Program staff includes the FTE of one Water Resources Specialist, administrative support from one Senior Office Specialist, and 10 hours per week from a temporary Water Resources Technician.

2. Water Waste Prevention

City Ordinance No. 4558, adopted on February 1989, prohibits the waste of water defined as gutter flooding and failure to repair leaks in a timely manner.

BMP 1.2 Water Loss Control

Annually City completes the standard water audit and balance using the AWWA Water Loss software. The City's system unaccounted loss is ~1%. The City implements an annual water main replacement program. Age, material, and break history of water mains are tracked to determine overall condition of main in order to determine the priority of mains to be replaced. The City replaces three miles per year of the 275 miles of main in the distribution system.

BMP 1.3 Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections

City meters all customers and has an inclining block rate structure.

BMP 1.4 Retail Conservation Pricing

City has an inclining block rate structure.

BMP 2. Education Programs

BMP 2.1 Public Information Programs

Water Conservation Hotline. The Hotline handles the incoming calls for the Water Conservation Program. Hotline staff schedule water checkups and provides administrative assistance to the Conservation Program.

Website. The City's Water Conservation Programs website is www.savewatersb.org. Additionally the City promotes the regional water conservation program website, www.sbwater.org.

Water Conservation Brochures and Handouts. Brochures and handouts are distributed both hard copy and via the website on indoor water conservation, efficient irrigation and sustainable landscaping.

Video Loan. Videos on sustainable landscaping, water conservation, efficient irrigation, and water supply are available to the public to loan.

Media Campaign. An annual media campaign is implemented in conjunction with the Santa Barbara County Water Agency and funding from water purveyors countywide.

Water Bill Message. A monthly water conservation message is printed directly on the water bill.

Demonstration Gardens. The Water Conservation Program has two low-water using demonstration gardens, at Alice Keck Park Memorial Garden in conjunction with the Parks Department and the Firescape Garden in conjunction with the Fire Department.

Garden Wise Guys. Garden Wise Guys a thirty-minute television show about designing & maintaining a sustainable landscape. The quarterly show is produced by City TV and funded by the Santa Barbara County Water Agency, the City of Santa Barbara Public Works Department, and the Goleta Water District. It is hosted by two local landscape architects: Owen Dell and Billy Goodnick. With a unique sense of humor, the Garden Wise Guys will give viewers the basic information they need to start making changes in their own yard.

Water Wise Gardening for Santa Barbara County CD and Website.
A free "tool" for water wise gardening —a compact disc and website of gardening information tailored to our climate and our need for water conservation, titled "Water Wise Gardening in SB County". Available on CD or online at www.savewatersb.org or www.sbwater.org, it includes: extensive database with searchable information on over 1,000 water wise plants; more than 300 photos grouped into garden tours and garden galleries, all from local gardens Countywide; helpful facts, resources, and guidance on gardening design and practices; and links to other useful sustainable gardening sites.

BMP 2.2 School Education Programs
Water education presentations are given in approximately 90 classes and summer camps per year. Water education materials are provided to schools. Tours of the City's water treatment facilities with free bus transportation are provided. The City participates in the Annual Water Awareness High School Video Contest.

Programmatic BMPS

BMP 3. Residential

Residential Assistance Program
The City's Water Resources Specialist conducts residential water surveys (water checkups) upon request by water customers. A water checkup includes evaluating all water uses on the property including, and providing recommendations to the customer for improved efficiency including both indoor usage, evaluating irrigation system, and specific recommendations on improvements and upgrades.

Landscape Water Survey
As an element of the water checkups staff performs site-specific landscape water surveys that include checking the irrigation system for maintenance and repairs, reviewing the irrigation schedule and making recommendations for adjusting program of irrigation controller, providing customer with evaluation results and water savings recommendations.

The City has conducted an average of 400 water checkups per year for a total of 9,290 surveys since June 1990 (this includes both residential and commercial water checkups.) Savings for this program is projected to be 400 AFY for the 20 year period as projected in the LTWSP.

Smart Rebates Program
The Smart Rebates Program is co-funded through Proposition 50 grant received by the California Urban Water Conservation Council (CUWCC) and participating water suppliers throughout California. The Program provides rebates for water users to improve their efficiency through appliance and equipment retrofits and replacements. The City is participating with water broom (high efficiency pavement washers) rebates at $50 each, high efficiency clothes washer rebates at $150 for residential customers, and $400 for commercial customers: high efficiency toilet rebates at $100 for residential customers and $200 for commercial customers; and waterless or high efficiency urinal rebates at $300 for commercial customers.

The City's Toilet Rebate Program was in place from August 1988 through June 1995. An $80 rebate was issued per toilet retrofitted to a 1.6 gallon or less per flush toilet. The rebate was reduced to $40 for the period July 1994 to June 1995. The total number of residential rebates that were issued is 18,842.

BMP 4. Commercial, Industrial and Institutional

Commercial Water Checkups
As mentioned in the Residential BMP section, water checkups are offered for both commercial, industrial, and residential customers.

CII Toilet Rebates. 2,995 toilets at commercial sector sites were retrofitted during the City's Toilet Rebate Program from August 1988 through June 1995.

Save Water, Save a Buck CII Rebate Program. This rebate program offered rebates for the installation of water efficient fixtures for CII water customers and was coordinated by the Santa Barbara County Water Agency. Rebates issued through this program: toilets (1.28 gpf) = 80, (1.6 gpf) = 25, urinals =21, and clothes washers = 32.

Smart Rebates Program
Currently commercial high efficiency toilets, waterless and high efficiency urinals, high efficiency clothes washers, and waterbroom. See information on Smart Rebates Program in Residential BMP section.

Rinse and Save Pre-rinse Spray Valve Program. Through *Rinse & Save*, an innovative door-to-door installation program, restaurants in the City received a free 1.6 gpm pre-rinse spray valve. 199 spray valves were installed in the City in 2003, and 104 from January to September 2005, for a total of 303. Each replaced valve will save approximately one acre foot (326,000 gallons) of water over five years. *Rinse & Save* Program is administered by the CUWCC and funded by a grant from the California Public Utilities Commission and the participating agencies.

Lodging Industry Water Conservation Program consists of table tents and door hangers encouraging patrons to conserve water for lodging industry as well as educational videos for lodging industry staff.

Restaurant Table Cards are provided which inform restaurant customers that water will be served upon request.

BMP 5. Landscape

Smart Landscape Rebate Program

The Smart Landscape Rebate Program offers rebates to increase water efficiency in both the commercial and residential landscapes. Rebates on approved irrigation equipment and landscape materials will be up to 50% of material costs. Rebates are available for up to $1,000 for single family homes and up to $2,000 per account serving irrigated area ($4,000 per site) for commercial, multi-family, and HOAs. Rebate will cover: drip irrigation parts, sprinkler system efficiency retrofits and rotating sprinkler nozzles; water-wise plants and mulch; and smart irrigation controller. The process is 3 steps: a pre-inspection, a 60 day window to complete the approved projects and then a post-inspection. Since the program began in April 2009, there have been 146 participants, with 86 properties completing the rebate process to date.

California Landscape Budgets Program (CLBP)

This program provides monthly water use reports via www.landscapebudgets.com for the properties served by dedicated irrigation meters and compares the usage to a weather-based water allocation calculation. The goal is to provide education to the customers, as well as monthly reporting, identifying ways to help customers irrigate more efficiently. Currently, all City dedicated landscape irrigation meters billing is based on a water budget calculated from historical evaportranspiration data.

Green Gardener Program

The City of Santa Barbara and the Santa Barbara County Water Agency began in March 2000 the Green Gardener Program (GGP) along with eleven other partnering agencies and organizations. The GGP trains gardeners in resource efficiency and pollution prevention landscape maintenance practices. In order to be a Green Gardener, gardeners attend a fifteen-week training session (two and half hour class per week) taught in both English and Spanish covering topics including water efficiency, non-point source pollution reduction, fertilizing, integrated pest management, and reduction of air pollution emissions and green waste. A test covering training material is required for Green Gardener status plus annual ongoing educational requirements. This program includes promotion of the Green Gardeners through advertising and a list of gardeners distributed by partnering agencies and on www.greengardener.org. So far, the GGP countywide has trained 1,000 gardeners.

California Irrigation Management Information System (CIMIS)

Two CIMIS weather stations are owned by the California Department of Water Resources (DWR) are located on the City's Golf Course and the Vic Trace Reservoir. City staff assists in maintenance of the stations. CIMIS is a network of weather stations that automatically read and collect information on wind speed and run, average vapor pressure, air temperature, relative humidity, dew point, solar radiation, soil temperature, and precipitation. The information is transmitted to a central computer data base in Sacramento which gives daily evapotranspiration rates that can be accessed on DWR's website.

Smart Irrigation Controller Distribution Program

In May 2002, the Santa Barbara County Water Agency, City of Santa Barbara, and Goleta Water District began implementing the Smart Irrigation Controller Distribution Program. The program involves distribution and installation of Weather TRAK ET irrigation controllers at no cost to residential customers with significant landscape water usage. The Weather TRAK ET Controller automatically calculates a scientifically-based irrigation schedule based on several factors, including plant and soil type. It then adjusts the irrigation schedule as local weather changes. To date, 180 irrigation controllers have been installed in the City.

Watering Index and Landscape Watering Calculator

Landscape Watering Calculator: This is an easy-to-use web-based tool that helps estimate the right amount of water to give a landscape. The calculator has been designed to give a weekly irrigation schedule. Information needed is zip code of the site, the type of plants watered by a particular station on the irrigation system, the soil type, and the sprinkler type. Available at www.SantaBarbaraCA.gov/water.

Watering Index: On many irrigation controllers there is a feature called "water budget", or seasonal adjust, which one can easily adjust the watering schedule as the weather changes. Set the water budget to the weekly watering index (W.I.) which represents the recommended percentage setting for the water budget feature. The W.I. is normally 100% for much of July and August. Over the course of the year, the W.I. changes to reflect the landscape's changing need for water as climatic conditions change. As new W.I. values are published weekly, the controller's water budget feature should be changed to match to current W.I. value. For the weekly watering index, visit www.SantaBarbaraCA.gov/water.

Free Rain Sensor Program

Free rain sensors are now available from the City of Santa Barbara and Goleta Water District. Rain sensors automatically shut off the sprinkler timer during and immediately after it rains, thus saving tremendous amounts of otherwise wasted water. There are two options to receive a rain sensor: 1. receive a voucher of up to $50 and purchase a rain sensor from approved list, or 2. receive a free rain sensor with a brief training on how to install it. They goal of the rain sensor rebate program is to reduce the amount of water wasted by automatically shutting off irrigation controllers during rain events. Since April 2008, 416 rain sensors have been distributed to City water customers.

Graywater

The City provides outreach on the use of graywater with handouts, fact sheet, sample plan sheet, workshops and information on the City's website. City promotes use of graywater in accordance with the California Plumbing Code Chapter 16A.

Landscape Design Standards. On August 12, 2008, the City Council adopted the revised Landscape Design Standards for Water Conservation, Resolution No. 08-083. The Landscape Design Standards were originally adopted by resolution of the City Council on June 27, 1989. There has been much progress in irrigation technology and sustainable landscaping practices in the last 19 years; therefore, it was time to bring the standards up to date. Chapters 14.23 and 22.80 of the Santa Barbara Municipal Code require projects that are subject to design review to comply with Landscape Design Standards.

Additional Programs

Regional Cooperative Programs
The City participates in many regional water conservation programs with neighboring water purveyors. The Santa Barbara County Water Agency's regional water conservation program administers these programs.

City Facilities Water Conservation Retrofit Program. City facilities are equipped with the latest in water-saving devices, including waterless urinals, low-flow toilets and showerheads. Many City facilities and parks are landscaped with water-wise plants. City facility and parks irrigation systems continue to upgrade with smart irrigation controllers, rain sensors and state-of-the-art irrigation equipment. To date, 145 low-flow showerheads, 317 low-flow toilets, and 22 waterless urinals are installed in City facilities. Eight City public restrooms are plumbed with recycled water for toilet flushing. In one City facility retrofitted two years ago with four waterless urinals, the building's water use has decreased by 45%.

City Facility Requirements for New Construction and Renovations at City Facilities. Require state-of-the-art water conservation technology for landscape, irrigation and plumbing for new construction and renovations at City Facilities. Approved by Resolution No. 08-008 on February 5, 2008.

(This page intentionally left blank.)

Appendix B:

Executive Summary:
Water Conservation Technical Evaluation

Maddaus Water Management

(This page intentionally left blank)

EXECUTIVE SUMMARY

Introduction

This conservation technical analysis was conducted by Maddaus Water Management (MWM) for the City of Santa Barbara (City). The purpose of the analysis is to:

1. Evaluate current conservation measures and identify new conservation measures that will reduce future water demand.
2. Estimate the costs and water savings of these measures.
3. Combine the measures into increasingly more aggressive programs and evaluate the costs and water savings of these programs.

Long-Term Conservation Program Analysis

A list of 92 potential conservation measures was developed from known water saving technologies and services. Twenty-three conservation measures, selected by the City and local stakeholders during an evaluation workshop, were further analyzed by the Least Cost Planning Decision Support System Model (DSS Model). The DSS Model is a planning tool that assists water planners with evaluating alternative water conservation programs. The model itself is an end use model that calculates water savings, costs and benefits from individual measures, and programs of a number of measures. Projections of future water demand with and without water conservation programs are made for the City water service area. Calculations are made for every year in the 30-year analysis period. In addition, twenty one measures, both current and potential future measures, were put into a "Tool Kit" for further qualitative evaluation.

Based on analysis by the model, conservation measures were grouped into alternative programs of increasingly higher water savings and implementation costs (Table ES-1). Conservation Program A consists of 10 measures that are part of the existing City water conservation program. Conservation Program B includes all of Program A, plus those additional measures that have an individual benefit-cost ratio of 0.9 or greater, for a total of 17 measures. Conservation Program C includes all measures evaluated, except for Measure 5 which is replaced with the enhanced Measure 6. The measures included in Conservation Programs A, B, and C are identified in Table ES-1 in the columns at the right. Figure ES-1 shows the projected demand without the effects of the plumbing code, with the plumbing code effects, and with the plumbing code and three conservation program alternates. Water savings were evaluated and benefit-cost ratios computed for 20–year period of 2011 to 2030, coinciding with the City's water supply planning period. Savings were then calculated to the year 2030 for each of these programs (see Table ES-2).

Table ES-3 shows the relative demand reductions in the year 2030, conservation program costs for the utility, present value economic information, and the utility cost of water saved for each of the alternate programs. Demand reduction by 2030 is measured from the 14,825 AFY projected 2030 demand without the effects of the plumbing code. Additional resources and customer contacts as embodied in the conservation programs identified in this memorandum, are required to reach higher levels of potential water savings. Utility costs include the cost to the City to run the program, including staff time, rebates, any contracted services, expense, etc. While utility cost is the primary consideration, this memorandum also considers customer costs and community costs to some extent, as described in the body of the memorandum. The plumbing code is included as passive baseline savings in addition to the long-term conservation program in Programs A-C. Most of the future program water savings consist of outdoor landscape improvements.

A Benefit-Cost ratio, which is the ratio of the present value of benefits to the present value of costs, is the most accurate indicator of cost-effectiveness. When the ratio of the Present Value of the benefits to the Present Value of the costs is greater than 1.0 for a particular program of measures, that program can be said to be cost-effective. Benefits for the utility can also be expressed as the value to the utility of the saved water. For the City, the value of the saved water is the cost savings from not producing the water that is saved. This could range from not treating pumped groundwater to not buying water from the State Water Project. An

assessment was made by the City and the value of the saved water was determined to be $600 per acre-foot. This value is hereafter referred to as the City's "Avoided Costs".

Program A reflects estimated water savings derived from the plumbing code and continuing the current program. The additional measures that create programs B and C produce increasing incremental water savings and costs. Figure ES-2 illustrates there are apparent diminishing returns when measures are added beyond Program B. Demand reductions for year 2030 range from 920 to 1,919 AF/Yr. As the plumbing code water savings do not cost the City any money, the graph starts at the plumbing code water savings in 2030.

Table ES-1
Conservation Measures Selected for Programs

No.	Measure Name (ND = Requirements for New Development)	Program A	Program B	Program C
1	Promote Water Efficiency in Green Buildings		✓	✓
2	ND Require High Efficiency Toilets		✓	✓
3	ND Require High Efficiency Faucets and Showerheads		✓	✓
4	Fixture Replacement SB 407		✓	✓
5	Financial Incentives for Irrigation and Landscape Upgrades (Current)	✓	✓	
6	Financial Incentives for Irrigation and Landscape Upgrades			✓
7	Washer Rebates	✓	✓	✓
8	Washer Rebates for High Efficiency Machines			✓
9	High Efficiency Toilet (HET) Rebates	✓	✓	✓
10	Single Family Water Check Up	✓	✓	✓
11	Multifamily Water Check Up	✓	✓	✓
12	Existing Commercial Washer Rebate	✓	✓	✓
13	Cisterns/Rain Catchments			✓
14	Gray water Retrofit SF			✓
15	Current High Efficiency Urinal Rebate (<0.25 gallon)	✓	✓	✓
16	ND Require 0.5 gal/flush or less urinals in new buildings		✓	✓
17	School Building Retrofit		✓	✓
18	Irrigation (Landscape) Water Budgets	✓	✓	✓
19	Irrigation Water Surveys	✓	✓	✓
20	Mulch Program			✓
21	CII Water Check Up Level 1	✓	✓	✓
22	CII Water Check Up Level 2		✓	✓
23	Customized CII Incentive Program			✓
	Total Measures in each Program	10	17	22

Figure ES-1

Long Term Demands with Conservation Programs
(Demand is measured by total water system production, including potable and recycled water)

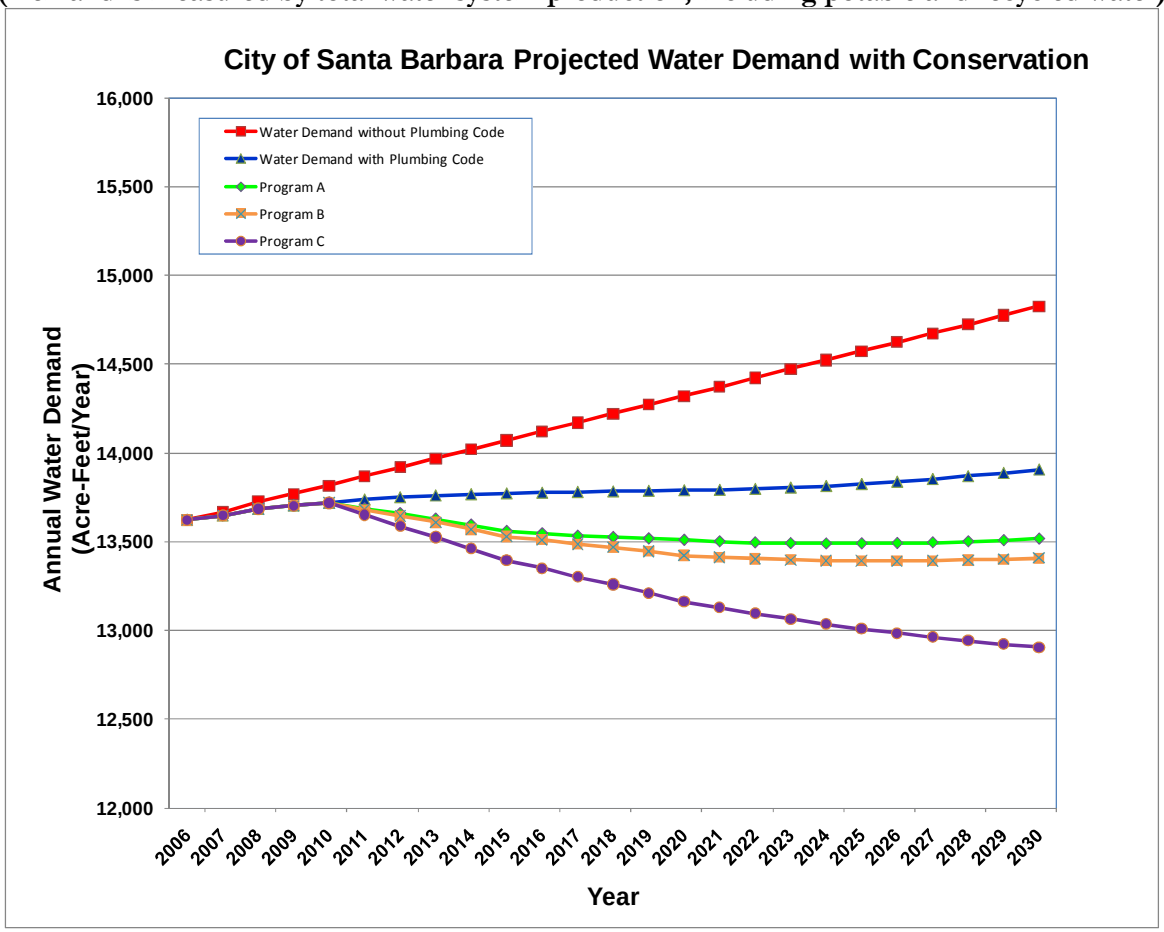


Table ES-2

Conservation Program Description and Future Water Savings

Conservation Program	Description	2030 Demand Reduction (AF/Yr)
-	No Conservation Programs, Plumbing Code Only	919
A	Continue Current Conservation Program (10 measures) and Plumbing Code	1,308
B	Add 7 Cost-Effective Measures to Current Program A and Plumbing Code	1,417
C	Add 5 More Measures to Program B and Plumbing Code	1,919

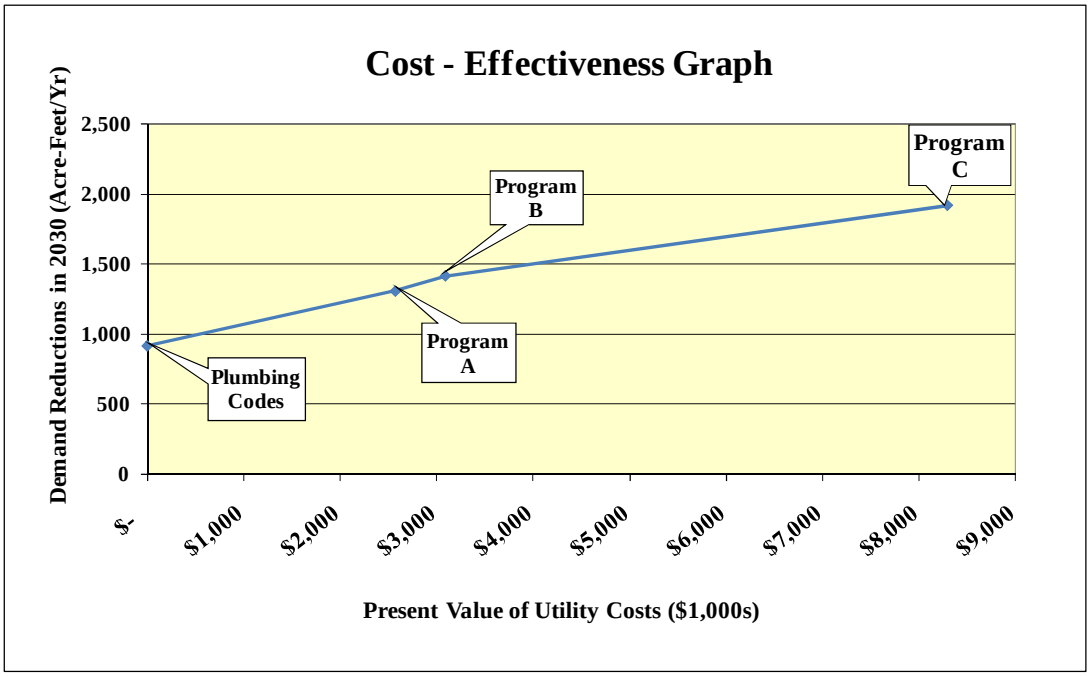
Table ES-3
Economic Summary of Long-Term Conservation Programs
(Excluding Tool Kit Measures)

Conservation Program	Demand Reduction by 2030 (AFY)	Total 20-Year Conservation Program Water Savings (AF)	Average Annual Program Cost to Utility ($)	Present Value of Utility Benefits ($)	Present Value of Utility Costs ($)	Utility Benefit - Cost Ratio	Utility Cost of Water Saved ($/AF)
Plumbing Code Only	919	11,085	NA	NA	NA	NA	NA
Program A + Plumbing Code	1,308	16,419	$194,000	$2,455,000	$2,570,000	0.96	$482
Program B + Plumbing Code	1,417	17,801	$233,200	$3,131,000	$3,089,000	1.01	$460
Program C + Plumbing Code	1,919	23,193	$629,400	$5,867,000	$8,287,000	0.71	$684

Notes:
1. The DSS model is a 30-year model. It was run for 2006 to 2036 to include the base year of 2006 and the 20-year conservation program period of 2011 to 2030.
2. Demand Reduction by 2030 is measured from the 14,825 AFY projected 2030 demand without the effects of the Plumbing Code.
3. Average Annual Program Cost excludes any potential costs for the 21 measures in the Tool Kit
4. Utility Cost of Water Saved somewhat undervalues the cost of savings because program costs are discounted to present value and the water benefit is not. Utility Benefit-Cost ratio is the most accurate measure of cost effectiveness, because it accounts for the time value of money.

Figure ES- 2

Present Value of Utility Costs versus Cumulative (Total) Water Saved



Appendix C:

Long-Term Water Supply Performance Charts

(This page intentionally left blank)

Water Supply Performance: Scenario A - Current Conditions

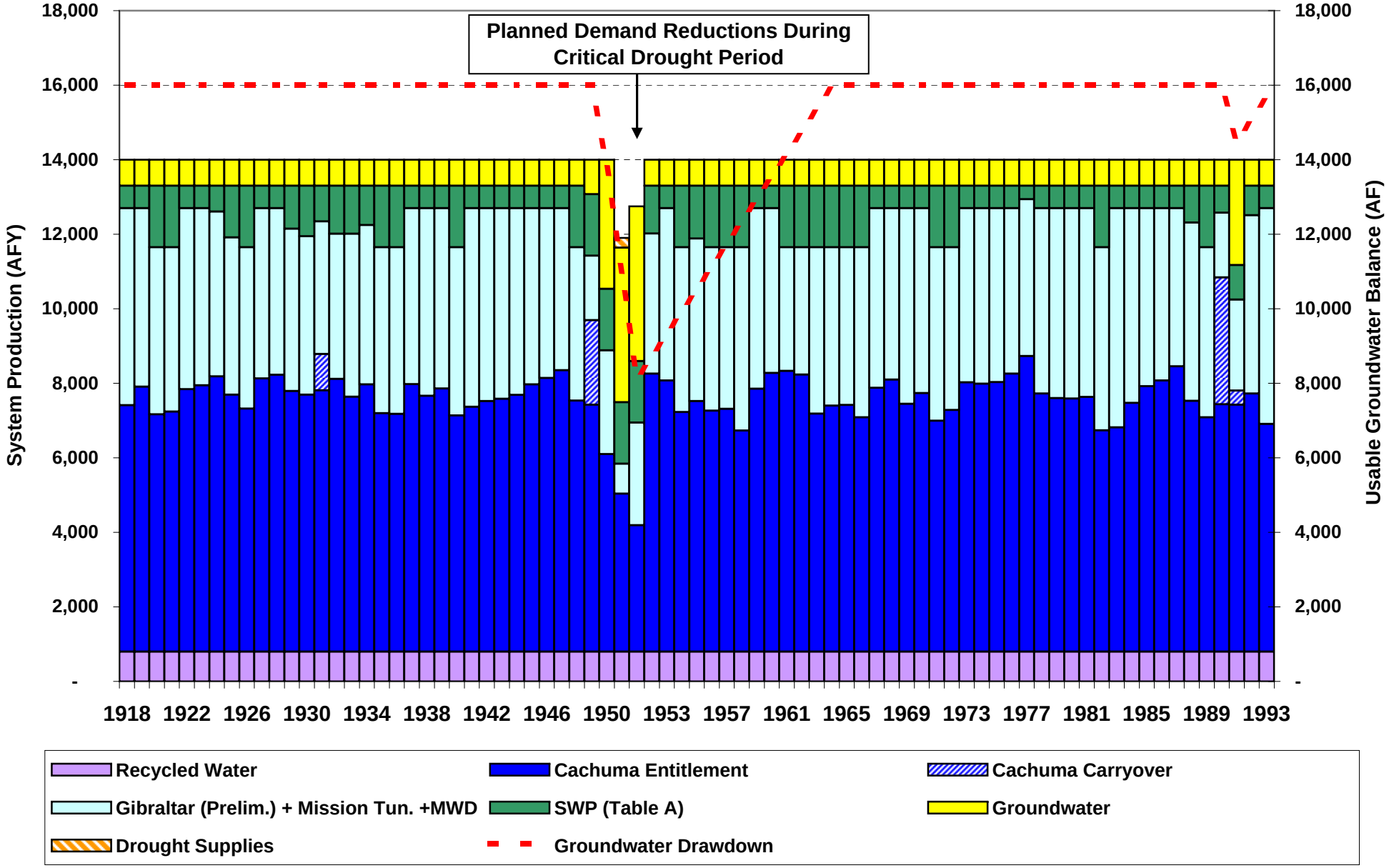
Projected System Demand (AFY): **14,000**

Cachuma Yield Assumption: **Current Entitlement**

Total Critical Period Drought Supplies Required (AF): **262**

Water Supply Target (including Safety Margin): **14,000**

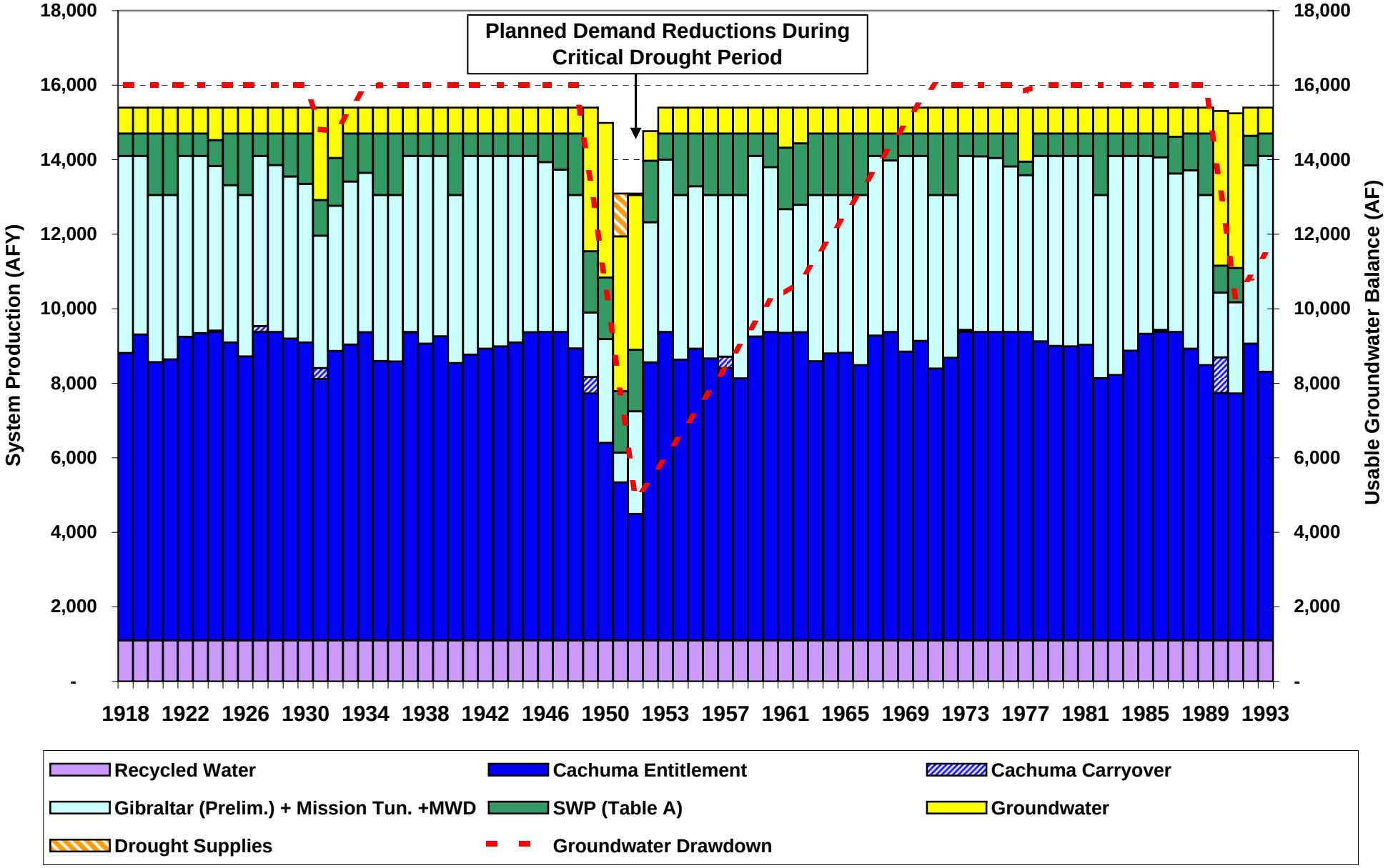
Planned Demand Reductions:	Stage 1	Stage 2	Stage 3
	10%	**15%**	**15%**



(This page intentionally left blank.)

Water Supply Performance: Scenario B - Near Term

Projected System Demand (AFY):	**14,000**	Water Supply Target (including Safety Margin):	**15,400**		
Cachuma Yield Assumption:	**Current Entitlement**	Planned Demand Reductions:	Stage 1	Stage 2	Stage 3
Total Critical Period Drought Supplies Required (AF):	**1,195**		**10%**	**15%**	**15%**



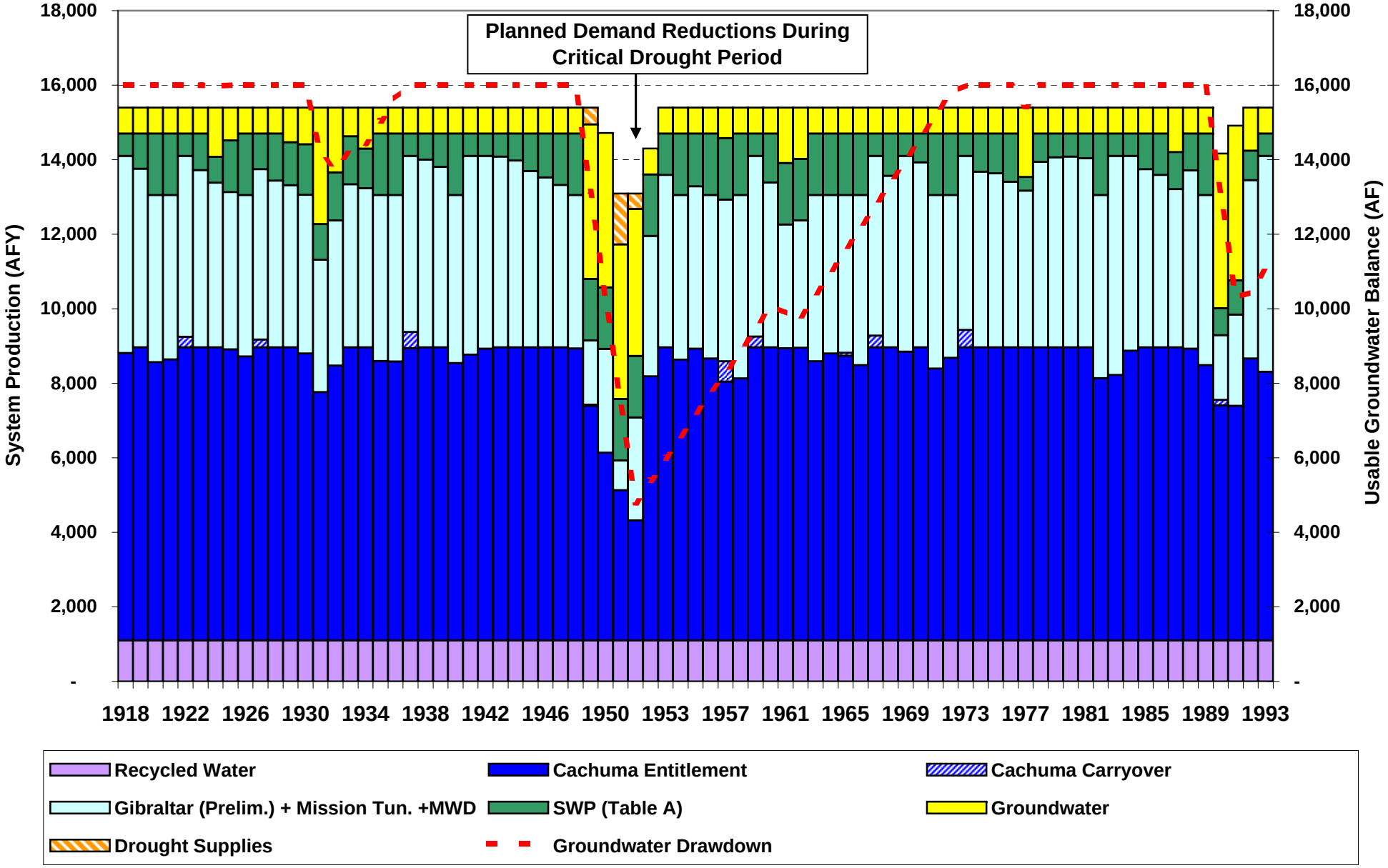
(This page intentionally left blank.)

Water Supply Performance: Scenario C - 2030 Conditions

Projected System Demand (AFY): **14,000**

Water Supply Target (including Safety Margin): **15,400**

Cachuma Yield Assumption: **Projected Entitlement**

Planned Demand Reductions: Stage 1 **10%** Stage 2 **15%** Stage 3 **15%**

Total Critical Period Drought Supplies Required (AF): **2,228**