ITEM 7

Preliminary Draft

City of Santa Barbara

Long-Term Water Supply Plan

Prepared by Water Resources Division,
Public Works Department

Adopted:

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 46 square miles with a population of approximately 94,700. The water utility is administered by the Water Resources Division of the Public Works Department. City water supply sources include surface water from Gibraltar Reservoir and Lake Cachuma, groundwater from City production wells and Mission Tunnel infiltration, State Water, recycled water, and desalination. 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, which was adopted following the severe drought of 1988 to 1992, an extensive analysis of current water supplies, 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.

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 operating the water system. The City has also recently certified an Environmental Impact Report (EIR) for the *Plan Santa Barbara* process to update the City's General Plan. A concurrent analysis of the City's water supply was conducted in conjunction with the City's Water Commission in preparation for a recommendation to update the water supply plan. On _____, the City Council adopted this Long-Term Water Supply Plan as Item No. _____.

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 to other agencies. 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: Approximately 26,700 retail water meters 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 meter inaccuracy this number is generally about 90% to 92% of the production amount.

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 source. For example, State Water has substantial costs for debt service and fixed operation and maintenance, but it is only the variable cost for chemicals and electricity that influences 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.

Conservation: The City's Water Conservation Program promotes ongoing efforts to improve efficiency and reduce waste in ways that don't require lifestyle sacrifices on the part of customers. Examples include using a more efficient washing machine to do the job with less water, fixing leaks, and substituting attractive low water use plants for lawn. This type of conservation can be counted on for long-term reduction in demand, which avoids the need for procuring more water supplies with high marginal cost. For water

supply planning, it is important to distinguish between these ongoing efforts, and short-term extraordinary efforts to curtail water that may be needed during an extended severe drought or other catastrophic water supply interruption. Such short-term sacrifices are related to the "acceptable shortage" concept.

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.

Acceptable Shortage: A water supply can be planned for 100% reliability (i.e. able to meet full demand under all circumstances); however, such a plan can result in significant additional cost to meet this reliability standard. 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 severe local drought of 1987-1991, it became necessary to seek extraordinary reductions of up to 50%, which came at some considerable expense to the community, and were deemed excessive during the development of the 1994 LTWSP. Instead, an acceptable shortage of 10% of target demand was adopted at that time.

Water Supply Performance: A water supply plan is evaluated by whether it meets the established technical and policy goals, over the planning period. This plan looks at the period of 2011 to 2030, which matches the planning period used for the *Plan Santa Barbara* analysis. 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. This explains why 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 very diverse water supply. The various supply sources are summarized below. Additional discussion is included in the Final Environmental Impact Report 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.

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.

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 to provide additional water for fish releases (now in place) 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 expected that normal year deliveries would be reduced from the current amount of 8,277 AFY to 7,863 AFY.

- 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.

Gibraltar Reservoir

In 1920, the City completed construction of Gibraltar Dam on the Santa Ynez River upstream of Lake Cachuma. The dam formed Gibraltar Lake, with an initial storage capacity of 15,793 AF. 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 it 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.

Current Gibraltar Reservoir operations are based on the 1989 Upper Santa Ynez River Operations Agreement (Pass Through Agreement) by which the City agreed to defer 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 protecting 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. [update with current estimate of Pass Through deliveries]

Mission Tunnel

Mission Tunnel conveys water from Gibraltar Reservoir through the Santa Ynez Mountains to the City. 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 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. The City's SWP Table A amount is 3,300 AFY; however, delivery of Table A amounts are subject to availability.

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. Key assumptions are listed below:

- Despite substantial efforts being made to address Delta delivery constraints, DWR's modeling assumes no improvements to the 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. Neither is it assumed that planned increases in reservoir capacity will be in place.

- 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 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.

Based on the above assumptions for future conditions, the 2009 report projects 6-year dry period deliveries of 32% to 36% of Table A amount, median deliveries of 63%, and long-term average annual deliveries of 60%. The long-term average is down from 66-69% in the 2007 report and 77% in the 2005 report, reflecting the restrictions of the biological opinions and the projected effects of climate change. To make assumptions about State Water deliveries more conservative, the staff analysis for this plan assumes annual deliveries will not exceed 50% of Table A amounts, reflecting experience during the most recent dry period of 2007 to 2009.

One additional important consideration is the ability of the SWP pipeline to convey non-project water to augment drought year deliveries. These potential supplemental water supplies include the State's Dry Weather Water Bank, 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). 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.

The estimated long-term safe yield of these two basins is approximately 1,800 AFY, with approximately 500 AFY used by private pumpers, leaving a safe yield of 1,300 AFY available to the City. The City has six existing wells in Storage Unit No. 1 and three existing wells in the Foothill Basin. While the estimated total pumping capacity is approximately 4,500 AFY, a reduced 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.

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.

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. [insert map of groundwater basins]

Recycled Water

Recycled water is used in the City to irrigate over 400 acres of landscaped areas, including schools, parks, and golf courses, and for toilet flushing in park restrooms. The City system as currently configured has the capacity to treat and deliver 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.

To meet a City goal of no more than 300 mg/L of chloride, approximately 300 AFY of excess potable water has historically been blended into the recycled water, since blending is the least costly solution and potable water is currently available for this use. Due to ongoing challenges with the secondary treatment process, blending has increased recently to approximately 700 AFY. Improvements to the secondary process are being evaluated to address this recent increased use of potable water for blending.

The City is also considering options to reduce the mineral content of the recycled water to further reduce or eventually eliminate the need for potable blending water. A conceptual project for demineralization of recycled water to reduce the need for potable water blending has been identified. For a production rate of 1,910 AFY, the demineralization component was estimated to cost approximately $4.6 million in capital expenditures. Annualized costs are estimated at approximately $652,000 (including the capital component) resulting in added unit costs of $341/AF. A reduction in recycled water salinity is considered a requirement for achieving any substantial increase in recycled water use.

Desalination

The Charles Meyer Desalination Facility was built in 1992 at an original capacity of 7,500 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 environmental review and permitting to convert the facility to permanent status. 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 also includes provision 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, including 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), can provide 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 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 on Exhibit ___ (Historical Water Production). Moderate cutbacks in response to a Stage 1 Drought are evident during 1989 and response to the Drought Emergency is reflected in significant reductions for 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 Exhibit ___ (Demand Analysis with Rainfall and ETo). This information suggests that weather based fluctuations are a 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 revenue requirements.

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 as a part of 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 13,348 AFY.

The significant reduction in current demand compared to pre-drought levels can be attributed to a number of factors, including 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 a 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 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 and they 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 CUWC Memorandum of Understanding Regarding Urban Water Conservation since 1992 and has worked 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 water conservation, including water wise plant selection, irrigation system management and scheduling, leak monitoring, appliance efficiency, and water use awareness;

- Rebates for installation of high efficiency toilets and clothes washers, water wise landscaping, and efficient irrigation systems;

- A school presentation program for elementary and secondary students;

- The Green Gardener program, which trains landscape professionals in water wise landscaping techniques;

- 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 particular emphasis on providing site-specific water budgets and real-time irrigation demand information; and

- A personalized customer service approach, where all customers are eligible for free water checkups to help save water.

The current program is outlined in more detail in Exhibit ___ (Water Conservation Program Summary)

The Plan Santa Barbara Process

As of the fall of 2010, the General Plan update process (*Plan Santa Barbara*) resulted in a proposed "hybrid" alternative that is similar to the originally proposed project in terms of water supply impacts. This alternative is projected to result in 2,795 new dwelling units (DU) and 1.5 million square feet of non-residential development within the City limits. 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:	1,500,000 ft^2 X .13 AFY per 1,000 ft^2 =	195 AFY

When 100 AFY of demand from projected added demand outside the City limits is included, the result is a projected new demand of about 830 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 became effective and now effectively 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 SB 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 likely to be "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 122 GPCD.

Water Conservation Technical Evaluation

In preparing this plan, it was important to evaluate all of the above factors and determine to what extent additional 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 and also 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 included a screening of 92 potential measures to identify 23 that made the most

sense in Santa Barbara. These 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 Exhibit ____ (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) to 14,825 AFY, if the effects of already adopted plumbing codes and appliance standards were not 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 916 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 benefit-cost ratio of 1.0, is estimated to reduce demand by an additional 501 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. The chart in Exhibit ___ (Demand Projections) shows demand projections reflecting the various factors that will contribute to the City's actual water demand over the course of the planning period.

Primary Planning Issues

Given the water supply as described above, there are several key issues that shaped the water supply policy elements 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 occurs until at least average rainfall has occurred. When this condition continues for multiple years in succession, the storage level of Lake Cachuma drops and shortage in entitlements 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 might occur 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 to include 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. Because the information is incomplete and still undergoing critical review, it would be premature to use it as the bases for additional capital investments in water supplies. However, it is appropriate to estimate how a six-year critical drought period would affect 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 catastrophic interruption 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, reactivation of the facility will trigger 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, the storage level at Lake Cachuma had been reduced to about 70,000 AF (37%) and the City was beginning the process.

One solution to this issue that was discussed during the Water Commission's discussion of this plan is to attempt to manage the City's numerous other supplies in a manner that allows this reactivation process to be deferred for an additional year, i.e. to plan for operation in the sixth year of a critical drought period instead of the fifth year. This would significantly reduce the frequency of the planning and design effort, as well as reducing the likelihood that the substantial expense of actually rehabilitating the facility would be needed.

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 the 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 the yield of Gibraltar, despite expected continuing siltation. As such, efforts to control sedimentation at Lake Cachuma are likely to be more productive. Such efforts 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.

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 to meet demand. Increased recycled water demand will help reduce the demand for potable water that is counted as a part of the state requirement for all water purveyors to reduce per capita water use by 2020. Carollo Engineers identified about 400 AFY of additional capacity in the existing system and 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 should be 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 difficult to achieve unless a reduction in salinity is included as a part of the program.

Water Supply Performance

Charts included as Exhibits ___ - ___ are based on a worksheet developed to simulate the water supply over the 76-year period now contained in the Santa Ynez River Hydrology Model and to explore the potential to defer the use of desalination at least until the sixth year of a drought. The worksheet uses a projected system demand of 14,000 AFY, 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 20% reduction in per capita daily water use by 2020. A category called "SWP (Non-Project Water)" is used to indicate water that would be available as a

substitute for desalination, either as unused State Water that is banked for use during dry periods or as purchase of water during the dry period. The worksheet suggests that significant amounts of unused State Water would be available for banking if suitable contractual arrangements could be made to store the water for future use.

The worksheet uses supplies according to the following sequence of priorities:

1. All available water from Gibraltar and Mission Tunnel, 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
5. Remaining available SWP Table A water, as needed;
6. Added groundwater pumping up to the "mid-level" amount, as needed;
7. Added pumping up to the "maximum level," as needed;
8. Deliveries of non-project/banked water through SWP facilities.

Water Supply Policy Elements

Based on the information contained and referenced herein, the City's water supply management program will be guided by the following elements:

- Water system demand for the planning period is projected to be 14,000 AFY (including potable and recycled demand).

- Achieve compliance with 20 X 2020 per capita water use limitations, through a combination of expanded use of recycled water and expansion of the City's Water Conservation Program.

- A safety margin of 10% above projected demand will be used for planning to accommodate unexpected increases in demand, or decreases in available supply.

- Acceptable shortage of up to 10% during a critical drought period is established, to be made up with short-term extraordinary reductions in customer water usage.

- Implementation of Pass Through operations for storage of Gibraltar water in Lake Cachuma pursuant to the Upper Santa Ynez Rive Operations Agreement will be expedited.

- Manage the ongoing USGS study to assess strategies for groundwater management, including maximized use of available recharge, injection of

potable water for artificial recharge, and injection of recycled water as a barrier to sea water intrusion.

- Investigate options for a long-term management strategy for minimizing sedimentation at Lake Cachuma in conjunction with Member Units and other appropriate parties and agencies, including state and federal agencies.

- Expand connected recycled water demand by up to an additional 300 AFY by 2020, for a total connected demand of 1,100 AFY and evaluate cost effective alternatives to blending with potable water to reduce salinity.

- Identify optimal techniques for banking surplus State Water when available, with the goal of deferring potential need for activation of the desalination facility at least until the sixth year of a critical drought period.

- Establish a reserve in the Water Fund for water purchases over the course of a potential 6-year critical drought period to meet water supply targets and help defer the need for desalination facility reactivation.

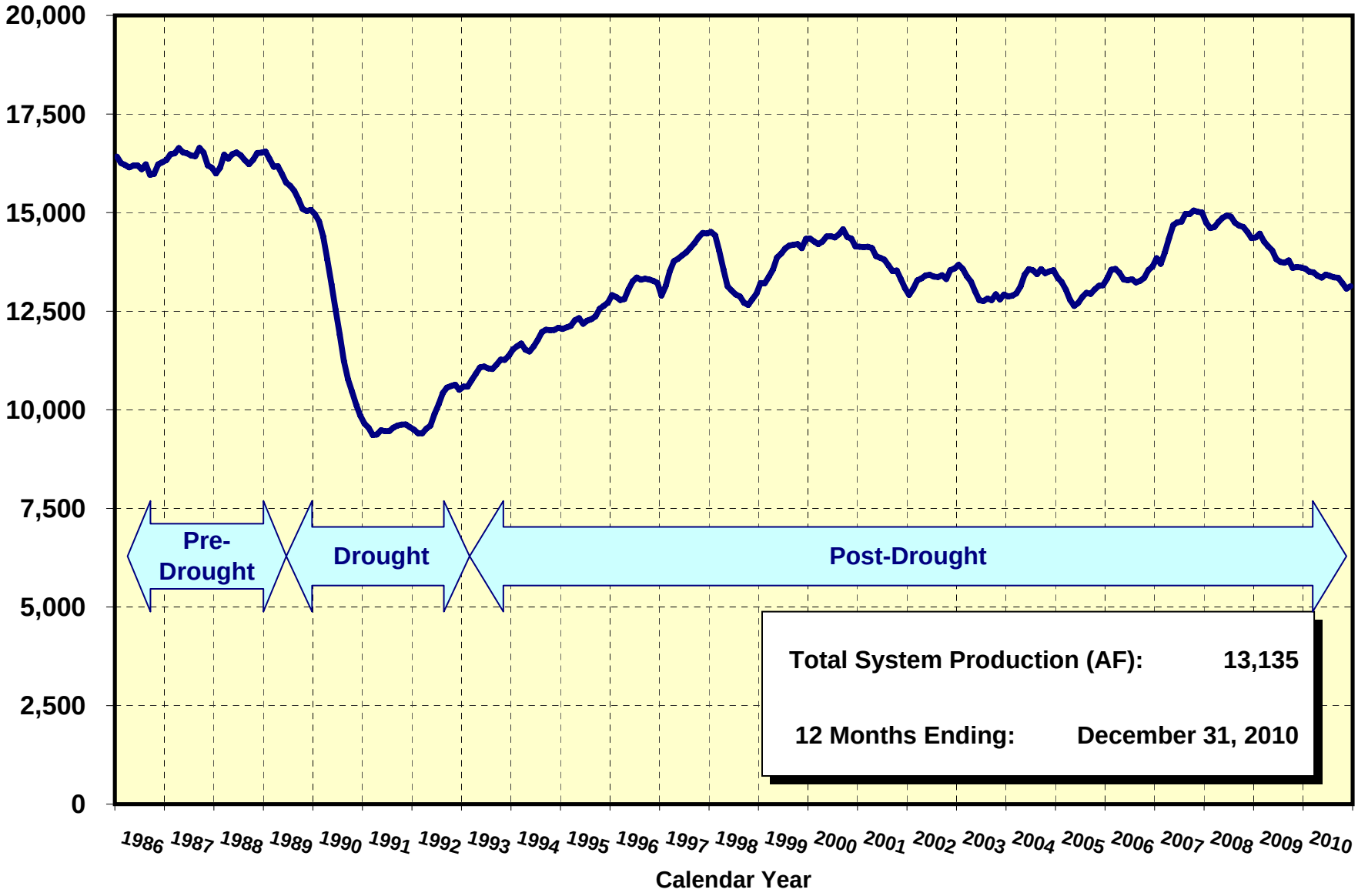
- Retain the desalination facility as an official part of the City's water supply for use as may be needed during extended drought or catastrophic water supply interruption.

- Manage land and equipment assets purchased with Water Fund resources to support the economic and sustainable operation of the water system.

- Provide ongoing monitoring of the City's water supply status, including annual water supply reports to City Council, preparation of 5-year updates of the City's Urban Water Management Plan for approval by City Council, and an update of this plan in approximately 2030.

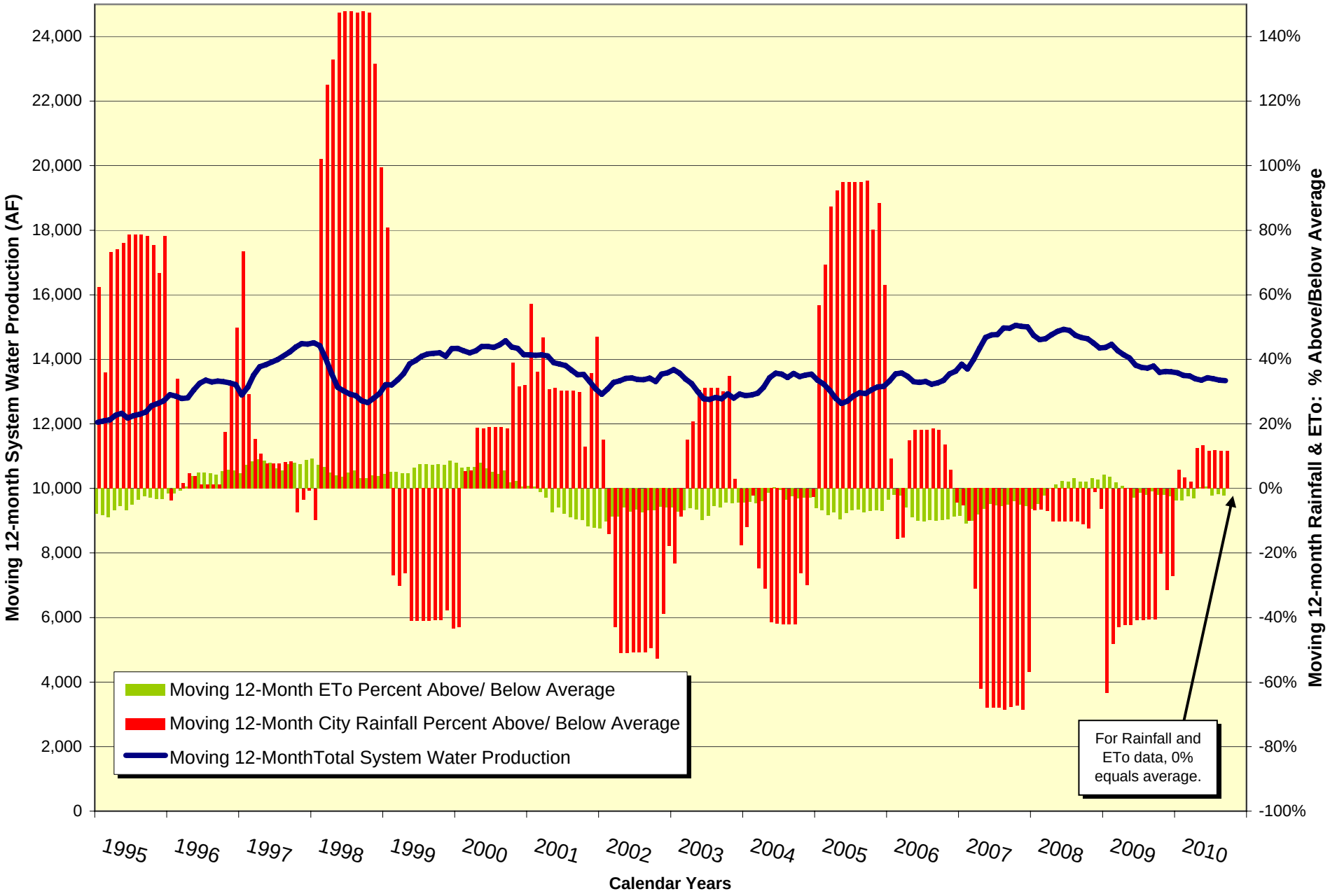
City of Santa Barbara Water Demand

(Acre Feet of Production - Potable + Recycled)



Demand Analysis: System Water Production, Rainfall, and Evapotranspiration

Based on Long-Term Average Annual ETo of 44.61" for Santa Barbara, Station #107, per CIMIS Web Site



City of Santa Barbara Public Works Department

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.

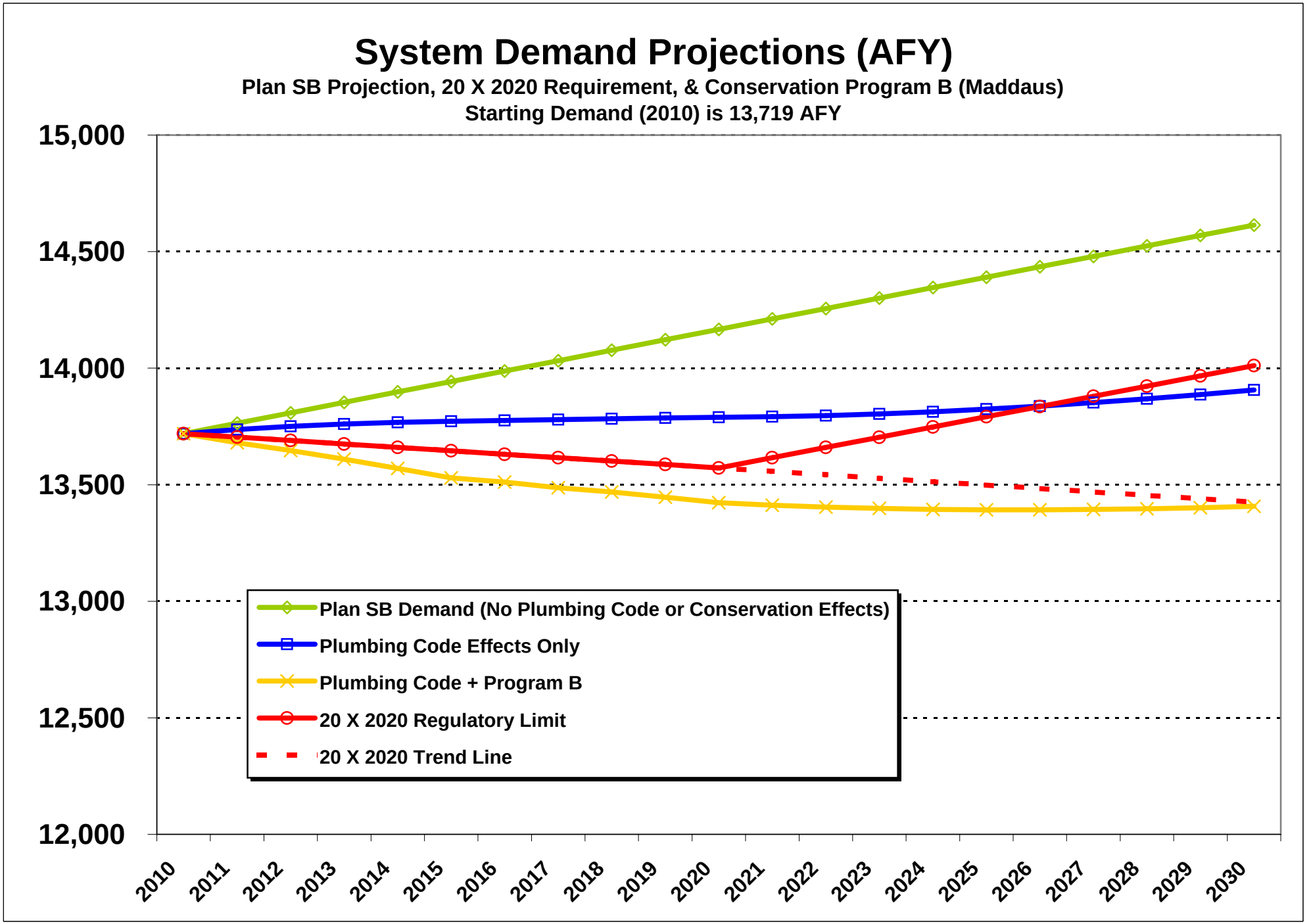
Landscape Design Standards. On August 12, 2008, the City Council adopted the revised Landscape Design Standards for Water Conservation, Resolution No. 08-083. The Landscape Design Standards were originally adopted by resolution of the City Council on June 27, 1989. There has been much progress in irrigation 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.


System Demand Projections (AFY)
Plan SB Projection, 20 X 2020 Requirement, & Conservation Program B (Maddaus)
Starting Demand (2010) is 13,719 AFY
15,000
14,500
14,000
13,500
13,000
12,500
12,000
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
Plan SB Demand (No Plumbing Code or Conservation Effects)
Plumbing Code Effects Only
Plumbing Code + Program B
20 X 2020 Regulatory Limit
20 X 2020 Trend Line

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)

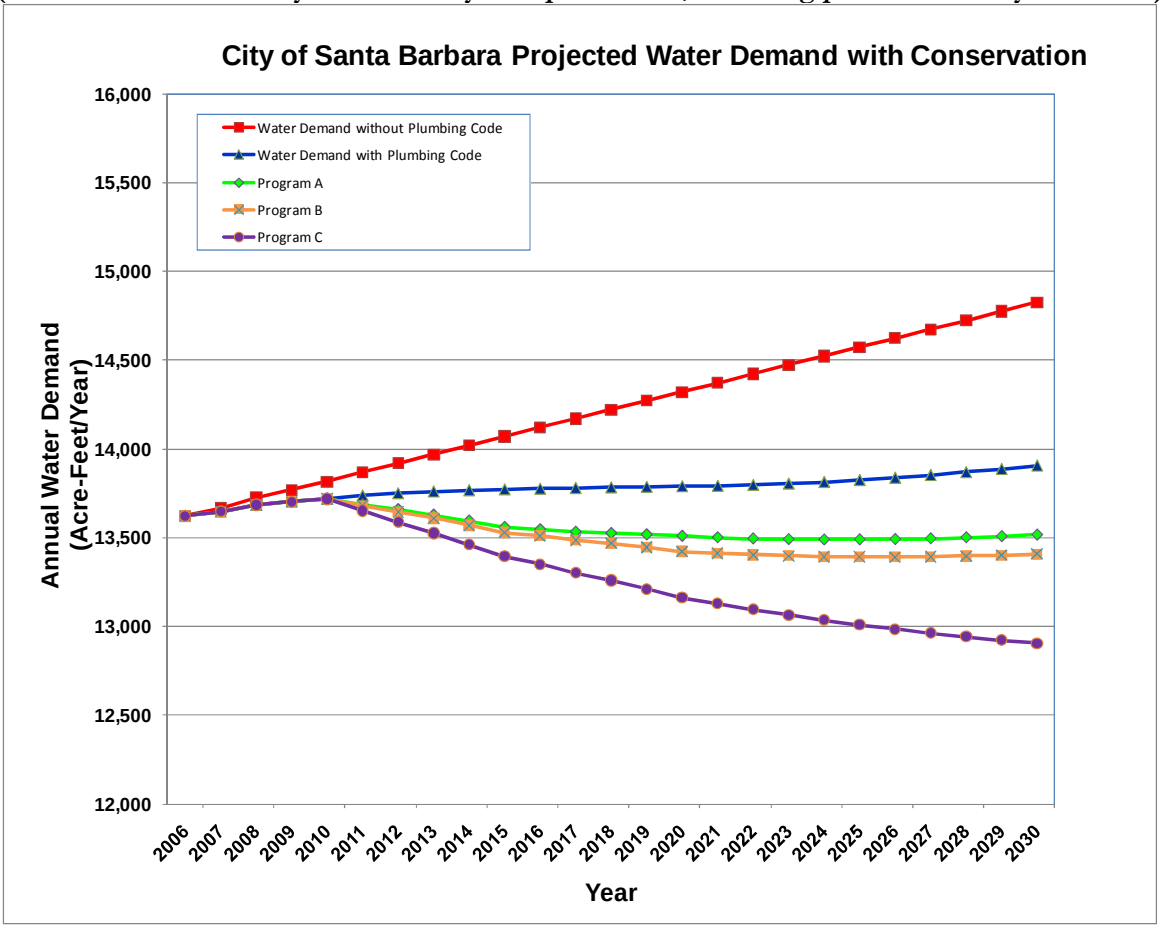


Table ES-2

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

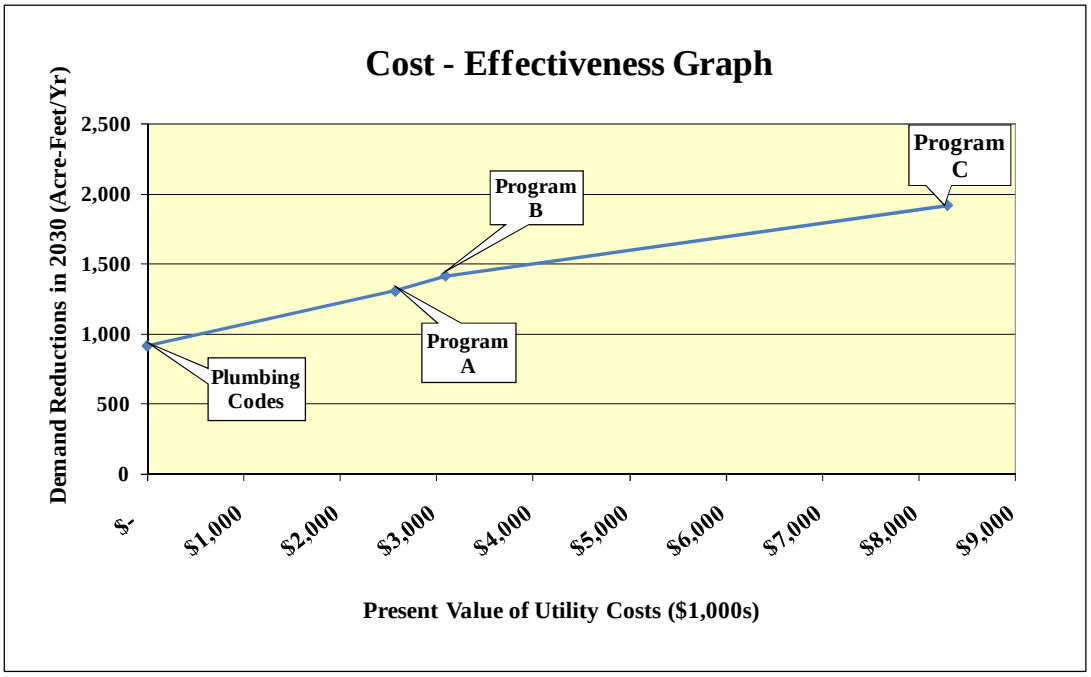
Table ES-3
Economic Summary of Long-Term Conservation Programs
(Excluding Tool Kit Measures)

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



Water Supply Performance Over 76-Year Model Period

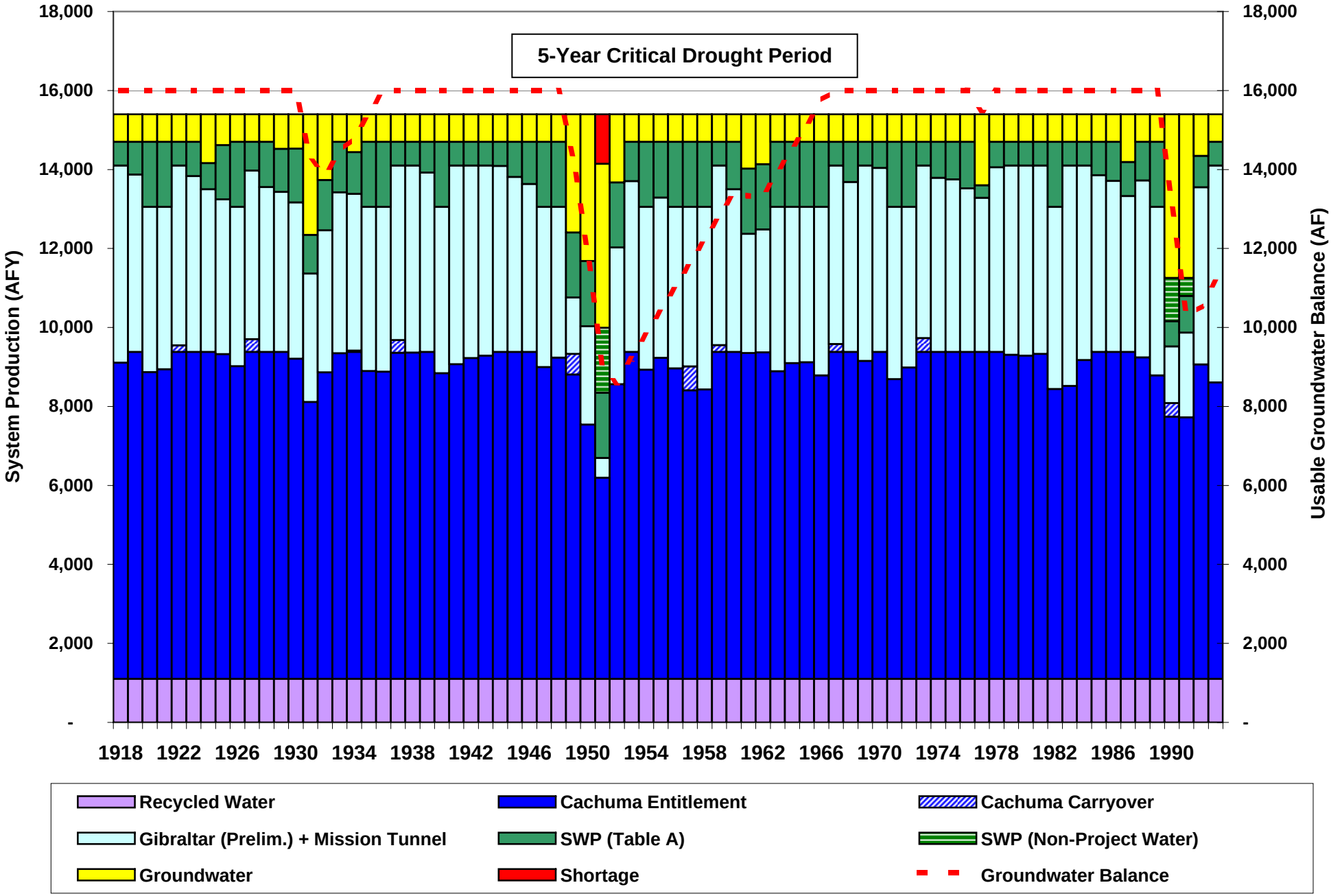
DRAFT
2/10/11

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

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

Cachuma Yield Assumption: **Current Entitlement**

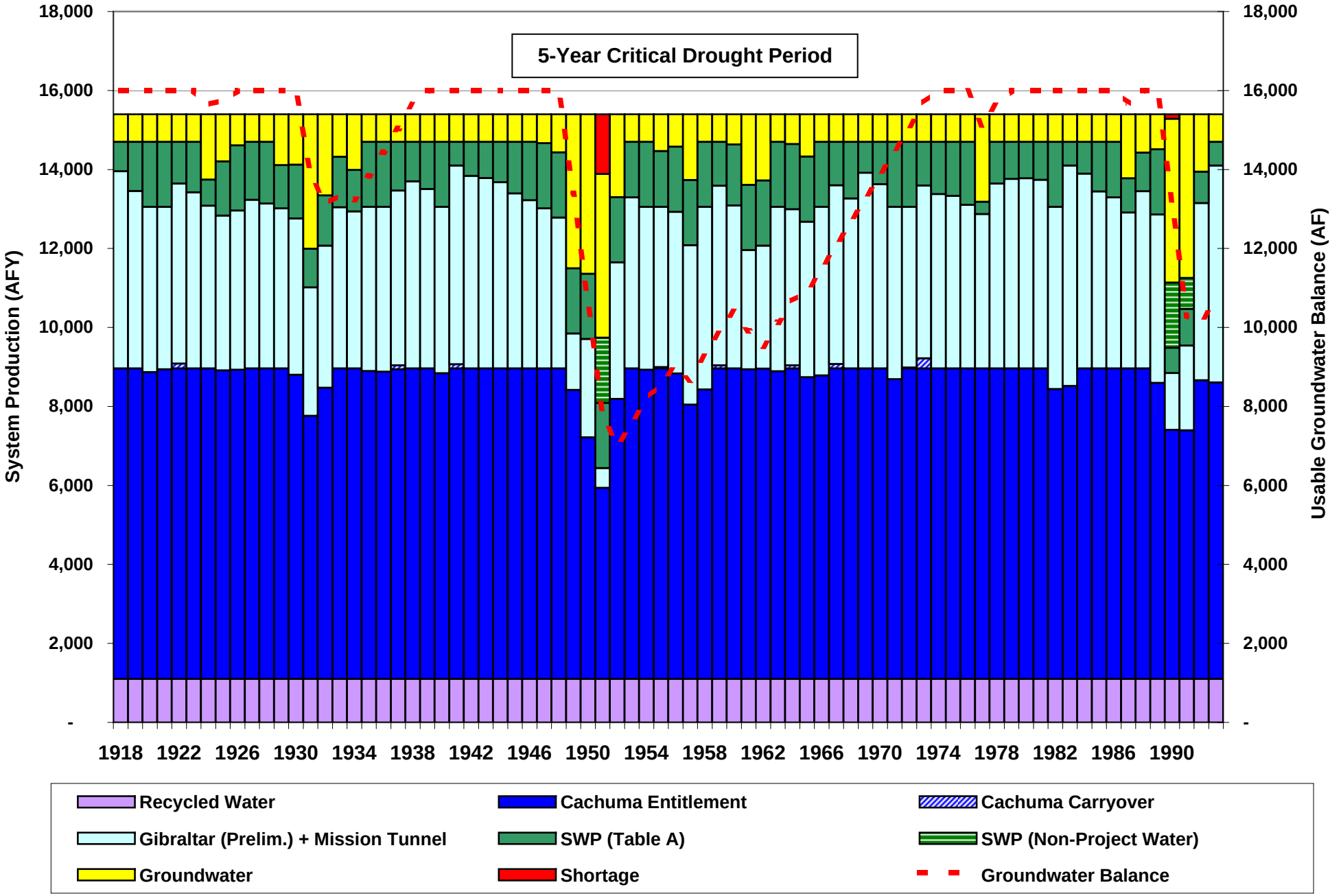
Maximum Shortage: **8%**



Water Supply Performance Over 76-Year Model Period

DRAFT
2/10/11

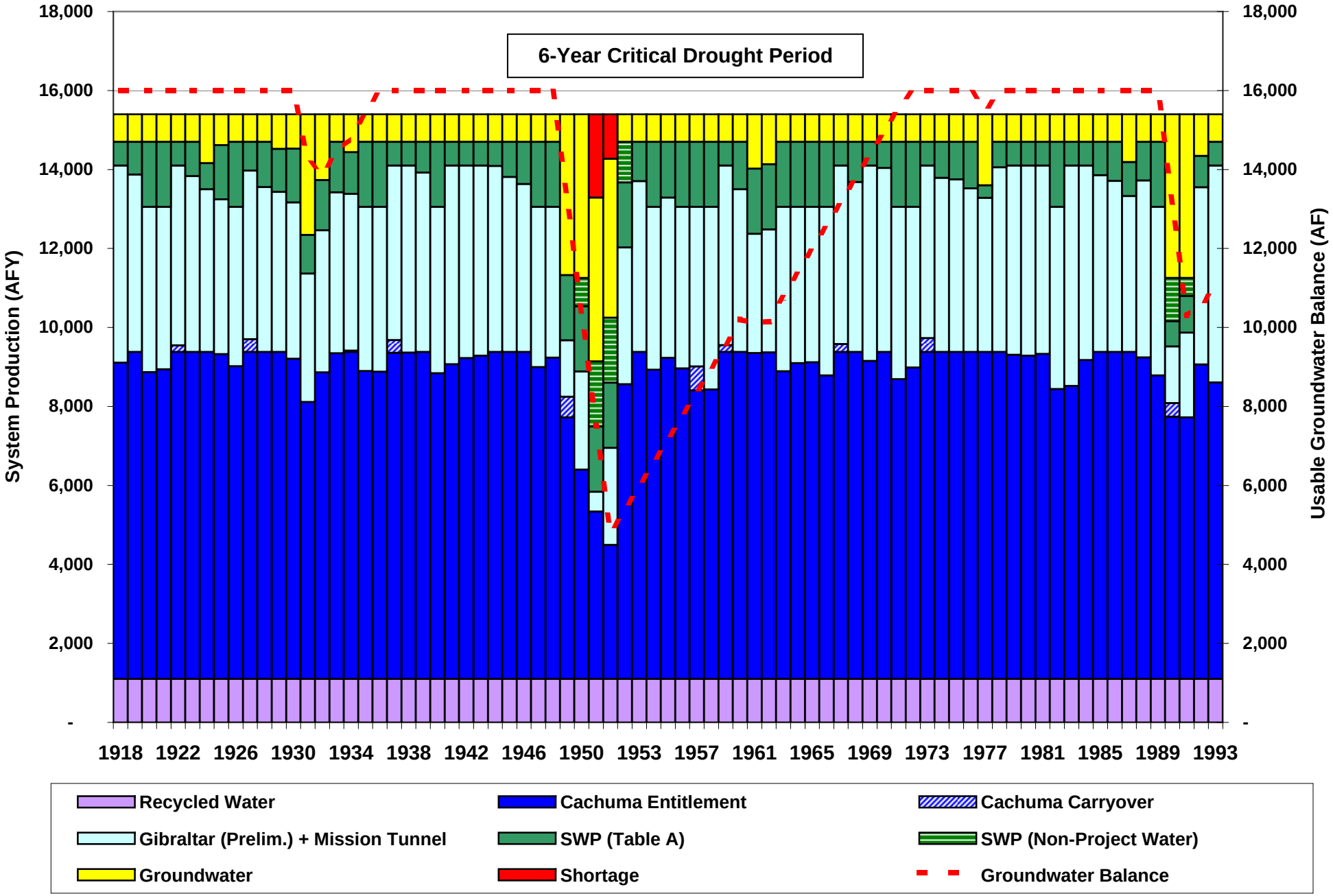
Projected System Demand (AFY): **14,000**
Water Supply Target (including Safety Margin): **15,400**
Cachuma Yield Assumption: **Reduced Entitlement**
Maximum Shortage: **10%**



Water Supply Performance Over 77-Year Model Period

DRAFT
2/10/11

Projected System Demand (AFY): **14,000**
Water Supply Target (including Safety Margin): **15,400**
Cachuma Yield Assumption: **Current Entitlement**
Maximum Shortage: **14%**



Water Supply Performance Over 77-Year Model Period

DRAFT
2/10/11

Projected System Demand (AFY): **14,000** Water Supply Target (including Safety Margin): **15,400**

Cachuma Yield Assumption: **Reduced Entitlement** Maximum Shortage: **15%**