




City of Santa Barbara
Public Works Department

Interoffice Memorandum

DATE: November 3, 2009
TO: John Ledbetter, Principal Planner
FROM: Rebecca Bjork, Water Resources Manager 
SUBJECT: Summary of "Water Supply Planning Study"

As you know, the Water Resources Division contracted with Carollo Engineers to prepare a Water Supply Planning Study (Planning Study) to address some of the water supply issues related to the *Plan Santa Barbara Process* and the planned update of the City's Long-Term Water Supply Program (LTWSP). Specifically, the purpose of the study was to address the following topics:

- State Water Project Reliability
- Local Climate Change Impact
- Expanded Use of Recycled Water
- Water Conservation Opportunities
- Water Supply Management Assessment

The Planning Study was not intended to be a complete review of all water supply issues and a number of other water supply analyses have been completed or are underway. These include the Desalination Rehabilitation Study, an update of the City's water demand factors, modeling of Gibraltar Reservoir Pass Through Operations, an update of the City's groundwater models and safe yield assumptions, and a technical/economic analysis of potential water conservation measures.

The attached summary has been prepared by Water Resources staff to highlight the main findings of the Planning Study. It has been discussed with our Water Commission at two recent meetings. The Commission requested that the summary be transmitted to you and your environmental consultant, along with this cover memo to clarify and elaborate on some points.

Policy Statements

We wish to emphasize that the statements, conclusions, and recommendations in the summary are taken directly from the Planning Study. These reflect the professional opinion of Carollo Engineers and are not to be construed as statements of City policy, nor are they necessarily the positions of staff or the Water Commission. The ongoing development of the *Plan Santa Barbara* environmental document will provide the opportunity for the Water Commission, along with other City boards and commissions, to comment on the environmental analysis and findings leading up to the adoption of an updated General Plan.

State Water Project Reliability

A concern was raised that improvements envisioned under the Bay Delta Conservation Plan are speculative and therefore cannot be counted on for water supply planning purposes. These proposed improvements include improved conveyance from a peripheral canal, added storage reservoirs to offset loss of snow pack storage resulting from climate change, habitat improvements to ease Delta export restrictions, and enhanced levy maintenance efforts. While much work is being done to resolve problems in the Delta, Staff concurs that any assumed benefits from these improvements would be speculative and we note that the State Water Project (SWP) information included in the Planning Study on future reliability reflects the State's assumption that no actions for improvements will be taken.

Given the above, staff was asked to determine the reason that SWP deliveries are projected to increase under the "future conditions" scenario (2027). This is primarily the result of the assumption that statewide demand will be higher in 2027 and the system will deliver water to meet the increased demand when it is available. This explains why the increase is most pronounced in the values for average deliveries, and generally not present at all during dry periods.

Regarding assumed SWP delivery reliability, our most recent information suggests that, as long as environmental restrictions continue in effect, we should not expect to receive more than 50% of Table A amounts through the Delta, regardless of the availability of SWP water above the Delta. This constraint is assumed in addition to limitations on available water on a year to year basis. The results of these assumptions are shown in the following table, which summarizes SWP delivery estimates from the Planning Study and under staff's current assumptions. Percentages are percent of average annual Table A amounts, which represent participants' maximum share of deliveries from the SWP.

	Long-Term Average Annual Deliveries	Extended Dry Period Deliveries (4 to 6 years)
DWR Estimates ¹		
Current Conditions (2007)	63%	35%
Future Conditions (2027)	66-69%	32-37%
Carollo's Recommended Dry Period Estimates ²	NA	26-27%
Current City Staff Estimates ³	50%	22%

- 1 Source: Water Supply Planning Study, Carollo Engineers
- 2 Carollo recommended using the more pronounced shortages associated with a typical 2-year dry period to simulate the extended dry period in order to provide a more conservative assumption than the estimates made by DWR.
- 3 Staff's estimates for long term average annual deliveries assume that SWP project participants will never receive more than 50% of Table A amount because of pumping restrictions. The Extended Dry Period estimate assumes the worst 5-year period of modeled SWP deliveries as a starting point, limits each year to no greater than 50%, and then averages the resulting values.

For comparison purposes, SWP allocations for the three years of the current statewide drought (2007-2009) have been 60%, 35% and 40%, for a 3-year average of 45%. The next update of

the SWP Reliability Report will provide important information to update delivery estimates based on the effects of expected sea level rise due to climate change and changes in environmental restrictions since the last report. Sea level rise is most commonly estimated at 1.4 meters, or approximately equal to the high end of the 20"-55" range identified by Carollo. In our discussion with the Water Commission, we were reminded of a phenomenon called the "Interdecadal Pacific Oscillation," which seems to be temporarily masking sea level increases along the West Coast and may magnify increases when the cycle shifts again, potentially magnifying effects on the Delta as well.

Local Climate Change Impacts

The most likely local change in water supply resulting from climate change will be an increase in the frequency of extreme rainfall events, though not necessarily an increase in overall annual precipitation amounts. While such a pattern is likely to be beneficial in terms of promoting inflow to local reservoirs, it also carries the risk of increased siltation, and results in an extended irrigation season, which generally translates to more water demand. The Water Commission noted that siltation will be an important aspect of water supply management. We expect to evaluate options for moving silt out of reservoirs in comparison with other water supply options based on cost, feasibility, and regulatory aspects.

Expanded Use of Recycled Water

Commissioners noted that the section on recycled water use expansion is extremely technical and difficult for the average reader to understand. This is understandable, since this part of the study was meant to be a comprehensive look at the capacities and constraints of the system. This will be important in determining where the most cost effective expanded uses will be. Future work related to developing recommendations on the LTWSP update will make this more accessible to a broader audience.

Blending recycled water with potable water is used to reduce the concentration of chloride in the recycled water during summer months. Historically potable blend water has been about 30% of recycled water production. Recently, blending rates have increased beyond the 30% average identified in the Planning Study, to about 55% of total recycled distribution water, or about 600 AF of the approximately 1,100 AF produced to meet customer demand and provide process water to the wastewater plant. This reflects ongoing challenges with the secondary treatment process at El Estero Wastewater Treatment Plant related to difficulty in consistently producing filterable water. Staff is embarking on a study to evaluate the treatment approach used to produce secondary water for filtering with the hope of finding a cost effective method for addressing filterability issues. Blend water is available while this problem is being corrected, but Commissioners wished to emphasize the importance of maintaining the option to implement demineralization as a way of offsetting the use of potable water for blending when it becomes necessary to do so. They also wished to emphasize that, to the extent blending is used to contribute to the estimated 1,100 AFY of recycled water use, it is not available as a part of the potable water supply. It was also mentioned that reduced mineral content in recycled water might make it more feasible to inject recycled water into the groundwater basin to act as a

barrier to seawater intrusion, though additional economic, infrastructure, and regulatory issues would need to be resolved as well.

Water Conservation Opportunities

The Commission supports the extensive and long term scope of the City's Water Conservation Program and recognizes the importance of sustained efforts in this area. At the same time, there was some concern about the assumption that additional conservation in the range of 5% to 10% is achievable. Also mentioned was the idea that additional conservation achievements will entail greater cost, as the more basic measures have already been utilized. Staff believes that additional conservation of 10% is ambitious but achievable; however, the cost of achieving this level of additional conservation is not yet known. We expect to be addressing both feasibility and cost in a comprehensive technical and cost/benefit analysis of a wide range of potential conservation measures, with the goal of defining the conservation component of the new LTWSP. Some Commissioners expressed the opinion that such potential conservation not be counted as a part of the available water supply. Staff concurs and has not included such savings as a part of our estimate of the existing water supply.

Advanced Meter Reading technologies, including various degrees of automated readings, were identified as potentially applicable measures. We are in the process of assessing costs the various approaches and the potential benefits in terms of reduced staff time and increased conservation.

Rate modifications were discussed, including changes to the current block rate billing system, to enhance the conservation pricing signal. Staff expects that such issues will be a major component of our next water rate study.

Water Supply Management Assessment

This section of the Planning Study was intended to provide Carollo an opportunity to offer general commentary on the City's overall approach to water supply planning outside of the specific issues studied in detail as a part of the study. It was requested that we clarify that suggestions to consider Cachuma enlargement and desilting of Gibraltar Reservoir are opportunities identified by Carollo, but are not currently contemplated by City programs or policies.

Some Commissioners noted their ongoing concern about considering the City's desalination facility as an available water supply rather than as an emergency/drought water supply. This was reflected in a Commission action in February 2009 that recommended that the desalination facility should not be considered a part of the existing water supply without authorization of additional expenditures. Commissioners also expressed concern about Carollo's identification of a potential use of the facility for the sale or exchange of water with agencies in other parts of the state. Staff considers the desalination facility an existing part of our supply, but one which serves as a drought buffer rather than an average year supply. The costs to restart and operate the desalination facility are sufficiently high that staff believes the water supply policy should aim to minimize the use of the facility to the greatest extent possible.

The Commission noted a draft summary of the City's existing water supply that had been distributed and discussed at the Commission's June 2009 study and suggested it be included with this memo. Accordingly, a copy has been attached. This table was created to begin to hone in on the updated capabilities of our various water supplies in support of the *Plan Santa Barbara* process and as a first step in the update of the LTWSP. The table looks at supplies during our typical non-drought periods and also during the 5-year critical drought period that represents our most likely water supply challenge. Notes are included to illustrate assumptions used to derive the estimates. Desalination is shown at zero during the typical non-drought year and for the critical drought period contributes only during the fifth year. The recycled water contribution is counted at 800 AFY to reflect current connected customer demand. It should be noted that this currently includes blending that will reduce available potable water, unless demineralization or reduction of salt input to the wastewater flow are implemented, or blending is suspended during the critical drought period. At the bottom of the table there is an indication of the expected percentage of shortage, reflecting the element of the current LTWSP that identifies an acceptable shortage of up to 10% during the critical drought period. Note that the table reserves 10% of the available supply, or about 1,700 AFY as a safety margin to reflect potential shortage in supply or unexpected demand.

We wish to thank you and your staff for your assistance with the *Plan Santa Barbara* process to date. We look forward its culmination in an updated General Plan that will be a key element of the updated LTWSP.

Attachments:

Staff Summary: Water Supply Planning Study, Carollo Engineers
Estimated Annual Water Supply – Existing Conditions, Draft Dated 6-8-09

cc: Board of Water Commissioners
Christine F. Andersen, Public Works Director
Cathy Taylor, Water System Manager
Paul Casey, Community Development Director
Bettie Weiss, City Planner
Barbara Shelton, Project Planner/Environmental Analyst
Stephen P. Wiley, City Attorney
Scott Vincent, Assistant City Attorney

Staff Summary:
Water Supply Planning Study
Water Resources Division, Public Works Department
November 2009

The City contracted with Carollo Engineers in November 2008 to prepare a Water Supply Planning Study (WSPS). The purpose was to analyze certain of the water supply issues related to the City's Plan Santa Barbara process (General Plan update) and update of the City's Long-Term Water Supply Program (LTWSP). Other issues have been, and are being, addressed in separate studies. The Water Supply Planning Study included:

- State Water Project (SWP) Reliability Assessment
- Local Climate Change Impact Assessment;
- Expanded Recycled Water Use Assessment;
- Water Conservation Opportunities; and
- Water Supply Management Assessment

Carollo was selected through a Request For Proposals process based on the proposed scope of work, cost estimate, and experience with the City's water system. This document summarizes key points of the study. It is intended only as a summary of the information developed by Carollo Engineers and does not represent the position of staff or the Water Commission. Staff will use this information as a part of developing recommendations for the update of the LTWSP.

State Water Project Reliability

Climate Change:

- Most analysis addresses long-term impacts (i.e. out to 2100); near term impacts are interpolated
- International research being augmented by various State of California analyses
- Expected impacts in the Delta watershed:
 - Increase in heat waves
 - Average temperature increases of 5.5 to 10.4 °F by 2100
 - Reduction in snow pack and the storage capacity it provides (25% to 40% by 2050)
 - Greater runoff during winter/spring storms; reduced storage capabilities in existing reservoirs due to modified flood control operations; lower summer flows
 - Reduced overall project storage capacity until additional storage is built
 - Sea level rise of 20"-55" projected by 2100
 - Increased salinity and flooding in the Delta
 - Potential water quality impacts in the Delta due to warmer water
- Many impacts expected even if corrective actions are taken; significant reliability impact will occur until major improvements can be made
- Current long-term projections may underestimate impacts (e.g. further sea level rise due to increased ice melt)
- State recommendations include: aggressive conservation, integrated flood management, ecosystem enhancements, expanded storage, improved conveyance, fix all aspects of the Delta, planning for sea level rise, and increased emergency preparedness

Other Vulnerabilities

- Delta flooding risks increased due to higher runoff and sea level rise
- 240% increase in levee failures due to flooding
- Seismic vulnerability:
 - 60% change of 6.5 magnitude earthquake within 25 years = 28% chance of 30 or more islands failing
 - Delta exports likely to be interrupted for 2 months to 2 years while repairs are made
 - Risk of interruption will continue until an isolated conveyance facility can be constructed

Environmental Limitations

- Delta smelt:
 - Considered a bellwether species – close to extinction
 - Wanger restrictions have generally been carried forward into revised December 2008 Biological Opinion (BO)
 - Delivery reductions of up to 50% in some dry years
 - Legal challenge underway
- Long Fin smelt:
 - Severe reductions in numbers – considered qualified for Endangered Species Act (ESA) protection by California Department of Fish and Game
 - Potential additional delivery reductions of 600,000 to 1.1 million AFY
 - Two legal challenges pending
- Salmon:
 - 2008 Wanger decision determined planned protection measures to be sufficient
 - Unprecedented close of commercial salmon fishery in 2008 and likely in 2009
 - New BO expected in 2009 [recently issued; further delivery reductions of up to 10%]
- Potential Public Trust Doctrine Legal Challenges – recent action withdrawn; others possible
- Area of Origin Issues:
 - Potential delivery deduction of 50,000 AFY
 - Legal action pending from both sides
 - Not clear how this affects Delta conveyance issues and contractors south of the Delta

SWP Delivery Reliability Evaluation

- Two time frames for reliability analysis:
 - “Current Conditions” assumptions:
 - Current facilities
 - Current Delta smelt restrictions
 - Historical hydrology (1922 – 2003) without climate change impacts
 - “Future Conditions” (2027) assumptions:
 - Current facilities (no storage or conveyance improvements assumed)
 - Current Delta smelt restrictions
 - Hydrology (rainfall and runoff) includes climate change impacts
 - Effects of sea level rise not included (5-year DWR analysis underway)
 - Catastrophic event not assumed

- Summary of SWP reliability (from Table 2.2 in WSPS):

Year	Estimated Average Annual Deliveries from Delta for Average Conditions and Various Dry Year Scenarios									
	Average Annual		Single Dry Year		2-Year Drought		4-Year Drought		6-Year Drought	
	%	afy	%	afy	%	afy	%	afy	%	afy
Current (2007)	63	2,079	6	198	34	1,122	35	1,155	35	1,155
2027	66-69	2,228	7	231	26-27	875	32-37	1,139	33-35	1,122

Note: Increase in average annual deliveries from 2007 to 2027 reflects higher demand assumptions and higher deliveries of water when available, generally in wet and average years.

- Carollo recommendations:
 - Use 2-year dry period values for extended drought
 - Revisit after release of 2009 State Water Project Reliability Report
- Delta Vision Strategic Plan recommendations:
 - Plan for 40% water supply reductions due to drought
 - Plan for 1-year interruption of all SWP deliveries from the delta due to catastrophic event (seismic and/or levee failure)

Potential SWP Improvements

- Co-equal goals included in Bay Delta Conservation Plan (BDCP):
 - Restore Delta ecosystem
 - Create reliable water supply
- Dual conveyance approach:
 - Improve existing channel through Delta
 - Construct an "isolated facility" to convey water around the Delta
- Target: increased diversions during wet period to offset reduced diversions during dry periods
- BDCP status/schedule:
 - Draft EIR/EIS scheduled for release in 2009
 - Final EIR/EIS during 2010
 - Permitting & final design during 2011
 - Construction 2012-2016
 - Obvious potential for delays, but broader consensus exists now and much is at stake; 2/3 of State's population depends on the Delta for water; huge economic impacts being felt
- Costs:
 - Very early estimate: \$11-\$33 billion
 - Potential sources of funding: user fees, State bonds, and Federal appropriations
 - Storage improvements would be additional
- Flood control management:
 - Inventory of needed levee improvements under way
 - Improved weather forecasting capabilities
 - System wide flood management integration
- Increased storage:
 - 5 major surface water reservoir projects undergoing feasibility analysis
 - Delta Vision Strategic Plan promotes increased surface/groundwater conjunctive use to take advantage of wet period flows
- Groundwater banking:
 - Optimize available supplies by more fully utilizing wet period deliveries
 - Variety of contractual arrangements possible

- Potential benefits from working through CCWA

Local Climate Change Impacts

- Rainfall patterns:
 - Slight trend of increasing local annual rainfall amounts, but not statistically significant
 - Increasing frequency of extreme rainfall events
 - Evident in recent rainfall history; 69% increase since 1948
 - Trend predicted to continue as climate change continues
 - Expect more intense runoff as a result of extreme events
- Recommendation: assume 20% increase in both frequency and duration of dry periods
- Irrigation demand:
 - With more concentrated rainfall, expect longer irrigation periods
 - Net increase in irrigation requirements expected; though not clear how much
 - Monitoring of changes in irrigation demands and climate data recommended
- Sea Level Rise:
 - 55" estimate of sea level rise by 2100 recommended for long-term planning purposes
 - EEWTP and Charles Meyer Desalination Facility may not be affected by 2027; but likely will by 2100

Expanded Use of Recycled Water

- State and City policies support and require the use of recycled water
- Source of supply is influent to EEWTP; currently averaging 7.8 mgd; assumed to continue to be at least 6.0 mgd into the future
- Current demand in AFY, Average Day Demand (ADD), and Maximum Month Demand (MMD):

	AFY	ADD (mgd)	MMD (mgd)
Customer Demand:			
Phase 1 Service Area:	449	0.400	0.800
Phase 2 Area – South:	109	0.097	0.194
Phase 2 Area – North:	289	0.258	0.516
Total Customer Demand:	847	0.760	1.500
Process Water to EEWTP:	291	0.260	0.340
Total:	1,138	1.000	1.800

(Continued on next page)

- System limitations, from Table 4.13 (expressed as MMD in mgd):

Scenario	Disinfection	Booster Pumps	Storage	Tertiary Filtration
<u>Without Blending</u>				
Phase I	Limited to amount not utilized by the Phase II zone	1.7 mgd	1.0 mgd ⁽²⁾	Limited to amount not utilized by the Phase II zone
Phase II	Limited to amount not utilized by the Phase I zone	1.6 mgd	1.5 mgd ⁽³⁾	Limited to amount not utilized by the Phase I zone
System Overall	4.3⁽¹⁾ mgd	3.3mgd	2.5 mgd	4.4 mgd
<u>With Blending</u>				
Phase I	Limited to amount not utilized by the Phase II zone	1.7 mgd	1.2 mgd ⁽²⁾	Limited to amount not utilized by the Phase II zone
Phase II	Limited to amount not utilized by the Phase I zone	1.6 mgd	1.5 mgd ⁽³⁾	Limited to amount not utilized by the Phase I zone
System Overall	6.0⁽¹⁾ mgd	3.3 mgd	2.7 mgd	6.0 mgd
Notes				
(1) Assumes that both the contact basin and the reservoir are used for the required 90 minutes contact time.				
(2) For the Phase I zone, the available supply is fixed by volume of storage and the method of operation of the tertiary filters. Supply can be increased by either increasing storage or altering the method of operation of the tertiary filters.				
(3) For the Phase II zone, the available supply is fixed by the volume of storage. Supply can be increased for Phase II only by increasing storage. Currently more than adequate.				

- Capacity conclusions per above:
 - The overall limiting facility is storage. The existing system, under current operational procedures, can serve an MMD of 2.5 mgd without blending and 2.7 mgd with blending. Given current MMD of 1.8 mgd, the existing system can serve 0.7 mgd of additional MMD, or about 0.35 mgd of ADD (392 AFY).
 - Phase I: Given that distribution demand plus process water demand is at or near 1.0 mgd, and that the desired elimination of blending would reduce the effective Phase I storage capacity, storage is likely to become a limitation in the Phase I area first. Solutions: Increase storage capacity (either construct more storage or increase the chlorine contact chamber capacity), or operate the filters on a continuous basis, or a combination of both.
 - Phase II: current MMD of 0.71 mgd is well within the 1.5 MG storage capacity of the Golf Course reservoir, which defines the daily demand limit in Phase II zone.
 - Consider use of secondary effluent for process water in lieu of filtered effluent.

- Estimated Operating Costs (\$/AF):

	Phase I Zone	Phase II Zone
Treatment Costs:		
Tertiary Filtration	\$57	\$57
Disinfection	\$57	\$57
Distribution Power Costs:	\$43	\$132
Total:	\$157	\$247

- Water Quality:

- Current water quality targets:
 - Chloride: <300 mg/l
 - TDS: <1,500 mg/l
 - Turbidity: < 2.0 NTU
- Blending required to meet these targets; amounts range from 200 to 600 AFY; averaging about 400 AFY or 30% of distribution water
- Horticultural standards for recycled water quality:
 - Ayers & Wescott used to date; Sodium Adsorption Ratio (SAR) is a key parameter
 - 2004 EPA "Guidelines for Water Reuse" cited as potential updated target (TDS of 1,000 mg/l)
- Conceptual demineralization project identified:
 - Needed secondary effluent improvements not included here
 - Rehabilitate tertiary filters and add slipstream treatment of microfiltration followed by reverse osmosis for mineral removal (per Alternative 5, Tertiary Filter Rehab study)
 - Estimated capital cost: \$4,624,500
 - O&M annual cost: \$249,000
 - Total annual cost: \$652,185
 - Additional unit cost: \$341/AF
 - Potable blend alternative: \$143,250 per year or \$75/AF at assumed potable water cost of \$250/AF

- Opportunities for Expanded Use of Recycled Water:

- Increased usage at existing user sites:
 - Irrigation: Samarkand, golf course greens, S.B. Zoo, Chase Palm Park
 - Toilet flushing: Harbor lot, Shoreline Park, Elings Park, Cabrillo Ball field, La Mesa Park
 - Lowest cost for expanded use
 - 96 AFY of demand identified
- New user sites adjacent to the existing system:
 - Hotels, multi-family housing, Mission Linen, the Armory, Mission Terrace
 - Costs limited to service connections and on-site modifications
 - Added cost for backflow requirements; especially multi-family with individual meters
 - 64 AFY of demand identified
- Distribution system extensions
 - 27 potential new users identified; served by 9 extension projects
 - 166 AFY of demand identified
 - Pipeline costs: \$526 to \$3,752 per AFY of displaced potable demand, plus user site modification costs

- Future Development
 - Some projects identified; other not proposed yet
 - Demand not quantified at this point
 - Recommendation to incorporate likely future development into system planning
- Expanded Use Issues
 - Toilet flushing: provided for in the California Plumbing Code; reliability becomes more important; being implemented at East Bay MUD and Irvine Ranch Water District
 - Industrial reuse: potential local applications include car washing and commercial laundries

Water Conservation Opportunities

- Metered sales ratio of 90%-94%; meets CUWCC BMP goal
- Percent usage by class (calendar year 2006 – average weather year):

Single Family Residential:	45%
Multi-family Residential:	24%
Commercial:	17%
Industrial:	3%
Irrigation (dedicated meters):	5%
Recycled Water:	6%
- Outdoor: 43%; Indoor 57% (based on analysis of 2001 – above average rainfall)
- Age of housing: 92% built prior to 1990
- Large user analysis: top 10 accounts average more than 25,000 gallons per day; conservation efforts here are likely to be more productive
- Per capita usage analysis:
 - City usage: 130 gallons per capita per day (gcd)
 - National average: 160 gcd
 - Statewide average: 229 gcd
 - Central Coast average: 179 gcd
 - South Coast average: 208 gcd
- Potential rate structure modifications:
 - Increase number of residential tiers
 - Implement inclining block rates based on season
 - Implement water budget based rates
- Conclusions/Next Steps:
 - Additional savings in the range of 5% to 10% over 30 years seem feasible
 - Program costs will be above average for other agencies due to City efforts made to date
 - Conservation budget likely to increase to support additional water savings
 - Perform comprehensive technical/economic analysis of water savings from specific conservation measures and a benefit-cost analysis of those measures to determine which potential new water conservation measures will be most cost effective for the City to pursue
 - Incorporate identified measures and programs into the water conservation component of the LTWSP
 - Conduct a water rate study to identify rate structure modifications to fine tune pricing signals and continue to meet revenue requirements; high tier block rate could fund added conservation costs

Water Supply Management Assessment

- Diversity of the City's water supply is an asset in view of climate change impacts, increased demands, and Delta export constraints
- Adjust operations to maximize diversions of surface water when available to make storage available to capture runoff
- Consider potential impact of reduced groundwater recharge and Mission Tunnel inflow as a result of climate change
- Desalination is an expensive option, but provides flexibility in how other supplies are used; may be feasible to operate on an exchange/transfer basis
- Pay attention to pending State regulations regarding energy requirements and green house gas emissions related to water supplies
- Expect to be required to incorporate State planning requirements into the City's updates of its Urban Water Management Plan
- Continue participation in the Integrated Regional Water Management Plan process to insure eligibility for grant funding
- Update information on the City's groundwater basins, particularly Storage Unit No. 1, the Foothill Basin, and bedrock aquifer supplies; pay particular attention to groundwater injection potential and seawater intrusion issues
- Pursue cost effective expansion of recycled water use and water conservation per above
- Retain enlargement and/or silt removal at Gibraltar and Cachuma as a potential long-term options

Estimated Annual Water Supply - Existing Conditions (AF)

10% = Assumed Safety Margin

Print Date: 8-Jun-09

DRAFT

Typical Non-Drought Year		5-Year Critical Drought Period									
Supply Source	Amount (AF)	Notes	Year 1	Year 2	Year 3	Year 4	Year 5	5-Year Average	5-Year Total	Notes	
Cachuma	8,277	Current Annual Project Entitlement	8,277	8,277	7,704	6,440	5,092	7,158	35,790	Modeled data for 1947-1951 local critical drought; Draft EIR, SWRCB Cachuma Project, 2003 Alternative 3C, B.O. with 3' surcharge	
Cachuma Carryover	-	Reserve available deliveries in excess of 8,277 for building carryover of at least 3,000 AF	-	-	1,300	900	800	600	3,000	3,000 AF of Cachuma carryover used over 5 years	
Transfer from Montecito	300	Per contract with Montecito Water District	300	300	300	300	300	300	1,500	Per contract with Montecito Water District	
Gibraltar	3,612	Assume 70% of 5,160 AFY long term yield of Base Reservoir per USYROA (includes Devil's Canyon, per USYROA tech memo)	3,206	3,161	877	1,961	-	1,841	9,206	Deliveries under USYROA estimated at 70% of values for Gibraltar diversions per modeling of 1947-1951 local critical drought in Draft EIR, SWRCB Cachuma Project, 2003	
Mission Tunnel	1,125	modeling in Draft EIR, SWRCB Cachuma Project, 2003	847	656	550	527	500	616	3,080	Data for 1947-1951 local critical period per Cachuma Water Rights Draft EIR, 2003	
State Water	1,650	Deliveries per SWP reliability report for long-term average, but not to exceed 50% of Table A amount.	438	1,650	155	566	845	731	3,654	Worst 5-year period of SWP Deliveries (1988-1992), per 2008 SWP Reliability Report, Table B.7; assumes 2027 "future conditions;" most restrictive climate change impacts; most restrictive target flows; and no new Delta facilities. Assumed coincident with local critical period despite actual history to the contrary (Constrained by 50% overall annual limitation)	
State Water; non-Table A	-	Generally planned only during drought periods	-	-	125	260	340	242	725	Expect high unit cost due to potential statewide drought	
Groundwater	1,300	Perennial yield of Basin No. 1 and Foothill Basin	3,150	2,150	3,550	3,600	3,550	3,200	16,000	Up to 4,150 per year production as needed; per testimony of Steve Mack, Cachuma Water Rights Revised Draft EIR, 2007; subject to 5-year total limit of 16,000	
Desalination	-	Planned as drought supply only	-	-	-	-	3,125	625	3,125	Assumed to be available in 5th year of critical drought period; no action years 1 & 2; preliminary design in year 3; final design & construction in year 4	
Recycled Water	800	Current connected demand	800	800	800	800	800	800	4,000	Current connected demand	
Total Supply:	17,064		17,018	16,994	15,361	15,354	15,352	16,113	80,079		
Reserved for Safety Margin:	1,706	Percent Shortage:	0%	0%	10%	10%	10%				
Maximum Normal Year Demand :	15,358										
Est. Current Demand: (Past 5-year average, rounded)	14,000										
Available Supply:	1,358										