ITEM 5

City of Santa Barbara
Public Works Department

Interoffice Memorandum

DATE: September 8, 2010

TO: Board of Water Commissioners

FROM: Rebecca Bjork, Water Resources Manager

SUBJECT: RESULTS OF THE WATER CONSERVATION TECHNICAL EVALUATION

City Water Resources Division staff and Maddaus Water Management, through a process over the past seven months, have completed the Water Conservation Technical Evaluation, a detailed quantitative, technical evaluation of future options for the Water Conservation Program.

Staff is pleased to provide the Board of Water Commissioners with the attached Executive Summary of the draft Technical Memorandum, which documents the process used and the results of the analysis. Also included is the slide presentation that will be given at the September 13, 2010 Water Commission meeting. Chair Neustadt, at the appointment by the Water Commission, participated in the measure screening workshop, which was one of the key steps in the evaluation process. For those who are interested, the full draft Technical Memorandum will be available by Friday afternoon to download from the City's FTP Internet site. The file name will be "Draft Water Conservation Technical Memo. PDF" and can be downloaded at the following Internet address: http://www.santabarbaraca.gov/Files/Public_Works/.

This technical analysis will be used as a key part of developing recommendations for the updated Long-Term Water Supply Program. We look forward to having Maddaus Water Management make its presentation to the Commission.

BF/dm

Attachments

MADDAUS WATER MANAGEMENT

Technical Memorandum – Executive Summary

Prepared for:	The City of Santa Barbara
Project Title:	City of Santa Barbara Water Conservation Technical Analysis
Subject:	Conservation Technical Analysis
Date:	September 8, 2010
To:	Bill Ferguson, City of Santa Barbara
	Alison Jordan, City of Santa Barbara
From:	Bill Maddaus, Maddaus Water Management
	Michelle Maddaus, Maddaus Water Management

DRAFT. This is not the final technical Memorandum. Information in this document may be incomplete. Please refer to the final version of this document for reference purposes.

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 analysis period.

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 years, and then savings were 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, and the utility cost of water saved for each of the alternate programs. Additional resources and customer contacts 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, 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 care-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)

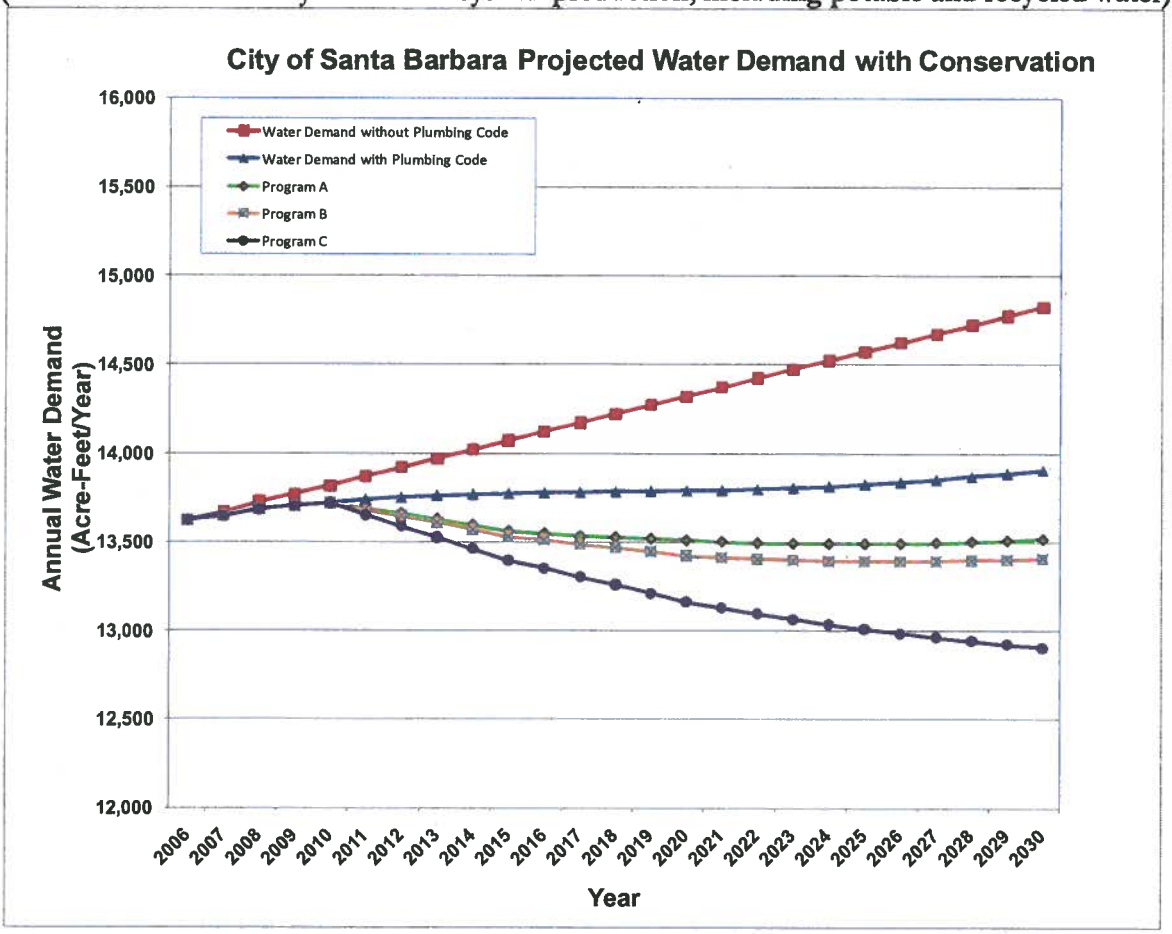


Table ES-2

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

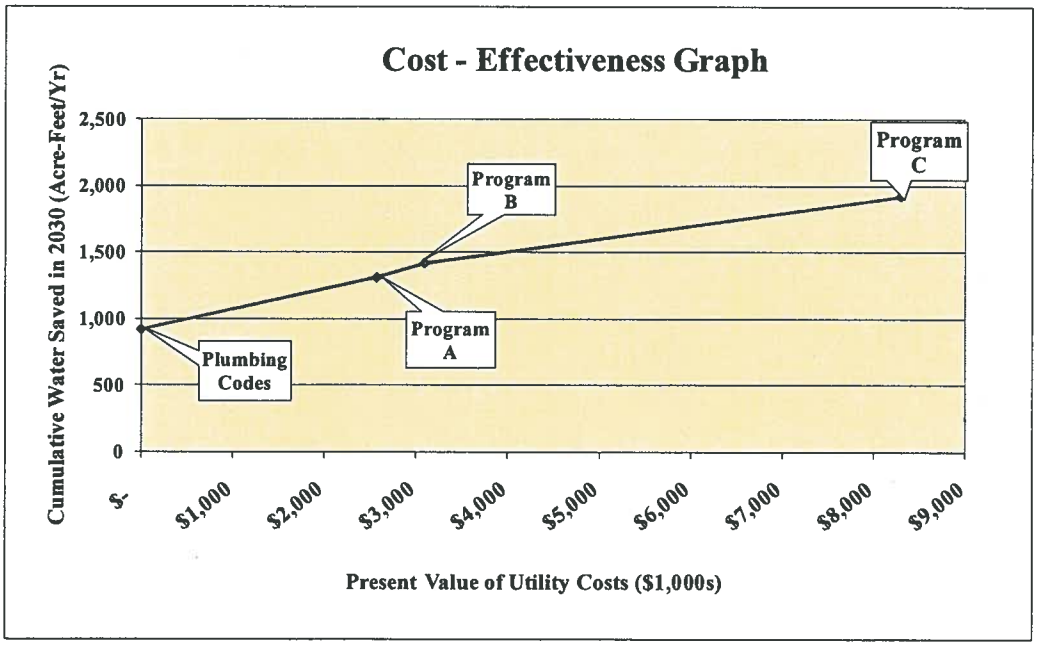
Table ES-3
Economic Summary of Long-Term Conservation Programs
(Excluding Tool Box Measures)

Conservation Program	Demand Reduction by 2030 (AFY)[1]	Total Conservation Program Water Savings in 2030 (AF)	Average Annual Program Cost to Utility ($)[3]	Present Value of Utility Benefits ($)	Present Value of Utility Costs ($)	Utility Benefit - Cost Ratio	Utility Cost of Water Saved ($/AF)[4]
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. Excludes cost associated with the 21 measures in the Tool Box
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



City of Santa Barbara Water Conservation Technical Analysis

Presented to the City Water Commission
September 13, 2010

Bill Maddaus
Michelle Maddaus
Maddaus Water Management

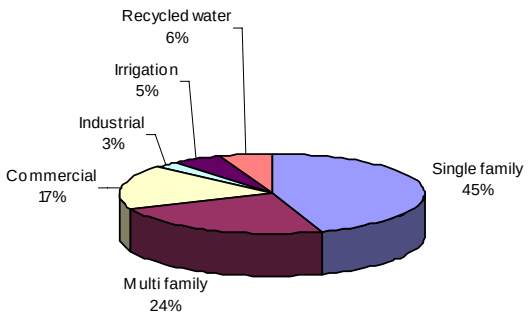
Presentation Outline

1. Project Goals
2. Conservation Input Data: Water Profile, Avoided Costs
3. DSS Model Structure
4. Conservation Measure Screening
5. Review of Conservation Results
6. Cost-Effectiveness of Alternative Conservation Programs
7. Discussion

Project Goals

- ✓ Evaluate Long-Term Water Conservation Potential
  - Conduct measure screening workshop to identify and screen conservation measures
  - Use DSS Demand Management Model to analyze conservation measures and forecast water savings
  - Evaluate how much conservation is cost-effective
- ✓ Prepare Final Report
  - Technical Memorandum is the technical basis for the Water Conservation element of updated Long-Term Water Supply Program

Water Use Profile
City of Santa Barbara



Residential use is approximately 69% of water use

Contact: michelle@maddauswater.com

Avoided Cost of Water Supply

	Potential Avoided Water Supplies	Acquisition Cost	Delivery/ Production Cost	Cater Treatment Cost	Total Avoided Cost ($/AF)
A	Groundwater (wellhead treatment only)		$120		$120
B	SWP: Table A deliveries		$290	$100	$390
C	Groundwater (OGT Plant)		$610		$610
D	SWP: Non-Table A deliveries (Non-Critical Drought Period)	$300	$300	$100	$700
E	SWP: Non Table A deliveries (Critical Drought Period)	$600	$300	$100	$1,000
F	Desalination (not including amortization of $17.7 million reactivation cost)		$1,470		$1,470

$100/AF = Variable Cost of Cater Treatment
$500/AF = Variable Cost of OGT Plant

$600/AF = Avoided cost of water based on average of B, C, & D

Conservation Measure Screening Workshop

- Over 92 measures screened during measure screening workshop with City of Santa Barbara and other local stakeholders
- 23 measures selected for evaluation in the DSS Model
- 21 measures selected for a qualitative evaluation put in the “tool box” for possible future implementation by the City

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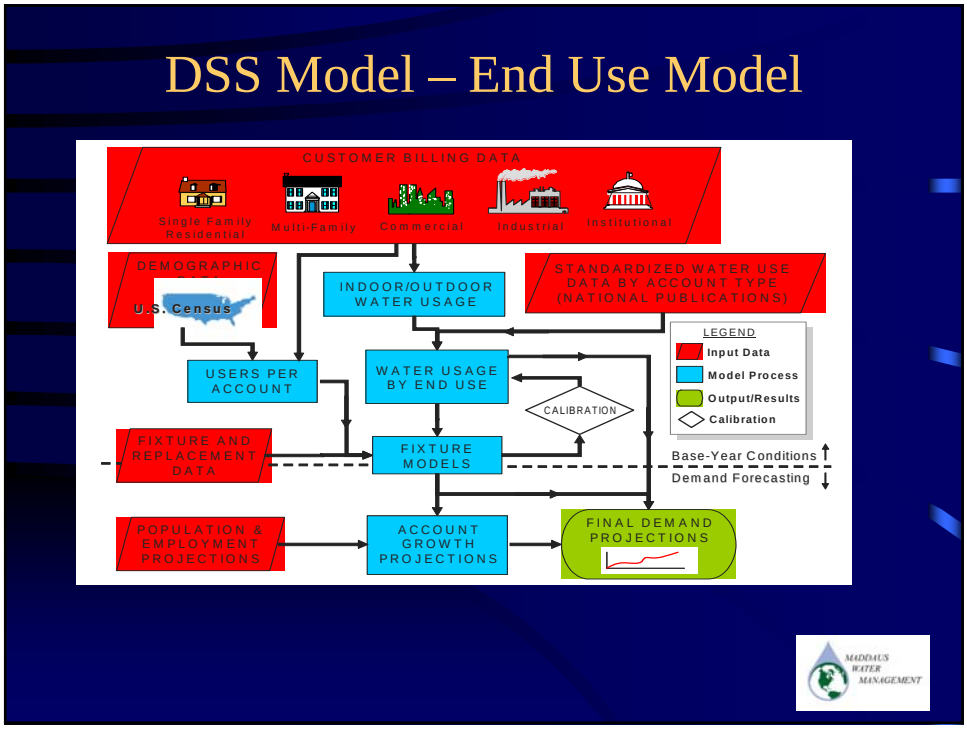

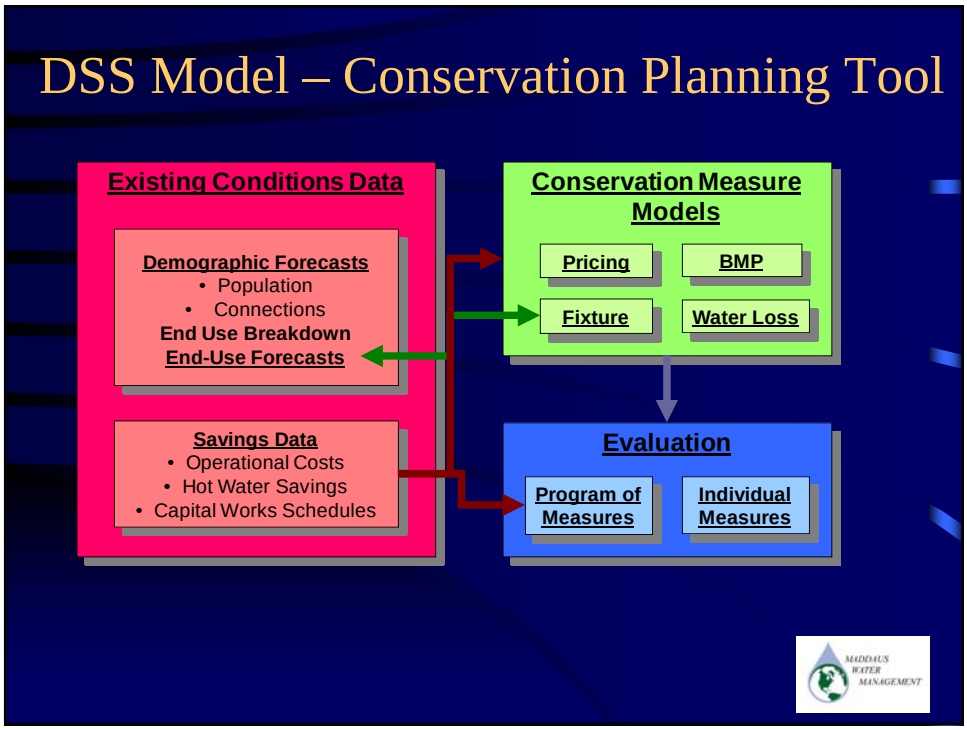

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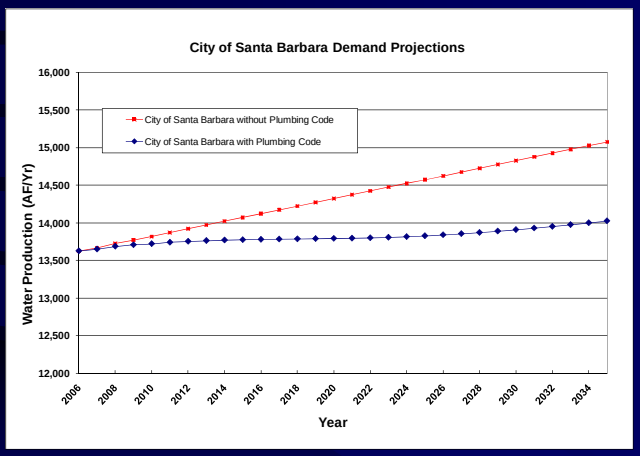
Summary of Conservation Demand Forecasts



Growth in water demand is 283 AFY between 2010 and 2030 (with plumbing code)

Measure Cost and Implementation Variables

- ✓Unit water savings for targeted end uses of water
- ✓Market penetration goal per measure
- ✓Unit costs of measure
- ✓Length of measure implementation
- ✓Measure life (savings decay)

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Conservation Measures in the DSS Model

No.	Measure Name	Program A	Program B	Program C
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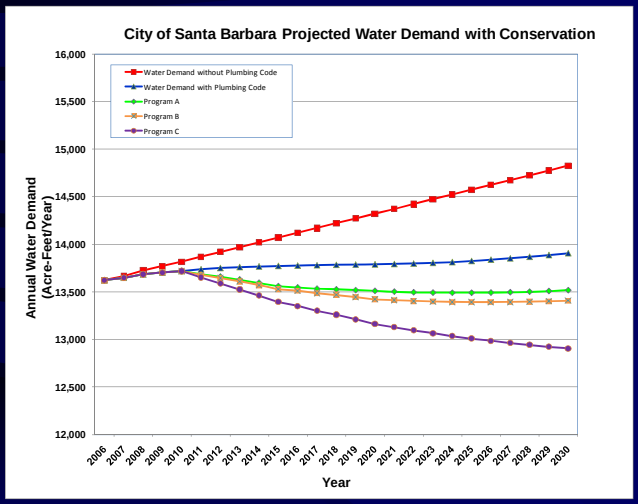
	Total Measures in each Program	10	17	22

See Technical Memorandum Appendix A for participation rates for each program

Conservation Savings Over Time



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Economic Summary

Conservation Program	Demand Reduction by 2030 (AFY)	Total Conservation Water Savings by 2030 (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)
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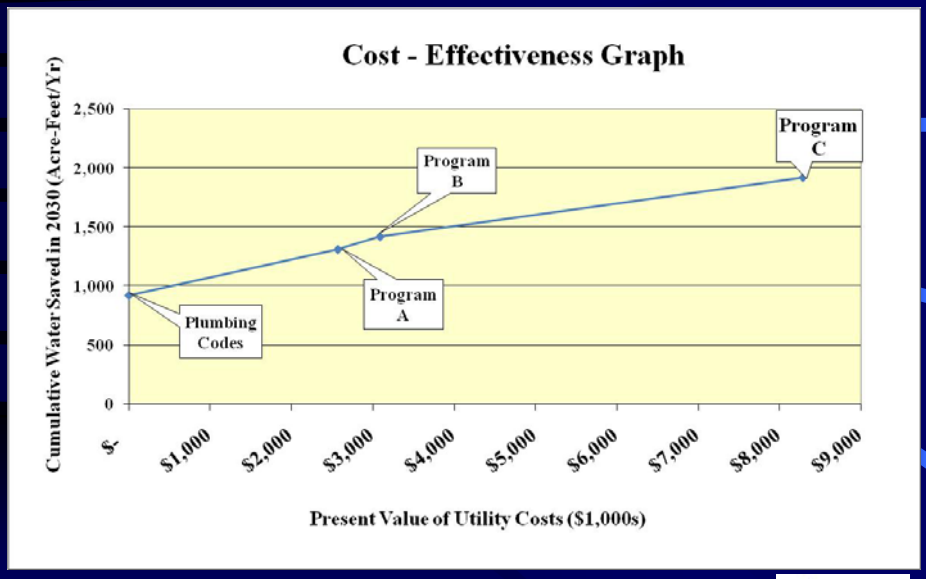
*Utility cost includes only measures quantitatively evaluated in the DSS Model

Conservation Cost-Effectiveness



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Cost Comparison and What it Means for City of Santa Barbara

- Avoided cost of water is $600 / AF
- Current cost of conservation is $480 to $680/AF
- Technical analysis indicates conservation can be significantly cheaper than purchasing additional water

What We've Learned

- Technology to reduce demands is readily available
- Demand reductions of 13% over 20 years are cost-effective!
- Water conservation can provide demand reductions of up to 1,000 AFY, in addition to savings from Plumbing Code

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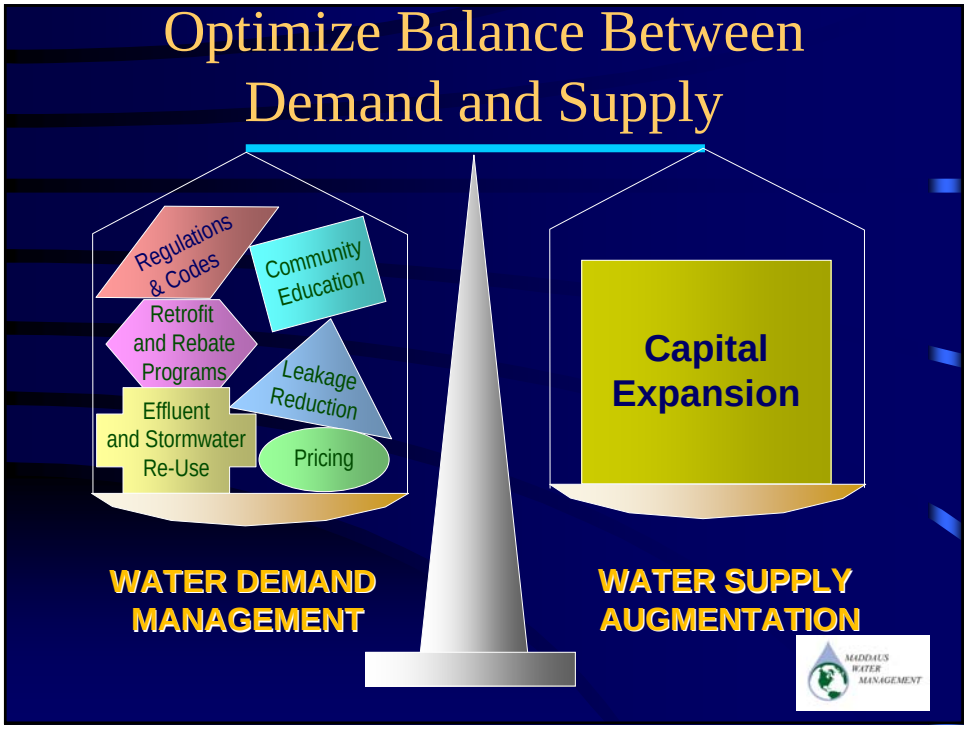
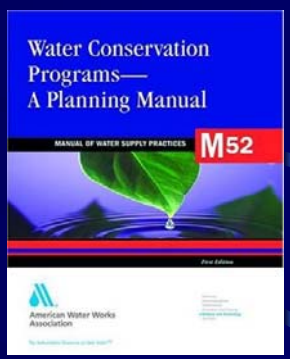


Next Step

- Choose a program (B or?)
  - Phase the program
- Develop Water Conservation element of updated LTWSP
  - Develop partners where appropriate
  - Establish water savings goals
  - Set budget
  - Plan staffing
  - Establish schedule



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Process for Conservation Master Plan

- Prepare Water Conservation Plan
  - Develop public support
  - Publish plan report
  - Adopt plan
- Fund programs
- Follow Implementation Plan
- Evaluate progress and make mid-course adjustments

Discussion –Q&A

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