State of California
The Natural Resources Agency
Department of Water Resources
Division of Statewide Integrated Water Management
Water Use and Efficiency Branch

FOURTH TARGET METHOD FOR URBAN WATER SUPPLIERS TO DETERMINE URBAN WATER USE TARGETS FOR 2020

A report to the Legislature pursuant to Section 10608.20(b)(4) of the California Water Code

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Abbreviations and Acronyms

ACWA	Association of California Water Agencies
afy	acre-feet per year
BMP	Best Management Practice
Calculator	A Target Method 4 Calculator
CII	Commercial, Industrial and Institutional
CUWA	California Urban Water Agencies
CUWCC	California Urban Water Conservation Council
CWC	California Water Code
DWR	Department of Water Resources
East Bay MUD	East Bay Municipal Utility District
ETo	Reference evapotranspiration
GIS	Geographic Information System
GPCD	gallons per capita per day
gpm	gallons per minute
GWRS	Groundwater Replenishment System
HR	hydrologic region
IR	Indoor Residential
LU	Landscape and unaccounted for
Method 4	Method 4 for Determining Water Use Targets
Methodologies Report	"Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use" issued by DWR
Metropolitan	Metropolitan Water District of Southern California
MOU	Memorandum of Understanding
PWSS	Public Water System Statistics
Sacramento	City of Sacramento
SB X7-7	Senate Bill X7-7
SWRCB	State Water Resources Control Board
U4 Subcommittee	USC U4 Technical Subcommittee
USC	Urban Stakeholder Committee
UWMP	Urban Water Management Plan
WF	Water Factor

Introduction

Senate Bill X7-7 (SB X7-7), Steinberg, enacted in November 2009, set a goal of reducing statewide urban per capita water use by 20 percent by the year 2020. To meet the 20% reduction goal, the statute directed urban water suppliers to calculate baseline water use and set 2020 water use targets. The legislation, recognizing the wide range of urban water use efficiency and water use, provided three different methods water suppliers could use to calculate water use targets and directed the Department of Water Resources (DWR) to develop a fourth method (referenced in this document as Method 4). DWR worked with an urban stakeholder committee to develop the Method 4. This legislative report describes the process used in the development of Method 4, proposed Method 4 alternatives, and the method selected by DWR entitled "Provisional Method 4 for Determining Water Use Targets" hereafter referred to as the Method 4. The Method 4 was released for public use in February 2011. DWR will continue working with stakeholders to improve Method 4 by 2014, when a review is required by law.

2. Background

In February 2008, Governor Arnold Schwarzenegger introduced a seven-part comprehensive plan for improving the Sacramento-San Joaquin Delta. A key component of his plan was a goal to achieve a 20 percent reduction in per capita water use statewide by the year 2020. In response to the Governor's goal, DWR and the State Water Resources Control Board (State Water Board) convened the 20x2020 Agency Team on Water Conservation. The Agency Water Conservation Team released a draft *20x2020 Water Conservation Plan* in April 2009 and the final *20x2020 Water Conservation Plan* in February 2010. The Water Conservation Plan included estimates of statewide and regional baseline per capita water use and outlined recommendations to the Governor on how statewide water use could be reduced by 20 percent by 2020.

In November 2009, water conservation legislation, SB X7-7, was signed into law as part of a comprehensive water legislative package of five bills. SB X7-7 focused on both urban and agricultural water conservation. The agricultural provisions addressed water measurement and the quantification of the efficiency of agricultural water use, and agricultural water management planning. The urban provisions require suppliers to calculate water use baselines and set 2020 water use targets, direct DWR to establish a Commercial, Industrial and Institutional (CII) Task Force to look at alternative CII best management practices (BMPs) and direct DWR to establish new regional targets for water management practices such as stormwater capture and recycled water use, among other tasks.

3. Method 4 Development Process

DWR, following the legislative directive, used a public process to develop Method 4. As a first step, public workshop listening sessions were held in Sacramento and in Los Angeles to take input on what should be included in Method 4. In May 2010, a technical subcommittee of the Urban Stakeholder Committee (USC) was formed to consider and evaluate proposed Method 4 alternatives. A draft version of the Method 4 was presented at two public workshops before the method was finalized in February of 2011. Greater detail on public participation is presented in Appendix A.

The Method 4 was developed through an iterative process. There were four proposed Method 4 alternatives. These proposals were analyzed by DWR and the USC using the criteria provided in the legislation. Some proposals were not moved forward, while others were revised to better meet the legislative criteria. The process of revision and evaluation of proposals occurred over a series of meetings with the USC until the Method 4 was decided upon. DWR tested the revised the proposals using a set of randomly selected urban water suppliers. Initially, 31 suppliers were selected, but the set was expanded to 52 suppliers to better represent the wide diversity of California water agencies. The random sample agencies are presented in Appendix B. Descriptions of proposed Method 4 alternatives are presented in Appendix C. The legislative criteria and DWR's evaluation of proposed Method 4 alternatives are provided in Appendix D.

SB X7-7 directs DWR to revise Method 4 in 2014 in advance of suppliers writing 2015 urban water management plans. DWR has titled the method "Provisional Method 4 for Determining Water Use Targets" (Method 4), in recognition that with more time improvements and revisions can be made to the method to better meet the legislative criteria.

DWR has incorporated the Method 4 by reference into the Process Water Regulation that was adopted by the Office of Administrative Law on July 5, 2011. The incorporation by reference of Method 4 was done based on the recommendation of the Office of Administrative Law. DWR, in updating Method 4 in 2014, will go through the rulemaking process as well as working with the Urban Stakeholder Committee and the public.

3.1 Description of the Provisional Method 4 for Determining Water Use Targets (Method 4)

3.1.1 Overview

The overall framework for Method 4 is described in this section. Details are presented in the "Detailed Procedures" section. For this target method, water savings are assumed between the baseline period and 2020 due to metering of unmetered water connections and achieving water conservation measures in three water use sectors.

The 2020 water use target for individual urban water suppliers is determined by Equation 1 in units of gallons per capita per day (GPCD).

Equation 1

Urban Water Use Target	=	Base Daily per Capita Water Use	-	Total Savings

The base daily per capita water use is separated into three sectors for the purpose of Method 4:

1. Residential indoor
2. Commercial, Industrial and Institutional (CII)
3. Landscape water use, water loss and other unaccounted-for water

Because accurate methods are not generally available to estimate the water use in these three sectors, a standard of 70 GPCD is assumed for residential indoor water use. For the purpose of Method 4, CII water use does not include landscape irrigation use served by dedicated landscape irrigation meters. Dedicated landscape meters often serve large commercial or institutional irrigation sites such as golf courses, parks or school grounds. CII water use includes irrigation water use served by mixed use water meters. Landscape irrigation water use in item 3 above is composed of residential irrigation and irrigation served by dedicated landscape irrigation meters or connections. Unaccounted-for water is water that is lost in water distribution systems. Other unaccounted-for water may include unmetered uses such as construction water or discrepancies in water meter accuracy. For simplification, water system losses and other unaccounted for water are referred to as “water loss” in this document.

For the purpose of Method 4, it is necessary to calculate landscape water use and system loss using Equation 2. The units for Equation 2 are GPCD.

Equation 2

Landscape and Water Loss per Capita Use	=	Base Daily per Capita Water Use	-	Standard Indoor Residential 70 gpcd	-	CII Water Use

Potential water savings are estimated for each of these water use sectors and for reduced water use due to installation of meters on unmetered connections, as shown in Equation 3. The units for Equation 3 are GPCD.

Equation 3

Total Savings	=	Metering Savings	+	Indoor Residential Savings	+	CII Savings	+	Landscape and Water Loss Savings

3.1.2 Detailed Procedures

Step 1: Baseline Water Use and Midpoint Year

The base daily per capita water use is an average calculated for the base period selected by the urban retail water supplier, as described in Methodology 3 in *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use* (Methodologies Report).

The data required for some of the following steps of Method 4 must be provided for the midpoint year for the base period. For a base period with an even number of years, the midpoint year will be the 12 months preceding the midpoint date.

The Calculator has been designed for calendar years. For water suppliers that choose to use a fiscal year reporting basis, the Calculator can be adapted by entering the fiscal year period representing the year designated in the Calculator.

Step 2: Metering Savings

For service areas with water service connections without water meters, a water supplier must estimate the total amount of water delivered to unmetered connections during the midpoint year of the baseline period. The metering savings is calculated using Equation 4.

Equation 4

$$\text{Metering Savings, GPCD} = \frac{\text{Water Deliveries to Unmetered Connections in Midpoint Baseline Year, gallons} \times 0.20}{\text{Service Area Population in Midpoint Baseline Year} \times 365 \text{ days}}$$

Step 3: Indoor Residential Savings

Indoor residential water savings are estimated based upon anticipated increases in the installation of more efficient toilets, residential clothes washers and showerheads. The savings estimates are based on a comparison of saturation levels of fixtures, at certain water use efficiencies, during the midpoint year of the baseline period and with saturation goals in 2020. Separating toilets in single-family and multi-family dwellings, the 2020 saturation goals for the four plumbing fixtures categories are listed in Table 1.

Table 1. Saturation Goals for Indoor Residential Fixtures

Fixture Type	2020 Saturation Goals
Single-family Toilets	85% 1.28 gal/flush toilets 15% average flush volume at midpoint baseline year
Multi-family Toilets	85% 1.28 gal toilets 15% average flush volume at midpoint baseline year
Residential Washers	85% Water Factor (WF) of 6 15% average WF at midpoint baseline year
Residential Showerheads	95% low flow showerheads 5% non-low flow showerheads

There are two alternatives for calculating indoor residential water savings, one using the Method 4 Calculator based on historic data for a water supplier, and the other using a default savings of 15 GPCD.

<u>Alternative 1:</u>

To calculate indoor residential savings using the historic data of an individual water supplier the following types of data may be required to enter into the Calculator:

- Persons per household
- Toilets per household
- Showers per household

- Numbers of single- and multi-family dwelling units for years 1991 through the midpoint of baseline period
- Population residing in group quarters in the midpoint year of baseline period
- Either (1) numbers of efficient toilets, showerheads and clothes washers distributed, installed, or credited through incentives such as rebates for years 1991 through the midpoint of baseline period, or (2) saturation levels of fixtures at various efficiencies at the midpoint year of the baseline period

After entry of the required data, the Calculator will determine the indoor residential savings in terms of GPCD.

Alternative 2:

If a water supplier does not have historic data for the midpoint baseline and prior years, the supplier can use a default indoor residential water savings of 15 GPCD. While the Calculator allows Alternative 2 for the convenience of calculating the target, if this alternative is chosen, the Calculator is unnecessary.

Determining whether to use the default value, the following information may be helpful. In developing the Method 4, a random sample of 52 water suppliers was selected to test the Calculator. The sample represented a variety of climatic and demographic characteristics. An analysis of this random sample developed a statewide average savings from the four indoor residential elements of 14.1 GPCD, with a range of 7.9 to 16.8 GPCD. Sixty percent of the suppliers fell within the range of 13.1 to 15.1 GPCD and 15 percent exceeded 15.1 GPCD.

Step 4: CII Savings

CII water savings is assumed to be 10 percent of baseline CII water use, which is an average for the baseline period calculated following procedures in Methodology 7 in the Methodologies Report. For the purpose of Method 4, CII water use does not include landscape irrigation served by dedicated landscape irrigation meters. CII savings is calculated using Equation 5.

Equation 5

CII Savings, GPCD	=	Average baseline CII Water Use, GPCD	X	0.10

Step 5: Landscape Irrigation and Water Loss Savings

Landscape water use and water loss savings are based on a 21.6 percent reduction in that sector for all suppliers. The 21.6 percent reduction was derived from an analysis of 52 sample water suppliers and was calculated so that the average water use target for the 52 sample suppliers would meet the overall goal of a cumulative 20-percent savings. Landscape water use and water loss use is calculated using Equation 2 and represents irrigation water use, water loss and other unaccounted-for water uses. The savings is calculated using Equation 6.

Equation 6

Landscape water use and Water Loss Savings, GPCD	=	Landscape Irrigation and Water Loss Sector Use per Eq. 2, GPCD	X	0.216

Step 6: Total Savings

The total savings required using Method 4 is calculated using Equation 3, entering results from Steps 2 through 5.

Step 7: 2020 Urban Water Use Target

The 2020 urban water use target in GPCD is calculated using Equation 1.

3.1.3 Example

To illustrate the procedures for the Method 4, calculations for the fictional Whispering Glen Water District are shown below.

Step 1. Baseline Water Use and Midpoint Year

Whispering Glen Water District selected a 10-year baseline period of 1996-2005. The average base daily per capita water use for this period was calculated to be 228 GPCD. The savings are calculated based on water deliveries in the midpoint year of the baseline period, which is 2000.

Step 2. Metering Savings (Equation 4)

$$\text{Metering Savings, GPCD} = \frac{\text{Water Deliveries to Unmetered Connections in Midpoint Baseline Year, gallons} \times 0.20}{\text{Service Area Population in Midpoint Baseline Year} \times 365 \text{ days}} = 8.3 \text{ GPCD}$$

Water Deliveries to Unmetered Connections in Midpoint Baseline Year, gallons	X	0.20
2,541,637,800		
Service Area Population in Midpoint Baseline Year	X	365 days
168,118		

Step 3. Indoor Residential Savings

Alternative 1, Method 4 Calculator:

Total Indoor Residential Savings, GPCD	=	Single-family Toilets Savings, GPCD	+	Multi-family Toilets Savings, GPCD	+	Residential Washers Savings, GPCD	+	Residential Showers Savings, GPCD	=	16.5 GPCD
		7.6		1.6		6.0		1.3		

Alternative 2, Default:

Total Indoor Residential Savings, GPCD	=	15.0 GPCD

Step 4. CII Savings (Equation 5)

CII Savings, GPCD	=	Average baseline CII Water Use, GPCD 69.0	X	0.10	=	6.9 GPCD

Step 5. Landscape Irrigation and Water Loss Savings (Equations 2 and 6)

Landscape Irrigation and Water Loss Sector Use, GPCD	=	2000 Base Daily per Capita Water Use 227.7	–	Standard Indoor Residential Use, GPCD 70.0	–	CII Water Deliveries in Midpoint Baseline Year, GPCD 68.7	=	89.0 GPCD

Landscape Irrigation and Water Loss Savings, GPCD	=	Landscape Irrigation and Water Loss Sector Use, GPCD 89.0	X	0.216	=	19.2 GPCD

Step 6. Total Savings

Because there are two alternative methods to calculate indoor residential savings, there are two alternatives for total savings, calculated using Equation 3.

Alternative 1 (based on Method 4 Calculator for Indoor Residential Savings):

Total Savings, GPCD	=	Metering Savings, GPCD	+	Indoor Residential Savings, GPCD	+	CII Savings, GPCD	+	Landscape Irrigation and Water Loss Savings, GPCD	=	50.9 GPCD
		8.3		16.5		6.9		19.2		

Alternative 2 (based on default for Indoor Residential Savings):

Total Savings, GPCD	=	Metering Savings, GPCD	+	Indoor Residential Savings, GPCD	+	CII Savings, GPCD	+	Landscape Irrigation and Water Loss Savings, GPCD	=	49.4 GPCD
		8.3		15.0		6.9		19.2		

Step 7. 2020 Urban Water Use Target (Equation 1)

Alternative 1 (based on Method 4 Calculator for Indoor Residential Savings):

Urban Water Use Target, GPCD	=	Base Daily per Capita Water Use, GPCD	–	Total Savings, GPCD	=	176.8 GPCD
		227.7		50.9		

Alternative 2 (based on default for Indoor Residential Savings):

Urban Water Use Target, GPCD	=	Base Daily per Capita Water Use, GPCD	–	Total Savings, GPCD	=	178.3 GPCD
		227.7		49.4		

DWR developed a Method 4 calculator (an excel calculator) that water suppliers can use to calculate the Method 4 target. The calculator is included in the report as a compact disc and is posted on DWR's website at:
http://www.water.ca.gov/wateruseefficiency/sb7/committees/urban/u4/

APPENDIX A

PUBLIC PARTICIPATION

Water Code section 10608.20(b)(4) requires that Method 4 be developed by DWR "through a public process." This was accomplished through holding several public workshops, and convening an Urban Stakeholder Committee (USC) and an USC Technical Subcommittee. In addition, a public review draft of Method 4 was released for comment. Committee meetings were announced and working documents considered at all meetings were posted on DWR's Web site. All written public comments were posted on the Web site and given consideration.

When work commenced to implement SB X7-7, two public listening sessions were held in Sacramento and Los Angeles on March 8 and 10, 2010, one of which was Web cast. An overview of the requirements of the water conservation law and the tasks DWR needed to perform to implement the law were described. Over 144 people attended these sessions either in person or through the Web cast. They provided comments and proposed an alternative target method for consideration.

The Urban Stakeholder Committee (USC) provides input on five SB X7-7 projects: urban technical methodologies denoted as Project U3, the fourth urban water use target method (U4), the development of a standardized reporting form (B1), regional resource management practices (B2), and the development of process water regulations (U5). The USC consists of 34 members, representing a variety of urban water suppliers, consultants, water supplier associations, and public interest groups. The role of the USC has been to advise and make recommendations to DWR. DWR retained the authority to make decisions independent of USC recommendations, such that DWR had latitude to consider legal and policy constraints and input from the public and other affected parties.

Because of the wide spectrum of SB X7-7 issues to be considered by the USC, a USC Technical Subcommittee (U4 Subcommittee) was created to assist in developing alternatives for Method 4 and providing technical analysis. The subcommittee consisted of 22 members, mostly drawn from the USC but also included others with specialized expertise.

The USC met several times in 2010 and 2011 but the core of the discussion on Method 4 occurred in five meetings of the U4 Technical Subcommittee before focused discussion was turned over to the USC. Members actively participated and provided vigorous dialogue.

In January 2011, 57 people viewed a Web cast tutorial on the draft Method 4. Thirty-two people viewed online, or attended in person, two public meetings held in Sacramento and Los Angeles to receive comment on the draft.

Over the course of the development of Method 4, numerous written comments were received and posted on the Web site.

All public workshops and advisory committee meetings were facilitated by professional consultants. In addition to guiding discussions in an effective way, the facilitation team also worked closely with staff throughout the process between meetings to advise on strategy and ensure that all stakeholders' opinions were given fair consideration. The facilitation team was a valuable addition to the public participation process.

Certain provisions of SB X7-7 are required to be implemented in consultation with the California Urban Water Conservation Council (CUWCC), the Agricultural Water Management Council, the SWRCB, the California Department of Public Health, the California Bay-Delta Authority or its successor agency, and the California Public Utilities Commission. While this consultation requirement did not apply specifically to the development of Method 4, nevertheless, DWR provided opportunity for the two councils and other state and federal agencies to provide input through periodic reporting to the Agency Team created to inform and coordinate with these agencies.

The CUWCC is an organization with 408 members, consisting of urban water suppliers, public advocacy organizations, consultants, product manufacturers, government agencies that do not deliver water, and others. It was created in 1991 to increase urban water use efficiency statewide. Urban water suppliers voluntarily commit to implement 14 best management practices for promoting efficient water use. In 2008 there were 266 water suppliers reporting their implementation of the BMPs. The Executive Director of CUWCC was co-chair of the USC, and CUWCC staff were a part of DWR's staff project team providing technical expertise in developing the target method. The involvement of CUWCC allowed special insight into the impacts and needs of a wide spectrum of water suppliers as well as the perceptions of its public interest members.

SWRCB contributed staff to chair the U4 Technical Subcommittee and to assist DWR in the development of Method 4 and other SB X7-7 tasks.

APPENDIX B

RANDOM SAMPLES USED FOR TARGET DEVELOPMENT AND ANALYSIS

B.1 Random Sample of 31 Urban Suppliers

Each of the four Phase II alternatives was analyzed in detail by applying its methodologies to a random sample of 31 water suppliers to the extent that data were available. The computational results from these analyses served three purposes:

- To calculate adjustment factors that are part of certain alternatives under consideration
- To assess whether and how well alternatives met the ten evaluation criteria set in statute and by DWR
- To provide a comparison of how each alternative might affect the target of water suppliers having certain characteristics, such as climatic conditions.

The random sample is listed in Table B-1 with associated information. Computations were generally run using data for 2005 as a baseline. Because a different methodology is incorporated into the DWR II alternative, it was necessary to rely on data from DWR's Public Water System Statistics (PWSS) and use an average baseline for the period 2000-2009 instead of a single year 2005.

Approximately 430 water suppliers meet the definition of "urban retail water supplier" as defined in section 10608.12(p) of the Water Code and will be subject to the provisions requiring per capita water use targets for the year 2020. Whether the random sample is representative of the total number of water suppliers that will be subject to the law depends on characteristics of the sampled suppliers in relation to the total number of suppliers. Because of climatic differences between hydrologic regions, the representation of the sample in each of the ten hydrologic regions may be important. Also, because membership in CUWCC may indicate a stronger than average implementation of water conservation practices, the representation of the sample in CUWCC may be an indication of a representative sample. The distributions of the random sample by hydrologic region and CUWCC membership status are presented in Tables B-1 and B-3. While the 31 sample group was generally representative, nevertheless, weighting factors were used in the analyses to correct for imbalances. Weighting factors were applied to the random sample in the analyses to normalize the sample for factors of regional and CUWCC membership representation. Population weighting was used for hydrologic region balancing and number of suppliers was used for CUWCC membership balancing.

For the Method 4, the random sample was increased to 52 suppliers (Table B-4) and the year 2000 was used for the baseline year to determine a more accurate adjustment

factor. Weighting factors were also used to normalize the sample for regional and CUWCC membership representation.

Table B-1. Water Suppliers in Random Sample

Water Supplier	Hydrologic Region	2005 Population	CUWCC Member as of 2010	Year Signed CUWCC MOU
Anaheim, City of, PUD	South Coast	341079	Y	1991
Azusa, City of, Light and Power	South Coast	48189	N	
Camarillo, City of	South Coast	46981	Y	1991
Camrosa WD	South Coast	27851	Y	1994
Carpenteria Valley Water District	Central Coast	14284	Y	1996
Chino Hills, City of	South Coast	77678	Y	2006
Clovis, City of	Tulare Lake	89972	N	
Crescent City, City of	North Coast	14000	N	
El Monte, City of	South Coast	16353	N	
Folsom, City of	Sacramento River	66242	Y	2004
Livingston, City of (w/o industrial)	San Joaquin River	14135	N	
Madera, City of	San Joaquin River	50581	N	
Mesa Consolidated WD	South Coast	111737	Y	1994
Newport Beach, City of	South Coast	79320	Y	2005
Oroville, California Water Service Company -	Sacramento River	9870	Y	1991
Pittsburg, City of	San Francisco Bay	62189	Y	1995
Rainbow MWD	South Coast	17750	Y	2009
Redding, City of	Sacramento River	88333	N	
Rincon Del Diablo MWD	South Coast	28200	Y	1991
San Bernardino, City of	South Coast	173359	N	
San Francisco PUC	San Francisco Bay	793403	Y	1991
San Luis Obispo, City of	Central Coast	44687	Y	1991
Santa Margarita WD	South Coast	150759	N	
Santa Monica, City of	South Coast	90576	Y	1991
Santa Paula, City of	South Coast	29500	N	
Seal Beach, City of	South Coast	25387	Y	2002
Simi Valley, Golden State Water Company -	South Coast	41994	Y	1991
South Gate, City of	South Coast	101439	N	
Stockton, City of, Mun Util Dept	San Joaquin River	128600	Y	2006
Vallecitos WD	South Coast	73820	Y	1991
Western MWD	South Coast	63383	Y	1994

Table B-2. 2005 Population Distribution of Random Samples

Region Number	Hydrologic Region	2005 Random Sample			2005 Total Population	
		Hydrologic Region Population	% of Statewide Sample	% of Total HR or State Population	Hydrologic Region Population	% of Statewide Population
1	North Coast	14,000	0.5%	2.1%	673,669	1.8%
2	San Francisco Bay	855,592	29.3%	13.4%	6,404,503	17.5%
3	Central Coast	58,971	2.0%	3.8%	1,534,971	4.2%
4	South Coast	1,545,355	52.9%	7.9%	19,489,176	53.2%
5	Sacramento River	164,445	5.6%	5.7%	2,902,348	7.9%
6	San Joaquin River	193,316	6.6%	9.8%	1,978,183	5.4%
7	Tulare Lake	89,972	3.1%	4.4%	2,067,314	5.6%
8	North Lahontan	0	0.0%	0.0%	106,103	0.3%
9	South Lahontan	0	0.0%	0.0%	783,854	2.1%
10	Colorado River	0	0.0%	0.0%	704,861	1.9%
Total		2,921,651	100.0%	8.0%	36,644,983	100.0%

Table B-3. 2000 CUWCC Membership (2005 not analyzed)*

Membership Status	Random Sample		All Suppliers	
	# Suppliers	%	# Suppliers	%
Members	14	45.2	163	41.8
Non-Members	17	54.8	227	58.2
Total	31	100.0	390	100.0

*Note: Population distribution by CUWCC membership status is not available.

Table B-4 Random Sample of 52 Urban Suppliers

Urban Supplier	Baseline GPCD (Sorted)	Indoor Residential Savings						Metering Savings GPCD BMP 1.3	CII Savings BMP 4 GPCD	Estimated per Capita Landscape Water Use and Water loss GPCD B-70- [J*10]	Landscape + Water Loss Savings GPCD K * 0.216	Total Savings GPCD (IR from BMP calculator) G+	Total Savings GPCD (default IR assumption)	Total Savings Percent (IR from BMP calculator)	Total Savings Percent (default IR assumption)
		Option 1 - Use BMP Calculator					Option 2 - Use Default								
		Single Family Toilets GPCD	Multi Family Toilets GPCD	Residential Washers GPCD	Residential Showers GPCD	Total IR Savings GPCD C + D + E + F	IR Savings GPCD					G + I + J + L	H + I + J + L	M / B * 100	N / B * 100
San Francisco PUC	101	-2.5	-5.2	-6.0	-0.2	-13.8	-15.0	0.0	-3.3	-1.8	0.4	-16.7	-17.9	-16.6	-17.7
Santa Cruz	115	-5.9	-2.2	-5.6	-0.2	-13.9	-15.0	0.0	-3.6	9.0	-1.9	-19.5	-20.5	-16.9	-17.9
Carpenteria Valley WD	121	-4.3	-3.5	-5.8	-1.2	-14.8	-15.0	0.0	-3.2	18.3	-4.0	-22.0	-22.2	-18.2	-18.4
San Luis Obispo	124	-1.5	-2.7	-5.8	0.0	-10.0	-15.0	0.0	-3.7	16.9	-3.7	-17.4	-22.4	-14.0	-18.0
Calaveras County WD	126	-7.3	-0.3	-6.5	-1.0	-15.1	-15.0	-12.8	-2.5	31.5	-6.8	-37.1	-37.0	-29.5	-29.4
San Fernando	133	-5.3	-1.9	-5.4	-0.4	-13.0	-15.0	0.0	-3.3	30.2	-6.5	-22.8	-24.8	-17.1	-18.7
Santa Monica	136	-2.5	-3.1	-6.4	-0.7	-12.7	-15.0	0.0	-3.9	27.4	-5.9	-22.5	-24.8	-16.5	-18.2
Seal Beach	146	-4.3	-4.8	-6.5	-1.2	-16.8	-15.0	0.0	-2.7	49.3	-10.7	-30.1	-28.3	-20.6	-19.4
Helix WD	155	-4.2	-3.5	-5.8	-1.3	-14.8	-15.0	0.0	-1.9	65.8	-14.2	-30.9	-31.1	-20.0	-20.1
Padre Dam Municipal WD	155	-6.1	-1.3	-5.7	-0.6	-13.7	-15.0	0.0	-1.1	73.7	-15.9	-30.8	-32.1	-19.8	-20.7
La Palma	155	-6.2	-1.6	-5.8	-1.3	-14.8	-15.0	0.0	-1.6	68.8	-14.9	-31.3	-31.5	-20.2	-20.3
Camarillo	160	-5.6	-0.2	-5.7	-0.6	-12.1	-15.0	0.0	-5.6	34.1	-7.4	-25.1	-28.0	-15.7	-17.5
Huntington Beach	161	-4.5	-3.1	-6.0	-1.1	-14.7	-15.0	0.0	-1.9	71.8	-15.5	-32.1	-32.4	-20.0	-20.1
El Monte	162	-5.4	-2.5	-5.3	-1.2	-14.4	-15.0	0.0	-6.6	26.3	-5.7	-26.6	-27.3	-16.4	-16.8
Crescent City	163	-3.5	-1.2	-3.5	-1.2	-9.5	-15.0	0.0	-9.5	-2.0	0.4	-18.5	-24.1	-11.4	-14.8
CWSC - Coronado	163	-4.1	-3.5	-5.7	-0.8	-14.1	-15.0	0.0	-5.6	36.6	-7.9	-27.7	-28.5	-17.0	-17.5
Santa Paula	164	-5.4	-2.5	-5.5	-1.1	-14.5	-15.0	0.0	-0.8	85.9	-18.6	-33.9	-34.4	-20.7	-21.0
CWSC - Livermore	169	-6.4	-0.5	-5.8	-1.1	-13.8	-15.0	0.0	-1.8	80.7	-17.4	-33.0	-34.3	-19.5	-20.3
Pittsburg	170	-5.6	-1.5	-5.7	-0.7	-13.5	-15.0	0.0	-3.9	61.1	-13.2	-30.6	-32.1	-18.0	-18.9
Livingston	172	-6.4	-1.6	-5.3	-1.2	-14.5	-15.0	-20.1	-3.4	68.0	-14.7	-52.8	-53.2	-30.7	-30.9
Mesa Consolidated WD	177	-3.0	-4.0	-5.9	-1.0	-13.9	-15.0	0.0	-5.3	53.8	-11.6	-30.8	-31.9	-17.4	-18.0
Escondido	178	-4.6	-2.4	-5.6	-1.0	-13.6	-15.0	0.0	-4.3	64.8	-14.0	-31.9	-33.3	-17.9	-18.7
GSWC Simi Valley	186	-6.7	-1.0	-5.7	-1.3	-14.7	-15.0	0.0	-1.5	101.5	-21.9	-38.1	-38.4	-20.5	-20.6
Vallecitos	187	-4.1	-0.6	-5.6	0.0	-10.3	-15.0	0.0	-3.9	78.5	-17.0	-31.1	-35.8	-16.6	-19.2
Torrance	188	-5.3	-3.3	-6.1	-1.3	-15.9	-15.0	0.0	-5.3	64.6	-14.0	-35.2	-34.3	-18.7	-18.2
Arroyo Grande	191	-6.6	-2.2	-6.0	-1.2	-16.0	-15.0	0.0	-1.9	101.7	-22.0	-39.9	-38.9	-20.9	-20.4
Azusa	205	-5.6	-2.5	-5.8	-1.0	-14.9	-15.0	0.0	-2.1	114.5	-24.7	-41.7	-41.8	-20.3	-20.4
Chino Hills	207	-7.5	-0.8	-5.6	-1.2	-15.0	-15.0	0.0	-1.0	127.0	-27.4	-43.4	-43.4	-21.0	-21.0
Clovis	214	-4.3	-1.4	-5.8	-0.7	-12.2	-15.0	0.0	-4.3	100.9	-21.8	-38.3	-41.1	-17.9	-19.2
Ventura Water Works	215	-6.3	-1.4	-5.7	-1.1	-14.6	-15.0	0.0	-1.9	126.1	-27.3	-43.8	-44.2	-20.3	-20.5
Newport Beach	217	-5.5	-3.3	-6.2	-1.2	-16.2	-15.0	0.0	-1.5	132.0	-28.5	-46.3	-45.0	-21.3	-20.7
Anaheim PUD	221	-4.3	-3.2	-5.6	-1.0	-14.1	-15.0	0.0	-8.4	66.6	-14.4	-36.9	-37.8	-16.7	-17.1
Rainbow MWD	222	-6.1	-0.7	-5.7	-1.1	-13.6	-15.0	0.0	-0.6	146.1	-31.6	-45.8	-47.2	-20.6	-21.2
Sacramento Suburban WD	228	-7.6	-1.6	-6.0	-1.3	-16.5	-15.0	-8.3	-6.9	89.3	-19.3	-50.9	-49.4	-22.3	-21.7
Manteca	229	-6.4	-1.5	-5.5	-0.5	-13.8	-15.0	0.0	-2.9	129.8	-28.0	-44.7	-46.0	-19.5	-20.1
Palmdale WD	234	-5.6	-1.2	-5.6	-0.8	-13.2	-15.0	0.0	-2.8	136.5	-29.5	-45.4	-47.2	-19.4	-20.2
San Bernardino	239	-5.4	-3.6	-5.7	-1.3	-16.0	-15.0	0.0	-3.3	135.9	-29.4	-48.6	-47.7	-20.3	-19.9
Rincon Del Diablo MWD	243	-5.2	-2.6	-5.8	-0.5	-14.1	-15.0	0.0	-3.8	134.9	-29.1	-47.1	-48.0	-19.4	-19.7
Corcoran	249	-3.3	-0.8	-2.6	-1.2	-7.9	-15.0	-14.9	-12.4	54.5	-11.8	-47.0	-54.1	-18.9	-21.8
Madera	251	-4.6	-1.7	-5.7	-0.9	-12.9	-15.0	-36.4	-5.3	127.9	-27.6	-82.3	-84.3	-32.8	-33.6
Lodi	264	-6.6	-2.9	-5.7	-1.1	-16.3	-15.0	-41.7	-5.2	141.6	-30.6	-93.9	-92.5	-35.6	-35.1
Santa Margarita	268	-5.5	-1.6	-5.9	-1.0	-14.0	-15.0	0.0	-0.9	188.6	-40.7	-55.7	-56.7	-20.8	-21.2
Redding	268	-4.8	-2.3	-6.0	-1.0	-14.1	-15.0	0.0	-9.3	105.2	-22.7	-46.1	-47.0	-17.2	-17.5
CWSC - Chico Hamilton	279	-3.1	-1.9	-5.8	-1.0	-11.8	-15.0	-23.5	-6.6	142.4	-30.8	-72.7	-75.9	-26.1	-27.3
CWSC - Selma	283	-4.9	-1.1	-5.6	-0.6	-12.1	-15.0	-29.7	-5.7	156.3	-33.8	-81.2	-84.1	-28.7	-29.7
Camrosa WD	291	-6.2	-1.0	-5.9	-1.1	-14.2	-15.0	0.0	-4.5	175.8	-38.0	-56.7	-57.5	-19.5	-19.8
Oroville CWS	300	-5.8	-2.3	-5.8	-1.4	-15.3	-15.0	-6.1	-13.7	93.2	-20.1	-55.2	-54.9	-18.4	-18.3
Folsom	310	-4.2	-1.0	-5.2	-0.7	-11.0	-15.0	-34.1	-1.7	223.4	-48.3	-95.0	-99.0	-30.7	-31.9
Western MWD	319	-6.2	-0.7	-5.7	-0.9	-13.4	-15.0	0.0	-3.1	218.0	-47.1	-63.6	-65.2	-19.9	-20.4
Fair Oaks WD	329	-7.5	-1.2	-5.1	-1.3	-15.1	-15.0	-46.2	-2.4	234.7	-50.7	-114.5	-114.3	-34.8	-34.8
Mammoth Community WD	372	-4.6	-1.4	-6.0	-1.0	-13.0	-15.0	0.0	-2.7	274.7	-59.4	-75.1	-77.1	-20.2	-20.7
GSWC - Barstow	395	-5.6	-1.7	-5.9	-1.1	-14.3	-15.0	0.0	-14.6	179.0	-38.7	-67.5	-68.3	-17.1	-17.3
Average	**210**	**-5**	**-2**	**-6**	**-1**	**-14**	**-15**	**-5**	**-4**	**98**	**-21**	**-44**	**-46**	**-21**	**-21**
Weighted Average GPCD	**192**	**-5**	**-3**	**-6**	**-1**	**-14**	**-15**	**-3**	**-4**	**81**	**-17**	**-38**	**-39**	**-20**	**-20**

	Average	Weighted Average
baseline		192
20% Per capita Savings		38
IR + metering + CII savings		21
Additional Savings required to make 20% statewide =C61-C62		17
Landscape Water Use & Water Loss		81
Landscape and Water Losss Saving Factor		0.216

APPENDIX C

PROPOSED METHOD 4 ALTERNATIVES

C.1 Association of California Water Agencies' Proposal April 19, 2010

Executive Summary

The Association of California Water Agencies (ACWA) and its members have supported and implemented a variety of water conservation measures over the past twenty years. The implementation of SB X7-7, enacted in November 2009, will require water agencies throughout California to continue and increase that commitment to water conservation over the next ten years to achieve the state's goal of a 20% reduction in water use, measured in gallons per capita per day (gpcd).

The legislation requires that urban retail water suppliers must calculate their respective demand reduction targets by one of four methods: a 20% reduction in baseline gpcd water use, achieving set performance standards, achieving 95% of the applicable state hydrologic region target, or through a method to be identified and developed by DWR. This fourth option is to take into account: climatic and population density differences, provide flexibility to communities and regions, plant water needs, and different levels of CII water use.

The ACWA Option 4 proposal includes two elements:

- A procedure through which a water supplier can establish a target for water conservation that will require the agency to contribute its fair share of the statewide 20% reduction; and

- Acknowledgement that code enforcement/water metering, urban use of recycled water, and active water conservation should all be considered in demonstrating compliance with the 20% Option 4 reduction target.

To establish a target, Option 4 takes as its foundation that water use in any two water systems can be compared on a water use efficiency basis. It is recommended that DWR establish landscape water use in agencies that could use Option 3 as a reference standard. Other urban retail suppliers could then determine their local water conservation target by comparing landscape water use in their service areas to the reference standard.

Calculations to account for variances in climate, plant water needs and population density from the reference standard can be performed to establish adjusted landscape efficiency targets. The indoor residential target will be 95% of reference area current indoor use. Finally, commercial, industrial and institutional use would be set at a 10%

reduction until the recommendations of the DWR/CUWCC Taskforce provide more appropriate direction.

Compliance with the 20% Option 4 conservation target will not be the only driver for water conservation over the next decade. The 2009 State Water Plan has identified four strategies that must be considered, since all will play a role in assuring compliance with the 20% target: code enforcement/water metering, urban water recycling, locally cost effective active conservation, and grant funded active conservation. Finally, there are examples of California water agencies aggressively implementing all five of the current CUWCC Best Management Practices for water conservation. These should be considered as potential tools that will assure meeting the 20% goal.

Introduction

This whitepaper describes a proposal by the Association of California Water Agencies (ACWA) for consideration by the Department of Water Resources (DWR) in implementing the so-called "Option 4" for water conservation as enacted in SB X7-7 (Water Code section 10608.20(b)(4)).[1] This proposal is intended to achieve three goals that are implicit in the statutory language: (i) ensuring that urban retail water suppliers that do not choose one of the other three "option paths to compliance" with the Governor's 20x2020 contribute their fair share towards a 20% reduction in statewide per capita urban water use by 2020, (ii) providing those urban retail water suppliers with flexibility to adopt water conservation plans that are tailored to the unique circumstances of each water district service area, and (iii) encouraging regional cooperation to maximize regional and statewide benefits and reduce the costs of implementing conservation measures.

Background – California Urban Water Conservation Council

The State Water Resources Control Board (SWRCB) placed increased emphasis on urban water conservation during the 1980's. During that same period, it became apparent that a formal process was needed to identify good urban water use efficiency and conservation practices as well as track progress in implementation of those practices. Urban conservation in the state took a major step in 1991 when the California Urban Water Conservation Council (CUWCC) was created, as urban water agencies, environmental interests, and the business community came together to sign the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU). Key to the MOU is a set of Best Management Practices (BMPs) for water conservation. The BMPs are measures that are the most effective water conservation measures currently available. Each BMP is regularly reviewed for effectiveness and updated as needed. Additionally, as new technologies or practices become available, they are considered for inclusion in the list of BMPs as well. The most recent review and revision of the BMPs took place in December 2008. During this process, the BMPs were categorized as either Foundational or Programmatic. The Foundational BMPs include Utility Operations, and Education and Public Information, which are those activities that a water supplier carries out as a matter of its regular course of business. The Programmatic BMPs address the Residential; Commercial, Industrial and

[1] Further references to the Water Code sections adopted by SB X7-7 will be to their code section number, so "10608.20" would be a reference to Water Code section 10608.20.

Institutional (CII); and Landscape water conservation sectors. A key component of the revised Programmatic BMPs is a "flex list" of measures to achieve implementation savings goals. This flex list concept allows water agencies more latitude in designing conservation programs best suited to their geographic and demographic circumstances. Finally, every two years (the reporting period required by the MOU), the CUWCC provides a report to the SWRCB that summarizes BMP implementation reports received from the MOU signatories.

The Governor's Call for Urban Water Conservation

A confluence of significant events has impacted California's water supplies and increased the focus on water use efficiency and conservation, including:

- severe declines of key fish populations in the Sacramento-San Joaquin Delta,
- resulting legal and regulatory actions that have reduced the withdrawal of water from the Delta for use in southern California, the southern Bay Area and the San Joaquin Valley,
- increased awareness that climate change may result in changes in Sierra and Colorado River system snowpack, river flows, and in sea levels worldwide,
- drought from 2006 through 2009, which has resulted in a deficit in precipitation in the northern and central Sierra, where much of California's water supply originates.

In light of these circumstances, on February 29, 2008, the Governor sent a letter to the Legislature that called for a statewide 20% reduction in per capita water use by 2020. Water conservation alone will not solve all of California's many water supply challenges, but most agree with the Governor that urban water conservation has an important role to play in future water management strategies.

SB X7-7

Enacted in November 2009 and effective as of January 1, 2010, SB X7-7 establishes the State's intent to achieve a 20% reduction in statewide urban per capita water use by 2020. It also contains new requirements for agricultural water suppliers.

The urban sector requirements of the bill apply mainly to urban retail water suppliers. Urban retail water suppliers must determine their "base daily per capita water use" and report it in their 2010 UWMPs by July 1, 2011 (this time extension is granted by the bill). They must utilize one of three methods identified in the bill:

- Average gross water use over a continuous 10-year period ending no earlier than Dec 31, 2004 and no later than Dec 31, 2010 (definition of gross water use is included in the bill).
- For retailers with at least 10% of 2008 demand served by recycled water (provided by either retailers or wholesalers), this calculation may be extended to include an additional five years ending no earlier than Dec 31, 2004 and no later

than Dec 31, 2010.

- For those retailers that are already close to their gpcd reduction targets (no more than 5% reduction), the estimate of average gross water use reported in gpcd and calculated over a continuous five-year period ending no earlier than Dec 31, 2007 and no later than Dec 31, 2010.

Urban retail water suppliers must also calculate their respective demand reduction targets by utilizing one of four methods identified in the bill:

1. 80% of baseline gpcd water use (i.e., a 20% reduction) (referred to herein as Option 1).

2. The sum of the following performance standards: indoor residential use (provisional standard set at 55 gpcd); plus landscape use equivalent to the State Model Landscape Ordinance (70% of ETo); plus 10% reduction in baseline CII use by 2020 (referred to herein as Option 2).

3. 95% of the applicable state hydrologic region target as set in the Draft 20x2020 Water Conservation Plan (April 03, 2009) (referred to herein as Option 3). For those urban retail water suppliers already meeting the applicable hydrologic region target this represents a 5% reduction.

4. A method to be identified and developed by DWR through a public process and reported to the Legislature by Dec 31, 2010, to achieve a cumulative statewide 20% reduction. An agency is not bound to use this new method if it results in a target that is higher than 20% for that agency***.*** It is this methodology that is the subject of this white paper (referred to herein as Option 4).

Option 4 must take into account climatic differences and population density differences within the State, provide flexibility to communities and regions, consider different levels of per capita water use according to plant water needs in different regions, consider different levels of CII water use in different regions, and avoid placing an “undue hardship” on communities that “have implemented conservation measures or taken actions to keep per capita use low.”

Through a concurrent public process, and in consultation with the CUWCC, DWR also must develop technical methodologies and criteria for the “consistent implementation” of all four paths to targeted reductions, such as methodologies for calculating daily per capita water use, baseline CII water use, compliance daily per capita water use, gross water use, service area population, indoor residential water use and landscaped area water use (10608.20(h)(1).) ***Urban retail water suppliers are required to use these methods once they are developed.*** (10608.20(h)(2)). Urban retail water suppliers must meet their interim gpcd targets, which are equal to one-half of the reduction to meet the target, by Dec 31, 2015 and their final targets by Dec 31, 2020 (10608.24(a)-(b)).

Wholesalers must comply with other requirements established by SB X7-7. They must

provide in their UWMPs "an assessment of present and proposed future measures, programs and policies to help achieve the water use reductions required…" (10608.36). Wholesalers may participate as part of a regional compliance effort (10608.28).

Retail suppliers may comply individually, or as a regional group by mutual agreement of the participating entities (10608.28). Regional compliance may be through a wholesaler and its retail member agencies, regional water management group, integrated regional water management plan funding area, hydrologic region or other appropriate geographic scale approved by DWR (10608.28). This approach is not mandatory, but is an option that agencies can choose (10608.28). Should a regional water management group decide to take on planning and reporting for retail agencies, all data and reports must include information for both the regional water management group and for each consenting retailer and urban wholesaler supplier separately (10608.28(b)).

Proposal

ACWA believes that Option 4 should include two elements:

- First, Option 4 should describe the procedure through which a water agency can establish a target for water conservation within its service area represented as gpcd in 2020. The target will require that agency to contribute its "fair share" to accomplishing California's goal of reducing urban water use 20% per capita statewide by 2020 and will also take into account the agency's unique circumstances as required by SB X7-7 (10608.20(b)(4)).

- Second, to demonstrate compliance with the Option 4 20% reduction target, code enforcement/water metering, urban use of recycled water, and active water conservation should all be considered.

Establishing Target

SB X7-7's first three conservation options rely on generalized statewide standards. Option 1 requires a flat 20% reduction in a retailer's water use. Option 2 is a formula using standardized criteria that are not subject to modification (55 gpcd indoors, 70% of reference evapotranspiration outdoors and a 10% reduction in the CII sector). Option 3 uses regional gpcd targets established in the draft DWR 20x2020 Water Conservation Plan, which relied on statewide weighted averages of water use, but without consideration for differences in land use density, and minimal consideration of climatic differences, and then requires a further 5% water-use reduction. Option 1 represents a conservation target, in that 20% must be achieved, whereas Option 2 identifies a level of efficiency that must be reached, regardless of an agency's baseline. Option 3 is a hybrid, requiring a 5% reduction if the regional efficiency target can be reached, again regardless of the baseline starting point.

Option 4 requires DWR to develop gpcd targets that specifically recognize local variations in factors beyond water agencies' control – including climate and land use density – that will significantly affect local per capita landscape water use. Indoor water use and CII water use targets are mostly unaffected by climate and land use density and under Option 4, would be handled in a manner that is consistent with the other options.

Under all four options once an urban retail water supplier has established a target, it can achieve that target through conservation in any combination of the outdoor residential, indoor residential or CII sectors.

Proposed Methodology

Option 4 takes, as its foundation, that water use in any two water systems can be compared on a water use efficiency basis. By separating CII and indoor water use from landscape water use we can recognize the inherent variations in CII use between communities, develop fair standards for indoor use for everyone and make valid comparisons of landscape water use by taking into account the differences in the amount of landscaped area per capita and reference ETo rates.

Option 4 recommends that DWR establish a reference standard for landscape water use (in gpcd) by taking a weighted average of landscape water use, amount of landscaped area per capita and reference ETo rates for all of the agencies that currently meet the targets in the 20x2020 Water Conservation Plan (Draft), and would thereby qualify for a 5% reduction under Option 3.

Option 4 then provides for an urban retail water supplier determining its local water conservation target (in gpcd) by comparing landscape water use to the reference standard. This approach effectively represents a comparable level of water efficiency as agencies qualifying for Option 3. This methodology directly takes into account climactic variations, population density and plant water needs as identified by the Legislature. Past conservation efforts are incorporated implicitly by comparing to the highly efficient areas qualifying for option 3. This methodology treats the three components of urban water use (CII, indoor residential and outdoor residential) as conceptually distinct, but retains the Legislature's fundamental requirement that water use efficiency as a whole should be viewed through the lens of gpcd. The methodology provides for the wide variability of CII use by separating out CII, treating it consistently with other parts of the legislation, and recognizing the future work of the CII task force. The calculations below for the CII, indoor, and landscape components are for the purpose of determining an overall conservation target (in gpcd), but do not imply specific requirements for each water use sector nor which sector a supplier will focus on to meet its target.

Preliminary Calculations

Determine agency's gross water use as defined in the Water Code 10608.12(g).

1. Determine CII annual water use by means of meters/accounts and deduct CII water use from gross water use. Convert to gallons and divide the CII use by 365 (days) and the population to convert to gpcd.

2. Solely for the purpose of determining supplier's ***existing*** indoor residential water use, calculate (in gpcd) indoor use using the method that is most technically reasonable for the supplier:

a. 70 gpcd[3]

b. Average January or February daily water deliveries in gallons, divided by population.

c. Available data from dedicated indoor/landscape meters.

Note: This proposal uses these methods of determining indoor water use only for determining existing use in order to allow suppliers to determine their outdoor use. As discussed below, this proposal uses other methods for determining the indoor use component of the supplier's 2020 water-use target.

3. Calculate outdoor landscape water use in gpcd as the remainder when CII and indoor use are subtracted from gross water use.

Reference Area

The Reference Area is defined as a consolidated representation of those urban retail suppliers that qualify for Option 3 by currently meeting the regional hydrologic targets in DWR's draft 20x2020 Water Conservation Plan or by qualifying for the 100 gpcd exemption. Using this Reference Area allows a supplier to compare its water use efficiency with the water use efficiency of the agencies that the Legislature recognized as being highly efficient due to past conservation efforts.

4. DWR will calculate (using the same methodology as above) the gpcd in the Reference Area for CII uses, indoor residential water use and landscape water use.

5. DWR will calculate the population-weighted evapotranspiration for the Reference Area based on its ETo map.

6. DWR will calculate the population-weighted landscape area for the Reference Area in square feet per capita.

Calculating the Urban Retail Water Supplier's Target gpcd

7. Calculate the landscape component of the water use target (in gpcd) by applying the following adjustments:

a. To adjust for climate and plant water needs, multiply the Reference Area landscape water use estimate (in gpcd) by the ratio of your agency's ETo to the Reference Area ETo (in inches).

b. Landscape area is inversely related to population density. To adjust the calculation for population density, or more accurately, differences in landscape area per capita, an estimate for a net landscape area must be determined. Landscape area can be determined through aerial photos, planning agency data, on-site surveys or other methods. Multiply the

result of calculation 7(a) above by a factor that is the ratio of your agency's landscape area in square feet per capita divided by the Reference Area's landscape area in square feet per capita. (Again, DWR will calculate the landscape area for the Reference Area.)

c. Multiply the result of 7a and 7b by 0.95 to reflect the 5% reduction required on the part of agencies using Option 3. The result is landscape water use component of the supplier's conservation target (in gpcd).

8. Calculate the indoor residential water use component of the target by multiplying indoor use in the Reference Area by 0.95.

9. The CII component of the supplier's target will be calculated as follows:

   a. Multiply the CII portion of your gross water use (from Step 1) by 0.90 (a 10% reduction). This 10% reduction is consistent with the CII reduction in Option 2. In accordance with the CUWCC's BMP 4, credit for prior activities may be claimed for up to 50% of the reduction.

   b. After the DWR and CUWCC's CII task force has submitted its report to the Legislature by April 1, 2012 under SB X7-7 (10608.43), the report recommendations shall be considered in updating the urban water supplier's targets.

10. Calculate your Option 4 gpcd target by adding the three components above: your landscape water use component, your indoor residential water use component, and your CII components.

In short, this option is crafted to ensure that – allowing for statutorily-permissible factors such as population density and climate – agencies choosing Option 4 achieve at minimum an equivalent level of water use efficiency as the collective population-weighted average of those agencies recognized by the Legislature as being highly efficient, which would qualify under Option 3.

<u>Achieving a 20% Reduction in Urban Per Capita Water Use</u>
As noted above, SB X7-7 is intended to implement the Governor's call for a 20% statewide reduction in per capita urban water use by 2020. DWR, the Natural Resources Defense Council and ACWA all agree that the appropriate test is whether Option 4 – if it were implemented by all urban water agencies in California – would result in a 20% statewide reduction in per capita water use by 2020.

The best available data – specifically data available in the Department's most recent California Water Plan – indicates that the implementation of conservation measures under the Urban Water Management Plan Act and other laws should achieve a 20% reduction in per capita water use by 2020.

However, compliance with the conservation target, regardless of which option a supplier selects, will not be the only driver for water conservation over the next decade. For a

variety of reasons, water supplier efforts may exceed those identified in their 2010 UWMPs.
DWR estimates, in the 2009 California Water Plan Update, that the following water conservation programs will be implemented by 2030. To demonstrate how those savings ratios might be applied to the 20% statewide reduction, proportional savings to 2020 are used below.

1. Code enforcement/water metering. Under existing law, nearly urban water suppliers in California will be required to begin metering water deliveries and charging based on volumetric rates by 2020. Also under existing law, new construction will be required to meet a standard of 20% reduction in water use beginning in 2011. The Department estimates that these two programs will combine over the next decade to reduce urban water use by a total of 769,000 acre-feet annually (afy).

2. Use of recycled water. In 2009, SWRCB adopted an aggressive new policy to encourage the use of recycled water in California. DWR estimates that there may be as much as 700,000 to 850,000 afy of additional recycled water use by 2020; the SWRCB's policy calls for a minimum of an additional 200,000 afy by 2020.

3. Active conservation. Due to climate change and decreased water supplies, many urban water agencies, particularly in Southern California, are turning to conservation as a cost-effective means to improve water supply reliability. Simply put, conservation will be the most reliable and cost-effective source of new water for many agencies. The DWR estimates that the average cost of water conserved is approximately $227/af and that, by 2020, California urban water agencies will conserve an additional 773,000 afy. Further, the implementation of Proposition 84 will provide hundreds of millions in grants over the next decade that may be used for water conservation measures (and other water management strategies, including recycling) that are not locally cost-effective. DWR estimates that these grant funds will result in an additional 224,000 afy of conserved or recycled water.

Combining these measures would result in just under two million acre-feet of new water supplies from conservation over the next ten years. Using the Department of Finance's estimate that California will have approximately 44.13 million people in urban areas in 2020, these programs would result in a net reduction in water use of 39 gpcd (or more), which is approximately equal to 20% of the current 192 gpcd. Thus, current programs for water conservation can – at the statewide level – result in meeting the Governor's goal of a 20% statewide reduction in per capita urban water use by 2020.

The question for Option 4, therefore, is whether it will require urban retail water agencies to implement each of these programs (while, at the same time, requiring the establishment and attainment of hard targets).

a. Option 4 is consistent with the implementation of code enforcement efforts

because those efforts are driven by other provisions of state law and nothing in Option 4 would undercut those efforts. Indeed, by establishing an indoor residential target at 95% of current use in the Reference Areas, Option 4 may well encourage retrofits over and above those required by CALGREEN (which requires a 20% reduction in interior water use in all new construction.) Moreover, because implementation of these measures is largely within the control of cities and counties that have direct incentives (e.g., compliance with the California Building Code) to implement the law aggressively and so create local construction jobs, it seems likely that water agencies will meet DWR's estimates and that Option 4 will enhance those efforts.

b. Option 4 also provides a very substantial incentive to the implementation of recycled water programs because, under SB X7-7, the use of recycled water does not count in determining an agency's water use. Thus, the substitution of recycled water for outdoor irrigation with potable water would be a way for an urban retail water agency to meet its ratepayers' desire for outdoor landscaping while still reducing per capita water use. In these ways, Option 4 will allow urban retail water agencies to reduce outdoor residential water use and to reduce outdoor CII use (e.g., public parks and playgrounds, soccer fields, commercial landscaping, and the like). Given the Department's relatively minimal goal of 200,000 afy (the Orange County Water District GWRS plant, by itself, accounts for about 70,000 afy), it seems likely that these incentives could result in substantial conservation over and above the levels anticipated by DWR.

c. Option 4 is also consistent with the implementation of water conservation measures as a way to improve water supply reliability; many agencies have adopted this strategy over the past decade and many more are likely to do so with the advance of climate change. For all of these reasons, Option 4 is not only consistent with the implementation of efforts that DWR's analysis suggest are needed to meet the SB X7-7 mandate; Option 4 reinforces the incentives that agencies have to implement these measures vigorously.

Of course, due to the recent enactment of the law, there is presently substantial uncertainty about how individual agencies will, collectively, satisfy the mandate that they implement water conservation measures that are sufficient to meet the statewide goal of a 20% reduction in urban per capita demand by 2020. The first "official" indication of each urban retail water agency's conservation target will come with submission of the 2011 urban water management plans (in which each agency will formally identify which of the four conservation compliance options it will be using and its specific water savings target). After the conservation information from the 2011 plans is aggregated by DWR, DWR and stakeholders can then update the projected aggregate total.

It should be noted that an additional uncertain element would provide great opportunity to assist in moving the state toward the 20 percent by 2020 urban goal (or possibly beyond 20 percent): passage of the November 2010 water bond. With $250 million identified for conservation, $1 billion for recycled water and much more in the way of funding for other programs where grants can be used for conservation (such as the IRWM program), the bond could be tremendously effective in ensuring that the goal is

reached. Needless to say, ACWA strongly supports the passage of the bond.

The best available data from the Department's most recent California Water Plan demonstrates that local agencies' implementation of key measures should reduce per capita use by 20% statewide in the same manner contemplated by SB 7. ACWA's proposed Option 4 approach will increase the likelihood of that result by adding an additional conservation requirement to those on which the Department based its projection. Specifically, ACWA's proposed Option 4 approach would require all agencies that select that approach to achieve the same level of water use efficiency achieved by agencies that the Legislature identified as exemplary in enacting Option 3. This requirement would require agencies that select ACWA's proposed Option 4 approach to achieve greater conservation than the Department has estimated that they will achieve due to other factors. Because ACWA's proposed Option 4 approach – if implemented by all agencies – effectively would require more conservation than the level of conservation that the Department assumed in the Water Plan, and because the Water Plan estimates that the state will achieve a 20% reduction in water use by 2020, ACWA's proposal satisfies SB 7's requirements for Option 4, while also incorporating SB 7's requirements for local flexibility.

Tools for Water Conservation

Urban retail water suppliers will require tools to reduce their water uses under Option 4. CUWCC has identified useful water conservation tools in, among other places, its two Foundational BMP categories, including Utilities Operations and Education Programs.

The implementation of the three Programmatic BMP sectors is where the flexibility of Option 4 will be most beneficial to water agencies. A 2008 California Urban Water Agencies (CUWA) study of its member agencies provides some excellent examples of Programmatic BMP programs designed to best meet the needs of the diverse service areas across California and encourage regional cooperation. Each of these programs, or tools, considered population and climate condition variables to develop effective programs reflective of needs of the community served. Below are some select examples of programs included in the study. While these programs were specifically designed for unique circumstances, they are exactly the types of programs and measures that are included in the attached Appendix A, CUWCC Flex List, and which should be encouraged through the Option 4 process.

Regional Water Authority – The City of Sacramento and 21 other water agencies in the Sacramento metropolitan area work cooperatively to conserve water and obtain grant funding for water conservation programs. Notable programs that have achieved water efficiency on a regional scale include public outreach, school education, residential and commercial rebate programs and landscape programs.

Geographic Information Systems (GIS) Tools – Alameda County Water District uses GIS to link irrigation meters to parcels for customers with dedicated landscape accounts, including city parks. Parcels are digitized to determine landscaped area measurements and then these accounts are added to the district's water budget program. Water budget reports are sent to customers and their landscape contractors

three times per year. District customers with a dedicated landscape water meter who remain within their water budget for the previous year are recognized. Participants and their landscape contractors receive an award certificate and their business name and landscape contractor are placed on a list that is published in the local newspaper one Sunday in May during Water Awareness Month.

Commercial Landscape Survey Program – The City of San Diego Commercial Landscape Survey Program is provided free of charge to CII customers with more than one acre of landscaped property in the city. Qualifying properties receive an audit of the irrigation system, practical advice, water-saving recommendations, a water-use budget, a written evaluation of the irrigation system's performance, aerial photos of the property, a water-use estimate for the upcoming year, and an irrigation controller schedule for each month. In fiscal year 2008, 135 water budgets were produced with new water savings of 75,802 gallons per day with most properties reporting water savings between 20 and 40 percent.

Regional CII Program - By combining all of their member agency CII programs into one large regional program more than seven years ago, Metropolitan Water District designed one of the most comprehensive CII programs in the nation. Last year alone, the program expanded from 18,000 devices rebated to more than 43,000 devices rebated. Over 110,000 devices have been rebated since the regional program started. The regional design also allows Metropolitan and its member agencies to partner with the energy utilities such as Southern California Edison and Sempra rebates for commercial clothes washers, food steamers and other technologies.

High-Efficiency Clothes Washer Programs – East Bay Municipal Utility District (East Bay MUD) led the effort among CUWA members to obtain grant funding for a high-efficiency clothes washer program. CUWA members have partnered with Pacific Gas and Electric Company to provide rebates for the purchase of high-efficiency clothes washers. This innovative program is offered to more than 100 Bay Area communities and allows customers to complete a single rebate application for both a water and energy rebate. CUWA members participating in the program include Alameda County Water District, Contra Costa Water District, East Bay MUD, Santa Clara Valley Water District, San Francisco PUC, and Zone 7 Water Agency. San Diego County Water Authority started its high-efficiency clothes washer incentive program in 1994 and provided financial incentives that resulted in the installation of nearly 80,000 high-efficiency clothes washers. Through joint funding and marketing with San Diego Gas and Electric, in fiscal year 2008 alone, the program was responsible for the replacement of over 17,000 inefficient clothes washers with high-efficiency clothes washers. Metropolitan Water District of Southern California (Metropolitan) has provided rebates for high-efficiency clothes washers since 1995, and the City of Sacramento (Sacramento) has provided rebates to residential customers since 2004.

Attachment A
CUWCC Flex Track Menus
(From the CUWCC Website)

2008 Flex Track Menus

In addition to the measures on the BMP List, the Flex Track menu options may be implemented to meet the savings goal for this BMP. Agencies choosing the Flex Track option are responsible for achieving water savings greater than or equal to that which they would have achieved using only the BMP list items. The Flex Track Menu will be maintained and regularly updated in the MOU Compliance Policies. Three Flex Track Menus are found below for the Residential, CII, and Landscape BMPs. These were developed by the BMP Revision Committees in 2008, and will be updated from time-time by the Research and Evaluation Committee. These will be maintained in the CUWCC MOU Compliance Policy and BMP Guidebooks.

Residential Flex Track Menu

1) High bill contact with single-family and multi-family customers.

2) Educate residential customers about the behavioral aspects of water conservation.

3) Notify residential customers of leaks on the customer's side of the meter.

4) Provide bill or surcharge refunds of the meter.

5) Provide unique water saving fixtures that are not included in the BMP list above.

6) Install residence water use monitors.

7) Participate in programs that provide residences with school water conservation kits.

8) Implement an automatic meter reading program for residential customers.

9) Refer to the landscape BMP for the Flex Track menu of landscape measures.

Any other programs that the signatory may implement for residential users that result in documented water savings.

Commercial, Industrial and Institutional Flex Track Menu

1) Industrial Process Water Use Reduction

    a) Recycling

    b) Deionization

2) Commercial Laundry Retrofits

3) Industrial Laundry Retrofits

4) Filter Upgrades

5) Car Wash Reclamation Systems

6) Wet Cleaning

7) Water Audits

8) Clean In Place (CIP) Technology

9) Waterless Wok

10) Alternative On-site Water Sources

    a) Cooling Condensate

    b) Foundation Drain Water

    c) Gray Water

    d) Storm Water

    e) Rain Water

    f) Pond and Water Feature Recycling

11) Submetering

12) Pool Covers

13) High Efficiency Showerheads

14) Faucet Flow Restrictions

15) Water Efficient Dishwashers

16) Hot Water on Demand

17) Pre-rinse Spray Valves of 1.2 gpm (gallons per minute) or less

18) Central Flush Systems

19) Other Measures chosen by the Agency

Landscape Flex Track Menu

	Measure*	Documentation
1.	**Monitor and report on landscape water use**	
1a.	Measure landscapes and develop water budgets for customers with dedicated landscape meters. Provide timely water use reports with comparisons of water use to budget (through bills, electronically, by mail or other means) that provide customers the information they need to adjust irrigation schedules.	# number of sites with dedicated meters, number of sites with landscape measurements and water budgets, number of sites to be measured and provided water budgets each of the next 10 years, estimated water savings
1b.	Measure landscapes and develop water budgets for customers with mixed meters. Provide timely water use reports with comparisons of water use to budget (through bills, electronically, by mail or other means) that provide customers the information they need to adjust irrigation schedules.	# number of sites with mixed meters, number of sites with landscape measurements and water budgets, number of sites to be measured and provided water budgets each of the next 10 years, estimated water savings
1c.	Establish agency-wide water budget.	# water budget, amount of water used (AF/acre)
1d.	Establish agency-wide, sector-based irrigation goal to reduce water use, based on seasonality.	# minimum irrigation goal (AF/acre compared seasonally)
2.	**Provide technical landscape resources and training**	
2a.	Upon customer requests, provide landscape irrigation management and landscape design information and resources: provide assistance, answer customer questions, respond to run-off and high-bill calls.	# number of contacts: calls in person, over the phone, or via e-mail, estimated water savings
2b.	Perform landscape & irrigation audits: including irrigation scheduling, plant information, and landscape area measurement.	# number of audits conducted per year, measurement of square footage of turf, non-turf areas, estimated water savings
2c.	Sponsor, co-sponsor, promote, or support landscape workshops, training, presentations and other technical educational events for homeowners and professionals: design, installation, maintenance, water management (gardeners, contractors, landscape architects/designers, irrigation specialists,	# number of events, number of participants, list title or type of events

	irrigation equipment manufacturers and distributors, nurseries, retailers, homeowners associations, property managers, etc.).	
2d.	Establish time-of-day irrigation restrictions.	Y/N describe restrictions
3.	**Provide incentives**	
3a.	Establish landscape budget-based rates.	Y/N describe rates
3b.	Provide incentives for conversions from mixed-use meters to dedicated landscape meters.	# number of conversions, estimated water savings
3c.	Provide incentives for installing sub-meters to separate landscape water use.	# number of sub-meters installed, estimated water savings
3d.	Provide incentives for irrigation equipment upgrades that improve distribution uniformity, irrigation efficiency, or scheduling capabilities (i.e. controllers, emitters, soil moisture sensors, pressure regulators, rain shut off devices, etc.).	# number of devices/systems installed, estimated water savings
3e.	Provide incentives for the reduction of water use over an irrigated area, or reduction in the size of the irrigated area due to replacement of turf or other high water-using plants with low water-using plants, artificial turf, or permeable surfaces.	# acreage of turf replaced, reduced acreage of irrigated landscape, estimated water savings
3f.	Provide incentives for conversions from potable to recycled water.	# number of conversions, number of incentives, funds invested, estimated water savings
3g.	Provide incentives for the use of alternative sources of water in the landscape (i.e. graywater, rainwater, cisterns, etc.).	# number of conversions, number of incentives, funds invested, estimated water savings
4.	**Participate in local and regional planning and regulatory activities**	
4a.	Collaborate with planning agencies at the local and regional level, other water suppliers in the area and stakeholders in response to state or federal requirements such as the State Model Water Efficient Landscape Ordinance and AB 1881. Participate in the development, review, implementation, and enforcement of requirements for new developments. Provide water use data to planning agencies.	Y/N, describe involvement
4b.	Establish or participate in a water conservation advisory committee or other community outreach effort to drive market transformation and exchange information about landscape water conservation with developers, community-based organizations, homeowners associations, residential customers, landscape professionals, educators, other water suppliers	Y/N, describe involvement

	in region.	
4c.	Participate in regional efforts: integrated water resource management, watershed management, NPDES permit agencies, etc.	Y/N, describe involvement
5.	**Develop a holistic approach to landscape water use efficiency**	
5a.	Develop and implement a comprehensive landscape water conservation program for all customers. Target marketing efforts to those most likely to result in benefits to both customer and Agency.	
6.	**Other Measures**	

C.2 Western Municipal Water District's Compliance Option 4: Hydrologic Region-to-Agency Targets

Section 10608.20(b)(4) states:

> *The method developed by the department shall indentify per capita targets that cumulatively result in a statewide 20-percent reduction in urban daily per capita water use by December 31, 2020.*

DWR's 20x2020 Water Conservation Plan (February 2010) provides GPCD targets for each hydrologic region that will result in a 20% reduction in urban daily per capita water use. It does not provide agency-level targets that reflect differences within a region.

A primary factor affecting GPCD is outdoor water use. Outdoor water use is a factor of population density (lower densities have more irrigated area per person) and weather (warmer areas require higher irrigation use).

By comparing agency service area conditions to hydrologic region conditions, DWR's regional GPCD targets can be refined to an agency level based on population density and evapotranspiration. Two adjustment factors are needed:

$$\text{Agency 2020 GPCD Target} = \left[(\text{HR Target} - 55) \times \frac{\text{Agency ETo}}{\text{HR ETo}} \times \frac{\text{HR Urban Area Density}}{\text{Agency Urban Area Density}} \right] + 55$$

HR = Hydrologic Region

HR Target = Target in 20x2020 Water Conservation Plan

55 = efficient indoor GPCD (consistent with Option 2 performance standard)

Agency ETo = weighted average of State Reference ETo Zones within an agency's populated service area

HR ETo = weighted average of State Reference ETo Zones within populated areas of hydrologic region

Urban Area = land area excluding vacant or unoccupied land

HR Urban Area Density = Region's population divided by urban area (acres or square miles)

Agency Urban Area Density = Agency's population divided by urban area (acres or square miles)

This methodology meets the legislative requirement for targets that will result in a 20% reduction in urban per capita water use.

C.3 Irvine Ranch Water District, Long Beach Water Department and City of San Luis Obispo's Proposal for the Use of the California Urban Water Conservation Council's BMPs as an Implementation Method for Option 4

SB X7-7's 20 x 2020 legislation articulates three options water agencies may choose from in order to be in compliance with the legislation. The legislation directs DWR to adopt a fourth option based on certain criteria. The following is a proposed 4th Option for DWR's consideration.

PROPOSED 4th Option – BMP Option

- Water agencies that file complete annual conservation reports with the CUWCC and are found to be in compliance with the CUWCC's BMPs. The CUWCC BMP Compliance Option will require full implementation of the Foundational BMPs plus implementation of either the standard programmatic BMPs or the Flex Track BMP option, as of the date last amended. For purposes of compliance with SB X7-7, no cost-effectiveness exemptions will be allowed.

- Agencies may also select the CUWCC's GPCD method for CUWCC compliance, however it should be noted that the CUWCC's methodology has more stringent requirements than Option 1 in the legislation, and also requires full implementation of the Foundational BMPs.

Why the BMP OPTION?

1. It would achieve the 20 x 2020 water-use reduction target. If this option were used throughout California, it can reasonably be assumed that the state would achieve an overall per capita water use reduction of 20-percent. The 20x2020 team estimated that full implementation of the BMPs would achieve approximately 17-18%. This figure did not include the Foundational BMPs, which includes Metering, System Loss Prevention and Reduction, and Conservation Pricing, all of which generate quantifiable water savings. Therefore it is anticipated that full compliance, which requires implementation of the Foundational BMPs, would achieve the 20% target.

    a. In developing its own GPCD standard, the CUWCC investigated the expected water savings from implementation of the BMPs and found that it was reasonable to assume an average of about 2-percent reduction in water use per year from implementation.

2. Ease of implementation for DWR: Requires no additional DWR staff or resources because the BMPs and reporting systems already exist.

3. Eliminates transition challenges for water agencies: Water agencies are (will be) using the CUWCC method for compliance with AB 1420 through the year 2014 or 2015. Allowing them to continue using this method will eliminate the need for all water agencies to transition to new compliance options in the years 2015 and beyond.

4. Consensus-based targets: Conservation targets were based on consensus among both water agencies and environmental organizations.

    a. The BMPs were crafted over many years, through very public consensus-based processes involving large numbers of retail and wholesale water agencies and environmental organizations.

5. BMPs are not just targets: The BMPs provide well-delineated best practices that, if implemented by a water agency, will result in achievement of the targets.

6. A true alternative to the Legislation's Options 1 – 3

    a. The legislation mandates that Option 4 be different than the first three options. A BMP Option provides a truly new option, not simply a variation or combination of existing options; this, then, creates more choice for water agencies and best meets the spirit of the legislation.

7. Maximum flexibility: provides greatest amount of flexibility for water agencies.

    a. The legislation mandates that Option 4 be flexible. While all agencies would have to comply with Foundational BMPs, agencies would have the choice of compliance with Programmatic BMPs using the traditional approach, the flex track or the GPCD approach. The number of implementation paths for a water agency becomes almost infinite, creating the maximum flexibility possible.

8. Accommodates differences between water agencies: The legislation mandates that climatic, population density differences, and differences in CII are taken into consideration. The BMPs automatically adjust for these differences.

    a. For example, the landscape BMP makes no assumptions about average climates or population densities; it asks only that the water agency implement certain best management practices with respect to landscape. This approach, then, accommodates all climatic and population density variations between water agencies.

    b. For example, the CUWCC's GPCD compliance option only requires a reduction from the individual water agencies baseline, a baseline which reflects climate, population density, and other important factors that drive water demand.

9. Gives credit for past conservation: The legislation mandates that communities that had implemented conservation in the past be protected.

    a. The GPCD compliance option does this by creating a baseline GPCD based on a 10-year average from the past. Water agencies that have conserved water in the past are credited with that previous conservation.

    b. The Traditional and Flex Track methods of compliance give credit for water conservation achieved in the past, by reducing the additional conservation required in order to meet the BMP compliance targets.

How it would work

- The existing BMPs targets culminate in the year 2018. This SB X7-7 Option 4 would extend those targets to the year 2020 by linearly extending the 2018 targets two more years.
- Water agencies report to CUWCC using that agency's normal 2-year reporting cycle.
- CUWCC reports to DWR compliance with BMPs and any other information DWR needs in order to determine an agency's compliance with this Option 4.

C.4 DWR's BMP Proposal Draft, June 17, 2010

Background

The Water Conservation Act of 2009 (SB X7-7) requires that urban retail water suppliers set water use targets to reduce statewide per capita water use by 20% by 2020. The legislation provides 3 methods that suppliers can choose from to set a target and directs the California Department of Water Resources (DWR) to develop a fourth target method that meets the following criteria

Water Code Section 10608.20 (b) (4)

> *… A method that shall be identified and developed by the department, through a public process, and reported to the Legislature no later than December 31, 2010. The method developed by the department shall identify per capita targets that cumulatively result in a statewide 20-percent reduction in urban daily per capita water use by December 31, 2020. In developing urban daily per capita water use targets, the department shall do all of the following:*
>
> *(A) Consider climatic differences within the state.*
> *(B) Consider population density differences within the state.*
> *(C) Provide flexibility to communities and regions in meeting the targets.*
> *(D) Consider different levels of per capita water use according to plant water needs in different regions.*
> *(E) Consider different levels of commercial, industrial, and institutional water use in different regions of the state.*
> *(F) Avoid placing an undue hardship on communities that have implemented conservation measures or taken actions to keep per capita water use low.*

In April, 2010 DWR convened an Urban Stakeholder Committee (USC) to provide input and guidance to DWR as it implements SB X7-7 requirements. A subcommittee of the USC (U4 Technical Subcommittee) was formed to specifically address the development of a fourth target method. Concept papers that have been submitted will be evaluated by the subcommittee. The advantages and disadvantages of each method that is proposed will be discussed based on the criteria in the law and in the subcommittee's charge. The subcommittee will meet at least 3 times and then make recommendations to the USC.

Concept Overview

The method proposed in this paper would provide that an urban retail water supplier's interim and 2020 targets be based on the volume of expected water savings from implementation of the California Urban Water Conservation Council's (CUWCC) Best Management Practices (BMPs) plus the water savings from the replacement of water-

using fixtures and appliances with more efficient equipment as required by current plumbing codes. Because of these measures would not be sufficient to achieve the 20% statewide reduction, and additional savings would be specified for the target.

The State's 20x2020 Water Conservation Plan predicted potential water savings by calculating statewide BMP savings. Under this proposed method, an individual urban retail water supplier (or a regional group) could take a similar approach and determine the annual volume of expected water savings from implementing the BMPs and through natural replacement of plumbing fixtures, express this volume in gpcd, and deduct it from its base daily per capita water use to derive its 2020 target. The required calculations would be the same as those required for the CUWCC's Flex Track compliance. The proposed method does not require that an urban retail water supplier achieve the target by implementing the BMPs. As with Flex Track compliance , once the target is established, the supplier can meet the target through any water conservation or water recycling program.

Calculation Steps

Under this method, an urban retail water supplier would determine its interim and 2020 targets using the following steps:

1) Calculate the expected volume of water savings in 2015 and 2020 assuming it were to implement the foundational and programmatic BMPs according to the coverage requirements and schedules listed in Exhibit 1 of the Memorandum of Understanding (MOU) of the CUWCC.

2) Calculate the expected volume of water savings in 2015 and 2020 from the natural replacement of toilets, showerheads, and other water-using fixtures and appliances affected by current plumbing codes.

3) Add the volumes determined in 1) and 2) and convert the 2015 and 2020 totals to gpcd using its 2015 and 2020 service area population projections from its 2010 Urban Water Management Plans.

4) Calculate 5% of base daily per capita water use as defined in paragraph (3) of subdivision (b) of Section 10608.12.

5) Calculate the interim target by subtracting from its base daily per capita water use (as defined in paragraphs (1) and (2) of subdivision (b) of Section 10608.12) the 2015 gpcd amount determined in 3).

6) If the supplier's base daily per capita water use (as defined in paragraphs (1) and (2) of subdivision (b) of Section 10608.12) is greater than 100 gpcd, calculate the 2020 target by subtracting from its base daily per capita water use the greater of:

    a. The 2020 gpcd amount from 3)

    b. The gpcd amount from 4)

If the supplier's base daily per capita water use is not greater than 100 gpcd, calculate the 2020 target by subtracting from its base daily per capita water use the 2020 gpcd amount from 3).

7) As discussed later in this paper, the resulting targets may need to be reduced further to ensure they would cumulatively result in a 20% reduction in urban per capita water use.

BMP Savings Quantification

Quantifying the expected volume of water savings from BMP implementation would need to address the following issues:

1) For which BMPs is it possible to estimate water savings?

Water savings from some BMPs can be estimated using reasonable assumptions. Others are much more difficult to quantify. The following table lists the BMPs for which there are water savings assumptions in the MOU or for which water savings assumptions can be developed from BMP guidance documents.

BMP	Short Description	Possible Basis for Savings Assumption
1.2 Water Loss Control	Conduct system water balance and implement water loss control program per AWWA M36 guidance	MOU does not quantify savings. Could adopt conservative estimate of 2020 savings as a percent of current system losses.
1.3 Metering with Commodity Rates	Retrofit all unmetered connections by 2012 and implement volumetric pricing	MOU assumes savings equal to 20% of pre-retrofit water use.
1.4 Retail Water Service Rates	Implement conservation rate structure and collect at least 70% of water sales revenue requirement through volumetric rates.	MOU does not quantify savings. Price elasticity estimate in CUWCC Conservation Rates Handbook could provide basis for savings assumption.
3.A.1) Residential Assistance	Provide leak detection assistance to 1.5% of SF and MF accounts per year for 10 years; 0.75% thereafter.	MOU assumes quantifiable savings. CUWCC BMP Cost & Savings Study could provide basis for savings assumption.
3.A.2)	Provide landscape surveys to 1.5% of SF accounts per year for 10 years; 0.75% thereafter.	MOU assumes quantifiable savings. CUWCC BMP Cost & Savings Study could provide basis for savings assumption.

3.A.3) HECW Incentives	Provide incentives to 1% of SF accounts per year for 10 years.	MOU assumes quantifiable savings. Savings based on HECW with water factor (WF) of 5.0.
3.A.4) WSS Toilets	Provide incentives for WSS toilets until 2014. Replicate performance of a retrofit-on-resale ordinance.	MOU assumes quantifiable savings. Existing CUWCC coverage calculator can be used to estimate savings.
4.	CII Savings	Reduce baseline CII use by 10% over 10 years. Baseline use defined as CII use in 2008. May want to use SB X7-7 base CII use instead.
5.A.1)	Provide water use budgets equal to 70% of ETo to 90% of landscape accounts with dedicated irrigation meters	MOU assumes quantifiable savings. Requires estimate of landscaped area or adoption of standard landscaped area assumption (which could possibly be developed using CUWCC data.)
5.A.2)	Survey 15% of CII accounts with mixed-use meters (or unmetered) over 10 years.	MOU assumes savings of 15-20% of pre-survey use. Requires estimate of average pre-survey use and landscaped area of surveyed accounts.

2) From what year should coverage be determined?

For most BMPs, coverage requirements depend on when an agency signed the MOU. For determining SB X7-7 targets, it would be simpler to base coverage on a fixed date, such as 2010. That would allow all urban retail water suppliers to develop BMP-based targets in the same way. These coverage calculations would not be used for purposes of MOU compliance. They would only be used to determine the SB X7-7 target.

3) Should a retail urban water supplier receive credit for previous BMP implementation?

Some BMPs allow the water supplier to take credit for previous BMP implementation when determining its coverage requirements, provided the previous implementation is documented. Credit is given on a sliding scale, with older activity receiving less credit than recent activity. A similar approach could be used to calculate the water use target. SB X7-7 requires that Method 4 avoid placing an undue hardship on communities that have implemented conservation measures or taken actions to keep per capita water use low, and credit for past BMP activity is consistent with that.

4) How would landscape BMP savings be quantified?

Estimating water savings from budgets and surveys would require knowledge of or assumptions about the average landscaped area of sites receiving budgets or surveys. Many urban retail water suppliers are unlikely to have this information. If the number of large landscapes in the service area is not large, the agency could measure landscaped area as part of target development, using techniques described for calculating water use targets under Method 2 (for reference, see the draft Methodology for Landscaped Area Water Use)

Flex Track and the CUWCC BMP Reporting Database

BMP savings quantification is already required if an urban retail water supplier complies with the MOU through the Flex Track option. Under Flex Track, the water supplier may deviate from strict compliance with the BMPs provided it saves a volume of water at least equal to the expected savings from implementing the regular BMPs. Thus, the same BMP savings calculations as described above are required for Flex Track implementation.

The CUWCC is in the process of revising its BMP reporting database and website to reflect the recent BMP revisions and to accommodate the Flex Track compliance option. The revised database may include the capability for quantifying expected water savings from regular BMP implementation. If this capability is developed within the timeframe for SB X7-7 implementation, it could provide a standardized way for water suppliers to calculate their SB X7-7 target under this proposed Method.

Code Savings Quantification

Methods and standardized assumptions for estimating water savings from plumbing code requirements have been developed for the CALFED Water Use Efficiency Comprehensive Evaluation, the 20x2020 report, and other studies. These estimation approaches could provide the basis for urban retail water suppliers to estimate code savings in 2015 and 2020. These approaches would need to be clearly defined in order to ensure that water suppliers implement this target method in a consistent manner. . One approach would be for DWR and/or CUWCC to develop a code savings calculator that water suppliers would use to estimate code savings. The Alliance for Water Efficiency's Water Conservation Tracking Tool is one example of such a calculator.

How the Concept Addresses SB X7-7 Requirements

SB X7-7, requires that Method 4 meet several criteria. These criteria are listed below, along with an initial evaluation of how this proposed method would address them. The method shall

1) Cumulatively result in a statewide 20% reduction in urban per capita water use by 2020.

Information developed for the 20x2020 report was used to provide an initial estimate of annual savings that could be achieved by 2020 under this proposed method.

Implementation of the BMPs at full coverage is estimated to yield about 24 gpcd, expressed as a statewide average.[2] Plumbing codes are predicted to yield another 8 gpcd. Thus, savings from BMPs and codes total 32 gpcd.[3] This is equal to about 16.67% of the statewide baseline per capita use of 192 gpcd estimated by the 20x2020 report.[4] On average, the calculated volume of BMP and code savings would therefore need to be scaled up by a statewide average factor of 1.2 (20%/16.67%) before subtracting it from base daily per capita water use in order to ensure that the targets cumulatively resulted in a 20% reduction in baseline use, as required by SB X7-7. The scaling factor could be applied uniformly to all water suppliers, which is the simplest approach. Other scaling approaches that take into account baseline gpcd and historical BMP implementation could also be evaluated.

2) Consider climatic differences within the state.

The landscape BMPs are referenced to each urban retail water supplier's service area conditions and therefore account for climate and landscaped area water use differences across service areas. The baseline per capita reflects climatic differences and is the basis for the 2020 targets.

3) Consider population density differences within the state.

The BMP coverage requirements for surveys and device retrofits are based on the number of accounts in each service area, and thus indirectly address this requirement. Water savings for toilets, showerheads and clothes washers can be based on estimates of persons per household, and therefore can also be made to address this requirement.

4) Consider different levels of per capita water use according to plant water needs in different regions.

The landscape BMPs are referenced to each urban retail water supplier's service area conditions and therefore account for climate and landscape land use differences across service areas. The baseline per capita reflects plants water needs in different regions and is the basis for the 2020 targets.

5) Consider different levels of commercial, industrial, and institutional water use in different regions of the state.

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[2] Savings from implementation of the BMPs at full coverage would be roughly equal to savings from 80% of cost-effective BMPs, grant funded BMPs, and accelerated BMP coverage shown in Table 7 of the 20x2020 Water Conservation Plan.

[3] Including savings from more aggressive leak detection and repair in the tally of BMP savings would increase the total savings to 38 gpcd.

[4] The 20x2020 report calculated statewide baseline per capita use over the period 1995-2005.

The CII BMP is referenced to each supplier's baseline CII water use, and thus automatically accounts for differences in CII use across the state.

6) Avoid placing an undue hardship on communities that have implemented conservation measures or taken actions to keep per capita water use low.

The method could satisfy this requirement by adjusting the BMP coverage for past BMP implementation. Some of the BMPs already do this to some extent. Credit could be given on a sliding scale, with older activity receiving less credit than recent activity. Importantly, though, crediting for past BMP activity would require further scaling of the targets to ensure the approach would achieve a statewide reduction of 20% in per capita water use by 2020.

C.5 DWR II Proposal

The Second Alternative Proposal for Method 4 (DWR II) is based on segregating 3 water use factors: Indoor Residential (IR), CII, and Landscape and unaccounted (LU) for water; and a 20 x 2020 plan estimate of 38 GPCD to reach 20% savings.

Indoor Residential

- Assumes a 2005 state average indoor residential use of 75 GPCD
- Adopts Method 2 efficiency standard of 55 GPCD
- Difference is calculated as a statewide average savings of 20 GPCD

75 GPCD-55 GPCD = 20 GPCD savings

CII Savings

- Uses 20x2020 Plan estimate of the state's 2005 CII on a per capita basis = 37 GPCD
- Use Method 2 savings goal of a 10% reduction in CII

(37GPCD) x 10% = 3.7 or 4 GPCD

- Outdoor/unaccounted statewide savings goal is calculated by taking the 20x2020 Plan statewide per capita savings estimate of 38 GPCD and subtracting the Indoor Residential goal and the CII goal

38 GPCD- 20 GPCD -4 GPCD = 14 GPCD

- The Landscape/unaccounted savings goal can be converted to a percentage by dividing the 14 GPCD by the state's average landscape/unaccounted use.
- State's average landscape/unaccounted equals state average baseline GPCD minus average IR GPCD minus average CII GPCD

192-75-37= 80 GPCD

- Divide LU savings goal by total LU water

14 PCD/80 GPCD= 18 percent

- State's 20 percent savings target will be met if the following conditions are met:
    - Average indoor residential reaches 55 GPCD
    - Baseline CII reduced by 10%
    - Outdoor and Unaccounted for water is reduced by 18%

Individual Supplier Target Calculation Steps

- Estimate baseline indoor residential use on a per capita basis

- Subtract 55 GPCD standard from baseline residential

  65 GPCD-55 GPCD=10 GPCD

- Calculate baseline CII, divide by population and multiply by 10%

  (baseline CII)/population x 10 percent = 5 GPCD

- Calculate gallons of indoor residential use by multiply step 1 by population

  (10 GPCD) x population = total indoor residential

- Calculate LU use by subtracting total indoor residential (gals)and total CII (gals) from total use

  Supplier's total use-indoor residential- total CII= total LU

- Multiply LU use by 18% and divide by population for the LU savings goal

  Total LU x18%/population= 15 GPCD

- Add the three savings goals to get a total savings

  10 + 5 + 15 = 30 GPCD

- Calculate target by subtracting total savings from base daily per capita

  170 - 30 = 140 GPCD

SB X7-7 CRITERIA

Considerations of Climatic Differences in State

- Landscape water savings requirements are proportional to use. Areas with large amounts of landscape water use have to save more , areas with low amounts of landscape water use have to save less.

Consideration of Population Density Differences within the State

- As with climatic differences considers population differences on a proportional

basis

Methods to Provide Flexibility to Communities and Regions

- Allows suppliers flexibility to segregate 3 components of water use to set target

Consideration of Different Levels of Per Capita Water Use - Regional Plant Water Needs

- Savings required increase proportionally with increase in Landscape and unaccounted for water use

Consideration of Different Levels of CII Water Use in Different Regions of the State

- As with landscape, CII has a proportional requirement for all users. Users with a high baseline will have to save more, users with a low baseline will have to save less.

Consideration of Undue Hardship on Communities

- The method accounts for suppliers who have implemented indoor residential water conservation.
- Suppliers who have implemented CII, Landscape or leak detection will start with lower baselines and have less required savings in these sectors

Difference from Legislatively Defined Methods

- Similar yet different - a hybrid of methods 1 and 2?

Cost and Expense to Collect Data Required to Implement the Method

- Relatively inexpensive

Ease of Implementation by the Water Supplier

- Relatively Simple and easy

Statewide 20% Savings

- Based on 20 x 2020 estimates of savings
- Better estimates needed for state 2005 average indoor residential use

C.6 Hybrid A and Hybrid B Proposals

Hybrid Calculation Steps

1) Calculate baseline water use
2) Calculate BMP savings from calculator
    a. Use all 10 BMP's in Hybrid A
    b. Use 5 BMPs in Hybrid B
3) Calculate water use over a specified threshold
    a. Hybrid A threshold is baseline water use over 100 GPCD
    b. Hybrid B threshold is baseline water use over indoor residential (70 GPCD) and CII water use. Termed landscape and water loss.
4) Adjust water use in step 3 for ETo
5) Calculate savings from the water use category in step 4
    a. Hybrid A uses a savings factor of 0.15
    b. Hybrid B uses a savings factor of 0.28
6) Add the BMP savings in step 2 with the water use savings in step 3 to obtain total savings
7) Divide total savings by baseline water use for total savings %

Savings Factor Calculation

1) Use weighted random sample averages
2) Calculate 20% per capita savings from baseline (190.5 X 0.2 =38.1)
3) Subtract average BMP savings from step 2. (38.1-25.1 = 13)
4) Divide step 2 savings by the ETo adjusted water use component. (13 ÷ 89 = 0.15)

Differences in Savings Percentage between Hybrid A and B

Examples of agencies whose savings % increased from Hybrid A to B

Simi Valley	-13.2 to -20.8
Camrosa	-19.4 to -24.8
Livingston	-16.3 to -21

These agencies have low CII and large outdoor

Example of agencies whose savings decreased from Hybrid A to B

Crescent City	-31.9 to -9.5
Pittsburgh	-31.1 to -21.5
Folsom	-39.9 to -29.9

Crescent City and Folsom have CII water use greater than 90 GPCD
Pittsburgh and Folsom have large water loss BMP savings included in Hybrid A

HYBRID A AND B CALCULATION STEPS

	Hybrid A Calculation Steps (11 17 10) Columns Letters marked in red in parenthesis ( )	
	Steps	Example (City of Redding)
1	Calculate Baseline Daily Per Capita Water Use per Technical Methodologies (B)	272 Based on 1 year average from UWMP
2	Caculate BMP Savings using BMP Calculator for all 10 elements, Columns C through L Link to calculator: http://www.water.ca.gov/wateruseefficiency/sb7/committees/urban/u4/	Required savings equals 44.9 (GPCD)
3	Calculate Water Use over 100 GPCD (=Baseline-100) (N)	272-100=171
4	Divide Water Use over 100 (N) by agency specific Eto Adjustment Factor (O) to obtain "Adjusted Water Use over 100" (P)	171÷ 0.92 = 186
5	Multiply Adjusted water Use over 100 (P) by it's the savings requirement factor (cell C43 = 0.15) to obtain savings for Water use over 100.	186 X 0.15 = -27.3 (GPCD)
6	Add BMP Savings (M) to Water Use over 100 savings (Q) to obtain total savings	-27.1 + -27.3 =-55.1
7	Divide Total Savings (R) by Baseline (B) and the multiply by 100 to obtain overall savings %	-55.1 ÷ 272 x 100 = -20.3

Calculation of Water Use over 100 GPCD Savings Factor

1	Weighted Averages are calculated for baseline GPCD (B36), Total BMP Savings (M36), and Adjusted Water Use over 100 (P36) using the following weighting factors, agency population (U), hydrologic region population (V) and CUWCC membership (W)	The simple average of the data is in row 35 and weighted averages are provided in row 36. The baseline average changes from 214 with the simple average to 190.5 with the weighted average.
2	The state per capita savings requirements are calculated by multiplying the weighted baseline average (B36) or (C37) by 0.2.	190.5 x 0.2 = 38.11 (C38)
3	Weighted BMPs savings (M36) or (C39) are subtracted from the per capita savings requirements [step 2] (C40) to obtain the GPCD savings from "Adjusted Water Use over 100"	38.1 - 25 = 13.1 (C41)
4	The savings calculated in Step 3 (C41) is divided by the Adjusted Water Use over 100 to determine the savings factor for Water Use over 100.	13.1÷89 = 0.15 (C43)

Hybrid B Calculation Steps (11 17 10) Columns Letters marked in red in parenthesis ( )		
	Steps	Example (City of Redding)
1	Calculate Baseline Daily Per Capita Water Use per Technical Methodologies (B)	272 Based on 1 year average from UWMP
2	Calculate BMP Savings using BMP Calculator to calculate savings requirements for the following elements, Metering, CII, single family toilets, Multi family toilets, residential washers, and residential showerheads. Columns C through H Savings are summed in column J. (J) Link to BMP Calculator: (http://www.water.ca.gov/wateruseefficiency/sb7/committees/urban/u4/	Required savings equals -20 (GPCD)
3	Landscape and Water Loss component is calculated by subtracting a default indoor residential value of 70 GPCD (K) and CII Water Use (L) from Baseline Water Use (B)	272-70 -79= 123
4	Landscape and Water Loss Component is adjusted for Eto by dividing the water use (M) by the agency specific Eto Adjustment Factor (N)	123÷ 0.92 =133
5	Adjusted Landscape and Water Loss (O) is multiplied by landscape water loss savings adjustment factor (C42) to obtain landscape and water loss savings	133 x 0.28= -37
6	Add BMP Savings (J) to Landscape and Water Loss Savings (P) to obtain total savings	-20 + -37 = -57
7	Divide Total Savings (Q)) by Baseline Water Use (B) to obtain the overall savings %	-57 ÷ 272 x 100 = -21%

Calculation of Landscape and Water Loss Savings Factor

1	Weighted Averages are calculated for baseline GPCD (B35) or (C37), Total BMP Savings (J35)), and Adjusted Landscape and Water Loss (O35) using the following weighting factors, agency population (U), hydrologic region population (V) and CUWCC membership (W)	The arithmetic average of the data is in row 34 and weighted averages are provided in row 36. The baseline average changes from 214 with the arithmetic average to 190.5 with the weighted average.
2	The GPCD per capita savings requirements are calculated by multiplying the weighted baseline average (C37) by 0.2.	190.5 x 0.2 = 38.1

3	Weighted BMPs savings (J35) or (C39) are subtracted from the per capita savings requirements [step 2] (C38) to obtain the landscape and water loss savings	38.1 - 17.4 = 20.7
4	The savings calculated in Step 3 (B40) is divided by the Adjusted Landscape Water Use and Water Loss (O35) or (C41) to determine the Landscape Water Use and Water Loss Savings factor (C42)	20.7÷73.8 = 0.28

APPENDIX D: EVALUATION OF PROPOSED ALTERNATIVES

Table 1. Preliminary DWR Staff Assessment of Proposed Alternatives (Initial Phase)

Proposal and Criteria	Preliminary Assessment
Western Municipal Proposal	
1. Statewide Savings	Savings can be determined if there are valid correlations in the proposed methodology. Density and climatic adjustments are based on 20x2020 Water Conservation Plan hydrologic region targets, which were developed to achieve a 20% reduction in per capita water use. DWR has done preliminary analysis to verify the correlations. Preliminary findings indicate that there is poor correlation between water supplier service area (land surface area) per capita and water use per capita, after excluding indoor water use or indoor and CII water use. An inverse proportional relationship between service area per capita and outdoor water use per capita is assumed in the proposed methodology.
2. Climatic Differences	Uses reference evapotranspiration adjustment to reflect climatic differences.
3. Population Density	Uses per capita urban area adjustment to reflect density differences.
4. Flexibility	Reflects differences in climate, landscape density. No adjustment for CII use. Because targets are based on hydrologic region average targets, agencies with past conservation implementation should be able to more easily meet target. While this method is similar to target method 3 specified in law, its adjustments allow for better match to local agency conditions.
5. Plant Water Needs	Uses reference evapotranspiration adjustment to reflect climatic differences.
6. Different CII Use	Method does not make an adjustment for CII use.
7. Undue Hardship	Because targets are based on hydrologic region average targets, agencies with past conservation implementation should be able to more easily meet target.
8. Different from 3 Specified Methods	Similar to target method 3 specified in law but has adjustments for local conditions.
9. Cost of Data Collection	Data Needs: Urban area, urban population, and reference evaporation data for each hydrologic region for DWR to provide agencies average population density and reference evaporation for each region. Service area, population served, and reference evaporation for each agency to adjust 20x2020 Water Conservation Plan hydrologic region per capita water use targets for individual targets. Additional data for DWR to verify correlations assumed in proposed methodology. Comment: It is unknown how easily urban service areas can be determined.
10. Ease of Implementation	Computational Needs: To be assured of achieving the estimated 20% statewide savings, DWR needs to analyze sample urban area, population, and water use data to verify correlations assumed in proposed methodology. DWR needs to calculate average population density and reference evaporation data for each hydrologic region to provide to agencies so they can develop their targets. Agencies need to adjust hydrologic region targets by population density and

Proposal and Criteria	Preliminary Assessment
	reference evapotranspiration factors to develop individual agency targets. Comment: Difficult for both agencies and DWR to determine population density data. It is necessary for DWR to determine total urban service areas prior to agencies using this method.
Other Comments	Initial attempts by DWR to correlate urban water use with adjustments factors have failed to show a correlation.
DWR BMP Proposal	
1. Statewide Savings	Savings can be quantified using the approach used in the 20x2020 Water Conservation Plan. Refinement of this approach is being evaluated.
2. Climatic Differences	The landscape BMP is based on an agency's reference evapotranspiration.
3. Population Density	BMP implementation adjusts for individual landscape size as well as population, but not for density per se.
4. Flexibility	Reflects differences in climate, landscape density, CII use, and past conservation implementation.
5. Plant Water Needs	Large landscape BMP is based on a water budget approach, which adjusts for differing plant water requirements.
6. Different CII Use	BMP approach is based on a 10% reduction in baseline CII use.
7. Undue Hardship	Agencies that have implemented the BMPs and, thus, have a lower baseline GPCD will have lower water saving requirements.
8. Different from 3 Specified Methods	Very different from the 3 specified methods.
9. Cost of Data Collection	Data Needs: Assuming quantifiable BMPs, for water suppliers and for DWR for sufficient sampling of water suppliers: baseline and future unmetered accounts, baseline and future number of residential customers receiving assistance, number of past and future residential landscape surveys, number of existing and future single-family accounts receiving clothes washer incentives, estimate of market penetration for efficient toilets using several items of data, number of 2008 CII customers and estimated savings from prior CII measures, number of dedicated irrigation accounts with and without water use budgets, number of mixed use CII accounts with landscape and number of these receiving landscape surveys and estimated landscape water use from mixed use CII accounts, estimates of market saturation for water saving toilets and showerheads using several data sources. Comment: Except for refinements to past estimates, data collection by DWR for estimating statewide water savings is accomplished. Agencies would need to collect these data for individual target setting.
10. Ease of Implementation	Computational Needs: Calculators to assist agencies to estimate savings from individual BMPs are needed, using the data described in criterion 9. Such calculators are available from California Urban Water Conservation Council (CUWCC) for many BMPs. Comment: Potentially complex computations are involved, requiring assumptions and calculators to develop individual targets. It may be difficult for local agencies to calculate target if they have not tracked past conservation or BMP implementation.
Other Comments	
Irvine, Long Beach, SLO Proposal	
1. Statewide Savings	Savings can be quantified using the approach used in the 20x2020 Water Conservation Plan. Refinement of this approach is being evaluated.

Proposal and Criteria	Preliminary Assessment
2. Climatic Differences	The landscape BMP is based on an agency's reference evapotranspiration.
3. Population Density	BMP implementation adjusts for individual landscape size as well population, but not population density per se.
4. Flexibility	Reflects differences in climate, landscape density, CII use, and past conservation implementation.
5. Plant Water Needs	Large landscape BMP is based on a water budget approach, which adjusts for differing plant water requirements.
6. Different CII Use	BMP approach is based on a 10% reduction in baseline CII use.
7. Undue Hardship	Agencies that have implemented the BMPs and, thus, have a lower baseline GPCD will have lower water saving requirements.
8. Different from 3 Specified Methods	Very different from the 3 specified methods.
9. Cost of Data Collection	Data Needs: Assuming quantifiable BMPs, for water suppliers and for DWR for sufficient sampling of water suppliers: baseline and future unmetered accounts, baseline and future number of residential customers receiving assistance, number of past and future residential landscape surveys, number of existing and future single-family accounts receiving clothes washer incentives, estimate of market penetration for efficient toilets using several items of data, number of 2008 CII customers and estimated savings from prior CII measures, number of dedicated irrigation accounts with and without water use budgets, number of mixed use CII accounts with landscape and number of these receiving landscape surveys and estimated landscape water use from mixed use CII accounts, estimates of market saturation for water saving toilets and showerheads using several data sources. Except for refinements to past estimates, data collection by DWR for estimating statewide water savings from quantifiable BMPs is accomplished. Agencies would need to collect these data for individual target setting. Comment: Except for refinements to past estimates, data collection by DWR for estimating statewide water savings is accomplished. Agencies would need to collect these data for individual target setting.
10. Ease of Implementation	Computation Needs: Calculators to assist agencies to estimate savings from individual BMPs, both quantifiable and nonquantifiable, are needed, using the data described in criterion 9. Such calculators are available from CUWCC for many BMPs. Comment: Potentially complex computations are involved, requiring assumptions and calculators to develop individual targets. It may be difficult for local agencies to calculate target if they have not tracked past conservation or BMP implementation.
Other Comments	As part of the method proposal, compliance would be based on performance of the BMPs rather than meeting the 2020 numeric per capita target. This method of compliance has been determined by DWR to be inconsistent with the law.
ACWA Proposal	
1. Statewide Savings	An approach has not been offered to be able to estimate statewide water savings using calculations relating to the methodology for setting individual agency targets. Statewide savings are assumed to reach the mandated statewide target of 20% based on the assumption that the savings will occur if Water Plan Update projections are achieved. It further assumes its reference areas provide an appropriate standard of water use efficiency for the state.
2. Climatic Differences	Uses reference evapotranspiration adjustment to reflect climatic

Proposal and Criteria	Preliminary Assessment
	differences.
3. Population Density	Uses per capita landscape adjustment to reflect population density.
4. Flexibility	Reflects differences in climate, landscape density, CII use. Target based on "Reference Area", which should favour agencies with past conservation implementation.
5. Plant Water Needs	Uses reference evapotranspiration adjustment to reflect climatic differences.
6. Different CII Use	Uses 10% reduction in baseline CII use.
7. Undue Hardship	Because the target is based on a "Reference Area" that is intended to represent areas of low water use, agencies that have implemented water conservation should have per capita water use equal to or less than Reference Area, so no undue hardship is envisioned.
8. Different from 3 Specified Methods	Very different from 2 of specified methods. While there are similarities to specified "Method 2", there are key differences, such as using the Reference Area instead of the Model Water Efficient Landscape Ordinance as the benchmark for the landscape component of the target.
9. Cost of Data Collection	Data Needs: Water use data for 2005 by sector from many suppliers to allow DWR to identify efficient water use suppliers to include in Reference Area. Irrigated landscape area, reference evapotranspiration, and population for 2005 of each supplier in Reference Area for DWR to compute averages for use by suppliers. Irrigated landscape areas and reference evapotranspiration from sufficient sampling of all suppliers for DWR to estimate statewide water savings. Irrigated landscape area and reference evapotranspiration for each water supplier to calculate individual target. Comment: Development of this method is potentially expensive and difficult for agencies as well as DWR.
10. Ease of Implementation	Computational Needs: DWR needs to evaluate data from candidate suppliers to identify which suppliers to include in Reference Area and calculate average per capita landscape water use, per capita landscape areas, and reference evapotranspiration for suppliers selected for Reference Area. Agencies will need to calculate targets by adjusting Reference Area per capita landscape water use and adding indoor residential and CII components to targets. Comment: Potentially expensive and difficult for agencies and DWR to determine irrigated landscape areas and for DWR to identify appropriate water suppliers to include in the Reference Area, which must be determined prior to agencies using this method.
Other Comments	The landscape water use portion of the target as determined by ACWA approach may be inconsistent with the State Model Water Efficient Landscape Ordinance requirements for landscape where maximum applied water allowance is determined by area's reference evapotranspiration, landscape area, plant factor of 0.5 and irrigation efficiency of 71%. The assumption that the "reference area" meets standard of water use efficiency may not be valid. Some water agencies with low overall water use that might be in the reference area may have excessive outdoor water use.

Table 2. Preliminary Assessment of Phase II Alternatives

Alternative	BMP Calculator	DWR II	Hybrid A	Hybrid B
1. Statewide Savings	20% savings will be achieved if the BMP savings adjustment factor is accurate, which is dependent on how well the random sample represents all suppliers.	20% savings will be achieved if the landscape and water loss savings factor is accurate, which is dependent on how well the random sample represents all suppliers.	20% savings will be achieved if the landscape and water loss savings factor for use over 100 GPCD is accurate, which is dependent on how well the random sample represents all suppliers.	20% savings will be achieved if the landscape and water loss savings factor is accurate, which is dependent on how well the random sample represents all suppliers.
2. Climatic Differences	The BMP Calculator does not address outdoor water use savings well. The statewide adjustment factor is based on the calculator savings.	The statewide adjustment factor is applied to the combined outdoor and systems losses sector, thus giving significant weight to outdoor use. ETo and effective precipitation factors normalize outdoor water use by climate.	The statewide adjustment factor is applied to all use above 100 GPCD, which is primarily outdoor use. ETo and effective precipitation factors normalize the outdoor and system losses water use by climate. This alternative does not identify outdoor water use as explicitly as the DWR II or Hybrid B alternatives.	The statewide adjustment factor is applied to the portion of use above 70 GPCD and CII use, which is primarily outdoor and system losses. ETo and effective precipitation factors normalize the outdoor and system losses water use by climate.
3. Population Density	Population density appears to be an indirect reference to per capita irrigated area. The BMP Calculator does not address outdoor water use savings well.	Population density appears to be an indirect reference to per capita irrigated area. While DWR II relates a significant portion of savings to outdoor use, it does not reflect differences in per capita irrigated area.	Population density appears to be an indirect reference to per capita irrigated area. While Hybrid A relates a significant portion of savings to outdoor use, it does not reflect differences in per capita irrigated area.	Population density appears to be an indirect reference to per capita irrigated area. While Hybrid B relates a significant portion of savings to outdoor use, it does not reflect differences in per capita irrigated area.
4. Flexibility	Suppliers have complete flexibility to decide measures to meet targets regardless of target method chosen.	Suppliers have complete flexibility to decide measures to meet targets regardless of target method chosen.	Suppliers have complete flexibility to decide measures to meet targets regardless of target method chosen.	Suppliers have complete flexibility to decide measures to meet targets regardless of target method chosen.

Table 2. Preliminary Assessment of Phase II Alternatives

Alternative	BMP Calculator	DWR II	Hybrid A	Hybrid B
5. Plant Water Needs	BMP 5.2 identifies savings from water budgets for dedicated landscape metered deliveries for which no budgets have been provided. However, the BMP Calculator does not address most outdoor use.	DWR II relates a significant portion of savings to outdoor use, which is normalized by ETo and effective precipitation.	Hybrid A relates a significant portion of savings to outdoor use, though potentially less accurately than DWR II or Hybrid B. Outdoor use is normalized by ETo and effective precipitation. Not all outdoor use is isolated; some is embedded in the portion of use under the 100 GPCD threshold.	Hybrid B relates a significant portion of savings to outdoor use, which is normalized by ETo and effective precipitation. Not all outdoor use is isolated; some is embedded within the CII sector and in the portion of use under the 70 GPCD threshold.
6. Different CII Use	The BMP Calculator alternative assumes 10 percent savings on total baseline CII use, but does not distinguish between types of CII use or past CII savings.	The DWR II alternative assumes 10 percent savings on total baseline CII use, but does not distinguish between types of CII use or past CII savings.	The Hybrid A alternative assumes 10 percent savings on total baseline CII use, but does not distinguish between types of CII use or past CII savings. Because CII savings is not correlated to a separate CII use sector, some CII water use falling within the use above 100 GPCD could be subject to additional savings.	The Hybrid B alternative assumes 10 percent savings on total baseline CII use, but does not distinguish between types of CII use or past CII savings.

Table 2. Preliminary Assessment of Phase II Alternatives

Alternative	BMP Calculator	DWR II	Hybrid A	Hybrid B
7. Undue Hardship	The BMP Calculator gives credit for past conservation in indoor residential, dedicated irrigation meter budgeting, and metering. Savings from past foundational BMPs are not determined.	Suppliers that have reduced indoor residential use closer to the 55 GPCD target will have less hardship achieving that. Because the statewide savings factor is applied to outdoor use and water losses, past reductions in those will be reflected in reduced savings requirements.	The BMP Calculator gives credit for past conservation in indoor residential, dedicated irrigation meter budgeting, and metering. Savings from past foundational BMPs are not determined. However, by requiring only BMP Calculator savings for use below 100 GPCD, it is likely that a significant portion of past conservation is captured, especially because reportedly most urban conservation efforts have emphasized indoor use. Because the statewide savings factor is applied to use over 100 GPCD, which is mostly outdoor use and water losses, past reductions in those will be reflected in reduced savings requirements.	The BMP Calculator gives credit for past conservation in indoor residential and metering. Savings from past foundational BMPs are not determined. However, by requiring only BMP Calculator savings for use below 70 GPCD, it is likely that a significant portion of past conservation is captured, especially because reportedly most urban conservation efforts have emphasized indoor use. Because the statewide savings factor is applied to outdoor use and water losses, past reductions in those will be reflected in reduced savings requirements.
8. Different from 3 Specified Methods	This alternative is very different from the 3 methods specified in Water Code, except that CII savings is 10% as in Method 2.	DWR II has similarities to Method 2 for indoor residential and CII use, but relies on determining indoor residential use as a means to determining outdoor use. Calculation of irrigated landscape area is not required in DWR II.	This alternative is very different from the 3 methods specified in Water Code, except that CII savings is 10% as in Method 2.	This alternative is very different from the 3 methods specified in Water Code, except that CII savings is 10% as in Method 2.

Table 2. Preliminary Assessment of Phase II Alternatives

Alternative	BMP Calculator	DWR II	Hybrid A	Hybrid B
9. Cost of Data Collection	There are many inputs to the BMP Calculator that many suppliers will not have readily available. Additional water suppliers will have to be added to the random sample for DWR to determine reliable baseline data and statewide adjustment factor. The random sample will have to be run for baseline 2000. Data Needs: Using the BMP Calculator: baseline water use, baseline unmetered accounts, past number of residential customers receiving indoor and outdoor use assistance, number of past water budgets provided for dedicated landscape meters, number of past single-family accounts receiving clothes washer incentives, number of residential toilet replacement incentives provided in past.	DWR II needs monthly water use data for water suppliers to estimate their own indoor water use and for DWR for each supplier in random sample to estimate indoor use and statewide adjustment factor. ETo and effective precipitation data are needed for each supplier.	There are many inputs to the BMP Calculator that many suppliers will not have readily available. Additional water suppliers will have to be added to the random sample to determine reliable baseline data and statewide adjustment factor. The random sample will have to be run for baseline 2000. ETo and effective precipitation data are needed for each supplier. Data Needs: Using the BMP Calculator: baseline water use, baseline unmetered accounts, past number of residential customers receiving indoor and outdoor use assistance, number of past water budgets provided for dedicated landscape meters, number of past single-family accounts receiving clothes washer incentives, number of residential toilet replacement incentives provided in past.	There are many inputs to the BMP Calculator that many suppliers will not have readily available. Only 7 of 10 elements of BMP Calculator used, reducing somewhat the number of inputs. Additional water suppliers will have to be added to the random sample to determine reliable baseline data and statewide adjustment factor. The random sample will have to be run for baseline 2000. ETo and effective precipitation data are needed for each supplier. Data Needs: Using the BMP Calculator: baseline water use, baseline unmetered accounts, past number of residential customers receiving indoor use assistance, number of past single-family accounts receiving clothes washer incentives, number of residential toilet replacement incentives provided in past.

Table 2. Preliminary Assessment of Phase II Alternatives

Alternative	BMP Calculator	DWR II	Hybrid A	Hybrid B
10. Ease of Implementation by Water Supplier	There are many inputs to the BMP Calculator that many suppliers will not have readily available.	Suppliers need monthly water use data to estimate their own indoor water use	There are many inputs to the BMP Calculator that many suppliers will not have readily available.	There are many inputs to the BMP Calculator that many suppliers will not have readily available.
Other Comments		Implementation is significantly hampered by the inability to determine indoor residential use accurately. Minimum month methods do not appear to be accurate and over-estimate indoor use in arid areas where winter irrigation takes place. DWR II does not rely on the BMP Calculator, which could simplify the ability of suppliers to calculate targets and simplify DWR review.		

D.1 Preliminary Assessment of Proposed Alternatives Draft Revised November 17, 2010 (Second Phase of Proposals)

The Department of Water Resources (DWR) is required by California Water Code section 10608.20(b)(4) to develop a fourth method that urban water agencies may select to establish urban water use targets for the year 2020. Four alternatives were initially formally proposed for consideration by stakeholders and DWR for the fourth target method. DWR staff provided a preliminary assessment, dated August 23, 2010, of how well these proposals met the U4 Technical Subcommittee charge and evaluation criteria. Since then new or revised alternatives have been proposed and evaluated. The purpose of this document is to provide a preliminary assessment of the four most viable alternatives that are being considered.

At the October 22, 2010, meeting of the SB X7-7 Urban Stakeholder Committee (USC) meeting, DWR presented two alternatives, identified below as BMP Calculator and DWR II alternatives. DWR was requested to conduct additional analyses on these two alternatives. Since then there have been discussions between DWR and the California Urban Water Conservation Council (CUWCC). It became apparent that two hybrid concepts might improve upon the BMP Calculator and DWR II alternatives. Data from the analyses of the hybrid alternatives along with further analyses of the BMP Calculator and DWR II alternatives will be presented to the USC. A preliminary assessment of the four alternatives is presented below.

<u>Criteria</u>

Seven criteria are specified in section 10608.20(b)(4) to guide DWR in developing this method. In addition, three additional criteria were identified in the "Urban Stakeholder Committee, U4 Technical Subcommittee, Charge and Evaluation Criteria," dated 26 May 2010. The first seven below are quoted from the law.

1. Statewide Savings: "The method developed by the department shall identify per capita targets that cumulatively result in a statewide 20-percent reduction in urban daily per capita water use by December 31, 2020." This criterion is the basic requirement for the fourth target method. The assessment for this criterion in the table that follows is based on the ability to estimate the statewide cumulative savings to demonstrate that a proposed methodology can satisfy this requirement.

2. Climatic Differences: "Consider climatic differences within the state."

3. Population Density: "Consider population density differences within the state."

4. Flexibility: "Provide flexibility to communities and regions in meeting the targets."

5. Plant Water Needs: "Consider different levels of per capita water use according to plant water needs in different regions."

6. Different CII (commercial, industrial, and institutional) Use: "Consider different levels of commercial, industrial, and institutional water use in different regions of the state."

7. Undue Hardship: "Avoid placing an undue hardship on communities that have implemented conservation measures or taken actions to keep per capita water use low."

8. Different from 3 Specified Methods: That the method be different from the three legislatively defined methods.

9. Cost of Data Collection: The cost and expense to collect the data required to implement the method.

10. Ease of Implementation: Ease of implementation by the water supplier.

The ten criteria above are not listed in an order of priority, other than number 1, which is an over-arching requirement for the fourth target method. Criteria 2 through 7 are listed in the order described in the law. Note that "consider" as used in the above criteria does not mean that the method contain a specific calculation or adjustment for the given factor. It means that the factor will be considered with respect to the proposal using such factors as relevancy, importance, how the factor may be mitigated in other ways, or overall equity. The strengths and weaknesses of each proposed alternative for each of the criteria will be assessed. Salient strengths or weaknesses in any one or more criteria may influence DWR's overall assessment and choice of a methodology.

Regarding the flexibility criterion, number 4 in the list above, the law does not require that water suppliers implement water conservation in the same manner as their targets are determined. Regardless of which method a water supplier selects to establish its 2020 target, the supplier has the flexibility to use any means of water conservation or water recycling to achieve compliance with the target. The methodology used to calculate the target does not govern how the target is met. In this respect, any option DWR adopts for the fourth target method will have the same flexibility. Also, suppliers have the flexibility to choose which of the four target methods to use.

Basis for Computational Analyses

Each of the four alternatives was analyzed in detail by applying its methodologies to a random sample of 31 water suppliers to the extent that data were available. The computational results from these analyses are the basis for this preliminary assessment. Approximately 400 water suppliers meet the definition of "urban retail

water supplier" as defined in section 10608.12(p) of the Water Code and will be subject to the provisions requiring per capita water use targets for the year 2020. The random sample is listed in Table 1 with associated information. Computations were run using data for 2005 as a baseline because data were most accessible for this year and 2005 was the baseline used for the "20x2020 Water Conservation Plan" released February 2010. Because a different methodology is incorporated into the DWR II alternative, it was necessary to rely on data from DWR's Public Water System Statistics Survey (usually abbreviated PWSS) and use an average baseline for the period 2000-2009 instead of a single year 2005.

Three of the four proposals currently being considered use a "BMP Calculator". The calculator was designed to estimate the potential per capita water use savings that could be obtained by implementation of certain best management practices (BMPs) and other water management practices. The calculator contains assumed values and computational procedures based on experience and research literature that, when combined with data specific to a water supplier, can compute the resulting savings by the year 2020. The BMP Calculator was run for the 31 sample suppliers for a 2005 baseline year. The BMPs or water management practices that are evaluated in the calculator are listed in Table 2. The one of the three alternatives that relies on the calculator does not use the results from all ten of the BMPs or practices in the calculator. While the BMPs in the calculator are based on the Memorandum of Understanding (MOU) of the CUWCC, they have been modified to simplify the analysis or increase the coverage or saturation levels expected by 2020. While the CUWCC MOU allows an agency to claim an exemption from a BMP on the basis of cost-effectiveness, such an exemption is not allowed in the calculator.

Whether the random sample is representative of the total number of water suppliers that will be subject to the law depends on several characteristics of the sampled suppliers in relation to the total number of suppliers. Because of climatic differences between hydrologic regions, the representation of the sample in each of the ten hydrologic regions may be important. The distribution of the random sample by hydrologic region is presented in Table 3. Also, membership in CUWCC may indicate a stronger than average implementation of water conservation practices. As shown in Table 4, the sample includes only 14 CUWCC members out of the total 31 agencies as CUWCC members – approximately representative of the state. The distributions of the random sample by hydrologic region and CUWCC membership status are presented in Tables 3 and 4. The number of samples may be increased in the final analysis to increase to overall confidence level of the sample. In addition, techniques may be employed to adjust the results of the sample to normalize the sample for factors of regional and CUWCC membership representation.

For most water suppliers, the baseline will be a continuous 10-year period within the years 1995-2010. The midpoints of the baseline periods will be between December 31, 1999-December 31, 2005. Many agencies have stated that they will probably select their baseline period toward the earlier part of the spectrum of years allowed. Thus, the year 2000 may be a more representative year than 2005 to simulate the alternative

target methods. Further analyses of the random samples will be conducted using 2000 as the baseline year.

Description of Alternatives

The four alternatives that are under current consideration and will be assessed are described below. The procedures described below are based on a certain conceptual approach for setting targets. As noted in the discussion above regarding flexibility, the procedures for settings targets do not determine how a water supplier has to achieve the targets. A water supplier may use any water conservation or water management measures, including the use of recycled water, to reduce urban potable water use.

1. BMP Calculator

The BMP alternative relies primarily on the ten elements in the BMP Calculator. Because savings from implementation of these BMPs or water management practices will not be sufficient to achieve an overall statewide average savings of 20 percent by 2020, an adjustment factor is added to the savings calculated from the BMP Calculator to determine the target savings for each water supplier such that the statewide average will achieve the statewide target. The adjustment factor under current consideration is proportional to the savings calculated by the BMP Calculator. The adjustment factor is based on the aggregate results of the random sample.

2. DWR II

The DWR II alternative involves dividing water use into three sectors: 1) indoor residential; 2) commercial, industrial, and institutional (CII); and 3) all other, which is presumed to be primarily outdoor use but also including water system losses. The target is calculated by assuming a target for indoor residential water use of 55 gallons per capita per day (GPCD) in 2020. CII water use is expected to be reduced by 10 percent by 2020 from the baseline. After calculating the expected savings from indoor residential and CII use, the water system losses and outdoor use is calculated to be reduced by a uniform percentage statewide to result in a total per capita savings of 20 percent. The uniform percentage is based on the aggregate results of the random sample. Because climate is known to affect outdoor water use, a procedure is incorporated to normalize each water supplier's outdoor use and system losses using reference evapotranspiration (ETo) and effective precipitation factors.

3. Hybrid A

The Hybrid A alternative incorporates elements of DWR II and the BMP alternatives. Water use is divided into two components: 1) water use equal to or below 100 GPCD, which is presumed to capture all indoor residential use as well as some or all CII, system water losses, and outdoor use, and 2) water use above 100 GPCD, which is presumed to be primarily outdoor use, but may contain CII and water system losses. For the component below 100 GPCD, water suppliers would calculate the target based on expected savings as determined by the BMP Calculator for the ten elements. For

the component above 100 GPCD, a statewide savings factor is applied by each water supplier such that the average statewide savings will achieve the 20 percent target. For water suppliers with a total water use less than 100 GPCD, baseline water use is expected to be maintained until 2020 without any additional savings. The statewide savings factor is based on the aggregate results of the random sample. Because climate is known to affect outdoor water use, a procedure is incorporated to normalize each water supplier's outdoor use and system losses using reference evapotranspiration (ETo) and effective precipitation factors. The basis for the 100 GPCD threshold in this alternative is consistency with Water Code section 10608.22, which exempts water suppliers with a baseline of less than or equal to 100 GPCD from applicability of that section.

4. Hybrid B

The Hybrid B alternative incorporates elements of DWR II and the BMP alternatives. Water use is divided into three use sectors: 1) water use equal to or below 70 GPCD, which is presumed to capture most or all of indoor residential water use but may include some portion of outdoor use and system water losses; 2) CII water use, which often includes landscape use associated with CII sites and which may include multi-family residential use; and 3) all other water uses, which are presumed to be primarily outdoor use but also including system water losses and, potentially, a small portion of indoor residential use if indoor use exceeds 70 GPCD. Water suppliers would calculate the savings, as determined by the BMP Calculator, for installing water meters for all customers. For the indoor water use sector (the portion of use below 70 GPCD), suppliers would calculate the savings as determined by the BMP Calculator for the indoor elements, items 3, 7, 8, 9, and 10. For the CII sector, a ten percent savings by 2020 is calculated. For the remaining sectors (primarily outdoor use and system losses), a statewide savings factor is applied by each water supplier such that the average statewide savings will achieve the 20 percent target. The uniform percentage is based on the aggregate results of the random sample. Because climate is known to affect outdoor water use, a procedure is incorporated to normalize each water supplier's outdoor use and system losses using reference evapotranspiration (ETo) and effective precipitation factors. The 70 GPCD threshold is based on a finding in an AWWA Research Foundation study, *Residential End Uses of Water*, that average indoor residential water use was 69.3 GPCD.[5]

<u>Preliminary Assessment</u>

DWR's assessment of these four proposed alternatives is presented in Table 5. The lists of data needs shown for criterion 9 are not intended to be comprehensive.

[5] Mayer, P. W., et al., *Residential End Uses of Water*, AWWA Research Foundation and American Water Works Association, Denver, CO, 1999.

Table 1. Water Suppliers in Random Sample

Water Supplier	Hydrologic Region	2005 Population	CUWCC Member as of 2010	Year Signed CUWCC MOU
Anaheim, City of, PUD	South Coast	341079	Y	1991
Azusa, City of, Light and Power	South Coast	48189	N	
Camarillo, City of	South Coast	46981	Y	1991
Camrosa WD	South Coast	27851	Y	1994
Carpenteria Valley Water District	Central Coast	14284	Y	1996
Chino Hills, City of	South Coast	77678	Y	2006
Clovis, City of	Tulare Lake	89972	N	
Crescent City, City of	North Coast	14000	N	
El Monte, City of	South Coast	16353	N	
Folsom, City of	Sacramento River	66242	Y	2004
Livingston, City of (w/o industrial)	San Joaquin River	14135	N	
Madera, City of	San Joaquin River	50581	N	
Mesa Consolidated WD	South Coast	111737	Y	1994
Newport Beach, City of	South Coast	79320	Y	2005
Oroville, California Water Service Company -	Sacramento River	9870	Y	1991
Pittsburg, City of	San Francisco Bay	62189	Y	1995
Rainbow MWD	South Coast	17750	Y	2009
Redding, City of	Sacramento River	88333	N	
Rincon Del Diablo MWD	South Coast	28200	Y	1991
San Bernardino, City of	South Coast	173359	N	
San Francisco PUC	San Francisco Bay	793403	Y	1991
San Luis Obispo, City of	Central Coast	44687	Y	1991
Santa Margarita WD	South Coast	150759	N	
Santa Monica, City of	South Coast	90576	Y	1991
Santa Paula, City of	South Coast	29500	N	
Seal Beach, City of	South Coast	25387	Y	2002
Simi Valley, Golden State Water Company -	South Coast	41994	Y	1991
South Gate, City of	South Coast	101439	N	
Stockton, City of, Mun Util Dept	San Joaquin River	128600	Y	2006
Vallecitos WD	South Coast	73820	Y	1991
Western MWD	South Coast	63383	Y	1994

Table 2. Water Management Practices Included in BMP Calculator

Item #	Water Management Practice	Targeted Water Use Sector
1	BMP 1.2 Water Loss Control	Distribution system losses before delivery
2	BMP 1.3 Metering	Multi-sector
3	BMP 3.1 Residential Assistance	Indoor residential
4	BMP 3.2 Residential Landscape	Outdoor residential
5	BMP 4 CII	CII
6	BMP 5.2 Landscape Budgets	Primarily outdoor use associated with CII sites (dedicated irrigation meters only)
7	Single Family Toilets	Indoor residential
8	Multi Family Toilets	Indoor residential
9	Residential Washers	Indoor residential
10	Residential Showerheads	Indoor residential

Table 3. 2005 Population Distribution of Random Samples

Region Number	Hydrologic Region	2005 Random Sample			2005 Total Population	
		Hydrologic Region Population	% of Statewide Sample	% of Total HR or State Population	Hydrologic Region Population	% of Statewide Population
1	North Coast	14,000	0.5%	2.1%	673,669	1.8%
2	SF Bay	855,592	29.3%	13.4%	6,404,503	17.5%
3	Central Coast	58,971	2.0%	3.8%	1,534,971	4.2%
4	South Coast	1,545,355	52.9%	7.9%	19,489,176	53.2%
5	Sacramento River	164,445	5.6%	5.7%	2,902,348	7.9%
6	San Joaquin River	193,316	6.6%	9.8%	1,978,183	5.4%
7	Tulare Lake	89,972	3.1%	4.4%	2,067,314	5.6%
8	North Lahontan	0	0.0%	0.0%	106,103	0.3%
9	South Lahontan	0	0.0%	0.0%	783,854	2.1%
10	Colorado River	0	0.0%	0.0%	704,861	1.9%
Total		2,921,651	100.0%	8.0%	36,644,983	100.0%

Table 4. 2000 CUWCC Membership (2005 not analyzed)*

Membership Status	Random Sample		All Suppliers	
	# Suppliers	%	# Suppliers	%
Members	14	45.2	163	41.8
Non-Members	17	54.8	227	58.2
Total	31	100.0	390	100.0

*Note: Population distribution by CUWCC membership status is not available.

Table 5. Preliminary Assessment of Four Alternatives

Alternative	BMP Calculator	DWR II	Hybrid A	Hybrid B
1. Statewide Savings	20% savings will be achieved if the BMP savings adjustment factor is accurate, which is dependent on how well the random sample represents all suppliers.	20% savings will be achieved if the landscape and water loss savings factor is accurate, which is dependent on how well the random sample represents all suppliers.	20% savings will be achieved if the landscape and water loss savings factor for use over 100 GPCD is accurate, which is dependent on how well the random sample represents all suppliers.	20% savings will be achieved if the landscape and water loss savings factor is accurate, which is dependent on how well the random sample represents all suppliers.
2. Climatic Differences	The BMP Calculator does not address outdoor water use savings well. The statewide adjustment factor is based on the calculator savings.	The statewide adjustment factor is applied to the combined outdoor and systems losses sector, thus giving significant weight to outdoor use. ETo and effective precipitation factors normalize outdoor water use by climate.	The statewide adjustment factor is applied to all use above 100 GPCD, which is primarily outdoor use. ETo and effective precipitation factors normalize the outdoor and system losses water use by climate. This alternative does not identify outdoor water use as explicitly as the DWR II or Hybrid B alternatives.	The statewide adjustment factor is applied to the portion of use above 70 GPCD and CII use, which is primarily outdoor and system losses. ETo and effective precipitation factors normalize the outdoor and system losses water use by climate.

Table 5. Preliminary Assessment of Four Alternatives

Alternative	BMP Calculator	DWR II	Hybrid A	Hybrid B
3. Population Density	Population density appears to be an indirect reference to per capita irrigated area. The BMP Calculator does not address outdoor water use savings well.	Population density appears to be an indirect reference to per capita irrigated area. While DWR II relates a significant portion of savings to outdoor use, it does not reflect differences in per capita irrigated area.	Population density appears to be an indirect reference to per capita irrigated area. While Hybrid A relates a significant portion of savings to outdoor use, it does not reflect differences in per capita irrigated area.	Population density appears to be an indirect reference to per capita irrigated area. While Hybrid B relates a significant portion of savings to outdoor use, it does not reflect differences in per capita irrigated area.
4. Flexibility	Suppliers have complete flexibility to decide measures to meet targets regardless of target method chosen.	Suppliers have complete flexibility to decide measures to meet targets regardless of target method chosen.	Suppliers have complete flexibility to decide measures to meet targets regardless of target method chosen.	Suppliers have complete flexibility to decide measures to meet targets regardless of target method chosen.
5. Plant Water Needs	BMP 5.2 identifies savings from water budgets for dedicated landscape metered deliveries for which no budgets have been provided. However, the BMP Calculator does not address most outdoor use.	DWR II relates a significant portion of savings to outdoor use, which is normalized by ETo and effective precipitation.	Hybrid A relates a significant portion of savings to outdoor use, though potentially less accurately than DWR II or Hybrid B. Outdoor use is normalized by ETo and effective precipitation. Not all outdoor use is isolated; some is embedded in the portion of use under the 100 GPCD threshold.	Hybrid B relates a significant portion of savings to outdoor use, which is normalized by ETo and effective precipitation. Not all outdoor use is isolated; some is embedded within the CII sector and in the portion of use under the 70 GPCD threshold.

Table 5. Preliminary Assessment of Four Alternatives

Alternative	BMP Calculator	DWR II	Hybrid A	Hybrid B
6. Different CII Use	The BMP Calculator alternative assumes 10 percent savings on total baseline CII use, but does not distinguish between types of CII use or past CII savings.	The DWR II alternative assumes 10 percent savings on total baseline CII use, but does not distinguish between types of CII use or past CII savings.	The Hybrid A alternative assumes 10 percent savings on total baseline CII use, but does not distinguish between types of CII use or past CII savings. Because CII savings is not correlated to a separate CII use sector, some CII water use falling within the use above 100 GPCD could be subject to additional savings.	The Hybrid B alternative assumes 10 percent savings on total baseline CII use, but does not distinguish between types of CII use or past CII savings.

Table 5. Preliminary Assessment of Four Alternatives

Alternative	BMP Calculator	DWR II	Hybrid A	Hybrid B
7. Undue Hardship	The BMP Calculator gives credit for past conservation in indoor residential, dedicated irrigation meter budgeting, and metering. Savings from past foundational BMPs are not determined.	Suppliers that have reduced indoor residential use closer to the 55 GPCD target will have less hardship achieving that. Because the statewide savings factor is applied to outdoor use and water losses, past reductions in those will be reflected in reduced savings requirements.	The BMP Calculator gives credit for past conservation in indoor residential, dedicated irrigation meter budgeting, and metering. Savings from past foundational BMPs are not determined. However, by requiring only BMP Calculator savings for use below 100 GPCD, it is likely that a significant portion of past conservation is captured, especially because reportedly most urban conservation efforts have emphasized indoor use. Because the statewide savings factor is applied to use over 100 GPCD, which is mostly outdoor use and water losses, past reductions in those will be reflected in reduced savings requirements.	The BMP Calculator gives credit for past conservation in indoor residential and metering. Savings from past foundational BMPs are not determined. However, by requiring only BMP Calculator savings for use below 70 GPCD, it is likely that a significant portion of past conservation is captured, especially because reportedly most urban conservation efforts have emphasized indoor use. Because the statewide savings factor is applied to outdoor use and water losses, past reductions in those will be reflected in reduced savings requirements.

Table 5. Preliminary Assessment of Four Alternatives

Alternative	BMP Calculator	DWR II	Hybrid A	Hybrid B
8. Different from 3 Specified Methods	This alternative is very different from the 3 methods specified in Water Code, except that CII savings is 10% as in Method 2.	DWR II has similarities to Method 2 for indoor residential and CII use, but relies on determining indoor residential use as a means to determining outdoor use. Calculation of irrigated landscape area is not required in DWR II.	This alternative is very different from the 3 methods specified in Water Code, except that CII savings is 10% as in Method 2.	This alternative is very different from the 3 methods specified in Water Code, except that CII savings is 10% as in Method 2.

Table 5. Preliminary Assessment of Four Alternatives

Alternative	BMP Calculator	DWR II	Hybrid A	Hybrid B
9. Cost of Data Collection	There are many inputs to the BMP Calculator that many suppliers will not have readily available. Additional water suppliers will have to be added to the random sample for DWR to determine reliable baseline data and statewide adjustment factor. The random sample will have to be run for baseline 2000. Data Needs: Using the BMP Calculator: baseline water use, baseline unmetered accounts, past number of residential customers receiving indoor and outdoor use assistance, number of past water budgets provided for dedicated landscape meters, number of past single-family accounts receiving clothes washer incentives, number of residential toilet replacement incentives provided in past.	DWR II needs monthly water use data for water suppliers to estimate their own indoor water use and for DWR for each supplier in random sample to estimate indoor use and statewide adjustment factor. ETo and effective precipitation data are needed for each supplier.	There are many inputs to the BMP Calculator that many suppliers will not have readily available. Additional water suppliers will have to be added to the random sample to determine reliable baseline data and statewide adjustment factor. The random sample will have to be run for baseline 2000. ETo and effective precipitation data are needed for each supplier. Data Needs: Using the BMP Calculator: baseline water use, baseline unmetered accounts, past number of residential customers receiving indoor and outdoor use assistance, number of past water budgets provided for dedicated landscape meters, number of past single-family accounts receiving clothes washer incentives, number of residential toilet replacement incentives provided in past.	There are many inputs to the BMP Calculator that many suppliers will not have readily available. Only 7 of 10 elements of BMP Calculator used, reducing somewhat the number of inputs. Additional water suppliers will have to be added to the random sample to determine reliable baseline data and statewide adjustment factor. The random sample will have to be run for baseline 2000. ETo and effective precipitation data are needed for each supplier. Data Needs: Using the BMP Calculator: baseline water use, baseline unmetered accounts, past number of residential customers receiving indoor use assistance, number of past single-family accounts receiving clothes washer incentives, number of residential toilet replacement incentives provided in past.

Table 5. Preliminary Assessment of Four Alternatives

Alternative	BMP Calculator	DWR II	Hybrid A	Hybrid B
10. Ease of Implementation by Water Supplier	There are many inputs to the BMP Calculator that many suppliers will not have readily available.	Suppliers need monthly water use data to estimate their own indoor water use	There are many inputs to the BMP Calculator that many suppliers will not have readily available.	There are many inputs to the BMP Calculator that many suppliers will not have readily available.
Other Comments		Implementation is significantly hampered by the inability to determine indoor residential use accurately. Minimum month methods do not appear to be accurate and over-estimate indoor use in arid areas where winter irrigation takes place. DWR II does not rely on the BMP Calculator, which could simplify the ability of suppliers to calculate targets and simplify DWR review.		