



# 2005 Urban Water Management Plan

Adopted  
June 20, 2007

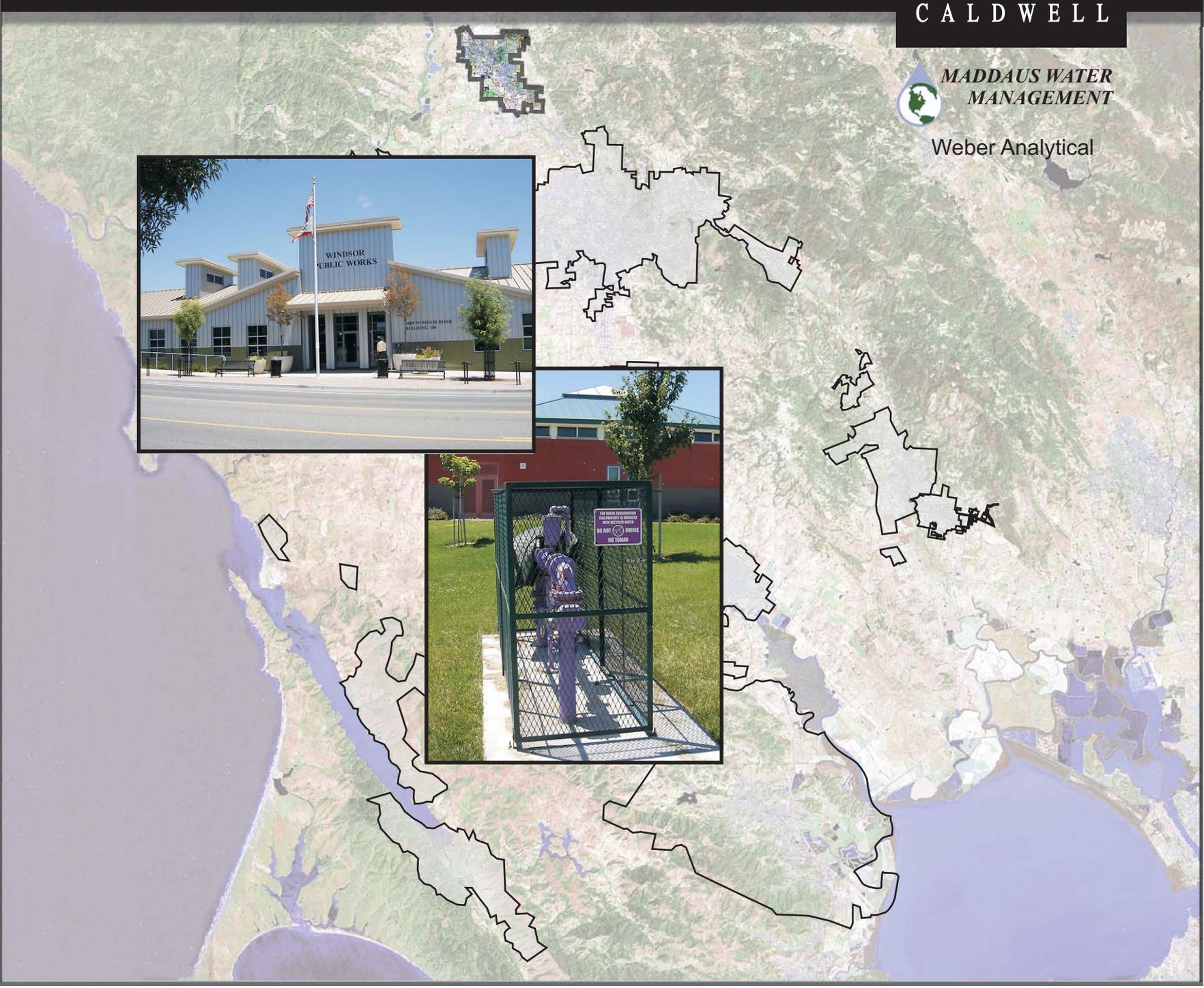
Town of Windsor

BROWN AND  
CALDWELL



MADDAUS WATER  
MANAGEMENT

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1017/127280.005

Subject: Town of Windsor, Urban Water Management Plan

Dear Mr. Scott:

Brown and Caldwell is pleased to submit this 2005 Urban Water Management Plan. Please do not hesitate to contact me if you have any questions at (916) 853-5306.

Sincerely,

BROWN AND CALDWELL



Paul Selsky, P.E.  
Vice President

PS:DM:ds

Enclosure

cc: w/enclosure: Jay Jasperse, Sonoma County Water Agency



# TOWN OF WINDSOR

## 2005 URBAN WATER MANAGEMENT PLAN

June 2007

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## LIST OF ACRONYMS AND ABBREVIATIONS

ABAG	Association of Bay Area Government's
Act	Urban Water Management Act
ac-ft	acre-feet
ac-ft/yr	acre-feet per year
ADWF	average dry weather flow
Agency	Sonoma County Water Agency
ALWSZ	Airport Larkfield/Wikkiup Sanitation Zone
BMP	best management practice
CEE	Consortium for Energy Efficiency
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CUWCC	California Urban Water Conservation Council
DHS	California Department of Health Services
DSS	Decision Support System
DWR	California Department of Water Resources
EDB	Economic Development Board
EIR	Environmental Impact Report
ERSP	Eastside Road Storage Project
ETo	evapotranspiration
GIS	Geographic Information System
gpf	gallons-per-flush
gpm	gallons per minute
HOA	Home Owners Association
hp	horsepower
MCL	maximum contaminant level
MF	Multi Family
MG	million gallons
mgd	million gallons per day
MOU	Memorandum of Understanding
NPDES	National Pollutant Discharge Elimination System
PG&E	Pacific Gas and Electric
Plan	Urban Water Management Plan
ppb	parts per billion
Restructured Agreement	Restructured Agreement for Water Supply
SF	Single Family
SWRCB	State Water Resources Control Board
Town	Town of Windsor
ULFT	Ultra Low Flow Toilet
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey



## **SECTION 1**

### **INTRODUCTION**

This Urban Water Management Plan (Plan) addresses the Town of Windsor (Town) water system and includes a description of the water supply sources, magnitudes of historical and projected water use, and a comparison of water supply to water demands during normal, single-dry, and multiple-dry years. The Town receives the majority of its water from the Russian River Well Field under the Agency's water rights with additional supplies from Sonoma County Water Agency (Agency). The Agency provides water principally from the Russian River to a number of retail water customers, primarily in Sonoma County, California.

This section provides background information on the Plan, an overview of coordination with other agencies, and a description of public participation and Plan adoption.

#### **1.1 Urban Water Management Planning Act**

This Plan has been prepared in accordance with the Urban Water Management Act (Act), as amended, California Water Code, Sections 10610 through 10657. The Act requires every urban water supplier that provides water for municipal purposes to more than 3,000 connections or supplying more than 3,000 ac-ft of water annually, to adopt and submit a plan every five years to the California Department of Water Resources (DWR). This Plan serves as a long-range planning document for the Town's water supply. The Agency's urban water management plan should be consulted for details regarding the Agency's water supplies (Sonoma County Water Agency, 2006).

#### **1.2 Resource Maximization and Import Minimization**

Water management tools have been used by the Town to maximize water resources. The Town has been participating with the Agency in the implementation of water conservation measures. Additionally, the Town is participating in the preparation of groundwater basin studies being conducted in Sonoma County by the Agency and the United States Geological Survey (USGS).

### 1.3 Coordination

The Act requires the Town to coordinate the preparation of its Plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies. The Town coordinated the preparation of its Plan with its wholesale water supplier, the Agency, and eight nearby water utilities that also utilize Agency water and the Santa Rosa Subregional Reclamation System. In addition, the Town coordinated the preparation of the water demand projections in this Plan with the Association of Bay Area Government’s (ABAG) demographic projections and Windsor’s General Plan. Table 1-1 provides a summary of the Town’s coordination with the appropriate agencies.

**Table 1-1. (DWR Table 1) Coordination with Appropriate Agencies**

	County Agencies		Wastewater Agency Facilities	Other
	Sonoma County	Sonoma County Water Agency	Santa Rosa Subregional Reclamation System	Public Involvement
Participated in developing the Plan		✓	✓	✓
Commented on the draft		✓	✓	
Attended public meetings		✓	✓	✓
Was contacted for assistance	✓	✓	✓	
Was sent a copy of the draft Plan	✓	✓	✓	✓
Was sent a notice of intention to adopt	✓		✓	✓
Not involved/No information				

### 1.4 Public Participation and Plan Adoption

The Town encouraged community and public interest involvement in the Plan update through public hearings and inspection of the draft document. Public hearing notifications were published in the Santa Rosa Press Democrat. A copy of the published Notice of Public Hearing is included in Appendix A. The public hearing on June 20, 2007 provided an opportunity for all residents and employees in the service area to learn and ask questions about their water supply and the Town’s plans for providing a reliable, safe, high-quality water supply. Copies of the draft Plan were made available for public inspection at the Town’s office.

This Plan was adopted by the Town Council on June 20, 2007. A copy of the adopted resolution is provided in Appendix A.

## **1.5 Plan Organization**

This section provides a summary of the sections in the Plan. Section 2 provides a description of the service area, climate, water supply facilities, and distribution system. Section 3 presents historical and projected water use. Section 4 describes surface and groundwater supplies. Section 5 describes recycled water. Section 6 addresses water conservation. Section 7 provides a comparison of future water supply to demand. Appendices A through D provide relevant supporting documents.

## **1.6 Assumptions**

The evaluation and conclusions in this Plan are based in part upon assumptions made by the Agency regarding their water supply. The Agency's urban water management plan should be consulted for information about these assumptions.



## SECTION 2

### DESCRIPTION OF EXISTING WATER SYSTEM

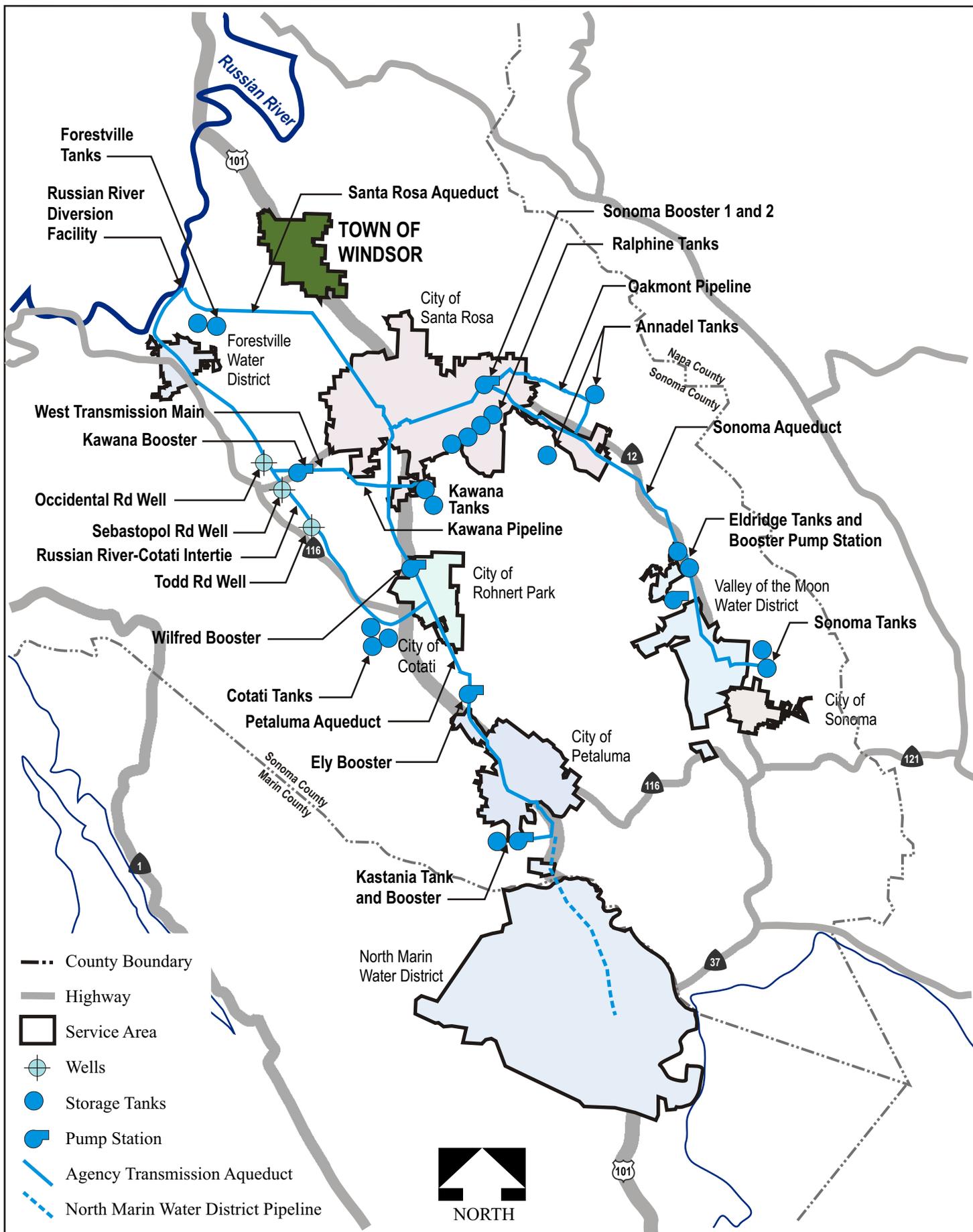
This section describes the Town's service area, climate, and water supply facilities.

#### **2.1 Description of Service Area**

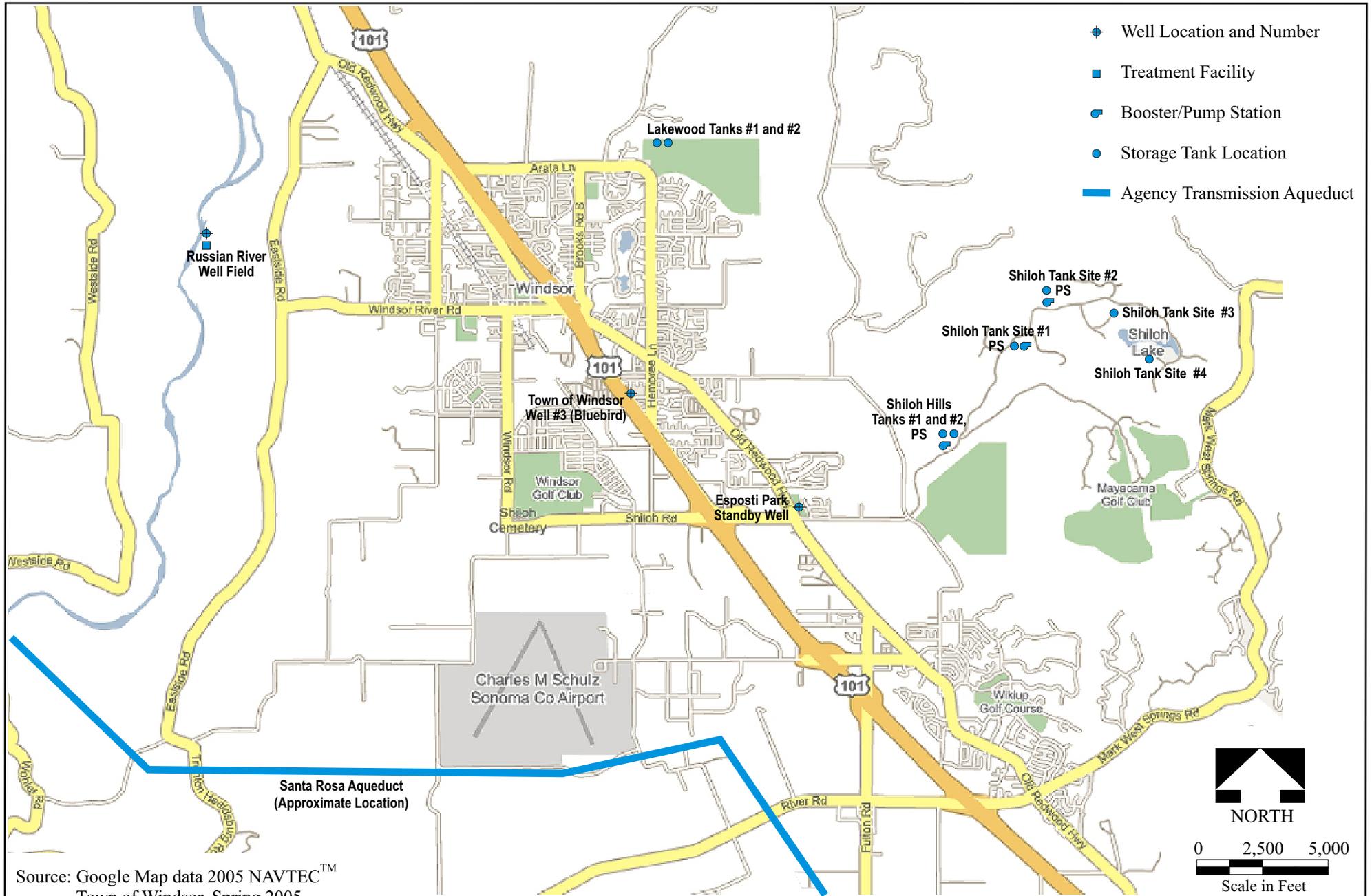
The Town's water system serves the Town of Windsor and several adjacent areas. Located along Highway 101 in central Sonoma County, approximately seven miles north of the City of Santa Rosa, the water system boundary consists of the town limits of Windsor, plus two service areas located outside the Town's boundary and are served by "outside service agreements:" the Airport Service Area and the Shiloh Service Area. The Town provides potable water to a total population of approximately 23,249 people. The entire population is not served by the Town, as there are several older developments and mobile home parks operating and maintaining their own private well system. Figure 2-1 illustrates the location of the Town's service area and Agency transmission system. Figure 2-2 shows the Town's water service areas.

#### **2.2 Climate**

The Town's climate is tempered by its proximity to the Pacific Ocean. In common with much of the California coastal area, the year is divided into wet and dry seasons. A majority of the annual precipitation normally falls during the wet season, October to May, with a large percentage of the rainfall typically occurring during three or four major winter storms. Winters are cool, and below-freezing temperatures seldom occur. Summers are warm and the frost-free season is fairly long. Annual precipitation averages 29.6 inches. Table 2-1 summarizes average monthly evapotranspiration rates (ET<sub>o</sub>), rainfall, and temperatures.



	PROJECT	127280-005	SITE	UWMP 2005, Town of Windsor	Figure 2-1
	DATE	1-22-07	TITLE	Town of Windsor Water System Service Area	



Source: Google Map data 2005 NAVTEC™  
Town of Windsor, Spring 2005

<b>BROWN AND CALDWELL</b>	PROJECT	127280-005	UWMP 2005, Town of Windsor  Water Supply Facilities	Figure 2-2
	DATE	4-13-07		

**Table 2-1. (DWR Table 3) Climate**

	Standard average ETo <sup>a</sup> , in	Average rainfall <sup>b</sup> , in	Average temperature <sup>b</sup> , °F
January	0.88	6.44	47.23
February	1.55	5.26	51.27
March	2.99	3.89	53.56
April	4.53	1.83	56.56
May	5.46	0.69	61.48
June	6.47	0.25	67.07
July	6.53	0.03	70.10
August	5.87	0.11	69.80
September	4.36	0.31	68.06
October	3.24	1.58	62.23
November	1.37	4.03	53.14
December	0.96	5.20	47.33
Annual	44.21	29.63	58.95

<sup>a</sup> Data represents the monthly average from August 1999 to September 2005 and was recorded from Windsor CIMIS Station 103. ETo, or evapotranspiration, is the loss of water from evaporation and transpiration from plants.

<sup>b</sup> 1952-2005 data recorded at Sonoma Station from NOAA website [www.wrcc.dri.edu](http://www.wrcc.dri.edu)

## 2.3 Water Supply Facilities

The Town has three water supply sources: the Russian River Well Field, the Agency transmission system, and one off-river groundwater well, called the Bluebird Well. A map of the Town's existing water system that depicts the locations of storage tanks, groundwater wells, and pumping stations is presented on Figure 2-2.

### 2.3.1 Agency Water System Facilities

The Town receives its surface water supply from the Agency's Santa Rosa Aqueduct. The Agency's water supply is provided by diversions of water from the Russian River, in addition to supplemental water from three groundwater wells located in the Santa Rosa Plain. The Agency's urban water management plan should be consulted for details regarding the Agency's water supply. A description of the supply quantity and quality are included in Section 4.

The Town receives Agency water through a connection to the 36-inch Santa Rosa Aqueduct line with a 12-inch water main located adjacent to Laughlin Road in the southern portion of the Airport Outside Service Area. This connection offers a physical capability of 3 million gallons per day (mgd). The Agency has been supplying water to the Town since 1985, when the Town agreed to be responsible for supplying water to the Sonoma County Airport and the Airport Industrial Area.

### 2.3.2 Russian River Well Field

The Russian River Well Field is located on a 27-acre parcel northwest of the Windsor River Road/Eastside Road intersection. The well field, which has been in operation since 1984, currently contains five producing wells with capacities of approximately 1,000 gallons per minute (gpm) each. These wells intercept underflow from the Russian River. The production of the Russian River Well Field is limited under terms of an agreement with the Agency that allows the Town to divert water under the Agency's water rights permit issued by the State Water Resources Control Board (SWRCB). The Town may divert up to 4,725 acre-feet per year (ac-ft/yr) of water per year at a maximum rate of 7.2 mgd over 30 days from the well field. The agreement with the Agency extends to 2014, including provisions for a 40-year renewal at no greater quantities.

### 2.3.3 Groundwater Facilities

The Town has three groundwater wells. The Bluebird Well is a 400-foot well located at the end of Bluebird Court in Windsor. Constructed in 1972, it had been placed on standby in the mid-1980s when the Russian River Well Field was developed, but has subsequently been used as an off-river supply source to improve system reliability. In 2006, the Bluebird well once more was taken off-line due to the lowering of the State's Arsenic standard from 50 parts per billion (ppb) to 10 ppb. The Town also owns the Esposti Well and Keiser Park wells which are primarily used for park irrigation, as well as serving as a backup or emergency source of potable water. Table 2-2 summarizes the Town's well data.

**Table 2-2. Windsor Well Data**

Site	Well No.	Capacity (gpm)	Status
Russian River Well Field (RRWF)	7	1,000	On line
RRWF	8	1,000	On line
RRWF	9	1,000	On line
RRWF	10	1,000	On line
RRWF	11	1,000	On line
Bluebird Well	3	400	Off-line
Esposti Park Well	N/A	200	Standby
Keiser Park Well	N/A	150	Standby

## 2.4 Distribution System

The Town's water system has several storage tanks and pumping station facilities. The pumping stations are located and serve the Shiloh service area.

### 2.4.1 Storage

The Town has five MG of storage tank capacity to serve its primary pressure zone. A 1 million gallon (MG) tank and a 2 MG tank (Lakewood Hills 1 and 2) are located in the northeastern part of the Town, two 1 MG tanks (Shiloh Ridge 1 and 2) are located off of Shiloh Ridge Road in the hills east of the Town. Additionally, three small pressure zones supply homes in the hills to the southeast of Windsor in the Shiloh Estates and Mayacama subdivisions. These subdivisions are located in unincorporated areas and are provided water service by the Town through outside service area agreements. The design characteristics of the reservoirs are summarized in Table 2-3.

**Table 2-3. Characteristics of Storage Reservoirs**

Name	Zone serviced	Tanks No. – capacity
Lakewood Hill Tank Site	1 (main pressure zone)	1 MG tank 2 MG tank
Shiloh Tank Site	1 (main pressure zone)	Two - 1 MG tanks
Shiloh 2	2 (lower Shiloh OSA)	Four - 10,500 gallon tanks
Shiloh 3	3 (middle Shiloh OSA)	Three - 10,500 gallon tanks
Shiloh 4 North	4 (middle Shiloh OSA)	Three - 10,500 gallon tanks
Shiloh 4 South	4 (middle Shiloh OSA)	100,000 gallon tank
Mayacama Tank	Mayacama pressure zone	220,000 gallon tank

### 2.4.2 Pump Stations

The Town operates four pump stations all located in the Shiloh Estates subdivision in the hills to the southeast of the Town. Characteristics of these stations are presented in Table 2-4.

**Table 2-4. Characteristics of Booster Pump Stations**

Name	Zone serviced	Capacity (gpm)
Shiloh 1	2 (lower Shiloh OSA)	2 @ 270 each
Shiloh 2	3 (middle Shiloh OSA)	2 @ 250 each
Shiloh 3	4 (highest Shiloh OSA)	2 @ 100 each
Vinecrest Pump Station	5 (higher Vinecrest Circle)	2 @ 280 total

### 2.4.3 Distribution Pipelines

The Town's distribution system consists of over 70 miles of pipe, ranging in diameters from 4 to 18 inches. The system is comprised of approximately 88 percent polyvinyl chloride, 2 percent ductile iron, and 10 percent asbestos cement. The majority of the pipelines have been installed in the last twelve years and are in excellent condition.



## SECTION 3

### HISTORICAL AND PROJECTED WATER USE

This section presents information regarding demographics and projections of future Town water demands. A more detailed analysis of water use characteristics and projected population and water demands are presented in Appendix B.

#### **3.1 Employment, Land Use, and Population**

This section describes the Town's employment and land use characteristics and current and projected future population for the Town's service area.

##### **3.1.1 Employment Characteristics**

The employment characteristics of the Town's service area are primarily in the public sector and in the service and manufacturing industries. Regionally, employment in the agricultural industry is related to vineyards, livestock, orchards, silage crops, and timber. The primary industrial activities in the region include telecommunications, wine production, timber and other agricultural product processing, gravel mining and processing, energy production, and miscellaneous manufacturing. Recreation and tourism are moderate and growing industries in the region.

##### **3.1.2 Land Use Characteristics**

Land use within the Town is primarily residential, but also includes agricultural, industrial, commercial, and recreational land uses. Sonoma County, by policy, concentrates urban growth within incorporated cities, not in the unincorporated area. Sonoma County has a voter-approved County-wide urban growth boundary and each city has an urban growth boundary. There are voter-approved taxes supporting open space acquisition in all of Sonoma County.

##### **3.1.3 Population Projections**

Population and employment projections were developed for the Town. The population and employment forecasts are based on the projections developed by ABAG. The population projections are described in the analysis performed by Maddaus Water Management, which is presented in Appendix B. Table 3-1 provides current and projected populations through the year 2030 for the Town's service area.

**Table 3-1. (DWR Table 2) Population – Current and Projected**

Year	Population
2005	22,909
2010	25,409
2015	26,409
2020	27,809
2025	28,809
2030	31,339

Source: Appendix B.

### 3.2 Historical and Future Water Use

This section outlines water use in the Town by customer type, water sales to other agencies, additional water use, and past and projected water use. The analysis presented here was performed by Maddaus Water Management for all retail water providers that are signatory to the Restructured Agreement for Water Supply. Per page 5 of the Maddaus demand analysis, the demand projections reflect average weather conditions and do not reflect dry, hot, non-drought conditions. The Town plans to supplement Agency supply with its own groundwater supplies as discussed in Section 4.2 of this Plan to meet consumptive needs during hot dry periods that do not also have drought conditions. The Agency and the Town worked together to develop a water demand analysis and water demand projections. The detailed water demand analysis and demand projections are presented in the evaluations performed by Weber Analytical and Maddaus Water Management, which are presented in Appendix B. The water demand projection process consisted of projecting future demographics, evaluating historical water use characteristics, defining alternative levels of water conservation efforts, and developing resulting water demand projections. The projections include consideration of the impacts of the plumbing code and current and future water conservation efforts.

The historical water use analysis consisted of evaluating the monthly water use per account for each customer category over a 6 year period. The analysis resulted in a weather normalized annual water use per account type, expressed as gallons per day per account. The demographic projections, water use characteristics, and alternative conservation efforts were integrated using the Decision Support System (DSS) model to develop resulting demand projections. The DSS model and the water conservation assumptions are described in Section 6.

### 3.2.1. Water Use by Customer Type

Water uses in the Town include single-family, multi-family, business, commercial, irrigation, and institutional customers. The historical and projected number of connections and deliveries to the Town’s customers by user sector are presented in Table 3-2. The projected water deliveries include implementation of the plumbing code and water conservation savings from the California Urban Water Conservation Council (CUWCC) Best Management Practices (BMPs) implemented through 2004. The projected water deliveries do not include water savings from future water conservation implementation beyond the plumbing code.

**Table 3-2. (DWR Table 12) Past, Current, and Projected Water Deliveries<sup>a</sup>**

			Water Use Sectors					Total
			Single-family	Multi-family	Commercial	Irrigation	Institutional	
2000 <sup>b</sup>	metered	# of accounts	6,564	57	465	260	4	7,349
		Deliveries ac-ft/yr	2,790	77	524	497	46	3,935
2005	metered	# of accounts	7,552	56	589	326	8	8,532
		Deliveries ac-ft/yr	3,033	100	770	599	26	4,527
2010	metered	# of accounts	8,474	63	625	346	9	9,517
		Deliveries ac-ft/yr	3,344	108	810	635	30	4,926
2015	metered	# of accounts	8,908	66	840	465	10	10,290
		Deliveries ac-ft/yr	3,463	110	1,077	854	31	5,535
2020	metered	# of accounts	9,473	70	1,050	581	10	11,184
		Deliveries ac-ft/yr	3,629	113	1,337	1,066	33	6,179
2025	metered	# of accounts	9,907	74	1,114	617	11	11,722
		Deliveries ac-ft/yr	3,749	115	1,415	1,131	35	6,446
2030	metered	# of accounts	10,180	76	1,164	645	11	12,075
		Deliveries ac-ft/yr	3,819	117	1,477	1,183	36	6,631

Source: See Appendix B.

ac-ft/yr = acre-feet per year

<sup>a</sup> The water use includes plumbing code water savings, but not the other projected water conservation savings.

<sup>b</sup> Based on historical data.

### 3.2.2. Water Sales to Other Agencies

The Town does not currently sell water to other agencies.

### 3.2.3. Unaccounted-for Water and Additional Water Use

Unaccounted-for water use is unmetered water use, such as that used for fire protection and training, system and street flushing, sewer cleaning, construction, system leaks, as well as that used by unauthorized connections. Unaccounted-for water use can also result from meter inaccuracies.

Table 3-3 provides the projected quantity of unaccounted-for system water losses. More details on the assumptions made to project system losses are presented in Appendix B.

At this time, the Town does not use water for groundwater recharge to prevent salt water intrusion (saline barriers) or for other conjunctive uses.

**Table 3-3. (DWR Table 14) Additional Water Uses and Losses, ac-ft/yr**

Water Use	2005	2010	2015	2020	2025	2030
Saline barriers	0	0	0	0	0	0
Groundwater recharge	0	0	0	0	0	0
Conjunctive use	0	0	0	0	0	0
Other	0	0	0	0	0	0
Unaccounted-for system losses (7%)	341	373	411	461	485	499
Total	341	373	411	461	485	499

### 3.2.4. Total Water Use

Past, present and projected future water use for the system, which is the sum of the totals from Tables 3-2 and 3-3, is presented in Table 3-4.

**Table 3-4. (DWR Table 15) Total Water Use<sup>a</sup>, ac-ft/yr**

Water Use	2005	2010	2015	2020	2025	2030
Total water use	4,868	5,299	5,946	6,640	6,931	7,130

Source: Appendix B

<sup>a</sup> The projected water deliveries include implementation of the plumbing code and water conservation savings from the CUWCC BMPs implemented through 2004. These demands do not include future projected savings from future Tier 1, Tier 2, and new housing standards. These additional conservation measures are discussed in Section 6 and are incorporated as potential supplies. Actual demand reduction and the manner in which the demand reduction is achieved may vary.

### 3.3 Demand on Wholesale Supply

Table 3-5 provides the projected amount of water that the Agency has determined for the Town to expect to purchase from the Agency from the Santa Rosa Aqueduct and pump from its Russian River Well field under the Agency's water rights to meet water demands in the future. The Town will use a combination of local groundwater, recycled water supplies, and future additional conservation measures to supply the difference between demand and the Agency water supply.

**Table 3-5. (DWR Table 19) Town Demand Projections to Wholesale Suppliers, ac-ft/yr**

Wholesaler	2010	2015	2020	2025	2030
Sonoma County Water Agency	4,480	4,701	5,417	5,827	5,750

Source: Table provided to the Town by Jay Jasperse at a meeting held on April 24, 2007.



## **SECTION 4**

### **WATER SUPPLY**

Water from the Agency's transmission system, the Town's Russian River Well Field, a local (off-river groundwater) well, and recycled water are used to meet the Town's water demand. This section describes the surface water and groundwater sources, quantities, supply constraints, and the reliability and water quality of the water supply sources. Recycled water use is described in Section 5.

#### **4.1 Agency Surface Water**

This section briefly describes the physical constraints to the Agency's surface water supply and the legal background and constraints to this supply. As described in Section 2, the Agency receives its surface water from the Russian River. More detailed information regarding the Agency's water supply and facilities can be found in the Agency's urban water management plan.

##### **4.1.1 Description**

The Town receives its water supply from both water delivered by the Agency through the Santa Rosa Aqueduct and water diverted by Windsor through facilities owned by Windsor under the Agency's State water rights and under its own water rights (off-river wells). The Agency is supplied by the federal Russian River Project, which it operates along with the Agency's appurtenant water transmission system. The Coyote Valley Dam, which creates Lake Mendocino on the East Fork Russian River, and Warm Springs Dam, which creates Lake Sonoma on Dry Creek (a tributary to the Russian River), are the key elements of the Russian River Project. Water from the Russian River is diverted by the Agency near Forestville and conveyed via its transmission system (including diversion facilities, treatment facilities, pipelines, water storage tanks, booster pump stations, and groundwater wells) to its wholesale customers, including the Town. Further detail on the Town's water supply facilities and distribution system is included in Section 2.

##### **4.1.2 Physical Constraints**

The capacity of the Agency's transmission system is a physical constraint on the delivery of water to the Town, particularly during high demand periods in the summer months. This physical constraint is addressed by the Memorandum of Understanding described in Section 4.1.3. Future water supply

projections are dependent upon planned infrastructure improvements being approved and constructed, as discussed in the Agency's urban water management plan.

#### 4.1.3 Legal Constraints

The Agency's Russian River water supply is controlled and influenced by a variety of agreements and decisions. The Agency's urban water management plan should be consulted for details regarding these arguments and decisions. This section of the plan describes the issues that influence the Town's water supply.

Water Rights. Four SWRCB permits<sup>1</sup> currently authorize the Agency to store up to 122,500 ac-ft/yr of water in Lake Mendocino and up to 245,000 ac-ft/yr of water in Lake Sonoma, and to divert and redivert 180 cubic feet per second (cfs) of water from the Russian River at the Agency's Wohler and Mirabel facilities, up to 75,000 ac-ft/yr. The Agency has applied to the SWRCB to increase the Agency's Russian River diversion limit from 75,000 to 101,000 ac-ft/yr.

In the early 1990s, the Agency initiated a water project to increase the amount of water released from Lake Sonoma and diverted from the Russian River and to expand the transmission system. A challenge to the Environmental Impact Report (EIR) for the water project was partially successful, and the Agency is in the process of preparing an EIR for a new water project. The new water project must undergo environmental review in accordance with the California Environmental Quality Act (CEQA) and obtain project approval before it can proceed. The Draft EIR is anticipated to be released for public review in 2007. Final EIR certification and project approval could be considered by the Board of Directors by June 2008.

Restructured Agreement for Water Supply. The *Restructured Agreement for Water Supply* (Restructured Agreement), which was executed in 2006, generally provides for the finance, construction, and operation of existing and new diversion facilities, transmission lines, storage tanks, booster pumps, conventional wells, and appurtenant facilities. The Restructured Agreement provides the contractual relationship between the Agency and its eight contractors, including the Town, and includes specific maximum amounts of water that the Agency is obligated to supply to its water contractors. Maximum water allocations for each of the Agency's water contractors set forth within the

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<sup>1</sup> SWRCB Permits Numbers 12947A, 12949, 12950, and 16596.

Restructured Agreement were premised on the Agency's diversion/rediversion water rights being increased to 101,000 ac-ft/yr and on the construction of the new facilities authorized by the Restructured Agreement. The water allocation for the Town under the Restructured Agreement is 4,725 ac-ft/yr and 900 ac-ft/yr with a maximum month of 7.2 mgd and 1.5 mgd through direct diversion and transmission system deliveries, respectively. Section 3.5 of the Restructured Agreement provides a method for allocating water among these parties during periods of shortage. The Town has adopted a water shortage methodology, consistent with Section 3.5, which is presented in Appendix D.

Memorandum of Understanding Regarding Water Transmission System Capacity Allocation during Temporary Impairment. The maximum delivery allocations in the Restructured Agreement assume the construction of certain additional facilities and approval by the SWRCB of increased Agency diversion from the Russian River up to 101,000 ac-ft/yr. Existing transmission system constraints have necessitated the development of an additional agreement to govern maximum water allocations during the summer months. The *Memorandum of Understanding Regarding Water Transmission System Capacity Allocation during Temporary Impairment* (Temporary Impairment MOU) is in effect between the Agency and its primary customers, including the Town, until September 30, 2008. The Temporary Impairment MOU allocates the existing 92 mgd of transmission system capacity among the parties during the "summer months" of June through September. The Town's allocation is a peak month of 1.5 mgd during the June to September period. The Temporary Impairment MOU also contains mechanisms for enhancing operational coordination among the Agency's customers to balance demands on the Agency's transmission system during times of high water use.

On April 18, 2006, the Agency's Board of Directors adopted Resolution No. 06-0342, which approved a water allocation methodology developed by the Agency and its water contractors. One factor prompting Resolution No. 06-0342 was to provide a water shortage allocation methodology that ensures retail water providers that have aggressive conservation programs are not penalized by the use of "percentage reduction from historic consumption" to determine shortage allocations, and to not create a disincentive from future conservation savings. An analysis conducted by West Yost and Associates (Methodology for Implementation of Shortage Provisions in the Eleventh Amended Agreement for Water Supply and related Agreements, September 2003) shows that if the Agency uses an average per capita methodology for determining the allocation of water under a shortage,

contractors with low per capita use will have the full annual volume of the Eleventh Agreement available under a scenario where the Agency has 75,000 ac-ft/yr.

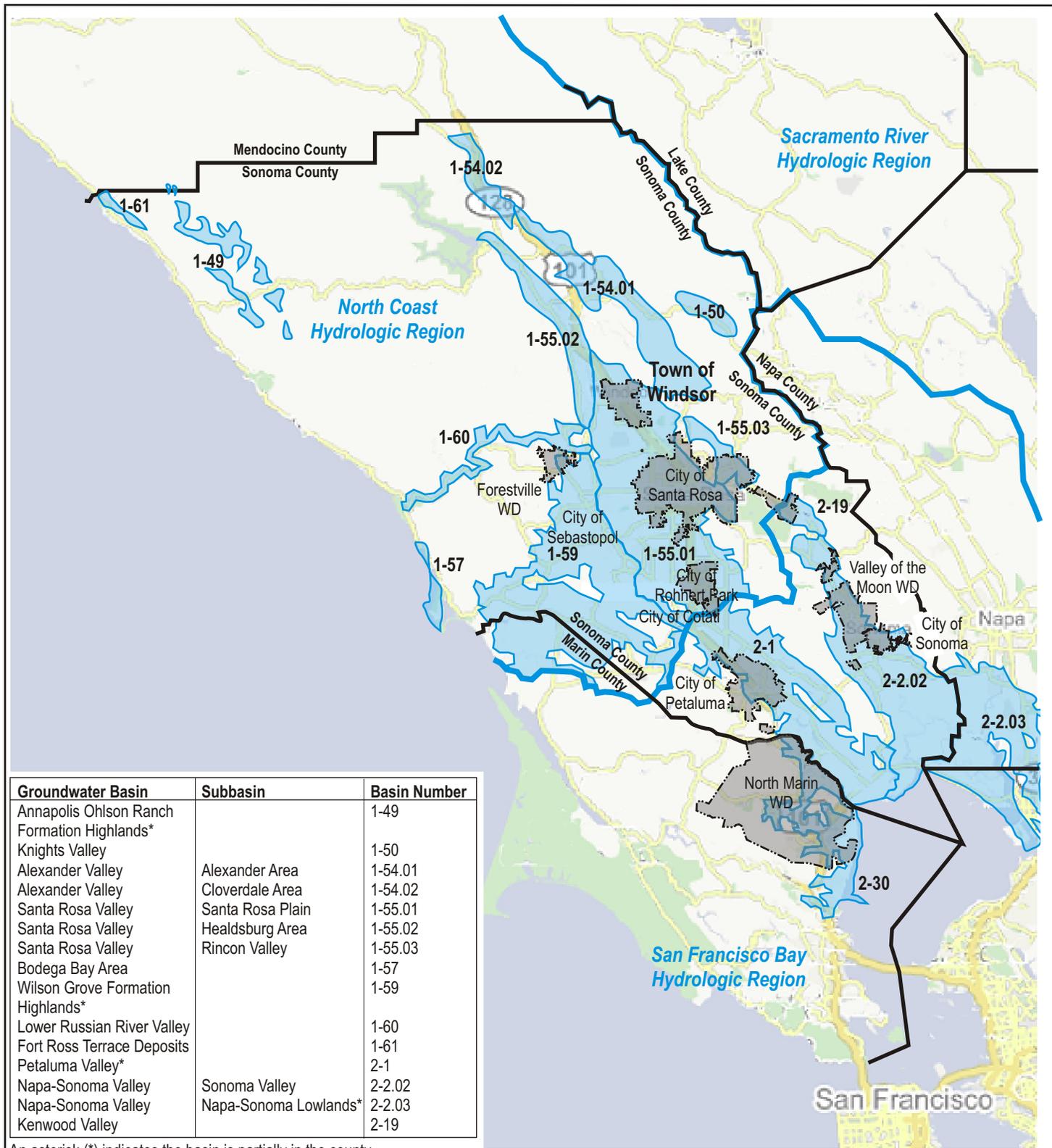
Town Water Rights. Water from the Russian River Well Field is pumped under an agreement established in 1991 with the Agency and a water rights permit issued by the SWRCB that allows the Town to divert up to 4,725 ac-ft/yr at a maximum rate (i.e., average rate over 30 days) of 7.2 mgd. The agreement, which includes a term of 23 years, includes provisions that allow for a 40-year renewal with no greater quantities. The Town's diversion falls under Agency water right permits. The Town applied for an independent surface water right with the SWRCB for diversion of Russian River Well Field (or "Russian River underflow," as referenced in the SWRCB water rights permit), which is considered a water supply with hydrologic connection to the Russian River surface water (Donaldson Associates, 2000; SWRCB Water Rights Information Management System, 2005).

## **4.2 Groundwater**

This section provides a description of the Town's groundwater supply as well as the physical and legal constraints of this supply. For the purposes of this plan, the Town's Russian River Well Field is not considered groundwater, because it taps underflow of the Russian River and is a surface water right. The groundwater supply facilities are described in Section 2.

### **4.2.1 Description**

The groundwater basin underlying the Town is the Santa Rosa Plain, a subbasin (DWR number 1-55.01) of the Santa Rosa Valley Basin (DWR, 2003). The Santa Rosa Plain drains northwest toward the Russian River, and is thus part of the North Coast Hydrologic Region. South of Rohnert Park is a drainage divide marked by several small hills that separate the Santa Rosa Valley Basin from the Petaluma Valley Groundwater Basin (2-1), which drains to the southeast toward the San Francisco Bay and is thus part of the San Francisco Bay Hydrologic Region (DWR, 2003). The groundwater basins are illustrated on Figure 4-1.



Groundwater Basin	Subbasin	Basin Number
Annapolis Ohlson Ranch Formation Highlands*		1-49
Knights Valley		1-50
Alexander Valley	Alexander Area	1-54.01
Alexander Valley	Cloverdale Area	1-54.02
Santa Rosa Valley	Santa Rosa Plain	1-55.01
Santa Rosa Valley	Healdsburg Area	1-55.02
Santa Rosa Valley	Rincon Valley	1-55.03
Bodega Bay Area		1-57
Wilson Grove Formation Highlands*		1-59
Lower Russian River Valley		1-60
Fort Ross Terrace Deposits		1-61
Petaluma Valley*		2-1
Napa-Sonoma Valley	Sonoma Valley	2-2.02
Napa-Sonoma Valley	Napa-Sonoma Lowlands*	2-2.03
Kenwood Valley		2-19

An asterisk (\*) indicates the basin is partially in the county.



- County Line and Name
- System Boundary and Name
- Hydrologic Region Boundary
- Groundwater Basin and Number

Source: Google Map data 2005 NAVTEC™  
DWR Bulletin 118, 2003 Update

<b>BROWN AND CALDWELL</b>	PROJECT 127280-005	SITE UWMP 2005, Town of Windsor	Figure 4-1
	DATE 1-22-07	TITLE Groundwater Basins	

The Santa Rosa Plain Subbasin is the largest basin in the County and underlies the most populated areas of the County. In December 2005, the USGS and the Agency began a five-year comprehensive basin study similar to the studies that have been completed for the Alexander and Sonoma Valleys. This \$1.975 million study is being funded by the Agency, City of Santa Rosa, City of Cotati, City of Rohnert Park, City of Sebastopol, Town of Windsor, County of Sonoma, the California American Water Company, and the USGS.

The objectives of the study are to: 1) develop an updated assessment of the geohydrology and geochemistry of the Santa Rosa Plain; 2) develop a multi-aquifer ground-water flow model for the Santa Rosa Plain; and 3) evaluate the hydrologic impacts of alternative ground-water management strategies for the basin. The study will provide hydrologic information that will assist the Agency, municipalities in the Santa Rosa Plain, and other management and regulatory agencies in better understanding the potential impacts of any increasing ground-water use on ground-water levels, stream-aquifer interaction, subsidence, and water quality. The study will consider several priority USGS water-resource issues including surface- and ground-water interactions, effects of urbanization on water resources, and hydrologic-system management. The approach of the study will include: (1) data compilation, utilizing a Geographic Information System (GIS); (2) new data collection, focusing on water-quality sampling; (3) data interpretation and geohydrologic characterization, including refining hydrologic budgets and updating conceptual models of the ground-water flow system based on the new data and the results of ongoing USGS geologic studies in the basin; and (4) simulation of ground-water flow in Santa Rosa Plain.

The geology of the Santa Rosa Plain Subbasin is complex and the stratigraphic relationships are the subject of recent and continuing studies, including mapping by the USGS and others (USGS, 2002). The subbasin is cut by many northwest-trending faults that influence groundwater flow. Most of the groundwater is unconfined, but in some locations can be confined where folding and faulting exists (DWR, 2003). The water-bearing deposits underlying the basin include the Wilson Grove Formation, the Glen Ellen Formation, and a younger and older alluvium (DWR, 2003).

The Wilson Grove Formation is the major water-bearing unit in the western part of the basin and ranges in thickness from 300 feet to 1,500 feet (Winzler and Kelly, 2005; DWR, 2003). Deposited during the Pliocene, it is a marine deposit of fine sand and sandstone with thin interbeds of clay, silty-clay and some lenses of gravel. Interbedded and interfingered with the Wilson Grove Formation are Sonoma Volcanic sediments in the eastern basin separating the water-bearing units.

Aquifer continuity and water quality are generally good according to Cardwell, 1958, which is still the most detailed reference on the hydrogeology.

The Glen Ellen Formation overlies the Wilson Grove Formation in most places and is Pliocene to Pleistocene in age (DWR, 2003). At some locations, the two formations are continuous and form the principal water-bearing deposits in the basin (Cardwell, 1958). The Glen Ellen consists of partially cemented beds and lenses of poorly sorted gravel, sand, silt, and clay that vary widely in thickness and extent (Cardwell, 1958; DWR, 1982). The formation is used for domestic supply and some irrigation (DWR, 2003).

The Pliocene Petaluma Formation is exposed at various localities in Sonoma County, from Sears Point northward nearly to Santa Rosa. The formation consists of folded continental and brackish water deposits of clay, shale, sandstone, with lesser amounts of conglomerate and nodular limestone and occasional thick beds of diatomite are present. The Petaluma Formation has been defined as being contemporaneous in part and interfingering with the Merced Formation. The Petaluma Formation is noted for its low well yields.

Quaternary deposits include stream-deposited alluvium, alluvial fan deposits, and basin deposits (Todd Engineering, 2004). The younger alluvium (Late Pleistocene to Holocene age) overlies the older alluvium (Late Pleistocene age). The alluvium deposits consist of poorly sorted sand and gravel and moderately sorted silt, fine sand, and clay. The upper and mid-portion of the alluvial fan deposits are on the eastern side of the Santa Rosa Plain and are permeable and provide recharge to the basin. The basin deposits overlie the alluvial fan materials and have a lower permeability (Todd Engineering, 2004; Cardwell, 1958).

A 1982 DWR study concluded that groundwater levels in the northeast part of the Santa Rosa Plain Subbasin had increased, while groundwater levels in the south had decreased (DWR, 1982).

Groundwater storage capacity in the Santa Rosa Plain is estimated by the USGS to be 948,000 ac-ft (Cardwell, 1958).

Natural recharge occurs east of Santa Rosa, primarily along stream beds, at the heads of alluvial fan areas, and in some parts of the Sonoma Volcanics. For the Santa Rosa Plain Subbasin, average annual natural recharge from 1960 to 1975 was estimated to be 29,300 ac-ft and average annual

pumping during the same time was estimated at 29,700 ac-ft. Well yields range from 100 to 1,500 gpm (DWR, 2003).

Brown and Caldwell and the Agency's staff have reviewed, considered, and summarized the available hydrogeologic information for the Agency's plan, and concluded groundwater levels in the basin have had variable trends since 1990, but most wells have been relatively stable. A comprehensive independent assessment of basin-wide groundwater conditions with respect to potential overdraft is not required by the Urban Water Management Planning Act and is beyond the scope of this Plan. DWR did not identify critical conditions of overdraft in Bulletin 118-80, and has not evaluated conditions since (DWR, 2003).

The use of recycled water in the Santa Rosa subbasin offsets demand for potential potable use by agricultural operations. Recycled water use in the Santa Rosa subbasin has decreased somewhat over the years due to increased emphasis on irrigation efficiency and crop conversion to vineyards which have lower water requirements. The Santa Rosa Subregional Reclamation System provides recycled water for agricultural users and will continue to meet the needs of the current agricultural customers.<sup>2</sup>

The DWR groundwater website (<http://wdl.water.ca.gov/gw>) has water level data for several wells in the Santa Rosa Plain in and near the Town. These monitoring data show stable or rising water levels since 1990. In its entirety, water level monitoring data indicate that the Town's well is reliable and there are no physical constraints on the groundwater supply other than the limited capacity of the Town's pumping facilities. The current USGS/Agency study will provide updated data and new tools that may affect groundwater management strategies for the Santa Rosa Plain Subbasin.

The amount of groundwater pumped in the last five years is shown in Table 4-1, while the projected future production through 2030 is shown in Table 4-2. With the projected addition of another groundwater well, the amount of groundwater pumped is estimated to increase by 2015 (Cave, 2005).

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<sup>2</sup> Personal communication with Jennifer Burke, City of Santa Rosa, Oct. 27, 2006.

**Table 4-1. (DWR Table 6) Amount of Groundwater Pumped by the Town – ac-ft/yr**

Basin Name (s)	2000	2001	2002	2003	2004	2005	2006
Santa Rosa Plain Subbasin	219	283	150	52	14	200	0
Percent of Total Water Supply	4	6	3	1	0	4	0

Note:  
This includes only the off-river Bluebird well.  
Source: Sonoma County Water Agency. 2004b.

**Table 4-2. (DWR Table 7) Amount of Groundwater Projected to be Pumped by the Town – ac-ft/yr**

Basin Name(s)	2010	2015	2020	2025	2030 - opt
Santa Rosa Plain Subbasin	400-600	800-1,000	759-1,000	569-1,000	774-1,000
Percent of Total Water Supply	8-11%	13-17%	11-15%	8-14%	11-14%

Note:  
It is projected that the Town could pump up to 1000 ac-ft/yr during a single-dry year. See Tables 4-6 and 7-4.

#### 4.2.2 Physical Constraints

The physical constraint of the current groundwater supply is the pumping capacity of existing well.

#### 4.2.3 Legal Constraints

There are no legal constraints on the Town’s use of its groundwater supply. The Town has no groundwater pumping restrictions as shown in Table 4-3.

**Table 4-3. (DWR Table 5) Groundwater Pumping Rights – ac-ft/yr**

Basin Name	Pumping Right, ac-ft/yr
Santa Rosa Valley (Santa Rosa Plain Subbasin)	Not limited
Total	Not limited

Source: California Department of Water Resources, 2003.

### 4.3 Desalination

Desalinated water is not a viable option for the Town’s water supply because the ocean is not immediately adjacent to the Town and neither brackish nor impaired groundwater have been identified.

#### 4.4 Transfer and Exchange Opportunities

Currently, the Town does not transfer or exchange water with other entities. However, water transfers between the Agency’s water contractors are authorized under the Restructured Agreement. Such transfers and exchanges between Agency water contractors have been necessary in the past and may be necessary in the future to improve water reliability. Nevertheless, no transfers or exchanges are projected for this Plan. Therefore, DWR Table 11 is not presented.

#### 4.5 Current and Projected Water Supplies

This section provides projections of the future water supply quantities available to the Town. Future water supplies from the Agency are dependent upon planned infrastructure improvements being approved and constructed, which are described in the Agency’s urban water management Plan. Future projects that will contribute to the Town’s local water supply are summarized in Table 4-4. Table 4-5 summarizes projected water supplies available to the Town.

**Table 4-4. (DWR Table 17) Future Water Supply Projects**

Project Name	Projected Start Date	Projected Completion Date	Normal year ac-ft to agency	Single-dry year yield ac-ft	Multiple-Dry Year		
					Year 1 ac-ft	Year 2 ac-ft	Year 3 ac-ft
Off River Wells Water Supply – Phase 1	2007	2009	400	400	400	400	400
Off-River Wells Water Supply – Phase 2	2008	2011	400	400	400	400	400
Recycled Water Expansion – Shiloh Road <sup>a</sup>	2010	2012	100	100	100	100	100

<sup>a</sup> Urban recycled water use for the Shiloh expansion is roughly estimated as one third of the water use of planned development in the Town’s southeast area.

**Table 4-5. (DWR Table 4) Current and Planned Water Supplies**

Water Supply Sources	2010	2015	2020	2025	2030
Sonoma County Water Agency Russian River Well Field and Sonoma County Water Agency Aqueduct	4,480	4,701	5,417	5,827	5,750
Supplier produced groundwater	400	800	703	527	774
Transfers in or out	0	0	0	0	0
Exchanges in or out	0	0	0	0	0
Future Recycled Water	a	a	a	a	a
Tier 1 Water Conservation – Future Savings	116	206	206	206	206
Tier 2 Water Conservation	42	74	120	142	151
Water Conservation – New Housing Standards	66	116	194	229	249
Desalination	0	0	0	0	0
Other <sup>b</sup>	195	49	0	0	0
Total	5,299	5,946	6,640	6,931	7,130
Existing Recycled water <sup>c</sup>	372	372	372	372	372

Source: Appendix B – Maddaus Water Management, Final Tier Two and New Development Conservation Measure Evaluation Summary of Data Inputs, Assumptions and Results, November 2, 2006, Table 5. Tier Two savings presented in Table 4-5 are half of the Tier Two savings presented in Table 5 of the November 2, 2006 Maddaus Water Management memo in Appendix B and as per discussions with the Agency.

<sup>a</sup> Included in “Other.”

<sup>b</sup> This increment of water can come from a variety of sources: future urban recycled water use, additional off river water supply, increased conservation, or the Agency supplies which may be available to meet Town demands. A discussion of the increased conservation measures is included in Chapter 6.

<sup>c</sup> This is an estimate of the Town’s 2005 urban recycled water use and consists of metered use of 207 ac-ft /yr for the Windsor Golf Course, an estimate of 75 ac-ft/yr for the Vintage Greens residential outdoor irrigation, and 90 ac-ft /yr of other metered urban recycled water use. This number is not included in the demand projections presented in Tables 3-4.

#### 4.6 Water Supply Reliability

This section presents the projected supplies available during single and multiple-dry water years. The reliability of the Town’s sources is summarized in Table 4-6. The Town’s surface water supply from the Agency is subject to reductions during dry years (seasonal and climatic shortages) pursuant to SWRCB water rights Decision 1610 (adopted in April 1986). When the Lake Sonoma water volume is less than 100,000 ac-ft during single dry years, a 30 percent reduction of diversions is required. The Town’s groundwater supply capacity is assumed to not be impacted by single dry years given the short duration and low frequency of occurrence.

The reliability of the Town’s three water supply sources (Russian River Well Field, Agency Aqueduct, and groundwater) for single and multiple dry years is summarized in Table 4-6.

**Table 4-6. (DWR Table 8) Year 2030 Supply Reliability - Percent of Normal ac-ft/yr**

Sources	Normal Water Year	Single Dry Water Year	Multiple Dry Water Years			
			Year 1	Year 2	Year 3	Year 4
Sonoma County Water Agency – Russian River Well Field and Aqueduct	5,750	4,682	5,750	5,750	5,750	5,750
Groundwater	774	800	774	774	774	774
Other <sup>a</sup>	606	606	606	606	606	606
Total	7,130	6,088	7,130	7,130	7,130	7,130
Percent of Normal	100	85	100	100	100	100

<sup>a</sup> Pursuant to discussion in this section, this increment of water can come from a variety of sources: future urban recycled water use, additional off river water supply, increased conservation to meet Town demands.

Table 4-7 lists the years upon which the data in Table 4-6 are based.

**Table 4-7. (DWR Table 9) Basis of Water Year Data**

Water Year Type	Base Year(s)
Normal Water Year	1962
Single Dry Water Year	1977
Multiple Dry Water Years	1990 - 1993

Factors resulting in inconsistency of supply are summarized in Table 4-8. Alternatives to replace inconsistent sources may potentially include the development of groundwater wells, aquifer storage and recovery, increased use of recycled water, and increased conservation.

Water quality issues are not anticipated to have a significant impact on water supply reliability. If applicable in the future, chemical contamination and the lowering of maximum contaminant levels (MCLs) for naturally occurring constituents can be mitigated by constructing new treatment facilities. These treatment facilities could have a significant cost.

**Table 4-8. (DWR Table 10) Description of the Factors in Inconsistency of Supply**

Name of supply	Legal	Environmental	Water Quality	Climatic
Sonoma County Water Agency <sup>a</sup>	Current supply is available at a consistent level of use with regard to these factors. Future supply increase may not be consistent due to delays in construction, in approval of water rights application, or in environmental documentation.		None	Drought could result in a reduction of surface water supply.
Groundwater	None	None	None	None
Recycled water	None	None	None	None

<sup>a</sup> See Agency's urban water management plan for details.

The Agency projections that quantify water availability to the Town through 2030 are presented in Table 4-9.

**Table 4-9. (DWR Table 20) Wholesaler Identified and Quantified the Existing and Planned Sources of Water – ac-ft/yr**

Wholesaler sources	2010	2015	2020	2025	2030
Sonoma County Water Agency – Russian River Well Field and Aqueduct	4,480	4,701	5,417	5,827	5,750

A water supply reliability comparison for Agency supply is made in Table 4-10, considering three water supply scenarios: normal water year, single-dry water year, and multiple-dry water years.

**Table 4-10. (DWR Table 21) Wholesaler Supply Reliability 2030– ac-ft/yr**

Wholesaler	Normal Water Year	Single Dry Water Year	Multiple Dry Water Years			
			Year 1	Year 2	Year 3	Year 4
Sonoma County Water Agency – Russian River Well Field and Aqueduct	5,750	4,682	5,750	5,750	5,750	5,750
Percent of Normal	100	81	100	100	100	100

Note:  
This table represents 2030 projections.

Factors resulting in inconsistency of the Agency’s supply are included in Table 4-11.

**Table 4-11. (DWR Table 22) Factors Resulting in Inconsistency of Wholesaler’s Supply**

Name of supply	Legal	Environmental	Water Quality	Climatic
Sonoma County Water Agency	Current supply is available at a consistent level of use with regard to these factors. Future supply increase may not be consistent due to delays in construction, in approval of water rights application, or in environmental documentation.		None	Drought could result in a reduction of surface water supply.

#### 4.7 Water Quality Impacts on Future Water Supply

The quality of the Town’s water deliveries is regulated by the California Department of Health Services (DHS), which requires regular collection and testing of water samples to ensure that the quality meets regulatory standards and does not exceed MCLs. Both the Town and the Agency perform water quality testing, which has consistently yielded results within the acceptable regulatory limits.

The quality of existing surface water and groundwater supply sources over the next 25 years is expected to be adequate. Surface water will continue to be treated to drinking water standards, and no surface water or groundwater quality deficiencies are foreseen to occur in the next 25 years.

Table 4-12 summarizes the current and projected water supply changes due to water quality.

**Table 4-12. (DWR Table 39) Current and Projected Water Supply Changes due to Water Quality – Percentage**

Water Source	2005	2010	2015	2020	2025	2030
Sonoma County Water Agency	0	0	0	0	0	0
Groundwater	0	0	0	0	0	0
Recycled water	0	0	0	0	0	0
Total	0	0	0	0	0	0

## **SECTION 5**

### **RECYCLED WATER**

The Town owns and operates a wastewater treatment system which produces and supplies disinfected tertiary reclaimed water. The reclamation system includes a Water Reclamation Plant, recycled water storage ponds, discharge to Mark West Creek, agricultural irrigation and urban uses. The Town's water reclamation permits enable it to provide recycled water for irrigation of rural pasture, crops and vineyards and of in-Town parks, playgrounds, and commercial and residential landscaping.

This section provides information on the amount of generated wastewater, existing disposal of wastewater, the amount of recycled water potentially available, and existing and future potential uses for the Town's recycled water.

#### **5.1 Coordination**

The Town works with a number of entities responsible for water supply and wastewater collection and treatment. The Town has coordinated its recycled water plans with a number of agencies in the development of its Water Reclamation Master Plan and the Water Reclamation Joint Use Feasibility Study (Joint Use Study). Additionally, the Town works with the development community to expand lands in Town for recycled water irrigation and with agricultural property owners to expand recycled water irrigation outside of Town and to develop additional water storage. The Town is currently exploring the development of a new recycled water storage facility at its Eastside Road property and is implementing a public outreach program in addition to coordination with regulatory agencies, and neighboring utilities. The Town continues to implement an extensive public recycled water awareness campaign as part of its on-going urban reuses including recycled water irrigation at the Town Green, Windsor High School, Vintage Greens Subdivision, Wilson Ranch Soccer Park, Windsor Golf Course, and for parks in the Vintana Subdivision. Table 5-1 identifies the public agencies the Town coordinates with in the operation and future enhancement of its water reclamation system.

**Table 5-1. (DWR Table 32) Participating Agencies**

Agency Name	Agency Type	Wastewater System	Plan Development Role
Sonoma County Water Agency	Wholesale Water Supplier	Airport Larkfield/Wikkiup Sanitation Zone (ALWSZ)	Provided recycled water supply and demand information
City of Santa Rosa	Municipality	Santa Rosa Wastewater system and the Laguna Subregional Wastewater Facility (Laguna Facility)	Provided recycled water supply and demand information
North Coast Regional Water Quality Control Board	State Regulatory Agency	Regulates Systems in the North Coast region	Regulates Town recycled water system through issuance of the National Pollutant Discharge Elimination System (NPDES) Permit
State Department of Health Services	State Regulatory Agency	Recycled Water systems in State	Implements regulations pertaining to urban uses of recycled water.

## 5.2 Wastewater Quantity and Reuse and Disposal

This section provides information on the amount of wastewater collected and treated within the Town’s service area and recycled wastewater.

### 5.2.1 Wastewater Collection and Treatment

The Town treats and discharges in the range of approximately 720 to 800 MG of recycled water to its recycled water system annually. In the range of approximately 270 to 350 MG of the Town’s recycled water are irrigated each year. A summary of the Town’s historical effluent volumes is presented in Table 5-2.

**Table 5-2. Historical Wastewater Collected and Treated**

Year	2002	2003	2004	2005	2006
Average Dry Weather Flow, MGD	1.57	1.49	1.51	1.58	1.54
Total Effluent Volume, MG	721	716	721	788	804
Total Volume Irrigated, MG	346	269	320	307	246

Source: Town of Windsor Monthly Monitoring Reports, 2002-2006.

**Table 5-3. (DWR Table 33) Projected Wastewater Collected and Treated**

Year	2010	2015	2020	2025	2030
Average Dry Weather Flow, MGD	1.8	2.0	2.3	2.5	2.6
Total Projected Effluent Volume, MG <sup>a</sup>	657	730	840	913	949
Total Projected Volume Available for Irrigation, MG <sup>b</sup>	423	463	503	543	581
Total Projected Volume Available for Irrigation, af/yr <sup>b</sup>	1,300	1,420	1,540	1,670	1,780

Source: Brelje and Race 2001.

<sup>a</sup> Based on Average Dry Weather Flow

<sup>b</sup> The projected volume of recycled water available for irrigation is estimated as the water volume equivalent to the current irrigated area of 520 equivalent acres (extending to 2010 because of the storage constraint) and increasing to the total of 820 equivalent acres stated in the 2001 Reclamation Master Plan under the buildout condition with an ADWF of 3.0 mgd. From Figure 2.2 of the Master Plan, ADWF in 2030 is estimated to be 2.6 mgd. Prorated from an ADWF of 3.0 to 2.6, the 820 equivalent acres becomes 713 equivalent acres. The equivalent acres converts to water volume by multiplying it by 2.5 feet of water per year. These estimates expect the ERSP and Shone Farm reservoir to be complete and operational by 2015.

Total projected volume available for irrigation is dependent on future wastewater flows and future total recycled water storage capacity. The 2001 Reclamation Master Plan presents an Alternative 1C to represent maximizing irrigation potential. Alternative 1C has an estimated 785 equivalent acres at an average dry weather flow (ADWF) of 3.0 mgd. An equivalent acre is defined in the Water Reclamation Master Plan as an acre requiring 30 inches of irrigation water per year. Using this definition, 785 equivalent acres results in an estimated 1,963 ac-ft of water per year. Figure 2.2 of the 2001 Reclamation Master Plan shows an estimated ADWF of 2.6 at the year 2030. Prorating the 1,963 ac-ft irrigated water potential by the ratio of 2.6 to 3.0 results in an estimated 1,700 ac-ft of potential irrigation demand or 554 MG/yr. The Town is currently planning on having the Shone Farm reservoir (40 MG) and the Eastside Road Storage Project (125 MG minimum) operational by 2015 and thus enabling the Town to serve additional irrigation lands at that time.

### 5.2.2 Wastewater Disposal

The Town's existing effluent discharge point is located on Mark West Creek, immediately downstream of the Trenton-Healdsburg Bridge. The Town is currently permitted to discharge disinfected tertiary effluent in quantities up to 1-percent of the natural flow of Mark West Creek from October 1 through May 14. The 1-percent discharge is calculated from the flow measured at the Trenton-Healdsburg Road bridge, minus the quantity discharged by the City of Santa Rosa's Laguna Treatment Plant. The current annual volume of disposed wastewater is shown in Table 5-3. The projected future disposal to Mark West Creek is mainly dependant upon the weather (frequency, duration, and spacing of rainfall events) and is, therefore, not practical to project.

Historically, over the period from 1994 to 2005 (excluding 1999-00 and 2000-01 due to data being unavailable), Town annual discharges to Mark West Creek ranged from 245 MG to 624 MG. Pursuant to the Town Council Resolution Number 1006-01, adopted on March 7, 2001, discharge to Mark West Creek is the Town’s lowest priority and is managed, along with the Town’s recycled water storage, to enhance the amount and reliability of recycled water irrigated by the Town.

**Table 5-4. (DWR Table 34) Disposal of Wastewater (Non-Recycled) MG**

Method of disposal	Units	2005	2010	2015	2020	2025	2030
Mark West Creek (tertiary)	MG	624	234	267	337	370	368
	af/yr	1,915	718	819	697	1,135	1,129

Note: 2005 estimate of wastewater includes inflow and infiltration whereas the projected years volumes are based on ADWF only as per Table 5-3.

### 5.3 Recycled Water Use

This section describes existing and potential recycled water use in the Town. Figure 5-1 depicts the location of the wastewater treatment facilities and reclamation facilities for the Town’s service area.

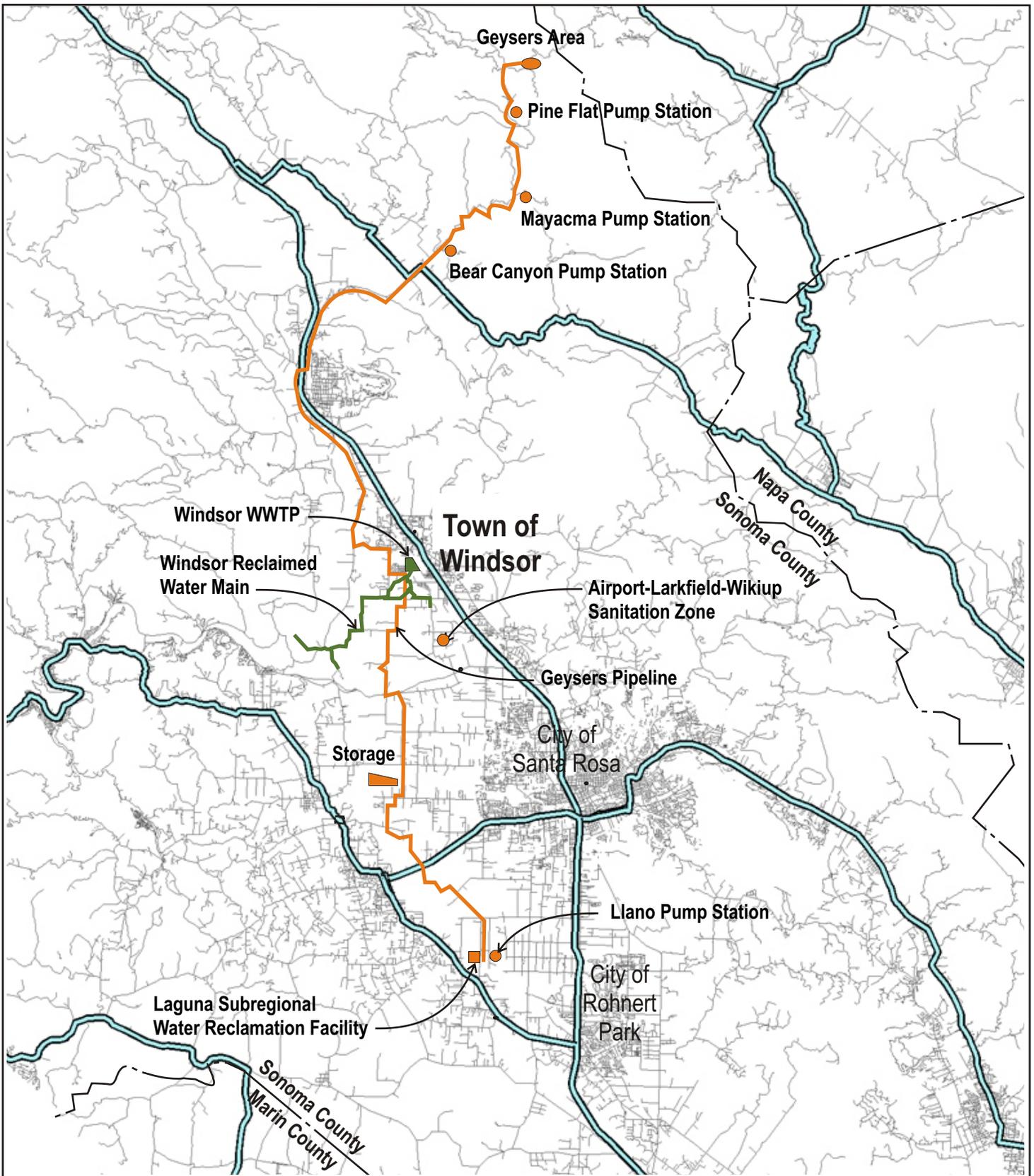
#### 5.3.1 Existing Recycled Water Use

Projections for recycled water use for 2005 were not made in the 2000 Urban Water Management Plan. Therefore, a comparison to projections for 2005 and actual use cannot be made. Table 5-4 depicts actual recycled water use in 2005.

**Table 5-5. (DWR Table 37) Recycled Water Uses –ac-ft/yr**

Type of Use	2005 Actual Use, ac-ft/yr
Agriculture	570
Landscape/Urban	372
Wildlife Habitat	0
Wetlands	0
Industrial	0
Groundwater Recharge	0
Total	942

Note:  
No projection made in 2000 Urban Water Management Plan.



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<b>BROWN AND CALDWELL</b>	PROJECT 127280-005	SITE UWMP 2005, Town of Windsor	Figure 5-1
	DATE 1-22-07	TITLE Santa Rosa Subregional Water Reclamation System	

Approximately 942 ac-ft of recycled water is used in the Town annually. Recycled water use in 2005 by category is listed in Table 5-5. Some of the specific recycled water uses include:

- Irrigation of Windsor High School’s athletic fields and landscaping
- Flush water for Windsor High School’s toilets and urinals
- Landscape irrigation of new homes located in the Vintage Greens 470-unit subdivision which have been built with a dual-pipe system
- Irrigation of vineyards
- Windsor Golf Course
- Town parks

**Table 5-6. (DWR Table 35a) Recycled Water Uses – Actual - ac-ft/yr**

Type of Use	Treatment Level	2005 Water Use, ac-ft/yr
Agriculture <sup>a</sup>	Tertiary	570
Urban Landscape <sup>b</sup>	Tertiary	372
Wildlife Habitat		0
Wetlands		0
Industrial		0
Groundwater Recharge		0
Other (type of use)		0
Total	Tertiary	942

Source: Brelje & Race, 2001.

<sup>a</sup> Agricultural use offsets groundwater pumping.

<sup>b</sup> Urban landscape use offsets potable water demand.

### 5.3.2 Potential and Projected Recycled Water Use

The Water Reclamation Master Plan adopted in 2001 described the potential recycled water use alternatives for the Town (Brelje & Race, 2001). Based on the analysis provided in the Water Reclamation Master Plan and input from the public, three alternatives were selected by the Town Council for further consideration and environmental review. Each of the three alternatives meet a projected ADWF of 3.0 MG/day at buildout. The three alternatives identified can be characterized as reuse options for tertiary effluent not discharged to Mark West Creek under the Town’s existing NPDES permit, which provides for a maximum daily discharge of up to 1 percent of Mark West Creek natural flow on a seasonal basis. Flows above this discharge limit are currently stored and used for seasonal irrigation of various land uses, including residential and non-residential landscaping, pastures, vineyards, parks, playing fields, and the golf course. To meet future

wastewater flows, the three alternatives present a continuum between the maximum use of storage facilities and dry season irrigation for disposal (Alternative 1C), and maximum use of capacity in the Geysers Recharge Project that was thought to be available to the Town (Alternative 4I). The third, Alternative 4X, reflects a reduced Geysers recharge rate that falls between alternatives 1C and 4I. The irrigated acreage for the alternatives range from 300 additional equivalent acres (Alternative 4I) to 785 equivalent acres (Alternative 1C) An equivalent acre is defined as being equal to an acre of land that uses 30 inches of irrigation water per year.

The City of Santa Rosa's Geysers Recharge Project was identified as a project that would allow the disposal of up to 0.75 MGD of the Town's recycled water year-round to the Geysers steamfields. This would have had the effect of decreasing the Town's ultimate required storage by 140 MG. Potential connection to the Geysers Recharge Project for the year-round disposal of 0.75 MGD of Windsor's tertiary recycled water, as envisioned in the Reclamation Master Plan, have been in progress for the past four years, but no agreement has been reached. The City of Santa Rosa is currently implementing their Incremental Recycling Water Program. Under this program, Santa Rosa may increase their use of the Geysers Project in order to meet its own increased wastewater flows and regulatory constraints. Due to these circumstances, there is no certainty at this time that Windsor can procure a dedicated share in the capacity of the Geysers Project. Since this particular project is still uncertain, the Town must proceed with other recycled water storage and disposal options. The Eastside Road Storage Project (ERSP) and the Shone Farm recycled water storage projects are two such options now being pursued by the Town. In light of the uncertainty of the Town's participation in the Geysers Project, its buildout recycled water storage goal is up to 375 MG. This goal is similar to the storage goal for the recycled water Alternative 1C which is also the Alternative to maximize the combined use of storage and dry season irrigation to meet the projected recycled water disposal needs. The potential recycled water uses reflect the recycled water use amounts described for Alternative 1C in the 2001 Water Reclamation Master Plan.

### Irrigation Lands

Approximately 785 equivalent acres of new irrigation lands would be provided with recycled water under Alternative 1C of the 2001 Water Reclamation Master Plan. The total new irrigated area would be in the range of 2,500 to 3,000 acres. Areas identified for recycled water are shown in

Figure 2-1 of the 2001 Water Reclamation Master Plan EIR and would include in-Town parks, school yards, and residential yards, and agricultural lands westerly and southerly of the Town. Recycled water would also be provided to agricultural lands easterly of the Town.

In order to distribute recycled water from the storage ponds to the irrigated lands, the recycled water pipelines would need to be extended as described on Page 2-9 of the 2001 Water Reclamation Master Plan EIR.

Wetlands

Additional potential uses for recycled water that were considered in the 2001 Water Reclamation Master Plan are development of constructed wetlands on the 10 acres adjoining the discharge point and a silviculture pilot project.

The volume of potential recycled water use, based on the projected amount available from the recycled water model analysis conducted for the 2001 Water Reclamation Master Plan, is shown in Table 5-7. However, major factors that determine the use of recycled water and implementation of recycled water projects are the financial feasibility of connecting users to the system and the construction of adequate recycled water storage. Recycled water distribution systems require additional pipelines, storage tanks, and pumps. Proximity to the production of the recycled water and the distribution system is a major factor in considering use of recycled water. In addition, the recycled water users must make their own investment in constructing and operating the on-site irrigation pipelines and sprinkler systems with the necessary warning signs, backflow prevention, and associated health and safety requirements. The projected future use of recycled water for the Town’s service area for the next 25 years is shown in Table 5-8. Methods to encourage recycled water use and the projected amount of resulting recycled water use are presented in Table 5-9.

**Table 5-7. (DWR Table 35 b) Recycled Water Uses – Potential - ac-ft/yr**

Type of Use	Treatment Level	2010	2015	2020	2025	2030
Agriculture and Urban Irrigation	Tertiary	1,300	1,420	1,540	1,670	1,780
Wildlife Habitat		0	0	0	0	0
Wetlands	Tertiary	Potential	Potential	Potential	Potential	Potential
Industrial		0	0	0	0	0
Groundwater Recharge	Tertiary	0	0	0	0	0
Total	Tertiary	1,300	1,420	1,540	1,670	1,780

Source: Brelje & Race, 2001.

**Table 5-8. (DWR Table 36) Projected Future Use of Recycled Water in Service Area – ac-ft/yr**

Type of Use	2010	2015	2020	2025	2030
Urban Irrigation <sup>a</sup>	372	472	502	532	542
Agricultural Irrigation <sup>b</sup>	928	948	1,038	1,138	1,238
Wildlife Habitat	0	0	0	0	0
Wetlands	0	0	0	0	0
Industrial	0	0	0	0	0
Groundwater Recharge	0	0	0	0	0
Total	1,300	1,420	1,540	1,670	1,780

<sup>a</sup> Urban landscape use offsets potable water demand.

<sup>b</sup> Agricultural use offsets groundwater pumping.

**Table 5-9. (DWR Table 38) Methods to Encourage Recycled Water Use – ac-ft/yr**

Methods	Ac-ft/yr of Use Projected to Result from this Action				
	2010	2015	2020	2025	2030
Ordinances, financial incentives, reliable supply	1,300	1,420	1,540	1,670	1,780



## SECTION 6

### WATER CONSERVATION

This section provides a description of the Town's water conservation program and its BMPs or water demand management measures. The Town utilizes water conservation BMPs as a method to reduce water demands, thereby reducing water supply need for the Town.

#### **6.1 Introduction**

The Town is a member of the CUWCC. The CUWCC was created to assist in increasing water conservation statewide, under a MOU. As signatory to the MOU, the Town has pledged their good faith effort towards implementing BMPs identified in the CUWCC MOU Regarding Urban Water Conservation. The two primary purposes of the MOU are as follows:

- a. to expedite implementation of reasonable water conservation measures in urban areas, and
- b. to establish assumptions for use in calculating estimates of reliable future water conservation savings resulting from proven and reasonable conservation measures. Estimates of reliable savings are the water conservation savings that can be achieved with a high degree of confidence in a given service area.

The Agency is the only wholesale water agency in the state to have all its water contractors signatory to the CUWCC MOU. The Town signed the CUWCC MOU on August 9, 1999, and submits annual BMP reports to the CUWCC in accordance with the MOU. The MOU requires that a water utility implement only the BMPs that are economically feasible. If a BMP is not economically feasible, the utility may request an economic exemption for that BMP. The Town has not requested economic exemption from any of the BMPs at this time.

Table 6-1 identifies the CUWCC's 14 BMPs along with information on the BMPs performed by the Town and the BMPs that are performed with assistance from the Agency.

**Table 6-1. California Urban Water Conservation Council Best Management Practices**

Best Management Practices, BMP	Town of Windsor	Sonoma County Water Agency <sup>a</sup>
BMP 01: Water Survey Programs for Single-Family and Multi-Family Residential Customers	✓	
BMP 02: Residential Plumbing Retrofit	✓	
BMP 03: System Water Audits, Leak Detection, and Repair	✓	
BMP 04: Metering with Commodity Rates for all New Connections and Retrofit of Existing	✓	
BMP 05: Large Landscape Conservation Programs and Incentives	✓	
BMP 06: High-Efficiency Washing Machine Rebate Programs	✓	
BMP 07: Public Education Programs	✓	✓
BMP 08: School Education Programs	✓	✓
BMP 09: Conservation Programs for Commercial, Industrial, and Institutional Accounts	✓	
BMP 10: Wholesale Agency Assistance Programs		✓
BMP 11: Conservation Pricing	✓	
BMP 12: Conservation Coordinator	✓	
BMP 13: Water Waste Prohibition	✓	
BMP 14: Residential ULFT Replacement Programs	✓	

<sup>a</sup> These programs are being run in part by Sonoma County Water Agency.

Urban water suppliers that are members of the CUWCC may submit their most recent BMP Annual Reports for reporting years 2003-04 to meet the requirements of DWR Water Code Section 10631 (f). DWR also recommends that urban water suppliers include the Coverage Reports identifying the water supplier’s progress on meeting the coverage requirement for quantifiable BMPs. The Town’s Water Supply and Reuse data, Accounts and Water Use data, and annual BMP Reports for 2003 and 2004, and the BMP Activity History, Base Year Data, and 2003 – 2004 Coverage Reports are presented in Appendix C. The Water Shortage Contingency Plan can be found in Appendix D.

## 6.2 Demand Management Measures Implementation

This section describes the Town’s current water conservation program through the end of calendar year 2006, including implementation of each of the 14 urban water conservation BMPs (Tier 1). Water savings calculations are taken from the Town’s most recent CUWCC Water Savings Report from 2005/2006. Section 6.3 describes additional water conservation measures, beyond the BMPs, the Town is considering implementing.

The Town actively implements all of the relevant BMPs as follows:

### **BMP 01 – Water Survey Programs for Single-Family and Multi-Family Residential Customers**

There are three conditions for strict compliance to BMP 1, although more weight is given by the Agency to adherence to number 3. Condition 1: Adopt survey targeting and marketing strategy on time. Condition 2: Offer surveys to 20 percent of Single Family (SF) accounts and 20 percent of Multi Family (MF) units during reporting period. Condition 3: Be on track to survey 15 percent of SF accounts and 15 percent of MF units within 10 years of implementation start date.

Starting in July 2006 the Town began implementing a residential water use survey program called the Water Smart Home Program. This program provides Windsor residents free comprehensive water use assessments that include the required survey elements of checking for low-flow showerheads and faucet aerators, conducting toilet leak tests, testing and inspection of irrigation systems, and providing seasonal irrigation schedules. As per BMP 2, free replacement aerators, showerheads, and hose nozzles are distributed to participants as testing warrants.

The program is marketed primarily through billing inserts, Home Owner Association (HOA) newsletters, and print media distributed through local businesses, with additional marketing from participation in public events (i.e. Windsor Chamber Business Expo), cold-calling high water use customers, Utility Billing referrals, and through word of mouth. Future marketing plans include advertising on the Town's Water Conservation web page, direct mailings, local print media advertisements, and banners.

Since July 2006, Town staff has completed over 120 residential surveys. The goal is to complete an additional 220 by calendar year-end 2007 and another 240 by calendar year-end 2008. This will get the Town on track to meet the compliance goals for BMP 1 before the end of the next CUWCC two-year reporting period in December 2008.

### **BMP 02 – Residential Plumbing Retrofit**

The Town distributes free low flow showerheads (2 gpm), faucet aerators (1.5 gpm), and hose nozzles to all residents. These devices are made available by request at the Utility Billing office or

are distributed to participants of residential water surveys as testing warrants. It is expected that market saturation for greater than 75 percent of pre-1992 single family housing units and pre-1992 multi-family units will be reached by the end of the reporting period in 2008.

### **BMP 03 – System Water Audits, Leak Detection, and Repair**

Most of the Town's transmission and distribution system is less than 15 years old and is in excellent condition. Consequently, the Town has experienced relatively few pipe failures or leaks. The Town has leak detection equipment and all leaks are traced and repaired as quickly as possible when noticed. In addition, the Town has an aggressive corrosion control program that is intended, in part, to prolong the useful life of the distribution system pipes.

Upon request, Town personnel will assist customers in leak detection by providing leak detection guidance and dye tablets for toilet checks. The Town does not charge for this service.

A water audit is a process of accounting for and verifying an agency's water from the source of supply through the distribution system to the customer. Its purpose is to identify and quantify the agency's accounted-for water or distribution system losses. The Town conducts informal audits annually in the process of tabulating sales and production data. A more detailed audit will be triggered if system losses exceed 10 percent.

### **BMP 04 – Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections**

All Town water connections are metered and have been as required by District Regulations, since 1959 when the Windsor Water District was formed. Metering is recognized as a sound urban water management practice as well a basic water conservation measure. Metering of each water connection provides the opportunity for the detection of water leaks and has the effect of compelling customers to manage their use of water, particularly for landscape irrigation. The District's supply sources are also metered, and the supply meters can be cross-checked against sales data to allow the District to identify water lost in the transmission/distribution system.

## **BMP 05 – Large Landscape Conservation Programs and Incentives**

There are three conditions for compliance.

*Condition 1: Develop water budgets for 90 percent of the Commercial, Industrial, Institutional (CII) accounts that have dedicated landscape irrigation meters.* Provide notices each billing cycle to accounts with water budgets showing the relationship between the budget and the actual consumption. The preliminary work required before budgets can be calculated is substantial. In order to create these water budgets it is necessary to obtain or directly measure the square footage of irrigated landscape for each account. There are several ways to go about this. When good imagery exists, this task can be accomplished to a great extent using GIS software, where parcel boundaries are used to delineate the service areas of landscape meters, and the landscaped areas are digitized so the software can compute the area measurements. Alternatively, if landscape plans exist and can be obtained, these can be used to derive to-scale estimates of the landscaped areas. Hand measuring with a measuring wheel is a third method.

It is very difficult to delineate the service areas of landscape meters in the field, where no clear lines of separation exist for landscape features between two businesses or when common area landscape and privately managed landscape features are contiguous, such as exists in the Airport Business Park. It is not a simple matter of going out and taking measurements, nor is it the case that adequate imagery or landscape plans exist that can be solely relied upon to complete this task for our service area. In practice, some combination of all three of the techniques listed above is required to obtain these landscape measurements, and all are labor intensive. There is some excitement about some recent imagery obtained by the Sonoma County Information Systems Department that may provide a new GIS solution to this problem. Details are forthcoming.

The current approach the staff is taking is to utilize the Santa Rosa GIS web portal to create aerial maps that display the parcel boundaries of businesses in our service area. These maps will be used to clarify and expedite the process of obtaining field measurements using a measuring wheel. Unfortunately, the Santa Rosa GIS portal is not a fully functioning GIS, which makes the process of creating maps more time consuming than would be the case if the Town maintained an in-house GIS. When a substantive number of maps are ready, they will be made available to Agency interns for obtaining field measurements. The Agency is providing contractual support to measure

landscape areas and create water budgets for approximately 100 sites. The Town staff goal throughout the course of normal work will be to obtain field measurements and create budgets for an additional 10 sites per month. With continued contractual support from the Agency in calendar year 2008 and with the ongoing efforts of the staff, the Town will be in compliance with this condition by the end of the current CUWCC two-year reporting period in December 2008.

*Condition 2: Be on track to survey at least 15 percent of CII accounts with mixed-use meters within 10 years of the date implementation is to start.* The survey elements required to meet this condition include: measurement of landscape area; measurement of total irrigable area; irrigation system check, and distribution uniformity analysis; review or development of irrigation schedules, as appropriate; provision of a customer survey report and information packet. These surveys are typically conducted by a paid consultant at an average cost of \$425 per acre for smaller sites. For larger parks with substantial acreage, charges are incurred at an hourly rate (i.e. \$11,000 to survey 12 parks with a total acreage of 67.4).

The number of CII accounts with mixed-use meters in Windsor has been estimated at 63, which means roughly 10 surveys need to be completed for compliance for this condition. Staff is in the process of obtaining more complete information before undertaking a marketing program that specifically targets businesses with mixed-use meters.

Surveys are currently offered to all Windsor businesses free of charge, with program marketing conducted primarily through a partnership with the Sonoma County Economic Development Board's (EDB) Business Water Project. This is a new partnership for the Town that was established in August 2006. Provided with a list of our highest water-using CII accounts, the EDB uses direct mailings, print advertisements, public event appearances, and business-to-business networking to solicit participation. Information about this partner program will soon be accessible on the Town's Water Conservation web pages. The Agency has also offered contractual support to conduct four large landscape surveys. Finally, the Town staff is working on completing the certification necessary to be able to conduct these surveys in-house.

*Condition 3: Implement and maintain customer incentive program(s) for irrigation equipment retrofits.* No incentive programs for irrigation equipment retrofits currently exist for the Town of Windsor. Some initial work has been undertaken to develop a suitable retrofit program, one that would result

in quantifiable water savings with minimal cost. Working collaboratively with Town Park Maintenance Staff and Ewing Irrigation, an initial test was conducted at Lakewood Park in September 2006 to demonstrate the potential of sprinkler nozzle retrofits for irrigation system efficiency improvements, and runoff reduction. The preliminary results of the test proved very positive, although there is more work to be done before staff is ready to move forward with such a measure.

### **BMP 06 – High-Efficiency Washing Machine Rebate Programs**

The Town of Windsor currently offers a \$75 rebate to all water customers who purchase and install a high-efficiency clothes washer with a modified water factor of 6.0 or better, as determined by the performance specification list published by the Consortium for Energy Efficiency (CEE). The Town has rebated the installation of over 435 high –efficiency washers, which exceeds the coverage goal of 367 required for our service area.

### **BMP 07 – Public Information Programs**

There has been a lot of effort put forth by staff in the last six months to create or update many elements within the Water Conservation Program. Paramount to this effort has been the establishment of new partnerships within the community, as a means of communicating to the residents of Windsor our increased commitment to the judicious use of our local water supply. Some examples include: outreach to all the local retailers in the North Bay to provide them with updates and education about the Town’s High Efficiency Clothes Washer Rebate Program; working with local HOA such as the Lakewood Hills HOA and Foothills HOA to jointly market information about our residential survey program and to provide educational talks at HOA events; enlisting the help of local businesses to distribute leaflets about the Town’s Water Conservation Program offerings. We are already seeing increased participation in many of our programs as a direct result of this outreach.

It has also been a priority in these past six months to establish or maintain connections with the wider community of organizations who focus on or incorporate water conservation strategies in their work. Examples include: the Redwood Empire Chapter of the U.S. Green Building Council; the California Landscape Contractors Association, Ecological Landscaper Association, and other

Green Industry trade groups; the North Bay and Bay Area Wide Water Conservation Practitioner groups; the local area Chambers of Commerce; the Sonoma County Economic Development Board; the newly formed EPA WaterSense Program. Working cooperatively is the key to creating a consistent conservation message, which can then become engrained in people's daily habits and consumer choices. It is also the most cost efficient way to develop the programs and services necessary to effect this change.

The Town conducts its public information program through a variety of means. Bi-monthly billing inserts are utilized to provide seasonal water conservation education, as well as to market the water conservation services provided by the Town. Additional program promotion is achieved through local print media advertisements, public displays (banners, information booths at public events), and public speaking events (HOA meetings). The Town also distributes a variety of informational pamphlets on water conservation to participants of water surveys and to residents when they visit the Utility Billing office. Finally, historic water use data, comparing current usage with past consumption, is clearly displayed on each bill.

#### **BMP 08 – School Education Programs**

School education program implementation is conducted for the Town by the Sonoma County Water Agency through a regional water conservation program agreement. The program consists of in-class instruction (1-2 hr), as well as a full day field component. Students are educated on topics such as watershed awareness, where their water comes from, and the ecological imperatives of water conservation. This program reached 928 Windsor students in years 2003/ 2004 and 900 students in years 2005 / 2006. Overall, 5,579 Windsor students have participated in the program since 1998.

#### **BMP 09 – Conservation Programs for Commercial, Industrial, and Institutional Accounts**

There are two main conditions for compliance. *Condition 1: Identify and rank by use all commercial, industrial, and institutional accounts. Condition 2a: Agency is on track to survey 10 percent of commercial accounts, 10 percent of industrial accounts, and 10 percent of institutional accounts within 10 years of date implementation to commence. OR Condition 2b: Agency is on track to reduce CII water use by an amount equal to 10 percent of baseline use within 10 years of implementation to commence. OR Condition 2c: Agency is on track to meet the combined target (% of 2a + % of 2b) as described in Exhibit 1 BMP 9 documentation.*

As was mentioned in the discussion of BMP 5, the Town of Windsor is working in partnership with the EDB to provide surveys to interested businesses in our service area, with one survey having been completed since program inception in August 2006. Credit for two past surveys brings the total number completed to three, with the need to complete an additional 19 to meet the performance track goal by year-end 2007, and an additional 30 by July 2011. Cost to complete the surveys is dependent on whether the business requires an engineering assessment for industrial water use processes. For businesses requiring the engineering assessment the average cost is \$3500 per survey. Otherwise, survey costs average \$1,600.

Staff is currently exploring the possibility of implementing an incentive program for water efficiency upgrades for CII accounts, to be applied toward meeting Condition 2b. An example would be the City of Santa Rosa's Sustained Reduction Rebates. This program offers rebates of \$100 for every 1,000 gallons of average monthly, sustained reduction in water use and wastewater flow that is achieved through measures other than toilet/faucet/showerhead replacement. A cooling tower retrofit would be a typical example of an efficiency upgrade targeted by this type of program. The maximum rebate amount for each upgrade in Santa Rosa's program cannot exceed the cost of materials for the project and does not include the cost of labor. Condition 2c allows for the percent reduction in baseline water savings achieved with this type of incentive program to be combined with the percent of surveys completed to obtain the compliance goal of 10 percent. This would provide the Town with an additional approach to meeting the compliance goal in the event that participation in the survey program falls short.

### **BMP 10 – Wholesale Agency Programs**

The Town is not a wholesale water provider and does not plan to be a potable water wholesaler in the future. This BMP is not applicable to the Town of Windsor.

### **BMP 11 – Conservation Pricing**

The water and sewer rate structures for the Town of Windsor are both increasing block rates with multiple tiers. Billing cycles are bi-monthly (6 per/yr.) and billing units are 1,000 gallons.

### **BMP 12 – Water Conservation Coordinator**

The Town of Windsor has maintained a conservation coordinator on staff since 1998. Occasional, part-time staff in support of the conservation coordinator has existed at the Town from the year 1998 up to June 2006. Starting in June 2006, a full time water conservation specialist was hired. Adopted Biennial Budget for fiscal years 2005 – 2007 lists personnel time allocation as follows:

Senior Management Analyst (Coordinator)	0.100
Accounting Specialist	0.200
Accounting Technician	0.300
Maintenance Technician	0.300
Water Conservation Specialist	1.000
Water Conservation Technician	0.343
<hr/>	
TOTAL STAFF	2.243

### **BMP 13 – Water Waste Prohibition**

In December 1999, the Town adopted Regulations and Restrictions on Water Use Ordinance Number 99-123 which prohibits use of equipment that is wasteful. A copy of the ordinance is included as an attachment of Appendix D. The ordinance gives the Town the authority to discontinue service if water waste is not corrected. The ordinance prohibits a number of wasteful practices including washing driveways with direct hosing, irrigation with excessive runoff, washing cars without a hose nozzle, and use of non-recycling decorative water fountains. Any reported water waste incident receives immediate response from field staff. If water waste is identified, a door tag is left at the property to notify the customer of the violation and follow-up technical assistance is provided.

### **BMP 14 – Residential Ultra-Low Flush Toilet Replacement Programs**

This BMP differs from other BMPs in that it is defined in terms of water savings instead of a level of activity. A reporting unit must meet one of the following conditions to be in compliance.

*Condition 1: Retrofit-on-resale ordinance in effect in service area. OR Condition 2: Water savings from toilet replacement programs equal to 90 percent of Exhibit 6 coverage requirement.*

The Town of Windsor does not have a toilet replacement program nor an ordinance in effect requiring a retrofit-on-resale or retrofit-on-change of service. Because this BMP is based on water savings that are cumulative, a toilet rebate program or direct install program at this time would not create water savings at a level which would allow the Town to reach compliance by the end of the signing period for the MOU. The staff believes that there is only a small market left for replacement of older 3 gallons-per-flush (gpf) and 5 gpf toilets in our service area.

Water savings targets implied by BMP 14 come from calculating the effect of requiring ULFT (Ultra Low Flow Toilet) replacement of all non-ULFTs at the time of resale for pre-1992 housing units. This is due to the enactment of the 1991 plumbing code, which required installation of ULFTs, or 1.6 gpf toilets in new residential construction. Windsor's baseline number of pre-1992 homes is 5,518. The Town of Windsor, however, proactively required ULFTs in new residential construction by 1988, which means that the baseline data supplied to the CUWCC by us is an inflated number. Subtracting out housing starts from 1988 up to and including 1991, the baseline number for Windsor is 2,915 pre-1988 housing units with non-ULFTs. The Town's coverage requirement using the adjusted data is 197 ac-ft of water savings. To achieve this level of savings at this late date would require replacing more non-ULF toilets (approximately 5,000 toilets) than currently exist in our service area.

There may be an alternative for obtaining compliance credit for this BMP based on the 1988 Town of Windsor ordinance requiring ULFTs in new residential construction. The argument can be made to the CUWCC that the Town should be given water savings credit for the toilets installed in new homes between the years 1988 and 1992, rather than simply subtracting the number of homes built during this period from Windsor's baseline number of pre-1992 housing stock. Using the coverage calculator provided by the CUWCC for BMP 14, the net water savings accumulated as a result of Windsor's ordinance is conservatively estimated at 1,484 ac-ft. The water savings requirement for Windsor to be compliant with this BMP (using the original baseline number of pre-1992 housing units) is 365 ac-ft, which means the Town would already be well over the needed level of savings.

In addition to the aforementioned approach, staff is seeking clarification on whether an ordinance requiring retrofit upon change of service at this late date would bring the Town into compliance, and what an ordinance would entail in regard to program maintenance, inspection, and costs.

### **6.3 Additional Demand Management Measures**

The Town has committed to implementing the CUWCC BMPs. The CUWCC BMPs are currently in various stages of completion. Water conservation measures that are not part of the CUWCC BMPs are being considered for implementation by the Town and are described as “Tier 2 BMPs” and “New development standards.” The proposed new development standards focus on low water using requirements for new single family housing. An analysis of the Tier 2 and new development standards was conducted to roughly estimate the water savings potential. The analysis projects the future water demands based on four levels of increasing conservation effort: (1) current unit water use and the projected water savings from future plumbing retrofits as required by the plumbing code, (2) Tier 1 BMP efforts to date and remaining Tier 1 BMP efforts, (3) future Tier 2 BMP efforts, and (4) adoption of new development standards. The new development standards water savings estimate does not reflect the water saving impacts of the Town’s new residential development which are almost exclusively either mixed use, higher density, and/or utilize recycled water for outdoor uses. The water savings potential, therefore, calculated by the Agency for the agency contractors is largely already being realized by newer development in the Town and is reflected in the base demand projections.

The Town will use its best effort to evaluate these additional water conservation measures and implement those measures that are found to be cost effective. Existing water conservation savings due to past implementation efforts are included in the baseline projection. Because the water conservation savings are projections, actual demand reduction and the manner in which the demand reduction is achieved may vary. Table 6-2 presents the Tier 2 BMPs. The analysis is presented in Appendix B.

**Table 6-2. Tier 2 BMPs (Include the proposed new development standards)**

Tier 2 BMP #	Measure Title
1	Rain-sensor (shut off device) retrofit on irrigation controllers
2	Cash for grass (turf removal program)
3	Financial incentives for being below water budget
4	Financial rebates for irrigation meters
5	Smart irrigation controller rebates
6	Financial incentives/rebates for irrigation upgrades
7	Hotel retrofit (with financial assistance) – CII existing
8	Offer new accounts reduced connection fees for installing efficient process equipment for selected businesses (restaurants, laundry mat, food/groceries and hospital).
9	Synthetic turf rebate
10	High efficiency toilet (HET)
11	Dishwasher new efficient
12	CII rebates – replace inefficient water using equipment
13	0.5 gal/flush urinals in new buildings
ND1	Rain-sensor shut off device on irrigation controllers
ND2	Smart irrigation controller
ND3	High efficiency toilet (HET)
ND4	Dishwasher new efficient
ND5	Clothes washing machines requirement for new residential
ND6	Hot water on demand
ND7	High efficiency faucets and showerheads
ND8	Landscape and irrigation requirements

ND = New Development

The BMP modeling analysis and demand projections were performed using the CUWCC approved DSS model which is a Microsoft® Office spreadsheet based program run from Windows XP. The DSS model has been designed to provide a detailed planning evaluation framework for water demand management programs. The DSS analysis projects on an annual basis the water savings and the estimated dollar values of the benefits and costs that would result from implementing the BMPs.

The total projected water savings estimated as a result of Tier 2 implementation is 400 ac-ft/yr by the year 2030 or nearly 6 percent of the projected base demand of 7,130 ac-ft. The projected 2030 base demand of 7,130 already reflects a decrease of approximately 579 ac-ft as a result of plumbing code changes and implementation of Tier 1 measures. Taken together, the total potential water conservation savings represents approximately 14 percent of total projected 2030 demands. Water conservation savings beyond the 14 BMPs are incorporated in Table 4-5 of this UWMP as a potential water supply.

#### **6.4 Demand Management Measures Not Implemented**

The Town is implementing all applicable Best Management Practices of the California Urban Water Conservation Council's Memorandum of Understanding regarding Urban Water Conservation.

#### **6.5 Water Conservation Assumptions and Modeling**

The water demand projections presented in Section 3 were developed based on certain assumptions regarding the future implementation of water conservation measures or BMPs. The Town has previously committed to implementing all of the CUWCC BMPs. The CUWCC BMPs are currently in various stages of completion. Water conservation measures that are not part of the CUWCC BMPs are also assumed to be implemented for this analysis. These measures are identified as Tier 2 BMPs. New development standards that focus on low water using requirements for new single family housing are also assumed. These assumed future water conservation activities were integrated with the current water use characteristics and the population growth projections using the DSS model. The analysis projects the future water demands based on four levels of increasing conservation effort: (1) current unit water use and the projected water savings from future plumbing retrofits as required by the plumbing code, (2) Tier 1 BMP efforts to date and remaining Tier 1 BMP efforts, (3) future Tier 2 BMP efforts, and (4) adoption of new development standards. The water demand projections presented in Section 3 assume that approximately half of the water savings from Tier 2 BMPs and 100 percent of savings from the new development standards would occur. The Town will use its best effort to implement these additional water conservation measures. Existing water conservation savings due to past implementation efforts are included in the baseline projection. Because the water conservation savings are projections, actual demand reduction and

the manner in which the demand reduction is achieved may vary. Table 6-2 presents the Tier 2 BMPs. The analysis is presented in Appendix B.

The BMP modeling analysis and demand projections were performed using the CUWCC approved DSS model, a Microsoft® Office spreadsheet based program run from Windows XP. The DSS model has been used elsewhere in northern California, including a recent project for the San Francisco Public Utilities Commission. The DSS model has been designed to provide a detailed planning evaluation framework for water demand management programs. The DSS model performs a cost-effectiveness evaluation of each BMP using the data on market potential for each conservation measure and the assumptions for each conservation measure variable. The DSS analysis projects on an annual basis the water savings and the dollar values of the benefits and costs that would result from implementing the BMPs. The DSS model components consist of the following steps:

1. Establish customer base-year water use conditions by customer-billing category and then by end use.
2. Establish service area conditions for evaluation of conservation measures by creating a database of service area data relevant to the conservation measures to be evaluated.
3. Conduct model calibration to current water use conditions by end use fixture models.
4. Use the service area data to perform a benefit and cost evaluation of each BMP.
5. Develop water demand projections assuming the implementation of the selected BMPs.

Table 6-3 presents water conservation savings.

**Table 6-3. Conservation Savings, ac-ft/yr**

Water Use	2010	2015	2020	2025	2030
Conservation savings <sup>a</sup>	224	396	520	577	607

<sup>a</sup>Water savings from plumbing codes are not included.



**SECTION 7**  
**WATER SUPPLY VERSUS DEMAND COMPARISON**

This section provides a comparison of the projected water supply and demand for the Town from 2005 through 2030. Water supply to demand comparisons are also provided for single-dry year and multiple-dry year scenarios. The water demands are developed in Section 3, water supplies are defined in Section 4, and recycled water supplies are presented in Section 5 of this report. Decreased water use resulting from water conservation is accounted for in Section 3.

**7.1 Normal Water Supply vs. Demand Comparison**

The analysis compares the projected normal water supply available to the Town and required customer demands from 2010 to 2030, in five-year increments. The projected available normal climate year water supply and demands are presented in Tables 7-1 and 7-2, respectively.

**Table 7-1. (DWR Table 40) Projected Normal Water Supply – ac-ft/yr**

(from DWR Table 4)	2010	2015	2020	2025	2030
Supply <sup>a</sup>	5,299	5,946	6,640	6,931	7,130
Percent of year 2005	109%	122%	136%	142%	146%

<sup>a</sup> From Table 4-5.

**Table 7-2. (DWR Table 41) Projected Normal Water Demand – ac-ft/yr**

(from DWR Table 15)	2010	2015	2020	2025	2030
Demand <sup>a</sup>	5,299	5,946	6,640	6,931	7,130
Percent of year 2005	109%	122%	136%	142%	146%

Note:

Demands assume compliance with local plumbing codes.

<sup>a</sup> From Table 3-5.

The comparison of projected water supply and demand is presented in Table 7-3.

**Table 7-3 (DWR Table 42) Projected Supply and Demand Comparison – ac-ft/yr**

	2010	2015	2020	2025	2030
Supply totals	5,299	5,946	6,640	6,931	7,130
Demand totals	5,299	5,946	6,640	6,931	7,130
Difference	0	0	0	0	0
Difference as Percent of Supply	0%	0%	0%	0%	0%
Difference as Percent of Demand	0%	0%	0%	0%	0%

## 7.2 Dry Year Water Supply vs. Demand Comparison

Tables 7-4 through 7-6 provide a comparison of a single-dry year water supply with projected total water use over the next 25 years, in five-year increments. As shown in Table 7-6, in single-dry years starting in 2020, water demands will exceed water supplies. During these single-dry years, the Town would reduce demands as described in Appendix D.

**Table 7-4. (DWR Table 43) Projected Single-Dry Year Water Supply – ac-ft/yr**

Supply	2010	2015	2020	2025	2030
Sonoma County Water Agency	4,480	4,701	5,185	4,964	4,682 <sup>a</sup>
Local Groundwater	400	800	800	800	800
Other <sup>b</sup>	419	445	520	577	606
<b>Total Supply</b>	<b>5,299</b>	<b>5,946</b>	<b>6,505</b>	<b>6,341</b>	<b>6,088</b>
Percent of projected normal	100%	100%	98%	81%	85%

<sup>a</sup> From Table 4-6.

<sup>b</sup> Pursuant to discussions in Section 4, this increment of water can come from a variety of sources: future urban recycled water use, additional off river water supply or increased conservation to meet Town needs.

**Table 7-5. (DWR Table 44) Projected Single-Dry Year Water Demand – ac-ft/yr**

	2010	2015	2020	2025	2030
Demand	5,299	5,946	6,640	6,931	7,130
Percent of projected normal	100%	100%	100%	100%	100%

**Table 7-6. (DWR Table 45) Projected Single-Dry Year Supply and Demand Comparison – ac-ft/yr**

	2010	2015	2020	2025	2030
Supply totals	5,299	5,946	6,505	6,341	6,088
Demand totals	5,299	5,946	6,640	6,931	7,130
Difference	0	0	-135	-863	-860
Difference as Percent of Supply	0%	0%	-2%	-9%	-17%
Difference as Percent of Demand	0%	0%	-2%	-9%	-15%

Tables 7-7 through 7-18 compare the total water supply available in multiple-dry water years with projected total water use over the next 20 years, in one-year increments.

**Table 7-7. (DWR Table 46) Projected Supply during Multiple-Dry Year Period Ending in 2010 – ac-ft/yr**

	2006	2007	2008	2009	2010
Supply	4,954	5,040	5,126	5,212	5,299
Percent of projected normal	100%	100%	100%	100%	100%

**Table 7-8. (DWR Table 47) Projected Demand Multiple-Dry Year Period Ending in 2010 - ac-ft/yr**

	2006	2007	2008	2009	2010
Demand	4,954	5,040	5,126	5,212	5,299
Percent of projected normal	100%	100%	100%	100%	100%

**Table 7-9. (DWR Table 48) Projected Supply and Demand Comparison during Multiple-Dry Year Period Ending in 2010 – ac-ft/yr**

	2006	2007	2008	2009	2010
Supply totals	4,954	5,040	5,126	5,212	5,299
Demand totals	4,954	5,040	5,126	5,212	5,299
Difference	0	0	0	0	0
Difference as Percent of Supply	0%	0%	0%	0%	0%
Difference as Percent of Demand	0%	0%	0%	0%	0%

**Table 7-10. (DWR Table 49) Projected Supply during Multiple-Dry Year Ending in 2015 – ac-ft/yr**

	2011	2012	2013	2014	2015
Supply	5,428	5,557	5,686	5,815	5,946
Percent of projected normal	100%	100%	100%	100%	100%

**Table 7-11. (DWR Table 50) Projected Demand Multiple-Dry Year Period Ending in 2015 - ac-ft/yr**

	2011	2012	2013	2014	2015
Demand	5,428	5,557	5,686	5,815	5,946
Percent of projected normal	100%	100%	100%	100%	100%

**Table 7-12. (DWR Table 51) Projected Supply and Demand Comparison during Multiple-Dry Year Period Ending in 2015- ac-ft/yr**

	2011	2012	2013	2014	2015
Supply totals	5,428	5,557	5,686	5,815	5,946
Demand totals	5,428	5,557	5,686	5,815	5,946
Difference	0	0	0	0	0
Difference as Percent of Supply	0%	0%	0%	0%	0%
Difference as Percent of Demand	0%	0%	0%	0%	0%

**Table 7-13. (DWR Table 52) Projected Supply during Multiple-Dry Year Period Ending in 2020 – ac-ft/yr**

	2016	2017	2018	2019	2020
Supply	5,807	5,946	6,085	6,224	6,640
Percent of projected normal	100%	100%	100%	100%	100%

**Table 7-14. (DWR Table 53) Projected Demand Multiple-Dry Year Period Ending in 2020 – ac-ft/yr**

	2016	2017	2018	2019	2020
Demand	5,807	5,946	6,085	6,224	6,640
Percent of projected normal	100%	100%	100%	100%	100%

**Table 7-15. (DWR Table 54) Projected Supply and Demand Comparison during Multiple-Dry Year Period Ending in 2020 – ac-ft/yr**

	2016	2017	2018	2019	2020
Supply totals	5,807	5,946	6,085	6,224	6,640
Demand totals	5,807	5,946	6,085	6,224	6,640
Difference	460	348	235	118	0
Difference as Percent of Supply	8%	6%	4%	2%	0%
Difference as Percent of Demand	8%	6%	4%	2%	0%

**Table 7-16. (DWR Table 55) Projected Supply during Multiple-Dry Year Period Ending in 2025 – ac-ft/yr**

	2021	2022	2023	2024	2025
Supply	6,698	6,756	6,814	6,872	6,931
Percent of projected normal	100%	100%	100%	100%	100%

**Table 7-17. (DWR Table 56) Projected Multiple-Dry Year Period Ending in 2025 - ac-ft/yr**

	2021	2022	2023	2024	2025
Demand	6,698	6,756	6,814	6,872	6,931
Percent of projected normal	100%	100%	100%	100%	100%

**Table 7-18. (DWR Table 57) Projected Supply and Demand Comparison during Multiple-Dry Year Period Ending in 2025 – ac-ft/yr**

	2021	2022	2023	2024	2025
Supply totals	6,698	6,756	6,814	6,872	6,931
Demand totals	6,698	6,756	6,814	6,872	6,931
Difference	0	0	0	0	0
Difference as Percent of Supply	0%	0%	0%	0%	0%
Difference as Percent of Demand	0%	0%	0%	0%	0%

**Table 7-19. Projected Supply during Multiple-Dry Year Period Ending in 2030 – ac-ft/yr**

	2026	2027	2028	2029	2030
Supply	6,971	7,011	7,051	7,091	7,130
Percent of projected normal	100%	100%	100%	100%	100%

**Table 7-20. Projected Multiple-Dry Year Period Ending in 2030 – ac-ft/yr**

	2026	2027	2028	2029	2030
Demand	6,971	7,011	7,051	7,091	7,130
Percent of projected normal	100%	100%	100%	100%	100%

**Table 7-21. Projected Supply and Demand Comparison during Multiple-Dry Year Period Ending in 2030 – ac-ft/yr**

	2026	2027	2028	2029	2030
Supply totals	6,971	7,011	7,051	7,091	7,130
Demand totals	6,971	7,011	7,051	7,091	7,130
Difference	0	0	0	0	0
Difference as percent of Supply	0%	0%	0%	0%	0%
Difference as percent of Demand	0%	0%	0%	0%	0%



## SECTION 8

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**APPENDIX A**

**Urban Water Management Plan Public Hearing and Resolution**



PROOF OF PUBLICATION

(2015.5 C.C.P.)

STATE OF CALIFORNIA

County of Sonoma

I am a citizen of the United States and a resident of the county aforesaid: I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of The Press Democrat, a newspaper of general circulation, printed and published DAILY IN THE City of Santa Rosa, County of Sonoma; and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Sonoma, State of California, under the date of November 29, 1951, Case number 34831, that the notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates to wit:

June 6, 13

all in the year 2007

I certify (or declare) under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct.

Dated at Santa Rosa, California, this

13th day of June

2007

*Roxanne Robson*

SIGNATURE

This space for County Clerk's Filing Stamp

Proof of Publication of

**Notice of Public Hearing**  
**Town of Windsor**

Hearing Topic: 2005 Urban Water Management Plan  
Date: June 20, 2007, 6:00 pm  
Location: Town of Windsor Council Chambers, 9291 Old Redwood Hwy., Windsor

The Town of Windsor Council will hold a hearing on June 20, 2007 at 6 pm to receive comments on the Draft 2005 Urban Water Management Plan (Plan). The Plan was developed in compliance with the State of California's Urban Water Management Planning Act, which requires an update every five years. Topics addressed by the Plan include water supply and demand forecasts, water supply reliability, and water shortage contingency planning. A copy of the Plan is available for review at the following locations:

Town of Windsor Planning Desk, 9291 Old Redwood Hwy., Windsor  
Town of Windsor Public Works, 8400 Windsor Road, Windsor

The Plan is also on the Town of Windsor's web page at <http://www.ci.windsor.ca.us/>

Oral and written testimony will be taken at the hearing. Written comments may also be submitted to Craig Scott, 9291 Old Redwood Highway, P.O. Box 100, Windsor, CA. 95492-0100, for receipt prior to the hearing.

In compliance with the Americans with Disabilities Act, if you need special assistance to participate in the Town Council meeting, please contact the Town Clerk. Notification at least 48 hours prior to the meeting will assist Town staff in assuring that reasonable accommodations are made to provide accessibility to the meeting.



**TOWN OF WINDSOR**

2129215 - Pub. Jun. 6, 13, 2007 211

PROOF OF PUBLICATION

(2015.5 C.C.P.)

STATE OF CALIFORNIA

County of Sonoma

I am a citizen of the United States and a resident of the county aforesaid: I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the printer of The Press Democrat, a newspaper of general circulation, printed and published DAILY IN THE City of Santa Rosa, County of Sonoma; and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Sonoma, State of California, under the date of November 29, 1951, Case number 34831, that the notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates to wit:

May 20

~~June 6, 13~~

all in the year 2007

I certify (or declare) under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct.

Dated at Santa Rosa, California, this

~~13~~th day of June

2007

*Roxanne Nasson*

SIGNATURE

This space for County Clerk's Filing Stamp

Proof of Publication of

**Notice of Public Hearing**  
**Town of Windsor**  
Hearing Topic:  
2005 Urban Water Management Plan  
Date: June 20, 2007, 6:00 pm  
Location: Town of Windsor Council Chambers, 9291 Old Redwood Hwy., Windsor

The Town of Windsor Council will hold a hearing on June 20, 2007 at 6 pm to receive comments on the Draft 2005 Urban Water Management Plan (Plan). The Plan was developed in compliance with the State of California's Urban Water Management Planning Act, which requires an update every five years. Topics addressed by the Plan include water supply and demand forecasts, water supply reliability, and water shortage contingency planning. A copy of the Plan is available for review at the following locations:

Town of Windsor Planning Desk, 9291 Old Redwood Hwy., Windsor  
Town of Windsor Public Works, 8400 Windsor Road, Windsor

The Plan is also on the Town of Windsor's web page at <http://www.ci.windsor.ca.us/>

Oral and written testimony will be taken at the hearing. Written comments may also be submitted to Craig Scott, 9291 Old Redwood Highway, P.O. Box 100, Windsor, CA. 95492-0100, for receipt prior to the hearing.

  
TOWN OF WINDSOR

2119894 - Pub. May 20, 2007

**RESOLUTION NO. 2079-07**

**A RESOLUTION OF THE TOWN COUNCIL OF THE TOWN OF WINDSOR  
ADOPTING THE 2005 URBAN WATER MANAGEMENT PLAN**

**WHEREAS**, the Urban Water Management Planning Act, which is codified at California Water Code Section 10610 et seq. (Chapter 1009, Statutes of 1983 and subsequent amendments thereto), requires that every urban water supplier which provides 3,000 acre-feet or more of water annually, or which directly or indirectly supplies water for municipal purposes to more than 3,000 customers, shall prepare an Urban Water Management Plan, the primary objective of which is to assure sound planning for and efficient management of water resources in the urban sector; and

**WHEREAS**, the Town of Windsor is an urban water supplier providing in excess of 3,000 acre-feet of water per year to over 3,000 connections; and

**WHEREAS**, the Act requires that the Plan shall be periodically reviewed at least once every five years, and that the Town shall make amendments or changes to its Plan which are indicated by the review; and

**WHEREAS**, the revised Plan must, after public review and a Public Hearing by the Town, and after adoption by the Town Council, be filed with the California Department of Water Resources; and

**WHEREAS**, the Town has heretofore prepared, and commencing on May 20, 2007, made available for public review, a Draft 2005 Urban Water Management Plan, in compliance with the requirements of the Act, and duly noticed a Public Hearing on said Draft Plan and having conducted a Public Hearing before the Town Council in accordance with said notice on June 20, 2007, said Draft Plan now may be adopted as prepared.

**NOW, THEREFORE, BE IT RESOLVED** that the Town Council of the Town of Windsor does hereby find, determine and declare that:

1. The Town has prepared its 2005 Urban Water Management Plan, dated May 2007.
2. A copy of said Plan has been available for public inspection continuously since May 20, 2007.
3. On June 20, 2007, the Town Council held a public hearing on the said Plan. Notice of the time and place of said hearing was published in the Press Democrat on May 20, 2007, June 6, 2007, and June 13, 2007 and in the Windsor Times on May 24, 2007.
4. The 2005 Urban Water Management Plan dated May 2007 prepared by the Town is hereby approved and adopted.
5. The Town Manager or his designee is hereby authorized and directed to submit three copies of the Plan with the California Department of Water Resources.

**PASSED, APPROVED AND ADOPTED this 20th day of June 2007, by the following vote:**

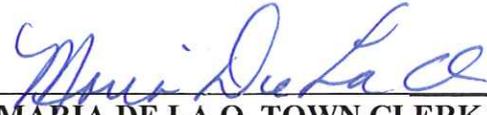
**AYES: COUNCILMEMBERS ALLEN, GOBLE, SALMON AND  
MAYOR PRO TEM FUDGE**  
**NOES: NONE**  
**ABSTAIN: NONE**  
**ABSENT: MAYOR PARKER**

---

**DEBORA FUDGE, MAYOR PRO TEM**

**ATTEST:**

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**MARIA DE LA O, TOWN CLERK**

## **APPENDIX B**

### **Town of Windsor Water Use and Conservation Analysis**

1. Weber Analytical, Windsor Historical Water Use, September 6, 2005
2. Maddaus Water Management, Customer Water Demand Projections, Summary of Data Inputs, Assumptions and Results, November 7, 2005
3. Maddaus Water Management, Revised Tier One Conservations Measure Evaluation, Summary of Data Inputs, Assumptions and Results, May 30, 2006
4. Maddaus Water Management, FINAL Tier Two and New Development Conservation Measure Evaluation Summary of Data Inputs, Assumptions and Results, November 2, 2006



**Weber Analytical**

**WINDSOR HISTORICAL WATER USE**

**Water Production Data**

Water production data for the City of Windsor was acquired, as reported in acre-feet per month. The data for the years 2002 through 2004 are listed below. The values for November and December 2004 were not available so the corresponding values for 2003 were used. The average value in acre-feet and MGD is also shown.

Year	Total Production, acre-feet	Production, MGD
2002	1,779.62	
2003	1,614.19	
2004	1,767.39	
Average	1,720.40	1.54

**Water Billing Data**

We developed five monthly water use tracking models from the historical water billing data using the monthly data provided by Windsor. We performed a regression analysis the time series of per account water use versus month that considered which weather variables best would account for variation in use due to the weather (weather normalization). Some general comments follow, and then brief comments on each billing category’s model. The purpose of each model is to determine the average water use per account per day to forecast additional future water use as new accounts are added.

Based on our initial analysis one of the customer groups (IRR) appears to be clean in terms of its water use pattern and doesn’t need further information. The other four (SFR, MFR, COM, Institutional) reflect water use patterns that cannot be completely deciphered statistically. The peculiarities in these three customer groups might be obvious to those at the Town of Windsor.

We recognize that the Town of Windsor switched from a monthly billing system to a bimonthly system in November of 2000. This switch appears to provide a mismatch between 2000 and subsequent years because of the way the customer base was split into the two monthly billing groups. In most cases, the analysis we did excluded the year 2000 because it did not fit statistically.

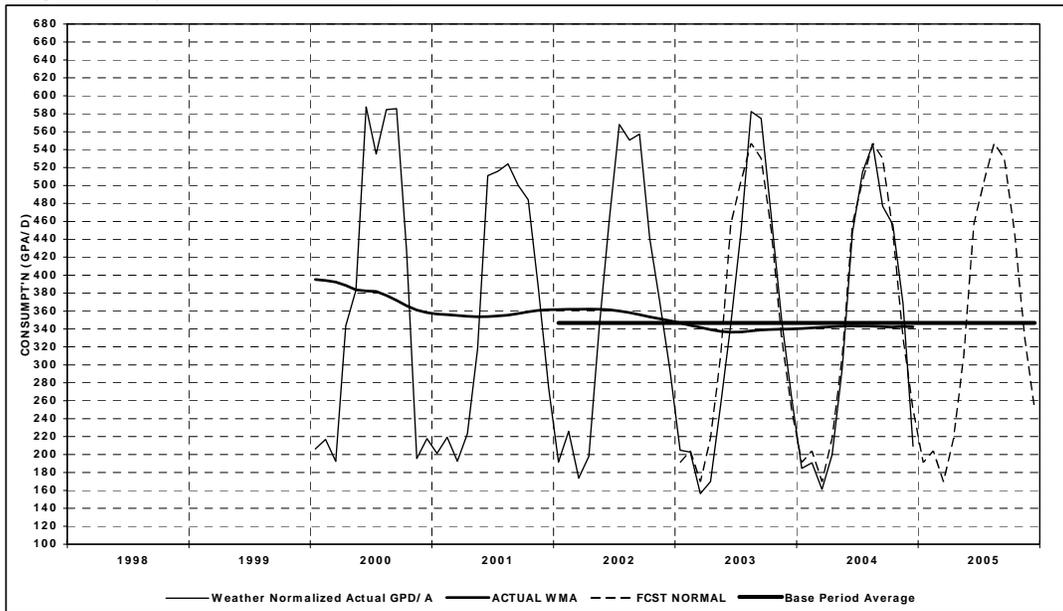
We are providing a graph of the pattern of water use for each customer group with a few of our interpretive comments that can either be accepted or the City can provide a more knowledgeable interpretation. These graphs have four lines (two of them have five lines):

1. Weather normalized actual water use expressed in terms of gallons per day per account (gpd/a). The weather normalization statistically derives the impact of weather on water use and restates actual water use to the level it would be with

normal weather. (Normal weather is based on long term average weather for each month.)

2. A 13 month weighted moving average is calculated that runs through the center of the data, giving an easy-to-visualize picture of the pattern of use.
3. An average of the last three years is given as a potential base point for demand projections and as a reference for viewing the stability or volatility of recent years. In two cases, more than one reference line is given.
4. A regression model forecast is given for the last two years of actual data by month and for 2005 just as a reference forecast. This forecast simply projects the pattern of the prior three years without any consideration given to any conservation or other measures that the Town might take that would change the water use pattern.

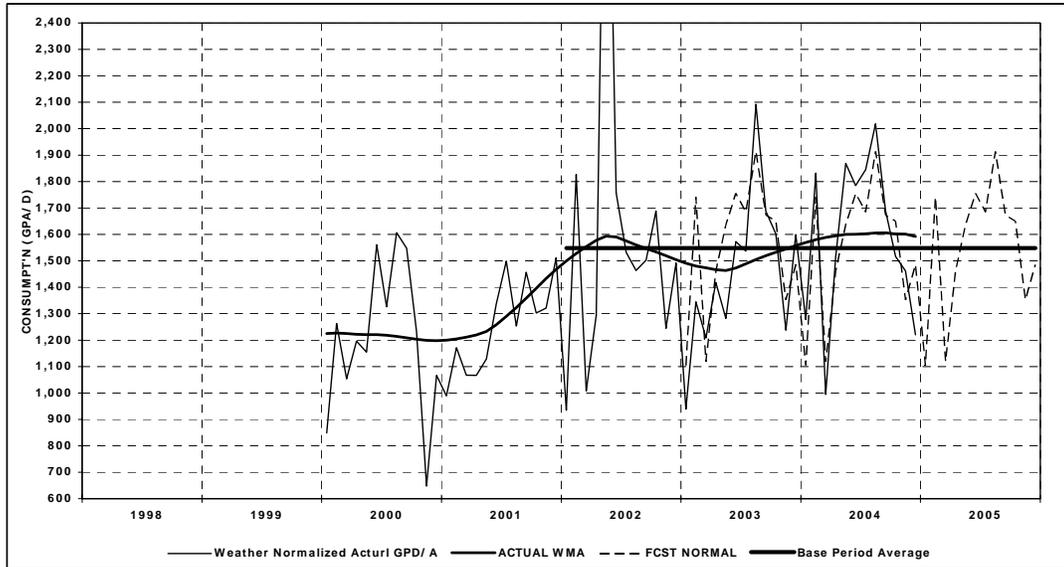
### Single Family Residential (SFR)



The first year is not representative because of the change in billing method. The years 2001 and 2002 averaged about 362 gpd/a compared to 343 for 2003 and 2004. The reason for this decline is not known but could be the result of conservation, either natural or programmatic. The last two years appear quite stable and could be the basis for projections if the reason for the drop from prior years is believed to be permanent. We hope the water experts in Windsor can provide insider insight in this situation.

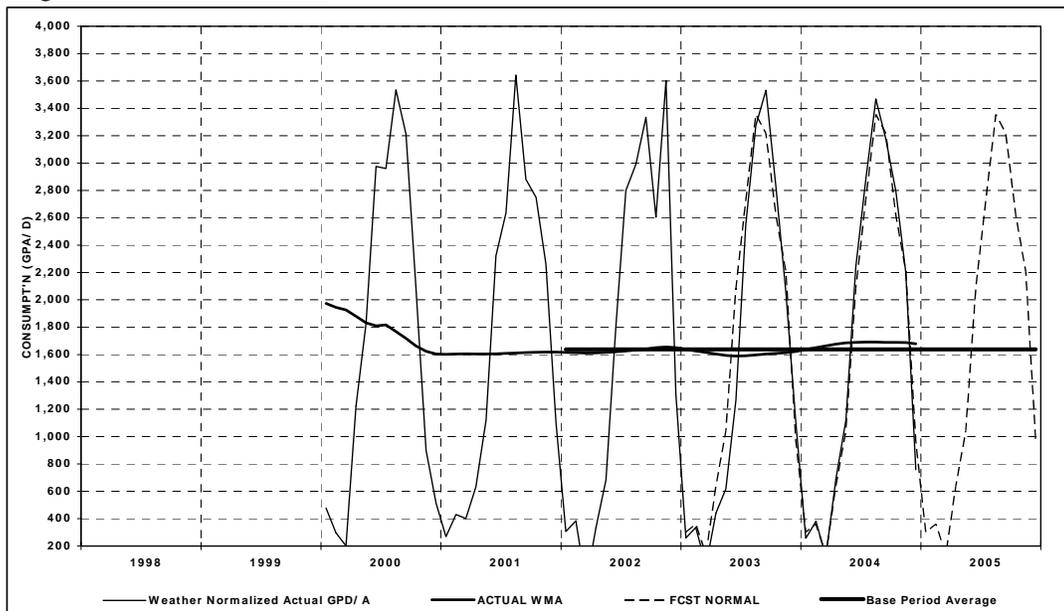
We intend to use the average of 360 gpd/a (based on 7,397 accounts) which corresponds to the last three years (2002 to 2004) for forecasting new account water use.

### Multi-family Residential (MFR)



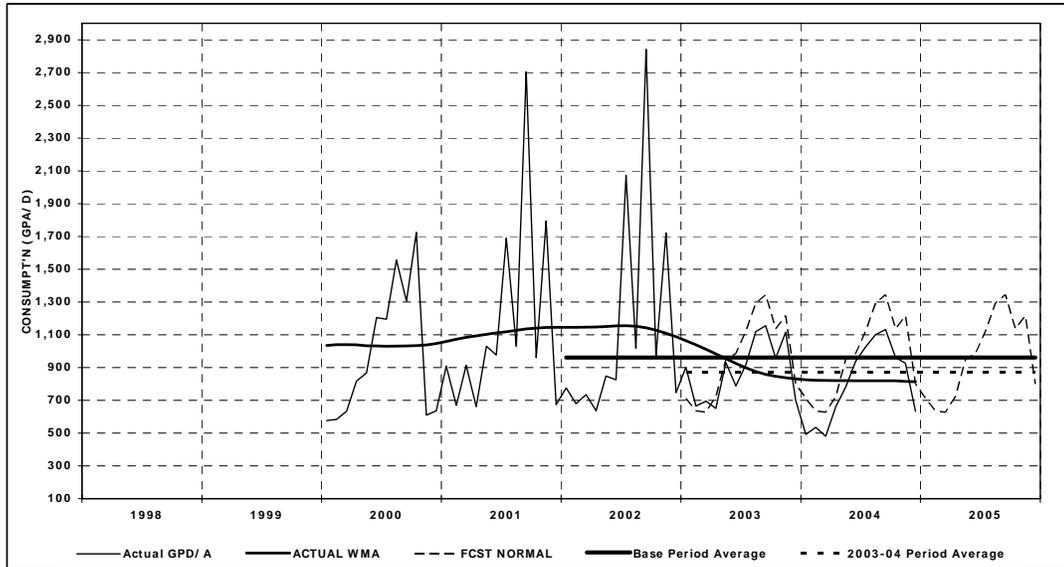
The first two and ½ years of this group’s pattern reflect some sort of outside influence that is not apparent from the raw data. The number of accounts changed only slightly, but the mix might have changed substantially. The average of 2002 through 2004 appears to provide a reasonably stable basis for projection, but the cause of the substantial shift from the 2000-01 level of use should be explained. The MFR pattern might be tied to the complementary patterns for commercial and institutional customers. In the absence of an interpretation of the data from Windsor, we intend to use the last three years’ average of 1595 gpd/a (based on 55 accounts).

### Irrigation Customers (IRR)



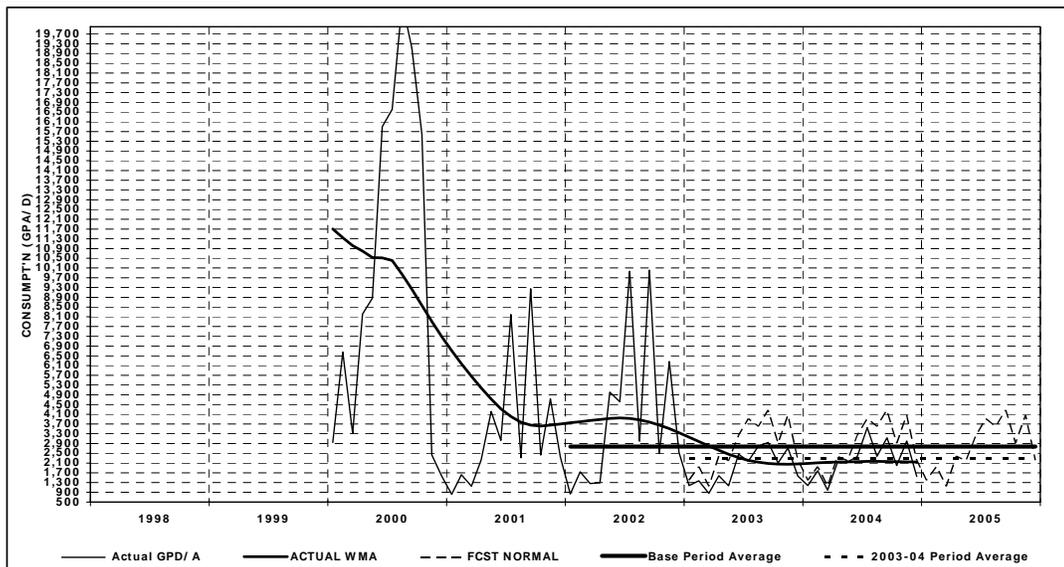
Use for Irrigation Accounts appears very stable for the period 2001 through 2004 and this average should be appropriate as a base for projection, which is 1,638 gpd/a (based on 325 accounts).

## Commercial (COM)



A dramatic change occurred between the first three years of data and the last two, possibly related to the changes in the MFR customer group. The last two years seems to have stabilized and could be used as the base for projections if an explanation of the shift in pattern supports continuation. With this volatile pattern, weather variables were not statistically significant. We could use an interpretation of the data shift from Windsor. For now we assume that the sharp difference in usage of the last two years will persist and we will use it (926 gpd/a based on 587 accounts). This is shown by the lower dashed line in the graph.

## Institutional (INST)



This category, which has only 10 customers, mirrors the pattern of the COM customers, and might also be related to the MFR variations in the early years. Weather was not significant. We could benefit from an interpretation of the data shift from Windsor. For now we assume that the sharp difference in usage of the last two

years will persist and we will use it (2,895 gpd/a based on 8 accounts). This is shown by the lower dashed line in the graph.

All of the patterns of water use for these customer groups in the last two or three years appear to have reached some level of stability; however, good forecasting practice requires valid explanations for the shifts in the MFR, COM, and INST customer groups especially before proceeding with the projections. Help with the SFR group is also highly desirable.





## MEMORANDUM

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Date: November 7, 2005

To: Mike Cave, Town of Windsor

From: William Maddaus, Maddaus Water Management

Subject: *Customer Water Demand Projections  
Summary of Data Inputs, Assumptions and Results*

---

### LIST OF CHANGES SINCE SEPTEMBER 6, 2005 MEMO

The following changes have been made to the demand projections.

1. At the request of the Town of Windsor, revised population served by private wells was changed from 2,300 to 2,028 based on 740 mobile home units and a household size of 2.74. ( $2.74 \times 740 \text{ units} = 2,028$ )
2. At the request of the Town of Windsor, it is assumed private wells will eventually be served by the Town of Windsor as the wells fail. The population of 2,028 served by private wells was evenly distributed over 30 years ( $2028/30 = 67.6$  persons per year).
3. The commercial water use factor, in gallons/account/day was increased 26.1 percent to the 2001 value of 1167.6 gpd/a from the prior value of 925.9 gpd/a which was the 2002 to 2004 average account use. A detailed explanation for these new commercial water use value is provided in MWM memo dated October 26, 2005 titled *Commercial Water Demand Factors for Water Demand Projections*.
4. At the request of the Town of Windsor, peak day factor was increased to 1.65..
5. At the Request of the Town of Windsor, relabeled graphs and tables from “with or w/o plumbing code” to “with or w/o low flow fixture conservation”
6. Updated Tier 1 conservation measures (low flow fixture installation data) to values provided in November 3, 2005 table provided by Lynn Florey of SCWA.
7. Added statement about average versus dry year demands on page 5.
8. Made word changes in memo for additional clarification including comments on recycled water and calculation of service area population.

As a result the demand projection for 2030 has increased 8.3 percent to 6.36 mgd. (7,130 AF)  
(The new demand values are shown in Table 4-1 with low flow fixture conservation included).

## LIST OF CONTENTS

The following five pieces of information are included in this packet:

1. Future Population and Employment Projections (Attachment 1)
2. Historical Water Use and Demographic Data Inputs to the Model (Attachment 2)
3. Key Assumptions for the Model (Attachment 3)
4. Alternative Water Demand Projections (Attachment 4)
5. Demand Tables for Urban Water Management Plan (Attachment 5)

Each of these will be discussed in individual sections below. As this information has not been concurred with by local agencies, all of the provided information is subject to change.

### 1. FUTURE POPULATION AND EMPLOYMENT PROJECTIONS

#### *Description of Population and Employment Forecasts (Attachment 1)*

There are generally two main sources of population and employment projections that can be used in this model. Below is a list of the two data sources that can be used to generate future water demands.

#### **Available Demographic Projections**

- *Local General Plan (population and employment)* – Typically these plans, depending upon when they were published, have a population and jobs forecast for 2020 and build out. The Town of Windsor General Plan does not include a population and employment forecast.
- *ABAG (population and employment)* - ABAG recently published a report in 2005 that includes population and employment estimates for each city in the Bay Area. This ABAG report provides projections for Windsor for 2005, 2010, 2015, 2020, 2025, and 2030.

At the Town of Windsor’s request the current ABAG 2005 projections were used as the source of population and employment forecasts. The population presented is *Residential or Household* population and excludes persons classified as institutionalized. Household population at 2030 is projected to be 31,339 persons. Total employment is projected to be 12,010 in 2030 as stated in ABAG 2005 Projections. The following two tables show how population and employment were calculated.

<b>SONOMA COUNTY ABAG 2005 PROJECTIONS TOTAL SERVICE AREA POPULATION</b>								
<b>SUBREGIONAL STUDY AREA</b>	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>	<b>2034**</b>
WINDSOR ABAG 2005 PROJECTION*	22,744	25,300	27,800	28,800	30,200	31,200	31,700	31,884
Group Quarters Population 2000 Census	91	91	91	91	91	91	91	91
Population Served by Private Wells	2028	1,960	1,622	1,284	946	608	270	0
<b>Household Service area population in DSS Model*</b>	<b>20,625</b>	<b>23,249</b>	<b>26,087</b>	<b>27,425</b>	<b>29,163</b>	<b>30,501</b>	<b>31,339</b>	<b>31,739</b>
Annual Percent Change		2.54%	2.44%	1.03%	1.27%	0.92%	0.55%	0.3%

\*Household Service area population in DSS Model\* = ABAG 2005 – Group Quarters Population from Census – Population served by Private Wells

\*\*ABAG only project to 2030. Straight line was used for 2030 to 2034.

<b>SONOMA COUNTY ABAG 2005 PROJECTIONS TOTAL SERVICE AREA EMPLOYMENT</b>								
<b>SUBREGIONAL STUDY AREA</b>	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>	<b>2034*</b>
WINDSOR ABAG 2005 PROJECTION*	5,960	6,080	6,450	8,670	10,830	11,490	12,010	12,426
Household Service area population in DSS Model*	5,960	6,080	6,450	8,670	10,830	11,490	12,010	12,426

\*ABAG only project to 2030. Straight line was used for 2030 to 2034.

## 2. WATER USE AND DEMOGRAPHIC DATA INPUTS TO MODEL

### *Description of “Water Use Data Input Sheet” (Attachment 2)*

Attachment 2 is a two-page print out of an Excel spreadsheet. The purpose of this “Water Use Data Input Sheet” is to gather and document basic information about the individual service area. The data shown on the “Water Use Data Input Sheet” can be broken into two main categories, (a) current water use data and (b) demographic data. Each area is broken out below and helps to provide some basic definitions and assumptions.

#### (a) Water Use Data

- Base Year – This is the starting year for the analysis. For this project, the recent average weather normalized data was selected as the base year for two reasons:
  1. 2004 shows less of an effect of the recession.  
(The year 2002-3 shows a dip in water demand in many areas due to reduction in economic activity)
  2. 2004 had relatively “normal” climate conditions – i.e. not a drought or excessively wet year, so weather adjustments were minor
- Average gal/day/acct- This is the amount of water in gallons that is used per day, per account.
- Indoor/outdoor water use – This is the amount of water per account split into the percent that is used indoors. The corresponding remaining percent of water is used outdoors.
- Consumption by customer class- This shows the annual amount of water used for an entire calendar year, broken down by customer class (Single Family, Multi Family, Commercial, Irrigation, etc)
- Provision for New Single Family Account Use– For selected agencies, and upon their specific request, a new category can be created to model water use of new single family homes. This value is held constant in the baseline projection and not subject to plumbing codes. It is assumed that all new homes are built to the current plumbing code with low flow showerheads and low flush (1.6 gallon per flush) toilets. The plumbing codes continue to work on the existing accounts.

The Town of Windsor declined to pursue creating a new single family home category.

- Unaccounted for water (UFW) - The difference between the amount of water purchased and the amount of water that was billed. Data provided by the agency was used, if provided, unless UFW was less than 7 percent, in which case 7 percent was used. The Town of Windsor has agreed to use 7 percent for future UFW planning purposes.
- Water Produced– This is the total amount of potable water produced by Forestville Water District. The water can come from multiple sources including amount purchased from SCWA, purchased from other agencies, local surface water, or obtained from groundwater. This does not include recycled water.
- Peak day factor – The ratio of water produced on the maximum day of the year to that produced on the average day. The value used in the recent SCWA Water Master Plan for agencies was used where available; otherwise a value of 1.6 was used. The Town of Windsor requested to use a peak day factor of 1.65.

#### **(b) Demographic Data**

- Census 2000 – The 2000 Census data was used as a reference when determining population and household sizes for each individual city (and/or unincorporated area) serviced by the water agencies.
- Department of Finance 2004 estimate and Calculation of 2004 Base Year Population- The State of California Department of Finance provides official estimates between censuses. The 2004 Department of Finance total population for the Town of Windsor is shown on Attachment 2. At the request of the Town of Windsor, 2004 Department of Finance value of 24,889 was used as the 2004 starting value for population. Then group quarters population of 99 and population served by private wells of 2,028 were subtracted to arrive at a total service area population for the Town of Windsor of 22,772. (2004 Base Year population calculation:  $24,889 - 99 - 2,028 = 22,772$ )
- Single and multi family dwelling units- The 2004 single family dwelling units is equal to the number single family accounts for 2004. The 2004 multi family dwelling unit estimate was calculated by applying a growth factor to the 2000 data as noted on the water use data sheet in Attachment 2.
- Procedure for service areas not contiguous with city boundaries – When a service area serves outside a city boundary, estimates were generated either from census data when available for the unincorporated areas, Department of Finance data, ABAG Projections, DWR reported data, General Plan or by the agency if known. If none of the six sources were available, then the modeling team worked with the local water district to make reasonable estimates.
- Employment data (ABAG) – The employment figures were gathered from the Association of Bay Area Governments (ABAG) report dated 2005. These numbers were developed regionally, and are based on the 2000 Census.

In summary, the key features of this sheet include the existing 2004 (baseline) level of water use, 2004 baseline accounts in each customer category, and 2004 baseline forecasts for population.

### **3. KEY ASSUMPTIONS FOR THE MODEL**

#### ***Key Assumptions for the Model (Attachment 3)***

The one page table shown in Attachment 3 shows some of the key assumptions used in the model. The assumptions having the most dramatic effect on the results are the natural replacement rate of fixtures, how residential or commercial future use is projected, and finally the percent of unaccounted for water.

### **4. WATER DEMAND PROJECTIONS**

#### ***Development of the Water Demand Projections Table and Graph (Attachment 4)***

Water demand projections were developed out to the year 2034 using the Demand Side Management Least Cost Planning Decision Support System (DSS) model. This model incorporates information from the:

- “Water Use Data Sheet” and the “Key Assumptions” shown in Attachments 2 and 3
- Questions asked of agencies
- Agency provided data
- 2000 Census data
- 2000 to 2004 Department of Finance population data
- Local General Plans
- Association of Bay Area Governments Projections

Attachment 4 shows the projected demands with and without plumbing codes and appliance standards. This page includes both a table and a graph. Each will be described below.

California law requires that for new construction after January 1, 1992 only fixtures meeting the following standards can be installed in new buildings:

- Toilet – 1.6 gal/flush maximum
- Urinals – 1.0 gal/flush maximum
- Showerhead and Faucets – 2.5 gal/min at 80 psi

Replacement of fixtures in existing buildings is governed by the Federal Energy Policy Act that requires only the above can be sold after January 1, 1994 for residential use and January 1, 1997 for commercial toilets. This law governs natural replacement.

New clothes washers are required to meet increased energy efficiency standards in 2004 and 2007. It is expected that this will lead to water efficiency improvements (efficient washers use at least 33% less water) by no later than 2007. We have assumed that by 2007, 30 percent of washers purchased will be efficient, by 2010, 50 percent purchased will be efficient, by 2015, 75 percent will be efficient, and by 2020, 100 percent purchased will be efficient.

#### **Graph of projected demands (Figure 4-1)**

Figure 4 shows the projection at five-year increments. The graph shows projections through 2034.

### **Table of water demand projections (Table 4-1)**

The table of water demands projections includes:

1. The water demand projections are based on the future population and employment projections shown and described above in Attachment 4.
2. Table 1-1 shows the population and employment projections used to prepare the demand projections.
3. Projections were made *with and without* the plumbing codes (low flow fixture conservation).
4. Projections are for potable water only. It does not include recycled water use. Recycled water use and projections are included in Chapter 5 of UWMP.

### **Dry Year Demands**

The demand projections reflect average weather conditions and **do not** reflect drier, hotter, non-drought conditions.

## **5. WATER DEMAND PROJECTIONS – 2005 URBAN WATER MANAGEMENT PLAN (UWMP) FORMAT**

### ***Conversion of the Water Demand Projections Table and Graph to 2005 UWMP Format (Attachment 5)***

The 2005 Urban Water Management Plan Guidance Document from the California Department of Water Resources (Ca DWR) requests that future demand information be in a specific format. Provided in Attachment 5 are the five tables relating to future average day demands they requested. The demand projection shown is the “with Low Flow Fixture Conservation” demands and is otherwise the same as appeared in the above table and graph. The demand projections in the Urban Water Management Plan will be included in Chapter 3.

### **NEXT STEPS**

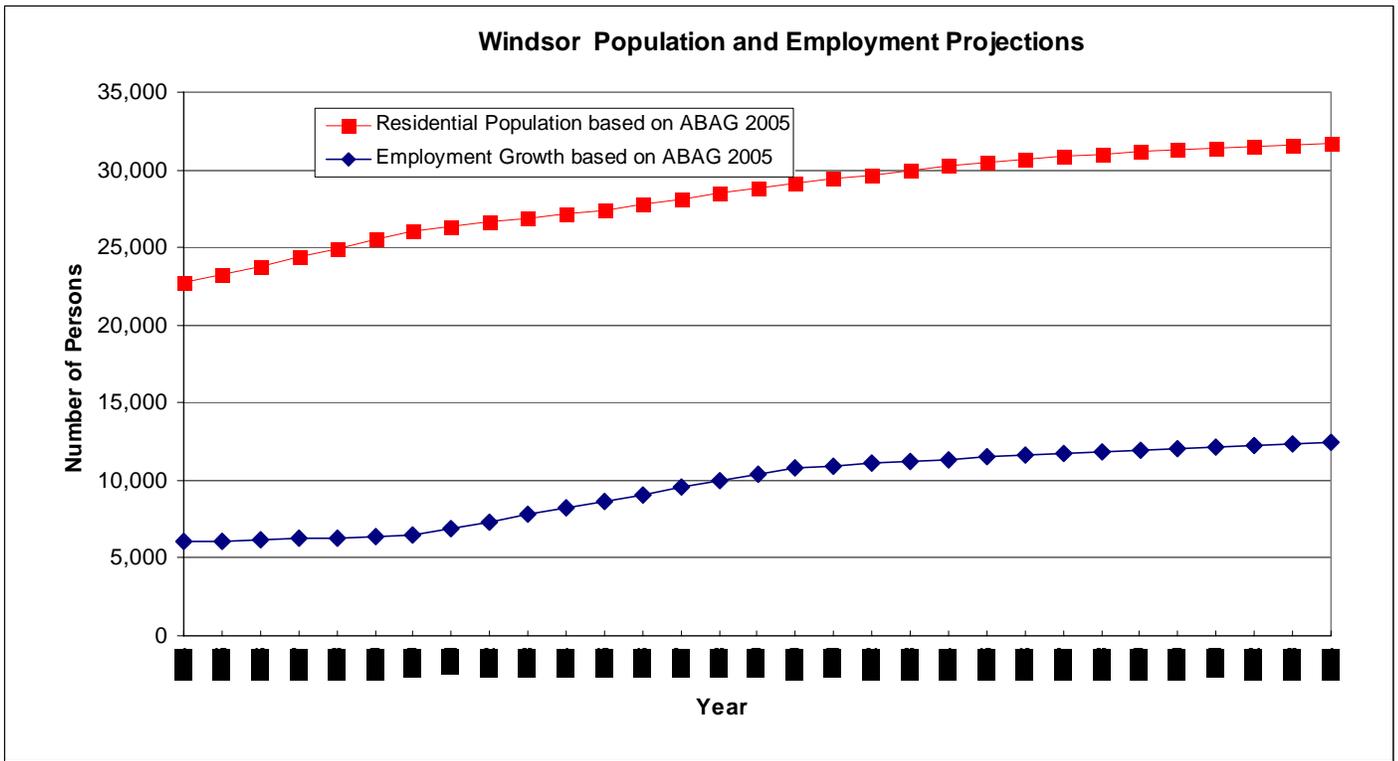
The following five steps remain to finalize the demand projections and evaluate conservation measures.

1. Contractor to concur with baseline projection
2. Evaluate Tier One conservation measures with the model
3. Develop projections with alternative levels of conservation
4. Provide information on the cost-effectiveness of water conservation
5. Identify individual agency projections with planned conservation

### **ATTACHMENTS**

Attachment 1	Future Population and Employment Projections (Figure 1-1 and Table 1-1)
Attachment 2	Water Use Data Input Sheet
Attachment 3	Key Model Assumptions (Table 3-1)
Attachment 4	Alternative Water Demand Projections (Figure 4-1, Table 4-1)
Attachment 5	UWMP Tables for Chapter 3 (Ca DWR format)

**Attachment 1 – Population and Employment Projections**



**FIGURE 1-1  
Population and Employment Projections for Town of Windsor**

**TABLE 1-1  
Population and Employment Results for Town of Windsor**

Projection	Residential Population						
	2004	2005	2010	2015	2020	2025	2030
Residential Population	22,772	23,249	26,087	27,425	29,163	30,501	31,339
Employment	6,056	6,080	6,450	8,670	10,830	11,490	12,010

## Attachment 2 – Water Use Data Input Sheet (Page 1)

### Town of Windsor Water Service Area<sup>1</sup> DSS Input Sheet November 6, 2005

#### Base Year Average Use and Indoor Percentages by Billing Category for DSS Model<sup>2</sup>

Year	Single family		Multifamily		Commercial*		Industrial	
	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor	Average, gpd/a	Indoor
2004	360	52%	1595	83%	1168	54%	0	0%
Bimonthly billing		Bimonthly billing		Bimonthly billing		No Industrial Accounts		
Irrigation		Institutional		Single Family - 7343 Includes single family homes & individually metered mobile homes plus 54 construction meters				
Average, gpd/a	Indoor	Average, gpd/a	Indoor	Multi Family - 54 Includes apartment meters plus 1 master meter mobile home park Royal Mobile Manor (83 units)				
1638	0%	2895	46%	5 mobile home parks. 4 are on private wells. See table below for total number of mobile home units				
Bimonthly billing		Bimonthly billing		Commercial inside and outside town includes 6 hotel, 9 church, 344 commercial, 17 town meters, 197 fireline, and 13 fire hydrant				
Commercial water use is based on 2001 consumption to account for recession, based on MWM memo of October 26, 2005								
Institutional includes 8 Schools, but does not include 3 recycled meters								

#### Data for DSS Model - - Base Year 2004

Category	Number of Accounts FY. 2004 <sup>3</sup>	Water Use 2004 gpd/a <sup>2</sup>	Water Use, MGD 2004	Use Profile Percent	Water Use gpd	Indoor Water Use gpd	2004 Weather Normalized Million Gallons Per Year
Single family	7,397	360	2.661	66.70%	126	66	971.4
Multifamily	55	1,595	0.088	2.20%	53	44	32.0
Commercial*	587	1,168	0.685	17.18%			250.2
Irrigation	325	1,638	0.532	13.34%			194.3
Institutional	8	2,895	0.023	0.58%			8.5
Total Billed in 2004 <sup>9</sup>	8,372	7,655	3.990	100.00%	Weather Normalized Usage for 2004		1456.3
2004 Total Water Produced Non weather normalized <sup>4</sup> =			3.86	MGD			
2004 Unaccounted for Water (UFW) <sup>5</sup> =			3.2%	Percent	Based on 2004 DWR Reports. Range from 1999 to 2004 is 1.5% to 6.2%		
Estimated UFW for DSS Model =			7.0%	Percent	7% if actual is < 7%, otherwise = agreed upon % by agency for 30 year forecast		
Water Produced for use in DSS Model =			4.29	MGD	Add UFW % to Total Billed Water Use		
					Water Produced = Billed / (1 - Projected UFW for DSS Model) = 4.29		
Peaking Factor			1.65	Provided by Agency			
Peaking Factor for DSS Model=			1.65	Provided by Agency			

Blue cells are entered by modeler  
Yellow cells are input to DSS Model

#### NOTES

- Communities served (includes all or portions of) Windsor and surrounding rural areas
- Average gpd/a is based on a 12-month moving average through December 2004. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly.
- Number of accounts is from data provided by water agency for this project (see worksheet with account data in this file)
- Total water produced provided by City of Windsor.
- Unaccounted for Water (UFW) is the percent difference between the total water purchased and the total water use.
- For reference see additional population estimates provided in population and employment estimates corresponding to service area table.
- Initial estimate based on census data for renter occupied units. For reference see table below that has 2000 census data for corresponding water service area city or cities.
- Group Quarters Population includes Institutionalized and non-Institutionalized and assumes their water use is in the Commercial sector
- Total accounts taken from DWR 2004 reports. It equals 8,553 accounts minus 171 sewer only accounts, minus 10 reclaimed water accounts = 8,372 total potable water accounts

#### Mobile homes in Town of Windsor

As of September 1, 2005

Units	Park Name	Address	City	Phone	Comment
23	MOBILE ESTATES	REDWOOD HWY	WINDSOR	707-838-4542	Private Well
83	MANOR	237 WADE DR	WINDSOR	707-838-2546	Master Meter
132	WINDSOR LAND	REDWOOD HWY	WINDSOR	707-838-4882	Private Well
334	MOBILE	8109 CONDE LN	WINDSOR		Private Well
127	MOBILE	REDWOOD	WINDSOR	707-838-4389	Private Well
123	UNIDENTIFIED /				
822	*Estimate is 822 units by 2004 Department of Finance				

#### Definitions / Abbreviations

ABAG	Association of Bay Area Governments	HHS	household size
DOF	Department of Finance	NA	not available
DSS	Decision Support System Model	MF	multi family
du	dwelling unit	MGD	million gallons per day
DWR	Department of Water Resources	No.	number
FY	Fiscal Year	Pop	population
gpd	gallons per capita / per day	Res	residential
gpd/a	gallons per day / per account	SF	single family
gpd	gallons per day	UFW	unaccounted for water

Data Prepared : June 23, 2005 By: M. Maddaus  
Revised: November 6, 2005 By: M. Maddaus

# Attachment 2 – Water Use Data Input Sheet (Page 2)

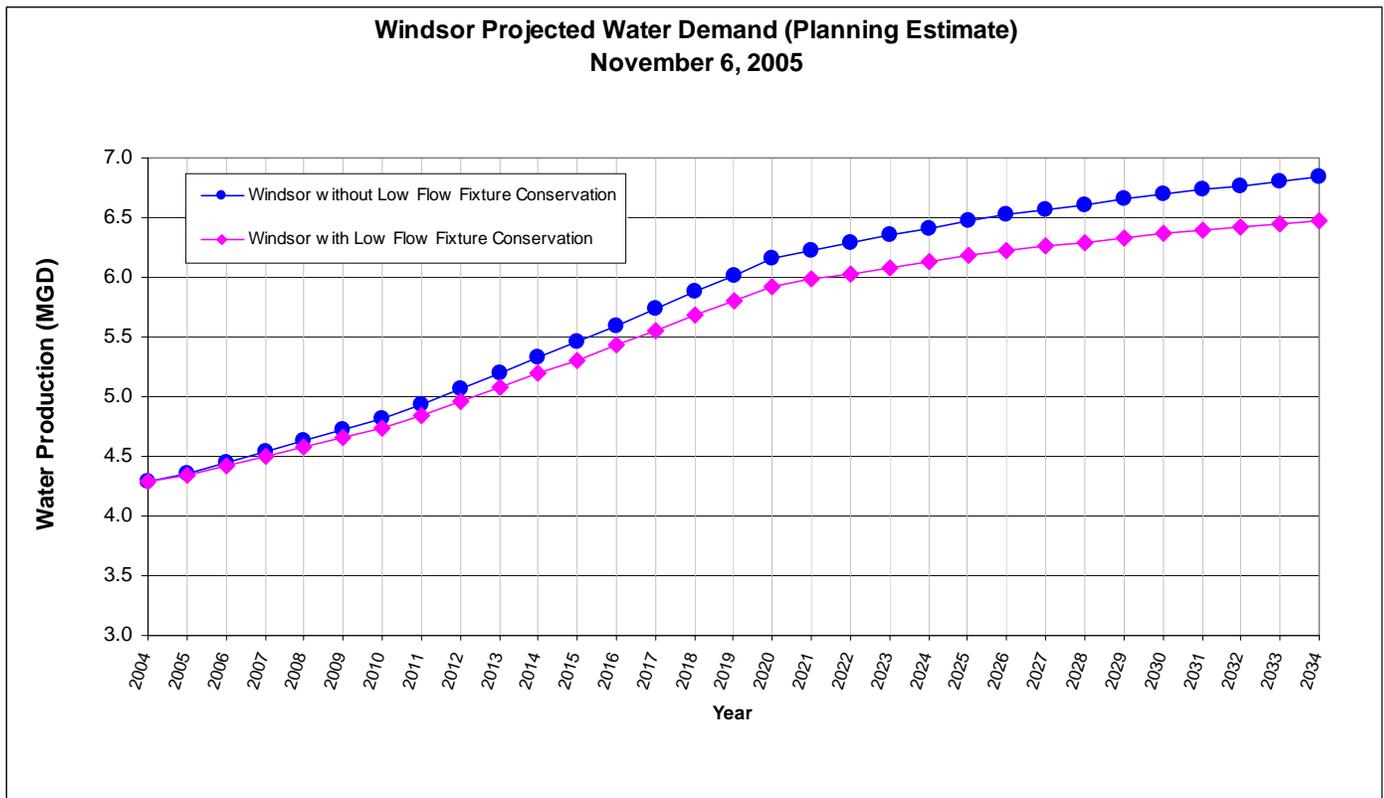
Town of Windsor Water Service Area <sup>1</sup>					
Reconcile agency account billing data and census data					
<b>Total Dwelling Units in Census 2000 for Windsor by Census Track</b>					
			<b>Service Area Billing Accounts - Year 2000<sup>3</sup></b>	<b>Difference between billing and census data</b>	
<b>Single family</b>	<b>2000 Units</b>	<b>No. Buildings</b>			<b>Data Sources / Notes</b>
1-detached	5,471	5,471			
1-attached	421	211			Some units in SF category are individual mobile home meters
Subtotal	5,892	5,681	6,455	774	When this happens some of the attached units classified by City as Multifamily
<b>Multi family</b>					
2-units	128	64			
3-4 units	267	76			
5 to 9 units	177	25			
10 to 19 units	68	5			
20 to 49 more units	113	3			
50 or more units	173	2			
mobile homes	880	18			1 Master meter for mobile home park Royal Mobile Manor. Rest of units are on private systems. Some mobile home units have individual wells.
Subtotal	1,807	194	60	-134	Must be more than one building on an MF meter.
MF Average =	9.3	units/building	30.1	units/account	This is a typical value of DUs/account
<b>Total SF + MF units =</b>	<b>7,699</b>	This includes all mobile home units. Some of these units are on well water and will be subtracted from Town of Windsor service area units			
<b>2000 Group Quarters Data</b>		<b>2000 Census Data</b>			
Institutionalized	24	Average household size	2.74		
Non-Institutionalized	67	Average household size of owner-occupied unit	2.69		
Total	91	Average household size of renter-occupied unit	1.63		
		Homeowner vacancy rate (percent)	0.4%		
		Rental vacancy rate (percent)	1.5%		
<b>Population and Household Size in Census 2000 for Windsor Water District</b>					
Note: 2,028 mobile home residents served by a private wells, see note in cell Q43					
	<b>Census Data</b>	<b>Department of Finance</b>	<b>Estimated Service Area</b>		<b>Data Sources / Notes</b>
	<b>Total Population 2000</b>	<b>Total Population 2004</b>	<b>Population 2004</b>		
Total Population from Census data <sup>6</sup> =	21,976	24,899			Estimated growth from 2000 to 2004 (ABAG Subregional Projections): 8.99%
Subtract Institutionalized =	91	91			Estimated employment growth from 2000 to 2004 (ABAG Employment Projections): 1.61%
Residential Population =	21,885	24,808			Water use for the institutionalized population is accounted for in nonresidential billing categories
Avg. HHS <sup>7</sup> =	2.84	2.84			Residential population shown corresponds to the city or cities represented by Census data
MF Pop @ MF HHS <sup>7</sup> =	1.15	1,265	1,379	1,651	7.3% Percent of Population that is MF
SF Pop =	20,620	23,429	21,121	92.7%	Percent of Population that is SF
SF HHS <sup>7</sup> =	3.19	3.17			
		Total	22,772	100.0%	
NOTE: MF household size is small because according to Town of Windsor most of the people living in mobile homes are elderly and living alone (most are retirement homes age 55+)					
NOTE: Subtracted 2,028 people out of total estimated population because 740 mobile homes of 2.74 household size are served by private systems.					
As requested by Town of Windsor model assumes these 2,028 people served by private wells will be served over the next 30 years as the wells fail.					
<b>Estimate Service Area Dwelling Units for 2004</b>					
SF Res	7,397	Equals 7,343 SF units according to 2004 DWR report, plus 54 construction meters which eventually convert to permanent residential meters after construction is complete.			
MF Res	1,100	in accounts for four years from cell U36			
Total	8,497				
<b>Population and Employment Estimates Corresponding to City of Novato (smaller than service area)</b>					
	<b>Population</b>	<b>Employment</b>			
2000 Census data for jurisdiction	21,976	NA			
2000 ABAG (jurisdictional)	22,744	5,960		Based on ABAG 2005 Projections	
2005 ABAG Projection (jurisdictional)	25,300	6,080		Based on ABAG 2005 Projections	
2000 ABAG (subregional)	22,744	5,960		Based on ABAG 2005 Projections	
2005 ABAG Projection (subregional)	25,300	6,080		Based on ABAG 2005 Projections	
2003 Department of Finance Benchmark	24,441	From State of California Department of Finance (DOF) table E-4 as of 1-1-2003. Website www.dof.ca.gov			
2004 Department of Finance Estimate	24,899	From State of California Department of Finance table E-4 as of 1-1-2004. Website www.dof.ca.gov			
2005 Department of Finance Estimate	25,475	From State of California Department of Finance table E-4 as of 1-1-2005. Website www.dof.ca.gov			
2004 Employment in Service Area (input to DSS Model) =		6,056		2005 ABAG Jurisdictional employment escalated to 2004 using the assumed growth rate in cell U37.	

### Attachment 3 – Key Model Assumptions

**TABLE 3-1  
List of SCWA Baseline Demand Projection Assumptions for DSS Model**

<b>Parameter</b>	<b>Model Input Value, Assumptions, and References</b>
Base Year	2004
Peak Day Factor	1.65
Unaccounted for Water, % of Water Production	Calculated from historical production and sales data or 7%, whichever is greater; constant over time. Requested value by Town of Windsor for UFW was 7%.
Population Projection, 2005 to 2034	ABAG 2005
Employment (Jobs) Projection 2005-2034	ABAG 2005
Number of Water Accounts for Base Year	Data submitted by customers for 2004
Distribution of Water Use Among Categories	Data submitted by customers for most recent year
Indoor/Outdoor Water Use Split by Category, % of Total	Monthly data submitted by customers
Residential End Uses, %	AWWARF Report “Residential End Uses of Water” 1999
Non-Residential End Uses, %	Professional judgment and AWWARF Report “Commercial and Institutional End Uses of Water” 1999
Residential Fixture Efficiency (Current existing fixtures installed in residential units)	Census 2000, Housing age by type of dwelling plus natural replacement plus rebate program (if any). Reference "High Efficiency Plumbing Fixtures - Toilets and Urinals" Koeller & Company July 23, 2005. Reference Consortium for Efficient Energy ( <a href="http://www.cee1.org">www.cee1.org</a> )
Water Savings for Fixtures, gal/capita/day	AWWARF Report “Residential End Uses of Water” 1999
Non-Residential Fixture Efficiency (Current fixtures installed in non-residential facilities)	Census 2000, assume commercial establishments built at same rate as housing, plus natural replacement plus rebate program (if any)
Residential Frequency of Use Data, Toilets, Showers, Washers, Uses/user/day	Falls within ranges in AWWARF Report “Residential End Uses of Water” 1999
Non-Residential Frequency of Use Data, Toilets and Urinals, Uses/user/day	Estimated based using AWWARF Report “Commercial and Institutional End Uses of Water” 1999
Natural Replacement Rate of Fixtures	Residential Toilets 3% (newer toilets), 4% (older toilets) Commercial Toilets 4% Residential Showers 4% Residential Clothes washers 6.7% A 4% replacement rate corresponds to 25 year life of a new fixture based on data published in "High Efficiency Plumbing Fixtures - Toilets and Urinals" Koeller & Company July 23, 2005. A 4% replacement rate is also the CUWCC recommended value. A 6.67% replacement rate corresponds to 15 year washer life based on “Bern Clothes Washer Study, Final Report:, Energy Division, Oak Ridge National Laboratory, for U.S. Department of Energy, March 1998, Internet address: <a href="http://www.energystar.gov">www.energystar.gov</a>
Future Residential, Institutional Water Use	Based on Projected Population Growth
Future Business Water Use	Based on Projected Employment Growth
Future Irrigation Water Use	Based on Projected Employment Growth

## Attachment 4 –Projected Potable Water Demands



**FIGURE 4-1**  
Baseline Potable Water Use Projections for Town of Windsor

**TABLE 4-1**  
Baseline Potable Water Use Results for Town of Windsor

Data Source for Projection		Low Flow Fixture Conservation	Total Potable Water Production, Average Day (MGD)						
Residential	Non-Residential		2004*	2005	2010	2015	2020	2025	2030
General Plan	General Plan	Included	4.29	4.35	4.73	5.31	5.93	6.19	6.36
General Plan	General Plan	Not Included	4.29	4.36	4.81	5.46	6.15	6.48	6.70

\*Weather normalized. Total Water use is potable only. Does not include recycled water use. Recycled water use and projection is in Chapter 5 of UWMP.

## Attachment 5 –Urban Water Management Plan Tables for Chapter 3 of 2005 UWMP

Table 3-1 below provides population projections for Town of Windsor service area.

**Table 3-1. (DWR Table 2). Population – Current and Projected**

Year	Population
2005	22,909
2010	25,409
2015	26,409
2020	27,809
2025	28,809

### 3.2 Past, Current, and Future Water Use

#### 3.2.1 Water Use By Customer Type

The historical and projected number of connections and deliveries to the Agency’s water distribution system, by sector is identified below on Table 3-2.

**Table 3-2. (DWR Table 12). Past, Current and Projected Water Deliveries**

Year			Water Use Sectors						Outside Sales	Total	
			Single family	Multi-family	Commercial	Irrigation	Institutional	Industrial			
2000	metered	# of accounts	To be completed by Brown and Caldwell								
		Deliveries AF/Y	To be completed by Brown and Caldwell								
2005	metered	# of accounts	7,552	56	589	326	8	0	0	8,532	
		Deliveries AF/Y	3,033	100	770	599	26	0	0	4,527	
2010	metered	# of accounts	8,474	63	625	346	9	0	0	9,517	
		Deliveries AF/Y	3,344	108	810	635	30	0	0	4,926	
2015	metered	# of accounts	8,908	66	840	465	10	0	0	10,290	
		Deliveries AF/Y	3,463	110	1,077	854	31	0	0	5,535	
2020	metered	# of accounts	9,473	70	1,050	581	10	0	0	11,184	
		Deliveries AF/Y	3,629	113	1,337	1,066	33	0	0	6,179	
2025	metered	# of accounts	9,907	74	1,114	617	11	0	0	11,722	
		Deliveries AF/Y	3,749	115	1,415	1,131	35	0	0	6,446	
2030	metered	# of accounts	10,180	76	1,164	645	11	0	0	12,075	

	<b>Deliveries AF/Y</b>	3,819	117	1,477	1,183	36	0	0	6,631
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### 3.2.2 Water Sales to Other Agencies

The Town of Windsor does not currently sell water to any other agency. According to Town of Windsor, all “outside sales” are local businesses and residents, and not to another agency.

**Table 3-3. (DWR Table 13). Sales to Other Agencies**

<b>Water Distributed</b>	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
N/A	0	0	0	0	0	0	0

### 3.2.3 Unaccounted-for Water and Additional Water Use

For this project unaccounted for water is defined to be the difference between water produced and water sold to customers. Unaccounted-for water use normally includes unmetered water use such as for fire protection and training, system and street flushing, sewer cleaning, construction, system leaks, and unauthorized connections. Unaccounted-for water can also result from meter inaccuracies.

**Table 3-4. (DWR Table 14). Additional Water Uses and Losses, AF/yr**

<b>Water Use</b>	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
Saline barriers	N/A						
Groundwater recharge	N/A						
Conjunctive use							
raw water	N/A						
recycled	N/A						
Unaccounted-for system losses	N/A	343	373	411	461	485	499
<b>Total</b>	N/A	343	373	411	461	485	499

### 3.2.4 Total Water Use

The total past, present and future water use for the system is shown in the table below.

**Table 3-5. (DWR Table 15). Total Potable Water Use, AF/yr**

<b>Water Use</b>	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
<i>(Total of Tables 3-2, 3-3, 3-4)</i>	NA	4,870	5,299	5,946	6,639	6,931	7,130

\*Total Water use is potable only. Does not include recycled water use. Recycled water use and projection is in Chapter 5 of UWMP.





## MEMORANDUM

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Date: May 30, 2006

To: Mike Cave, Town of Windsor

From: William Maddaus, Maddaus Water Management

Subject: *Revised Tier One Conservation Measure Evaluation  
Summary of Data Inputs, Assumptions and Results*

---

### INTRODUCTION AND PURPOSE

The purpose of this memorandum is to present an overview of the conservation evaluation process which has been completed for your agency. The evaluation was performed on the Tier One measures which correspond to the California Urban Water Conservation Best Management Practices (CUWCC BMPs). The conservation measures, where quantification is possible (BMP 1, 2, 3, 5, 6, 7, 9, and 14), were analyzed using the Least Cost Planning Decision Support System (DSS) Model. The remaining BMPs (4, 8, 10, 11, 12, and 13) are either of a qualitative nature or not applicable to your agency and were not included in this analysis other than to state if your agency is meeting the coverage requirements according to the CUWCC. These conservation measures were then organized into two programs showing historical and then future activity levels and associated cost for your agency.

### Changes Since February 3, 2006 Memorandum

- The changes described in our memorandum dated March 3, 2006 have been implemented. Most of the changes related to prior conservation efforts and minor improvements in the presentation of results. The items listed immediately below resulted in a significant increase in estimated water savings from future planned water conservation activities.
- Water savings for BMP 9, commercial water audits was revised to make the unit water savings per audit consistent with that being used for other contractors.
- The CUWCC BMP 14 was updated to include resale rates for Sonoma County.

### CONTENTS

This technical memorandum provides a general overview for the methodology, assumptions, and results for the conservation analysis

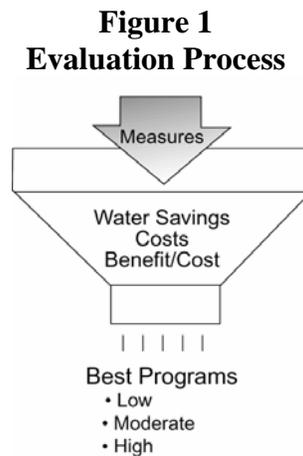
The following four pieces of information are included in this packet:

1. Overview of Evaluation Performance
2. Comparison of Individual Conservation Measures
3. Results of Tier One Conservation Analysis
4. Conclusions

Each of these will be discussed in individual sections below. As this information has not been concurred with by local agencies, all of the provided information is subject to change.

## 1. OVERVIEW OF EVALUATION PROCESS

During the evaluation process, water savings were estimated and costs for the measures were developed. Benefits and costs were compared in a formal present value analysis (PVA) and then conclusions were drawn about which measures produce cost-effective water savings. This process can be thought of as an economic screening process, shown in Figure 1. Packaging the best measures into alternative programs is how we are helping you to consider what level of conservation is appropriate for your agency.



Benefit-cost analysis has been used by many water agencies to evaluate and help select a water conservation measure best suited to local conditions. This analysis requires a locale-specific set of data, such as historical water consumption patterns by customer class, population and employment projections, age of housing stock, and prior conservation efforts.

The following eight steps were used to implement the methodology by expanding upon the same DSS model used to prepare the demand projections.

1. *Develop baseline water use projections without additional conservation.* Projections cover each key customer category and are broken down into indoor end uses and outdoor end uses. These were presented in previous memoranda. Note, the plumbing code refers to savings from the Energy Act; it is not the same as savings from BMP conservation.
2. *Identify possible water conservation measures* and screen the measures qualitatively to identify those that are applicable to the service area. Develop appropriate unit water savings and cost factors for each measure.
3. *Estimate the affected customers (or number of accounts) for each conservation measure* by dividing the measure's projected *customers* (or accounts) that implements the measure by the total service area *customers* (accounts). This factor is called the market penetration or installation rate.
4. *Estimate total annual average and peak day water savings.* The water savings are computed by multiplying unit water savings, per measure, by the market penetration or installation rate, and then multiplying by the number of units in a particular service area (such as dwelling units) targeted by a particular measure.

5. *Identify benefits to the water agency* including potential reduced water purchases (SCWA wholesale water rate for each agency).
6. *Quantify total benefits for each year* in the planning period by multiplying average water savings by the computed value of the benefits.
7. *Determine initial and annual costs to implement the measures* based upon pilot projects, local experience, and the costs of goods, services, and labor in the community. This is multiplied by the number of units participating each year and then added to overall administration and promotion costs to arrive at a total measure cost, which may be spread over a number of years.
8. *Compare benefits and costs of measures* by computing the present value of costs and benefits over the planning period.

## **2. COMPARISON OF INDIVIDUAL CONSERVATION MEASURES**

### **Perspectives on Benefits and Costs**

The determination of the economic feasibility of water conservation programs depends on comparing the costs of the programs to the benefits provided. The analysis was performed using the DSS model. The DSS model calculates savings at the end-use level; for example, the model determines the amount of water a toilet rebate program saves in daily toilet use for each single family account. For this evaluation benefits are based on reduced water purchases from SCWA at the (2005) wholesale rate of \$519.22 per acre-foot (\$1,594 per million gallons).

Present value analysis is used to discount costs and benefits to the base year. From this analysis benefit-cost ratios of each measure are computed. When measures are put together in programs the interactions are accounted for by multiplying water use reduction factors together at the end use level. A water use reduction factor is 1.0 minus the water savings, expressed as a decimal. This avoids double counting when more than one measure acts to reduce the same end use of water.

Benefit-cost analysis can be performed from several different perspectives, based on who is affected. For planning water conservation programs for utilities, the perspectives most commonly used for benefit-cost analyses include the utility and the community. The "utility" benefit-cost analysis is based on the benefits and costs to the water provider. The "community" benefit-cost analysis includes the utility benefit and costs together with account owner/customer benefits and costs. These include customer energy benefits and costs of implementing the measure, beyond what the utility pays.

The utility perspective offers two advantages for this analysis. First, it considers only the program costs that will be directly borne by the utility. This enables the utility to fairly compare potential investments for saving and supplying water. Second, because revenue shifts are treated as transfer payments, the analysis is not complicated with uncertainties associated with long-term rate projections and retail rate design assumptions. Because it is the water provider's role in developing a conservation plan that is paramount in this study, the utility perspective was primarily used to evaluate elements of the plan.

No evaluation perspectives are without shortcomings. The principal weakness of the utility perspective is that it does not count the benefits accrued or costs incurred outside of the utility. Therefore another perspective is also used – the community perspective. The community perspective is defined to include the utility costs and benefits and the customer costs and benefits. Costs incurred by customers striving to save water while participating in conservation programs are considered, and are the benefits received in terms of reduced energy bills (from water heating costs). Other factors external to the utility, such as environmental effects, are not included in the benefit-cost analysis. Because these external factors are often difficult to quantify, they are frequently excluded from economic analyses, including this one.

## **Present Value Parameters**

The time value of money is explicitly considered. The value of all future costs and benefits is discounted to 2004 (the base year) at the real interest rate of 3.0%. The DSS model calculates this real interest rate, adjusting the current nominal interest rate (assumed to be approximately 6.1%) by the assumed rate of inflation (3.0%). Cash flows discounted in this manner are herein referred to as "Present Value" sums.

## **Assumptions about Costs**

Costs were determined for each of the measures based on industry knowledge and past experience. Costs may include incentive costs, usually determined on a per-participant basis; fixed costs, such as marketing; variable costs, such as the costs to staff the measures and to obtain and maintain equipment; and a one-time set-up cost. The set-up cost is for measure design by staff or consultants, any required pilot testing, and preparation of materials that will be used in marketing the measure. Measure costs were estimated for each year between 2005 and 2030. Costs were spread over the time period depending on the length of the implementation period for the measure.

Lost revenue due to reduced water sales is not included as a cost because the conservation measures evaluated herein generally take effect over a span of time that is sufficient to enable timely rate adjustments, if necessary, to meet fixed cost obligations.

## **Water Savings**

Data necessary to forecast water savings of measures include specific data on water use, demographics, market penetration, and unit water savings. Savings normally develop at a measured and predetermined pace, reaching full maturity after full market penetration is achieved. This may occur three to ten years after the start of implementation, depending upon the implementation schedule.

Where measures have a finite life, it was assumed that the agency would take steps to renew the measure by such actions as continuing to perform audits indefinitely so as to make the water savings permanent.

## Overview of the CUWCC BMPs and Coverage Status

To begin the discussion of conservation analysis, it is important to understand the efforts that have been completed to date. *Table 1* shows the BMPs that have been either (a) completed (b) currently meeting the coverage requirements (c) not meeting coverage requirements or (d) not applicable. It is important to note that BMP 10 is not applicable for retail agencies.

**Table 1**  
**Current BMP Compliance for the Town of Windsor as of June 30, 2005**

CUWCC Best Management Practice Name	Meeting CUWCC Coverage Requirements (Compliance)	BMP Status
<b>BMP 01: Water Survey Programs for Single-Family and Multi-Family Residential Customers</b>	NO	Continue to pursue program.
<b>BMP 02: Residential Plumbing Retrofit</b>	NO	Have not reached 75% saturation.
<b>BMP 03: System Water Audits, Leak Detection and Repair</b>	YES	UFW lower than 10%.
<b>BMP 04: Metering with Commodity Rates for all New Connections and Retrofit of Existing</b>	YES	No unmetred accounts.
<b>BMP 05: Large Landscape Conservation Programs and Incentives</b>	NO	Began program on IRR accounts in 2005.
<b>BMP 06: High-Efficiency Washing Machine Rebate Programs</b>	COMPLETED	Have reached coverage requirement.
<b>BMP 07: Public Information Programs</b>	YES	Has public information program.
<b>BMP 08: School Education Programs</b>	YES	Have school education program.
<b>BMP 09: Conservation Programs for CII Accounts</b>	NO	Attempting to comply with performance track
<b>BMP 10: Wholesale Agency Assistance Programs</b>	NOT APPLICABLE	Not wholesaler.
<b>BMP 11: Conservation Pricing</b>	YES	Have tiered rate structure.
<b>BMP 12: Conservation Coordinator</b>	YES	Complies with this BMP.
<b>BMP 13: Water Waste Prohibition</b>	YES	Water Conservation Ordinance complies with this BMP.
<b>BMP 14: Residential ULFT Replacement Programs</b>	YES	Town has a retrofit on resale ordinance.

## Conservation Measures Evaluated with the DSS Model

*Table 2* is a table summarizing the 10 Tier One measures evaluated in the DSS Model. Some Tier One measures were split into components, such as indoor and outdoor savings (BMP 1) or single family and multi family (BMP 14). This was necessary to address all end uses in the model. The savings from the components of each measure are additive.

**Table 2**  
**Tier One Conservation Measures Evaluated in the DSS Model**

Measure Number	CA BMP Number	Target Customer Category	Measure	Short Description
1	1	RSF, RMF	Residential Water Surveys - Indoor	This is the <u>indoor</u> component of indoor and outdoor water surveys for existing single-family and multi family residential customers. Normally those with high water use are targeted and provided customized report to homeowner.
2	1	RSF, RMF	Residential Water Surveys - Outdoor	This is the <u>outdoor</u> component of indoor and outdoor water surveys for existing single-family and multi family residential customers. Normally those with high water use are targeted and provided customized report to homeowner.
3	2	RSF, RMF	Residential Retrofit	Provide owners of pre-1992 homes with retrofit kits that contain easy-to-install low flow showerheads, faucet aerators, and toilet tank retrofit devices, until saturation reaches 75%.
4	5a	IRR	Water Budgets	90% - 100% of all irrigators of landscapes with separate irrigation accounts would receive a monthly or bi-monthly irrigation water use budget.
5	5b	COM, INS	Large Landscape Conservation Audits	All public and private irrigators of landscapes larger than one acre would be eligible for free landscape water audits upon request.
6	6	RSF	Clothes Washer Rebate	Homeowners would be eligible to receive a rebate on a new water efficient clothes washer.
7	7	RSF, NRSF	Public Information Program	Public education would be used to raise awareness of other conservation measures available to customers. Programs could include poster contests, speakers to community groups, radio and television time, and printed educational material such as bill inserts, etc.
8	9	COM, INS	Commercial Water Audits	High water use accounts would be offered a free water audit that would evaluate ways for the business to save water and money.
9	14	RSF	Single Family Residential ULF Toilet Rebate	Homeowners would be eligible to receive a rebate to replace an existing high volume toilet with a new water efficient toilet.
10	14	RMF	Multi family Residential ULF Toilet Rebate	Homeowners would be eligible to receive a rebate to replace an existing high volume toilet with a new water efficient toilet.

Notes:

RSF = Residential Single Family  
BUS = Business  
COM = Commercial

RMF = Residential Multi Family  
INS = Institutional  
IND = Industrial

NRSF = New Residential Single Family  
RES IRR = Residential Irrigation  
COM IRR = Commercial Irrigation

## Measure Assumptions, Unit Costs, Market Penetration

**Attachment 1** summarizes all the water savings and cost assumptions for each measure for your agency. Do note that the unit costs vary according to the type of account being addressed. For example, a measure might cost a different amount for a residential single family account, than a residential multi family account.

## Comparison of Individual Measures

**Tables 3 and 4** are tables summarizing the evaluation of Tier One conservation measures for your agency. **Table 3** presents results through-2004 and **Table 4** presents results of Tier One measure going forward from 2005 and continuing until they are completed as per compliance with the CUWCC MOU.

These tables show how much water the measures would save on a 30-year average basis, how much they would cost and what the benefit-cost ratios are *if the measures were run on a stand-alone basis, i.e. without interaction or overlap from other measures that might address the same end use(s)*. Note that measures with benefit-cost ratios less than 1.0 are defined to be “not cost-effective”. Water savings shown are averaged over the 30-year analysis period and may be higher or lower in a particular year. Other key statistics are the cost of water saved in dollars per million gallons (\$/MG), and the benefit-cost ratios. Benefits and costs are defined below:

- *Utility benefits and costs:* those benefits and costs that the utility would receive or spend.
- *Community benefits and costs:* community benefits equal utility benefits plus customer energy (cost to heat water) benefits. Community costs include utility and customer costs.
- *Water Benefits:* based on the 2005 cost of SCWA water to the agency.
- *Costs for the utility:* include measure set-up, annual administration of private contractor contracts or in-house staff, and payment of rebates or purchase of devices or services as specified in the measure design.
- *Customer costs:* include costs of implementing the measure and maintaining its effectiveness over the life of the measure. For example customer costs for BMP 5b include retrofitting the irrigation system to achieve the water savings indicated by the landscape irrigation audit.

NOTE: Individual measure water savings are not additive in Tables 3 and 4 due to measure overlap.

From Tables 3 and 4 the following observations can be made:

- The most cost-effective Future Tier One measure is the residential retrofit program (BMP 2), from the Utility perspective.
- For Future Tier One Conservation BMP 1a has the lowest benefit-cost ratio which is less than one, indicating it is not cost-effective.
- Toilet rebates in multi family have been more cost-effective than single family.

**Table 3**

**Historical Tier One Conservation Measure Costs and Savings To 2004**

Tier One Conservation Measure		Water Utility Benefit-Cost Ratio	Total Community Benefit-Cost Ratio	“30-year” Average Water Savings (MGD)	Cost of Savings per Unit Volume (\$/MG)	Estimated Historic Utility Cost
1	BMP 1a - Residential Water Surveys-Indoor	NC	NC	NC	NC	NC
2	BMP 1b - Residential Water Surveys-Outdoor	NC	NC	NC	NC	NC
3	BMP 2 - Residential Retrofit	3.34	16.69	0.0330	\$321.20	\$120,102
4	BMP 5a - Landscape Water Budgets	NC	NC	NC	NC	NC
5	BMP 5b - Large Landscape Conservation Audits	NC	NC	NC	NC	NC
6	BMP 6 - Washing Machine Rebate	1.58	0.52	0.0046	\$686.06	\$36,075
7	BMP 7 - Public Information	1.27	2.85	0.0008	\$1,240.98	\$11,558
8	BMP 9 - Commercial Water Audits	0.85	0.64	0.0015	\$1,242.40	\$21,600
9	BMP 14 - ULF Toilet Rebate- Single Family	3.03	0.50	0.0024	\$374.28	\$10,000
10	BMP 14 - ULF Toilet Rebate- Multi family	1.22	0.49	0.0002	\$929.17	\$2,000

\*NC. No Interventions completed by 2004.

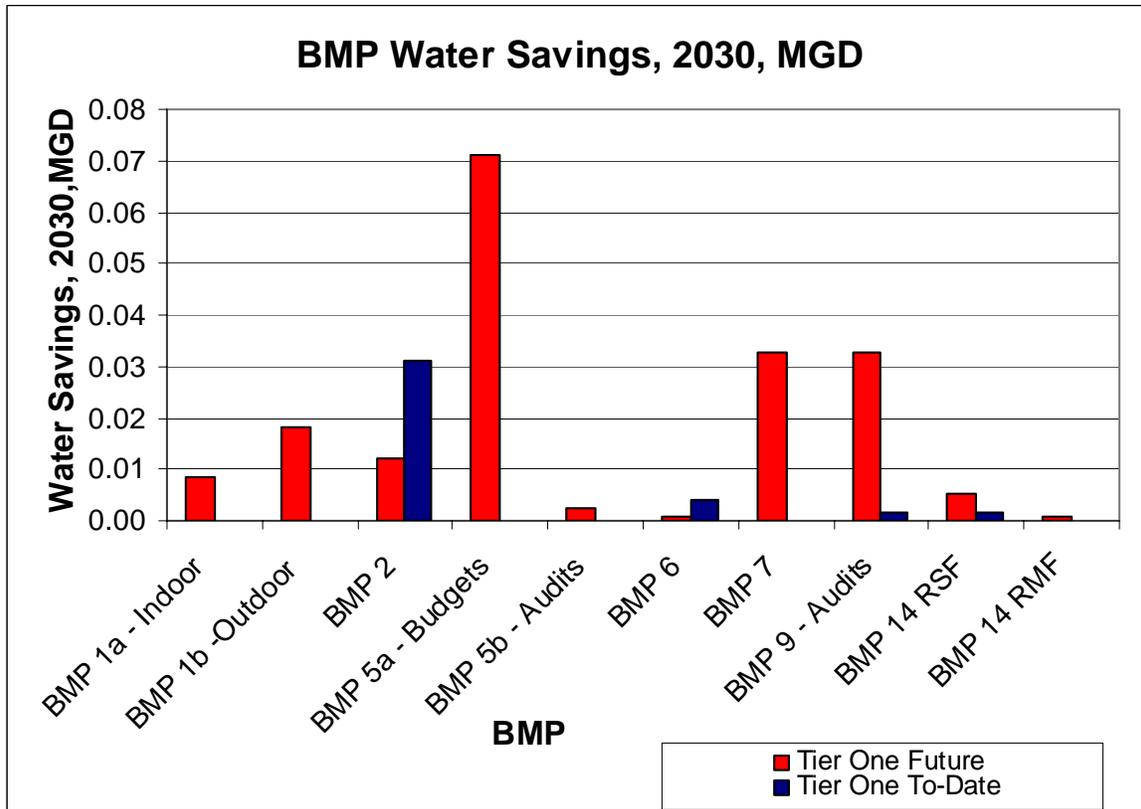
**Table 4**

**Future Tier One Conservation Measure Costs and Savings 2005 to 2030**

Tier One Conservation Measure		Water Utility Benefit-Cost Ratio	Total Community Benefit-Cost Ratio	“30-year” Average Water Savings (MGD)	Cost of Savings per Unit Volume (\$/MG)	First Five Years of Utility Cost (2005-2009)
1	BMP 1a - Residential Water Surveys-Indoor	0.63	1.77	0.0065	\$1,565	\$24,396
2	BMP 1b - Residential Water Surveys-Outdoor	1.28	1.16	0.0133	\$765	\$24,262
3	BMP 2 - Residential Retrofit	3.21	8.02	0.0118	\$323	\$45,756
4	BMP 5a - Landscape Water Budgets	2.63	2.63	0.0538	\$368	\$53,158
5	BMP 5b - Large Landscape Conservation Audits	0.70	0.46	0.0024	\$1,455	\$18,428
6	BMP 6 - Washing Machine Rebate	1.54	0.50	0.0008	\$691	\$6,240
7	BMP 7 - Public Information	1.22	2.68	0.0252	\$875	\$61,879
8	BMP 9 - Commercial Water Audits	0.36	0.24	0.0264	\$2,636	\$234,976
9	BMP 14 - ULF Toilet Rebate- Single Family	4.72	0.51	0.0072	\$228	\$20,000
10	BMP 14 - ULF Toilet Rebate- Multi family	5.98	1.24	0.0009	\$180	\$2,000

Figure 2 is a graphical representation of 2030 BMP water savings for each BMP to-date (through 2004) and future (2005 to 2030). 2030 savings are “individual year” savings and are different from the “30-year average” savings shown in Tables 3 and 4.

**Figure 2**  
**Tier One Conservation Measure Water Savings**



### 3. RESULTS OF TIER ONE CONSERVATION ANALYSIS

#### Descriptions of Programs

For the analysis of conservation, this study divided conservation savings from the Tier One measures (CUWCC BMPs) into two separate parts. The first part is all historical savings to date. The second part is future savings. The name and description of these programs is provided below.

#### Program Tier One to 2004 – Historical Conservation Savings

This program is a consolidation of prior efforts through the year 2004. It includes measures that correspond to your current program. Your base demand projection already reflects these savings, as they are part of your base demand.

#### Program Tier One Future – Future Conservation Savings for Tier One Measures

This program was designed to be the future program with full compliance for “Tier One Measures” including all the CUWCC BMPs. Future includes actual achievements in 2005 and then participation rates starting in 2006 in accordance with those specified in the California Urban Water Conservation Council’s Memorandum Of Understanding, which may be higher (or lower) than you are currently

achieving. If you continue to implement the BMPs as planned, your future demands will be reduced by the amount of savings from Tier One future measures.

These programs are not intended to be rigid programs but rather to demonstrate the range in saving that could be generated if selected measures were run together. In this step we account for the overlap in water savings (and benefits) and estimate combined savings and benefits from programs or packages of measures.

**Figure 3** shows how the Tier One prior efforts and the Tier One savings will change over time. In this representation the individual measures have been combined into overall programs that account for any measure overlap. It is noted that there is a slight decline in the prior Tier One measure savings that are affected by the plumbing codes (affecting toilets, showers, washing machines). This impact primarily affects BMPs 2, 6 and 14.

Tier One To-Date water savings are actually imbedded in the baseline 2004 water use that was arrived at in calibrating the water demand model. Therefore it is not possible to add the two curves in Figure 3. Only Tier One Future water savings should be considered as a way of meeting future water needs by 2030.

**Table 5** presents key evaluation statistics compiled from the DSS model. Assuming all measures are successfully implemented, projected water savings for 2015 and 2030 in acre-feet and million gallons per day (MGD) are shown, as are the costs of achieving this reduction.

The costs are expressed three ways. Total present value over the 30-year period, the money utilities would need to budget in the first five years to get the program underway, and the cost of water saved.

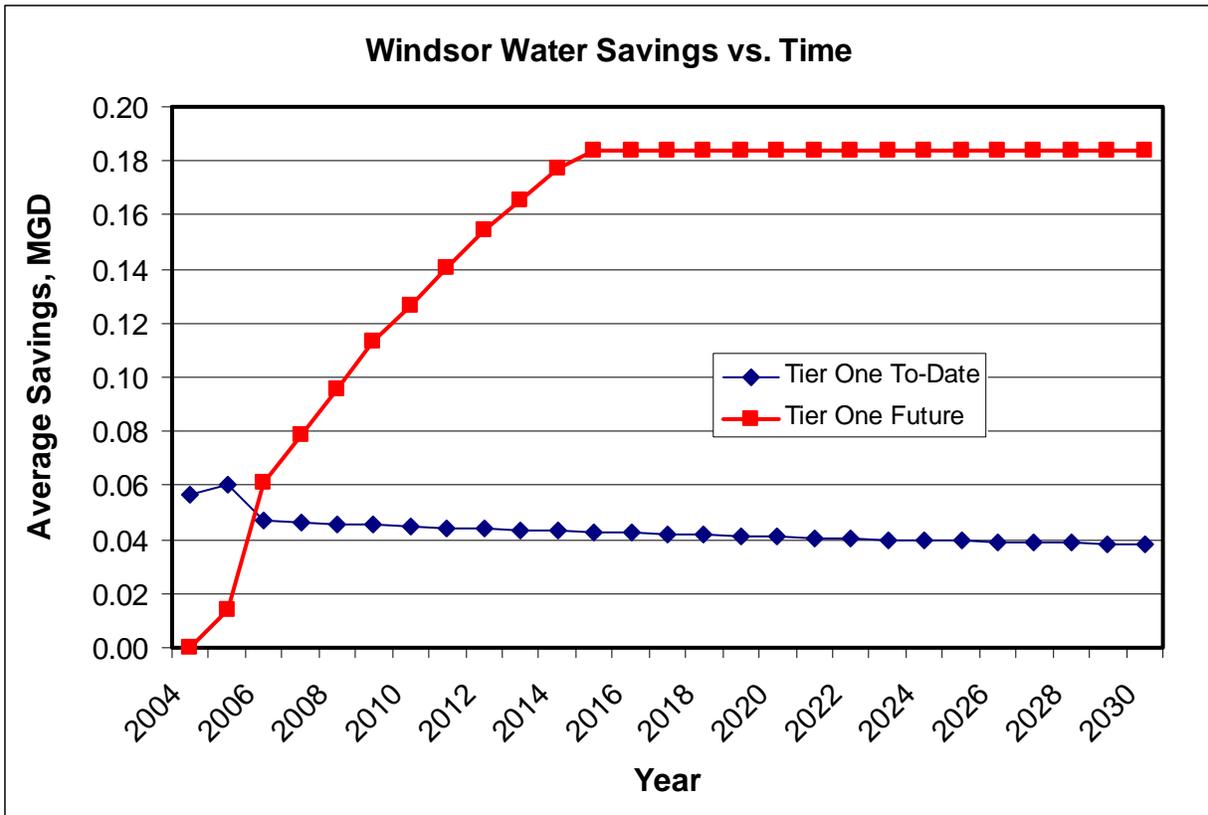
The water savings are expressed as a percentage of the projected 2030 demand. Note that savings from Tier One measures slightly decline from 2015 to 2030 due to the plumbing code. For those Tier One measures that are not permanent and the savings would otherwise erode over time, additional expense is assumed to be planned to maintain the water savings constant.

The last column indicates the percentage of the new water demand for 2030 that each program could fill. In other words the amount of new water needed between 2005 and 2030 is 2.0 MGD (2,264 acre-feet) and Tier One Future could make up 9.1% of that need.

**Figure 4** shows how the marginal returns change as more money is spent to achieve water savings. As the figure shows the cost versus savings curve is starting to decline after the completion of Tier One To-Date. This means that the added cost of going from that program to Tier One Future will save less per unit of expenditure. In other words Tier One Future is slightly less cost-effective as Tier One To-Date. This is confirmed by the lower benefit-cost ratio of Tier One Future relative to Tier One To-Date. Both programs, however, are cost-effective (Benefit-Cost Ratio greater than 1.0).

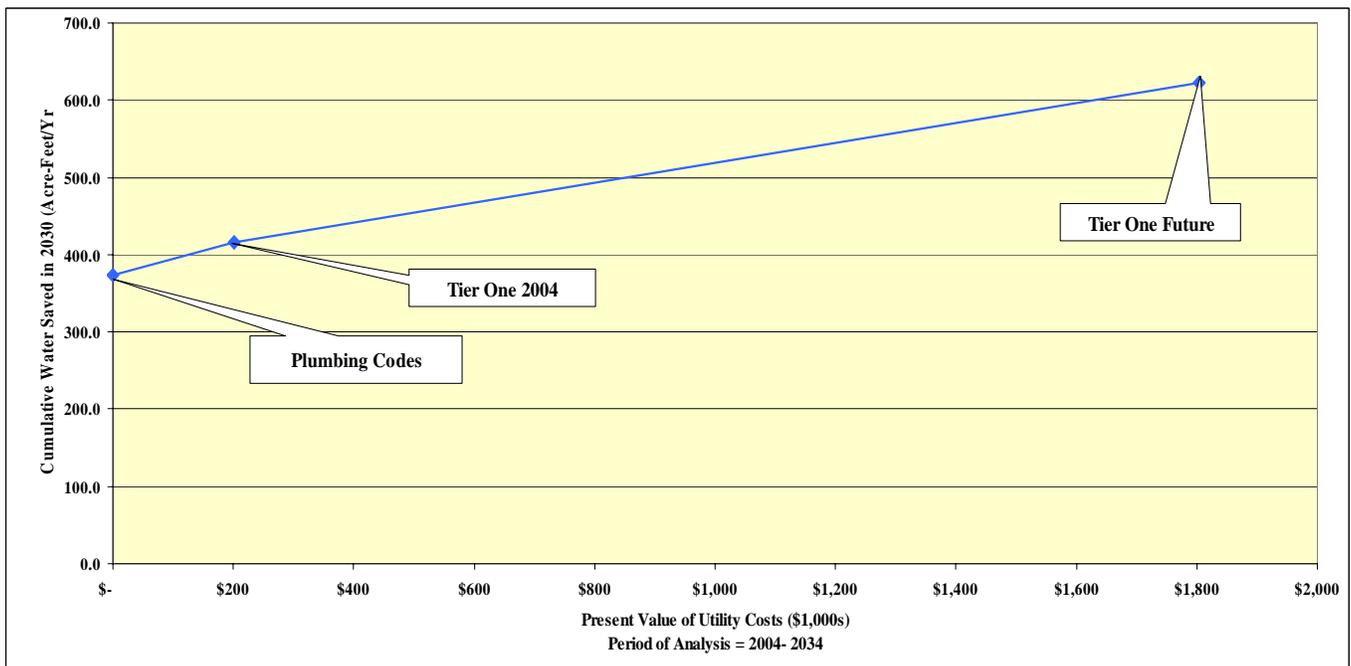
**Figure 3**

**Tier One Conservation Measure Water Savings vs. Time**



**Figure 4**

**Present Value of Utility Cost versus Cumulative Water Saved in 2030**



**Table 5**

**Prior and Future Tier One Conservation Measure Programs - Costs and Savings**

Conservation Program	Water Utility Benefit-Cost Ratio	2015 Water Savings (Acre-Feet/Yr)	2015 Water Savings (MGD)	2030 Water Savings (Acre-Feet/Yr)	2030 Water Savings (MGD)	2030 Indoor Water Savings (MGD)	2030 Outdoor Water Savings (MGD)	Total Water Savings as a % of Total Production in 2030	Present Value of Water Utility Costs (\$1,000s)	First Five Year Total Utility Costs (\$1,000s)	Cost of Water Saved (\$/AF)	% of New Water Needed from 2005 to 2030
Tier One To 2004	2.60	47.8	0.04	43.0	0.04	0.04	0.00	0.60%	\$ 201	\$ 201	\$ 136	NA
Tier One Future	1.04	206.1	0.18	206.1	0.18	0.06	0.12	2.89%	\$ 1,602	\$ 491	\$ 312	9.1%
Totals	1.21	254.0	0.23	249.1	0.22	0.1	0.1	3.49%	\$ 1,804	\$ 692	\$ 282	9.1%

*Notes:*

- Tier One measure savings are included in the baseline demand projections and are presented for information purposes only*
- Present Value is determined using an interest rate of 3%*
- Cost of water saved is present value of water utility cost divided by total 30-year water savings.*
- First Five Year Cost for "Tier One to 2004" is 2004 to 2008*
- First Five Year Cost for "Tier One Future" is 2005 to 2009*

## **4. CONCLUSIONS**

### **Relative Cost-Effectiveness of Programs**

Windsor's service area has relatively high per capita residential water use and a large proportion of outdoor water use. Consequently, residential conservation programs produce significant savings. Water use in the commercial sector is low, offering modest conservation potential.

Overall conclusions are:

- Total savings from Tier One conservation programs would be about 3.5 percent in 2030 (249 AF as shown on Table 5), 0.6 percent of which have already been achieved. In other words continued implementation of Tier One programs will reduce water needs in 2030 by 2.9 percent.
- For Future Tier One measures, about one-third of the conservation potential in 2030 is in reducing indoor use; the rest is outdoor use reduction potential.
- Because of the projected relatively rapid growth rate in new accounts, future Tier One conservation could make up about 9 percent of the total future additional water needed by 2030, with benefit-cost ratio of 1.04 to 1.
- The average cost of water saved over 30-years is lower than the current price of SCWA water. Thus measures that are cost-effective at today's water rates will be more so if SCWA rates rise in the future.

## **NEXT STEPS**

The following steps remain to be completed on evaluating conservation measures:

1. Review and approve, with comments, the Tier One measure evaluation for your agency.
2. Review and approve, with comments, the Tier Two measure evaluation for your agency, sent to you in a separate Technical Memorandum.

## **ATTACHMENTS**

Attachment 1      Assumptions for the Tier One Measures (starting in 2005) Evaluated in the DSS Model

**Attachment 1**  
**Assumptions for Tier One Measures (starting in 2005) Evaluated in the DSS Model**

	<b>BMP 1a Residential Audits</b>	<b>BMP 1a Residential Audits</b>	<b>BMP 1b Residential Audits</b>	<b>BMP 1b Residential Audits</b>	<b>BMP 2 Plumbing Retrofits</b>
Account Category	RSF	RMF	RSF	RMF	RSF / RMF
Affected End Uses	Internal	Internal	External	External	Toilets, Faucets, Showers
Percent Reduction in Water Use	5%	5%	10%	10%	5%/5%/21%
CUWCC MOU Sign-on Year	1999	1999	1999	1999	1999
Evaluation Start Year	2004	2004	2004	2004	2004
Required Interventions Starting in 2005 (Accounts)	935	9	935	9	1309/11
Market Penetration by End Of Program,%	15	15	15	15	75
Measure Life (years)	7	7	7	7	Permanent
Initial Cost	\$ -	\$ -	\$ -	\$ -	\$ -
Utility Unit Cost, per site one time cost	\$ 40.00	\$ 80.00	\$ 40.00	\$ 50.00	\$ 30.00
Customer Unit Cost to achieve savings	\$ 10.00	\$ 30.00	\$ 5.00	\$ 20.00	\$ 0
Administration Cost, percent of unit cost	25%	25%	25%	25%	10%
Affected Units	dwelling unit	dwelling unit	dwelling unit	dwelling unit	1992 and older dwelling units
Comments					

**Notes:**

RSF = Residential Single Family  
RMF = Residential Multi Family  
BUS/COM= Commercial  
IND = Industrial  
IRR = Dedicated irrigation meters  
INS = Institutional/Public, buildings / grounds owned by the Water Utility or City  
NRSF = New Single Family Homes  
GOV = Government

**Attachment 1**  
**Assumptions for Tier One Measures (starting in 2005) Evaluated in the DSS Model**

	<b>BMP 5a Water Budgets</b>	<b>BMP 5b Water Audits</b>	<b>BMP 6 Washer Rebates</b>	<b>BMP 7 Public Education</b>	<b>BMP 9 CII Audits</b>	<b>BMP 14 Toilet Rebates</b>
Account Category	IRR	COM/INS	RSF	RSF/RMF	COM/INS	RSF/RMF
Affected End Uses	Irrigation	Irrigation	Laundry	All	All	Internal
Percent Reduction in Water Use	15%	15%	34%	1%	12%	60%
CUWCC MOU Sign-on Year	1999	1999	1999	1999	1999	1999
Evaluation Start Year	2004	2004	2004	2004	2004	2004
Required Interventions Starting in 2005 (Accounts)	289	48	0	0	6,321	361/5
Market Penetration by End Of Program, %	90	15	4.8	100	10	Match resale rate
Measure Life (years)	10	10	Permanent	2	Permanent	Permanent
Initial Cost	\$ -	\$ -	\$ -	\$ -	\$ -	NA
Utility Unit Cost, per site one time cost	\$ 400.00	\$ 1,500.00	\$ 75.00	\$ 2.50	\$ 4,000.00	\$50
Customer Unit Cost to achieve savings	\$ -	\$ 1,000.00	\$ 200.00	\$ -	\$ 2,000.00	\$75
Administration Cost, percent of unit cost	15%	30%	30%	25%	50%	included
Affected Units	Irrigation accounts	large landscape accounts	per dwelling unit	per dwelling unit	CII accounts	per toilet
Comments			BMP 6 complete			Complete in 2008

**Notes:**

RSF = Residential Single Family  
 RMF = Residential Multi Family  
 BUS/COM= Commercial  
 IND = Industrial  
 IRR = Dedicated irrigation meters  
 INS = Institutional/Public, buildings / grounds owned by the Water Utility or City  
 NRSF = New Single Family Homes  
 GOV = Government





## MEMORANDUM

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Date: November 2, 2006

To: Craig Scott, Town of Windsor

From: William Maddaus, Maddaus Water Management

Subject: *FINAL Tier Two and New Development Conservation Measure Evaluation Summary of Data Inputs, Assumptions and Results*

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### INTRODUCTION AND PURPOSE

This final memorandum on the conservation evaluation process for your agency has been revised to better reflect the true avoided costs and benefits of saving water. The analysis has been changed by using a future cost of water from the Sonoma County Water Agency plus a value that represents the approximate cost of distributing this water to your customers. All other measure costs and water savings for Tier Two and New Development measures remain unchanged from the Draft memorandum.

The purpose of this memorandum is to present an overview of the conservation evaluation process which has been completed for your agency. The evaluation was performed on the Tier Two measures and New Development potential measures to make new single family homes more water efficient. The conservation measures were analyzed using the Least Cost Planning Decision Support System (DSS) Model. These conservation measures were then organized into three programs showing benefits, costs, and water savings for Tier One plus Tier Two measures, Tier One plus New Development measures, and finally Tier One plus Tier Two plus New Development measures for your agency. Each of these programs will be discussed in detail in this memorandum.

### CONTENTS

This technical memorandum provides a general overview for the methodology, assumptions, and results for the conservation analysis.

The following four pieces of information are included in this packet:

1. Overview of Evaluation Process
2. Comparison of Individual Conservation Measures
3. Results of Tier Two and New Development Conservation Analysis
4. Conclusions

Each of these will be discussed in individual sections below.

## 1. OVERVIEW OF EVALUATION PROCESS

### Selecting Conservation Measures to be Evaluated (Conservation Measure Screening):

A list of 75 potential conservation measures considered appropriate for this region was developed by Maddaus Water Management from known technology that included devices or programs (e.g., such as a new dual flush toilet) that would save water if installed by a water retailer, contractor, or customer. These measures are considered to be beyond the Tier One measures. A description of the potential conservation measure was developed that addressed the methods through which the device or program will be implemented, including the distribution method, or mechanism, that would be used to activate the device or program.

A screening process was undertaken to reduce the number of measures to a more manageable number and to eliminate those measures that are not as well suited to the Marin-Sonoma County area as other potential measures. Each potential measure was screened based on four qualitative criteria (below), scored on a scale of 1 to 5, with 5 being the most acceptable, and 20 being the maximum possible number of points for all criteria. The screening was completed by local conservation professionals, in a one day meeting in July 2005, facilitated by Maddaus Water Management.

#### Qualitative Criteria

The rating group used the following criteria to evaluate the measures:

- **Technology/Market Maturity** – Refers to whether the technology needed to implement the conservation measure, such as an irrigation control device, is commercially available and supported by the local service industry. A measure was scored low if the technology was not commercially available or high if the technology was widely available in the service area. A device may be screened out if it is not yet commercially available in the region.
- **Service Area Match** – Refers to whether the measure or related technology is appropriate for the area's climate, building stock, or lifestyle. For example, promoting Xeriscape gardens for multi-family or commercial sites may not be appropriate where water use analysis indicates little outdoor irrigation. Thus, a measure scored low in this category if it was not well suited for the area's characteristics and could not save water. A measure scored high in this criterion if it was well suited for the area and could save water.
- **Customer Acceptance/Equity** – Refers to whether retail customers within the wholesale customer service area would be willing to implement and accept the conservation measures. For example, would retail customers attend homeowner irrigation classes and implement lessons learned from these classes? If not, then the water savings associated with this measure would not be achieved and a measure with this characteristic would score low for this criterion. This criterion also refers to retail customer equitability (i.e., one category of retail customers receives benefit while another pays the costs without receiving benefits). Retail customer acceptance may be also based on convenience, economics, perceived fairness, or aesthetics.
- **Relative Effectiveness of Measure Available** – Refers to the selection of the most effective measure if alternate conservation measures address the same end use. If the

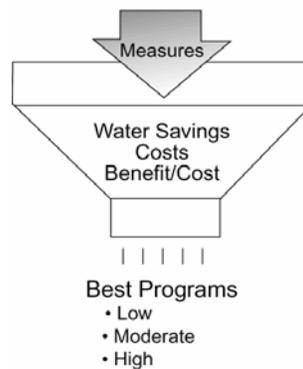
measures are equally effective the most appropriate was selected (e.g., the measure that was easier or less expensive to implement).

Measures with low scores were eliminated from further consideration, while those with high scores passed into the next evaluation phase (cost-effectiveness analysis using the DSS Model). To reduce the list to a more manageable number, normally a score of 17 or more was necessary to pass. The process reduced the measures to be evaluated further down to 22 new measures in addition to the 10 Tier One measures. Table 4 lists all 32 measures evaluated in the DSS Model.

## Evaluation Process

During the evaluation process, water savings were estimated and costs for the measures were developed. Benefits and costs were compared in a formal present value analysis and conclusions were drawn about which measures produce cost-effective water savings. This process can be thought of as an economic screening process, shown in Figure 1. Packaging the best measures into alternative programs is how we are helping you to consider what level of conservation is appropriate for your agency.

**Figure 1**  
**Evaluation Process**



Benefit-cost analysis has been used by many water agencies to evaluate and help select a water conservation measure best suited to local conditions. This analysis requires a locale-specific set of data, such as historical water consumption patterns by customer class, population and employment projections, age of housing stock, and prior conservation efforts.

The following nine steps were used to implement the methodology by expanding upon the same DSS model used to prepare the demand projections.

1. *Develop baseline water use projections without additional conservation.* Projections cover each key customer category and are broken down into indoor end uses and outdoor end uses. These were presented in previous memoranda. Note, the plumbing code refers to savings from the Energy Act; it is not the same as savings from BMP conservation.
2. *Identify possible water conservation measures* and screen the measures qualitatively to identify those that are applicable to the service area. Develop appropriate unit water savings and cost factors for each measure.
3. *Estimate the affected customers (or number of accounts) for each conservation measure* by dividing the measure's projected *customers* (or accounts) that implements the measure

by the total service area customers (accounts). This factor is called the market penetration or installation rate.

4. *Estimate total annual average and peak day water savings.* The water savings are computed by multiplying unit water savings, per measure, by the market penetration or installation rate, and then multiplying by the number of units in a particular service area (such as dwelling units) targeted by a particular measure.
5. *Identify benefits to the water agency* including potential reduced water purchases (SCWA wholesale water rate and distribution cost for each agency).
6. *Quantify total benefits for each year* in the planning period by multiplying average water savings for each measure by the computed value of the benefits.
7. *Determine initial and annual costs to implement the measures* based upon pilot projects, local experience, and the costs of goods, services, and labor in the community. This is multiplied by the number of units participating each year and then added to overall administration and promotion costs to arrive at a total measure cost, which may be spread over a number of years.
8. *Compare benefits and costs of measures* by computing the present value of costs and benefits over the planning period.
9. *Compile and compare packages containing various new measures.*

## **2. COMPARISON OF INDIVIDUAL CONSERVATION MEASURES**

### **Perspectives on Benefits and Costs**

The determination of the economic feasibility of water conservation programs depends on comparing the costs of the programs to the benefits provided. The analysis was performed using the DSS model. The DSS model calculates savings at the end-use level; for example, the model determines the amount of water a toilet rebate program saves in daily toilet use for each single family account. For this evaluation, benefits are based on reduced water purchases from SCWA at the forecasted 2020 Santa Rosa Aqueduct rate of \$565.17 per acre-foot<sup>1</sup> plus a value of \$437.09 per acre-foot<sup>2</sup> to represent water distribution costs (\$3,077 per million gallons total avoided cost).

Present value analysis is used to discount costs and benefits to the base year. From this analysis benefit-cost ratios of each measure are computed. When measures are put together in programs the interactions are accounted for by multiplying water use reduction factors together at the end use level. A water use reduction factor is 1.0 minus the water savings, expressed as a decimal. This avoids double counting when more than one measure acts to reduce the same end use of water.

Benefit-cost analysis can be performed from several different perspectives, based on who is affected. For planning water conservation programs for utilities, the perspectives most commonly used for benefit-cost analyses include the utility and the community. The "utility" benefit-cost analysis is based on the benefits and costs to the water provider. The "community" benefit-cost analysis includes the utility benefit and costs together with account owner/customer

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<sup>1</sup> SCWA Future Water Supply Projects Financial Plan, 2004

<sup>2</sup> Appendix J, City of Petaluma Water Supply and Demand Analysis Report, Dodson Engineers, June 2006.

benefits and costs. These include customer energy benefits and costs of implementing the measure, beyond what the utility pays.

The utility perspective offers two advantages for this analysis. First, it considers only the program costs that will be directly borne by the utility. This enables the utility to fairly compare potential investments for saving and supplying water. Second, because revenue shifts are treated as transfer payments, the analysis is not complicated with uncertainties associated with long-term rate projections and retail rate design assumptions. Because it is the water provider's role in developing a conservation plan that is paramount in this study, the utility perspective was primarily used to evaluate elements of the plan.

No evaluation perspectives are without shortcomings. The principal weakness of the utility perspective is that it does not count the benefits accrued or costs incurred outside of the utility. Therefore another perspective is also used – the community perspective. The community perspective is defined to include the utility costs and benefits and the customer costs and benefits. Costs incurred by customers striving to save water while participating in conservation programs are considered, as well as the benefits received in terms of reduced energy bills (from water heating costs). Other factors external to the utility, such as environmental effects, are not included in the benefit-cost analysis. Because these external factors are often difficult to quantify, they are frequently excluded from economic analyses, including this one.

### **Present Value Parameters**

The time value of money is explicitly considered. The value of all future costs and benefits is discounted to 2004 (the base year) at the real interest rate of 3.0%. The DSS model calculates this real interest rate, adjusting the current nominal interest rate (assumed to be approximately 6.1%) by the assumed rate of inflation (3.0%). Cash flows discounted in this manner are herein referred to as "Present Value" sums.

### **Assumptions about Costs**

Costs were determined for each of the measures based on industry knowledge and past experience. Costs may include incentive costs, usually determined on a per-participant basis; fixed costs, such as marketing; variable costs, such as the costs to staff the measures and to obtain and maintain equipment; and a one-time set-up cost. The set-up cost is for measure design by staff or consultants, any required pilot testing, and preparation of materials that will be used in marketing the measure. Measure costs were estimated for each year between 2005 and 2030. Costs were spread over the time period depending on the length of the implementation period for the measure.

Lost revenue due to reduced water sales is not included as a cost because the conservation measures evaluated herein generally take effect over a span of time that is sufficient to enable timely rate adjustments, if necessary, to meet fixed cost obligations.

### **Water Savings**

Data necessary to forecast water savings of measures include specific data on water use, demographics, market penetration, and unit water savings. Savings normally develop at a measured and predetermined pace, reaching full maturity after full market penetration is achieved. This may occur three to ten years after the start of implementation, depending upon the implementation schedule.

## Conservation Measures Evaluated with the DSS Model

Upon inspection of the overall list of new measures it became apparent that some measures could be combined and others could be separated into two categories as follows:

- Measures that were voluntary and incentive based
- Measures that were regulatory and applied to new development only

This division was used to create two lists of measures that could be evaluated separately. Tier Two targets various types of customers and offers a range of incentives to enhance participation. New Development measures were targeted at single family homes (including town homes and condos), as this category represents the largest category of new development with the most water savings potential.

**Table 1** is a table summarizing the 13 Tier Two measures, and 8 New Development measures evaluated in the DSS Model.

**Table 1**  
**Tier Two and New Development Conservation Measures Evaluated in the DSS Model**

Measure Number	Target Customer Category	Measure	Short Description
<b>T2 - 1</b>	Existing Customers SF	Rain-sensor (shut off device) retrofit on irrigation controllers	Agency pays for the rain sensor, homeowner pays for the optional installation (\$35).
<b>T2 - 2</b>	Existing Customers SF, MF, CII	Cash for Grass (turf removal program)	Provide a rebate for customers who remove irrigated turf grass and replace it with low water using plants. The rebate would require that an appropriate irrigation system be installed for the replacement landscaping. Limited to \$500 rebate at \$1.00 per square foot.
<b>T2 - 3</b>	All Dedicated Irrigation Meter customers, IRR	Financial Incentives for Being Below Water Budget	For dedicated irrigation customers, link a landscape water budget to a retail water agency's rate schedule so that the dedicated irrigation meter customer pays less when their water use is at or under their water budget.
<b>T2 - 4</b>	Existing CII Customers with mixed water use (indoor and outdoor)	Financial Rebates for Irrigation Meters	Provide financial incentives/rebates for selected permits and equipment to convert mixed use meters to a separate dedicated irrigation meter. Model implementation program after City of Santa Rosa's Service Split program. Utility will provide a water budget for the new irrigation meter.
<b>T2 - 5</b>	Existing Customers SF, MF, CII, IRR	Smart Irrigation Controller Rebates	Provide an up to \$450 rebate for the purchase of a SMART irrigation controller and associated signal fees (up to \$150). Assume one controller for SF and two for all other customer categories. Minimum participant requirements: at least 500 sq ft of well maintained turf irrigated with an automatic irrigation control system.

<b>T2 - 6</b>	Existing Customers MF, CII, IRR	Financial Incentives/ Rebates for Irrigation Upgrades	For MF, CII, and IRR customers with landscape, provide rebates for selected types of irrigation equipment upgrade including rain sensors. Model program after water agencies such as EBMUD or Contra Costa Water District.
<b>T2 - 7</b>	Existing Customers: CII	Hotel retrofit (w/financial assistance) - CII Existing	Following a free water audit, offer the hotel a rebate for equipment identified that would save water. Provide a rebate schedule for certain efficient equipment such as air-cooled ice machines, steamers, washers, cooling towers, and spray rinse valves.
<b>T2 - 8</b>	New Customers: CII	Offer new accounts reduced connection fees for installing efficient process equipment for selected businesses (restaurants, laundry mat, food/groceries and hospital)	Offer reduced water and sewer connection fees to new facilities to install water efficient equipment in new facilities that goes above and beyond the building code requirements. Model program after Santa Rosa's BAT program.
<b>T2 - 9</b>	Existing Customers: SF (North Marin only) , IRR	Synthetic Turf Rebate	Provide a rebate for replacing existing turf with synthetic turf. Market program to all irrigation customers (and single family for North Marin only).
<b>T2 - 10</b>	Existing Customers: SF & MF	High Efficiency Toilet (HET)	Provide a rebate or voucher for the installation of a high efficiency toilet (HET). HET are defined as any toilet to flush 20% less than an ULFT and include dual flush technology. Rebate amounts would reflect the incremental purchase cost.
<b>T2 - 11</b>	Existing Customers: SF	Dishwasher New Efficient	Provide a rebate to encourage homeowners to replace old inefficient dishwashers with new efficient dishwashers (meeting certain water efficiency standards, such as gallons/load).
<b>T2 - 12</b>	Existing Customers: CII	CII Rebates - replace inefficient water using equipment	Provide a rebate for a standard list of water efficient equipment. Included would be x-ray machines, icemakers, air-cooled ice machines, steamers, washers, spray valves, efficient dishwashers, replace once through cooling, add conductivity meters on cooling towers, etc.
<b>T2 - 13</b>	New Customers: CII	0.5 gal/flush urinals in new buildings	Require that new building be fitted with 0.5 gpf urinals rather than the current standard of 1.0-gal/flush models.
<b>ND1</b>	New Customers: SF	Rain-sensor shut off device on irrigation controllers	Require-sensor or rain shut off devices with all new automatic irrigation system installations on new homes.
<b>ND2</b>	New Customers: SF	Smart Irrigation Controller	Require developers to provide the latest state of the art SMART irrigation controllers. These SMART controllers have on-site temperature sensors or rely on a signal from

			a central weather station that modifies irrigation times at least weekly.
<b>ND3</b>	New Customers: SF	High Efficiency Toilet (HET)	Require developers to install a high efficiency toilet (HET). HET are defined as any toilet to flush 20% less than an ULFT and include dual flush technology.
<b>ND4</b>	New Customers: SF	Dishwasher New Efficient	Require developers to install an efficient dishwasher (meeting certain water efficiency standards, such as gallons/load).
<b>ND5</b>	New Customers: SF	Clothes washing machines requirement for new residential	Building departments would be responsible to ensure that an efficient washer was installed before new home occupancy.
<b>ND6</b>	New Customers: SF	Hot Water on Demand	Require developers to equip new homes with a hot water on demand system or tankless hot water heaters, such as those made by Metland Systems and others. These systems use a pump placed under the sink to recycle water sitting in the hot water pipes to the water heater.
<b>ND7</b>	New Customers: SF	High efficiency faucets and showerheads	Require developers to install lavatory faucets that flow at no more than 1.5 gpm, kitchen faucets at 2.2 gpm, and showerheads at 2.0 gpm.
<b>ND8</b>	New Customers: SF	Landscape and irrigation requirements	Enforce a regulation that specifies that homes be landscaped according to Xeriscape principals, with appropriate irrigation systems. (Combines with Smart Controller listed above). Goal is overall 25% in irrigation water use.

Notes: ND = New Development  
T2 = Tier Two  
SF = Residential Single Family  
MF = Residential Multi Family  
CII = Commercial/Industrial/Institutional  
IRR = Dedicated irrigation meters

### Measure Assumptions, Unit Costs, Market Penetration

**Attachment 1** summarizes all the water savings and cost assumptions for each measure for your agency. Do note that the unit costs vary according to the type of account being addressed. For example, a measure might cost a different amount for a residential single family account, than a residential multi family account.

### Comparison of Individual Measures

**Tables 2 and 3** are tables summarizing the evaluation of Tier Two and New Development conservation measures for your agency. **Table 2** presents results for Tier Two and **Table 3** presents results of New Development measures going forward from 2007.

These tables show how much water the measures would save on a 30-year average basis, how much they would cost and what the benefit-cost ratios are *if the measures were run on a stand-alone basis, i.e. without interaction or overlap from other measures that might address the same end use(s)*. Note that measures with benefit-cost ratios less than 1.0 are defined to be “not cost-

effective”. Water savings shown are averaged over the 30-year analysis period and may be higher or lower in a particular year. Other key statistics are the cost of water saved in dollars per million gallons (\$/MG), and the benefit-cost ratios. Benefits and costs are defined below:

- *Utility benefits and costs:* those benefits and costs that the utility would receive or spend.
- *Community benefits and costs:* community benefits equal utility benefits plus customer energy (cost to heat water) benefits. Community costs include utility and customer costs.
- *Water Benefits:* based on the 2020 cost of SCWA water to the agency plus distribution costs.
- *Costs for the utility:* include measure set-up, annual administration, and payment of rebates or purchase of devices or services as specified in the measure design.
- *Customer costs:* include costs of implementing the measure and maintaining its effectiveness over the life of the measure.

NOTE: Individual measure water savings are not additive in **Tables 2 and 3** due to measure overlap.

The column headings in **Tables 2 and 3** are defined as follows:

- *Water Utility Benefit-Cost Ratio = NPV of Utility of Benefits (based on reduced purchase of water from SCWA and distribution costs) divided by NPV of Utility Costs (see above)*
- *Total Community Benefit-Cost Ratio = NPV of Utility Benefits plus Customer Benefits (see above) divided by NPV of Utility plus Customer Costs (see above) where NPV = 30 year present value of annual costs discounted at 3 percent*
- *30-year Average Water Savings (MGD) = sum of annual average water savings (MGD) divided by 30 where MGD = million gallons per day*
- *Cost of Savings per Unit Volume (\$/MG) = NPV of Utility Costs divided by 30-year Average Water Savings \* 365 where MG = million gallons*
- *Five Years of Utility Costs (2007-2011) = sum of annual costs for period shown, undiscounted*

From **Tables 2 and 3** the following observations can be made:

- The most cost-effective Tier Two measure is the Financial Incentives for Being Below Water Budget, from the Utility perspective.
- For Tier Two conservation the synthetic turf and new efficient dishwasher measures have a low benefit-cost ratios (which is less than one), indicating they are not cost-effective measures.
- The most cost-effective New Development measure is the Smart Irrigation Controller for new residential, from the Utility perspective.
- All eight of the New Development measures are cost effective from the Utility perspective.
- Nine out of 13 Tier Two measures are cost effective from the Utility perspective.

- Five of the Tier Two measures and two of the New Development measures are cost effective from the community perspective, indicating that all other measures have relatively high customer costs.

**Table 2**  
**Tier Two Conservation Measure Costs and Savings**

<b>Conservation Measure</b>		<b>Water Utility Benefit-Cost Ratio</b>	<b>Total Community Benefit-Cost Ratio</b>	<b>“30-year” Average Water Savings (MGD)</b>	<b>Cost of Savings per Unit Volume (\$/MG)</b>	<b>Five Years of Utility Cost 2007-2011</b>
T2-1	Rain-sensor (shut off device) retrofit on irrigation controllers	4.30	1.79	0.0092	\$423.40	\$16,714
T2-2	Cash for Grass (turf removal program)	1.16	0.65	0.0027	\$1,590.92	\$45,294
T2-3	Financial Incentives for Being Below Water Budget	50.62	0.39	0.0716	\$32.86	\$0
T2-4	Financial Rebates for Irrigation Meters	3.67	2.04	0.0006	\$502.82	\$3,100
T2-5a	Smart Irrigation Controller Rebates	0.49	0.42	0.0061	\$3,498.01	\$49,825
T2-5b	Smart Irrigation Controller Rebates	1.84	1.70	0.0217	\$930.96	\$50,418
T2-6	Financial Incentives/ Rebates for Irrigation Upgrades	3.48	1.93	0.0105	\$490.56	\$16,479
T2-7	Hotel retrofit (w/financial assistance) - CII Existing	2.10	0.81	0.0016	\$814.90	\$4,204
T2-8	Offer new accounts reduced connection fees for installing efficient process equipment for selected businesses (restaurants, laundry mat, food/groceries and hospital)	9.67	1.07	0.0254	\$173.85	\$8,069
T2-9	Synthetic Turf Rebate	0.13	0.07	0.0042	\$12,896.45	\$174,561
T2-10	High Efficiency Toilet (HET)	0.74	0.42	0.0235	\$2,441.56	\$322,017
T2-11	Dishwasher New Efficient	0.13	0.02	0.0006	\$13,332.84	\$41,786
T2-12	CII Rebates - replace inefficient water using equipment	0.81	0.32	0.0016	\$2,105.14	\$10,930
T2-13	0.5 gal/flush urinals in new buildings	3.46	0.38	0.0029	\$493.42	\$2,602

**Table 3**  
**New Development Conservation Measure Costs and Savings**

Conservation Measure		Water Utility Benefit-Cost Ratio	Total Community Benefit-Cost Ratio	“30-year” Average Water Savings (MGD)	Cost of Savings per Unit Volume (\$/MG)	Five Years of Utility Cost 2007-2011
ND1	Rain-sensor shut off device on irrigation controllers	14.32	2.86	0.0164	\$119.80	\$8,801
ND2	Smart Irrigation Controller	23.86	0.64	0.0274	\$71.88	\$8,801
ND3	High Efficiency Toilet (HET)	9.21	0.40	0.0229	\$188.70	\$19,361
ND4	Dishwasher New Efficient	1.03	0.03	0.0012	\$1,670.07	\$8,801
ND5	Clothes washing machines requirement for new residential	20.45	0.55	0.0231	\$85.17	\$8,801
ND6	Hot Water on Demand	15.82	0.71	0.0181	\$108.59	\$8,801
ND7	High efficiency faucets and showerheads	9.61	6.02	0.0110	\$179.10	\$8,801
ND8	Landscape and irrigation requirements	15.91	0.07	0.0183	\$107.82	\$8,801

**Figures 2 to 5** are graphical representations of Tier Two and New Development water savings and costs for each measure in the future (2005 to 2030). Water savings are “individual year” savings and are different from the “30-year average” savings shown in **Tables 2 and 3**.

Important Note on Figures 2 and 3. Total water savings shown on **Figures 2 and 3** are approximate and slightly higher than will occur if all measures are run together as a program. This is due to multiple measures addressing the same end uses. Program savings (which account for the overlap) are provided in Section 3.

### TIER 2 CONSERVATION WATER SAVINGS ESTIMATES - MEASURE 1 to 13

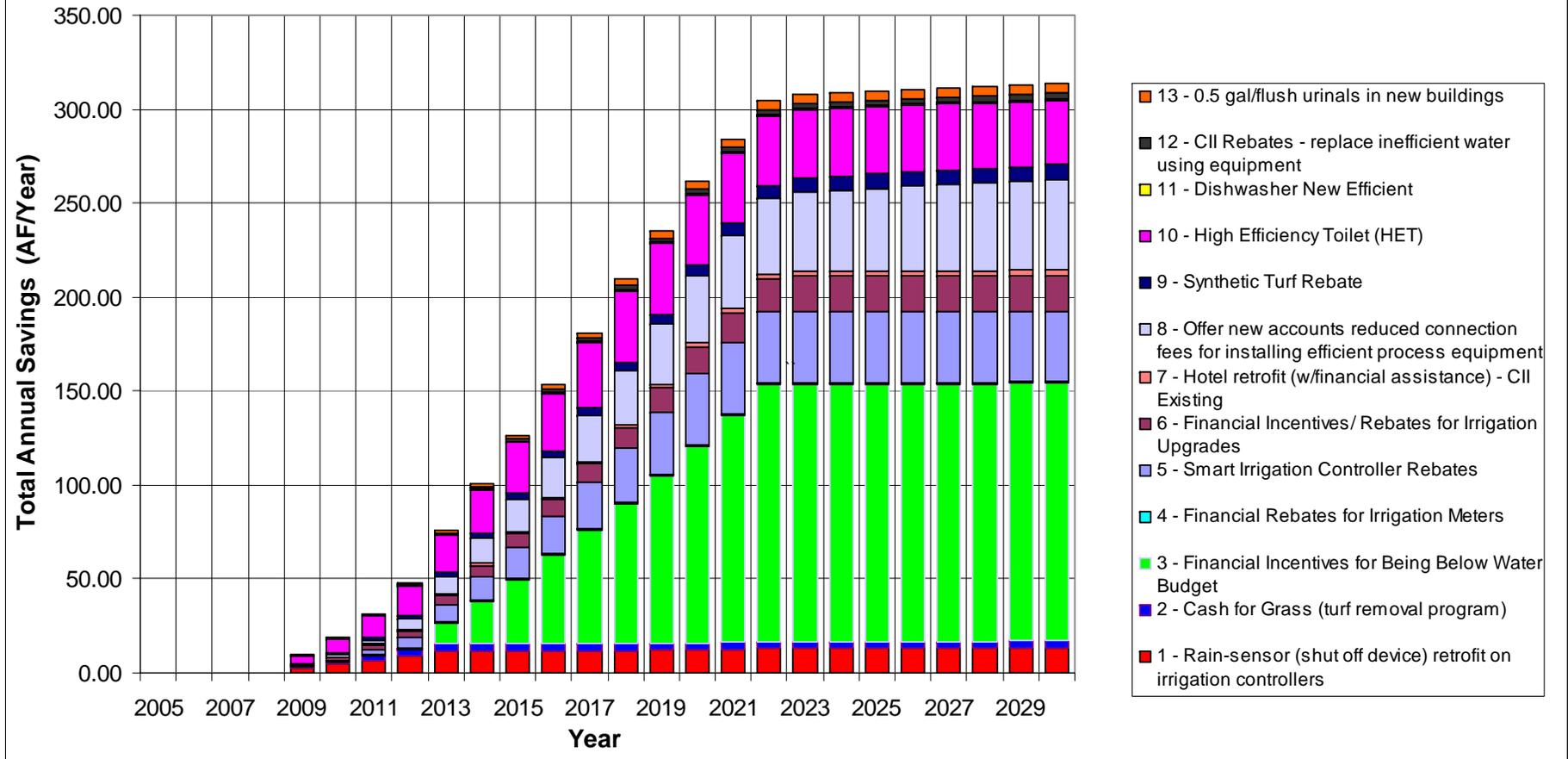
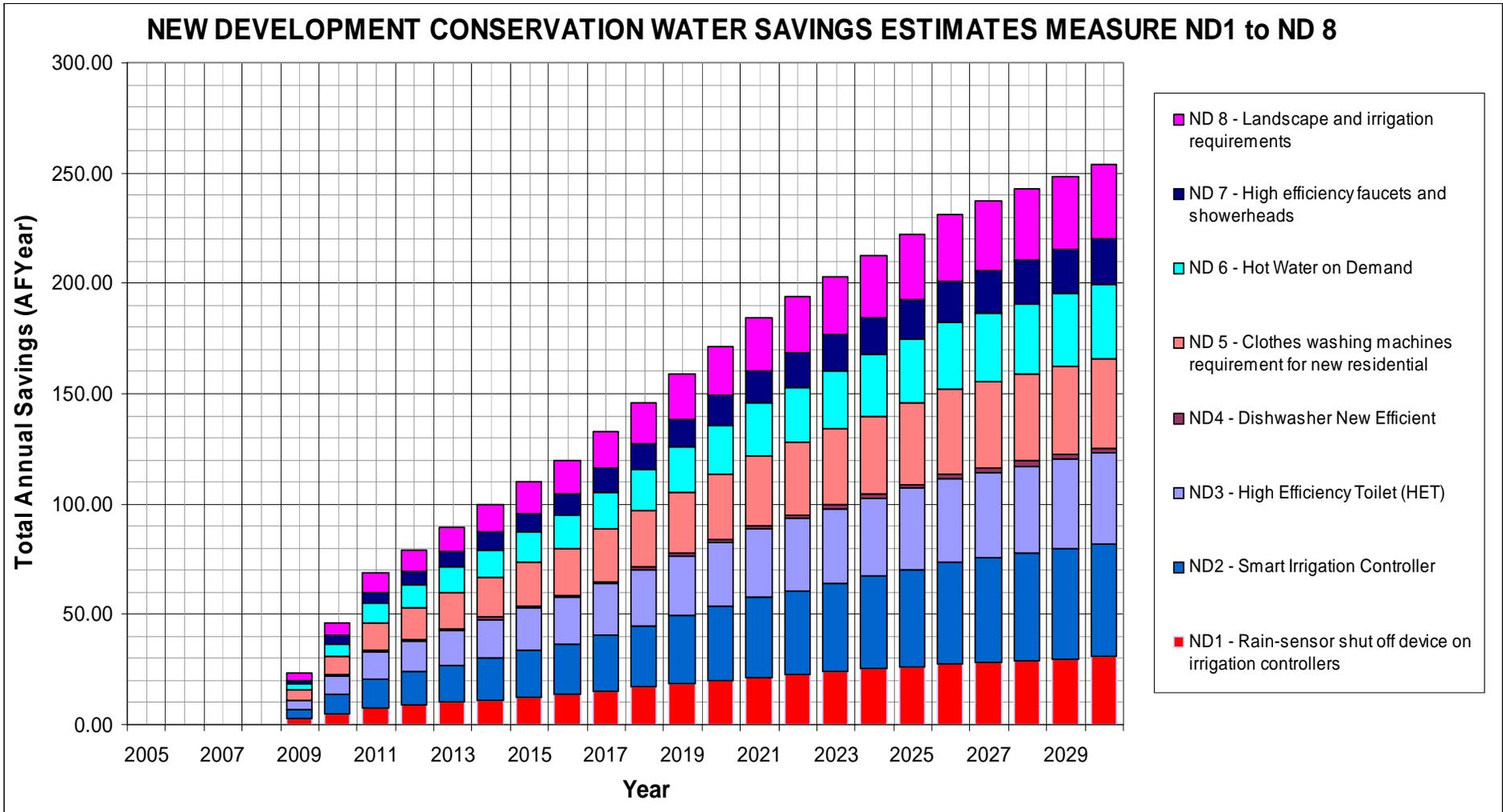
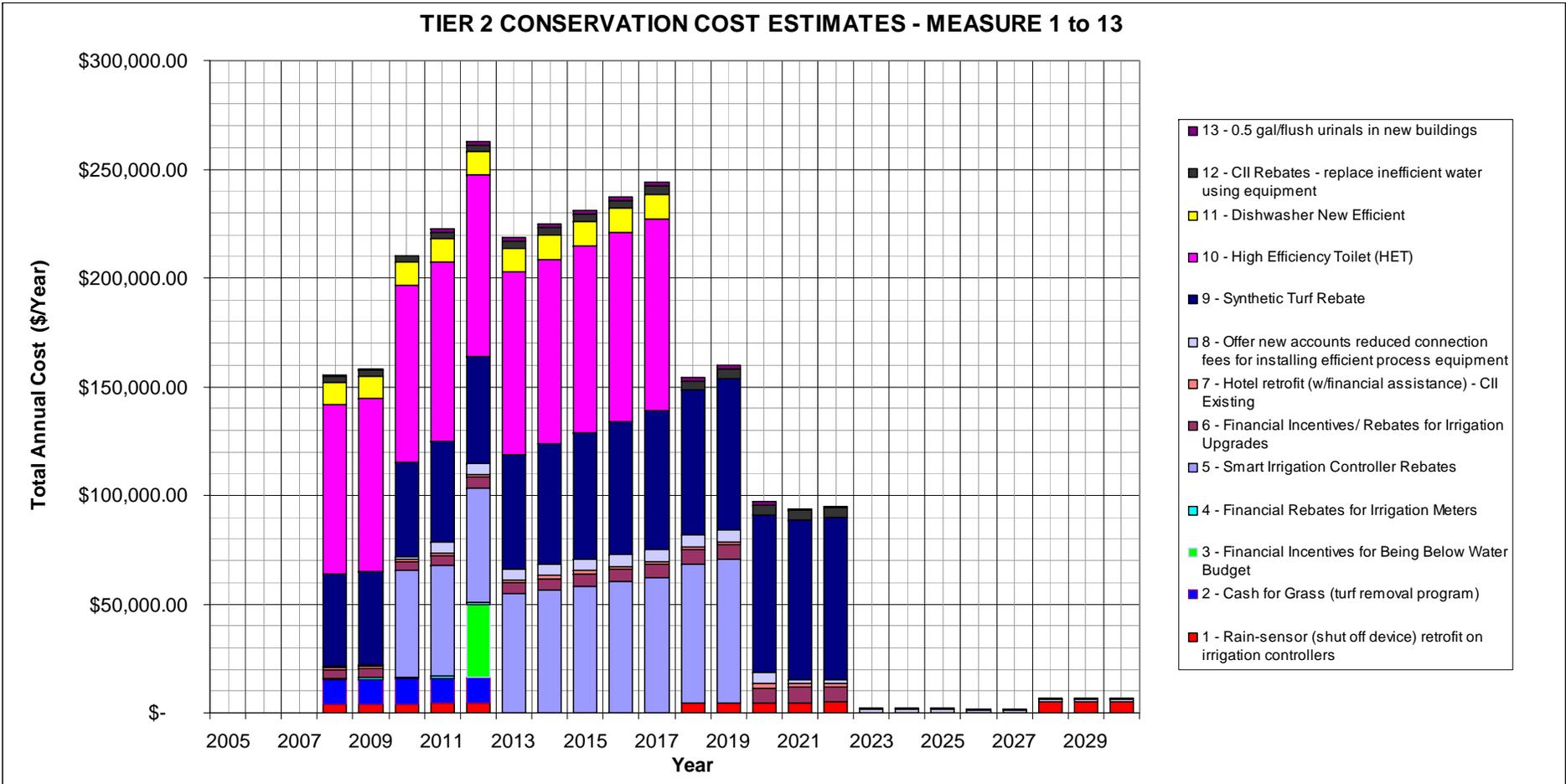


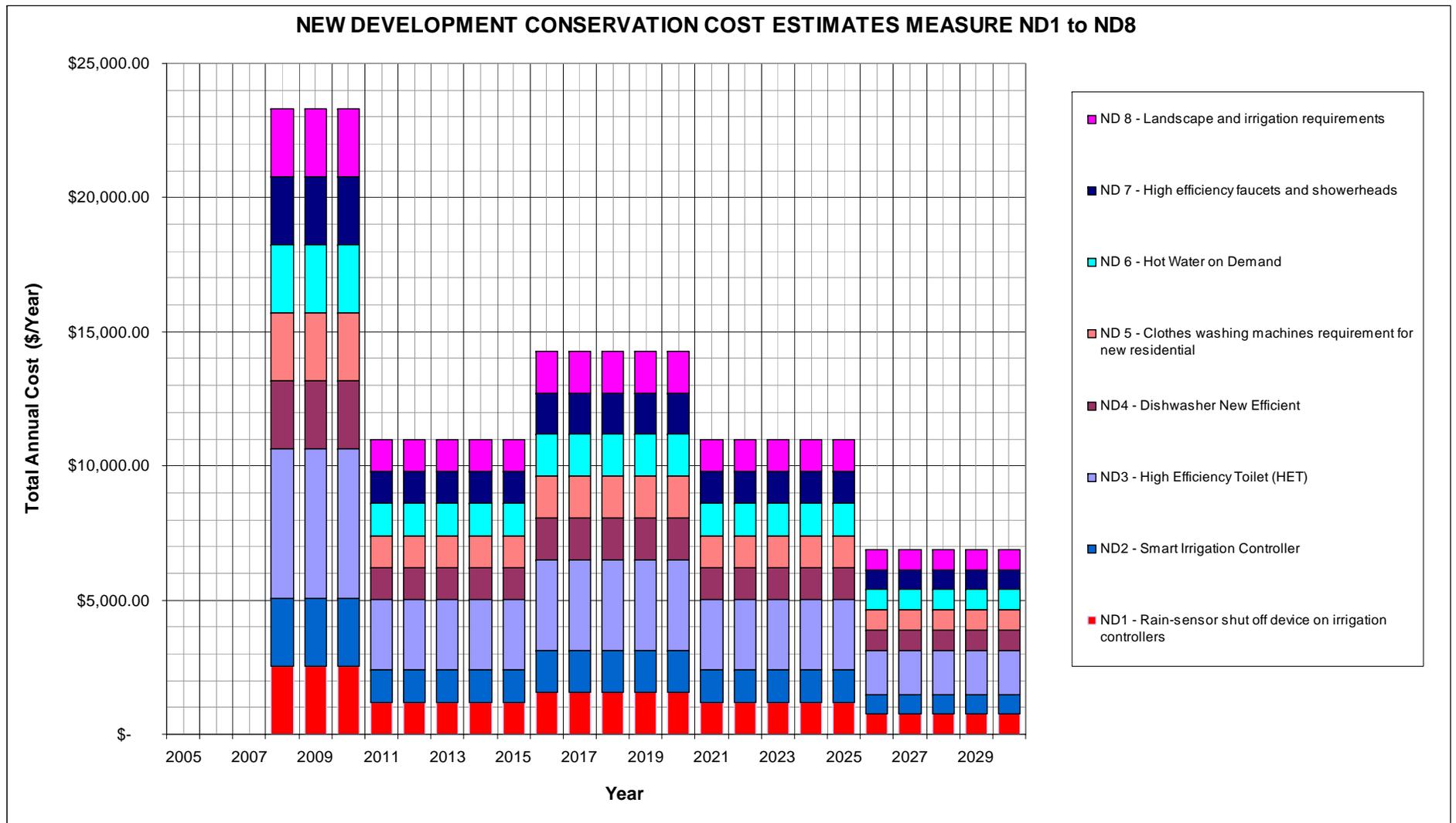
Figure 2: Conservation Savings from Tier Two Measures



**Figure 3: Conservation Savings from New Development Measures**



**Figure 4: Conservation Costs from Tier Two Measures**



Note: Utility costs depend upon the pace of new development, which depends on the projected growth in new single family accounts

**Figure 5: Conservation Costs from New Development Measures**

### 3. RESULTS OF TIER TWO AND NEW DEVELOPMENT CONSERVATION ANALYSIS

**Table 4** provides a summary of which measures make up each of the three options programs. The three packages are designed to illustrate an increasing level of water savings.

These programs are not intended to be rigid programs but rather to demonstrate the range in saving that could be generated if selected measures were run together. In this step we account for the overlap in water savings (and benefits) and estimate combined savings and benefits from programs or packages of measures.

A description of each program evaluated follows. Because Tier Two will commence in 2007 and some agencies will have continued to implement some Tier One measures since the base year of 2004, it is necessary to evaluate Tier Two and New Development measures in addition to the water savings generated by the completion of Tier One measures. The Tier One measure parameters have been updated based on comments received from agencies. Numerical changes to Tier One were minor with two exceptions. Both Sonoma and Valley of the Moon had an unaccounted for water reduction measure added as per the CUWCC requirements for compliance with BMP 3. For these agencies projected water savings from Tier One measures went up significantly. Other agency water savings from Tier One measures changed very little, if at all.

#### **Program – Future Savings for Tier One + Tier Two Measures**

*Program Future Savings for Tier One + Tier Two Measures* includes 13 additional measures beyond the CUWCC BMPs. Tier One Future was designed to be the future program with full compliance for all the CUWCC BMPs. The participation rates starting in 2004 are in accordance with those specified in the California Urban Water Conservation Council’s Memorandum Of Understanding, which may be higher (or lower) than you are currently achieving. If you continue to implement these measures, your future water demands will be reduced by the amount of conservation savings. Descriptions of the Tier Two measures are in **Table 1** and cost and saving assumptions for each individual measure can be found in **Attachment 1**.

#### **Program - Future Savings for Tier One + New Development Measures**

*Program Future Savings for Tier One + New Development Measures* was designed to isolate the effects of the New Development measures that would be implemented as well as the completion of Tier One measures. These eight New Development measures target new single family homes only.

#### **Program: Future Savings for All Measures Tier One, Tier Two, New Development**

*Program Future Savings for All Measures Tier One, Tier Two, New Development* includes all 32 analyzed conservation measures. Do note that this is the theoretical maximum amount of conservation savings that are identified at this time. Also note that measures that either saved a small amount of water or were not cost-effective (Benefit-Cost ratio less than 1.0 and a high cost of water saved) were included here so as to represent the maximum water savings. Some of the Tier Two measures are small programs in that the target number of accounts is very small. So even though they appear to be relatively expensive from a measure point of view, their impact on the overall program costs and savings is relatively minor.

**Table 4**  
**Conservation Measures Selected for Programs**

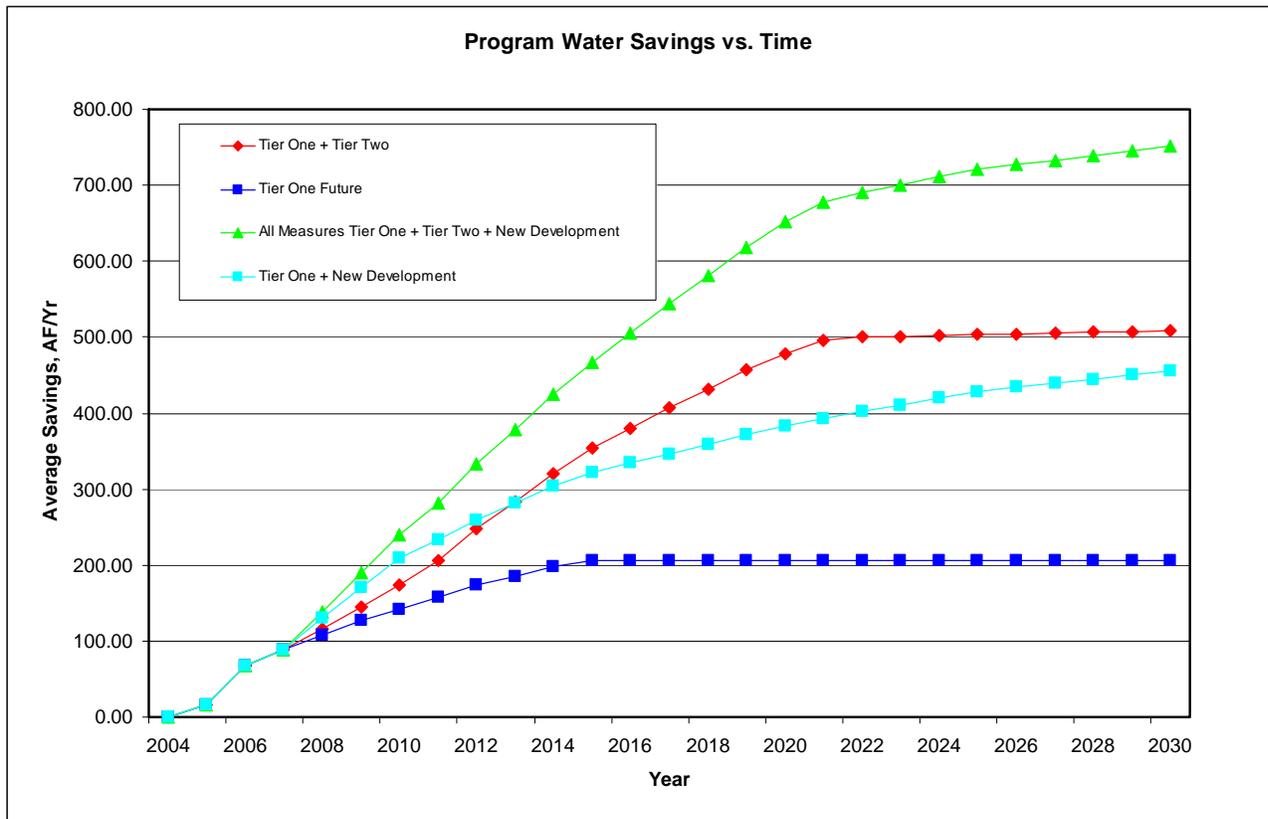
<b>Description of Conservation Activity</b>	<b>Corresponding Measure Number</b>	<b>Program Tier One + New Development</b>	<b>Tier One + Tier Two</b>	<b>All Measures</b>
BMP 1a - Residential Water Surveys-Indoor	Tier 1 - 1	<b>X</b>	<b>X</b>	<b>X</b>
BMP 1b - Residential Water Surveys-Outdoor	Tier 1 - 2	<b>X</b>	<b>X</b>	<b>X</b>
BMP 2- Plumbing Retrofits	Tier 1 - 3	<b>X</b>	<b>X</b>	<b>X</b>
BMP 5a - Landscape Water Budgets	Tier 1 - 4	<b>X</b>	<b>X</b>	<b>X</b>
BMP 5b - Large Landscape Conservation Audits	Tier 1 - 5	<b>X</b>	<b>X</b>	<b>X</b>
BMP 6 - Washing Machine Rebate	Tier 1 - 6	<b>X</b>	<b>X</b>	<b>X</b>
BMP 7 - Public Information	Tier 1 - 7	<b>X</b>	<b>X</b>	<b>X</b>
BMP 9 - Commercial Water Audits	Tier 1 - 8	<b>X</b>	<b>X</b>	<b>X</b>
BMP 14 - ULF Toilet Rebate- Single Family	Tier 1 - 9	<b>X</b>	<b>X</b>	<b>X</b>
BMP 14 - ULF Toilet Rebate- Multifamily	Tier 1 - 10	<b>X</b>	<b>X</b>	<b>X</b>
Tier 2 - 1 Rain Sensor Retrofit	Tier 2 - 1		<b>X</b>	<b>X</b>
Tier 2 - 2 Cash for Grass	Tier 2 - 2		<b>X</b>	<b>X</b>
Tier 2 - 3 Financial Incentives for Being Below Water Budget	Tier 2 - 3		<b>X</b>	<b>X</b>
Tier 2 - 4 Irrigation Meter Rebates	Tier 2 - 4		<b>X</b>	<b>X</b>
Tier 2 - 5a Smart Irrigation Controller Rebates - RSF	Tier 2 —5a		<b>X</b>	<b>X</b>
Tier 2 - 5b Smart Irrigation Controller Rebates - RMF, CII, IRR	Tier 2 - 5b		<b>X</b>	<b>X</b>
Tier 2 - 6 Financial Incentives/Rebates for Irrigation Upgrades	Tier 2 - 6		<b>X</b>	<b>X</b>
Tier 2 - 7 Hotel Retrofit	Tier 2 - 7		<b>X</b>	<b>X</b>
Tier 2 - 8 New CII Reduced Connection Fees for Efficient Equipment	Tier 2 - 8		<b>X</b>	<b>X</b>

<b>Description of Conservation Activity</b>	<b>Corresponding Measure Number</b>	<b>Program Tier One + New Development</b>	<b>Tier One + Tier Two</b>	<b>All Measures</b>
Tier 2 - 9 Synthetic Turf Rebate	Tier 2 - 9		X	X
Tier 2 - 10 High Efficiency Toilets	Tier 2 - 10		X	X
Tier 2 - 11 Dishwasher New Efficient	Tier 2 - 11		X	X
Tier 2 - 12 CII Rebates - Replace Inefficient Water Using Equipment	Tier 2 - 12		X	X
Tier 2 - 13 New Commercial Urinals	Tier 2 - 13		X	X
ND1- Rain Sensor Retrofit	ND1	X		X
ND2 - Smart Irrigation Controller	ND2	X		X
ND3 - High Efficiency Toilets	ND3	X		X
ND4 - Dishwasher New Efficient	ND4	X		X
ND5 - Clothes Washing Machine Requirement	ND5	X		X
ND6 - Hot Water on Demand	ND6	X		X
ND7 - High Efficiency Faucets and Showerheads	ND7	X		X
ND8 - Landscape and Irrigation Requirements	ND8	X		X
<b>TOTAL NUMBER OF MEASURES*</b>		<b>18</b>	<b>24</b>	<b>32</b>

\*Measures BMP 1a, 1b, 5a, 5b, 14, and Tier 2-5a and 5b are all counted as individual measures. These measures were split for more accurate evaluation.

Figure 6 shows annual water savings for each of these programs for the year 2005 to 2030.

**Figure 6**  
**Conservation Measure Programs - Annual Water Conservation Savings**



**Table 5** presents key evaluation statistics compiled from the DSS model. Assuming all measures are successfully implemented, projected water savings for 2015 and 2030 in acre-feet and million gallons per day (MGD) are shown, as are the costs of achieving this reduction.

The costs are expressed three ways:

- Total present value
- The money utilities would need to budget in the first five years (2007-2011) to get new programs underway,
- The cost of water saved. These costs include costs to complete Tier One measures, as needed.

The water savings are expressed as a percentage of the projected 2030 demand. The last column indicates the percentage of the new water demand for 2030 that each program could fill. That new water needed is over the next 25 years is the difference between 2005 demand with the plumbing code (4.35 MGD) and 2030 demand (6.37 MGD) with the plumbing code. The new water needed for your agency by 2030 is 2.02 MGD.

**Table 5**  
**Conservation Measure Programs - Costs and Savings**

Conservation Program	Water Utility Benefit-Cost Ratio	2015 Water Savings (Acre-Feet/Yr)	2015 Water Savings (MGD)	2030 Water Savings (Acre-Feet/Yr)	2030 Water Savings (MGD)	2030 Indoor Water Savings (MGD)	2030 Outdoor Water Savings (MGD)	Total Water Savings as a % of Total Production in 2030*	Present Value of Water Utility Costs (\$1,000s)	Five Years Utility Cost 2007 to 2011 (\$1,000)	Cost of Water Saved (\$/AF)	% of New Water Needed from 2005 to 2030
Tier One Future	2.01	206.1	0.18	206.1	0.18	0.06	0.12	2.89%	\$ 1,602	\$ 503	\$ 312	9.1%
Tier One Future + Tier Two	1.74	353.9	0.32	508.3	0.45	0.14	0.31	7.13%	\$ 3,725	\$ 1,249	\$ 338	22.5%
Tier One Future + New Development	3.22	322.0	0.29	455.5	0.41	0.14	0.27	6.39%	\$ 1,807	\$ 584	\$ 185	20.2%
Tier One Future + Tier Two + New Development	2.30	467.3	0.42	751.9	0.67	0.26	0.41	10.55%	\$ 3,930	\$ 1,330	\$ 253	33.3%

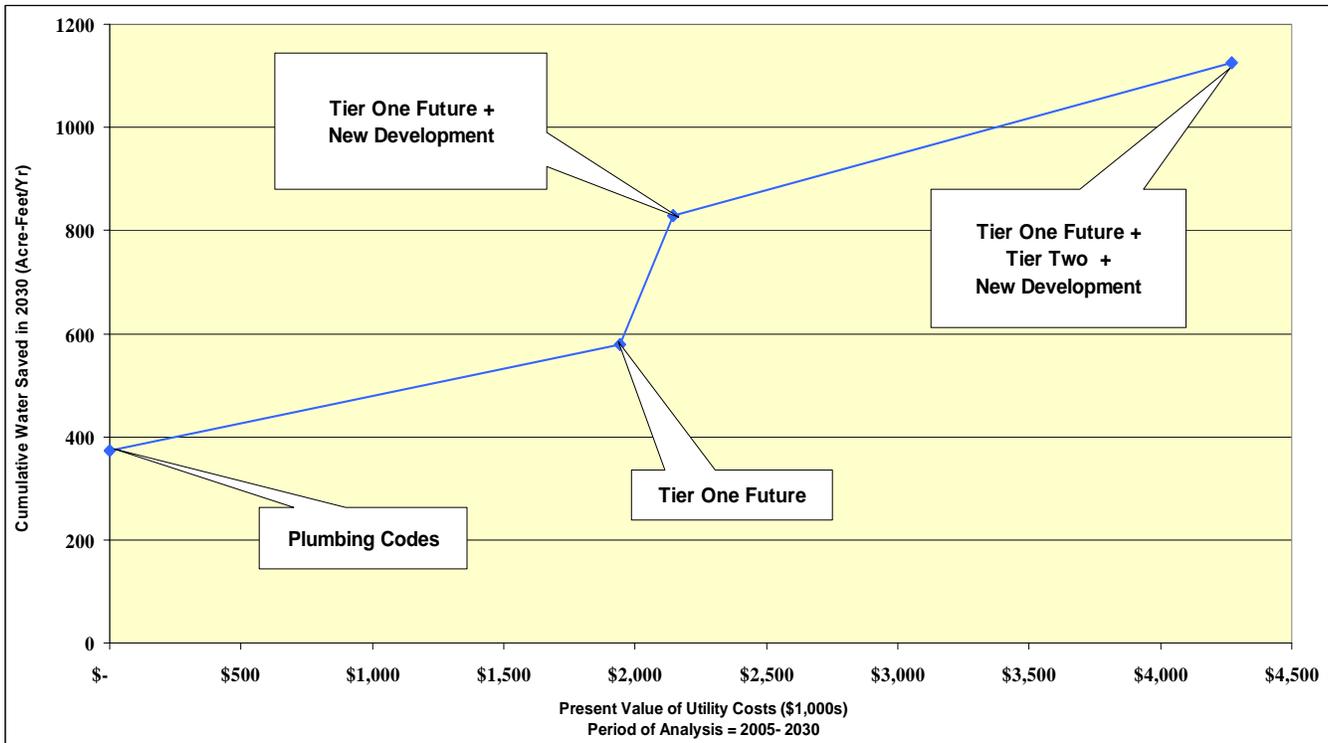
Notes:

- Present Value is determined using an interest rate of 3%
- Cost of water saved is present value of water utility cost divided by total 30-year water savings.
- Five Year Cost for all above programs is 2007 to 2011
- \* % of water saved refers to the demand with the plumbing code

**Figure 7** shows how marginal returns change as more money is spent to achieve savings. As the figure shows the cost versus saving curve is starting to decline after Program Tier One + New Development. This means that the added cost of going from that Program to Tier One + Tier Two will save less water per unit expenditure. In other words there are diminishing returns when the curve starts to flatten out as Tier Two measures are added to the program. It is clear that the New Development measures are more cost-effective to the utility than Tier Two measures.

**Figure 7**

**Present Value of Utility Costs versus Cumulative Water Saved in 2030**



## 4. CONCLUSIONS

### Relative Savings and Cost-Effectiveness of Programs

Windsor's service area has relatively high portion of residential water use and a significant amount of outdoor water use. Consequently, residential conservation programs produce the most savings. Water use in the commercial sector is low, offering modest conservation potential. Overall conclusions are:

- Total savings from all conservation programs would be about 10.6 percent in 2030 (751.9 AF as shown on **Table 5**). Implementation of all of the programs described in this memorandum will reduce water needs in 2030 by 10.6 percent.
- Savings contributed by Tier Two measures alone are 302.2 acre-feet in 2030 or 0.27 MGD. This equates to a 4.2 percent reduction in 2030 water demand.
- Savings contributed by the New Development measures alone are 249.4 acre-feet (0.23 MGD). This equates to a 3.5 percent reduction in 2030 water demand.
- Because of the projected relatively high growth rate in new accounts, future Tier One measures plus combinations of Tier Two and New Development conservation measures could make up about 20 to 33 percent of the total future additional water needed by 2030.
- The average cost of water saved for all of the programs from the utility standpoint (as shown on **Table 5**) is lower than the forecasted 2020 price of \$565 per AF.
- The cost for the New Development measures is largely funded by the builders of the new homes, which tends to reduce the overall cost to the utility for all measures.

## ATTACHMENTS

Attachment 1      Assumptions for the Tier Two Measures Evaluated in the DSS Model

**Attachment 1**  
**Assumptions for Tier Two Measures Evaluated in the DSS Model**

Measure	T2 - 1	T2 - 2	T2 - 3	T2 - 4	T2 - 5a	T2 - 5b	T2 - 6
Applicable Customer Classes	SF	Existing Customers SF, MF, CII	IRR	Customers with mixed water use (indoor and	SF	Existing Customers MF, CII, IRR	Existing Customers MF, CII, IRR
Applicable End Uses	Irrigation	Irrigation	Irrigation	Irrigation	Irrigation	Irrigation	Irrigation
Market Penetration by End Of Program	10%	1%	100%	10%	5%	20%	10%
Water Use Reductions For Targeted End Uses	9%	26%	15%	15%	15%	15%	15%
Program Length, years	5	5	10	5	10	10	15
Measure Life, years	10	permanent	permanent	permanent	21	permanent	permanent
Utility Unit Cost for SFaccounts, \$/unit	\$ 20.00	\$ 500.00	\$ 25,000.00	\$ -	\$ 450.00	\$ -	\$ -
Utility Unit Cost for MF accounts, \$/unit	--	\$ 500.00	\$ -	\$ -	\$ -	\$ 900.00	\$ -
Utility Unit Cost for non-Res accounts, \$/unit	--	\$ 500.00	\$ -	\$ 500.00	\$ -	\$ 900.00	\$ 500.00
Customer Unit Cost. \$/unit	\$ 35.00	\$ 500.00	\$ 10,000.00	\$ 500.00	\$ 100.00	\$ 100.00	\$ 500.00
Annual Utility Admin & Marketing Cost	25%	25%	35%	25%	30%	30%	25%

**Notes:**

- SF = Residential Single Family
- MF = Residential Multi Family
- CII = Commercial/Industrial/Institutional
- COM = Commercial
- IRR = Dedicated irrigation meters
- INS = Public, buildings / grounds owned by the Water Utility or City
- NRSF = New Residential Single Family Homes

**Attachment 1**  
**Assumptions for Tier Two Measures Evaluated in the DSS Model**

Measure	T2 - 7	T2 - 8	T2 - 9	T2 - 10	T2 - 11	T2 - 12	T2 - 13
Applicable Customer Classes	Existing Customers: CII	New Customers: CII	IRR	SF, MF	SF	CII	COM New
Applicable End Uses	Indoor uses	Indoor uses	Irrigation	Toilet end use	Diswasher end use	Process end use	COM Urinal
Market Penetration by End Of Program	20%	75%	1%	20%	10%	10%	100%
Water Use Reductions For Targeted End Uses	20%	25%	90%	45 to 55%	34%	10%	65 to 75%
Program Length, years	15	30	15	10	10	15	30
Measure Life, years	permanent	permanent	permanent	permanent	permanent	permanent	permanent
Utility Unit Cost for SFaccounts, \$/unit	\$ -	\$ -	\$ -	\$ 150.00	\$ 100.00		\$ 50.00
Utility Unit Cost for MF accounts, \$/unit	\$ -		\$ -	\$ 150.00	--		
Utility Unit Cost for non-Res accounts, \$/unit	\$ 100.00	\$ 100.00	\$ 150,000.00		--	\$ 500.00	
Customer Unit Cost. \$/unit	\$ 200.00	\$1,000.00	\$ 150,000.00	\$ 150.00	\$ 700.00	\$1,000.00	\$ 500.00
Annual Utility Admin & Marketing Cost	25%	25%	25%	35%	25%	30%	25%

**Notes:**

- SF = Residential Single Family
- MF = Residential Multi Family
- CII = Commercial/Industrial/Institutional
- COM = Commercial
- IRR = Dedicated irrigation meters
- INS = Public, buildings / grounds owned by the Water Utility or City
- NRSF = New Residential Single Family Homes

**Attachment 1**  
**Assumptions for New Development Measures Evaluated in the DSS Model**

Measure	ND 1	ND 2	ND 3	ND 4	ND 5	ND 6	ND 7	ND 8
Applicable Customer Classes	NRSF	NRSF	NRSF	NRSF	NRSF	NRSF	NRSF	NRSF
Applicable End Uses	Irrigation	Irrigation	Toilet end use	Diswasher end use	Clothes Washer end use	Faucet and shower end use	Faucet and shower end use	Irrigation
Market Penetration by End Of Program	100%	100%	100%	100%	100%	100%	100%	100%
Water Use Reductions For Targeted End Uses	9%	15%	50 to 55%	34%	50%	14.2 gpd per house	15%	10%
Program Length, years	30	30	30	30	30	30	30	30
Measure Life, years	permanent	permanent	permanent	permanent	permanent	permanent	permanent	permanent
Utility Unit Cost for SFaccounts, \$/unit	\$ 12.50	\$ 12.50	\$ 12.50	\$ 12.50	\$ 12.50	\$ 12.50	\$ 12.50	\$ 12.50
Utility Unit Cost for MF accounts, \$/unit	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Utility Unit Cost for non-Res accounts, \$/unit	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Customer Unit Cost. \$/unit	\$ 55.00	\$ 500.00	\$ 300.00	\$ 400.00	\$ 500.00	\$ 700.00	\$ 50.00	\$3,000.00
Annual Utility Admin & Marketing Cost	10%	10%	10%	10%	10%	10%	10%	10%

**Notes:**

- SF = Residential Single Family
- MF = Residential Multi Family
- CII = Commercial/Industrial/Institutional
- COM = Commercial
- IRR = Dedicated irrigation meters
- INS = Public, buildings / grounds owned by the Water Utility or City
- NRSF = New Residential Single Family Homes
- ND = New Development



## **APPENDIX C**

### **Best Management Practices Report Filing**



## BMP 01 Coverage: Water Survey Programs for Single-Family and Multi-Family Residential Customers

Reporting Unit:  
**Town of Windsor**

Reporting Period:  
**05-06**

### MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period?

No

A Reporting Unit (RU) must meet three conditions to satisfy strict compliance for BMP 1.

Condition 1: Adopt survey targeting and marketing strategy on time

Condition 2: Offer surveys to 20% of SF accounts and 20% of MF units during report period

Condition 3: Be on track to survey 15% of SF accounts and 15% of MF units within 10 years of implementation start date.

### Test for Condition 1

Town of Windsor to Implement Targeting/Marketing Program by:	2001		
		<b>Single-Family</b>	<b>Multi-Family</b>
Year Town of Windsor Reported Implementing Targeting/Marketing Program:	2003		2003
Town of Windsor Met Targeting/Marketing Coverage Requirement:	NO		NO

### Test for Condition 2

			<b>Single-Family</b>	<b>Multi-Family</b>
Survey Program to Start by:	2000	Residential Survey Offers (%)	19.26%	14.49%
Reporting Period:	05-06	Survey Offers ≥ 20%	NO	NO

### Test for Condition 3

	Completed Residential Surveys	
	<u>Single Family</u>	<u>Multi-Family</u>
Total Completed Surveys 1999 - 2006: Past Credit for Surveys Completed Prior to 1999 (Implementation of Reporting Database):	27	
Total + Credit	27	
Residential Accounts in Base Year	6,231	345
Town of Windsor Survey Coverage as % of Base Year Residential Accounts	0.43%	
Coverage Requirement by Year 6 of Implementation per Exhibit 1	6.30%	6.30%

Town of Windsor on Schedule to Meet 10-Year  
Coverage Requirement

NO

NO

---

**BMP 1 COVERAGE STATUS SUMMARY:**

**Water supplier is not currently on track to meet the coverage requirements  
for this BMP.**

## BMP 02 Coverage: Residential Plumbing Retrofit

Reporting Unit:

Reporting Period:

**Town of Windsor**

**05-06**

### MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period?

No

An agency must meet one of three conditions to satisfy strict compliance for BMP 2.

Condition 1: The agency has demonstrated that 75% of SF accounts and 75% of MF units constructed prior to 1992 are fitted with low-flow showerheads.

Condition 2: An enforceable ordinance requiring the replacement of high-flow showerheads and other water use fixtures with their low-flow counterparts is in place for the agency's service area.

Condition 3: The agency has distributed or directly installed low-flow showerheads and other low-flow plumbing devices to not less than 10% of single-family accounts and 10% of multi-family units constructed prior to 1992 during the reporting period.

### Test for Condition 1

Report Year	Report Period	Single-Family		Multi-Family	
		Reported Saturation	Saturation > 75%?	Reported Saturation	Saturation > 75%?
1999	99-00	48.00%	NO	50.00%	NO
2000	99-00	50.00%	NO	52.00%	NO
2001	01-02	51.00%	NO	53.00%	NO
2002	01-02	54.00%	NO	56.00%	NO
2003	03-04		NO		NO
2004	03-04		NO		NO
2005	05-06	81.00%	YES	65.00%	NO
2006	05-06	81.00%	YES	65.00%	YES

### Test for Condition 2

Report Year	Report Period	Town of Windsor has ordinance requiring showerhead retrofit?
1999	99-00	YES
2000	99-00	YES
2001	01-02	YES
2002	01-02	YES
2003	03-04	YES
2004	03-04	YES
2005	05-06	YES
2006	05-06	YES

### Test for Condition 3

Reporting Period: 05-06

<u>1992 SF Accounts</u>	<u>Num. Showerheads Distributed to SF Accounts</u>	<u>Single-Family Coverage Ratio</u>	<u>SF Coverage Ratio &gt; 10%</u>
5,318	220	4.1%	NO
<u>1992 MF Accounts</u>	<u>Num. Showerheads Distributed to MF Accounts</u>	<u>Multi-Family Coverage Ratio</u>	<u>MF Coverage Ratio &gt; 10%</u>
200	50	25.0%	YES

---

**BMP 2 COVERAGE STATUS SUMMARY:**

**Water supplier has met the coverage requirements for this BMP.**

Reported as of 12/28/06

## BMP 03 Coverage: System Water Audits, Leak Detection and Repair

Reporting Unit:  
Town of Windsor

Reporting Period:  
05-06

### MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period?

No

An agency must meet one of two conditions to be in compliance with BMP 3:

Condition 1: Perform a prescreening audit. If the result is equal to or greater than 0.9 nothing more needs be done.

Condition 2: Perform a prescreening audit. If the result is less than 0.9, perform a full audit in accordance with AWWA's Manual of Water Supply Practices, Water Audits, and Leak Detection.

### Test for Conditions 1 and 2

<u>Report Year</u>	<u>Report Period</u>	<u>Pre-Screen Completed</u>	<u>Pre-Screen Result</u>	<u>Full Audit Indicated</u>	<u>Full Audit Completed</u>
1999	99-00	NO			NO
2000	99-00	NO			NO
2001	01-02	NO			NO
2002	01-02	NO			NO
2003	03-04	NO			NO
2004	03-04	YES	97.9%	No	NO
2005	05-06	YES	102.3%	No	NO
2006	05-06	YES	96.0%	No	NO

### BMP 3 COVERAGE STATUS SUMMARY:

Water supplier has met the coverage requirements for this BMP.

Reported as of 12/28/06

## **BMP 04 Coverage: Metering with Commodity Rates for all New Connections and Retrofit of Existing**

Reporting Unit:

Reporting Period:

**Town of Windsor****05-06**

### **MOU Exhibit 1 Coverage Requirement**

No exemption request filed

Agency indicated "at least as effective as" implementation during report period?

No

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An agency must be on track to retrofit 100% of its unmetered accounts within 10 years to be in compliance with BMP 4.

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### **Test for Compliance**

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Total Meter Retrofits

Reported through 2006

No. of Unmetered Accounts  
in Base YearMeter Retrofit Coverage as  
% of Base Year Unmetered  
AccountsCoverage Requirement by  
Year 5 of Implementation per  
Exhibit 1

32.5%

RU on Schedule to meet 10  
Year Coverage Requirement

YES

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### **BMP 4 COVERAGE STATUS SUMMARY:**

**Water supplier has met the coverage requirements for this BMP.**

## BMP 05 Coverage: Large Landscape Conservation Programs and Incentives

Reporting Unit:  
**Town of Windsor**

Reporting Period:  
**05-06**

### MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

An agency must meet three conditions to comply with BMP 5.

Condition 1: Develop water budgets for 90% of its dedicated landscape meter accounts within four years of the date implementation is to start.

Condition 2: (a) Offer landscape surveys to at least 20% of its CII accounts with mixed use meters each report cycle and be on track to survey at least 15% of its CII accounts with mixed use meters within 10 years of the date implementation is to start OR (b) Implement a dedicated landscape meter retrofit program for CII accounts with mixed use meters or assign landscape budgets to mixed use meters.

Condition 3: Implement and maintain customer incentive program(s) for irrigation equipment retrofits.

#### Test for Condition 1

Year	Report Period	BMP 5 Implementation Year	No. of Irrigation Meter Accounts	No. of Irrigation Accounts with Budgets	Budget Coverage Ratio	90% Coverage Met by Year 4
1999	99-00		236			NA
2000	99-00		265			NA
2001	01-02		284			NA
2002	01-02	1	302			NA
2003	03-04	2	315			NA
2004	03-04	3	321			NA
2005	05-06	4	336			No
2006	05-06	5	369			No

#### Test for Condition 2a (survey offers)

Select Reporting Period: 05-06  
 Large Landscape Survey Offers as % of Mixed Use Meter CII Accounts  
 Survey Offers Equal or Exceed 20% Coverage Requirement NO

#### Test for Condition 2a (surveys completed)

Total Completed Landscape Surveys Reported through Credit for Surveys Completed Prior to Implementation of Reporting Database  
 Total + Credit  
 CII Accounts in Base Year 515  
 RU Survey Coverage as a % of Base Year CII Accounts  
 Coverage Requirement by Year of Implementation per Exhibit 1 4.9%  
 RU on Schedule to Meet 10 Year Coverage Requirement NO

#### Test for Condition 2b (mixed use budget or meter retrofit program)

<u>Report Year</u>	<u>Report Period</u>	<u>BMP 5 Implementation Year</u>	<u>Agency has mix-use budget program</u>	<u>No. of mixed-use budgets</u>
1999	99-00		NO	
2000	99-00		NO	
2001	01-02		NO	
2002	01-02	1	NO	
2003	03-04	2	NO	
2004	03-04	3	NO	
2005	05-06	4	NO	
2006	05-06	5	NO	

<u>Report Year</u>	<u>Report Period</u>	<u>BMP 4 Implementation Year</u>	<u>No. of mixed use CII accounts</u>	<u>No. of mixed use CII accounts fitted with irrig. meters</u>
1999	99-00		63	
2000	99-00		63	
2001	01-02		63	
2002	01-02	1	63	
2003	03-04	2	63	
2004	03-04	3	63	
2005	05-06	4	63	
2006	05-06	5	63	

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### Test for Condition 3

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<u>Report Year</u>	<u>Report Period</u>	<u>BMP 5 Implementation Year</u>	<u>RU offers financial incentives?</u>	<u>No. of Loans</u>	<u>Total Amt. Loans</u>
1999	99-00		NO		
2000	99-00		NO		
2001	01-02		NO		
2002	01-02	1	NO		
2003	03-04	2	NO		
2004	03-04	3	NO		
2005	05-06	4	NO		
2006	05-06	5	NO		

<u>Report Year</u>	<u>Report Period</u>	<u>No. of Grants</u>	<u>Total Amt. Grants</u>	<u>No. of rebates</u>	<u>Total Amt. Rebates</u>
1999	99-00				
2000	99-00				
2001	01-02				
2002	01-02				
2003	03-04				
2004	03-04				
2005	05-06				
2006	05-06				

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**BMP 5 COVERAGE STATUS SUMMARY:**  
**Water supplier is not currently on track to meet the coverage requirements for this BMP.**

## **BMP 06 Coverage: High-Efficiency Washing Machine Rebate Programs**

Reporting Unit:

**Town of**

**Windsor**

Reporting Period:

**05-06**

### **Pre-2004 MOU Exhibit 1 Coverage Requirement**

An agency must meet one condition to comply with BMP 6.

Condition 1: Offer a cost-effective financial incentive for high-efficiency washers if one or more energy service providers in service area offer financial incentives for high-efficiency washers.

### **Revised MOU Exhibit 1 Coverage Requirement**

An agency must meet two conditions to comply with BMP 6.

Condition 1: Offer a cost-effective financial incentive to customers for the purchase of high-efficiency washers with water factors of 9.5 or less.

Condition 2: Meet Coverage Goal (CG=Total Dwelling Units x 0.048) by January 1, 2007.

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**BMP 06 was revised March 10, 2004; effective July 1, 2004. All previous BMP 06 implementation efforts will count towards meeting agency's Coverage Goal. Please see the current BMP 06 Coverage Requirement report for your agency's progress on this BMP.**

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Reported as of 12/28/06

**BMP 07 Coverage: Public Information Programs**

Reporting Unit:

Reporting Period:

**Town of Windsor****05-06****MOU Exhibit 1 Coverage Requirement**

No exemption request filed

Agency indicated "at least as effective as" implementation during report period?

No

An agency must meet one condition to comply with BMP 7.

Condition 1: Implement and maintain a public information program consistent with BMP 7's definition.

**Test for Condition 1**

<u>Year</u>	<u>Report Period</u>	<u>BMP 7 Implementation Year</u>	<u>RU Has Public Information Program?</u>
1999	99-00		
2000	99-00		
2001	01-02	1	
2002	01-02	2	
2003	03-04	3	
2004	03-04	4	
2005	05-06	5	
2006	05-06	6	

**BMP 7 COVERAGE STATUS SUMMARY:****Water supplier has met the coverage requirements for this BMP.**

Reported as of 12/28/06

**BMP 08 Coverage: School Education Programs**

Reporting Unit:

**Town of Windsor**

Reporting Period:

**05-06****MOU Exhibit 1 Coverage Requirement**

No exemption request filed

Agency indicated "at least as effective as" implementation during report period?

No

An agency must meet one condition to comply with BMP 8.

Condition 1: Implement and maintain a school education program consistent with BMP 8's definition.

**Test for Condition 1**

<u>Year</u>	<u>Report Period</u>	<u>BMP 8 Implementation Year</u>	<u>RU Has School Education Program?</u>
1999	99-00		
2000	99-00		
2001	01-02	1	
2002	01-02	2	
2003	03-04	3	
2004	03-04	4	
2005	05-06	5	
2006	05-06	6	

**BMP 8 COVERAGE STATUS SUMMARY:****Water supplier has met the coverage requirements for this BMP.**

## BMP 09 Coverage: Conservation Programs for CII Accounts

Reporting Unit:  
**Town of Windsor**

Reporting Period:  
**05-06**

### MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

An agency must meet three conditions to comply with BMP 9.

Condition 1: Agency has identified and ranked by use commercial, industrial, and institutional accounts.

Condition 2(a): Agency is on track to survey 10% of commercial accounts, 10% of industrial accounts, and 10% of institutional accounts within 10 years of date implementation to commence.

OR

Condition 2(b): Agency is on track to reduce CII water use by an amount equal to 10% of baseline use within 10 years of date implementation to commence.

OR

Condition 2(c): Agency is on track to meet the combined target as described in Exhibit 1 BMP 9 documentation.

#### Test for Condition 1

Year	Report Period	BMP 9 Implementation Year	Ranked Com. Use	Ranked Ind. Use	Ranked Inst. Use
1999	99-00		YES	YES	YES
2000	99-00		YES	YES	YES
2001	01-02		YES	YES	YES
2002	01-02	1	YES	YES	YES
2003	03-04	2	YES	YES	YES
2004	03-04	3	YES	YES	YES
2005	05-06	4	YES	YES	YES
2006	05-06	5	YES	YES	YES

#### Test for Condition 2a

	Commercial	Industrial	Institutional
Total Completed Surveys Reported through 2006	2	0	0
Credit for Surveys Completed Prior to Implementation of Reporting Databases			
Total + Credit	2		
CII Accounts in Base Year	503		12
RU Survey Coverage as % of Base Year CII Accounts	0.4%		
Coverage Requirement by Year 5 of Implementation per Exhibit 1	3.3%	3.3%	3.3%
RU on Schedule to Meet 10 Year Coverage Requirement	NO	NO	NO

#### Test for Condition 2b

Year	Report Period	BMP 9 Implementation Year	Performance Target Savings (AF/yr)	Performance Target Savings Coverage	Performance Target Savings Coverage Requirement	Coverage Requirement Met
1999	99-00					YES

2000	99-00			YES
2001	01-02			YES
2002	01-02	1	0.5%	NO
2003	03-04	2	1.0%	NO
2004	03-04	3	1.7%	NO
2005	05-06	4	2.4%	NO
2006	05-06	5	3.3%	NO

---

**Test for Condition 2c**


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Total BMP 9 Surveys + Credit	2
BMP 9 Survey Coverage	0.4%
BMP 9 Performance Target Coverage	
BMP 9 Survey + Performance Target Coverage	0.4%
Combined Coverage Equals or Exceeds Coverage Requirement?	NO

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**BMP 9 COVERAGE STATUS SUMMARY:**

**Water supplier is not currently on track to meet the coverage requirements for this BMP.**

Reported as of 12/28/06

**BMP 11 Coverage: Conservation Pricing**

Reporting Unit:  
**Town of Windsor**

Reporting  
 Period:  
**05-06**

**MOU Exhibit 1 Coverage Requirement**

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

An agency must meet one condition to comply with BMP 11.

Agency shall maintain rate structure consistent with BMP 11's definition of conservation pricing. Implementation methods shall be at least as effective as eliminating non-conserving pricing and adopting conserving pricing. For signatories supplying both water and sewer service, this BMP applies to pricing of both water and sewer service. Signatories that supply water but not sewer service shall make good faith efforts to work with sewer agencies so that those sewer agencies adopt conservation pricing for sewer service.

a) Non-conserving pricing provides no incentives to customers to reduce use. Such pricing is characterized by one or more of the following components: rates in which the unit price decreases as the quantity used increases (declining block rates); rates that involve charging customers a fixed amount per billing cycle regardless of the quantity used; pricing in which the typical bill is determined by high fixed charges and low commodity charges.

b) Conservation pricing provides incentives to customers to reduce average or peak use, or both. Such pricing includes: rates designed to recover the cost of providing service; and billing for water and sewer service based on metered water use. Conservation pricing is also characterized by one or more of the following components: rates in which the unit rate is constant regardless of the quantity used (uniform rates) or increases as the quantity used increases (increasing block rates); seasonal rates or excess-use surcharges to reduce peak demands during summer months; rates based upon the longrun marginal cost or the cost of adding the next unit of capacity to the system.

**Test for Condition 1**

<u>Year</u>	<u>Report Period</u>	<u>RU Employed Conserving WATER Rate Structure</u>	<u>RU Employed Conserving SEWER Rate Structure</u>	<u>RU Meets BMP 11 Coverage Requirement</u>
1999	99-00	YES	YES	YES
2000	99-00	YES	YES	YES
2001	01-02	YES	YES	YES
2002	01-02	YES	YES	YES
2003	03-04	YES	YES	YES
2004	03-04	YES	YES	YES
2005	05-06	YES	YES	YES
2006	05-06	YES	YES	YES

**BMP 11 COVERAGE STATUS SUMMARY:**

**Water supplier has met the coverage requirements for this BMP.**

Reported as of 12/28/06

**BMP 12 Coverage: Conservation Coordinator**

Reporting Unit:

Reporting Period:

**Town of Windsor****05-06****MOU Exhibit 1 Coverage Requirement**

No exemption request filed

Agency indicated "at least as effective as" implementation during report period?

No

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Agency shall staff and maintain the position of conservation coordinator and provide support staff as necessary.

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**Test for Compliance**

<u>Report Year</u>	<u>Report Period</u>	<u>Conservation Coordinator Position Staffed?</u>	<u>Total Staff on Team (incl. CC)</u>
1999	99-00	YES	3
2000	99-00	YES	3
2001	01-02	YES	3
2002	01-02	YES	3
2003	03-04	YES	3
2004	03-04	YES	3
2005	05-06	YES	3
2006	05-06	YES	3

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**BMP 12 COVERAGE STATUS SUMMARY:****Water supplier has met the coverage requirements for this BMP.**

## BMP 13 Coverage: Water Waste Prohibition

Reporting Unit:

Reporting Period:

**Town of Windsor**

**05-06**

### MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

An agency must meet one condition to comply with BMP 13.

Implementation methods shall be enacting and enforcing measures prohibiting gutter flooding, single pass cooling systems in new connections, non-recirculating systems in all new conveyer car wash and commercial laundry systems, and non-recycling decorative water fountains.

#### Test for Condition 1

##### Agency or service area prohibits:

<u>Year</u>	<u>Gutter Flooding</u>	<u>Single-Pass Cooling Systems</u>	<u>Single-Pass Car Wash</u>	<u>Single-Pass Laundry</u>	<u>Single-Pass Fountains</u>	<u>Other</u>	<u>RU has ordinance that meets coverage requirement</u>
1999	YES	YES	YES	YES	YES	NO	YES
2000	YES	YES	YES	YES	YES	NO	YES
2001	YES	YES	YES	YES	YES	NO	YES
2002	YES	YES	YES	YES	YES	NO	YES
2003	YES	YES	YES	YES	YES	NO	YES
2004	YES	YES	YES	YES	YES	NO	YES
2005	YES	YES	YES	YES	YES	NO	YES
2006	YES	YES	YES	YES	YES	NO	YES

#### BMP 13 COVERAGE STATUS SUMMARY:

**Water supplier has met the coverage requirements for this BMP.**

## BMP 14 Coverage: Residential ULFT Replacement Programs

Reporting Unit: **Town of Windsor**

### MOU Exhibit 1 Coverage Requirement

A Reporting Unit (RU) must meet one of the following conditions to be in compliance with BMP 14.

Condition 1: Retrofit-on-resale (ROR) ordinance in effect in service area.

Condition 2: Water savings from toilet replacement programs equal to 90% of Exhibit 6 coverage requirement.

An agency with an exemption for BMP 14 is not required to meet one of the above conditions. This report treats an agency with missing base year data required to compute the Exhibit 6 coverage requirement as out of compliance with BMP 14.

### Status: Water supplier is not currently on track to meet the coverage requirements for this BMP. as of 2006

<u>Coverage Year</u>	<u>BMP 14 Data Submitted to CUWCC</u>	<u>Exemption Filed with CUWCC</u>	<u>ROR Ordinance in Effect</u>	<u>Exhibit 6 Coverage Req'tmt (AF)</u>	<u>Toilet Replacement Program Water Savings* (AF)</u>
2000	YES	NO	NO	98.10	
2001	YES	NO	NO	241.93	
2002	YES	NO	NO	405.88	
2003	YES	NO	NO	576.93	
2004	YES	NO	NO	748.38	
2005	YES	NO	NO	916.82	
2006	YES	NO	NO	1080.59	
2007	NO	NO	NO	1238.91	
2008	NO	NO	NO	1391.49	
2009	NO	NO	NO	1538.31	

\*NOTE: Program water savings listed are net of the plumbing code. Savings are cumulative (not annual) between 1991 and the given year. Residential ULFT count data from unsubmitted forms are NOT included in the calculation.

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### BMP 14 COVERAGE STATUS SUMMARY:

**Water supplier is not currently on track to meet the coverage requirements for this BMP.**

## BMP 14 Coverage: Residential ULFT Replacement Programs

Reporting Unit: Town of Windsor

### BMP 14 Coverage Calculation Detail: Retrofit on Resale (ROR) Ordinance Water Savings

	Single Family	Multi-Family
<b>1992 Housing Stock</b>		
Average rate of natural replacement (% of remaining stock)	.04	.04
Average rate of housing demolition (% of remaining stock)	.005	.005
Estimated Housing Units with 3.5+ gpf Toilets in 1997	4002.03	150.51
Average resale rate	.45	.8
Average persons per unit	2.85	2.65
Average toilets per unit	2.5	1.5
Average savings per home (gpd; from Exhibit 6)	47.2	55.6

### Single Family Housing Units

Coverage Year	Unretrofitted Houses	Houses Sold	Houses Unsold	Sold and Retrofitted	Sold and Already Retrofitted	Unsold and Retrofitted	Gross ROR Savings (AFY)	Nat'l Replacement Only Savings (AFY)	Net ROR Savings (AFY)
2000	2122.52	1791.91	2190.11	1791.91		87.60	168.92	77.99	90.94
2001	1125.70	1782.95	2179.16	950.36	832.59	46.46	221.62	86.07	135.55
2002	597.03	1774.03	2168.26	504.03	1270.00	24.64	249.56	93.83	155.73
2003	316.64	1765.16	2157.42	267.32	1497.85	13.07	264.39	101.29	163.10
2004	167.93	1756.34	2146.64	141.77	1614.56	6.93	272.25	108.45	163.80
2005	89.06	1747.56	2135.90	75.19	1672.36	3.68	276.42	115.32	161.10
2006	47.24	1738.82	2125.22	39.88	1698.94	1.95	278.63	121.92	156.71
2007	25.05	1730.12	2114.60	21.15	1708.97	1.03	279.80	128.25	151.55
2008	13.29	1721.47	2104.02	11.22	1710.26	0.55	280.42	134.34	146.08
2009	7.05	1712.87	2093.50	5.95	1706.92	0.29	280.75	140.18	140.57

### Multi Family Housing Units

Coverage Year	Unretrofitted Houses	Houses Sold	Houses Unsold	Sold and Retrofitted	Sold and Already Retrofitted	Unsold and Retrofitted	Gross ROR Savings (AFY)	Nat'l Replacement Only Savings (AFY)	Net ROR Savings (AFY)
2000	29.51	119.81	29.95	119.81		1.20	10.62	3.45	7.16
2001	5.78	119.21	29.80	23.49	95.72	0.23	12.09	3.81	8.28
2002	1.13	118.61	29.65	4.60	114.01	0.05	12.38	4.16	8.23
2003	0.22	118.02	29.50	0.90	117.11	0.01	12.44	4.49	7.95
2004	0.04	117.43	29.36	0.18	117.25	0.00	12.45	4.80	7.65
2005	0.01	116.84	29.21	0.03	116.80	0.00	12.45	5.11	7.34
2006	0.00	116.26	29.06	0.01	116.25	0.00	12.45	5.40	7.05
2007	0.00	115.67	28.92	0.00	115.67	0.00	12.45	5.68	6.77
2008	0.00	115.10	28.77	0.00	115.10	0.00	12.45	5.95	6.50
2009	0.00	114.52	28.63	0.00	114.52	0.00	12.45	6.21	6.24

## **APPENDIX D**

### **Water Shortage Contingency Plan**



## **WATER SHORTAGE CONTINGENCY PLAN**

Section 10632 of the California Water Code states that the Urban Water Management Plan shall provide an urban water shortage contingency analysis that includes information on the estimated three-year minimum water supply, actions in the event of a water shortage, water waste prohibitions, non-essential water uses during a water shortage, mechanisms for determining water use reductions, revenue and expenditure impacts and the emergency preparedness and plans for catastrophic events. The Town of Windsor (Windsor) draft water shortage contingency model ordinance to be enacted during a water shortage is provided in Attachment 1. Attachment 2 contains Section 12-3-361 from the Town's Municipal Code regarding Regulations and Restrictions on Water Use.

### **Estimate of Minimum Water Supply for Next Three Years (Water Code §10632(b))**

The minimum water supply available during the next few years during a multiple dry year drought is presented in Section 7 of the Town of Windsor's 2005 Urban Water Management Plan. No supply reduction is projected under this scenario. Therefore DWR Table 24 is not included.

### **Stages of Action to be Taken in Response to Water Supply Shortages (Water Code §10632(a))**

The Town Manager shall be responsible for monitoring all potential water shortage conditions, and shall make recommendations to the Town Council regarding the implementation of the Water Shortage Contingency Plan stages 1, 2, or 3. It is the responsibility of the Town Council or its designee to declare a water shortage. The specific stages and triggers to activate each stage based on a percentage reduction in water supply will be determined in cooperation with the Sonoma County Water Agency and the other water contractors served by the Russian River aqueduct system.

Table 1 summarizes the triggers and degree of water shortage for each stage of action based on the stages defined in the model ordinance (Attachment 1).

**Table 1. (DWR Table 23) Water Supply Shortage Stages and Conditions**

Rationing stages		
Stage No.	Water supply conditions	% Shortage
1	Disruptions to the Town's water delivery system or shortages in the amount of water available for delivery by Sonoma County Water Agency and Sonoma County Water Agency has declared a Stage 1 water shortage.	15
2	Disruptions to the Town's water delivery system or shortages in the amount of water available for delivery by Sonoma County Water Agency and Sonoma County Water Agency has declared a Stage 2 water shortage.	15-25
3	Disruptions to the Town's water delivery system or shortages in the amount of water available for delivery by Sonoma County Water Agency and Sonoma County Water Agency has declared a Stage 3 water shortage.	25-50

Stage 1 – Introductory Stage - Voluntary Reductions

During Stage 1, the Town shall implement a public information campaign to inform customers regarding the special need to conserve water due to drought conditions, or any other factor which would cause a reduction in the Town's water supply. The public information campaign shall address certain water use restrictions which customers may implement on a voluntary basis. The list of voluntary restrictions is provided in the model ordinance (Attachment 1) and summarized in Table 3.

Stage 2 – Mandatory Rationing-Community Cooperation Method

In the event that further water conservation is necessary the Town will ask customers to reduce their water consumption by 15 to 25 percent dependant upon the specific water supply conditions. Water allotments may be recommended in a resolution or ordinance depending on alternative supplies and the Town's needs. The Town shall inform its customers that water shortage conditions have reached a magnitude that requires the implementation of mandatory restrictions on the uses of water. The Town will implement water reductions by user class, in order of importance, for healthcare and public safety, non residential use, irrigation use, and residential use – percent of water allotted to them.

In addition further non-essential water use prohibitions are recommended to meet necessary water consumption reductions. For example, it is suggested that restaurants implement a “water on

request” program. The list of restrictions on water use are defined as non-essential uses in the model ordinance (Attachment 1) and summarized in Tables 3 and 4.

### Stage 3 – Mandatory Restrictions of Both the Uses of Water and the Amounts of Water Used.

If it is determined that further water consumption reductions are necessary or that stage 2 reduction methods are not effective, it may be recommended that water customers implement a water allotment/penalty method. The necessary water consumption reduction will be 25 to 50 percent. Water allotments will be assigned for each water use class depending on the necessary water conservation percent reduction.

To further achieve water consumption reductions the Model Ordinance recommends limits on all new connections, excluding the exemptions listed in the Model Ordinance. Recommendations for construction offset programs are also included in the Model Ordinance. The list of additional non-essential uses for Stage 3 are defined in the Model Ordinance (Attachment 1) and summarized in Tables 3 and 4.

### **Catastrophic Supply Interruption Plan (Water Code §10632(c))**

The Town of Windsor Water System Master Plan describes the mitigation strategies that may be implemented to limit the impact due to catastrophic events resulting in long-term and short-term interruptions of their water supplies, excluding water shortages and interruptions due to drought. Catastrophic events that have been addressed by the Town include toxic spills, earthquakes, floods, fires, and power outages. The preparation actions for these catastrophic events are summarized in Table 2.

In the event of an emergency, a designated Emergency Operations Center (EOC) may be activated to act as a coordination center for all of the District’s emergencies. Town personnel will be required to inspect wells, storage tanks, and transmission lines and file a report with the EOC. The EOC would set an order of priority for repair and shut down projects.

**Table 2. (DWR Table 25) Preparation Actions for a Catastrophe**

Possible Catastrophe	Summary of Actions
Earthquake	Shut-off isolation valves and above ground use of flexible piping for ruptured mains
Floods	Use of the Aqueduct, Bluebird Facility, and storage while Russian River Well sites are interrupted
Toxic Spills	Use of the Aqueduct, Bluebird Facility, and storage while Russian River Well sites are interrupted
Fire	Storage supplies for fire flows
Power outage or grid failure	Portable and emergency generators available for Town, Russian River Well Field, and Aqueduct facilities
Severe winter storms	Portable and emergency generators available for Town, Russian River Well Field, and Aqueduct facilities
Hot Weather	Portable and emergency generators available for Town, Russian River Well Field, and Aqueduct facilities

**Prohibitions, Penalties, and Consumption Reduction (Water Code §10632(d)-(f))**

Table 3 lists the suggested non-essential water uses and water waste prohibitions. For exceptions to prohibitions or non-essential water uses refer to the Town’s Municipal Code Section 12-3-361 which contains regulations and restrictions on water use (Attachment 2). Non-essential water use prohibitions in a subsequent stage include the prohibitions from the previous stage.

**Table 3. (DWR Table 26) Voluntary Restrictions and Mandatory Prohibitions**

Examples of Water Waste Prohibitions and Non-Essential Water Uses	Stage When Prohibition Becomes Mandatory
Washing of sidewalks, walkways, driveways, parking lots, and other hard surfaces	Water Waste Prohibition
Irrigation in a manner that causes run-off or unreasonable overspray	Water Waste Prohibition
Washing cars, boats, trailers, or other vehicles without a hose with a shutoff nozzle	Water Waste Prohibition
Water for non-recycling decorative water fountains	Water Waste Prohibition
Water for non-recycling car and industrial clothes wash systems	Water Waste Prohibition
Water for single pass evaporative cooling systems	Water Waste Prohibition
Un-repaired leaks	Water Waste Prohibition, Stage 1
Refilling a swimming pool	Stage 1
Non-commercial washing of motor vehicles, trailers, and boats except with a bucket and a hose with a shut-off nozzle for a rinse	Stage 1
Use of fire hydrants except for essential needs or by permit	Stage 2
Watering of any existing turf grass, ornamental plant, garden, landscaping or other plants, except using a hand-held container or drip irrigation	Stage 2
Watering of new turf grass or landscaping	Stage 2
Initial filling of a swimming pool	Stage 2

Note: Refer to the Town of Windsor’s Municipal Code Section 12-3-361 for their Water Waste Prohibition.

The actual percent reductions and the stage of action depend on the total water requirement necessary, available supply, and alternative sustainable local supplies. Consumption reduction methods are listed in Table 4.

**Table 4. (DWR Table 27) Consumption Reduction Methods**

Consumption Reduction Methods	Stage When Method Takes Effect	Projected Reduction (%)
Water waste prohibitions	At all times	
Reduce pressure in the water lines	Stage 1	15
Prohibit non-essential water use	Stage 1	15
Education and outreach program	Stage 1	15
Water conservation plumbing fixture replacement	Stage 1	15
Voluntary rationing	Stage 1	15
Water shortage pricing, rate adjustments	Stage 2	15-25
Mandatory rationing	Stage 2, 3	15-50
Restrict use for irrigation	Stage 2,3	15-50
Restrict new water connections	Stage 2,3	15-50
New construction offset programs	Stage 2,3	15-50
Per capita allotment by customer type	Stage 3	25-50

Table 5 summarizes suggested penalties when the violation has not been remedied or is repeated. Depending on the extent of the water waste the Town may, after written notification to the customer and a reasonable time to correct the violation, as solely determined by the Town, take some or all of the actions in Table 5. The Stage when the penalties take effect is based on the model ordinance (Attachment 1).

**Table 5. (DWR Table 28) Penalties and Charges**

Penalties or Charges	Stage When Penalty Takes Effect
Termination of service	Stage 2
Flow restriction	Stage 2
Reconnection fee	Stage 2
Water waste fee	Stage 3

Note: Penalties and charges in this table are based on the Town of Windsor's Municipal Code Section 12-3-361, Regulations and Restrictions on Water Use.

**Analysis of Revenue Impacts of Reduced Sales During Shortages (Water Code §10632(g))**

Measures available to the Town to offset impacts during water shortages would include rate adjustments, or revision of the tier levels, and use of financial reserves including the general fund. Due to reduction in water sales the revenue obtained from water sales will be reduced, however much of the operations and maintenance expenses for the Town will remain the same. The Town may experience increased expenditures for public information and outreach campaigns and staffing. A “Revenue Impact Model – Step by Step Instructions” (Attachment 4) was supplied to the Town by the Agency to assist the Town in analyzing the financial impacts during a water shortage and make decisions on actions to be taken. In the event of a water shortage, the Town would evaluate the financial impact for the needed percent water consumption reduction. Tables 6 and 7 list suggestions to overcome the revenue and expenditure impacts.

**Table 6. (DWR Table 29) Proposed Measures to Overcome Revenue Impacts**

Names of measures	Summary of effects
Rate adjustment	Offset loss in revenue
Use of financial reserves	Offset loss in revenue

**Table 7. (DWR Table 30) Proposed Measures to Overcome Expenditure Impacts**

Names of measures	Summary of effects
Reconnection fees	Support water conservation programs
Excessive use charges	Support water conservation programs
Construction offset programs	Support water conservation programs

**Water Shortage Contingency Draft Ordinance and Use Monitoring Procedure (Water Code §10632(h) and (i))**

As noted above, the Sonoma County Water Agency Board has approved an allocation methodology for use by the Town in the event of a water supply shortage. The draft model ordinance and allocation methodology are provided as Attachments 1 and 3, respectively. It is recommend by Sonoma County Water Agency that the Town utilize a chart depicting actual community water use compared to overall rationing goal and provide this information to the media and the public to

encourage water conservation. Sonoma County Water Agency developed recommendations for the Town to monitor water use reductions as shown in Table 8.

**Table 8. (DWR Table 31) Water Use Monitoring Mechanisms**

Mechanisms for determining actual reductions	Data expected
Continuous system data collection	Normal water usage
Review of water use data	Percent reduction based on weather and growth normalized projected demand
Review of production data	Percent reduction based on historical usage normalized for growth and weather
Increased meter reading (Stage 3)	Regular water usage information during shortage
Agency supply meters	Quantity of delivered water

**Attachments**

- Attachment 1            Draft Water Shortage Contingency Model Ordinance
- Attachment 2            Town of Windsor Municipal Code Section 12-3-361 Regulations and  
Restrictions on Water Use
- Attachment 3            Water Supply Allocation Model
- Attachment 4            Revenue Impacts of the Model Ordinance



**ATTACHMENT 1**

**Water Shortage Contingency Model Ordinance**



# MODEL WATER SHORTAGE EMERGENCY ORDINANCE

## ORDINANCE NO.

AN ORDINANCE OF <CITY/DISTRICT> DECLARING THE EXISTENCE OF A WATER SHORTAGE EMERGENCY CONDITION WITHIN THE <CITY/DISTRICT>, PROHIBITING THE WASTE AND NON-ESSENTIAL USE OF WATER, AND PROVIDING FOR THE CONSERVATION OF THE WATER SUPPLY OF THE <CITY/DISTRICT>

BE IT ORDAINED by the <City Council /Board of Directors> as follows:

### Section 1. Declaration of a Water Shortage Emergency

The <City Council /Board of Directors> does hereby find and declare as follows:

(a) Pursuant to Resolution No. \_\_\_\_\_ duly adopted by this <Council/Board> on <date1>, a public hearing was held on <date2>, on the matter of whether the <City/District> should declare that a water shortage emergency condition exists within the water service area of the <City/District>.

(b) Notice of said hearing was published in the <name of paper>, a newspaper of general circulation printed and published within said water service area of the <City/District>.

(c) At said hearing all persons present were given an opportunity to be heard and all persons desiring to be heard were heard.

(d) Said hearing was called, noticed and held in all respects as required by law.

(e) The <City Council /Board of Directors> heard and has considered each protest against the declaration and all evidence presented at said hearing.

(f) A water shortage emergency condition exists and prevails within the territory of the <City/District>. Said water shortage exists by reason of the fact that the ordinary demands and requirements of the water consumers in the <City/District> water service area cannot be met and satisfied by the water supplies now available to this <City/District> without depleting the water supply to the extent that there would be insufficient water for human consumption, sanitation and fire protection.

### Section 2. Purpose and Authority

The purpose of this ordinance is to conserve the water supply of the <City/District> for the greatest public benefit with particular regard to public health, fire protection and domestic use, to conserve water by reducing waste, and to the extent necessary by reason of the existing water shortage emergency condition to reduce water use fairly and equitably. This ordinance is adopted pursuant to Water Code Sections 350 to and including 358, and Sections 31026 to and including 31029.

### Section 3. Definitions

The terms used in this ordinance shall have the following meanings:

- (a) Corresponding billing period - A similar billing period occurring in a prior designated year to which current water use is compared for the purpose of determining the percent reduction in use.
- (b) Drip system - An irrigation system downstream of a reduced pressure device fitted with drip emitters, bubblers or low pressure micro-jet sprayers.
- (c) ETo - Evapotranspiration demand reported as reference evapotranspiration for each California Irrigation Management Information System (CIMIS) weather station located in Sonoma and Marin Counties. (Local ETo data is available by calling <insert Local CIMIS hot-line phone number>).
- (d) ETo Adjustment Factor - A factor to multiply times ETo to determine the appropriate amount of water to apply to turf grass while rationing is in effect. The amount of water to apply is found by multiplying the area of turf to be irrigated (square ft) times the ETo Adjustment Factor (see percentage in Section 9(c)) times ETo (inches for a given period of time - typically 3 to 7 days) times 7.48/12 to convert to gallons.
- (e) Healthcare and public safety use - Use of water by customers whose principal purpose is to provide health services to the public (such as hospitals, clinics, invalid and senior care facilities and homes, and doctor, dentist, optometrist and chiropractor offices, etc.) or which provide vital public safety services (such as police stations, jails, fire stations, utility services, etc.). Not included in this class are office buildings that provide solely administration services (such as health insurance organizations, etc.) or landscaping uses at any healthcare or public safety site.
- (f) Irrigation only use - Water use downstream of a <City/District> owned billing meter whose principal purpose and design is to serve irrigation use.
- (g) Overall mandatory rationing requirement - The percent reduction in overall withdrawals from the water system determined by the <City Council/Board of Directors> to be necessary in order to achieve and to safely survive the water shortage emergency.
- (h) Run-time - The duration in minutes either programmed or set for each valve controlled by an irrigation system clock (controller) or manually operated.
- (i) Shop unit - A type of residential unit which is separately metered and which involves a dwelling unit that is incorporated into the premises of a business - sometimes also referred to as a shop house or live/work unit.
- (j) Sprinklers - As used in this ordinance the term sprinklers means an irrigation sprinkler connected to a hose, irrigation sprinklers connected to an in-ground pipe system, and soaker

hoses or porous pipelines operating off of normal service pressure.

#### **Section 4. Effect of Ordinance**

This ordinance shall take effect immediately, shall supersede and control over any other ordinance or regulation of the <City/District> in conflict herewith, and shall remain in effect until the <City Council /Board of Directors> declares that the water shortage emergency has ended.

#### **Section 5. Suspension of New Connections to the <City's/District's> Water System**

(a) From the effective date of this ordinance until the date the <City Council /Board of Directors> by resolution declares that the water shortage has ended, which period is hereinafter referred to as the suspension period, no new or enlarged connection shall be made to the <City's/District's> water system except the following:

- (1) Connection pursuant to the terms of connection agreements which prior to <date1>, had been executed or had been authorized by the <City/District> to be executed;
- (2) Connection of fire hydrants.
- (3) Connection of property previously supplied with water from a private water source (such as a well or spring) upon submittal and approval of the <title of designated official> evidence that the private source has failed or dried up or has otherwise been impaired by the drought or water shortage event to such a degree that the source no longer can meet minimal potable water needs of the applicant.
- (4) During Stage 2 and 3 if the overall mandatory rationing requirement is equal to or less than 30%, connection of property for which the applicant has obtained all approvals required for development, except potable water supply, and agrees to defer installation of landscaping until after the suspension period.
- (5) During Stage 2 and 3 if the overall mandatory rationing requirement is greater than 30%, connection of property for which the applicant: has obtained all approvals required for development except potable water supply; agrees to defer installation of landscaping until after the suspension period; and, either retrofits good quality water conservation fixtures and devices (1.6 gallon per flush toilets, 2.5 gallon per minute shower heads, and 2.2 gallon per minute faucet aerators for kitchen sinks and lavatories) in five existing single family detached dwelling units served by the <City/District>, or pays the <City/District> \$1,500 per equivalent single family detached dwelling unit for which water service is being applied. These payments shall be used by the <City's/District's> to help fund its expanded water conservation program efforts during the suspension period. If an applicant chooses the retrofit option and a selected home already has some water conserving fixtures, applicant shall install conservation fixtures in additional dwellings as determined necessary by the <title of designated official>.

(b) During the suspension period, applications for water service will be processed only if the applicant acknowledges in writing that such processing shall be at the risk and expense of the applicant and that if the application is approved in accordance with the <City's code/District's regulations>, such approval shall confer no right upon the applicant or anyone else until the

suspension period has expired, and that the applicant releases the <City/District> from all claims of damage arising out of or in any manner connected with the suspension of connections.

(c) Upon the termination of the suspension period, the <City/District> will make connections to its water system in accordance with its <code/regulations> and the terms of connection agreements for all said applications approved during the suspension period. The water supply then available to the <City/District> will be apportioned equitably among all the customers then being served by the <City/District> without discrimination against services approved during the suspension period.

(d) Nothing herein shall prohibit or restrict any modification, relocation or replacement of a connection to the <City's/District's> system if the <title of designated official> determines that the demand upon the <City's/District's> water supply will not be increased thereby.

**Section 6. Waste of Water Prohibited** *(Note: If your City/District has adopted a Water Waste Prohibition ordinance as a permanent feature of your Water Conservation Program, Subsection (a) below can be replaced with a reference to same.)*

(a) No water furnished by the <City/District> shall be wasted. Waste of water includes, but is not limited to, the following:

- (1) Washing of sidewalks, walkways, driveways, parking lots and other hard-surfaced areas by direct hosing, except as may be necessary to properly dispose of flammable or other dangerous liquids or substances, wash away spills that present a trip and fall hazard, or to prevent or eliminate materials dangerous to the public health and safety.
- (2) Escape of water through breaks or leaks within the customers plumbing or private distribution system for any substantial period of time within which such break or leak should reasonably have been discovered and corrected. It shall be presumed that a period of seventy two (72) hours after the customer discovers such a break or leak or receives notice from the <City/District>, is a reasonable time within which to correct such break or leak or, as a minimum, to stop the flow of water from such break or leak (also see Section 7 (2)).
- (3) Irrigation in a manner or to an extent which allows excessive run-off of water or unreasonable over-spray of the areas being watered. Every customer is deemed to have his water system under control at all times, to know the manner and extent of his water use and any run off, and to employ available alternatives to apply irrigation water in a reasonably efficient manner.
- (4) Washing cars, boats, trailers or other vehicles and machinery directly with a hose not equipped with a shutoff nozzle.
- (6) Water for non-recycling decorative water fountains.
- (6) Water for single pass evaporative cooling systems for air conditioning in all connections installed after \_\_\_\_\_<date3>\_\_\_\_\_ unless required for health or safety reasons.
- (7) Water for new non-recirculating conveyor car wash systems.
- (8) Water for new non-recirculating industrial clothes wash systems.

(b) Waste of water shall also include failure to put to reasonable beneficial use any water withdrawn from the <City's/District's> water system as determined by the <title of designated official>.

## **Section 7. Prohibition of Non-Essential Use of Water**

(a) No water furnished by the <City/District> shall be used for any purpose declared to be non-essential by this ordinance. The restrictions in this section shall not apply to use of recycled wastewater furnished by a government agency.

### Stage 1 - Introductory Stage (15% volunteer reduction)

(b) As of the effective date of this ordinance and continuing until Stage 2 is implemented, all customers are asked to voluntarily reduce consumption of water furnished by the <City/District> to 15% and all customers of the <City/District> are requested to:

- (1) Apply irrigation water only during the evening and early morning hours to reduce evaporation losses.
- (2) Inspect all irrigation systems, repair leaks, and adjust spray heads to provide optimum coverage and eliminate avoidable over-spray.
- (3) For irrigation valves controlling water applied to turf grass, vary the minutes of run-time consistent with fluctuations in weather.
- (4) Reduce minutes of run-time for each irrigation cycle if water begins to run-off to gutters and ditches before the irrigation cycle is completed.
- (5) Become informed about and strictly adhere to the <City's/District's> Water Waste Prohibition Ordinance (refer to Section 6 hereof).
- (6) Utilize water conservation incentive, rebate and giveaway programs to replace water guzzling plumbing fixtures and appliances with water efficient models.
- (7) Take advantage of the free information available from the <City/District> on how to use water efficiently, read a water meter, repair ordinary leaks, and how to apply water efficiently to the landscape.

(c) The following uses are declared to be non-essential from and after \_\_\_\_\_ <date1>

- (1) Refilling a swimming pool drained after \_\_\_\_\_ <date4> \_\_\_\_\_;
- (2) Water escaping from a broken pipe or leak once discovered and after passage of a reasonable amount of time to determine how to shut off the water;
- (3) Non-commercial washing of motor vehicles, trailers and boats except from a bucket with use of a hose equipped with a shutoff nozzle for a quick rinse.

### Stage 2 - Mandatory Rationing - Community Cooperation Method (X1% reduction)

(d) Stage 2 sets forth an overall mandatory rationing requirement of X1% for customers to

collectively meet. In determining compliance, the <City/District> shall rely on water production records comparing current production trends to trends that would normally be expected to occur. Individual customers who can conserve more than the overall mandatory requirement of X1% are requested and strongly encouraged to do so voluntarily in order to help those customers who would incur economic hardship in order to meet the rationing level.

(e) During Stage 2, the following additional uses are declared to be non-essential from and after <date5> :

- (1) Any residential use (excluding irrigation only use) in excess of X2% of the amount used by the customer during the corresponding billing period in <year1>.
- (2) Any irrigation only use in excess of X3% of the amount used by the customer during the corresponding billing period in <year1>.
- (3) Any non-residential use (excluding irrigation only use and healthcare and public safety use) in excess of X4% of the amount used by the customer during the corresponding billing period in <year1>.
- (4) Any water used for healthcare and public safety (excluding irrigation only use) in excess of X5% of the amount used by the customer during the corresponding billing period in <year1>.
- (5) Any use of water from a fire hydrant except for fighting fires, human consumption, stock water, essential flushing and clean-up purposes, and water used for construction needs. If the overall mandatory rationing requirement is greater than 30%, a permit issued by the <title of designated official> shall be required for all hydrant use except for water used for fighting fires or for other emergency use deemed essential by the a fire chief.
- (6) Watering of any existing turf grass, ornamental plant, garden, landscaped area, tree, shrub or other plant except from a hand-held hose or container or drip irrigation system except as provided in Section 9 hereof.
- (7) Watering of new turf grass or replacement turf grass. If the overall mandatory rationing requirement is greater than 30%, this restriction is extended and applies to watering of any new landscape or replacement landscape except in cases where the replacement landscapes will use less water than the original landscape.
- (8) Initial filling of any swimming pool for which approval of a construction permit issued by the <City/County> was made after <date5>;
- (9) Use for service of drinking water at any restaurant, café, cafeteria or other public place where food is sold, served or offered for sale, unless expressly requested by a patron.

(f) Except in cases of blatant non-compliance, as solely determined by the <title of designated official>, individual billing records will generally not be used during Stage 2 to determine compliance with the provisions of Subsections (e) (1), (2), (3) and (4), it being assumed that customers will cooperate to do the best that they can to individually meet or exceed the overall mandatory rationing requirement. Violations of non-essential uses that come to the attention of the <title of designated official>, however, will be enforced pursuant to the provisions of Section 11 hereof.

Stage 3 - Mandatory Rationing - Allotment Method (X1% reduction)

(g) From and after the date that the <City Council/Board of Directors>, by resolution, determines that the Stage 2 rationing method is not working and the overall mandatory rationing requirement of (X1%) is or may not be met, and/or, that it would be more equitable to apportion the available supply by a fixed allotment, water use in excess of the following allotments established for each meter are in addition declared to be non-essential:

- (1) Residential meters serving single family detached homes including mother-in-law or second units that are served by the same meter: X6 gallons per capita per day times the number of permanent occupants. Permanent occupants shall be a whole number. Babies, children, adults and senior citizens whose principal place of residence is in the dwelling in question shall each count as one occupant. In determining the number of permanent occupants, the <City/District> shall rely upon data it has acquired from the customer or other sources. Provided sufficient time is available, the <City/District> will attempt to canvas customers to obtain current data on permanent household occupants.
- (2) Residential meters serving multiple units: X2% of the amount used by the customer during the corresponding billing period in <year1>.
- (3) Irrigation only meters: X3% of the amount used by the customer during the corresponding billing period in <year1>.
- (4) Meters serving any non-residential use (excluding irrigation only metered use and healthcare and public safety use): X4% of the amount used by the customer during the corresponding billing period in <year1>.
- (5) Meters serving water used for healthcare and public safety (excluding irrigation only use): X5% of the amount used by the customer during the corresponding billing period in <year1>.
- (6) Meters serving mixed uses: An allotment to be determined by the <title of designated official> based upon the criteria contained in items (1) through (5) immediately above.

(h) Any customer exceeding their allotment, based on metered billing records, shall be billed and required to pay a penalty of \$X7 for each 1,000 gallons of such excess. This penalty charge shall be waived for the first bill received after Stage 3 is implemented and shall terminate the day the suspension period ends.

(i) If a connection to the <City/District> system was not in existence or used in <year1>, the <City/District> will estimate use in such year based on other historic records and/or water use by customers having similar end uses.

(j) The <title of designated official> may increase or decrease the allotment for any customer if he determines that special circumstances exist and that to do so would better achieve equity in allocation of available water or better meet health and safety concerns.

### **Section 8. Signs on Lands Supplied from Private Sources**

The owner or occupant of any land within the water service area of the <City/District> that is

supplied with water from a source not owned or operated by the <City/District> (such as a well, spring or legal surface diversion) which is used to irrigate landscape which is visible to the general public, will be requested to post and maintain in a conspicuous place thereon a sign furnished by the <City/District> giving public notice of the private supply.

**Section 9. Use of Sprinklers Conditional**

(a) Any customer of the <City/District> may use sprinklers to apply water furnished by the <City/District> to irrigate any turf grass, garden, landscaped area, trees or shrubs provided said application is properly controlled and performed in a non-wasteful and efficient manner confined to the nighttime hours of 7:00 p.m. and 9:00 a.m. of the next day. In the event low pressure micro-jet sprayers are present in a drip system, irrigation by the valve(s) controlling same shall also be confined to the nighttime hours noted above.

(b) The amount of water normally applied for landscape irrigation shall not exceed X3%. This condition shall not apply to residential customers if Stage 3 allotments are implemented.

(c) In determining the amount of water to apply to turf grass, customers are encouraged to use the following formula:

$$\begin{aligned} \text{Applied water for turf grass (gallons)} = & \text{Area of turf grass (square-ft)} \\ & \times \text{ETo (inches for a given period of time - typically} \\ & \text{3 to 7 days)} \\ & \times \text{ETo Adjustment Factor of } \underline{\text{X8\%}} \\ & \times \text{conversion factor of 0.62} \end{aligned}$$

The ETo Adjustment Factor is based on the assumption that overall irrigation efficiency is 65% and that the crop coefficient for turf grass is 0.8. Use of this formula to determine applied water will yield the appropriate amount of water to apply while rationing is in effect.

(d) Water applied by sprinklers shall be applied in short enough cycles to avoid run-off to gutters and drains.

(e) During the suspension period, use of water by sprinklers is a privilege and permission to use water in this way may be withdrawn if it comes to the attention of the <title of designated official> that such use by a given customer is wasteful or in excess of the amount determined in Section 8 (b). A common result of wasteful application of water by sprinklers is evidence of run-off to a gutter.

## Section 10. Variances

(a) Any customer of the <City/District> may make written application for a variance. Applications shall be addressed to:

<title of designated official>  
<address of City/District>

Said application shall describe in detail why applicant believes a variance is justified. The <title of designated official> may grant a variance to permit a use of water otherwise prohibited by this ordinance, if he determines that failure to do so would cause:

- (1) an emergency condition affecting the health, sanitation, fire protection or safety of the applicant or public; or
- (2) an unnecessary and undue hardship on the applicant or the public, including but not limited to, adverse economic impacts, such as loss of production or jobs.

(b) The decision of the <title of designated official> to deny an application for variance under this section may be appealed to the <City Council/Board of Directors> by submitting a written appeal to the <City/District> within fifteen (15) calendar days of the date of the decision. Variances granted by the <City Council/Board of Directors> shall be prepared in writing and contain any conditions imposed by the <City Council/Board of Directors> in granting said variance. The <City Council/Board of Directors> may require the variance be recorded at applicant's expense.

## Section 11. Enforcement and Fees

(a) During Stage 2 or 3, should the <title of designated official> become aware of any violation of any provision of this ordinance, the following enforcement procedure shall be undertaken:

- (1) For the first such violation, the customer shall be given a warning, generally by phone or directly in person by a <City/District> employee, or by leaving a door tag notice informing the customer of the problem and asking that it be corrected.
- (2) If the violation continues or is repeated, a certified letter shall be mailed to the customer who receives the water bill. Said letter shall describe the violation and request that it be corrected, cured and abated immediately or within such specified time as the <title of designated official> determines is reasonable under the circumstances. Said letter shall state the consequences of non-compliance with the request.
- (3) If the violation continues, the <title of designated official> may forthwith order disconnection of the service where the violation occurs.

(b) Before reconnection of a service, the customer must stop the violation, pay all past due charges on the account, and pay a Violation Reconnection Fee.

(c) If, during the suspension period, a water service is disconnected twice because of

violation of this ordinance, a flow restriction device may be installed by the <City/District> before service is reconnected. Furthermore, the customer must stop the violation, pay all past due charges on the account, and pay a Second Violation Reconnection Fee. If a flow restriction device is installed, the <City/District> shall remove same after expiration of the suspension period.

(d) If, during the suspension period, a water service is disconnected more than twice because of violation of this ordinance, a flow restriction device shall be installed by the <City/District> before service is reconnected. Furthermore, the customer must stop the violation or agree to stop the violation, pay all past due charges on the account, and pay a Subsequent Violation Reconnection Fee for each such instance.

(e) It shall be unlawful for any customer to willfully tamper with or in anyway modify or attempt to modify a <City/District> meter or anything within the <City's/District's> meter box. Violation shall result in customer being charged a Meter Tampering Fee plus the cost of labor and materials to remedy any damage caused to the <City's/District's> equipment as a result of such tampering.

(f) Anyone who willfully takes water from the <City/District> water system without the <City's/District's> permission or who willfully tampers with or causes damage to any <City/District> meter or water system appurtenance is liable to the <City/District> in the sum of \$500, as a civil penalty, for the first such act and \$1,000, as a civil penalty, for each subsequent act during the suspension period. This sum shall be recoverable by civil suit in a court of competent jurisdiction. This section does not limit the <City's/District's> right to recover the cost of any <City/District> water taken without the <City's/District's> permission.

(g) All customer fees required by this section shall be set by a resolution of the <City/District>.

## **Section 12. Severability**

If any section, subsection, sentence, clause, phrase, or word of this ordinance is for any reason held to be invalid, the validity of the remaining portion of this ordinance shall not be affected.

## **Section 13. Effective Date**

This ordinance shall become effective upon its adoption.

## **Section 14. Publication**

Within ten (10) days after its adoption, this resolution shall be published pursuant to Section 6061 of the Government Code in full in a newspaper of general circulation that is printed, published, and circulated in the <City/District>. If there is no such newspaper the resolution shall be posted within ten (10) days after its adoption in three public places within the <City/District>.

o o o o

I hereby certify that the foregoing is a true and complete copy of an ordinance duly and regularly adopted by the <City/District>> at a regular meeting thereof held on <date> by the following vote:

Ayes:

Noes:

Absent:

Abstained:

(SEAL)

---

Secretary  
<City/District>>



**ATTACHMENT 2**

**Town of Windsor Municipal Code  
Section 12-3-361 Regulations and Restrictions on Water Use**



The water of any consumer may be shut off from the main at any time for repairs, alterations or other purposes and the District shall inform such consumers, in advance, of the time such shutdown will occur and although notice is not received by the consumer due to his/her absence, the District will not be responsible nor liable for any consequent damage resulting from such shutdown. In the event of an emergency necessitating immediate action the service of any consumer may be shut off without prior notice and the District will not be liable for any consequent damages resulting from such shutdown.

### **12-3-361 Regulations and Restrictions on Water Use.**

a. Purpose. The purpose of this section is to promote water conservation and the efficient use of potable water furnished by the Town of Windsor by eliminating all intentional or unintentional water waste when a reasonable alternative solution is available, and by prohibiting use of equipment which is wasteful. Customers of the Town of Windsor shall comply with the following regulations and restrictions on water use:

b. Nonessential Uses. No customer of the Town of Windsor shall engage in or permit the following nonessential uses of potable water from the Town, regardless of whether the purpose is residential, commercial, institutional, industrial, agricultural or other:

1. The washing of sidewalks, walkways, driveways, parking lots and other hard-surfaced areas by direct hosing, except as may be necessary to properly dispose of flammable or other dangerous liquids or substances, to wash away spills that present a trip and fall hazard, or to prevent or eliminate materials dangerous to the public health and safety;
2. The escape of water through breaks or leaks within the customer's plumbing or private distribution system for any substantial period of time within which such break or leak should reasonably have been discovered and corrected. It shall be presumed that a period of seventy-two (72) hours after the customer discovers such a break or leak or receives notice from the Town, is a reasonable time within which to correct such break or leak or, as a minimum, to stop the flow of water from such break or leak;
3. Irrigation in a manner or to an extent which allows excessive runoff of water or unreasonable over spray of the areas being watered. Every customer is deemed to have his water system under control at all times, to know the manner and extent of his water use and any runoff, and to employ available alternatives to apply irrigation water in a reasonably efficient manner;
4. Washing cars, boats, trailers or other vehicles and machinery directly with a hose not equipped with a shutoff nozzle;
5. Water for nonrecycling decorative water fountains;
6. Water for single pass evaporative cooling systems for air conditioning in all new installations unless required for health or safety reasons;
7. Water for new nonrecirculating conveyor car wash systems;
8. Water for new nonrecirculating industrial clothes wash systems.

c. Exempt Water Use. All water use associated with the operation and maintenance of fire suppression equipment or employed by the Town for water quality flushing and sanitation purposes shall be exempt from the provisions of this section. Use of water supplied by private well or from a reclaimed water, grey water or rainwater utilization system is also exempt.

d. Variances. Any customer of the Town may make written application for a variance. Such application shall describe in detail why applicant believes a variance is justified.

1. The Town Manager or his/her designee may grant variances for the use of water otherwise prohibited by this section upon finding and determining that failure to do so would cause an emergency condition affecting the health, sanitation, fire protection or safety of the applicant or public, or that denial would cause an unnecessary and undue hardship on applicant or public, including but not limited to, adverse economic impacts, such as loss of production or jobs.
2. The decision of the Town Manager may be appealed to the Town Council by submitting a written appeal to the Town Clerk within fifteen (15) calendar days of the date of the Town Manager's decision. Upon granting any variance on appeal, the Town Council may impose any conditions it determines to be just and proper. Variances granted by the Town Council shall be prepared in writing and the Town Council may require the variance be recorded at applicant's expense.

e. Enforcement and Fees. Depending on the extent of the water waste the Town may, after written notification to the customer and a reasonable time to correct the violation, as solely determined by the Town, take some or all of the following actions. Penalties, fees and charges noted below shall be established by resolution of the Town:

1. Written notice to the customer of the waste water violation including a specified period of time from notification to correct the violation;
2. Personal contact with the customer at the address of the water service. If personal contact is unsuccessful, written notice of the violation including a date by which the violation is to be corrected may be left on the premises and a copy of the notice sent by certified mail to the customer;
3. The Town may install a flow-restricting device on the customer's service line;
4. The Town may levy a water waste fee on the customer, which after service of written notice of the fee, as provided for above shall become a special assessment against the property on which the waste occurred and be collected at the same time and in the same manner as ordinance Town taxes. The procedure for such assessment shall be as provided for Title 3, Chapter 8, Article 3 of this Code;
5. The Town may cause termination of water service and the charge for same shall be billed to the customer. Except in some cases of extreme emergency as solely determined by the Town Manager, service shall not be restored until the Town verifies that the violation has been corrected and all charges and fees have been paid. (Ord. No. 99-123 § 1; Ord. No. 2000-129 § 1)

### **12-3-365 Maintenance of Water Service Connection Generally.**

All water service pipes and connections to water mains within the District shall be installed and maintained by the District to the customer



**ATTACHMENT 3**

**Water Supply Allocation Model**



**Description of Model that Calculates the  
Allocation of Water Available to Sonoma County Water Agency for its Customers\*  
During a Water Supply Deficiency Taking Demand Hardening into Account**

**April 4, 2006 Version**

This EXCEL workbook (040406 Allocation Model.xls) presents two models that calculate allocations to Sonoma County Water Agency (SCWA) Customers during a shortage of water supply in the Russian River. The calculations meet all of the requirements of the Restructured Agreement for Water Supply (Agreement). See **Contents** sheet for layout of sheets in the workbook. Another EXCEL workbook (040406 Customer Water Use.xls) supports this workbook and contains data compiled for the 2005 Urban Water Management Plan.

\* "SCWA Customers" or "Customer" is defined as any of the following:

**Regular Customers**

Water Contractors (sometimes referred to as "Primes"): Cotati, Petaluma, Rohnert Park, Santa Rosa, Sonoma, Windsor (Airport Service Area), North Marin Water District, Valley of the Moon Water District

Other Agency Customers: SCWA, County of Sonoma, Larkfield Water District, Forestville Water District, Lawndale Mutual Water Co., Kenwood Village Water Co., Penngrove Water Co., City of Sebastopol, State of California, and Santa Rosa Jr. College)

**Marin Municipal Water District (MMWD)**

**Russian River Customers** (Customers of SCWA that divert water directly from the Russian River or via wells adjacent to the River).

**Where to Find Results:**

Results for allocating water during a shortage given varying assumed amounts of water available to SCWA in the Russian River are modeled for two cases.

- The **Current Model** is to be employed during a real drought. Inputs to this model must be updated to then current conditions. For current conditions, results are shown on the **Current Recap** sheet.
- The **Future Model** is a "planning" model whose purpose is to predict allocations for various levels of deficiency in the future when all Customers are assumed to have reached their entitlement limits – generally about 20 years from now for most Customers. (Note: This was the type of model prepared by West, Yost & Associates for the City of Santa Rosa and is also the type prepared by Petaluma.) Results are shown on the **Future Recap** sheet.

**Required Allocation Methodology:**

Section 3.5(a)(3) of the Agreement provides for allocation of water in the event of a water supply deficiency as follows:

- **"First"**, Allocation of quantities of water required by each Customer\* for human consumption, sanitation and fire protection (HC, S & FP) after taking into consideration all other sources of potable water then available to said customer. (Section 3.5(a)(3)(i)) (Often referred to as Tier 1.)
- **"Second"**, Allocation of any additional water available to the SCWA proportionately to its Customers\* as follows (Section 3.5(a)(3)(ii)) (Often referred to as Tier 2 allocation.):

Regular Customers (Water Contractors and Other Agency Customers): Deliveries from aqueduct based on respective average daily rate of flow during any month entitlements. These entitlements are set forth as million gallon per day (mgd) rates in Sections 3.1(a) and 3.2 of the Agreement.

Russian River Customers: Authorized diversions or rediversions of water based on delivery limits set forth in agreements with the SCWA.

Marin Municipal Water District (MMWD): Deliveries based on Third Amended Offpeak Agreement and Agreement for Sale of Water (as amended on Jan 25, 1996), and amendments or subsequent agreements between the SCWA and MMWD that have been approved by the Water Advisory Committee.

- **Sum of Two:** The Agreement further requires that the sum of the "First" plus "Second" allocation for a given SCWA Customer not exceed the Reasonable Requirement or entitlement limit/contracted amount, whichever is less (Section 3.5(a)(3)(iii)).

#### **"Human Consumption, Sanitation and Fire Protection" Definition:**

In determining HC, S & FP amounts, the Agreement provides that SCWA shall take into account the level of water conservation achieved by the Customer and the resulting decrease in end user ability to reduce water use (the hardening of demand) resulting from such conservation. The allocation shall be determined using a methodology which rewards and encourages water conservation; avoids cutbacks based upon a percentage of historic consumption, and, among other things, bases the amounts necessary for HC, S & FP upon no greater than average indoor per capita water use determined from recent retail billing records for winter water use by all of the Water Contractors; and, if necessary or appropriate for equitable purposes, considers commercial, industrial and institutional water uses separately and determines that element of the allocation based on winter water use from recent retail billing records for commercial, industrial and institutional uses. (Section 3.5(c)(1))

#### **"Reasonable Requirements" Definition:**

The Agreement states that the fundamental purpose of the Reasonable Requirements limitation is to ensure that no Customer receives more water during a shortage than that Customer reasonably needs. In determining reasonable requirements, the SCWA may take into account the hardening of demand resulting from the level of conservation achieved by the Customer; the extent to which the Customer has developed recycled water projects and local supply projects, and the extent to which the Customer has implemented water conservation programs. The Agreement further states that it is the intention of the

parties that the SCWA make its Reasonable Requirements determinations so as to encourage Customers to implement water conservation, recycled water, and local supply projects. (Section 3.5(c)(2))

### **Description of Models:**

Two models are presented.

- **Current Model:** The Current Allocation Model determines annual allocations based on the assumption the water supply deficiency occurs now and impacts current conditions and levels of use. This is the model that would be used in the event of an actual deficiency in water supply available from the Russian River. It employs estimates of HC, S & FP needs, Reasonable Requirements, and Local supply. In the event of a real perceived water supply deficiency, inputs to the model must be updated to then currently available data. If the shortage persists longer than one year the inputs must again be updated – particularly local supply estimates which should be updated every year of the drought. Customers relying on surface water for local supply, such as North Main Water District, and MMWD, can be expected to have reduced local supply available.
- **Future Model:** The second model is hypothetical and predicts future allocations at a point in time that assumes that all customers of the SCWA have reached their annual entitlement limits. It sets the Reasonable Requirement for each SCWA Customer to that customer’s annual entitlement limit (cap). The Future Allocation Model is useful for planning purposes to predict allocations from the SCWA for various assumed water supply deficiencies.

### **Model Assumptions and Inputs:**

1. **Entitlements:** Entitlements (Regular Customers) and contracted amounts (MMWD and Russian River Customers) for both models are as set forth in the Agreement and existing agreements between the SCWA and MMWD and its Russian River Customers. (See **Entitlements** and **RR Cust** sheets.)
2. **Local Supplies:** The estimates of safe yield of local supplies are the same for both models and are based on estimates reported by Water Contractors to West, Yost & Associates in a September 23, 2004 Tech. Memo to the City of Santa Rosa and are generally average local supply that was available for the period 2000 through 2003. A contingency factor is applied by John Olaf Nelson Water Resources Management (JONWRM) to each local supply to account for equipment/maintenance issues or other potential problems. This factor was assumed to be 10% for each Water Contractor for lack of better data. The safe yield value for MMWD was supplied by MMWD. Local supply estimates for Other Agency Customers were not available and was assumed to be “0”. Information on Local supplies needs to be accurately determined and updated by the SCWA. (See **Local** and **TM Data** sheets.)
3. **Water for Human Consumption, Sanitation and Fire Protection:** Water needed to meet HC, S & FP needs for both models is assumed to be equal to total winter level demand of customers served by Customers of the SCWA and is based on metered water sales (billings) for calendar 2004, the base year analyzed in the 2005 Urban Water Management Plan. Winter level demands are then extrapolated to a full year to determine the annual HC, S & FP need. Water available

from local supplies is then determined and net HC, S & FP needs determined in order to calculate the “First” allocation. In determining the “First” allocation, demand hardening is accounted for using winter level per capita demand. (See **GPCD** and **Human** sheets and the footnotes on the Current Model for details.)

#### 4. Reasonable Requirements:

- For the Current Model, Reasonable Requirements were assumed to equal average annual aqueduct deliveries to SCWA’s Regular Customers and MMWD for FY 2003-04 and FY 2004-05. For Russian River Customers, the average for Water Years 2004 and 2005 was used, as that was the format the data was available in. (Use of a three or four year average would normally be a better choice for calculating Reasonable Requirements, however, this was not done as at least one SCWA customer made a significant policy change in aqueduct usage which would not have been fairly reflected if years prior to FY 2003-04 were used. Also in subsequent analyses, the data should be normalized to common annual periods.) (See **Reasonable** sheet.) Pursuant to Section 3.5(c)(2), Reasonable Requirements were adjusted with a demand hardening factor to account for differing levels of conservation achieved by Customers. The demand hardening factor is derived from total per capita demand (residential, non-residential and unaccounted for water) as determined for the base year (cal. 2004) of the 2005 Urban Water Management Plan. (See **DH Factor** sheet.)
- In the Future Model, Reasonable Requirements are set equal to annual entitlement limits (caps) or contract limits as applicable, it being assumed that each Customer has reached its annual entitlement limit (the same approach taken in the Santa Rosa and Petaluma models). **THIS IS THE ONLY INPUT DIFFERENCE BETWEEN THE “CURRENT” AND “FUTURE” MODEL.**

#### Model Design and Workbook Layout:

The two model sheets are totally independent and are designed to automatically calculate water shortage allocations for any SCWA available supply bounded by a low value equal to the sum of water required for HC, S & FP and an upper value equal to the sum of Reasonable Requirements or sum of annual entitlement limits, whichever is less. Cells in both models are linked to the various supporting data sheets.

To operate a model, simply input the assumed available supply in Cell H:4 of the model you are working with. The results – the sum of the “First” (Tier 1) plus “Second” (Tier 2) allocation appear to the far right (Column 42 of the Current Model and Column 39 of the Future Model).

The Current Model sheet is followed by a sheet entitled “Current Recap” that shows the resulting allocations (both in tabular and graph form) for each Customer for various assumed levels of available supply. This recap and the graphs are automatically populated by running the Macro entitled “CurRecap”.

Likewise, following the Future Model sheet is a sheet entitled “Future Recap” which shows the tabular and graph results for the Future Model. This recap and the graphs are automatically populated by running the Macro entitled “FutRecap”.

**Caution Concerning Data Collection and Maintenance:**

With the allocation methodology introduced in the Agreement, it is essential that the SCWA develop and maintain a data base containing information collected from all of its Customers based on application of uniform standards, and containing data on water service area population, portion of population served by private wells (none of the models correct for private well water use by service area population), winter level water consumption, annual consumption, local supplies, unaccounted for water, conservation, recycled water use, etc. Good regional data on evapotranspiration differences may also be needed to modify the Reasonable Requirement demand hardening adjustment factor. A fair and uniform way to determine the safe yield of local supply capacity is especially important. It may be useful to categorize local supply into: (1) normally available and used capacity, and (2) strictly standby capacity that is more expensive to use than aqueduct water or has some non-threatening quality issues, i.e. taste and odor that make it undesirable to use under normal water supply conditions.

John Olaf Nelson Water Resources Management (JONWRM)  
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Ph: (707) 778-8620 Email: [jonolaf@comcast.net](mailto:jonolaf@comcast.net)

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**Contents of this EXCEL Workbook**  
**Water Shortage Allocation Model w. Demand Hardening Factor (a)**  
**April 4, 2006 Version**

**Models (Current and Future)**

<b>Page</b>	
1	<b>Contents</b>
2, 3	<b>Current Model</b> (To be used in case of imminent drought.)
3, 4	<b>Current Recap</b> (Recap of <u>Current</u> Allocation Model)
5, 6	<b>Future Model</b> (To be used for long range planning purposes.)
7, 8	<b>Future Recap</b> (Recap of <u>Future</u> Allocation Model)

**Input Data for Models**

9	<b>Entitlements</b> *
10	<b>RR Cust</b> (Russian River Customer demand) *
11	<b>Human</b> (Human Consumption, Sanitation and Fire Protection demand) *
12	<b>Reasonable</b> ("Reasonable Requirements" are recent (non-drought) aqueduct deliveries and Russian River diversions of SCWA Customers) **
13	<b>Local</b> (Local Supply expected to be available in a drought) *
14	<b>Pop</b> (Service Area population data) *
15	<b>GPCD (Winter level per capita demand (b))</b>
16	<b>DH Factor</b> Demand Hardening Factor - used for adjusting "Reasonable Requirements" in <u>Current</u> Model
17	<b>TM Date</b> Data compiled by West, Yost & Associates for Santa Rosa Planning Allocation Model

\* Same data used in both Current and Future Model.

\*\* Based on aqueduct sales and Russian River diversions in recent non-drought years. In the Future Model, reasonable requirements are set equal to annual entitlement limits (caps) or contract delivery limits as applicable in order to estimate allocations at that time in the future when demand has grown to equal the annual entitlement limits.

For questions, contact:

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Ph: (707) 778-8620

Email: jonolaf@comcast.net

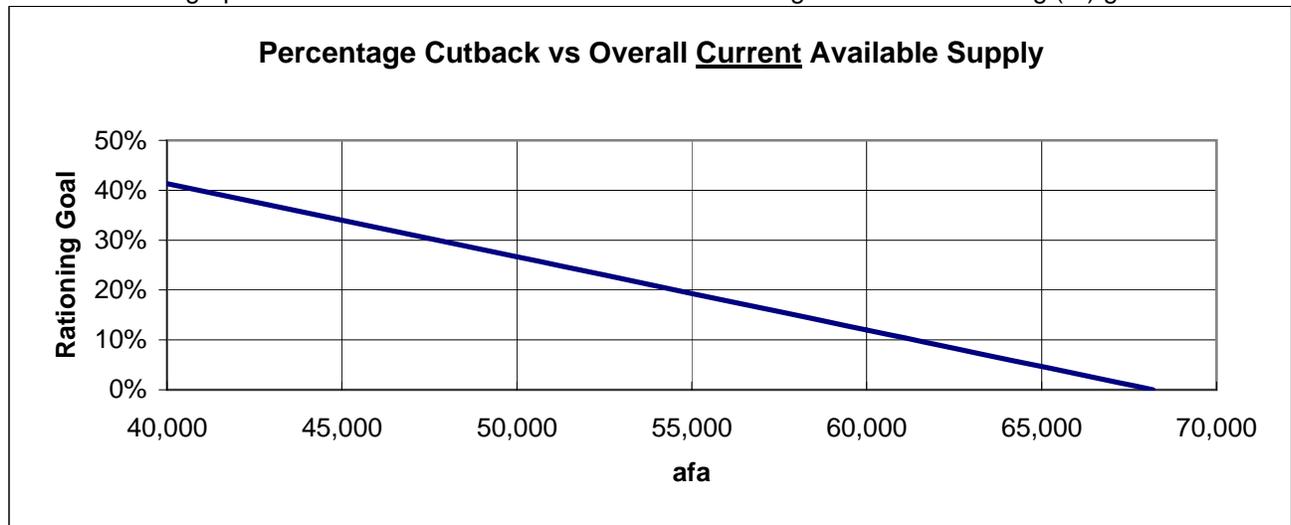
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**Results for Current Allocation Model vs. Assumed Available Supply**

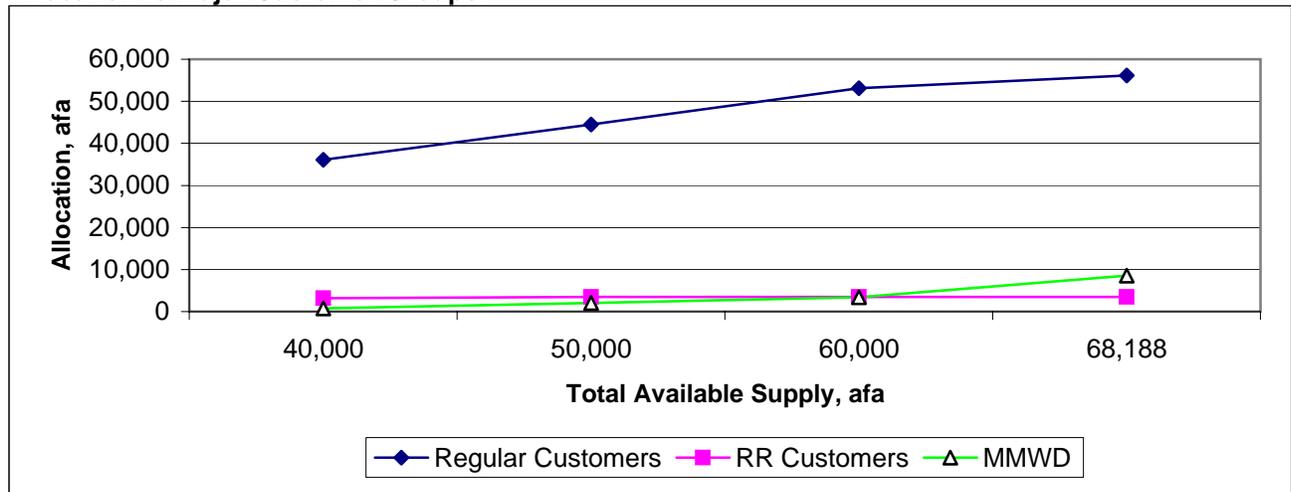
Available RR SCWA Supply, afa >	<b>40,000</b>	<b>50,000</b>	<b>60,000</b>	<b>68,188 *</b>
Equivalent Cutback in Deliveries >	<b>41.3%</b>	<b>26.7%</b>	<b>12.0%</b>	<b>0.0%</b>
Regular Customers				
Cotati	694	928	1,095	1,095
Petaluma	6,155	7,501	8,952	9,735
Rohnert Park	2,924	3,850	4,849	5,246
Sonoma	1,261	1,650	2,069	2,200
Windsor	317	409	410	410
NMWD	4,775	6,004	7,328	8,459
Santa Rosa	16,856	20,351	24,118	24,737
VOM	2,157	2,682	3,086	3,086
Other Agency	949	1,116	1,207	1,207
Sub-Total	36,088	44,491	53,114	56,173
MMWD	737	2,014	3,391	8,520
Russian River Cust's	3,175	3,495	3,495	3,495
<b>Total</b>	<b>40,000</b>	<b>50,000</b>	<b>60,000</b>	<b>68,188</b>

\* Note: Max. Value is capped at 68,188 afa as this satisfies sum of Reasonable Requirements.

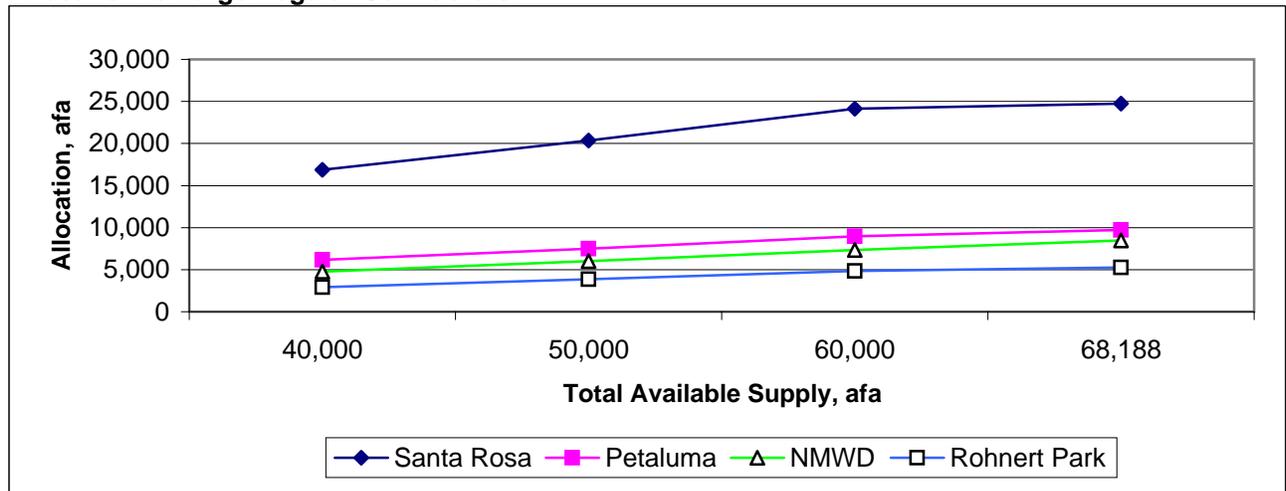
Tool: Use this graph to determine overall allocation available for a given overall rationing (%) goal.



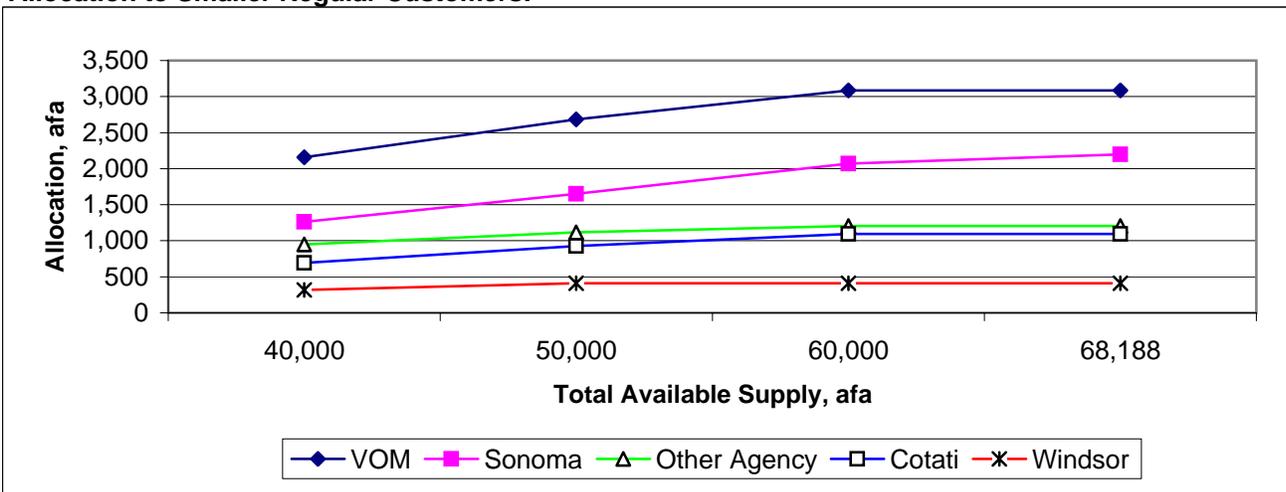
**Allocation to Major Customer Groups:**



**Allocation to Large Regular Contractors:**

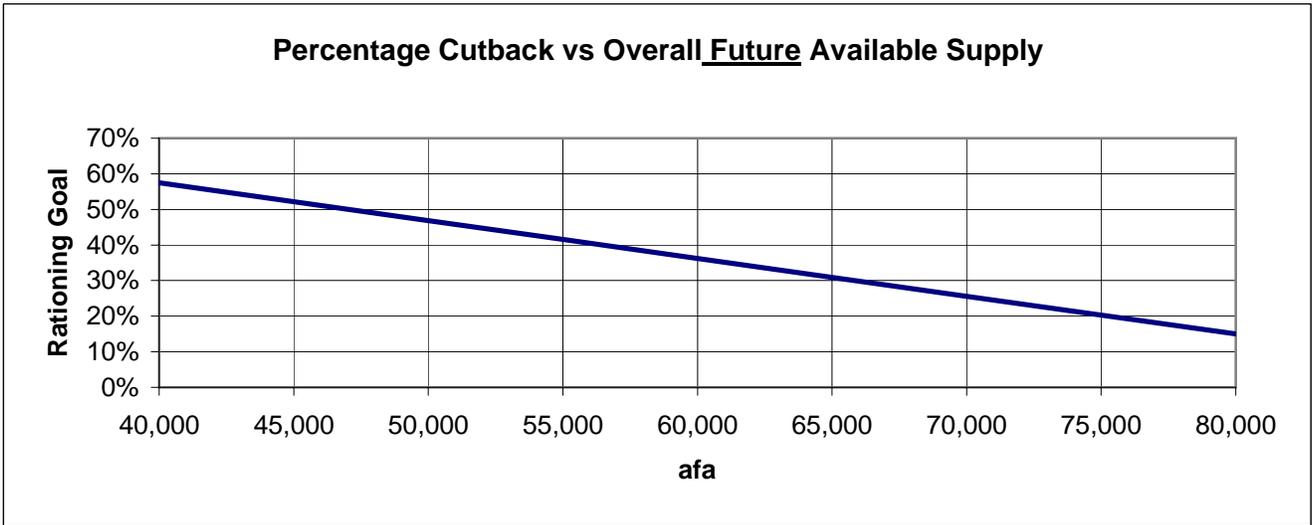


**Allocation to Smaller Regular Customers:**

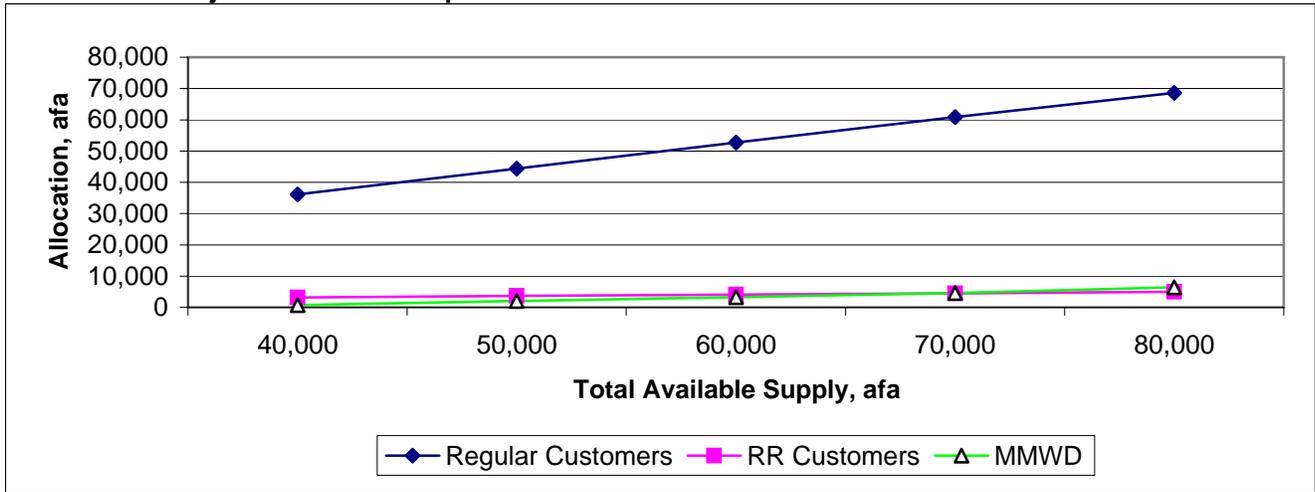


**Results for Future Allocation Model vs. Assumed Available Supply**

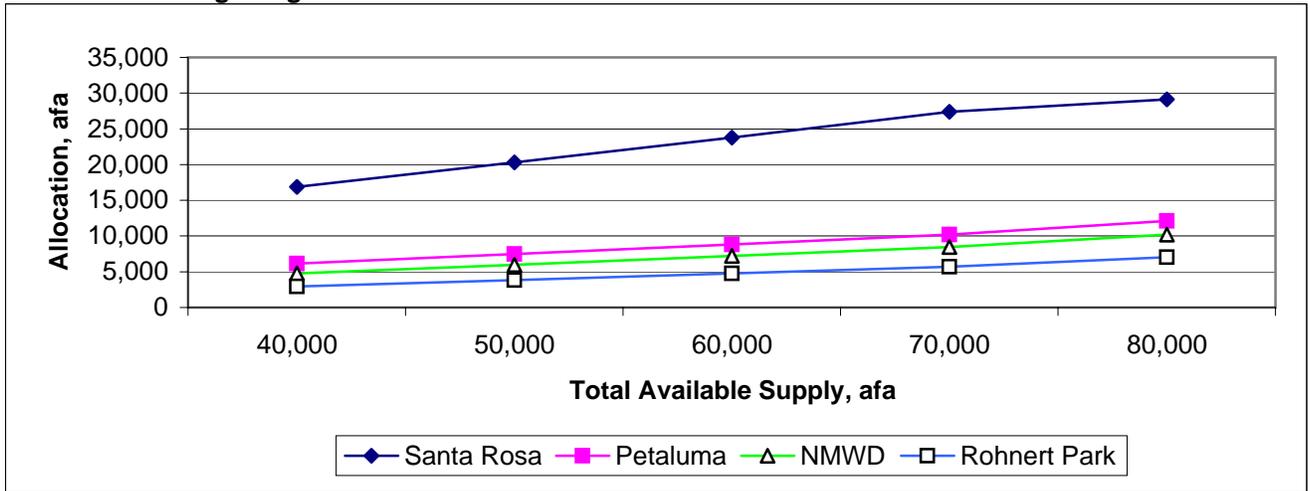
Available RR SCWA Supply, afa >	<b>40,000</b>	<b>50,000</b>	<b>60,000</b>	<b>70,000</b>	<b>80,000</b>
Equivalent Cutback in Deliveries >	<b>57.5%</b>	<b>46.9%</b>	<b>36.2%</b>	<b>25.6%</b>	<b>15.0%</b>
Regular Customers					
Cotati	694	925	1,157	1,401	1,520
Petaluma	6,155	7,484	8,813	10,214	12,118
Rohnert Park	2,924	3,838	4,753	5,716	7,027
Sonoma	1,261	1,645	2,029	2,433	2,984
Windsor	317	408	500	596	727
NMWD	4,775	5,988	7,201	8,480	10,218
Santa Rosa	16,856	20,306	23,756	27,393	29,100
VOM	2,157	2,675	3,193	3,200	3,200
Other Agency	949	1,113	1,278	1,451	1,687
Sub-Total	36,088	44,384	52,680	60,884	68,581
MMWD	737	1,998	3,259	4,587	6,394
Russian River Cust's	3,175	3,618	4,061	4,528	5,025
<b>Total</b>	<b>40,000</b>	<b>50,000</b>	<b>60,000</b>	<b>70,000</b>	<b>80,000</b>



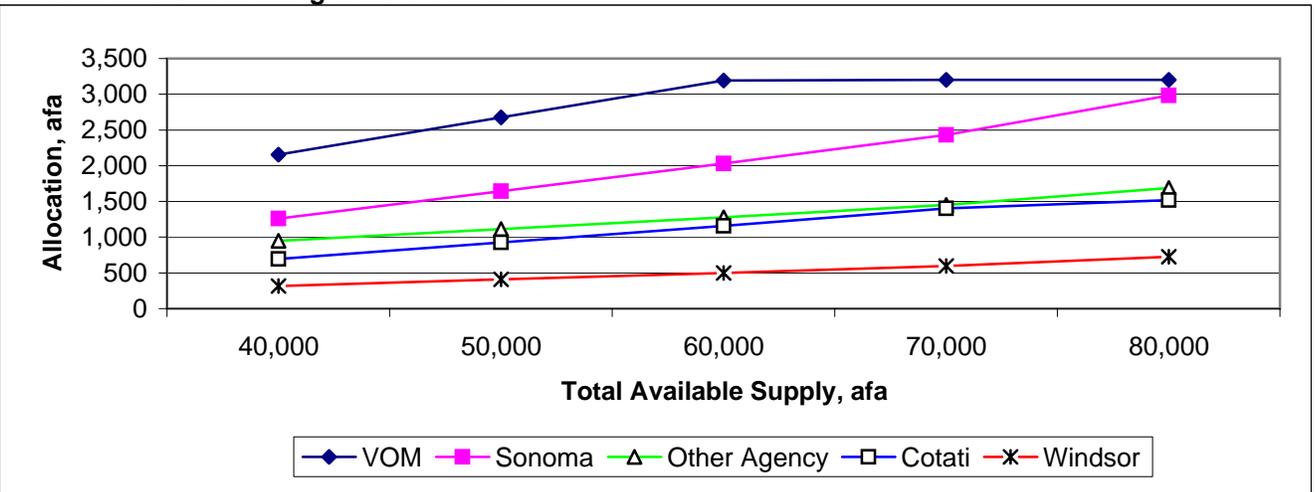
**Allocation to Major Customer Groups:**



**Allocation to Large Regular Contractors:**



**Allocation to Smaller Regular Customers:**



### Entitlements of SCWA Customers

SCWA Customer:	Source	Entitlement mgd (any month)	Annual Limit afa
Regular Customers			
Cotati	a	3.8	1,520
Petaluma	a	21.8	13,400
Rohnert Park	a	15	7,500
Sonoma	a	6.3	3,000
Windsor (Airport Service Area)	b	1.5	900
North Marin WD	a	19.9	14,100
Santa Rosa	a	56.6	29,100
Valley of the Moon WD	a	8.5	3,200
Other Agency Cust (Includes FWD)	c	2.7	2,048
Sub-Total		136.1	74,768
Marin Muni. WD	d	0	14,300
Russian River Customers	e	0	5,025
<b>Total</b>		<b>136.1</b>	<b>94,093</b>

Notes:

- a Eleventh Amended WS Agree. (Proposed Restructured WS Agree is same)
- b Proposed Restructured WS Agree. Applies only to Airport Service Area served from SCWA Aqueduct. Windsor's direct diversions from the RR are covered by an Agreement with the SCWA and potentially via its pending application to the State for Water Rights
- c "mgd any month" limit is per Eleventh Amended WS Agree. (Proposed Restructured WS Agree is same). Annual limit is estimated based on avg. annual Other Agency Customer demand (as defined in Restructured Agree) for FY's 2003 and 2004 (1,356 af) projected through 2020 assuming a 2% per year increase for anticipated growth plus a 10% contingency.
- d Second Amended WS Agree and Agree for Sale of Water as Amended by The Supplemental WS Agree dated Jan 25, 1996. Note: Annual deliveries are subject to certain prior year minimum purchase provisions. Deliveries are subordinate to Regular Customer Entitlements.
- e Various Agreements between SCWA and each of its RR Customers (refer "RR Cust" sheet)

**Russian River Customers of SCWA**

**Entitlements of RR Customers**

Source: Chris Murray, SCWA, 3/3/05

Contractor	Date	Max Diversion Limit, afa	Comments
<b>Currently Approved Points of Diversion *:</b>			
Town of Windsor **	1/8/1991	4,725	Windsor has application pending for its own water rights
Russian River Co. WD	3/14/1991	300	
Sub-total		<b>5,025</b>	
<b>No Points of Diversion Approved*</b>			
City of Healdsburg	11/17/1992	4,440	Healdsburg holds own water rights for other points of diversion
Camp Meeker Parks & Rec. Dist.	7/9/1996	90	
Occidental CSD	4/23/2002	65	
Redwood Valley Co. WD	Pending	?	Agreement pending
Sub-total		4,595	
Potential Total		9,620	

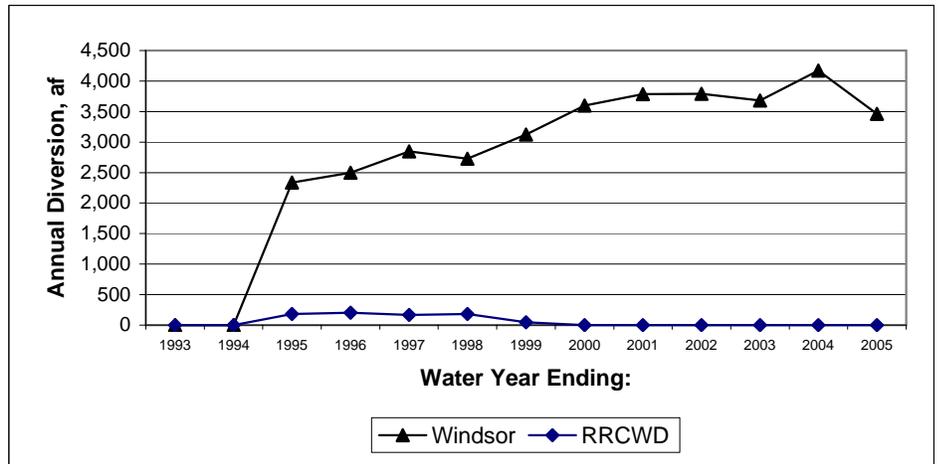
\* As pertains to SCWA's water rights.

\*\* Direct diversions via wells situated near the Russian River.

**Historic Diversions from the RR, af**

Source: Chris Murray, SCWA, 2/15/06 (SCWANTS.xls)

W Yr	RRCWD	Windsor	Total
1993	0	0	0
1994	0	0	0
1995	182	2,337	2,519
1996	203	2,496	2,699
1997	166	2,848	3,013
1998	183	2,728	2,911
1999	47	3,124	3,171
2000	0	3,596	3,596
2001	0	3,786	3,786
2002	0	3,789	3,789
2003	0	3,684	3,684
2004	0	4,173	4,173
2005	0	3,465	3,465



Avg of W Yr's 2004 & 05	<b>3,819</b>
Avg of last 3 W Yrs	3,882

Note: Water Yr extends from Oct 1 through Sept 30 of subsequent yr.

**Water Needed for Human Consumption, Sanitation and Fire Protection (a)**

	TM Data (b)	6/15/05 Model	2005 UWMP (c)	4/4/06 Model
SCWA Customer:				
Regular Customers				
Cotati	0.62	0.62		0.64 f
Petaluma	5.83	5.83	6.15	6.15
Rohnert Park	4.23	4.23	3.74	3.74
Sonoma	1.45	1.45	0.92	0.92
Windsor (Airport Service Area)		0.13 d		0.24 g
North Marin WD	5.80	5.80	6.04	6.04
Santa Rosa	13.74	13.74	13.48	13.48
Valley of the Moon WD	2.01	2.01	2.14	2.14
Other Agency Cust (Includes FWD)		0.45 d		0.48 g
Sub-Total				
Marin Muni. WD		17.1 e		18.4 h
Russian River Customers		unknown		unknown
Total				

Notes:

- a Water needed for HC, S & FP is assumed to be equal to "inside" use for all retail customers. Inside use in turn is estimated by examining retail sales in the Winter months (generally Jan. and Feb).
- b Estimate by West/Yost contained in Allocation Table prepared for City of Santa Rosa (Sept 23 Tech Memo).
- c Total demand including UFW as determined by Maddaus for base year (Cal. 2004) of the 2005 UWMP. Indoor use is based on average of 2 lowest consecutive months in the winter if meters read bimonthly, or single lowest month if meters read monthly. Winter level use for Cotati supplied by Toni Bertolero (see Note f).
- d Avg Jan and Feb Aqueduct Sales\* as
 

	Windsor	Other Ag Cust
Avg af/mo (2000->03, SCWA, Kiergan Pegg)	11.5	40.6
Avg mgd	0.13	0.45
- \* In the case of Windsor (ASA only) and Other Agency Customers, winter level demand is unknown and is therefore estimated from Aqueduct sales, it being assumed that all Winter demand is met from the Aqueduct.
- e MMWD customer Avg per capita use in Jan and Feb for (2000 - 03), mgd, Dana Roxon,
- f Avg. Jan and Feb Aq plus Local use FY 2003 -> FY 2005, Tony Bertolero via Matthew Damos
- g Avg. Jan and Feb Aq Sales w. Billing Days for FY 2003 -> FY 2005 from Kiergan Pegg,
- h From MMWD Water Watch Reports, avg demand for period noted, mgd

Week Ending:	For same	
	For period noted to left	week one yr earlier
2/26/2006	17.6	17.6
2/19/2006	18.4	18.3
2/12/2006	18.8	19.1
2/5/2006	18.2	18.6
1/29/2006	18.4	18.5
1/22/2006	18.5	18.7
1/15/2006	17.9	18.6
1/8/2006	18.5	18.8
1/1/2006	18.1	18.5
Avg Winter	18.3	18.5
Avg for both yrs	18.4	

**Reasonable Annual Need, afa (a)**  
**(Avg. Aq. Sales or RR Diversions for FY's Indicated)**

	6/15/05 Model	4/4/06 Model
		Avg for FY 03-04 and FY 04-05
Regular Customers	FY 03-04	
Cotati	1,071	1,045
Petaluma	11,294	10,636
Rohnert Park	4,710	4,835
Sonoma	2,611	2,403
Windsor (Airport Service Area)	474	448
North Marin WD	9,498	9,242
Santa Rosa	24,421	23,584
Valley of the Moon WD	3,157	3,036
Other Agency Cust (Includes FWD) (b)	1,326	1,318
Sub-Total	58,561	56,547
Marin Muni. WD	7,792	7,823
Russian River Customers (c)	3,928	3,819
Total	70,281	68,188

Notes:

- a SCWA Aqueduct Sales Records, Kiernan Pegg, SCWA. Note that Surplus sales are not included.
- b SCWA Aq. Sales Records. Excludes Windsor and includes FWD as proposed in Restructured WS Agree.
- c Average of Water Yr Diversions for 2003 and 2004 was used for 6/15/05 Model and avg. of 2004 and 2005 was used for 4/4/06 Model. (see RR Cust sheet).

**Local Potable Water Supply Available to SCWA Customers, afa**

	Local Supply (a)	Contingency Factor (b)	Est'd Safe Yield (c)
Regular Customers			
Cotati	240	10%	216
Petaluma	831	10%	748
Rohnert Park	2308	10%	2,077
Sonoma	80	10%	72
Windsor (Airport Service Area)	0	10%	0
North Marin WD	2000	10%	1,800
Santa Rosa	1700	10%	1,530
Valley of the Moon WD	595	10%	536
Other Agency Cust (Includes FWD) (d)	0		0
Sub-Total	7754		6,979
Marin Muni. WD Local Sys. Safe Yield (e)			20,500
Russian River Customers (d)	0		0
Total			27,479

Notes:

- a Based on 4-yr avg: 2000-2003 as reported in Sept 33, 2004 Tech. Memo to Santa Rosa
- b To account for well equipment problems/maintenance down-time, etc. Estimated by JONWRM
- c It is recognized that the quality of Local Supply varies. Presented here is the yield (safe yield) that is expected to be available in the first year of a water supply deficiency based on Local Water Supply capacities..
- d Unknown and therefore assumed to be "0" for the purposes of this model. Needs to be determined by SCWA.
- e Safe Yield of Local Supply System provided by MMWD. Source: Dana Roxon, 5/31/05.

### Most Recent Service Area Population

SCWA Customer:	TM Data for Yr 2003	6/15/05 Model	2005 UWMP	4/4/06 Model
<b>Regular Customers</b>				
Cotati	6,825	6,825		7,337 e
Petaluma	57,050	57,050	58,057	58,057
Rohnert Park	42,300	42,300	42,329	42,329
Sonoma	10,252	10,252	10,502	10,502
Windsor (Airport Service Area)		1,338 d		2,495 f
North Marin WD	56,000	56,000	55,587	55,587
Santa Rosa	153,400	153,400	155,121	155,121
Valley of the Moon WD	23,000	23,000	22,646	22,646
Other Agency Cust (Includes FWD)	8,000 a	8,000		8,080 g
Sub-Total		358,165		362,154
Marin Muni. WD	184,999 b	184,999		189,945 h
Russian River Customers	27,360 c	27,360		27,634 g
<b>Total</b>		<b>570,524</b>		<b>579,733</b>

**Notes:**

- a Estimate by West/Yost contained in Allocation Table prepared for City of Santa Rosa (Sept 23 Tech Memo).
- b Estimate provided by MMWD to West/Yost and contained in Allocation Table prepared for City of Santa Rosa (Sept 23 Tech Memo).
- c Estimate by West/Yost contained in Allocation Table prepared for City of Santa Rosa (Sept 23 Tech Memo). Includes 24,350 (2003 Department of Finance estimate for the Town of Windsor) and an estimate of 3,000 for the RRCWD service area.
- d Windsor Airport Service Area is primarily Commercial and Institutional use. An equivalent population is estimated by dividing avg Winter use by 95 gpcd, the wt'd avg. per capita use determined by West/Yost.
- e Cotati pop. per Dept of Finance data as of 1/1/2005, Cristina Goulart, Winzler & Kelly
- f Windsor Airport Service Area is primarily Commercial and Institutional use. An equivalent population is estimated by dividing avg Winter use by 94 gpcd, the wt'd avg. per capita use determined in the 2005 UWMP.
- g Population estimated for 6/15/05 Model increased by an assumed growth rate of 1%.
- h MMWD 2004 Pop., provided by Dana Roxon, MMWD, Mar. 2006.

**Other Data:**

From 2005 UWMP, population for 2004:	
FWD population	2,201
Windsor RR Service Area	24,899

**Winter Level Per Capita Demand, gpcd**

	TM Data (a)	6/15/05 Model	2005 UWMP (b)	4/4/06 Model
Regular Customers				
Cotati	89	89		88 c
Petaluma	101	101	106	106
Rohnert Park	96	96	88	88
Sonoma	136	136	88	88
Windsor (Airport Service Area)		95		94
North Marin Water Dist.	99	99	109	109
Santa Rosa	87	87	87	87
Valley of the Moon Water Dist.	87	87	94	94
Other Agency Cust (Includes FWD)		unknown		94
Sub-Total				
Marin Muni. Water Dist.		92		97 c
Russian River Customers				
Wt'd Avg	95			94 d

**Notes:**

- a Source: TM Data sheet by West Yost and Assoc. Winter level use is based on avg. use in Jan, and Feb. of 2000 through and including 2003.
- b Source: Bill Maddaus Tech. Memos - Includes Unaccounted For Water (UFW). Inside use is calculated from calendar 2004 retail sales records and is based on average of 2 lowest consecutive months in the winter if meters are read bimonthly, or single lowest month if meters read monthly.
- c Calc'd from Winter level demand (See Human sheet) and est'd pop. (See Pop Sheet)
- d Data for 11th Amend. Agree. Primes:

	gpcd	pop
Cotati	88	7,337
Petaluma	106	58,057
Rohnert Park	88	42,329
Sonoma	88	10,502
NMWD	109	55,587
Santa Rosa	87	155,121
VOM	94	22,646
FWD	99	2,201
Wt'd Avg. (using pop. as weighting factor)	94	

**Other Data:**

From 2005 UWMP, Winter Level Use, gpcd:  
    FWD 99

**Demand Hardening Factor - Used for Adjusting Reasonable Need in Current Allocation**

	Total Demand mgd 1	Total gpcd 2	Use in 3/27/06 Model 3	Lesser of Col. 3 or Average 4	Demand Hardening Adj Factor (Avg / Col. 4) 5
Regular Customers					
Cotati	1.07 b	146 d	146	146	1.14
Petaluma	10.19 c	176 d	176	167	1.00
Rohnert Park	5.95 c	141 d	141	141	1.19
Sonoma	2.25 c	214 d	214	167	1.00
Windsor (Airport Service Area)		172 e	172	167	1.00
North Marin Water Dist.	10.58 c	190 d	190	167	1.00
Santa Rosa	22.57 c	146 d	146	146	1.15
Valley of the Moon Water Dist.	3.40 c	150 d	150	150	1.11
Other Agency Cust (Includes FWD)			167 f	167	1.00
Sub-Total					
Marin Muni. Water Dist.			140 g	140	1.19
Russian River Customers			167 f	167	1.00
Average for Water Contractors (h)		167			

Notes:

- a Sec 3.5(c)(2) provides that in determining "reasonable requirements" the SCWA may take into account hardening of demand resulting from the level of conservation achieved by a given customer of the SCWA.
- b From Toni Bertolero. Avg of RR Purchases and Ground Water Production for FY 2003->05, mgc
- c Total demand including UFW as determined by Maddaus for base year (2004) 2005 UWMP.
- d Col 1 divided by population. See Pop sheet.
- e There are no residents in Windsor ASA therefore per capita demand set equal to Windsor RR Service Area average value as determined for base year (2004) of 2005 UWMP.
- f No data available so assumed equal to average value for Water Contractors.
- g From MMWD 2005 Fact Sheet - avg demand for 10 yrs ending 2005, n 26.6 divided by population (See Pop sheet).

**Other Data from 2005 UWMP for Base Yr 2004:**

	mgd	gpcd
Forestville Water Dist.	0.48	219
Windsor RR Service Area	4.29	172

**SUPPORT TABLES  
For Tech Memo**

**Table A-1. Average Monthly Retail Sales (acre-feet) for SCWA Water Contractors in January & February<sup>(a)</sup>**

Contractor	2000	2001	2002	2003	4-Year Average <sup>(b)</sup>
Santa Rosa	1,263	1,316	1,265	1,154	1,249
Petaluma	553	538	515	514	530
North Marin	563	554	525	468	528
City of Rohnert Park	406	406	356	373	385
Cotati	45	73	58	50	57
Forestville <sup>(c)</sup>	22	23	24	21	22
City of Sonoma	136	135	133	122	131
Valley of the Moon	182	189	187	174	183

**Table A-2. Historical Population<sup>(d)</sup>**

Contractor	2000	2001	2002	2003
Santa Rosa	147,595	149,300	151,700	153,400
Petaluma	53,710	54,510	55,850	57,050
North Marin	55,000	56,000	56,000	56,000
Rohnert Park	42,236	42,200	42,150	42,300
Cotati	6,471	6,600	6,861	6,825
Forestville <sup>(e)</sup>	1,973	Not Available	Not Available	Not Available
Sonoma	10,091	10,131	10,172	10,252
Valley of the Moon	20,512	21,996	22,923	23,000

**Table A-3. Per Capita Demand (gpcd) for SCWA Water Prime Contractor in Winter (January & February)<sup>(a,f)</sup>**

Contractor	2000	2001	2002	2003	4-Year Average <sup>(b)</sup>
Santa Rosa	90	93	88	79	87
Petaluma	108	104	97	95	101
North Marin	108	104	99	88	99
Rohnert Park	101	101	89	93	96
Cotati <sup>(g)</sup>	72	116	89	78	89
Forestville	115	123	126	113	119
Sonoma	142	140	138	125	136
Valley of the Moon	93	90	86	80	87
Simple Average <sup>(h)</sup>	104	109	101	94	102
Weighted Average <sup>(i)</sup>	99	100	93	87	95

<sup>(a)</sup> Data obtained from water sales data from the Prime Contractor

<sup>(b)</sup> Simple average of the last 4 years. Using Santa Rosa in Table A-1:  $(1,263+...+1,154)/4 = 1,249$  acre-feet

<sup>(c)</sup> Data for Forestville obtained from the SCWA

<sup>(d)</sup> Data obtained from the Prime Contractor, California Department of Finance Website, or the 2000 UWMP for Sonoma County unless specified otherwise

<sup>(e)</sup> Population for Forestville obtained from the 2000 SCWA UWMP

<sup>(f)</sup> Based on populations from Table A-2, if population for particular year was not available, then population for year 2000 was used

<sup>(g)</sup> For 2001 & 2002, based on Dec/Jan instead of Jan/Feb because Cotati did not provide Feb; 2003 is based on Jan/Feb

<sup>(h)</sup> Simple average of the eight individual gpcds. Using 2000 of Table A-3:  $(90+...+93)/8 = 102$  gpcd

<sup>(i)</sup> Weighted average for population. Using 2000 of Table A-3:  $(90*147,595+...+93*20,512)/(147,595+...+20,512) = 98$  gpcd



**Current Allocation Model**

**Allocation of Water During a Period of Deficiency Pursuant to Sec. 3.5 (a) of the Restructured Agreement for Water Supply**

Based on **CURRENT** Level Demands and Water Available from the SCWA of **60,000** afa

This equates to an overall cutback in Russian River water supply of: **12.0%**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	23	41	42	43
	Entitlement Limits		Minimum Needs		Reasonable Requirement				Local Supply		HC, S & FP Per Capita Demand				First Allocation & Test		Second Allocation		Results				
	Assumed Available Supply afa	Entitlement Daily Rate	Annual Entitlement Limit (Cap) afa	Water Needed for Human Consumption, Sanitation and Fire Protection **** afa	Apparent Reasonable Requirement afa	Demand Hardening (DH) Adjust. Factor	Adjust'd Reason. Req't	Final Reason. Req't	Lesser of Reason. Req't vs Cap afa	Safe Yield of Local Supply afa	Pop. persons	Avg. Winter Level Per Capita Demand gpcd	Weighted Avg Per Capita Demand of Water Contractors gpcd	Portion of Per Capita Demand that can be served by Local Supply gpcd	Per Capita Demand that is not met by ("First" Allocation Parameter) gpcd	"First" Allocation (Water req'd for HC, S & FP) afa	TEST Less Than Annual Entitlement Limit?	Normalized ("Second" Allocation Parameter) %	"Second" Allocation afa	"First" plus "Second" Allocations afa	TEST Less Than Reasonable Req't ?		
<b>SCWA Customers</b>																							
<b>Regular Customers</b>																							
Cotati*			3.8	1,520	0.64	720	1,045	1.14	1,196	1,095	216	7,337	88	94	26	68	558	Yes	2%	536	1,095	Yes	
Petaluma*			21.8	13,400	6.15	6,893	10,636	1.00	10,636	9,735	748	58,057	106	94	11	83	5,379	Yes	13%	3,574	8,952	Yes	
Rohnert Park*			15	7,500	3.74	4,186	4,835	1.19	5,731	5,246	2,077	42,329	88	94	44	50	2,390	Yes	9%	2,459	4,849	Yes	
Sonoma*			6.3	3,000	0.92	1,029	2,403	1.00	2,403	2,200	72	10,502	88	94	6	88	1,036	Yes	4%	1,033	2,069	Yes	
Windsor (Airport Service Area) (ASA)*			1.5	900	0.24	263	448	1.00	448	410	0	2,495	94	94	-	94	263	Yes	1%	146	410	Yes	
North Marin Water Dist. (NMWD)*			19.9	14,100	6.04	6,767	9,242	1.00	9,242	8,459	1,800	55,587	109	94	29	65	4,066	Yes	12%	3,262	7,328	Yes	
Santa Rosa*			56.6	29,100	13.48	15,094	23,584	1.15	27,027	24,737	1,530	155,121	87	94	9	85	14,840	Yes	35%	9,279	24,118	Yes	
Valley of the Moon Water Dist.*			8.5	3,200	2.14	2,397	3,036	1.11	3,372	3,086	536	22,646	94	94	21	73	1,854	Yes	5%	1,232	3,086	Yes	
Other Agency Cust (Includes FWD)			2.7	2,048	0.48	534	1,318	1.00	1,318	1,207	-	8,080	94	94	-	94	853	Yes	2%	354	1,207	Yes	
Sub-Total			136.1	74,768	33.82	37,884	56,547		61,374	56,173	6,979	362,154					31,239				53,114		
Marin Muni. Water Dist.			0	14,300	18.39	20,605	7,823	1.19	9,309	8,520	8,520	20,500	189,945	97	94	96	0	0	Yes	13%	3,391	3,391	Yes
Russian River Customers***			0	5,025	unknown	2,916	3,819	1.00	3,819	3,495	-	27,634	unknown	94	-	94	2,916	Yes	4%	579	3,495	Yes	
<b>Total</b>			136.1	94,093		61,404	68,188		74,501	68,188	68,188	27,479	579,733				34,155		100%	25,845	60,000		
Reasonable Need Remaining Unmet Water Available for Allocation			60,000														25,845						

**Definitions:**

\* Defined in Restructured Water Supply Agreement as "Water Contractors"

\*\* FWD = Forestville Water Dist.

\*\*\* SCWA Russian River Contractors whose direct diversions and points of diversion have been approved and come under the auspices of the SCWA's Water Rights (Town of Windsor and Russian River County Water Dist.)

\*\*\*\* HC, S & FP = Human Consumption, Sanitation and Fire Protection

TM Data = information set forth in Tech Memo prepared by West, Yost & Associates (West/Yost) dated Sept 23, 2004, "Methodology for Implementation of Water Shortage Provisions in Eleventh Amended Agreement for Water Supply"

UWMP = Urban Water Management Plan

UFW = unaccounted for water (ie water due to losses, leakage, theft and unmetered deliveries, meter inaccuracies, fire hydrant flows, pipeline flushing, etc.)

af = ac-ft mgd = millions of gallons per day

afa = ac-ft per annum (year) gpcd = gallons per capita per day

**Column Explanations:**

1 All Customers of the SCWA except customers served Surplus Water. Surplus Water users are not allowed an allocation during periods of water deficiency.

2 Water supply assumed to be available to SCWA for delivery to or diversion by its Customers. In the event of a real drought, this value is predicted by SCWA using its Russian River models and including estimated yield from the SCWA's wells and deducting losses from the Aqueduct

3 & 4 Entitlement limits pursuant to Restructured Agreement. Note that agreement does not specify an Annual Entitlement Limit (cap) for Other Agency Customers so this have been estimated by escalating the avg of FY 2003 and FY 2004 demand by 2% per year growth and then adding a 10% contingency. MMWD "annual entitlements" are set forth in agreements between SCWA and MMWD. Russian River Customers entitlements are based on agreements the SCWA has with these respective customers taking into account points of diversion authorized to be covered under SCWA's water rights. See Entitlement sheet and RR Cust sheet for details.

5 Water for HC, S & FP is assumed to be fairly represented by "inside demand" for all metered uses and including an adjustment factor for UFW. Inside demand is in turn estimated by examining winter level demand, a requirement of the Restructured Agreement. Values used in this model are from the base year (cal. yr 2004) compiled for the 2005 UWMP. See "Human" sheet for details.

6 Prior column extended over the entire year and converted to afa.

7 Reasonable Requirement is assumed to be equal to annual deliveries made to Customers in a recent non-drought year. For the purposes of this analysis, The avg. for FY 2003-04 and 2004-05 deliveries were used. In future analyses, an average of the immediate past 3 years is recommended. In the case of this analysis, going back further in time was not done due to significant changes in aqueduct demand by the City of Rohnert Park.

- 8 Sec 3.5(c)(2) provides that in determining "reasonable requirements" the SCWA may take into account hardening of demand resulting from the level of conservation achieved by a given customer of the SCWA. This column contains a Demand Hardening adjustment factor derived from annual per capita demand taking into account all uses and including UFW. Information compiled for the base year (2004) for the 2005 UWMP was used. See DH Factor sheet for details.
- 9 Col 8 x Col 7.
- 10 Col 10 "normalizes" Col 9 such that sum of all adjusted reasonable requirements is equal to original sum of Reasonable Requirements.  $Col 9 \times (\text{sum of Col 7} / \text{sum of Col 9})$ . This column is then used to define the "Reasonable Requirement" that is referred to in Sec. 3.5(a)(3)(iii) of the Restructured Agreement.
- 11 Lesser value comparing Reasonable Requirement to Annual Entitlement Limit as stipulated in Section 3.5 (2) (3) (iii). This is the value used for testing to see that the total of the "First" and "Second" allocation of water to a given customer is reasonable.
- 12 Local supplies are based on an estimate by JONWRM of "safe yield" of same. For Water Contractors, the data reported to West/Yost is the basis for the estimate. See Local sheet for details. The "safe yield" used for MMWD was provided by MMWD. It is noted that data is missing for Other Agency Customers and Russian River Customers. It is important that SCWA develop an on-going data collection system to at all times know potential local supply yield in order to achieve accuracy necessary for the allocation calculation.
- 13 Detailed population estimates from Census tract data compiled by Maddaus for the base year (cal. 2004) used in the 2005 UWMP. See Pop sheet for details and explanation of exceptions.
- 14 Winter level per capita demand determined by Maddaus for the base year (cal. 2004) used in the 2005 UWMP. See GPCD sheet for detailed explanation.
- 15 Weighted avg. of per capita winter level demand for existing Prime contractors. See GPCD sheet.
- 16 Safe yield of Local Supply expressed as a per capita value using population data shown i.e.  $Col 12 * 7.48 * 43,560 / (365 * Col 13)$ .
- 17 HC, S & FP demand not met by Local Supplies and calculated as follows: If Wt'd average per capita demand (Col 15) is greater than the portion of per capita demand met by Local Supply (Col 16), the difference of the two is entered in this column, if not, "0" is entered.
- 18 "First" allocation calculated as follows: If Local Supply safe yield (Col 12) is greater than Winter level demand extrapolated for the full year (Col 6), then "0" is allotted, if not the portion of per capita demand not met by Local Supply (Col 17) is calculated for the year for the entire population, expressed in ac-ft and entered here. In the case of consecutive drought years, it is important that Col 12 values (safe yield of local supplies) be updated in order for this calculation to be accurate. This is especially true for contractors relying on surface water supplies such as NMWD and MMWD whose surface supplies drop sharply when faced with consecutive drought years.
- 19 Test to see that "First" allocation does not exceed respective Entitlement Limits as required by Section 3.5 (a)(3)(i).
- 20-22 These three columns combine the entitlements of the Regular Customers (which pursuant to Sec. 3.5(a)(3)(ii) must be derived from the avg. daily rate during any month - mgd values contained in Sec. 3.1) and the contractual entitlements of MMWD and RR Customers which are expressed in ac-ft per year values contained in their contracts. These relative entitlements are first converted to %'s, then added together.
- 24 This column "normalizes" the combined entitlement shares such that the sum of all entitlement shares adds to 100%. The resulting %'s are then used to distribute the "Second" allocation of water called for by Sec. 3.5(a)(3)(ii).
- 25-40 These cells contain the iterative trials necessary to arrive at the "Second" allocation of water. The process is iterative as the Test of whether the "Second" allocation is valid or not is set forth in Section 3.5 (b) (3) (iii) and requires that (in addition to not exceeding the Entitlement Limit) the sum of the "First" allocation (Col 18) and the "Second" allocation not exceed the "Reasonable Requirement" (Col 10)

**Future Allocation Model**

**Allocation of Water During a Period of Deficiency Pursuant to Sec. 3.5 (a) of the Restructured Agreement for Water Supply**

Based on **FUTURE** Level Demands and Water Available from the SCWA of **60,000** afa

This equates to an overall cutback in Russian River water supply of:

**36.2%**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	20	38	39	40	41
	Entitlement Limits	Minimum Needs	Reasonable Requirement	Local Supply	HC, S & FP Per Capita Demand	First Allocation & Test	Second Allocation	Results													
	Entitlement (Maximum Daily Rate	Assumed Available Supply afa	of Flow During any Month) mgd	Annual Entitlement Limit (Cap) afa	Water Needed for Human Consumption, Sanitation and Fire Protection **** mgd afa	Lesser of Reasonable Requirement vs Annual Cap afa	Reasonable Requirement afa	Safe Yield of Local Supply afa	Pop. persons	Avg. Winter Level Per Capita Demand gpcd	Weighted Avg Per Capita Demand of Contractors gpcd	Portion of Per Capita Demand that can be served by Local Supply gpcd	Per Capita Demand that is not met by Local Supply ("First" Allocation Parameter) gpcd	"First" Allocation (Water req'd for HC, S & FP) afa	TEST Less Than Annual Entitlement Limit?	Normalized Entitlements ("Second" Allocation Parameter) %	"Second" Allocation afa	"First" plus "Second" Allocations afa	TEST Less Than Reasonable Req't ?	Amount Falling Short (-) of Reasonable Req't afa	
SCWA Customers																					
Regular Customers																					
Cotati*			3.8	1,520	0.64 720	1,520	1,520	216 7,337	88	94	26	68	558	Yes	2%	599	1,157	Yes	-363		
Petaluma*			21.8	13,400	6.15 6,893	13,400	13,400	748 58,057	106	94	11	83	5,379	Yes	13%	3,434	8,813	Yes	-4,587		
Rohnert Park*			15	7,500	3.74 4,186	7,500	7,500	2,077 42,329	88	94	44	50	2,390	Yes	9%	2,363	4,753	Yes	-2,747		
Sonoma*			6.3	3,000	0.92 1,029	3,000	3,000	72 10,502	88	94	6	88	1,036	Yes	4%	992	2,029	Yes	-971		
Windsor (Airport Service Area) (ASA)*			1.5	900	0.24 263	900	900	0 2,495	94	94	-	94	263	Yes	1%	236	500	Yes	-400		
North Marin Water Dist. (MMWD)*			19.9	14,100	6.04 6,767	14,100	14,100	1,800 55,587	109	94	29	65	4,066	Yes	12%	3,135	7,201	Yes	-6,899		
Santa Rosa*			56.6	29,100	13.48 15,094	29,100	29,100	1,530 155,121	87	94	9	85	14,840	Yes	35%	8,917	23,756	Yes	-5,344		
Valley of the Moon Water Dist.*			8.5	3,200	2.14 2,397	3,200	3,200	536 22,646	94	94	21	73	1,854	Yes	5%	1,339	3,193	Yes	-7		
Other Agency Cust (Includes FWD)**			2.7	2,048	0.48 534	2,048	2,048	- 8,080	94	94	-	94	853	Yes	2%	425	1,278	Yes	-770		
Sub-Total			136.1	74,768	33.82 37,884	74,768	74,768	6,979 362,154					31,239					52,680		-22,087	
Marin Muni. Water Dist.			0	14,300	18.39 20,605	14,300	14,300	20,500 189,945	97	94	96	0	0	Yes	13%	3,259	3,259	Yes	-11,041		
Russian River Customers***			0	5,025	unknown 2,916	5,025	5,025	- 27,634	unknown	94	-	94	2,916	Yes	4%	1,145	4,061	Yes	-964		
Total			136.1	94,093	61,404	94,093	94,093	27,479 579,733					34,155		100%	25,845	60,000		-34,093		
Reasonable Need Remaining Unmet Water Available for Allocation			60,000																		

**Definitions:**

\* Defined in Restructured Water Supply Agreement as "Water Contractors" and often referred to as "Primes"

\*\* FWD = Forestville Water Dist.

\*\*\* SCWA Russian River Contractors whose direct diversions and points of diversion have been approved and come under the auspices of the SCWA's Water Rights (Town of Windsor and Russian River County Water Dist.)

\*\*\*\* HC, S & FP = Human Consumption, Sanitation and Fire Protection

TM Data = information set forth in Tech Memo prepared by West, Yost & Associates (West/Yost) dated Sept 23, 2004, "Methodology for Implementation of Water Shortage Provisions in Eleventh Amended Agreement for Water Supply"

UWMP = Urban Water Management Plan

UFW = unaccounted for water (ie water due to losses, leakage, theft and unmetered deliveries, meter inaccuracies, fire hydrant flows, pipeline flushing, etc.)

af = ac-ft mgd = millions of gallons per day

afa = ac-ft per annum (year) gpcd = gallons per capita per day

**Column Explanations:**

All are same as shown on Current Model sheet except for below:

7 Reasonable Requirement is set equal to the Annual Entitlement limit (cap) in order to estimate the allocation in the future when SCWA Customers reach (or exceed) their Annual Entitlement (or contract) Limits.

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## **ATTACHMENT 4**

### **Revenue Impacts of the Model Ordinance**



## Revenue Impact Model - Step by Step Instructions (9/12/00)

**Purpose: Determine revenue loss due to rationing and calculated rate surcharge to offset same.**

Step	Instructions*
<b>Table 1</b>	
Step 1	Footnote c: Collect monthly production records and enter total production (Aqueduct deliveries and local sources) for base period in Col 1 in units of millions of gallons.
Step 2	Footnote d: Enter appropriate value for estimated unaccounted for water in the box.
Step 3	Footnote e: Enter uniform commodity rate in box. If utilize a tiered rate, divide total commodity rate revenue by sales (1,000's of gallons) for prior year to calculate weighted average rate and enter this value in box.
Step 4	Footnote g: Enter percentage representing share of total revenue requirement (capital + O&M) that is spent on energy and chemical purchases.
Step 5	Footnote 6: Obtain average single family per capita use value for your service area from Table 4 and enter in footnote box.
<b>Table 2</b>	
Step 7	Read all assumptions and alter as appropriate.
Step 8	Footnote a: Enter balance existing in your Water Shortage Contingency Fund in box on Line 1. If none, enter "0".
Step 9	Footnote b: Follow footnote instructions and enter appropriate rationing requirement for each month in Col 1.
Step 10	Footnote c: From Table 1 obtain corresponding monthly revenue loss values (intersection of month and rationing requirement) and enter in Col 2.
Step 11	As a first approximation of correct Rate Surcharge required to mitigate revenue loss, obtain rate from Table 1 corresponding to the most prevalent Overall Rationing Requirement appearing in Col 1 of Table 2 and enter in the box on Line 20 of Table 2.
Step 12	If the value in the box on Line 19 is negative, increase the Rate Surcharge a cent at a time until a positive value is obtained. Increase the Rate Surcharge even more if a residual Water Shortage Contingency Fund balance is desired.

\* In the case of a actual shortage event, the base period and mandatory rationing level for Stage 2 (Stage 3 is the same) need to be determined before using this model.

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Table 1 - Monthly Values of Revenue Loss

Col > Overall Rationing Requirement, % (a) >	1		3	Estimate of Lost Sales, \$ (f)											
	Production in Base Year, mg (b)	Adjusted (d)		Estimated Sales Base Year, \$ (e)	4	5	6	7	8	9	10	11	12	13	
Month	Total (c)			15%	25%	30%	35%	40%	45%	50%	55%	60%	65%		
Jan	179	166	239,642	35,946	59,910	71,893	83,875	95,857	107,839	119,821	131,803	143,785	155,767		
Feb	157	146	210,583	31,587	52,646	63,175	73,704	84,233	94,762	105,291	115,820	126,350	136,879		
Mar	179	167	239,911	35,987	59,978	71,973	83,969	95,964	107,960	119,955	131,951	143,947	155,942		
Apr	223	208	299,294	44,894	74,823	89,788	104,753	119,718	134,682	149,647	164,612	179,576	194,541		
May	372	346	498,746	74,812	124,687	149,624	174,561	199,498	224,436	249,373	274,310	299,248	324,185		
Jun	417	388	558,891	83,834	139,723	167,667	195,612	223,556	251,501	279,446	307,390	335,335	363,279		
Jul	466	433	623,783	93,567	155,946	187,135	218,324	249,513	280,702	311,892	343,081	374,270	405,459		
Aug	442	411	592,007	88,801	148,002	177,602	207,202	236,803	266,403	296,003	325,604	355,204	384,804		
Sep	402	374	537,895	80,684	134,474	161,369	188,263	215,158	242,053	268,948	295,842	322,737	349,632		
Oct	350	326	469,027	70,354	117,257	140,708	164,159	187,611	211,062	234,513	257,965	281,416	304,867		
Nov	198	184	265,016	39,752	66,254	79,505	92,755	106,006	119,257	132,508	145,759	159,009	172,260		
Dec	215	200	288,286	43,243	72,071	86,486	100,900	115,314	129,729	144,143	158,557	172,971	187,386		
Total	3,601	3,349	\$4,823,079	\$723,462	\$1,205,770	\$1,446,924	\$1,688,078	\$1,929,232	\$2,170,386	\$2,411,540	\$2,652,694	\$2,893,848	\$3,135,002		
Approximate Rate Surcharge required to Offset Revenue Loss (g)				\$0.22	\$0.41	\$0.52	\$0.66	\$0.82	\$1.00	\$1.22	\$1.50	\$1.84	\$2.27		

Definitions:

mg = million gallons

[ ] = cells for which data unique to water utility must be entered

Notes to Table 1:

- a This is "X1" in the Rationing Ordinance, except for 15% value which is applicable during Stage 1.
- b For the purposes of this calculation, production records are used to estimate lost sales as they are readily available. The Base Period is the same period selected for the Rationing Ordinance (usually the same period one year earlier).
- c Enter total monthly production in the Base Year in this Col 1 (Aqueduct deliveries plus sum of water produced from local sources).
- d Enter estimated unaccounted for water percentage in the box [ 7.0% ] Col. 1 values x (1 - Unaccounted %) yield Col. 2 values (Adjusted Production) which are a fair approximation of water sales in the Base Period.
- e If your utility utilizes a uniform commodity rate for all sales, enter it in box as \$/1000 gal [ \$1.44 ] The model multiplies this value times the values in Col. 2 times 1,000 to obtain Sales Income in Base Period (Col 3 values). If your utility has a tiered rate, divide total revenue from commodity rates by total sales, express in \$/1000 gallons and enter in the box.
- f In Col 4 through Col 13, the Model automatically calculates lost monthly sales as a function of overall rationing requirement.
- g The model reduces the rate surcharge by costs that are avoided. It assumes avoided costs are limited to out of pocket cost of energy + chemicals. The portion of the total annual revenue requirement (capital + O&M + purchases) that is due to the purchase of energy and chemicals is assumed to be: [ 15% ]

**Table 2 - Cash Flow Analysis & Mitigation**

Line\Column	1	2	3	4	5
1	WSCF Starting Balance (a)				\$500,000
	Rationing Level (b)	Revenue Loss (c)	Revenue Surcharge Offset (e)	Contribution from WSCF	WSCF Remaining Balance
2	Jan	0%	0	0	500,000
3	Feb	15%	31,587	0	468,413
4	Mar	40%	95,964	92,966	465,414
5	Apr	40%	119,718	115,976	461,673
6	May	40%	199,498	193,264	455,438
7	Jun	40%	223,556	216,570	448,452
8	Jul	40%	249,513	241,716	440,655
9	Aug	40%	236,803	229,403	433,255
10	Sep	40%	215,158	208,434	426,531
11	Oct	40%	187,611	181,748	420,668
12	Nov	40%	106,006	102,694	417,356
13	Dec	40%	115,314	111,711	413,752
14	Jan	40%	95,857	92,861	410,756
15	Feb	40%	84,233	81,601	408,124
16	Mar	40%	95,964	92,966	405,125
17	Apr	35%	104,753	0	300,372
18	May	30%	149,624	0	150,749
19	Jun	25%	139,723	0	11,026

21 Rate Surcharge required (d) \$0.93 per 1,000 gallons << Mitigation

Check:

Sum of Revenue Losses 2,450,883  
 Sum of Revenue Surcharge Income plus depletions of WSCF 2,450,883

Definitions:

WSCF = Water Shortage Contingency Fund (funds saved and designated for use to mitigate rate impact during water shortages.

Rate Surcharge is the amount the uniform commodity rate needs to be raised to offset revenue losses.

In the case of a tiered rate structure, this value represents the weighted average rate.

= cells for which data unique to water utility must be entered

Assumptions for this Example Water Shortage shown in this table:

- 1 Shortage is due to lack of rainfall and hence runoff SCWA reservoirs.
- 2 Shortage is recognized in January. Rationing Ordinance is adopted with Stage 1 effective Feb 1st and Stage 2 effective March 1st. At this point in time it is assumed the shortage will be over at the close of the following winter. Thus the rationing period is assumed to terminate on April 1 of the next year.
- 3 Uniform Commodity Surcharge is approved and applied to all readings and bills rendered after March 1.
- 4 By April 1st of the next year, rains have come and stream flow models predict sufficient storage will exist at the end of the runoff season to permit termination of rationing as of April 1st.
- 5 Water use rebounds at the rate of 5% per month after April 1st.
- 6 Recovery of lost revenue due to rebound revenue losses outside of the second fiscal year period are ignored and hence are not recovered.
- 7 WSCF available = \$500,000 and fund is exhausted by June 30 of the second fiscal year of the event.

Notes for Table 2:

- a Enter amount of WSCF in box on Line 1. If no reserves are available for water shortage mitigation, enter "0".
- b Enter Stage 1 and Stage 2 rationing requirements in Col 1 opposite each month of the assumed rationing period duration. Enter rebound percentages per assumption No. 5.
- c From Table 1 obtain corresponding monthly revenue loss values (intersection of month and rationing requirement percentage) and enter in Col 2.
- d As a first approximation of correct Rate Surcharge required to mitigate revenue loss, obtain rate from Table 1 corresponding to the most prevalent Overall Rationing Requirement appearing in Col 1 and enter in the box on Line 20 of Table 2 (\$0.82 for this example). If the value in the box on Line 19 is negative, increase the Rate Surcharge a cent at a time until a positive value is obtained in the box on Line 19. (In this example, the Rate Surcharge required to just achieve a positive value is \$0.93.) Should you want to maintain the WSCF at some higher level, fearing that the shortage event may last more than one year, increase the Rate Surcharge accordingly.



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