

# **CITY OF VACAVILLE**

## **2010 Urban Water Management Plan Update**



**JULY 2011  
REVISED JUNE 2013**

**NOLTE**  
BEYOND ENGINEERING

# CITY OF VACAVILLE

## 2010 Urban Water Management Plan Update



**July 2011  
Revised June 2013**

**Submitted to:  
City of Vacaville  
Utilities Department  
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**City of Vacaville 2010 Urban Water Management Plan Contact Sheet**

Date plan submitted to the Department of Water Resources: July 2011

Date revised plan submitted to the Department of Water Resources: June 2013

Name of person preparing this plan: Vanessa Andrews

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The water supplier is a: Municipality

The water supplier is a: Retailer

Utility services provided by the water supplier include: water treatment, storage, and distribution;  
wastewater treatment

Is this agency a bureau of reclamation contractor? Yes

Is this agency a state water project contractor? Yes

## 1.0 INTRODUCTION

The following plan has been prepared in accordance with State of California Assembly Bill No. 797. The bill, adopted in 1983, required all water suppliers in California with more than 3,000 customers or a demand exceeding 3,000 acre-feet annually to prepare and adopt an urban water management plan (UWMP) by 1985. The legislation also required the suppliers to adopt follow-up plans by December 31, 1990. Since originally adopted in 1983, the UWMP Act has been modified by several bills:

1. Assembly Bill 2661, adopted in July 1990, formally extended the process, requiring suppliers to update their plans every five years.
2. Subsequently, Senate Bill 553 (SB 553) was signed into law on September 28, 2000, revising the Urban Water Management Planning Act by replacing the 16 Demand Management Measures (DMMs) with the 14 Best Management Practices (BMPs) currently being implemented by Group 1 signatories to the Memorandum of Understanding Regarding Urban Water Conservation in California.
3. AB 2552 was signed into law on September 28, 2000, and requires each urban water supplier to notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing its UWMP and considering changes to the plan.
4. AB 1420 was adopted in 2007, and requires water suppliers to implement the water Demand Management Measures to be eligible for water management grants or loans administered by the Department of Water Resources (DWR).
5. SBx7-7, adopted in 2009, was passed with the goal of reducing municipal water use by 20 percent by the year 2020. SBx7-7 requires water suppliers to report baseline per capita water use, 2015 interim per capita water use target, 2020 per capita water use targets, and the basis for determining the estimates.

In response to assembly Bill 797, the City of Vacaville (City) prepared and submitted its first UWMP in 1985. The follow-up plan in 1990 was prepared and submitted in January 1991 as part of a county-wide effort. The water agencies of Solano County, with which the City of Vacaville cooperated for the 1990 plan, were the City of Benicia, City of Fairfield, Solano County Water Agency (SCWA), City of Suisun, and the City of Vallejo. Subsequent updates to the 1990 plan including this 2010 plan update were produced as individual plans by the City of Vacaville.

### 1.1 UWMP Contents

This section provides a brief description of the contents of the plan by section.

**Section 1.0 – Introduction:** This section provides the contact sheet, a review of the plan contents, and background information about the City of Vacaville.

**Section 2.0 – Public Participation:** Section 2.0 provides a summary of public outreach activities, plan adoption information, and agency coordination.

**Section 3.0 – Water Supply Sources:** This section reviews the potential sources for water in the City of Vacaville, including groundwater, surface water, and imported water.

**Section 4.0 – SBx7-7 Water Use Targets:** The calculation of baseline per capita water use and per capita water use targets are presented in Section 4.0 as required by SBx7-7.

**Section 5.0 – Water Use Provisions:** Past, current, and projected water use is summarized in Section 5.0. Water use is quantified for five-year increments through the year 2035 for uses such as single-family residential, industrial, commercial, etc.

**Section 6.0 – Reliability Planning:** This section discusses the frequency and magnitude of supply deficiencies, plans to ensure a reliable water supply, and transfer and exchange opportunities.

**Section 7.0 – Supply and Demand Comparison Provisions:** This section compares current and projected water supply and demand.

**Section 8.0 – Water Demand Management Measures:** Section 8.0 provides a description of each water DMM that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures.

**Section 9.0 – Water Recycling:** This section discusses wastewater generation, collection, and treatment, as well as disposal and potential recycled water uses. It also discusses actions taken to encourage recycled water use.

**APPENDIX A** Urban Water Management Plan Checklist

**APPENDIX B** Public Notification Materials

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The Department of Water Resources Urban Water Management Plan Checklist is used to confirm that the required information is included in the UWMP. A Checklist for the 2010 UWMP Update is included in Appendix A.

**1.2 Plan Implementation**

This UWMP provides a comparison of water supplies available to the City with the projected water demand through the year 2035, as well as discusses conservation measures the City has implemented to ensure a safe and reliable water supply is available to the City. As with previous UWMP Updates prepared by the City, this plan will be used to provide the basis for determining that sufficient water supply is available for future proposed development.

This UWMP also provides the per capita water use baseline and target required by SBx7-7. The City will compare the per capita water use in upcoming years with the SBx7-7 targets to ensure the City will meet its 2015 and 2020 per capita water use targets.

**1.3 Background**

This section presents history and population growth information for the City of Vacaville, as well as a summary of the City's climate.

History and Growth

The City of Vacaville, founded in 1850, is nestled at the base of the Vaca Mountains. Vacaville is located centrally between Sacramento and San Francisco on Interstate 80. City limits encompass over 29 square miles with a population of approximately 97,000, which makes Vacaville the third largest city in Solano County.

The population of Vacaville increased by 63 percent from 1980 to 1990 and increased an additional 24 percent from 1990 to 2000. The growth rate from 2000 to 2010 was approximately 10 percent. It is anticipated that the population will grow by an additional 14 percent from 2011 to 2035. This population projection is based on slower growth than previous population projections, due to decreasing population growth trends caused by the economic downturn observed recently.

Population projections for Solano County published in the City Community Development Department's *Community Profile and Trends Report* are summarized in Table 1.

TABLE 1  
CITY OF VACAVILLE POPULATION PROJECTIONS 2010 – 2035

Year	2010 <sup>a</sup>	2015 <sup>b</sup>	2020 <sup>b</sup>	2025 <sup>b</sup>	2030 <sup>b</sup>	2035 <sup>b</sup>
Total Population	97,300	102,600	105,000	107,300	109,400	111,100
Adjusted Population <sup>c</sup>	86,893	91,238	93,062	94,924	96,822	98,759

<sup>a</sup> 2010 population from California Department of Finance.

<sup>b</sup> Population projections for 2015 to 2035 provided by Association of Bay Area Government's 2009 Projections and Priorities.

<sup>c</sup> The adjusted population discounts the portion of the California State Prison – Solano and California Medical Facility that is supplied by the Solano Irrigation District

The population projections in Table 1 include the population of California State Prison – Solano (CSP-Solano) and the California Medical Facility (CMF). A portion of the water demand for these facilities is met by the Solano Irrigation District (SID). Therefore, the total population for the City of Vacaville is adjusted to remove the portion of the prison population that is served by SID. The methodology for adjusting the total population is described in Section 4.1.

By far, the largest growth increase has been in the residential sector. While commercial and industrial growths have been steady, they have not kept pace with residential growth. In the next 20 years, commercial and industrial development is projected to increase an average of five percent per year. Approximately 76 percent of the City's total water consumption occurs in the residential sector. For this reason, the City has chosen to focus water conservation efforts on residential household and landscape usage. As of 2010, Vacaville's total domestic water connections number approximately 26,830. Table 2 provides a summary of the current number of connections by customer type.

TABLE 2  
CURRENT NUMBER OF CONNECTIONS BY CUSTOMER TYPE

Customer Type	Number of Connections <sup>a</sup>
Single-family Residential	24,332
Multi-family Residential	644
Commercial	1,028
Industrial	79
Public Agency/Institutional	222
Dedicated Landscaping	525
General Other	0
<b>Total</b>	<b>26,830</b>

<sup>a</sup> Number of connections in 2010

## Climate

The climate in Vacaville is characterized by mild winters and hot summers. The Western Regional Climate Center reports that the annual average precipitation is 24.55 inches, 85 percent

of which occurs from December through March. Temperatures during the winter usually drop into the forties at night and occasionally drop below the freezing point. Snow is extremely rare. In the summer, temperatures often rise above 100 degrees. The days are typically hottest between four and five P.M. and temperatures cool off noticeably in the evenings.

The climate has significant influence on the water demands in Vacaville. Winters are characterized by relatively low water demand, while the summers have substantially higher demand. Lawn watering in the summer is a major contributor to the higher summer demand.

## **2.0 PUBLIC PARTICIPATION**

### **2.1 Public Outreach**

The City of Vacaville has actively encouraged community participation in its urban water management planning efforts since the first plan was developed in 1985. Advertisements were placed in the Vacaville Reporter (the City newspaper) and the draft Plan was made available to the public for review and comment before City Council approval. Copies of the draft Plan were available at City offices. Additionally, community input was sought during the development of the UWMP Workshop, which was held during the City Council meeting on June 14, 2011. Copies of the newspaper advertisement are included as Appendix B.

### **2.2 Plan Adoption**

This 2010 update of the UWMP was prepared from March 2010 through March 2011. The updated plan was adopted by City Council and submitted to the Department of Water Resources (DWR) in July 2011. See Appendix C for a copy of the Resolution approving the filing of the 2010 Urban Water Management Plan Update. This plan includes all information necessary to meet the requirements of California Water Code Division 6, Part 2.6 (Urban Water Management Planning).

A copy of the adopted UWMP was submitted to the California Department of Water Resources, the California State Library, and is available to the public at the following locations in the City:

City Manager's Office (Front Counter)  
Vacaville City Hall  
650 Merchant Street  
Vacaville, CA 95688

Utilities Department (Front Counter)  
Utilities Control and Administration Building  
6040 Vaca Station Road  
Elmira, CA 95625

### **2.3 Agency Coordination**

City of Vacaville Utilities Department staff coordinated the development of this plan with the City of Vacaville Finance Department. The Utilities Department is responsible for utility billing and maintains statistical data regarding water consumption. See Appendix D for a list of people contacted in the development of this plan.

The City also continues participation with SCWA as part of a Water Conservation Committee (WCC). This county-wide committee allows for broader distribution of materials and information as well as reduced costs to individual cities by sharing resources. Specific projects are highlighted in Section 8.0 of this plan.

SCWA is a wholesaler who supplies surface water to the City. SCWA is also instrumental in generating water source reliability factors used later in this report to determine the reliability of water sources. Water demand projections developed as part of this plan have been shared with SCWA. A copy of the UWMP will be provided to SCWA after adoption of the plan.

The City is currently upgrading its General Plan. The City coordinated with the General Plan consultant to ensure that information provided in the UWMP is consistent with the General Plan update.

### 3.0 WATER SUPPLY SOURCES

This section contains a description of the City's existing water supply system facilities. In addition, a discussion about existing and planned sources of water including groundwater, surface water, and recycled water, is provided.

#### 3.1 Description of Existing Facilities

The water utility system is a self-supporting City enterprise that provides water to the residences of the City. The City's water supply service area is coaligned with the City limits. The water utility is responsible for operation, maintenance, and repair of the City's water treatment and distribution system, as well as water quality. It is also responsible for meter installation and meter reading. Vacaville's water utility system was purchased from Pacific Gas and Electric (PG&E) Company in 1959 by issuing voter-approved water revenue bonds. Since purchasing the system, the City has systematically improved and upgraded it.

The Vacaville water system consists of surface water treatment facilities, wells, pumping facilities, distribution and transmission pipelines, and storage reservoirs. The system receives water from several sources, including Solano Project water from the Lake Berryessa reservoir, State Water Project water and Settlement Water from the North Bay Aqueduct (NBA), and groundwater from local city wells. Within Vacaville's water entitlements, the percentage of water used from each supply source varies due to conjunctive use. If any one source has limited water availability or poor water quality, use from other sources can increase. Likewise, if unscheduled water becomes available it can be utilized to the City's advantage.

Surface water from Lake Berryessa is provided by contract between the U.S. Bureau of Reclamation and the SCWA and delivered by the SID. This water is treated at either the North Bay Regional water treatment plant (NBR) or at the City's diatomaceous earth water treatment plant (DE Plant). The DE Plant has a rated capacity of 12 million gallons per day (mgd) and a firm capacity of 10 mgd. Wells 1, 6, and 13 also supply water directly to the DE Plant clearwell. From the clearwell, a booster pump station pumps the water into the distribution system. Water from the remaining wells (2, 3, 5, 8, 9, 14, 15, 16, and De Mello) is treated at the wellhead and pumped directly to the distribution system. Well 7 is currently out of service due to a damaged casing. The City is evaluating whether the well will be repaired or abandoned. The De Mello Well is currently being used as a standby well. The City is currently planning for the construction of a new supply well, Well 17. The locations of the City wells and DE Plant are shown in Figure 1.

The NBR plant provides a capacity of 13.3 mgd for Vacaville and supplies water directly to the City's distribution system. The NBR plant draws water from the Sacramento River Delta via the NBA, as well as Solano project water from the Putah South Canal. The location of the NBA and Putah South Canal can be seen in Figure 2.

FIGURE 1 CITY OF VACAVILLE MUNICIPAL WELLS, DE PLANT, AND RESERVOIRS

FIGURE 2 REGIONAL WATER SUPPLY FACILITIES

## 3.2 Groundwater

As noted earlier, one source of water supply for the City is groundwater. Currently, groundwater is provided by 12 permitted wells, 10 of which withdraw water from the deep aquifer in the basal zone of the Tehama Formation. Most City wells are located in the Elmira well field. However, new wells are being sited further north, near Interstate 80 (I-80). Currently, approximately 5,000 acre-feet per year (ac-ft/yr) of groundwater is withdrawn. Vacaville continues to explore well field expansion as a means of maintaining adequate water supply. A regional program is being implemented to monitor groundwater data as a means of insuring against overdraft or contamination. A discussion of the groundwater basin and historic groundwater pumping follows.

The City adopted a Groundwater Management Plan Update, prepared by Ludhorff and Scalmanini Consulting Engineers, on March 8, 2011. The Groundwater Management Plan provides the framework and related actions required to maintain a high quality, reliable, and sustainable groundwater supply.

### Boundaries, Soils, Storage Capacity

The City pumps groundwater primarily from the basal zone of the Tehama Formation in the Solano Sub-basin, located east of the English Hills Fault. Well 1 is the only well currently in operation that extracts water from a different formation, the Markley Formation, located west of the English Hills fault. The Tehama formation consists of moderately to highly consolidated fluvial, alluvial, and lacustrine deposits. Lithology present within the Tehama Formation includes inter-layered sand, silt, clay, and gravel, a stiff blue lacustrine clay located near the upper portions of the formation, and other continuous clay layers that divide the formation into upper, middle, and basal zones. The basal zone of the formation also includes gravel and cobble deposits, layers of detrital tuff, and calcium carbonate cemented conglomerate.

The primary source of groundwater supply for municipal use is the basal zone of the Tehama Formation, which is a highly confined aquifer. The overlying Quaternary alluvial deposits and upper and middle zones of the Tehama Formation are not suitable for high production municipal water supply. However, they are used for some domestic and agricultural purposes in unincorporated areas of Vacaville. East of the Vacaville area, these aquifers are utilized by SID to supplement surface water supplies and for shallow groundwater pumping for drainage purposes.

The Solano Sub-basin includes the southernmost portion of the Sacramento Valley Basin and extends into the northern portion of the Sacramento-San Joaquin Delta. Sub-basin boundaries are as follows: (1) Putah Creek on the north; (2) Sacramento River on the east (from Sacramento to Walnut Grove); (3) North Mokelumne River on the southeast (from Walnut Grove to San Joaquin River); (4) San Joaquin River on the south (from the North Mokelumne River to Sacramento River); and, (5) boundary between the San Francisco bay and Sacramento River hydrologic study areas as described in DWR Bulletin 118 on the west.

### Historic Groundwater Pumping

The City is the primary groundwater user within the Vacaville area. Unmeasured agricultural and domestic groundwater extractions in unincorporated areas of the Vacaville area, Rural North Vacaville Water District (RNVWD) production wells, and SID are the other groundwater usages. Since 1968, the City's annual groundwater pumping has varied from a low of 2,862 ac-ft in year 1968 to a high of 8,024 ac-ft in year 1983. Annual groundwater production, including all wells, is summarized in Table 3 from year 1968 to year 2010. The majority of groundwater production in the past was obtained from wells located at the Elmira Road well field. The newer northeast sector well field located near I-80 now contributes to the groundwater production. In the future, groundwater pumpage will be more widely distributed in the study area rather than concentrated in the Elmira Road well field.

TABLE 3  
CITY OF VACAVILLE  
HISTORICAL GROUNDWATER PUMPING

Year	ac-ft/yr	Year	ac-ft/yr
1968	2,862	1989	6,045
1969	3,046	1990	5,625
1970	2,871	1991	5,447
1971	3,198	1992	5,531
1972	3,255	1993	4,395
1973	3,125	1994	3,893
1974	3,316	1995	3,886
1975	3,970	1996	3,230
1976	4,965	1997	3,386
1977	5,093	1998	3,905
1978	5,020	1999	4,096
1979	6,185	2000	5,141
1980	6,990	2001	6,214
1981	7,740	2002	6,638
1982	7,683	2003	6,628
1983	8,024	2004	6,622
1984	6,089	2005	6,680
1985	5,853	2006	6,635
1986	5,824	2007	6,612
1987	6,236	2008	5,784
1988	5,421	2009	4,647
		2010	5,068

The Solano Sub-basin was not listed as in a “critical condition of overdraft” in the 1980 Bulletin 118: Groundwater Conditions in California. Based on information provided in the Groundwater Management Plan and the Groundwater Supply Sufficiency (see Appendix E), the sub-basin is not projected to become overdrafted if current management conditions continue.

### 3.3 Surface Water

The City has three separate sources for surface water including Solano Project, State Water Project, and Settlement Water. Each surface water source is described below.

#### Solano Project (Vacaville Supply, SID Agreement)

The Solano Project was constructed by the Bureau of Reclamation in 1958. The water rights permits for the Solano Project are held by the Bureau of Reclamation in trust for the Solano water users. The water rights permits further state that when the permits are converted to a license, the license will be issued in the name of Solano water users. Unlike most federal water projects, the water rights to the Solano Project “belong” to the Solano water users. The main feature of the Solano Project is Monticello Dam, which provides for storage of 1.6 million ac-ft of water in Lake Berryessa (Lake). Water from the Lake is diverted through the Putah Diversion Dam to the 32-mile Putah South Canal, which transports water to the eight SCWA-member unit contractors for Solano Project water.

SCWA has entered into agreements with cities, districts, and state agencies to provide water from the Solano Project. The Solano Project contracting agencies are: Fairfield, Suisun City, Vacaville, Vallejo, SID, Maine Prairie Water District, University of California at Davis, and CSP- Solano. The annual entitlement to each agency is described in Table 4.

TABLE 4  
SUMMARY OF SOLANO PROJECT  
WATER CONTRACTS (AC-FT/YR)

<b>Agency</b>	<b>Annual Entitlement</b>
Fairfield	9,200
Suisun City	1,600
Vacaville	5,750
Vallejo	14,600
SID	141,000
Maine Prairie Water District	15,000
UC Davis	4,000
California State Prison – Solano	1,200
Project Operating Loss (average estimated)	<u>15,000</u>
<b>Total</b>	<b>207,350<sup>a</sup></b>

<sup>a</sup> Value approximates a firm yield during the driest hydrologic period on record (1916-1934).

In addition to its entitlement from SCWA, Vacaville entered into a 1995 Master Water Agreement with SID, which was amended in 2010. Pursuant to the agreement, Vacaville receives an increasing supply from SID through the year 2039 and a consistent supply thereafter until the year 2050. The annual water schedule for SID water available to Vacaville is contained in Table 5.

TABLE 5  
ANNUAL WATER SCHEDULE FOR  
THE SID WATER AGREEMENT (AC-FT/YR)

Year	Annual Entitlement	Year	Annual Entitlement
2010	2,500	2026	5,925
2011	2,625	2027	6,225
2012	2,750	2028	6,525
2013	2,875	2029	6,825
2014	3,000	2030	7,125
2015	3,125	2031	7,425
2016	3,325	2032	7,725
2017	3,525	2033	8,025
2018	3,725	2034	8,325
2019	3,925	2035	8,625
2020	4,125	2036	8,925
2021	4,425	2037	9,225
2022	4,725	2038	9,525
2023	5,025	2039	9,825
2024	5,325	2040 - 2050	10,050
2025	5,625		

#### State Water Project (North Bay Aqueduct)

Vacaville receives water allocations from the State Water Project through SCWA (termed Table A water) and water from a Year 2000 purchase agreement from the Kern County Water Agency (KCWA). Surface water received pursuant to these agreements is delivered through the NBA, a State Water Project facility. The City supply from the State Water Project is 6,100 ac-ft/yr, while KCWA Agreement water totals 2,878 ac-ft/yr. The Solano County branch of the NBA was completed in 1988. The Aqueduct is 28 miles long starting from Barker Slough in the Delta and ending in Napa County. The location of the NBA can be seen in Figure 2. DWR is the owner and operator of the NBA.

The water supply for the NBA is less reliable than the Solano Project. Supply from the NBA comes from the State Water Project which provides water to a total of 29 contractors. A list of these contractors and their respective allocations is shown in Table 6. Because the NBA is part of the entire State Water Project, any shortages occurring in the State Water Project impact the NBA.

TABLE 6  
**STATE WATER PROJECT 2010  
 WATER ALLOCATIONS (AC-FT/YR)**

<b>Agency</b>	<b>Maximum Allocations</b>
<b>Upper Feather River Area</b>	
City of Yuba City	9,600
County of Butte	27,500
Plumas County Flood Control and Water Conservation District	<u>2,160</u>
Subtotal	39,260
<b>North Bay Area</b>	
Napa County Flood Control and Water Conservation District	29,025
Solano County Water Agency	<u>47,506</u>
Subtotal	76,531
<b>South Bay Area</b>	
Alameda County Flood Control and Water Conservation District	80,619
Alameda County Water District	42,000
Santa Clara Valley Water District	<u>100,000</u>
Subtotal	222,619
<b>San Joaquin Valley Area</b>	
County of Kings	9,305
Dudley Ridge Water District	50,343
Empire West Side Irrigation District	3,000
Kern County Water Agency	982,730
Oak Flat Water District	5,700
Tulare Lake Basin Water Storage District	<u>88,922</u>
Subtotal	1,140,000
<b>Central Coastal Area</b>	
San Luis Obispo County Flood Control and Water Conservation District	25,000
Santa Barbara County Flood Control and Water Conservation District	<u>45,486</u>
Subtotal	70,486

TABLE 6 (Continued)  
**STATE WATER PROJECT 2010**  
**WATER ALLOCATIONS (AC-FT/YR)**

<b>Agency</b>	<b>Maximum Allocations</b>
Southern California Area	
Antelope Valley-East Kern Water Agency	141,400
Castaic Lake Water Agency	95,200
Coachella Valley Water District	138,350
Crestline-Lake Arrowhead Water Agency	5,800
Desert Water Agency	55,750
Littlerock Creek Irrigation District	2,300
Metropolitan Water District of Southern California	1,911,500
Mojave Water Agency	82,800
Palmdale Water District	21,300
San Bernardino Valley Municipal Water District	102,600
San Gabriel Valley Municipal Water District	28,800
San Geronio Pass Water Agency	17,300
Ventura County Flood Control District	<u>20,000</u>
Subtotal	2,623,100
<b>Total</b>	<b>4,171,996</b>

Within Solano County there are currently seven agencies with NBA water allocations. These include Benicia, Dixon, Fairfield, Rio Vista, Suisun City, Vacaville, and Vallejo. The annual increase in SCWA's contract is described in Table 7. Member units using the NBA and their allocations are described in Table 8. Shortages during dry years are proportional to their share of the overall contract with DWR.

TABLE 7  
**SUMMARY OF STATE WATER PROJECT ALLOCATIONS TO THE**  
**SOLANO COUNTY WATER AGENCY THROUGH THE NORTH BAY AQUEDUCT (AC-FT/YR)**

<b>Year</b>	<b>Annual Allocations</b>	<b>Year</b>	<b>Annual Allocations</b>
2001	45,836	2009	47,456
2002	46,296	2010	47,506
2003	46,756	2011	47,556
2004	47,206	2012	47,606
2005	47,256	2013	47,656
2006	47,306	2014	47,706
2007	47,356	2015 <sup>a</sup>	47,756
2008	47,406		

<sup>a</sup> Each year thereafter will have an annual allocation of 47,756 ac-ft/yr.

TABLE 8  
**STATE WATER PROJECT  
 ALLOCATION TO SOLANO COUNTY CITIES SERVED  
 BY THE NORTH BAY AQUEDUCT (AC-FT/YR) IN YEAR 2035**

<b>City</b>	<b>Annual Allocations</b>
Benicia	17,200
Dixon	0 <sup>a</sup>
Fairfield	14,678
Rio Vista	0 <sup>a</sup>
Suisun City	1,300
Vacaville	8,978 <sup>b</sup>
Vallejo	<u>5,600</u>
<b>Total</b>	<b>47,756</b>

<sup>a</sup> Dixon and Rio Vista currently do not use their individual allocation of 1,500 ac-ft/yr. If Dixon and/or Rio Vista decide to use the NBA water supply, supplies to Benicia, Fairfield and Vallejo are reduced commensurately.

<sup>b</sup> Vacaville allocations from State Water Project (including KCWA Agreement).

### Settlement Water (DWR Agreement)

Settlement Water consists of surface water from the Sacramento River and Sacramento-San Joaquin Delta Estuary. Settlement Water is diverted under water rights held by DWR, but is not considered State Water Project water. The water is made available by DWR in settlement of area-of-origin water right applications by the cities of Fairfield, Benicia, and Vacaville.

The City currently uses only 25 to 30 percent of the Settlement Water, and experiences water quality and delivery challenges. The City is working with SCWA to construct a new intake on the Sacramento River to resolve these challenges. The Agreement provides an allocation to each of the three cities as shown in Table 9.

TABLE 9  
**SUMMARY OF SETTLEMENT WATER FOR THE CITIES OF  
 FAIRFIELD, BENICIA, AND VACAVILLE (AC-FT/YR)**

<b>Agency</b>	<b>Annual Allocations</b>
Fairfield	11,800
Benicia	10,500
Vacaville	<u>9,320</u>
<b>Total</b>	<b>31,620</b>

### 3.4 Recycled Water

A preliminary planning study performed in 2003 evaluated the potential for recycled water delivery and use citywide. Potential customers were identified that may accept tertiary treated recycled water generated at the Easterly Wastewater Treatment Plant (EWWTP) in the future. Several considerations were also identified: (1) I-80 splits Vacaville into south and north segments with the EWWTP located in the farthest southeast section of the City. Distribution piping does not currently exist and the planning and coordination to construct a system reaching north of I-80 would be expensive and challenging; and (2) SID has a non-potable water conveyance system established throughout Vacaville and has the potential to deliver to all areas of the City at a lesser cost than the City could provide recycled water.

Evaluation of these considerations has focused the City's current planning on future delivery to customers south of I-80 and near the EWWTP. Delivery estimates for 2020 currently total 1,175 ac-ft/yr; however, this drought-proof resource will require user contracts and possible retrofit costs on the user's behalf. Therefore, for planning purposes, only 75 percent of the total delivery estimate, or 880 ac-ft/yr, is assumed to be available beginning in 2020.

### 3.5 Summary of Water Supply Sources

The total water supply available to the City in 2035 from groundwater, surface water, and recycled water will be 41,553 ac-ft/yr. A summary of the respective supply sources previously discussed is presented in Table 10.

TABLE 10  
CITY OF VACAVILLE  
TOTAL WATER SUPPLY IN YEAR 2035

Sources of Supply	Allocations (ac-ft/yr)
Solano Project	
Vacaville Entitlement <sup>a</sup>	5,750
SID Agreement <sup>b</sup>	8,625
State Water Project <sup>c</sup>	
Vacaville Table A	6,100
KCWA Agreement	2,878
Settlement Water <sup>d</sup>	9,320
Groundwater Pumping <sup>e</sup>	8,100
Recycled Water	<u>880</u>
<b>Total</b>	<b>41,653</b>

<sup>a</sup> See Table 4.

<sup>b</sup> See Table 5.

<sup>c</sup> See Table 8.

<sup>d</sup> See Table 9.

<sup>e</sup> Projected groundwater pumping. See Appendix E.

### **3.6 Quality of Water Supply**

High quality water is supplied to customers in the City, as illustrated in the City's annual Drinking Water Quality Consumer Confidence Reports. The 2009 Drinking Water Quality Consumer Confidence Report is provided in Appendix F. Groundwater is typically higher in hardness and mineral content than surface water sources. Surface water is treated either at the City DE Water Treatment Plant or the NBR Water Treatment Plant. The quality of surface water varies seasonally, typically being more turbid during the winter months. Groundwater treatment includes chlorination and fluoridation at the wellhead. The chlorination of groundwater is to ensure a sufficient chlorine residual in the distribution system to prevent proliferation of harmful organisms. The quality of the City water supply is not expected to change through 2035.

#### 4.0 SBx7-7 WATER USE TARGETS

In February 2008, Governor Arnold Schwarzenegger introduced a plan for improving the Sacramento-San Joaquin Delta, a component of which is to achieve a 20 percent reduction in per capita water use statewide by the year 2020. In November 2009, Senate Bill 7-7 (SBx7-7) was signed into law, addressing urban and agricultural water conservation. SBx7-7 requires water suppliers to calculate baseline per capita water use and per capita water use targets for 2015 and 2020 in the 2010 UWMP.

The following methodology was used to determine SBx7-7 compliance goals:

1. Determine the population served by the City (described in Section 4.1 and Table 11)
2. Determine the City's Baseline Per Capita Water Use (described in Section 4.2 and Table 12)
3. Determine the 2020 Per Capita Water Use Target by one of four methods (described in Section 4.3)
4. Confirm 2020 Per Capita Water Use Target against target based on minimum amount of conservation (described in Section 4.4 and Table 13)
5. Determine the 2015 Per Capita Water Use Target (described in Section 4.5)

#### 4.1 Population

The City's total population, presented in Table 1, includes inmates housed at CSP-Solano and CMF. CSP-Solano and CMF receive potable water from the City and raw water from SID, which is treated on site and used to meet potable water demands at these facilities. To determine the fraction of CSP-Solano and CMF population that is served by the City, the total population of the prison is adjusted by the proportion of water served by the City to the total amount of water delivered to the facilities, using the following equation:

$$Pop_{City} = (Pop_{tot}) \frac{(V_{City})}{(V_{City} + V_{SID})}$$

Where  $Pop_{City}$  is the portion of the prison population that is served by the City,  $Pop_{tot}$  is the total population of the facilities,  $V_{City}$  is the volume of water delivered by the City, and  $V_{SID}$  is the volume of water delivered by SID. The total amount of water supplied to the prison is  $V_{City} + V_{SID}$ .

The population of the City used to determine per capita baseline and targets is the total population of the City, plus the difference between the total and adjusted prison populations. The calculation of the adjusted City population from 1999 to 2010 is provided in Table 11.

TABLE 11  
DETERMINATION OF ADJUSTED CITY POPULATION

Year	Total Prison Population	Water Delivered by City, MG	Water Delivered by SID, MG	Adjusted Prison Population <sup>a</sup>	Total City Population	Adjusted City Population <sup>b</sup>
1999	8,863	55	447	971	85,817	77,925
2000	8,810	159	374	2,635	87,551	81,376
2001	9,031	148	388	2,489	90,262	83,720
2002	9,071	272	404	3,647	91,817	86,393
2003	9,049	123	410	2,082	92,807	85,840
2004	9,230	167	391	2,766	93,350	86,886
2005	9,112	186	362	3,098	93,954	87,940
2006	9,039	227	336	3,645	93,129	87,735
2007	9,110	91	378	1,768	92,980	85,638
2008	8,580	66	333	1,422	93,069	85,911
2009	7,698	51	288	1,164	92,493	85,959
2010	7,784	63	245	1,587	93,090	86,893

<sup>a</sup> The Adjusted Prison Population is determined by multiplying the Total Prison Population by the Water Delivered by City and dividing by the sum of Water Delivered by City and Water Delivered by SID.

<sup>b</sup> The Adjusted City Population is determined by subtracting the Total Prison Population from the Total City Population and then adding the Adjusted Prison Population.

Prison population and water supply data is available for 1999 through 2010. The methodology described above was used to determine the adjusted City population for this period. The prison population prior to 1999 is assumed to be the average prison population between 1999 and 2010 (8,701). To determine the portion of the prison population served by the City during years prior to 1999, the average amount of water supplied to the prison was multiplied by the average percentage of the water supplied to the prison that is supplied by the City (27 percent). Using this methodology, the prison population receiving water supplied by the City is estimated to be 2,353 from 1995 through 1998. The estimated total prison population of 8,701 and the estimated population that received City water of 2,353, is used to determine the adjusted City population from 1995 through 1998.

#### 4.2 Baseline Per Capita Water Use

The determination of baseline per capita water use for the City is summarized in Table 12. The baseline use is the average annual per capita water use calculated over a period of ten years ending between 2004 and 2010. As seen in Table 12, the City's baseline per capita water use is 189 gallons per capita per day (gpcd).

TABLE 12  
**BASELINE PER CAPITA WATER USE FOR THE CITY OF VACAVILLE**

Year	Total Water Use <sup>a</sup> , ac-ft/yr	Total Water Use <sup>a</sup> , MG/yr	Total Population <sup>b</sup>	Adjusted Population <sup>c</sup>	Annual Per Capita Water Use, <sup>d</sup> gpcd	SBx7-7 Baseline Per Capita Water Use Target, <sup>e</sup> gpcd
1995	14,695	4,788	81,361	75,013	175	--
1996	15,055	4,905	81,623	75,275	179	--
1997	15,155	4,938	82,258	76,117	178	--
1998	14,247	4,642	84,258	77,910	163	--
1999	16,011	5,217	85,817	77,925	183	--
2000	16,879	5,500	87,551	81,376	185	--
2001	17,662	5,755	90,770	83,720	188	--
2002	17,874	5,824	92,802	86,393	185	--
2003	17,460	5,689	94,215	85,840	182	--
2004	18,541	6,041	95,121	86,886	190	181
2005	17,990	5,862	96,222	87,940	183	182
2006	18,563	6,048	95,879	87,735	189	183
2007	19,321	6,295	96,025	85,638	201	185
2008	19,391	6,318	96,441	85,911	201	189
2009	17,694	5,765	96,235	85,959	184	189
2010	16,329	5,320	97,305	86,893	168	187
<b>Baseline Per Capita Water Use, gpcd:</b>						<b>189</b>

<sup>a</sup> The City Total Water Use is based on total production during a given year.

<sup>b</sup> Total City population as provided by the California Department of Finance for the City of Vacaville., including total prison population.

<sup>c</sup> Adjusted City population accounts for the portion of the CSP Solano and CMF that are served by SID. See Table 11 above.

<sup>d</sup> Annual per capita water use is the total water use divided by the population.

<sup>e</sup> The SBx7-7 baseline per capita water use is the ten-year average of annual per capita water use ending in a given year.

### 4.3 2020 Per Capita Water Use Target

The per capita water use target, which must be met by 2020, must be calculated using one of four methods described in the *Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan* (UWMP Guidebook). The four methods are, in brief:

- Method 1: 80 percent of Baseline Per Capita Water Use
- Method 2: Performance standard based on actual and estimated water use data including indoor residential water use; landscaping area; commercial, industrial, and institutional water use
- Method 3: 95 percent of the State Hydrologic Regional Target Water Use
- Method 4: Subtract water savings based on identified practices from Baseline Per Capita Water Use

The City evaluated all four methods and determined that Methods 1 and 3 are the most appropriate methods to determine Vacaville's 2020 Per Capita Water Use Target. It is in the City's interest to use the highest target calculated by the four methods in order to minimize impacts to the water users of the City while still meeting established water use goals.

The City used Methods 1 and 3 to determine potential per capita water use targets. Using Method 1, the per capita water use target is 80 percent of the baseline per capita water use. The City’s per capita water use target would be 151 gpcd using Method 1.

Using Method 3, the per capita water use target is 95 percent of the applicable state hydrologic region target as defined in the draft 20x2020 Water Conservation Plan. The City is located in hydrologic region 5, which has a hydrologic region target of 176 gpcd. The City’s per capita water use target, based on Method 3, is therefore 167 gpcd.

+

The 2020 Per Capita Water Use Target of 167 gpcd calculated by Method 3 is the preferred target, however further comparison to a maximum target figure is required.

**4.4 Confirm 2020 Per Capita Water Use Target**

SBx7-7 requires Cities to achieve a minimum amount of conservation regardless of the 2020 Per Capita Water Use Targets calculated by the four methods. This minimum amount of conservation is described in Section 10608.22 of SBx7-7. A water supplier may not use a per capita water use target greater than the water use target described in Section 10608.22.

This maximum water use target is determined using a baseline per capita water use calculated by averaging per capita water use over a five-year period ending between 2007 and 2010. The maximum per capita water use target is 95 percent of this baseline per capita water use. Note that the baseline per capita water use used to determine the maximum per capita water use target is not the same baseline per capita water use used to determine the Method 1 per capita water use target as described in Section 4.3 and Table 12. The maximum per capita water use target calculation for the City is summarized in Table 13.

TABLE 13  
MAXIMUM PER CAPITA WATER USE TARGET

Year	Annual Per Capita Water Use <sup>a</sup> , gpcd	SBx7-7 Baseline Per Capita Water Use <sup>b</sup> , gpcd
2003	182	--
2004	190	--
2005	183	--
2006	189	--
2007	201	189
2008	201	193
2009	184	192
2010	168	189
Baseline Per Capita Water Use, gpcd:		193
<b>Maximum Per Capita Water Use Target, gpcd:</b>		<b>183</b>

<sup>a</sup> Annual per capita water use is the total water use divided by the population, from Table 12.  
<sup>b</sup> The SBx7-7 baseline per capita water use is the five-year average of annual per capita water use ending in a given year. Note that this is different than the baseline per capita water use calculated in Table 12 to determine the Method 1 per capita water use goal.

As seen in Table 13, the baseline per capita water use associated with the maximum per capita water use target is 193 gpcd, which corresponds to a maximum per capita water use target of 183 gpcd (95 percent of 193 gpcd). Because the maximum per capita water use target (183 gpcd) is greater than the per capita water use target calculated for 2020 using Method 3 (167 gpcd), the City is required to use the per capita water use target calculated with Method 3.

**4.5 2015 Interim Per Capita Water Use Target**

The interim per capita water use target, which must be met in 2015, is defined as the midpoint between the baseline per capita water use and the 2020 per capita water use target. The City’s 2015 interim per capita water use target is 178 gpcd.

**4.6 SBx7-7 Implementation Plan**

As described above and summarized in Table 14, the City’s baseline per capita water use is 189 gpcd, the 2015 interim per capita water use target is 178 gpcd, and the 2020 per capita water use target is 167 gpcd. Per capita water use in the City has historically been relatively low due to the City’s water conservation efforts. The City expects to be able to meet the per capita water use targets through continued water conservation. The per capita water use in the City is expected to decrease as new development is constructed due to more stringent building requirements such as mandatory measures of the 2010 California Green Building Standards Code. The City also plans to continue water conservation education and measures described in Section 8.

TABLE 14  
SUMMARY OF SBx7-7 BASELINE AND TARGETS

Parameter	Value
Baseline Per Capita Water Use <sup>a</sup>	189 gpcd
Verification Baseline Per Capita Water Use <sup>b</sup>	1835 gpcd
2015 Interim Per Capita Water Use <sup>c</sup>	178 gpcd
2020 Per Capita Water Use <sup>d</sup>	167 gpcd

<sup>a</sup> Based on ten-year average as described in Section 4.1.  
<sup>b</sup> Based on five-year average as described in Section 4.3.  
<sup>c</sup> As described in Section 4.4  
<sup>d</sup> 2020 Per Capita Water Use as determined by SBx7-7 Section 10608.22 (minimum amount of water conservation), as described in Section 4.3.

## 5.0 WATER USE PROVISIONS

This section quantifies, to the extent records are available, past, current, and projected water use. As water demands increase and sources of production capacity are expanded in the future, the utilization of each source of production will shift. Each year the City establishes goals for utilization of each source.

Projected water demands in five year increments for the City and future development in the City are presented in Table 15. Baseline City demand is based on 2010 monthly water production as reported by the City of Vacaville. Water demands for the year 2035 were based on the growth projected in the most recent land use database prepared by the City's Community Development Department and population projects by the Association of Bay Area Governments (ABAG). The five-year incremental demands were estimated using linear interpolation between 2015 and 2035. The demands summarized in Table 15 are less than projected demands in previous documents to be consistent with lowered population projections due to the recent economic downturn.

TABLE 15  
CITY OF VACAVILLE  
SUMMARY OF NORMAL YEAR  
ANNUAL WATER DEMAND (AC-FT/YR) IN FIVE YEAR INCREMENTS

<b>Demand</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>
Existing City (2010) <sup>a</sup>	16,329	16,329	16,329	16,329	16,329
Proposed Developments <sup>b</sup>	1,432	1,081	1,429	1,784	2,146
Other Future Development in City <sup>c</sup>	0	0	0	0	0
<b>Total Demand</b>	<b>17,761</b>	<b>17,410</b>	<b>17,758</b>	<b>18,113</b>	<b>18,475</b>

<sup>a</sup> Existing City demand is based on actual water supply data for January through December 2010.

<sup>b</sup> Proposed developments include Lower Lagoon Valley, Southtown, Rice McMurtry, and Vanden Meadows.

<sup>c</sup> Other future development water demands are based on the most current land use information in the City's Web Based Land Use Database Management System (WBLUDMS).

The demand projections presented in Table 15 are based on the City's currently adopted General Plan, and takes into consideration recent development conditions. In conjunction with the population growth as projected by ABAG, water demand in 2035 is projected to be 18,475 ac-ft/yr with an adjusted population of 98,759. The City's General Plan update, currently underway, is evaluating low, medium, and high alternative growth scenarios in which growth projections range from a low of 2,100 to a high of 4,700 residential units in 2035, corresponding to 1,100 to 2,200 ac-ft/yr. As will be seen in later sections of this plan, the City has sufficient supplies to provide water to development in excess of the demand growth projected in Table 15. The reduction in proposed development demand observed between 2015 and 2020 is due to conservation efforts.

Table 16 provides a summary of past, current, and projected population, service connections, and water demands through the year 2035. While increases in water demand are essentially proportional to population increase, the per capita figures also reflect commercial and industrial growth. For example, the per capita use rate in the year 2010 is estimated at 168 gallons/day. In the year 2035, the average per capita water use is estimated at 167 gallons/day. Table 17 presents

projected water use by customer type through 2035. Historical data by customer type is only available starting in 2000.

Since 2005, the City has changed its water billing system, installed radio read meters throughout the City, and installed evapotranspiration based irrigation controllers at parks and City facilities. These changes are believed to account for the decrease in “Public Landscaping” water use observed from 2005 to 2010 in Table 17. Because the total water use in 2005 and 2010 are comparable, it is believed that the observed changes are due to how water is accounted.

Several steps, including demand reduction, are being taken to help ensure an adequate water supply for the City of Vacaville. First, the City has imposed a planned growth ordinance that allows the Public Utilities time to plan, acquire, and construct sources and facilities necessary to maintain an adequate water supply and environmentally safe processing and discharge of wastewater. Secondly, the City of Vacaville adopted Water Conservation Ordinance No. 1431 on March 12, 1991 that helped the utility meet short-term deficiencies. City-wide conservation throughout the peak dry years of 1991 through 1993 enabled the utility to adequately meet water demands with a 20 percent reduction in water consumption city-wide. In February 1992, the City, in cooperation with the SCWA, also adopted the “Urban Water Shortage Contingency Plan.” Both the Urban Water Shortage Contingency Plan and the ordinance are attached to this plan as part of Appendix G.

The City of Vacaville is committed to implementing water conservation measures to reduce overall water demands. Section 8 provides a detailed discussion of how the City is evaluating and putting into practice the 14 DMMs required by the Urban Water Management Planning Act. These DMMs include programs such as water surveys for single-family and multi-family residences, residential plumbing retrofits, and school education, to name a few.

#### Low Income Housing Water Demand

The projected water demand for low income housing is described in this section. A low income household is defined as a household whose income is 80 percent or less of the median income in the City.

The *Vacaville General Plan Housing Element*, adopted on April 27, 2010, states that a total of 2,901 housing units need to be constructed in the City between 2007-2014 to meet projected housing demands. Low income housing units make up 42 percent (1,222 units) of the total units needed. The water demand of low income housing was estimated by scaling the single-family and multi-family residential water demand. This is thought to be conservative because larger housing types that are not typically associated with low income housing, such as residential estates, typically have higher water demands. The water demand associated with low income housing units is presented in Table 18.

The Housing Element states, as New Construction Implementing Policy H.1- I23, that the City will grant priority for service allocation to proposed developments that include housing units affordable to lower-income households.

TABLE 16  
PAST, CURRENT, AND PROJECTED WATER USE (1980-2035)

	Past (Actual)						Current <sup>c</sup>	Projected				
	1980	1985	1990	1995 <sup>a</sup>	2000 <sup>a</sup>	2005 <sup>b</sup>	2010	2015	2020	2025	2030	2035
Total Population	43,367	49,854	70,496	81,361	87,551	96,222	97,305	102,600	105,000	107,300	109,400	111,100
Growth Rate (% per 5 years)	37	14	35	15	8	10	1	5	2	2	2	2
Adjusted Population	--	--	--	75,013	81,376	87,940	86,893	91,238	93,062	94,924	96,822	98,759
Average per capita water use (gallons/day) <sup>d</sup>	182	200	177	175	185	183	168	178	167	167	167	167
<b>Connections<sup>e</sup></b>												
Number of service connections	12,143	13,786	19,878	21,531	22,716	26,201	26,830	27,800	28,400	29,100	29,600	30,100
<b>Water Demand Totals</b>												
Drinking Water Deliveries (units/yr) <sup>f</sup>	3,845,187	4,884,558	6,094,734	6,401,070	7,353,941	7,838,622	7,112,299	7,736,692	7,583,715	7,735,389	7,890,097	8,047,899
Million gallons/day (MGD)	7.88	10.01	12.49	13.12	15.07	16.06	14.6	15.85	15.54	15.85	16.17	16.49
Million gallons/year (MGY)	2,876	3,654	4,559	4,788	5,500	5,862	5,320	5,787	5,673	5,786	5,902	6,020
Acre-feet/year (af/yr) <sup>g</sup>	8,827	11,213	13,991	14,695 <sup>h</sup>	16,879	17,990	16,329	17,761	17,410	17,758	18,113	18,475

<sup>a</sup> Data for 1995 and 2000 has been revised from the 2005 UWMP Update to reflect adjustments and the most current records by the City and State.

<sup>b</sup> 2005 data reported in this table differs from 2005 data reported in the 2005 UWMP Update. The 2005 data in the 2005 UWMP Update were estimates. Actual data is reported in this table.

<sup>c</sup> Existing City demand is based on actual water supply data for January through December 2010

<sup>d</sup> Includes residential and industrial demands. Average per capita water use is based on adjusted population after 1995.

<sup>e</sup> 100 percent of service connections are metered.

<sup>f</sup> One unit = 748 gallons or 100 cubic feet.

<sup>g</sup> City limits only.

<sup>h</sup> 1995 water use based on City water system production records.

TABLE 17  
PAST, CURRENT, AND PROJECTED WATER USE BY CUSTOMER TYPE (2005 – 2035)

Customer Type <sup>a</sup>	Water Demand Totals (ac-ft/yr)						
	Past	Current	Projected <sup>b</sup>				
	2005	2010	2015	2020	2025	2030	2035
Single-Family Residential	10,541	9,437	10,265	10,062	10,263	10,468	10,677
Multi-Family Residential <sup>c</sup>	2,174	2,098	2,282	2,237	2,282	2,327	2,374
Commercial	1,305	1,405	1,528	1,498	1,528	1,559	1,590
Industrial	548	794	864	847	863	881	898
Public Agency/Institutional	830	684	744	729	744	759	774
Public Landscaping <sup>d</sup>	1,172	765	832	816	832	849	866
General Other	215	0	0	0	0	0	0
Unaccounted for Water Loss <sup>e</sup>	1,205	1,146	1,247	1,222	1,246	1,271	1,297
<b>TOTAL</b>	<b>17,990</b>	<b>16,329</b>	<b>17,761</b>	<b>17,410</b>	<b>17,758</b>	<b>18,113</b>	<b>18,475</b>

<sup>a</sup> The City does not supply water for saline water intrusion barrier, groundwater recharge, or agriculture. The City also does not sell water to other agencies

<sup>b</sup> Current and projected water use is based on the percentage of use by customer type in 2010.

<sup>c</sup> Single Family and Multi-Family Residential include water demand of low income units.

<sup>d</sup> The decrease in public landscape demand from 2005 to 2010 is attributed to the installation of evapotranspiration based irrigation controllers and the retrofit of irrigation heads at City parks and set-back landscaping.

<sup>e</sup> The increase in unaccounted for water loss from 2005 and 2010 is attributed to a change of the City's utility billing system software during the 2004/2005 fiscal year. The system change-out increased accuracy of consumption data and sales figures.

TABLE 18  
LOW INCOME HOUSING WATER DEMAND (2010 – 2035)

Customer Type	Water Demand Totals (ac-ft/yr)					
	2010	2015	2020	2025	2030	2035
Single Family Housing Water Demand, ac-ft/yr	3,975	4,355	4,564	4,774	4,953	5,030
Multi-Family Housing Water Demand, ac-ft/yr	884	968	1,015	1,061	1,101	1,118
<b>Total Low Income Housing Water Demand, ac-ft/yr</b>	<b>4,859</b>	<b>5,323</b>	<b>5,579</b>	<b>5,835</b>	<b>6,054</b>	<b>6,148</b>

## **6.0 RELIABILITY PLANNING**

This section presents a discussion on reliability planning, where reliability is defined as a measure of a water service system's expected success in managing water shortages.

### **6.1 Frequency and Magnitude of Supply Deficiencies**

Vacaville's Utilities Department continues to work closely with the Community Development Department, the City Council, and regional water suppliers to ensure adequate water supply for planned City growth. Current and projected water supply, to the year 2035, is shown in Table 19. Vacaville continues to plan for both short-term supply crisis and long-term supply acquisition.

In Vacaville, short-term supply deficiencies can be mitigated through a variety of measures as was evidenced during the peak of the 1991-1993 drought.

1. **Conjunctive Use** – With three (3) surface water supply sources (Solano Water Project, State Water Project, and Settlement Water) and groundwater, Vacaville has the ability to increase, decrease, or eliminate the production of any one source should supplies become limited or contaminated. During the 1991-1993 drought, NBA supplies were reduced by 80 percent. Vacaville was able to rely more heavily on alternate surface water and groundwater supplies. Conjunctive use does require close production management and monitoring of supply availability and quality. Foresight in supply planning ensures that Vacaville is not dependent on any single source.
2. **Demand Management** – Conservation measures that reduce demand will help to sustain a supply during short-term crisis. Section 8.0 outlines demand management measures in detail.
3. **Purchase** – Vacaville works closely through the SCWA in purchasing water for short-term use, possibly unused agricultural supplies or unscheduled State Water Project water. Long-term supply needs are met through purchases and trades with regional wholesalers and retailers. In addition, the City has the option of purchasing additional water under the SID Water Agreement.

TABLE 19  
CURRENT AND PROJECTED AVAILABLE WATER SUPPLY (2010 – 2035)

Sources of Supply	2010	2015	2020	2025	2030	2035
Solano Project - Quantity (af/yr)						
Vacaville Entitlement	5,750	5,750	5,750	5,750	5,750	5,750
SID Agreement	2,500	3,125	4,125	5,625	7,125	8,625
Percent of supply (%)	25	26	27	30	32	35
State Water Project -Quantity (af/yr)						
North Bay Aqueduct	6,100	6,100	6,100	6,100	6,100	6,100
Kern County Water Agency	2,878	2,878	2,878	2,878	2,878	2,878
Settlement Water	9,320	9,320	9,320	9,320	9,320	9,320
Percent of supply (%)	55	54	51	48	46	44
Groundwater						
Quantity (af/yr)	6,500	7,000	7,000	7,300	7,700	8,100
Percent of supply (%)	20	20	20	20	20	20
Recycled Water						
Quantity (af/yr)	--	--	880	880	880	880
Percent of Supply (%)	--	--	2	2	2	2
<b>Water Supply Totals</b>						
Drinking Water Available, units/yr <sup>a</sup>	14,398,353	14,888,493	15,707,571	16,491,795	17,319,587	18,147,379
Million gallons/day (MGD)	29.51	30.51	32.19	33.80	35.49	37.19
Million gallons/year (MGY)	10,770	11,137	11,749	12,336	12,955	13,574
Acre-feet/year (af/yr)	33,048	34,173	36,053	37,853	39,753	41,653

<sup>a</sup> One unit = 748 gallons or 100 cubic feet.

## 6.2 Plans to Ensure a Reliable Water Supply

In this section, the reliability of the City’s groundwater and surface water supplies are analyzed. The sources are identified for their availability during normal, single dry, and multiple dry years as determined by the DWR Sacramento Valley Water Hydrologic Classifications. The three separate hydrologic conditions considered are described as follows:

*Normal year:* This is a year when average rainfall has been received. During a normal year, the water availability from some sources may be less than the allocated amount.

*Single dry year:* This is a solitary dry or critical dry year and may be the first year of a multiple year drought.

*Multiple dry years:* This is a series of three consecutive dry and/or critical dry years.

Groundwater

A groundwater source sufficiency report was prepared in 2011 by Ludhorff and Scalmanini Consulting Engineers to describe the use and sufficiency of groundwater supplies beneath the City (see Appendix E). As part of the groundwater source sufficiency report, an analytical groundwater flow model was used to provide a preliminary assessment of water level impacts from future increases in groundwater pumping by the City to meet future water demands. The modeling effort included simulations of ten future pumping scenarios in which pumping would be increased and/or redistributed within the study area. The recommended maximum pumping is summarized in Table 20. Details regarding the model simulations and suggested pumping practices are found in Appendix E.

TABLE 20  
**CITY OF VACAVILLE**  
**PROJECTED MAXIMUM GROUNDWATER PUMPING (AC-FT/YR)**  
**DURING NORMAL, SINGLE DRY, AND MULTIPLE DRY YEARS**

Year	Normal Year	Single Dry Year	Multiple Dry Year
2010	6,500	7,800	7,800
2015	7,000	8,300	8300
2020	7,000	8,300	8,300
2025	7,300	8,700	8,700
2030	7,700	9,200	9,200
2035	8,100	9,700	9,700

Increased pumping during dry years will cause groundwater levels to decrease. Based on the results of the groundwater model, groundwater levels will return to normal levels once pumping decreases to normal year rates.

Surface Water

The following contains a description of the availability of the City’s surface water sources during normal, single dry, and multiple dry years.

*Solano Project (Vacaville Supply, SID Agreement)*

The contracts with the public entities that use Solano Project water provide for the sale and distribution of water made available by the Bureau of Reclamation each year. The Bureau of Reclamation is contractually committed to delivering the full contract amount of water supply from the Solano Project unless the water supply does not physically exist (e.g. an empty reservoir). All Solano Project contractors, whether they are municipal or agricultural, are impacted by water supply reductions on an equal basis.

The Solano Project has an annual water supply of 207,350 ac-ft/yr. As shown in Table 21, Vacaville is entitled to 5,750 ac-ft/yr of this annual yield. The Solano Project differs from other reservoir projects in California due to the reservoir storage size relative to the watershed yield.

This means it may take a relatively long time to deplete the reservoir, but, in turn, it takes a relatively long time to fill the reservoir. Due to the size of the reservoir as a function of its yield, the long-term reliability for the Solano project is excellent.

Because of the high degree of reliability and historical records, the City anticipates receiving 99 percent of the entitlement (and SID agreement water) during normal years, and 98 percent of the entitlement during a single dry year, and 89 percent during multiple dry years. Solano Project availability percentages for the City are derived using Sacramento Valley Water Year Hydrologic Classifications and historical records and are included in Appendix H, Solano Project Water Supply Availability, dated August 10, 2010.

TABLE 21  
**CITY OF VACAVILLE**  
**WATER SUPPLY IN YEAR 2010**

Sources of Supply	Entitlement	Normal Year		Single Dry Year		Multiple Dry Year	
		% Available	ac-ft/yr	% Available	ac-ft/yr	% Available	ac-ft/yr
Solano Project							
Vacaville Entitlement	5,750	99%	5,693	98%	5,635	89%	5,118
SID Agreement	2,500	99%	2,475	98%	2,450	89%	2,225
State Water Project							
Vacaville Table A	6,100	64%	3,904	63%	3,843	33%	2,013
KCWA Agreement	2,878	64%	1,842	63%	1,813	31%	892
Settlement Water <sup>a</sup>	9,320	100%	9,320	100%	9,320	100%	9,320
Groundwater <sup>b</sup>	6,500	100%	6,500	120%	7,800	120%	7,800
Recycled Water	0	100%	0	100%	0	100%	0
<b>Total</b>	<b>33,048</b>		<b>29,734</b>		<b>30,861</b>		<b>27,368</b>

<sup>a</sup> The City is currently utilizing 25 to 30 percent of Settlement Water due to seasonal availability of the entitlement and turbid water conditions making treatment difficult.

<sup>b</sup> Recommended maximum groundwater pumping.

*State Water Project (North Bay Aqueduct)*

As previously discussed, the water supply for the NBA is less reliable than the Solano Project. Supply from the NBA originates from the State Water Project and has a similar level of priority as all other 28 contractors to the project. As a result, this source is subject to significant cutbacks during dry years. Specifically, the City anticipates 63 percent availability during a single dry year and 33 percent availability during multiple dry years for this source. State Water Project availability percentages for the City are derived from CALSIM II Model Studies for State Water Project Delivery Capability and provided by SCWA. The State Water Project availability is included in Appendix I, State Water Project Water Supply Availability, dated August 10, 2010.

The 2029 model includes pumping restrictions in the South Delta based on the Biological Opinions for Delta Smelt and Salmon, which has resulted in lower reliability than those used in the 2005 UWMP update. In addition, the 2029 scenario includes climate change impacts that further reduce reliability. These lower reliabilities are used in the 2030 and 2035 water supply estimates.

*Settlement Water (DWR Agreement)*

In lieu of an Area of Origin Water Rights filing by the City, DWR and the City entered into a settlement agreement for water. An analysis on the expected reliability of the water to be provided to the City in accordance with the settlement agreement concluded that the City can anticipate receiving 100 percent of the allocation during normal, single dry, and multiple dry years. However, as described in Section 3.3, there are hydrologic factors that may limit the availability of the full allocation.

*Recycled Water*

Preliminary planning estimates indicate that recycled water will be available for delivery in 2020. Recycled water is a 100 percent reliable source of non-potable water and is completely independent of hydrologic conditions. Therefore, the City anticipates that this source will be 100 percent available during normal, single dry, and multiple dry years.

*Other Sources*

The City does not have the opportunity to desalinate ocean water, brackish water, or groundwater.

Summary of Water Supply Availability

This section contains a determination of water supply availability. As previously described, the amount of water entitled to the City is increasing until the maximum entitlement is reached by year 2040. Furthermore, each source has a different availability under normal, single dry, and multiple dry years. Information on supply entitlement and availability is shown in Tables 21 through 26 for normal, single dry, and multiple dry years in five-year increments between 2010 and 2035. The water supply availability is summarized in Tables 27, 28, and 29.

TABLE 22  
CITY OF VACAVILLE  
WATER SUPPLY IN YEAR 2015

Sources of Supply	Entitlement	Normal Year		Single Dry Year		Multiple Dry Year		
		% Available	ac-ft/yr	% Available	ac-ft/yr	% Available	ac-ft/yr	
Solano Project								
Vacaville Entitlement	5,750	99%	5,693	98%	5,635	89%	5,118	
SID Agreement	3,125	99%	3,094	98%	3,063	89%	2,781	
State Water Project								
Vacaville Table A	6,100	64%	3,904	63%	3,843	33%	2,013	
KCWA Agreement	2,878	64%	1,842	63%	1,813	31%	892	
Settlement Water <sup>a</sup>	9,320	100%	9,320	100%	9,320	100%	9,320	
Groundwater <sup>b</sup>	7,000	100%	7,000	120%	8,300	120%	8,300	
Recycled Water	0	100%	0	100%	0	100%	0	
<b>Total</b>	<b>34,173</b>		<b>30,853</b>		<b>31,974</b>		<b>28,424</b>	

<sup>a</sup> The City is currently utilizing 25 to 30 percent of Settlement Water due to seasonal availability of the entitlement and turbid water conditions making treatment difficult.

<sup>b</sup> Recommended maximum groundwater pumping.

TABLE 23  
CITY OF VACAVILLE  
WATER SUPPLY IN YEAR 2020

Sources of Supply	Entitlement	Normal Year		Single Dry Year		Multiple Dry Year		
		% Available	ac-ft/yr	% Available	ac-ft/yr	% Available	ac-ft/yr	
Solano Project								
Vacaville Entitlement	5,750	99%	5,693	98%	5,635	89%	5,118	
SID Agreement	4,125	99%	4,084	98%	4,043	89%	3,671	
State Water Project								
Vacaville Table A	6,100	64%	3,904	63%	3,843	33%	2,013	
KCWA Agreement	2,878	64%	1,842	63%	1,813	31%	892	
Settlement Water <sup>a</sup>	9,320	100%	9,320	100%	9,320	100%	9,320	
Groundwater <sup>b</sup>	7,000	100%	7,000	120%	8,300	120%	8,300	
Recycled Water	880	100%	880	100%	880	100%	880	
<b>Total</b>	<b>36,053</b>		<b>32,723</b>		<b>33,834</b>		<b>30,194</b>	

<sup>a</sup> The City is currently utilizing 25 to 30 percent of Settlement Water due to seasonal availability of the entitlement and turbid water conditions making treatment difficult.

<sup>b</sup> Recommended maximum groundwater pumping.

TABLE 24  
CITY OF VACAVILLE  
WATER SUPPLY IN YEAR 2025

Sources of Supply	Entitlement	Normal Year		Single Dry Year		Multiple Dry Year		
		% Available	ac-ft/yr	% Available	ac-ft/yr	% Available	ac-ft/yr	
Solano Project								
Vacaville Entitlement	5,750	99%	5,693	98%	5,635	89%	5,118	
SID Agreement	5,625	99%	5,569	98%	5,513	89%	5,006	
State Water Project								
Vacaville Table A	6,100	64%	3,904	63%	3,843	33%	2,013	
KCWA Agreement	2,878	64%	1,842	63%	1,813	31%	892	
Settlement Water <sup>a</sup>	9,320	100%	9,320	100%	9,320	100%	9,320	
Groundwater <sup>b</sup>	7,300	100%	7,300	120%	8,700	120%	8,700	
Recycled Water	880	100%	880	100%	880	100%	880	
<b>Total</b>	<b>37,853</b>		<b>34,508</b>		<b>35,704</b>		<b>31,929</b>	

<sup>a</sup> The City is currently utilizing 25 to 30 percent of Settlement Water due to seasonal availability of the entitlement and turbid water conditions making treatment difficult.

<sup>b</sup> Recommended maximum groundwater pumping.

TABLE 25  
CITY OF VACAVILLE  
WATER SUPPLY IN YEAR 2030

Sources of Supply	Entitlement	Normal Year		Single Dry Year		Multiple Dry Year		
		% Available	ac-ft/yr	% Available	ac-ft/yr	% Available	ac-ft/yr	
Solano Project								
Vacaville Entitlement	5,750	99%	5,693	98%	5,635	89%	5,118	
SID Agreement	7,125	99%	7,054	98%	6,983	89%	6,341	
State Water Project								
Vacaville Table A	6,100	64%	3,904	46%	2,806	31%	1,891	
KCWA Agreement	2,878	64%	1,842	46%	1,324	31%	892	
Settlement Water <sup>a</sup>	9,320	100%	9,320	100%	9,320	100%	9,320	
Groundwater <sup>b</sup>	7,700	100%	7,700	120%	9,200	120%	9,200	
Recycled Water	880	100%	880	100%	880	100%	880	
<b>Total</b>	<b>39,753</b>		<b>36,393</b>		<b>36,148</b>		<b>33,642</b>	

<sup>a</sup> The City is currently utilizing 25 to 30 percent of Settlement Water due to seasonal availability of the entitlement and turbid water conditions making treatment difficult.

<sup>b</sup> Recommended maximum groundwater pumping.

TABLE 26  
CITY OF VACAVILLE  
WATER SUPPLY IN YEAR 2035

Sources of Supply	Entitlement	Normal Year		Single Dry Year		Multiple Dry Year	
		% Available	ac-ft/yr	% Available	ac-ft/yr	% Available	ac-ft/yr
Solano Project							
Vacaville Entitlement	5,750	99%	5,693	98%	5,635	89%	5,118
SID Agreement	8,625	99%	8,539	98%	8,453	89%	7,676
State Water Project							
Vacaville Table A	6,100	64%	3,904	46%	2,806	31%	1,891
KCWA Agreement	2,878	64%	1,842	46%	1,324	31%	892
Settlement Water <sup>a</sup>	9,320	100%	9,320	100%	9,320	100%	9,320
Groundwater <sup>b</sup>	8,100	100%	8,100	120%	9,700	120%	9,700
Recycled Water	880	100%	880	100%	880	100%	880
<b>Total</b>	<b>41,653</b>		<b>38,278</b>		<b>38,118</b>		<b>35,477</b>

<sup>a</sup> The City is currently utilizing 25 to 30 percent of Settlement Water due to seasonal availability of the entitlement and turbid water conditions making treatment difficult.

<sup>b</sup> Recommended maximum groundwater pumping.

TABLE 27  
CITY OF VACAVILLE  
WATER SUPPLY DURING NORMAL YEAR (AC-FT/YR)

Sources of Supply	Year					
	2010	2015	2020	2025	2030	2035
Solano Project						
Vacaville Entitlement	5,693	5,693	5,693	5,693	5,693	5,693
SID Agreement	2,475	3,094	4,084	5,569	7,054	8,539
State Water Project						
Vacaville Table A	3,904	3,904	3,904	3,904	3,904	3,904
KCWA Agreement	1,842	1,842	1,842	1,842	1,842	1,842
Settlement Water	9,320	9,320	9,320	9,320	9,320	9,320
Groundwater	6,500	7,000	7,000	7,300	7,700	8,100
Recycled Water	0	0	880	880	880	880
<b>Total</b>	<b>29,734</b>	<b>30,853</b>	<b>32,723</b>	<b>34,508</b>	<b>36,393</b>	<b>38,278</b>

TABLE 28  
CITY OF VACAVILLE  
WATER SUPPLY DURING SINGLE DRY YEAR (AC-FT/YR)

Sources of Supply	Year					
	2010	2015	2020	2025	2030	2035
Solano Project						
Vacaville Entitlement	5,635	5,635	5,635	5,635	5,635	5,635
SID Agreement	2,450	3,063	4,043	5,513	6,983	8,453
State Water Project						
Vacaville Table A	3,843	3,843	3,843	3,843	2,806	2,806
KCWA Agreement	1,813	1,813	1,813	1,813	1,324	1,324
Settlement Water	9,320	9,320	9,320	9,320	9,320	9,320
Groundwater	7,800	8,300	8,300	8,700	9,200	9,700
Recycled Water	0	0	880	880	880	880
<b>Total</b>	<b>30,861</b>	<b>31,974</b>	<b>33,834</b>	<b>35,704</b>	<b>36,148</b>	<b>38,118</b>

TABLE 29  
CITY OF VACAVILLE  
WATER SUPPLY DURING MULTIPLE DRY YEAR (AC-FT/YR)

Sources of Supply	Year					
	2010	2015	2020	2025	2030	2035
Solano Project						
Vacaville Entitlement	5,118	5,118	5,118	5,118	5,118	5,118
SID Agreement	2,225	2,781	3,671	5,006	6,341	7,676
State Water Project						
Vacaville Table A	2,013	2,013	2,013	2,013	1,891	1,891
KCWA Agreement	892	892	892	892	892	892
Settlement Water	9,320	9,320	9,320	9,320	9,320	9,320
Groundwater	7,800	8,300	8,300	8,700	9,200	9,700
Recycled Water	0	0	880	880	880	880
<b>Total</b>	<b>27,368</b>	<b>28,424</b>	<b>30,194</b>	<b>31,929</b>	<b>33,642</b>	<b>35,477</b>

### 6.3 Potential Reduction of Potable Water Demands

In addition to the potable water demand reductions required by SBx7-7, which will be achieved through established water conservation measures, the City has the ability to reduce potable water demands through the use of recycled water for irrigation, the City's water conservation and rationing ordinance, and ongoing water conservation programs. Each is described below.

#### Use of Recycled Water

Wastewater generated in the City of Vacaville is currently conveyed to and treated at the 15 mgd Easterly Wastewater Treatment Plant (Easterly Plant). Treated effluent is currently discharged to Alamo Creek which flows into Cache Slough. Reclaimed treated effluent is a viable resource and

can reduce the demand for potable water supply when used for irrigating public parks and to meet industrial and other demands. Information regarding Vacaville's preliminary planning is discussed in Section 3.4.

The City of Vacaville has been working with a power ventures developer for a possible power plant located on property adjacent to the wastewater treatment plant. The close proximity to the wastewater treatment plant has allowed the City to establish a reasonable rate for recycled water. This incentive provided continuing interest in Vacaville as a project site and, if the project moves forward, could result in as much as 5 MGD of recycled water sales in the future. Incentives have not been offered to other potential customers at this time.

#### Water Conservation and Rationing Ordinance

The *Urban Water Shortage Contingency Plan* (Appendix G) establishes a Water Conservation Ordinance which defines three voluntary and mandatory water conservation stages. The contingency plan addresses water conservation during normal, drought, and emergency conditions as defined below.

##### *Normal Conditions*

The normal conservation condition is in effect any time when drought or emergency conditions are not in effect. Normal conditions will prevail when there is not a water shortage. Conservation practices (including the *City of Vacaville Water Efficient Landscape Requirements*) will be required during normal conditions in accordance with this ordinance. A copy of the *Water Efficient Landscape Requirements* and a memorandum comparing the requirements with the State mandated Model Water Efficient Landscape Ordinance are provided in Appendix J.

During normal conditions the goal is to maximize beneficial use of water through specific provisions of this ordinance, public education, voluntary water conservation, and the *City of Vacaville Water Efficient Landscape Requirements*.

Implementation Methods: Under normal conditions, water prices shall be established and modified from time to time with the objective of fully compensating for the acquisition, treatment, and distribution of water through revenues collected from customers, and promoting beneficial use of the water.

The *City of Vacaville Water Efficient Landscape Requirements* is applicable and water wasting activities may be prohibited under normal conditions. Water wasting activities are specified in Section 8.13.

No water may be supplied for temporary construction purposes without a permit from the Department of Public Works and payment of the costs of such water. Other than water released by the City itself for public purposes, no water may be taken from a fire hydrant without a permit from the City, payment of water charges as required, and the use of metering and backflow prevention devices.

*Drought Conditions*

Drought conditions will be in effect when there is a water shortage necessitating a reduction in water use, either city-wide or in area or use category within the City, greater than 10 percent from the normal condition but less than a 30 percent reduction.

Implementation Methods: Under drought conditions, water prices may be adjusted by any combination of (1) increases in the unit prices of water for established blocks, (2) modification of the unit amounts which define blocks, and (3) addition of new blocks. Under drought conditions, it will be necessary to increase price to balance cost to the City with revenues collected from customers as a result of lower water use, to acquire additional or supplemental supplies of water, or to promote water conservation. Changes in water pricing for drought conditions shall be made by a resolution of the City Council.

The water units which define the block structure price stages may be set from time to time by the City Council by resolution on either an annual or seasonal basis, and reduced by the percent decrease necessary to achieve the conservation goal for residential use, general use, and metered irrigation use.

In addition to normal restrictions, the following restrictions may be applicable under drought conditions. Further, the City Council may direct, by resolution, additional restrictions:

1. Watering and irrigation of plants, trees and landscaping will be allowed only during specified hours of the day, pursuant to regulations promulgated by the Director of Utilities.
2. Fountains and water using ornamental structures shall be prohibited from using water unless equipped with a recirculating pump.
3. Drought notices shall be posted in hotels, motels and all public establishments offering lodging.
4. Restaurants will serve water to customers only upon request of their patrons.
5. No landscaping, other than turf, may be installed unless irrigated with a drip irrigation system or a similar system with the equivalent savings in water usage.
6. Defer construction of new City parks unless specific factors determined by the City Council authorize such construction.
7. Prohibit new set-back landscaping at commercial and industrial sites. Deferred installation agreements may be required to ensure construction of the set-back landscaping when the water drought or emergency is over.

### *Emergency Conditions*

Emergency conditions will be in effect whenever there is a water shortage necessitating a reduction in water use, either city-wide or in a sub-area or land-use category within the City, of 30 percent or greater from the normal condition.

During emergency conditions the goal is to achieve a 30 percent or greater reduction in water consumption compared with normal conditions.

Implementation Methods: Under emergency conditions, water prices may be further adjusted as set forth under drought conditions.

Under emergency conditions, water unit amounts which define the block structure price increase stages can be further adjusted, as set forth in the ordinance and as determined necessary by the City Council, by resolution, to maintain revenues and decrease water consumption.

In addition to normal and drought restrictions, the following additional restrictions may be enacted under emergency conditions. The City Council may also establish other water use restrictions to be in effect during an emergency condition.

1. Depending upon the severity of the water shortage, limit landscape watering to specified days only, or limit water utilization only for trees and plants watered by drip irrigation or hand-held buckets/hoses, or prohibit all irrigation completely.
2. Depending upon the severity of the water shortage, limit other outdoor water use such as, but not limited to, the washing of equipment or vehicles to specified times during the day, on specified days only, at commercial washes only where recycling of water is maintained, or prohibit all outdoor uses of water altogether.
3. Depending upon the severity of the water shortage, require all swimming pools and spas to have a cover, limit refilling of pools and spas to certain days, or prohibit the issuance of any new building permits for a pool or spa.
4. Prohibit the operation of fountains or ornamental water-using structures.
5. Prohibit the installation of turf grass.
6. Depending upon the severity of the water shortage, prohibit the construction of new golf courses and reduce or prohibit new residential construction.

### Water Conservation Programs

To achieve short term and long term conservation, the City has implemented, is planning to implement, or is currently studying the 14 DMMs summarized in Section 8.

### Summary of Reduced Potable Water Demands

Based on historical experience, the City has the ability to reduce potable water demands by 10 percent for a single dry year and 20 percent for multiple dry years. Water reductions are determined by comparing per capita water use during years when water conservation measures were in effect with years immediately prior to the implementation of water conservation measures. A summary of reduced water demands during drought years when conservation measures were implemented is presented in Table 30.

TABLE 30  
CITY OF VACAVILLE  
CHANGE IN WATER PRODUCTION AND DEMAND DURING  
DROUGHT YEARS (1990 – 1995)

Year	Population <sup>a</sup>	Water Production		Per Capita Demand, gpd/person	Demand Change <sup>b</sup>
		ac-ft/yr	mgd		
1990	70,496	13,991	12.5	177	0%
1991	75,103	11,672	10.4	139	-21%
1992	77,504	12,036	10.7	139	-21%
1993	79,956	12,764	11.4	142	-20%
1994	81,592	14,189	12.7	155	-12%
1995 <sup>c</sup>	81,361	14,695	13.1	161	-9%

<sup>a</sup> State of California, Department of Finance, Demographic Research Unit.

<sup>b</sup> Reduction in per capita demand as compared to 1990 demand.

<sup>c</sup> Data for 1995 has been revised from the 2005 UWMP Update to reflect adjustments and the most current records by the City and State.

### 6.4 Catastrophic Water Supply Interruption Plan

The *City of Vacaville Emergency Response Plan for Water Treatment* (Plan) outlines the water system response plan in the event of a disaster such as an earthquake, a City-wide power outage, or a bio-terrorism attack on the City's water treatment and distribution system. The City has an emergency operations center for the Utilities Department, which, when activated, coordinates damage surveys, gathers information, and conducts responses to the damaged processes and system. The Plan includes the following elements:

- List of water system components (wells, distribution system, storage tanks)
- Measures to be taken prior to and following an emergency event
- List of City emergency operation personnel
- Information regarding coordination with police and fire department personnel
- List of water testing laboratories, water system contractors, and pipe repair and installation contractors
- Utility service numbers for traffic signal repairs, gas and electrical repairs, and water works suppliers

## 6.5 Transfer or Exchange Opportunities

Vacaville works closely through SCWA to purchase water for short-term and long-term use. One example is the purchase of additional entitlements of State Water Project water from the Kern County Water Agency, outlined in Section 3.3. As a wholesaler, SCWA keeps the City of Vacaville apprised of any unscheduled water that may become available for short-term use. Vacaville has a good working relationship with the SID and is notified of supply changes through its Master Water Agreement.

## 6.6 Summary of Potable Water Supply and Distribution System Master Plan

In 1990 the City of Vacaville adopted a water system master plan that identified improvements to the water supply and distribution system required to implement the City's General Plan. In 1992, in conjunction with the master plan, the City adopted the *Water and Sewer Facilities Development Impact Fee Study* which laid the funding groundwork necessary to construct needed water facilities and infrastructure improvements for the existing users and future demands on the water system. The *Water and Sewer Facilities Development Impact Fee (DIF) Study* includes a Capital Improvement Program (CIP) for the City's water system. A copy of the city's most current CIP status report is provided in Appendix K.

The Master Plan identifies improvements to the existing water system necessary to solve existing deficiencies and to accommodate future growth and its estimated costs. In addition, improvements and associated cost estimates for the North Bay Regional Water Treatment Plant were developed. Pending water system improvements identified in the 2010/2011 planning period are summarized in Table 31. The City is currently in the process of developing an updated water system master plan. In addition, the *DIF* will be updated in 2011 to determine future project schedules.

Through the combined use of existing water rates, capital replacement funds, water connection fees (impact fees), direct developer construction, and various long-term financing options, the City has the ability to raise the necessary revenue to fund and implement the construction of the needed water production, treatment, and transmission facilities defined in the CIP and Master Plan.

The City budgeted \$6,664,000 in local water improvements for 2010/2011. The local water improvements are funded with capital reserves and development impact fee revenues (\$5,115,545), and net operating transfers and other revenue (\$1,615,000). The City estimates that there would be a fund balance of \$66,545 at the end of 2010/2011.

Implementation of the CIP and Master Plan will provide needed upgrades to the existing water system and facilities and continue to provide an adequate water supply for the currently planned new developments within the City's sphere of influence.

Permitting

The City submits amendments to the Water System Permit as needed, such as when constructing a new water supply well.

TABLE 31  
PENDING WATER SYSTEM CAPITAL IMPROVEMENTS SUMMARY <sup>a</sup>

<b>Project</b>	<b>Budget</b>
E. Monte Vista Water Line: Horse Creek Lift Station to Vaca Valley Parkway (DIF 53C)	\$2,567,000
Vaca Valley Parkway Water Line: Well 16 to Crocker Drive (DIF 43B)	\$1,868,000
Noonan Reservoir	\$797,300
Water Rights Buy Back	\$1,589,500
Well Field Equipment/Instrumentation Improvements	\$545,400
Alamo Drive Water Line: California Dr. to Merchant St.	\$524,400
Water Reclamation Projects	\$1,199,700
SCADA – Phase 2	\$409,600
Water System Study	\$1,153,400
Water Development Projects	\$5,835,000
NBR Plant Upgrade	\$5,211,900
Well #17 Drilling	\$1,500,000
N. Orchard Reservoir – 2MG	\$1,850,000
Water Main Capacity Program	\$2,447,000
Peabody Road Water Line: NBR Plant to Foxboro Pkwy	\$1,400,000
Reynolds Ranch Reservoir	\$583,400
Reynolds Ranch Booster Pump Station	\$446,100
Lagoon Valley Zone 2 Reservoir & Booster Pump Station (DIF 9A/B)	\$1,192,400
Water DIF Study	\$230,000
Water Meter Replacement Program	\$2,650,000
Southeast Water Line: New Alamo Creek to UPRR	\$108,000
Leisure Town Road Water Line: Orange Drive to Sequoia	\$850,000
Butcher Reservoir Valve Vault	\$543,500
Well #17 Equipping	\$2,507,200
DE Plant Emergency Generator Replacement	\$1,989,800
Water System Mapping (GIS)	\$563,000
Groundwater Monitoring & Modeling	\$1,218,000
Vine Street Reservoir Improvements	\$52,500
Crocker Drive – 18” Water Main	\$135,000

<sup>a</sup> As identified in the 2010/2011 Planning Period.

**7.0 SUPPLY AND DEMAND COMPARISON PROVISIONS**

This section compares projected water demand to available water supply during normal, single dry, and multiple dry years. It also provides a summary of the projected water demand at buildout.

**7.1 Supply and Demand Comparison Through 2035**

As shown in Table 32, Vacaville has sufficient water to meet its customers’ needs through 2035. This is based on continued application of the water conservation ordinance and on-going conjunctive use of water supply sources.

Groundwater and surface water supplies are projected to meet or exceed projected water demands even during extended drought conditions. This was demonstrated during a previous drought that lasted for seven years. In planning for dry years, the City is fortunate to have as reliable a water source as the Solano Project. Based on storage volume and annual yield, the Solano Project has an approximate seven (7) year return period. This water coupled with the City’s groundwater aquifer provides for a consistent supply in single and multiple dry years. In view of this demonstrated reliability of the City’s conjunctive water supply strategy, future water supply will be adequate to offset future water demands during normal, single, and multiple dry years as illustrated in Table 32.

TABLE 32  
**CITY OF VACAVILLE  
 SUMMARY OF PROJECTED WATER  
 DEMAND VERSUS AVAILABLE SUPPLY DURING  
 NORMAL, SINGLE DRY, AND MULTIPLE DRY YEARS (AC-FT/YR)**

Year	Normal Year		Single Dry Year		Multiple Dry Year	
	Projected Demand	Available Supply	Projected Demand <sup>a</sup>	Available Supply	Projected Demand <sup>b</sup>	Available Supply
2015	17,761	30,853	15,985	31,974	14,209	28,424
2020	17,410	32,723	15,669	33,834	13,928	30,194
2025	17,758	34,508	15,982	35,704	14,206	31,929
2030	18,113	36,393	16,302	36,148	14,490	33,642
2035	18,475	38,278	16,628	38,118	14,780	35,477

<sup>a</sup> Based on historical experience, the City has the ability to reduce demand by 10 percent during single dry years.

<sup>b</sup> Based on historical experience, the City has the ability to reduce demand by 20 percent during multiple dry years.

Tables 32, 33, 34, and 35 represent a potential response for single and multiple dry years consistent with the City’s Water Shortage Contingency Plan (Appendix G) and based on actual water source reductions realized during the sixth and seventh consecutive year of the past drought. Table 33 assumes supply shortages with no change in demand. It is assumed that Year 3 of the multiple dry year scenario includes an additional 50 percent reduction in State Water Project water, an additional 20 percent reduction in Solano Project Water, and no change in groundwater pumping. Under these circumstances, a water supply shortage of 33 percent is

observed in Year 3 of the multiple dry scenario; however, no overall water shortage is projected during multiple dry years.

TABLE 33  
SINGLE DRY YEAR AND MULTIPLE DRY WATER YEARS  
ASSUMES SUPPLY SHORTAGES WITH NO CHANGE IN DEMAND (AC-FT/YR)

Water Supply Sources	Current Normal Year Supply 2010	Single Dry Water Year <sup>a</sup>	Multiple Dry Water Years		
			Year 1	Year 2	Year 3
Supply totals	29,734	30,861	27,368	27,368	19,787
Demand totals	16,329	16,329	16,329	16,329	16,329
Supply Difference <sup>b</sup>		4%	-8%	-8%	-33%
<b>Difference</b>	<b>13,405</b>	<b>14,532</b>	<b>11,039</b>	<b>11,039</b>	<b>3,458</b>

<sup>a</sup> Single dry year supply increases because increased groundwater production is greater than reductions in surface water sources.

<sup>b</sup> The supply difference is the change in supply projected for a dry year compared to a normal year. A positive difference indicates an increase in supply during the dry year, and a negative difference indicates a decrease in supply.

The supply during single dry years is higher than normal year demand. This occurs because the increase in groundwater production is greater than decreases in surface water supply. The increased groundwater production cannot be sustained for more than a few years to prevent overdrafting the aquifer. For this reason, the increased groundwater production is not used to calculate normal year supplies.

Table 34 modifies the comparison by increasing the supply available for use with the inclusion of groundwater banking in previous years where demands did not equal the available supply. In this scenario, groundwater pumping is increased by an additional 15 percent, to 8,790 ac-ft/yr during Year 3. Demand remains the same as in Table 33. Vacaville's current water demand is approximately 45 percent less than its current water supply. This analysis demonstrates that the excess capacity of the City of Vacaville's water well system is sufficient to meet the demand in a water shortage, even after multiple dry years.

TABLE 34  
RELIABILITY AND COMPARISON WITH SUPPLY OPTIONS  
INCREASED GROUNDWATER PUMPING (AC-FT/YR)

Water Supply Sources	Average/ Normal Water Year	Single Dry Water Year <sup>a</sup>	Multiple Dry Water Years		
			Year 1	Year 2	Year 3
Supply totals	29,734	30,861	27,368	27,368	20,957
Demand totals	16,329	16,329	16,329	16,329	16,329
<b>Difference</b>	<b>13,405</b>	<b>14,532</b>	<b>11,039</b>	<b>11,039</b>	<b>4,628</b>

<sup>a</sup> Single dry year supply increases because increased groundwater production is greater than reductions in surface water sources.

Table 35 modifies the comparison by implementing DMMs and other consumption-reduction methods. Year 1 of multiple dry year water shortage exhibits a 10 percent reduction in demand, Year 2 exhibits a 15 percent reduction in demand, and Year 3 exhibits a 20 percent reduction in demand. This comparison holds supply at the same level as Table 33. This analysis demonstrates that the use of conservation measures can reduce demand levels to less than water supply quantities during multiple dry years.

TABLE 35  
RELIABILITY AND COMPARISON WITH DEMAND OPTIONS (AC-FT/YR)

Water Supply Sources	Average/Normal Water Year	Single Dry Water Year <sup>a</sup>	Multiple Dry Water Years		
			Year 1	Year 2	Year 3
Supply totals	29,734	30,861	27,368	27,368	19,787
Demand totals	16,329	16,329	14,696	13,880	13,063
Demand difference <sup>b</sup>		0%	-10%	-15%	-20%
<b>Difference</b>	<b>13,405</b>	<b>14,532</b>	<b>12,672</b>	<b>13,488</b>	<b>6,724</b>

<sup>a</sup> Single dry year supply increases because increased groundwater production is greater than reductions in surface water sources.

<sup>b</sup> The demand difference is the change in demand projected for a dry year compared to a normal year. A positive difference indicates an increase in demand during the dry year, and a negative difference indicates a decrease in supply.

Table 36 modifies the comparison by increasing supply to account for increased groundwater production in Year 3 of multiple dry years and decreasing water supplies to account for conservation during dry years. It demonstrates that most circumstances of shortage can be planned for. However, effort should be devoted towards securing additional supplies during a catastrophic supply reduction.

TABLE 36  
RELIABILITY AND COMPARISON WITH SUPPLY AND DEMAND OPTIONS (AC-FT/YR)

Water Supply Sources	Average/Normal Water Year	Single Dry Water Year <sup>a</sup>	Multiple Dry Water Years		
			Year 1	Year 2	Year 3
Supply totals	29,734	30,861	27,368	27,368	20,957
Demand totals	16,329	16,329	14,696	13,880	13,063
<b>Difference</b>	<b>13,405</b>	<b>14,532</b>	<b>12,672</b>	<b>13,488</b>	<b>7,894</b>

<sup>a</sup> Single dry year supply increases because increased groundwater production is greater than reductions in surface water sources.

As demonstrated in Tables 32, 33, 34, and 35 the City of Vacaville has more than sufficient water to effectively meet water demands during multiple dry water years. This was demonstrated during recent droughts. Even though the City is fortunate enough to have more than adequate water to meet current and projected future demands, it realizes the importance of conserving water to ensure sufficient future supplies are available for Vacaville and its neighboring

communities. The City continues participation with the SCWA as part of the California Urban Water Conservation Council (CUWCC), and the following section highlights the City’s continued commitment to water conservation practices.

**7.2 General Plan Buildout Demand and Supply Analysis**

Water demand estimates in this Plan are projected through 2035. In addition, buildout water demand was determined for the City using the most current WBLUDMS. In addition, projected water demand for five high-use customers was based on actual water allocated to each business. The five customers given special consideration were Genetech, Vaca Valley Parkway Business Park, Kaiser, Chiron, and Alza. As shown in Table 37, the City has sufficient water to meet its customers’ needs through buildout in a normal, single dry, and multiple dry years.

TABLE 37  
**CITY OF VACAVILLE**  
**SUMMARY OF PROJECTED WATER**  
**DEMAND VERSUS AVAILABLE SUPPLY DURING**  
**NORMAL, SINGLE DRY, AND MULTIPLE DRY YEARS (AC-FT/YR)**  
**THROUGH GENERAL PLAN BUILDOUT**

Year	Normal Year		Single Dry Year		Multiple Dry Year	
	Projected Demand	Available Supply	Projected Demand <sup>a</sup>	Available Supply	Projected Demand <sup>b</sup>	Available Supply
2015	17,761	30,853	15,985	31,974	14,209	28,424
2020	17,410	32,723	15,669	33,834	13,928	30,194
2025	17,758	34,508	15,982	35,704	14,206	31,929
2030	18,113	36,393	16,302	36,148	14,490	33,642
2035	18,475	38,278	16,628	38,118	14,780	35,477
Buildout <sup>c</sup>	33,026	38,277	29,723	38,117	26,420	35,477

<sup>a</sup> Based on historical experience, the City has the ability to reduce demand by 10 percent during single dry years.  
<sup>b</sup> Based on historical experience, the City has the ability to reduce demand by 20 percent during multiple dry years.  
<sup>c</sup> Buildout demand is based on land use data from the City’s WBLUDMS.

## **8.0 WATER DEMAND MANAGEMENT MEASURES**

The City of Vacaville is committed to implementing water conservation programs. This section provides brief descriptions of water conservation measures that the City has implemented, plans to implement, or intends to study. For over 20 years, the City has actively participated in a regional Water Conservation Committee (WCC) that includes other cities in Solano County, as well as the City's water wholesaler, the Solano County Water Agency (SCWA). As a result of this partnering, cities are able to share resources and benefit from each other's programs and studies. Reference will be made to the WCC throughout this section. The discussion of water conservation programs is outlined in the format of Demand Management Measures (DMMs), which are the same as the 14 Best Management Practices (BMPs) outlined by the California Urban Water Conservation Council (CUWCC).

### **8.1 DMM 1 - Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers**

#### Implementation Description

An indoor/outdoor residential water use survey is offered free of charge to the top 10 percent and 20 percent single-family and multi-family residential water users as identified through the City's utilities billing system. Surveys are also offered at change of account status and are available to any residential water customer upon request. The surveys are conducted by a two person team which identifies and recommends potential areas for water savings including repairs, corrections, or changes in usage.

During the indoor portion of the survey, surveyors provide the customer with a detailed history of their water consumption over a three year period; check toilets and fixtures for leaks; measure flow rates of fixtures; install high-efficiency showerheads and aerators as requested/required; and provide free literature, water savings devices, and materials to help promote water efficient use.

The surveyors then conduct an outdoor/landscape survey in which they demonstrate to the resident how to locate and read the water meter as well as leak detection practices; inspect the irrigation system equipment; review the sprinkler timer schedule; check for breaks and/or leaks; evaluate soil and ground cover condition; test water pressure; and provide free literature and water savings devices and materials to help promote water efficient landscaping.

#### Implementation Schedule

The City has been participating in the regional water survey program since 2009. The program is scheduled to be conducted over a ten year period.

#### Method to Evaluate Effectiveness

The program goal is to survey 1.5 percent of the City population over the life of the program, or 0.15 percent annually. Updated reports of invitations, responses, and surveys conducted are provided to the City on a regular basis in order to assess annual and overall program progress.

Feedback from customers contacted is considered for refining and updating the program as needed. In 2009, 3,701 customers were contacted, with 402 surveys completed. In 2010, 4,350 customers were contacted, with 225 surveys completed.

### Conservation Savings

The City is currently compiling and evaluating water consumption data from 2009 and 2010 water survey participants to identify water savings and/or reduction in consumption, if any, since the implementation of the program. Factors to be considered in the analysis include impacts from weather and economic conditions for each year. In 2010, our surveyors reported that an estimated 70.7 percent of residents participating in the survey saved water totaling 60,119 gallons per day (GPD). Additional results are expected to be available by the end of 2011.

### Budget

In 2010, Vacaville budgeted approximately \$10,000 for the continuation of this DMM.

## **8.2 DMM 2 - Residential Plumbing Retrofit**

### Implementation Description

Currently, this DMM requires retrofitting all pre-1992 residences, estimated to be 17,106 single-family homes and 6,085 multi-family units (per the 1998 City of Vacaville Water Conservation Plan), with low flow fixtures.

Plumbing retrofit kits are provided to all pre-1992 accounts at change of account status (unless the City has a record of a retrofit at that account). Customers are also offered water use surveys at change of account status (see DMM 1). If a survey is scheduled at that time, the retrofit kit is delivered at the time of the survey. Implementation includes:

- Distribution of retrofit kits consisting of high-efficiency showerheads, rated at 2.5 gallons per minute (gpm) or less, and faucet aerators rated at 2.2 gpm or less
- Contacting the top 1 percent of single-family residential water users, and all multi-family managers, for delivery.
- Contacting potential users via direct mail and distributing information at local community events for distribution.

### Implementation Schedule

In 1992, Vacaville distributed 3,000 low-flow showerheads to pre-1980 households in the service area as previously required. Since 2004, the City has been distributing low-flow devices on an as-requested basis.

### Method to Evaluate Effectiveness

Based on data collected between 1998 and 2005, the City met the 75 percent saturation requirement for single-family housing in 2004. To date, an additional 2,164 low flow showerheads and 897 faucet aerators have been distributed to single and multiple family accounts. Currently, an estimated 80 percent of pre-1992 single-family residences in the City are fitted with low-flow devices. Accordingly, this meets the requirement for completing DMM 2. However, the City will continue to implement the change of account method in order to achieve 100 percent saturation.

The City will continue to collect and/or assess the following information to determine the effectiveness of this DMM:

- The total number of non-retrofitted pre-1992 single-family residence and multifamily units.
- The location, type, and number of retrofits completed, devices distributed, and program costs.
- The number of retrofit kits distributed and installed during the previous reporting period.
- The estimated percentage of pre-1992 single-family residences and multi-family units in the service area fitted with low flow showerheads and faucet aerators.

### Conservation Savings

It is estimated that full implementation of this DMM will save approximately 265 acre-feet of water annually.

### Budget

The 2010 budget for this program was \$2,500 for the implementation of this DMM.

## **8.3 DMM 3 - System Water Audits, Leak Detection and Repair**

### Implementation Description

The City conducts distribution system water audits annually in order to reconcile water production figures with consumption records. After accounting for unmetered uses, the City estimates its system losses and utilizes leak detection equipment in an attempt to minimize those losses. The City's system audit program consists of the following:

- Annually complete a pre-screening system audit to determine the need for a full-scale system audit. The pre-screening system audit is determined as follows:
  - Determination of metered sales;
  - Determination of other system verifiable uses;
  - Determination of total supply into system
  - Division of metered sales plus other verifiable uses by total supply into the system. In the event this quantity is greater than 10 percent, a full-scale system audit is initiated.

- The City also advises customers whenever it appears possible that leaks exist on the customer's side of the meter; performs distribution system leak detection when warranted and cost-effective; and repairs leaks when found.

### Implementation Schedule

Vacaville began its leak detection and repair program in 1989. The City initiated a meter replacement program in 2005 to upgrade existing meters to radio read meters in addition to maintaining its water main replacement and leak detection program. During this period, the City has been able to maintain unaccounted for water losses at 7 percent annually.

If the annual prescreening audit indicates that unaccounted water exceeds 10 percent, the City will complete a water audit of its distribution system using methodology consistent with that described in American Water Works Association's (AWWA) "Water Audit and Leak Detection Guidebook".

### Method to Evaluate Effectiveness

The City collects the following information to determine the effectiveness of this DMM:

- Prescreening audit results and supporting documentation.
- Maintain in-house records of audit results or the completed AWWA Audit Worksheets for each completed audit period.

### Conservation savings

Based on the system water supply and verifiable metered uses for 2010, water losses are currently estimated at 7.0 percent.

### Budget

A portion of the Utilities Department's maintenance operating budget and capital improvement project budget is utilized on an as-needed basis for repair and replacement. More than 10 percent of the City's system was evaluated during the year.

## **8.4 DMM 4 - Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections**

### Implementation Description

All new and existing connections are metered and billed by volume of use. As of March 1, 2011, Residential Tier 1 billing is based on an initial 12 units (1 unit = 748 gallons) of water at \$1.12 per unit; each additional residential unit is \$1.53 per unit. Senior primary residence rates are 15 percent lower. Meters and volume of use billings are also applied to commercial, industrial, and institutional (CII) accounts. The utilities billing system currently provides customers with a bar chart graphic of their volume-of-use over the last 12 months.

Table 38 provides a summary of the number of meter connections per account classification.

TABLE 38  
WATER CONNECTIONS - METER INFORMATION

<b>Account Classification</b>	<b>Number of Potable Connections Metered</b>
Single Family	24,332
Residential Landscape	28
Multi-Dwelling	644
Multi-Dwelling Landscape	31
Commercial	965
Commercial Mixed Use	63
Commercial Landscape	138
Commercial Mixed Use Landscape	11
Industrial	79
Industrial Landscape	10
Institutional	100
Institutional – Public City	57
Institutional – Public City/School	65
Institutional Landscape	10
Institutional – Public City Landscape	287
Institutional – Public County/School Landscape	10
<b>Total Urban Connections (2010)</b>	<b>26,830</b>

### Implementation Schedule

The City has required meters for all new connections since the inception of the public utility in 1959. The City does not have any unmetered connections so does not have a program for retrofitting unmetered connections. In 2005 the City initiated an evaluation of the City's meters to determine areas for retrofitting existing meters to newer and more accurate radio-read meters.

The City will continue to install and read meters on all new services, and will continue to conduct its meter calibration and replacement program, as well as continue to evaluate and determine areas for retrofitting and upgrading to more accurate meters. Since 2005, over 8,100 existing meters have been replaced and upgraded.

### Conservation Savings

Conservation literature states that metered accounts can result in a 20 percent reduction in demand compared to non-metered accounts.

## Budget

The budget for this program is part of the existing Utilities Department Operations and Maintenance (O&M) budget. The annual budget for replacement and upgrade to radio-read meters is \$350,000.

### **8.5 DMM 5 - Large Landscape Conservation Programs and Incentives**

#### Implementation Description

Large landscape areas in the City of Vacaville primarily consist of parks, schools, golf courses, and community and private facilities or businesses.

Through the WCC the City offers water conservation indoor (see DMM 9) and outdoor (landscape) surveys to its Commercial, Industrial, and Institutional (CII) customers. The goal of the program is to provide financial incentives for CII accounts to upgrade their irrigation systems, plumbing fixtures, and/or water-using appliances for the purpose of water use efficiency. The surveys are offered free of charge to CII customers as identified through the City's utilities billing system. The surveys are conducted by ConserVision, a consultant specializing in water conservation. The inspectors inspect the irrigation system equipment; check for breaks and/or leaks; evaluate the landscape; check pools and spas for leaks; and identify and recommend potential areas for water savings including repairs, corrections, or changes in usage.

Since 2005, we have offered to conduct 18 water conservation CII landscape surveys to customers, and have been able to complete 7 surveys. Participants in these surveys included the following:

- Creekside Shopping Center
- Vacaville City Hall
- America's Best Value Hotel
- Alamo Plaza Shopping Center
- Best Western Heritage Inn
- McDonald's
- Quality Inn

Total costs associated with these surveys were approximately \$10,500.

Also, three California Irrigation Management Information System (CIMIS) weather stations are positioned at various micro climates by the WCC, collecting, calculating, and storing weather data for use by the central system. The City is able to use this weather data to further assist large landscape accounts with water conservation management techniques during development, as well as on request. The City is currently in the process of updating its large landscape irrigation control systems to coordinate with CIMIS.

To date Vacaville has installed smart weather-based central controllers at 11 City parks and one Business Park. The participating sites and approximate costs of equipment installation were:

- Alamo Creek Park \$ 20,000
- Al Patch Park \$ 50,000
- Andrews Park \$ 10,000
- Cannon Station Park \$ 4,000
- Cooper Park \$ 14,000
- Countrywood Park \$ 4,000
- Hawkins Park \$ 5,000
- Meadowlands Park \$ 12,000
- Ridgeview Park \$ 15,000
- Southwood Park \$ 14,000
- Stonegate Park \$ 21,000
- Orange Drive Business Park \$ 75,000 (paid for from tenant assessments)

The controllers receive data from the CIMIS station located at Arlington Park.

Finally, the City maintains *Water Efficient Landscape Requirements* that require a water budget for all landscape areas (except single-family backyards). The regulations establish a budget based on the season and the ratio of high, medium, low, and hardscape areas contained within the designated landscape area. New CII customers and change-of-service CII customer accounts are also provided information on climate-appropriate landscape design and efficient irrigation equipment/management. A copy of the *Water Efficient Landscape Requirements* is provided in Appendix J.

#### Implementation schedule

Approximately 75 percent of irrigation meter accounts have a water budget, including the Public-City landscape accounts, as of 2010. The City will continue to work towards 100 percent participation.

#### Method to Evaluate Effectiveness

Development plans are reviewed to ensure compliance with *Water Efficient Landscape Requirements* and Specifications. The plan check/review process is completed by city employees who have been trained as landscape water auditors and ensures that landscaping meets the high, medium, low water uses for the square footage of landscaping.

The program focus will be on identifying large landscapes installed prior to implementation of the *Water Efficient Landscape Requirements* update in 1998 and then offering presentations to market free landscape surveys.

### Conservation Savings

The City will be compiling and evaluating water consumption data from 2009 and 2010 program participants to identify water savings and/or reduction in consumption. The manufacturers of the irrigation equipment installed at the City parks estimate a 30 to 40 percent savings in water use annually at the participating sites.

### Budget

The City's 2010 annual budget for this DMM is estimated to be \$2,000. Funds are budgeted for contingency activities, such as evapotranspiration landscape irrigation controllers; however, any other costs (such as requested customer surveys) are absorbed in the course of normal business.

## **8.6 DMM 6 - High-Efficiency Washing Machine (HEW) Rebate Programs**

### Implementation Description

The City participates in a high-efficiency clothes washing machine (HEW) rebate program funded by the State and administered through SCWA. The rebate program currently offers up to \$125 rebates for the purchase of a Tier 3 water-saving, high-efficiency clothes washer.

Residents are notified of the availability of the program on the City and SCWA websites and program information is provided at City public counters. The City further supports the program by offering detailed information about the rebate and emphasizing the water saving aspects associated with high-efficiency washers. Residents eligible for these rebates may also be eligible for separate rebates through Pacific Gas and Electric for purchase of energy-efficient washers.

### Implementation Schedule

The City has been participating in the HEW program since 2007. The program is scheduled to be conducted on an annual basis while funding is available.

### Method to Evaluate Effectiveness

The City is monitoring the impact of the existing rebates on purchases of high efficiency washer purchases while continuing to assess any other customer incentives to purchase high-efficiency washing machines being offered by local energy service providers.

The rebate program has proved to be very popular, particularly when combined with the projected \$650 long-term savings in energy and water costs over the life of the appliance. Since 2007, 840 residents have received rebates.

### Conservation Savings

The City is currently compiling and evaluating water consumption data from 2009 and 2010 HEW rebate participants to identify water savings and/or reduction in consumption, if any, since

the implementation of the program. However, there is no current method to determine what percentage of any water savings would come from installation of the HEWs.

### Budget

The 2010 budget for Vacaville's support of this DMM is \$4,000.

## **8.7 DMM 7 - Public Information Programs**

### Implementation Description

As a member of the WCC, Vacaville participates in the following programs:

- Planet Water Display at Six Flags Marine World in Vallejo, California - a permanent exhibit that includes a water-conserving demonstration garden and interactive exhibits emphasizing the need for water conservation. Approximately 2 million visitors to Marine world view this exhibit annually.
- Expanded Billing Software – since 2005 the city has utilized a billing system which incorporates bar chart displays of customers water use over the previous 12 months, allowing them to assess and monitor their water usage.
- As part of the Putah Creek Discovery Corridor (PCDC) partnership, continues support of the Corridor, a “place of discovery” demonstration/activity site that promotes many aspects of environmental and water conservation.
- Solano Water Relief Model- A table-top model of Water supply facilities in Solano County was designed and fabricated with WCC involvement and is used for public meetings and school education.

In addition to these group activities, the City’s public information program includes the following components:

- Public library displays.
- Providing speakers to employees, community groups, and the media.
- Annual billing inserts promoting water conservation awareness. Water conservation information is also printed directly on bills.
- Providing information on customer bills showing water use for the current billing period compared to the same period the year before.
- Maintaining a dedicated water conservation section on the Public Works Department website to promote water conservation practices and water rate information, as well as maintaining a link to [www.solanosaveswater.org](http://www.solanosaveswater.org), the SCWA website promoting water conservation, education, and gardening county-wide.

As an active member of the regional WCC, the City has developed and participated in all of the public information events put together by the committee, as well as financially supporting the California Water Awareness Campaign through its participation in the WCC.

### Implementation Schedule

The City will continue to promote water conservation via the City's and SCWA's websites and promotion efforts, rebate programs, materials, information and display sites, demonstration gardens, workshops, and public events. Additionally, the City has begun work with the WCC to hold residential irrigation and landscape workshops throughout the County, and anticipate the first workshops to be implemented in 2012. The City will continue to explore more partnership opportunities to increase its methods of marketing and encouraging water conservation.

### Method to Evaluate Effectiveness

The City will annually collect and assess relevant data to determine program effectiveness, including, but not limited to:

- number of visits to conservation websites
- number of programs and materials distributed
- number of participants at workshops and public events
- annual budget for program

### Conservation Savings

The City has no method to quantify the savings as a result of the implementation of this DMM, but maintains these programs and contributions to actively promote water conservation in the best interest of the City.

### Budget

WCC public information program costs are shared county-wide by the member agencies. SCWA pays 50 percent and each agency pays a percentage commensurate with its population. The 2010 budget for Vacaville's share of this jointly funded DMM is currently estimated at \$5,000.

## **8.8 DMM 8 - School Education Programs**

### Implementation Description

The Solano Water Education Program (SWEP), administered through the Solano Irrigation District (SID) in partnership with the cities of Vacaville, Suisun, Dixon, and Fairfield, provides in-school water conservation education workshops to K-12 students, teachers, and parents. The program focuses on educating participants on the water cycle, local water sources, water and wastewater treatment, and water conservation.

The program is supplemented with materials including videos, activity books, maps, posters, test kits, and models. A new poster, "OUR WATER: Where it Comes From, Where it Goes, and How to Conserve It," depicting the flow of water throughout Solano County, was provided to all educators participating in the program.

Incentive materials for student participation include bracelets, erasers, pencils, rulers, static clings, and stickers. Project W.E.T. (Water Education for Teachers) focuses on providing workshops specifically for teachers. This year's workshops provided six hours of water conservation training for 19 participating educators.

The program continues to administer the annual water education poster contest in which students from throughout the county compete to have their original artwork featured in the SWEP brochure and materials. In the 2010 school year, over 2,500 brochures were distributed to schools in the participating districts. Also, this was the first year in which the brochure was available on the SID website. The program plans to work with the participating agencies to post the program on each agency website in order to gain greater exposure for the program.

This regional program maintains the following emphasis: *Working with public and private schools in the water suppliers' service area to provide teacher workshops, educational materials, and classroom and school presentations that identify urban, agricultural, and environmental issues and conditions in the local watershed. Education materials shall meet the state education framework requirements, and grade appropriate materials shall be distributed to grade levels K-3, 4-6, 7-8, and high school.*

#### Implementation Schedule and Budget

In addition to the new materials for 2010, the program expanded to bring in Zun Zun Environmental Education to perform at school rallies throughout the region in the fall, with several requests for additional performances. The first annual high school water conservation video contest will take place in spring 2011. The City will continue to implement this DMM as described above.

#### Method to Evaluate Effectiveness

Periodic meetings are held throughout the year to review and discuss the program activities and strategies in order to determine the effectiveness of this DMM. In the 2009/2010 school year, the program reported the following for Vacaville:

- 19 in-school presentations were made during the reporting period. This year the program added "Hands On Water Activities" booklets for teachers.
- 471 students were reached.
- A "water play" activity booklet for 2<sup>nd</sup> and 3<sup>rd</sup> grade students and "Discovering Drought" booklet for 3<sup>rd</sup> through 6<sup>th</sup> graders was added to the curriculum.
- Over 2,500 activity books, posters, and materials were distributed to students and teachers.

#### Conservation Savings

The City has no method to quantify the savings as a result of the implementation of this DMM, but maintains these programs and contributions to actively promote water conservation in the best interest of the City.

## Budget

The annual budget for 2010 is approximately \$10,000.

### **8.9 DMM 9 - Conservation Programs for Commercial, Industrial, and Institutional Accounts**

#### Implementation Description

The City participates in a regional commercial, industrial, and institutional (CII) water use survey and customer incentive program. The program is grant funded and administered through SCWA. Implementation of the program consists of the following:

- The identification and confirmation of eligibility of CII customers. Participants must have a water service account active for the previous twelve months and use potable water for irrigation.
- Ranking potential participants – large landscapes for schools, parks and publicly funded common areas are targeted, with preference given to areas of irrigated turf.
- Providing water use surveys to identified CII customers.
- Monitoring the effectiveness of implemented audit recommendations.
- Identifying incentives programs that would encourage the implementation of cost-effective audit recommendations that were not implemented.

Publicly funded accounts are eligible for up to \$10,000 in financial incentives, while commercial accounts are eligible for up to \$5,000.

#### Implementation Schedule

The City implemented a pilot survey program in 2000, with \$15,000 in funding. Additional funding received in 2004 was used for the second phase of the project to conduct additional indoor and outdoor water audits at industrial and mixed-use retail locations. With the additional funding made available for the current program through SCWA, the City will continue to update the eligible list and attempt to conduct more audits through the regional program. Ten indoor surveys were conducted between 2000 and 2004. Since 2005, an additional 20 indoor surveys have been conducted as part of this program.

The City has completed the development phase of this Regional CII program, and is developing a schedule for implementation for the remaining targeted accounts. Implementation will include some or all of the following components:

- Further marketing of the program on the City and County websites.
- Generating and distributing flyers to advertise the program.
- Conducting audits as requested.
- Enrolling in the Spray and Rinse program.

### Method to Evaluate Effectiveness

The City is continuing to collect the following information to determine the effectiveness of the survey program implemented to satisfy this DMM:

- The number of customers and amount of water use within the CII customer classes for comparative years.
- The type and number of water saving recommendations implemented each year.
- Incentive program budget and customer outlays.

### Conservation Savings

The City of Vacaville continues to monitor implementation of recommendations at each account location. Water consumption data for each year of participation will be assessed to determine water savings achieved.

### Budget

The City has a 2010 budget of \$6,300 for implementation of this DMM.

### **8.10 DMM 10 - Wholesale Agency Assistance Programs**

The City of Vacaville is not a wholesale agency; therefore, this DMM does not apply.

### **8.11 DMM 11 - Conservation Pricing**

#### Implementation Description

The City of Vacaville has uniform and increasing block price structures for all customer categories. Uniform pricing applies to commercial, industrial, and institutional customers that are billed at the higher, Tier 2 rate for all water units as a monetary incentive to conserve. All relevant codes and regulations have provisions allowing the City Council to approve higher rates and additional tiers or price blocks during drought or emergency conditions. Existing rates (2010) for water services are structured as shown in Table 39.

TABLE 39  
CURRENT CITY RATE STRUCTURE

Customer Classification	Lifeline <sup>a</sup>	Uniform <sup>b</sup>	Inclining Block <sup>c</sup>
Single Family Residential	√		√
Multi-Family Residential	√		√
Commercial		√	
Industrial		√	
Institutional		√	
Public Agency		√	
Public Landscape		√	
Reclaimed		Free	
Agricultural		N/A	
Other			
Construction Water		√	
Miscellaneous		√	

<sup>a</sup> Lifeline = Minimal amount of water allotted to customer.

<sup>b</sup> Uniform = Price per unit used is constant.

<sup>c</sup> Inclining Block = Price is higher as use is greater.

Per Vacaville's regulations (Municipal Code 13.20.050.1, Ordinance 1431), as drought or emergency conditions are declared by City Council, additional tiers are added to the existing rate structure to promote conservation. A target water use amount is determined across the board for all residential customers and based on past usage patterns for commercial, industrial, and landscape customers. Customers exceeding their target water usage amount pay increasingly higher rates for that water.

### Implementation Schedule

The City has employed conservation pricing since 1991.

### Method to Evaluate Effectiveness

The City is currently compiling and evaluating water consumption data from 2009 and 2010 water users to determine impact on water usage from Tier 2 billing.

### Conservation Savings

The incentive of this DMM is to decrease the customers' water costs and water use through price incentives, as described above.

### Budget

There is no budget for implementation of this DMM.

## **8.12 DMM 12 – Conservation Coordinator**

### Implementation Description

The City of Vacaville has maintained a Water Conservation Coordinator position since 1989. The current water conservation coordinator is Ramiro Jimenez. Ramiro is a full-time Management Analyst with the Utilities Department and is in charge of water conservation and water information outreach. He can be contacted at:

Ramiro Jimenez  
Management Analyst II/Water Conservation Coordinator  
Utilities Department  
City of Vacaville  
P.O. Box 214  
Elmira, CA 95625  
(707) 469-4123  
Email: [rjimenez@cityofvacaville.com](mailto:rjimenez@cityofvacaville.com)

### Implementation Schedule

The Water Conservation Coordinator spends up to 30 percent of his time annually on water conservation programs.

### Method to Evaluate Effectiveness

The Water Conservation Coordinator reports regularly on water conservation activities, efforts, goals and results in order to measure current program effectiveness, as well as recommends additional or alternative ideas for achieving water conservation.

### Conservation Savings

The City has no method to quantify the savings as a result of the implementation of this DMM, but maintains this position to actively promote water conservation in the best interest of the City.

### Budget

In 2010, the City budgeted a total of \$40,000 towards staffing the Water Conservation Coordinator position to implement the various DMMs for the City of Vacaville.

## **8.13 DMM 13 - Water Waste Prohibition**

### Implementation Description

The Urban Water Shortage Contingency Plan (Appendix A) includes Ordinance No. 1431 titled "An Urgency Ordinance of the City of Vacaville Establishing Water Conservation Requirements and Water Rate Structures to Address Normal, Drought, and Emergency Conditions".

The intent of the ordinance is to initiate immediate water conservation measures and develop a plan to achieve a 50 percent reduction in water use should it become necessary to preserve and protect the limited water supplies available to the City of Vacaville for human consumption, public sanitation, residential use, and maintenance of business and commercial facilities. Water conservation measures, as well as pricing mechanisms to reduce water consumption, were approved in 1991 and continue to be applicable to all water users within the City.

No user of the City's water system may knowingly make, cause, use, or permit the use of water from the system in a manner that violates the ordinance as cited below:

- Excessive water runoff due to landscape irrigation activities.
- Washing of sidewalks, driveways, walkways, parking lots, and all other hard-surfaced areas by direct hosing except for removal of hazardous materials for protection of public health and safety.
- Washing of vehicles, equipment, structures, and other items without the use of a shutoff.
- The escape of water through breaks or leaks within the water users' plumbing or distribution system that is not repaired within 24 hours of discovery.
- Fire hydrants used for purposes other than firefighting, water quality, maintenance, sanitation, and construction.

Any customer violating the regulations and/or restrictions on water use set forth in the Ordinance is subject to compliance measures as follows:

- Customer receives a written warning for the first violation
- Customer is fined for up to three additional violations
- In the event of a fourth violation, customer is fined and the Utilities Director may install a flow restrictor, or disconnect water service, on the property for a temporary period of time
- Properties with multiple violations may be deemed a public nuisance and may be subject to abatement by restraining order or injunction. In addition to the aforementioned water use prohibitions, the City's Water Efficient Landscape Requirements are always in effect and apply to all water users as well.

During Drought and Emergency stages, City Council may also add supplemental water use restrictions, as appropriate, to achieve the desired level of conservation.

### Implementation Schedule

The City has permanently incorporated this DMM into its ordinances, which have been in effect since 1991.

### Method to Evaluate Effectiveness

The City is collecting the following information to determine the effectiveness of this DMM:

- Number of customers contacted about water waste violations
- Number of customers cited for repeat water waste violations

### Conservation Savings

The City has no method to quantify the savings as a result of the implementation of this DMM, but maintains this DMM to actively promote water conservation in the best interest of the City.

### Budget

Enforcement costs are part of the department's overhead, and while the ordinance is enforced at all times, additional enforcement costs would only be incurred during drought conditions.

## **8.14 DMM 14 - High-Efficiency Toilet (HET) Rebate Programs**

### Implementation Description

The City participates in a high-efficiency toilet rebate program funded by the State and administered through SCWA. The rebate program currently offers up to \$125 rebates for the purchase and installation of a water-saving, high-efficiency toilet.

Residents are notified of the availability of the program on the City and SCWA websites and program information is provided at City public counters. The City further supports the program by offering detailed information about the rebate and emphasizing the water saving aspects associated with high-efficiency toilets.

### Implementation Schedule

The City has been participating in the HET program since 2008. The program is scheduled to be conducted on an annual basis while funding is available.

### Method to Evaluate Effectiveness

The City is monitoring the impact of the existing rebates on purchases of high efficiency toilet purchases while continuing to assess any other customer incentives or mandates to install high-efficiency toilets.

Since 2007, 149 residents have received rebates for purchasing and installing high-efficiency toilets.

### Conservation Savings

The City is currently compiling and evaluating water consumption data from 2009 and 2010 HET rebate participants to identify water savings and/or reduction in consumption, if any, since the implementation of the program. However, there is no current method to determine what percentage of water savings has resulted from installation of the HET.

### Budget

The 2010 budget for Vacaville's support of this DMM is \$10,000.

**9.0 WATER RECYCLING**

This section provides information on recycled water and its potential for use as a water source in the City of Vacaville. It also includes a description of the wastewater collection and treatment system for the City.

**9.1 Wastewater Collection and Treatment**

The City owns and operates the Easterly Wastewater Treatment Plant (WWTP) located southeast of the town of Elmira, which serves the City of Vacaville. The WWTP is a standard secondary treatment facility with a rated dry weather flow capacity of 15 mgd. In April 2008, the Regional Water Quality Control Board (Regional Board) adopted a new permit for the WWTP which added new treatment requirements to include nitrate reduction, blending elimination, seasonal tertiary filtration, and trihalomethanes (THMs) reduction. The Regional Board also issued the City a Time Schedule Order (TSO) which requires nitrate reduction facilities to be in place, tested, and operating prior to April 2013. The permit requires tertiary level treatment and blending elimination facilities to be operating by April 2015. The City received City Council approval in 2009 to proceed with the Tertiary Project and complete all upgrades required by the Regional Board permit. These upgrades are underway.

The Gibson Canyon Creek Wastewater Treatment Plant (Gibson Plant) has been closed and demolished. This was a small, secondary treatment plant located on the west side of I-505. The Gibson Plant received waste from two industrial dischargers who are now discharging directly to the WWTP.

Table 40 provides a summary of current and projected annual average wastewater generation and treatment rates at Easterly WWTP.

TABLE 40  
**CURRENT AND PROJECTED ANNUAL AVERAGE  
 WASTEWATER GENERATION AND TREATMENT RATES (MGD)  
 EASTERLY WASTEWATER TREATMENT PLANT**

	2010	2015	2020	2025	2030	2035
Wastewater Generation <sup>a</sup>	12.7	14.5	15.1	15.4	15.7	16.0
Wastewater Treatment <sup>a</sup>	14.9	17.0	17.7	18.1	18.4	18.8

<sup>a</sup> Wastewater generation and treatment volumes for 2010-2035 are from the draft 2002 Infrastructure Audit. Wastewater volumes for 2025 and 2030 are estimated based on a projected population increase of 2 percent every five years.

**9.2 Wastewater Disposal and Water Reuse**

Currently, treated effluent from the Easterly facility is discharged into Alamo Creek, which flows into Cache Slough. A portion is used for irrigation by the Solano and Maine Prairie Irrigation Districts and offered to construction firms free of charge for use in dust control and other construction activities. The use of reclaimed water for urban irrigational purposes is an important and viable resource. If reclaimed water were used for watering City parks or meeting

industrial and other demands, reductions in the demand for domestic water supply could be realized.

A preliminary planning study performed in 2003 identified a network of recycled water pipelines, pumping, and storage facilities that could be constructed in the southern part of town. This distribution system could deliver recycled water mainly for the irrigation of public parks, green belts, golf courses, business parks, and schools. Additional customers could be added as they become viable. Possible future customers include the Vacaville-Elmira Cemetery and the CSP- Solano.

In addition, the City of Vacaville has been working with a power generation plant developer for a possible power plant located on property adjacent to the wastewater treatment plant. The close proximity to the wastewater treatment plant allowed the City to establish a reasonable rate for recycled water. This incentive provided continuing interest in Vacaville as a project site and, if the project moves forward, could result in as much as 5 MGD of recycled water sales. While this will not directly offset City potable water use, which is not available in the Elmira area, it could offset groundwater or non-potable SID water use. The power ventures developer is currently holding a lease on the property pending acceptance of their project by PG&E. The City has not offered incentives to other potential customers at this time.

**APPENDIX A**

**URBAN WATER MANAGEMENT PLAN CHECKLIST**

**APPENDIX B**

**PUBLIC NOTIFICATION MATERIALS**

**APPENDIX C**

**RESOLUTION TO ADOPT THE CITY OF VACAVILLE 2010 URBAN WATER  
MANAGEMENT PLAN UPDATE**

**A SIGNED RESOLUTION TO BE PROVIDED UPON PLAN ADOPTION.**

**APPENDIX D**

**UWMP UPDATE PARTICIPANTS**

Parties who participated in the development of this UWMP Update include:

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**APPENDIX E**

**GROUNDWATER SOURCE SUFFICIENCY TECHNICAL MEMORANDUM**

**APPENDIX F**

**2009 DRINKING WATER QUALITY CONSUMER CONFIDENCE REPORT**

**APPENDIX G**

**URBAN WATER SHORTAGE CONTINGENCY PLAN**

**APPENDIX H**

**SOLANO PROJECT WATER SUPPLY AVAILABILITY**

**APPENDIX I**

**STATE WATER PROJECT WATER SUPPLY AVAILABILITY**

**APPENDIX J**

**WATER EFFICIENT LANDSCAPE REQUIREMENTS & COMPARISON WITH  
STATE WATER EFFICIENT LANDSCAPE ORDINANCE**

**APPENDIX K**

**PUBLIC WORKS DEPARTMENT 2010/2011 SECOND QUARTER STATUS OF  
CAPITAL IMPROVEMENT PROJECTS**