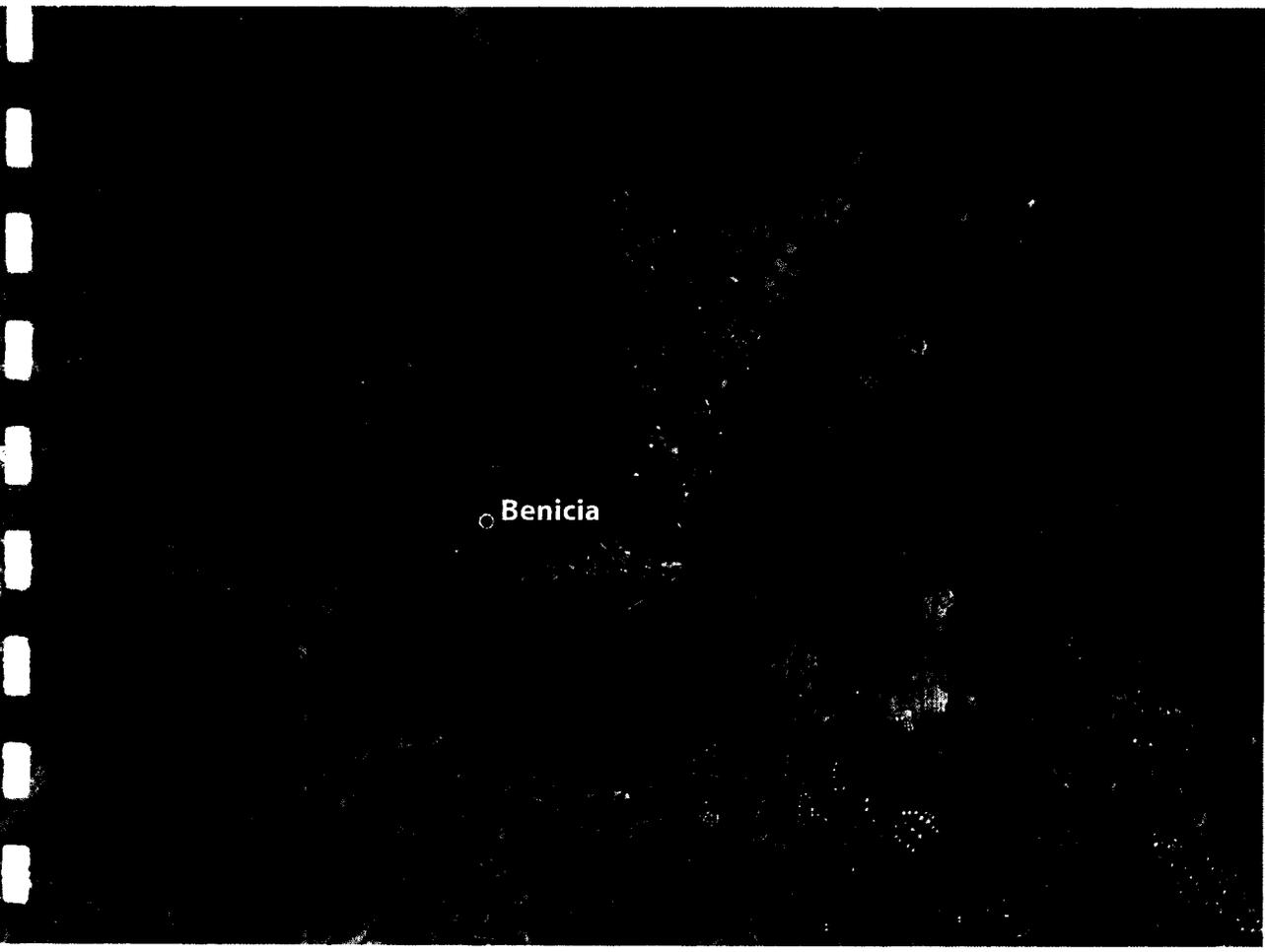


*Final Report*



Benicia



Urban Water  
Management Plan

December 2005

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## Reference Web-Links

City of Benicia website: <http://www.ci.benicia.ca.us>

Solano County Integrated Regional Water Management Plan:

<http://www.scwa2.com/irwmp%20public.html>

DWR California Water Plan Update 2005:

<http://www.waterplan.water.ca.gov/cwpu2005/index.cfm>

DWR Flood Management White Paper:

[http://www.publicaffairs.water.ca.gov/newsreleases/2005/01-10-05flood\\_warnings.pdf](http://www.publicaffairs.water.ca.gov/newsreleases/2005/01-10-05flood_warnings.pdf)

DWR Presentation on Impact of Major Earthquake on Delta Levees

<http://www.publicaffairs.water.ca.gov/newsreleases/2005/11-01-05DeltaEarthquake.pdf>

Association of Bay Area Governments (ABAG) Hazard Mitigation Planning, Earthquake Maps, and Related Information:

<http://www.quake.abag.ca.gov/mitigation/>

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# Acknowledgements

The valuable contributions of many participants are acknowledged in successfully completing the 2005 Urban Water Management Plan. In particular, an active Task Force appointed by the City Council provided key input and comments throughout the project that were critical to the plan's success. The Task Force members included:

- Kathleen Van Velsor – Task Force Chair (Public Representative)
- Fred Railsback – Task Force Vice Chair (Planning Commission)
- Greg Gartrell (Public Representative)
- Dennis Lund (People Using Resources Efficiently – PURE)
- Brad MacLane (People Using Resources Efficiently – PURE)
- Elizabeth Patterson (Vice Mayor)
- Veronica Stone (Planning Commission)

The task force held four meetings during the course of the plan preparation. Major meeting topics included reviewing key findings and soliciting input from the public perspective, and guest speakers attended from the State Department of Water Resources (DWR) and the Association of Bay Area Governments (ABAG) Earthquake and Hazards Program. The Task Force meetings were also used to distribute and discuss related information published by other agencies.

In addition, the following City of Benicia staff members were actively involved in all aspects of the plan development and report preparation:

- Chris Tomasik, Assistant Director of Public Works/Utilities Manager
- Dave Wenslawski, Water Quality Technician

The general public was invited to participate in all the meetings by means of newspaper notices and articles, water bill inserts, information posted on the City's website, announcements on the local television access channel, and invitations to the news media to cover the meetings.

# List of Acronyms and Abbreviations

|           |   |
|-----------|---|
| Acre-foot | Water use and water supply information is often provided in units of acre-feet per year. One acre-foot of water is the volume of water that will cover one acre of land at a depth of one foot. One acre-foot of water is approximately 326,000 gallons of water. |
| AB        | Assembly Bill   |
| ABAG      | Association of Bay Area Governments   |
| ACT       | Urban Water Management Planning Act   |
| AF        | acre-feet   |
| AF/year   | acre-feet per year  |
| AWWA      | American Water Works Association  |
| CALFED    | California Bay Delta  |
| City      | City of Benicia   |
| CUWCC     | California Urban Water Conservation Council   |
| DMM       | Demand Management Measures  |
| DWR       | State of California Department of Water Resources   |
| ET        | Evapotranspiration  |
| gpd       | gallons per day   |
| gpf       | gallons per flush   |
| mgd       | million gallons per day   |
| Mojave    | Mojave Water Agency   |
| NBA       | North Bay Aqueduct  |
| PG&E      | Pacific Gas & Electric Company  |
| Plan      | 2005 Urban Water Management Plan  |
| PURE      | People Using Resources Efficiently  |
| SCWA      | Solano County Water Agency  |
| SWP       | State Water Project   |
| SWRCB     | State Water Resources Control Board   |
| ULFT      | Ultra low flow toilet   |
| UWMP      | 2005 Urban Water Management Plan  |
| WTP       | water treatment plant   |
| WWTP      | wastewater treatment plant  |

# Section 1

## Introduction

Section 1 provides an overview of the Urban Water Management Planning Act and the City’s integrated resource management efforts, and describes the City of Benicia (City) public information efforts regarding the 2005 Urban Water Management Plan (UWMP), coordination with regional water agencies, and the plan adoption process.

### 1.1 Urban Water Management Planning Act

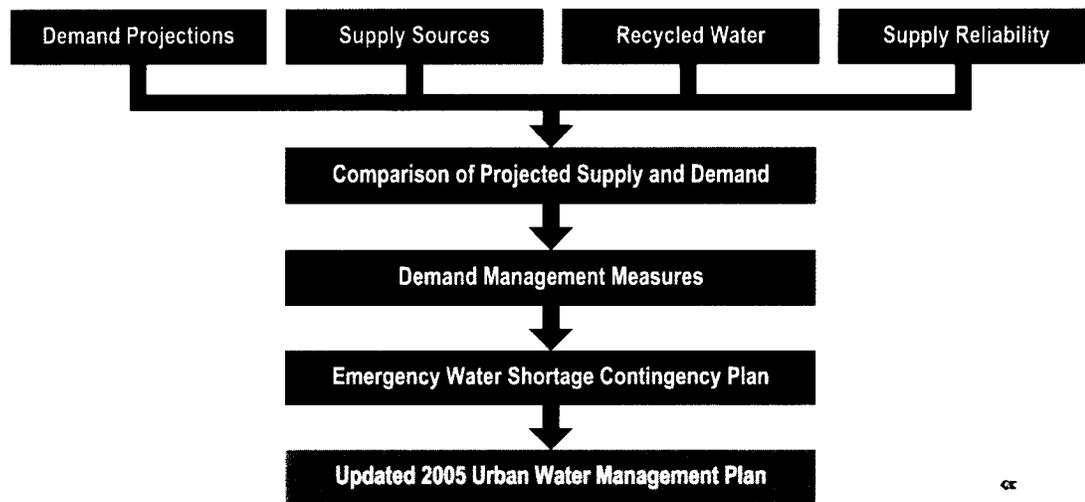
In 1983, the California Legislature enacted the Urban Water Management Planning Act (Act). This Act requires water suppliers serving more than 3,000 customers or water suppliers providing more than 3,000 acre-feet (AF) per year of water to prepare an urban water management plan to promote water conservation and efficient water use.

Since its initial adoption, a number of measures have been enacted by the Legislature that modified the Act. Table 1-1 summarizes the history of the urban water management planning measures. Appendix A contains the current Act specifying the current requirements for UWMPs. Figure 1-1 shows the major elements of the UWMP.

The City provides treated water to a population of over 25,000 people and is required to submit an updated UWMP by December 31st in years ending in zero or five.

**Table 1-1**  
**History of Urban Water Management Planning**

| <b>Timeframe</b> | <b>Legislative Measures</b>  |
|------------------|--|
| 1983             | <b>Assembly Bill (AB) 797; Water Code, Division 6, Part 2.6, Sections 10610-10656</b> – initial enactment requiring water suppliers serving more than 3,000 customers or more than 3,000 AF annually to prepare Urban Water Management Plans (Plan) as specified in the statute.   |
| 1991 to 1995     | <b>AB 11</b> – requires urban water shortage contingency analysis as part of Plans.<br><b>AB 1869</b> – requires description of water recycling activities as part of Plans.<br><b>AB 892</b> – allows members of California Urban Water Conservation Council (CUWCC) to submit a copy of the annual report to the Council to satisfy reporting requirements related to water conservation measures.<br><b>SB 1017</b> – authorizes water suppliers to recover in rates the costs incurred in preparing its plan and implementing reasonable water conservation measures included in the plan.<br><b>AB 2853</b> – requires water suppliers to give greater consideration to recycled water in their plans.  |
| 1995 to 2000     | <b>AB 1845</b> – requires a prescribed water supply and demand assessment of reliability of water service during normal, dry, and multiple dry years; required agencies to submit their plans on or before December 31 <sup>st</sup> in the years ending in 0 and 5.<br><b>AB 2552</b> – requires agencies to submit their plans to cities and counties where the supplier provides water.   |
| Since 2000       | <b>AB 610</b> – adds additional requirements for agencies that utilize groundwater as a supply source; requires written verification of water supply for large commercial and industrial development projects.<br><b>SB 221</b> – requires written verification of water supply for large residential development projects.<br><b>SB 901</b> – requires discussion of certain water quality information.<br><b>SB 672</b> – encourages reduced reliance on imported water.<br><b>SB 1348</b> – requires the State Department of Water Resources to consider plan information in evaluating applications for grants and loans.<br><b>SB 1384</b> – adds requirement to exchange supply and demand information between wholesale and retail agencies.<br><b>SB 1518</b> – requires that the Plan include projections of recycled water supply.<br><b>SB 318</b> – requires that the Plan discuss opportunities for desalination. |



**Figure 1-1**  
Overview of Major Plan Elements

## 1.2 Integrated Resource Management

The California Water Plan Update 2005, under preparation by the California Department of Water Resources, provides an overall strategy framework to guide water planning on a state-wide basis. The California Water Plan Update identifies 25 strategies to help meet regional water management objectives in the context of broader integrated resource management. These strategies include water use efficiency, recycling, desalination, and storage; as well as improving water quality; management of floodplains, runoff, and watersheds; and ecosystem restoration. (The Table of Contents of this UWMP includes a reference web-link to the California Water Plan 2005.)

The California Water Plan Update 2005 encourages integrated water resource planning to build balanced water portfolios that increase water use efficiency and maximize the return on investment in sound water management policies. A diverse portfolio of water management strategies provides flexibility to handle changing and uncertain future conditions. Each region chooses an appropriate mix of resource management strategies and objectives based on its own objectives and goals.

The integrated resource management plans, prepared by many regional associations of water agencies in response to this guidance, address the portfolio of water management strategies appropriate for each region. The Solano County Water Agency's Integrated Regional Water Management Plan developed with the City of Benicia's participation is one of these regional efforts.

The City is committed to using all its resources efficiently, including water. The City is an active participant in ongoing regional (County) water planning efforts focused

on integrating all aspects of water resource management including water supply, water quality, wastewater treatment/recycling, flood control, watershed planning, and environmental programs. The regional water management planning efforts are discussed further in Section 1.4 Agency Coordination. This UWMP incorporates the regional planning information relevant to the City. In particular, the UWMP specifically addresses urban water use efficiency and discusses demand management measures for water conservation that are discussed in the California Water Plan. (The Table of Contents of this UWMP includes a reference web-link to the Solano County Integrated Regional Water Management Plan.)

The Bay Area Water Forum is a regional group of water agencies and stakeholders that focuses in particular on water issues affecting the Bay Area and the Sacramento-San Joaquin Delta. The Forum has encouraged all Bay Area jurisdictions to consider a set of water and land use principles as part of land use and water resource planning. Appendix B contains a copy of the "Ahwanhee Water Principles for Resource Efficient Land Use" provided by the Task Force.

Many of the Ahwanhee Principles are addressed by a community's General Plan, which encompasses all aspects of community planning. The City's General Plan guides land use and development policies. Ahwanhee Principles that the City could consider incorporating into its General Plan and/or land use planning efforts to encourage more efficient use of water resources include: designing all aspects of landscaping to reduce water demand and retain runoff; minimizing impervious surfaces so land is available to absorb stormwater; and incorporating water holding areas such as creeks and ponds into the urban landscape.

This UWMP is based on the City's adopted General Plan land uses and policies, and focuses on water demand and supply. Ahwanhee Principles specifically discussed in the UWMP include: maximizing use of recycled water, implementing urban water conservation technologies, and exploring locally available drought-proof water supplies such as desalination of non-potable water.

## **1.3 Public Participation**

The City conducted an extensive public involvement effort for this UWMP update. Public participation included a special City Task Force that held meetings several times during the preparation of the plan that were open to the public, a public hearing to receive public comments on the draft UWMP report, and coordination with other agencies regarding the Plan. These public involvement activities are described below.

### **1.3.1 City Task Force**

To guide the development of the UWMP, the City Council requested and approved the formation of a special task force. Seven members were appointed to the Task Force by the Mayor and confirmed by Council resolution on May 17, 2005. The Task Force was composed of the following members:

- Vice Mayor
- Two members from the People Using Resources Efficiently Committee (PURE)
- Two members from the Planning Commission
- Two members from the general public

The task force held four meetings during the course of the Plan preparation. These meetings were held on May 29, July 28, September 15, and October 13. Appendix C contains the meeting minutes.

The general public was invited to participate in all the Task Force meetings by means of newspaper notices and articles, water bill inserts, information posted on the City's website, announcements on the local television access channel, and invitations to the news media to cover the meetings.

Major meeting topics included: reviewing findings regarding demand projections, supply sources, and supply reliability; and soliciting input from the Task Force and public's perspective on water demand management measures and water shortage contingency planning. At the September meeting, guest speakers from the State Department of Water Resources (DWR) and the Association of Bay Area Governments (ABAG) Earthquake and Hazards Program provided an overview of the California Water Plan Update 2005 and the new regional hazard mitigation program. The Task Force meetings were also used to distribute and discuss related information published by other agencies.

### **1.3.2 Public Hearing**

The Public Draft UWMP report was distributed for public review on October 26, 2005. Copies of the public draft report were made available at the City's public library, City Hall, water and wastewater treatment facilities, and posted on the City's website.

Notices of the public hearing were posted on the City's website and published in the Benicia Herald on the following dates: October 30, November 2, November 6, and November 9, 2005.

The public hearing was held on November 15<sup>th</sup>, 2005, at City Hall to receive comments from the public on the draft UWMP. Appendix D contains a copy of the public notice, the public hearing agenda, and the minutes of the public hearing.

## **1.4 Agency Coordination**

The City participates in regional water management planning efforts through the Solano County Water Agency (SCWA). SCWA members include the Cities of Benicia, Dixon, Fairfield, Rio Vista, Suisun City, Vacaville and Vallejo; the Solano Irrigation and Maine Prairie Water Districts; and Reclamation District 2068.

Regional efforts have included preparation of an Integrated Regional Water Management Plan for the member agencies. The first phase of the regional plan documented existing SCWA programs and summarized individual member agency water supplies and current demands. The second phase of the regional plan evaluated potential future water management measures and provided guidance on future programs and direction for the SCWA.

Several meetings with SCWA and its member agencies were held during the preparation of the City's UWMP. The primary purpose of the meetings was to coordinate the supply reliability assessment methodology used by the member agencies sharing common water supply sources. The meetings were attended by the Cities of Benicia, Fairfield, Vacaville and Vallejo; the Solano County Irrigation District (Suisun and Dixon); and SCWA.

A copy of the draft UWMP was provided to SCWA and its member agencies for review.

## **1.5 Plan Adoption**

The final UWMP was adopted by the City Council at its scheduled Council meeting on December 6, 2005. A signed copy of the resolution is provided in Appendix E. The final UWMP is submitted to the DWR and other agencies involved in the preparation of the Plan within 30 days following adoption.

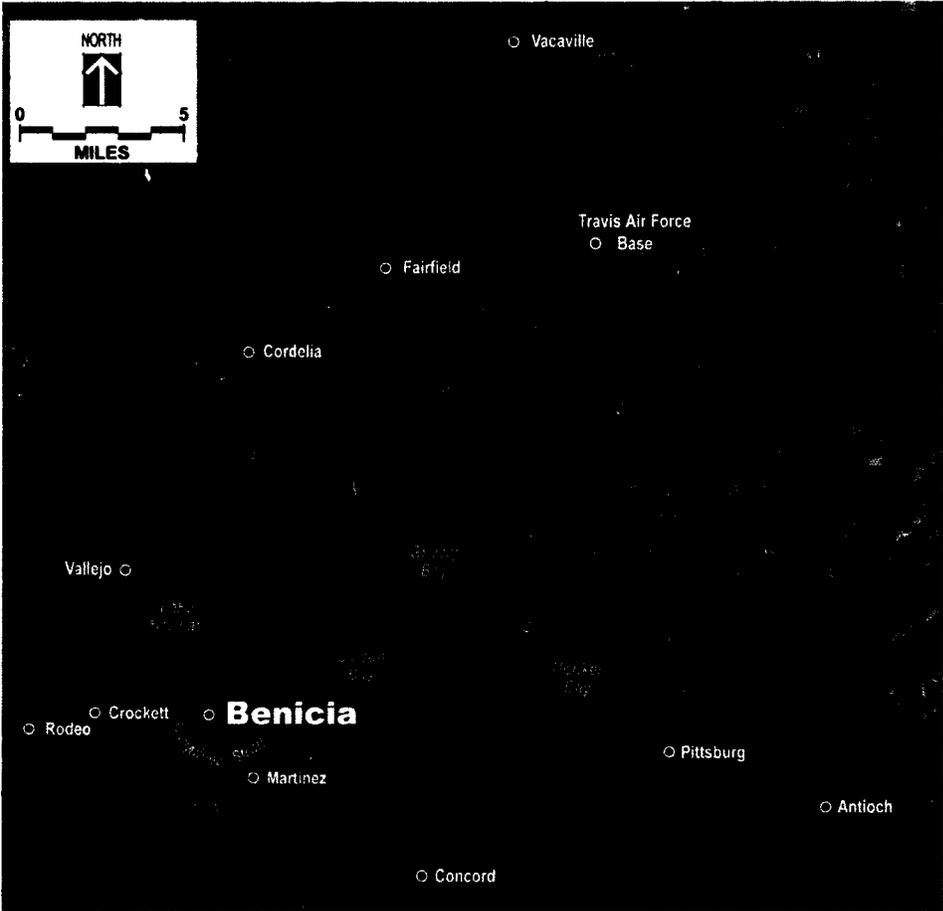
# Section 2

## Service Area Description

Section 2 provides a description of the City’s water service area, climate, population, and water customers.

### 2.1 Service Area

As shown on Figure 2-1, Benicia is a waterfront city located on the northern side of Carquinez Strait that connects San Pablo Bay and the San Joaquin Bay-Delta Estuary system. The City is bordered on the west by the neighboring City of Vallejo. The City of Martinez is located across the Carquinez Strait to the south. The areas to the north and east of the City are unincorporated County lands.



**Figure 2-1**  
Location Map

Benicia is an historic city and retains many of its historic buildings. It was founded in 1847, and was one of the first two cities to incorporate in the State in 1850. The downtown area is located along the waterfront, and residential development is to the north against the coastal hills. Industrial uses are primarily along major highways.

Benicia is a full-service city with an elected member Council and full-time City Manager. The City's water and wastewater services are operated and managed through its Public Works Department.

The first waterworks system for the City, the Benicia Water Company, was built in 1880 by a group of citizens who acquired water rights on Paddy Creek and Sulphur Springs Creek north of the City, constructed a pipeline into town, and installed some wells to supplement the creek water (source: article in the *Benician* "History of Benicia's Water Supply", March 14, 1958).

## 2.2 Drainage Watersheds

The City's planning area drains to Suisun Bay and the Carquinez Strait. Figure 2-2 shows the major drainage watersheds within the City planning area as identified in the City's General Plan. These watersheds are areas that drain surface runoff to creeks and water bodies in and adjacent to the City.

Sulphur Springs Creek and its main tributary, Paddy Creek, form the largest watershed that drains the central part of the planning area and includes Lake Herman. The Sulphur Springs Creek watershed is approximately 18 square miles, with the upper 6 square miles located outside the City's planning area within the City of Vallejo sphere of influence. The Paddy Creek tributary drains a 3 square mile area at the lower reach of Sulphur Springs Creek just below the Lake Herman outlet. Lake Herman serves as part of the City's water supply system as discussed in Sections 4.2.2 and 4.3.3.

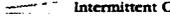
The southernmost part of the City drains southerly into the Carquinez Strait via local drainages. The northeastern part of the planning area drains easterly to Goodyear Slough and then to Suisun Bay. These other smaller watersheds, while not part of the City's water supply system, are included in its overall water resource management efforts.

## 2.3 Climate

Benicia has an inland coastal maritime climate typified by cool, wet winters with significant periods of fog and warm, dry summers with frequent cooling sea breezes from the west. Water demand in the City service area increases dramatically in the summer months due to outdoor irrigation.

Figure 2-3 shows climate data for the City. Total precipitation in Benicia averages about 20 inches per year and falls mostly between December and April. Typically, July and August are the hottest months of the year with an average high temperature of 87 degrees Fahrenheit. December and January are the coolest months with an average low temperature of 39 degrees Fahrenheit.

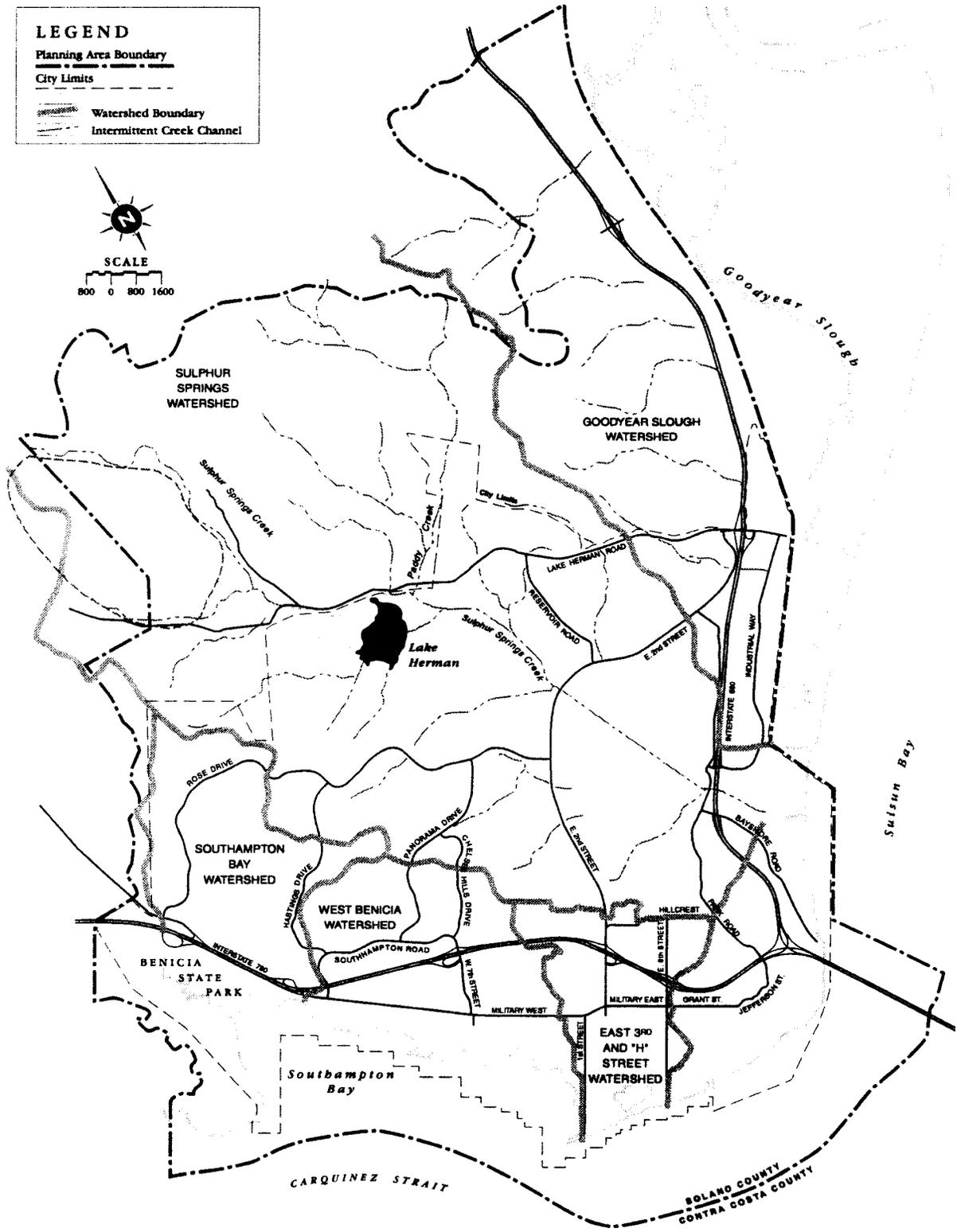
**LEGEND**

-  Planning Area Boundary
-  City Limits
-  Watershed Boundary
-  Intermittent Creek Channel

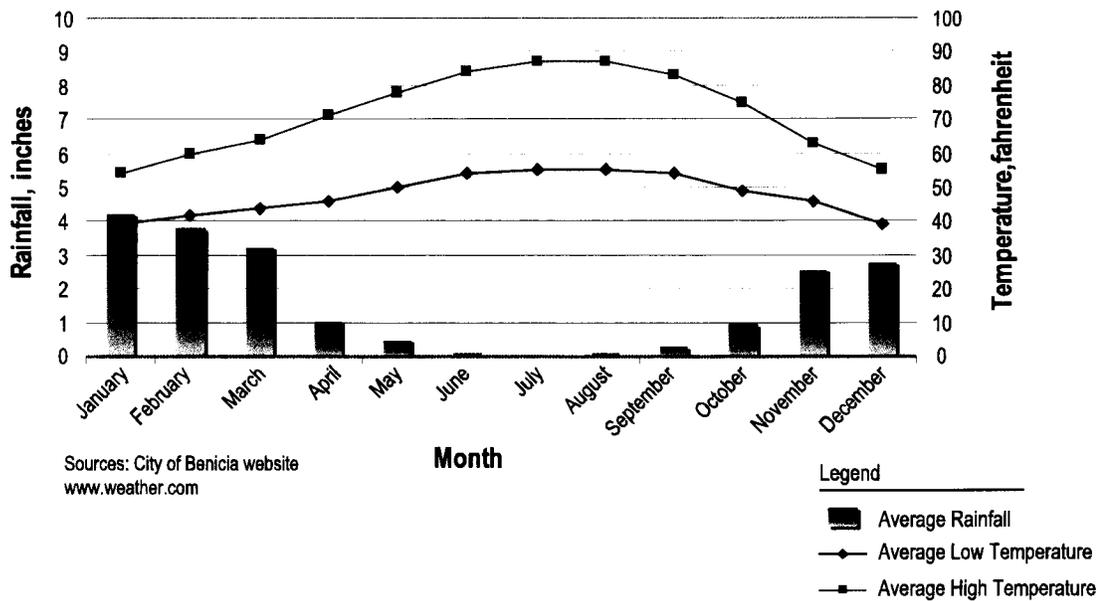


**SCALE**

800 0 800 1600



**Figure 2-2**  
Drainage Watersheds



**Figure 2-3**  
Climate Data

In the future, there may be long-term global climate changes that may affect water supply and demand conditions both regionally and statewide. The California Water Plan Update includes a discussion of the state’s monitoring and investigation of the potential impacts of global climate changes. There is still significant scientific controversy about both the potential climate changes and the potential impacts. On a regional level, the Solano County Integrated Water Management Plan includes a long-term action to assess risk and uncertainties associated with potential effects of climate change, when sufficient firm scientific information is available to apply to local supplies and facilities. The City participates in the regional integrated water planning efforts, and will be involved in future regional efforts related to supply impacts of climate change. This issue does not impact the 2005 UWMP, and will be re-evaluated in future UWMP updates.

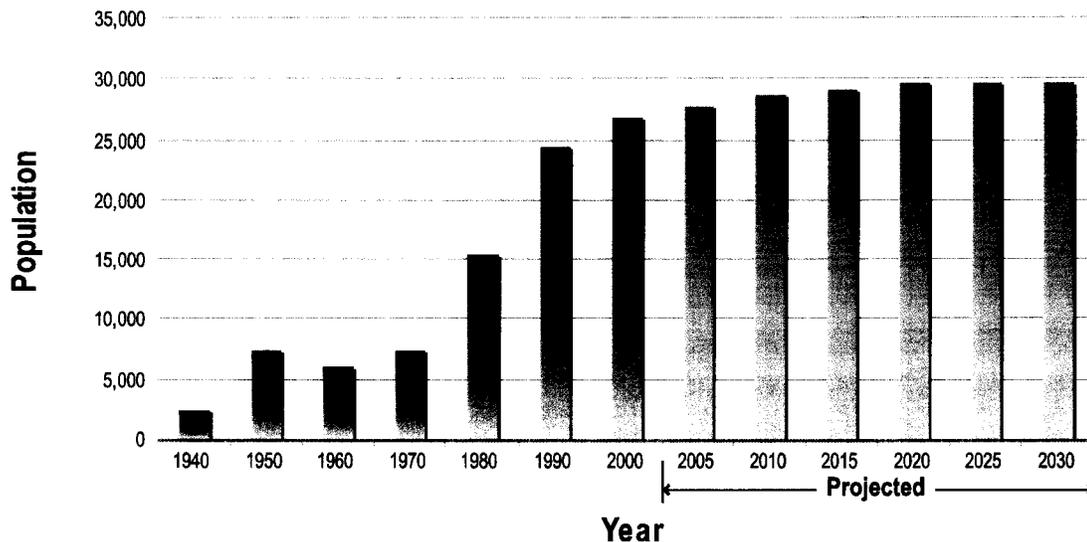
## 2.4 Population

Growth in the City was slow in the late 1800's and early 1900's and did not increase until the World War II period. Growth declined after that period due to a decrease in fishing and military activity. Growth returned to the community in the 1960's, and the City more than doubled its population between 1970 and 1980. A significant amount of growth also occurred between 1980 and 1990. After 1990, growth became more moderate, and has slowed considerably since 2000.

Table 2-1 provides population projections for the City service area from 2005 to 2030. The City is very close to build-out based on the City's adopted General Plan. The current General Plan was adopted in 1999, with an updated Housing Element adopted in 2003. According to the General Plan, it is anticipated that build-out of the community will occur by the year 2020, with a population of 29,600, an increase of about 1,800 people.

| <b>2005</b>  | <b>2010</b> | <b>2015</b> | <b>2020</b> | <b>2025</b> | <b>2030</b> |
|--|-------------|-------------|-------------|-------------|-------------|
| 27,780   | 28,700      | 29,150      | 29,600      | 29,600      | 29,600      |
| Source: City of Benicia General Plan, 2003 Housing Element |             |             |             |             |             |

Figure 2-4 shows the City's historical and projected population.



**Figure 2-4**  
Historical and Projected Population

## 2.5 Water Customers

The City provides treated water to customers within the City for residential and non-residential uses. The customers are classified as single-family residential, multifamily residential, commercial, industrial, and irrigation use categories. An additional category called “other” includes meters for construction projects and similar uses. In 2004, the City had a total of 9,182 treated water customers. The City also provides untreated water to the Valero Refinery for industrial uses..

Table 2-2 shows the projected number of treated water customers from 2005 to 2030 at 5-year intervals. Each customer is a billing account served by a separate water meter. The number of customers is estimated to increase linearly between 2005 and buildout at 2020.

| <b>Customer Category</b>                 | <b>Actual<br/>2004</b> | <b>Estimated Future Number of Total Connections</b> |              |              |              |              |              |
|--|------------------------|---|--------------|--------------|--------------|--------------|--------------|
|  |                        | <b>2005</b>   | <b>2010</b>  | <b>2015</b>  | <b>2020</b>  | <b>2025</b>  | <b>2030</b>  |
| <b>Single-Family Residential</b>         | 8,078                  | 8,109   | 8,264        | 8,420        | 8,575        | 8,575        | 8,575        |
| <b>Multiple-Family Residential</b>       | 270                    | 270   | 272          | 274          | 276          | 276          | 276          |
| <b>Commercial and Institutional</b>      | 671                    | 677   | 707          | 738          | 768          | 768          | 768          |
| <b>Industrial<sup>(1)</sup></b>          | 92                     | 96  | 118          | 139          | 160          | 160          | 160          |
| <b>Irrigation</b>                        | 48                     | 49  | 54           | 60           | 65           | 65           | 65           |
| <b>Other (e.g., construction meters)</b> | 23                     | 23  | 24           | 24           | 25           | 25           | 25           |
| <b>TOTAL</b>                             | <b>9,182</b>           | <b>9,225</b>  | <b>9,440</b> | <b>9,654</b> | <b>9,869</b> | <b>9,869</b> | <b>9,869</b> |

<sup>(1)</sup> Industrial category includes Valero treated water meters only. Valero untreated (raw) water use is considered separately, as discussed in Section 3.

Customer projections are based on estimates of future development obtained from the City’s adopted planning documents: 1999 General Plan for non-residential uses and the 2003 Housing Element update for residential uses. Future development estimates include the proposed Benicia Business Park which consists of about 297 developable acres for commercial and light industrial uses. Available land use planning information for the proposed Benicia Business Park was included in the analysis as discussed in the key assumptions below. These projections are based on the planning information available at this time, and will be re-evaluated in future UWMP updates.

Key assumptions for each customer category are provided below:

- Single-family residential connections are the largest category. One connection serves each single-family dwelling unit. The buildout number of residential units was estimated based on the number of future residential units allowed by the 2003 Housing Element, including some that may be constructed above first floor commercial.

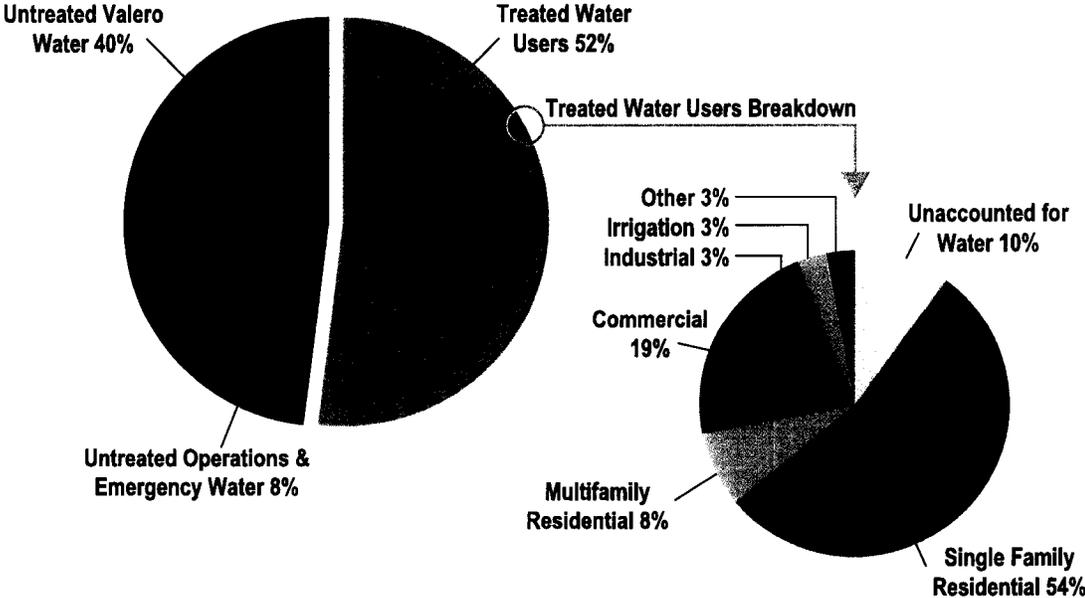
- Multiple-family residential connections comprise a much smaller part of the customer base. Typically, an average of 9 multiple-family units are served by each multi-family connection.
- The commercial and institutional category is the second largest served by the City. This category includes such customers as downtown businesses, retail shops, offices, schools, and other public buildings. The number of future commercial/institutional customers is based on the amount of vacant land designated for future commercial/institutional uses in the City's General Plan and the available planning information for the proposed Benicia Business Park. Of the total future commercial lands, the proposed Benicia Business Park will comprise 33 acres of commercial development, including such proposed uses as two hotels, a health club, a service station and eating establishments, a bank, and research and development office space.
- Future industrial connections are also based on information on the amount of vacant land designated as industrial in the City's General Plan and available planning information for the proposed Benicia Business Park. Of the total future industrial lands, the proposed Benicia Business Park will comprise 264 acres of light industrial and flex space comprising a variety of uses. Potential uses include industrial research and development services, government offices, ambulance services, maintenance and repair services, warehousing and storage, light manufacturing, wholesaling and distribution, warehousing and transportation, trucking/freight transfer, package distribution, communication facilities, or laboratories.
- The number of connections in the irrigation category was assumed to increase by 10 percent of the future commercial/institutional and industrial customers, in order to account for large commercial and industrial areas that have a separate irrigation meter to avoid paying sewer charges on irrigation water. The separate irrigation meters generally serve multiple commercial/institutional and industrial customers that have common landscape areas. The current number of irrigation meters is approximately 6 percent of the current number of commercial and industrial meters. A factor of 10 percent was used to project future irrigation meters.
- The number of connections in the other category was assumed to remain similar to the current maximum number of customers served in the period between 1999 and 2004. It is assumed that future construction activities will be similar or less than previous years. This category is only a small number of customers and a small percentage of the total water use.

# Section 3 Water Use

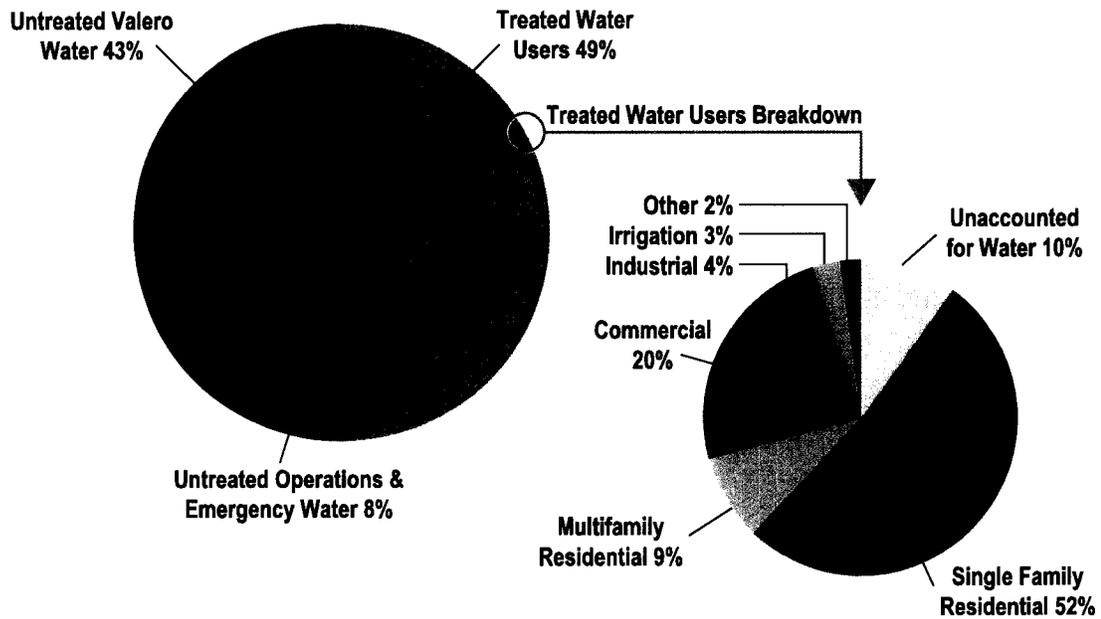
Section 3 summarizes the City’s historical water demand and provides the projected future water demands to year 2030. Water demand is the amount of water used by the City’s customers and in the City’s water system, which the City will need to supply. The four components of the City’s water demand discussed in this section are listed below:

- Treated water use by customers
- Unaccounted-for water (treated water system losses)
- Operations and emergency (untreated) water
- Raw (untreated) water for Valero industrial use

Figures 3-1 and 3-2 show the current (2005) and buildout (2020) amounts of the four components that comprise the City’s total demand. The rest of the section describes each of the components and how the projections were developed.



**Figure 3-1**  
Current (2005) Demand Components



**Figure 3-2**  
Buildout (2020) Water Demand Components

### 3.1 Historical Treated Water Use by Customers

Table 3-1 presents the historical treated water consumption information for the City’s service area. The customer sectors are classified as single-family residential, multi-family residential, commercial, industrial, and irrigation use categories. An additional category called “other” includes meters for construction projects and similar uses.

Table 3-1 also shows the average day water use per connection for each customer category. The usage per connection is the average of the historical use in each category for the period from 1999 through 2004.

Section 2 provides information on the current and projected number of future treated water customers.

| <b>Customer Category</b>     | <b>Consumption<br/>(acre-feet per year) <sup>(1)</sup></b> |              |              |              |              |              | <b>Average Annual<br/>Use per<br/>Connection <sup>(2)</sup></b> |
|------------------------------|--|--------------|--------------|--------------|--------------|--------------|---|
|                              | <b>1999</b>  | <b>2000</b>  | <b>2001</b>  | <b>2002</b>  | <b>2003</b>  | <b>2004</b>  |   |
| Single-Family Residential    | 3,137  | 3,102        | 3,127        | 3,124        | 3,041        | 3,399        | 0.4 AF/year<br>(355 gal/day)                                    |
| Multi-family Residential     | 588  | 575          | 598          | 553          | 542          | 552          | 2.2 AF/year<br>(2,000 gal/day)                                  |
| Commercial and Institutional | 959  | 983          | 1,158        | 1,121        | 1,040        | 1,173        | 1.7 AF/year<br>(1,500 gal/day)                                  |
| Industrial <sup>(3)</sup>    | 158  | 154          | 155          | 152          | 138          | 156          | 1.7 AF/year<br>(1,500 gal/day)                                  |
| Irrigation                   | 144  | 158          | 167          | 157          | 156          | 180          | 3.3 AF/year<br>(2,700 gal/day)                                  |
| Other                        | 17   | 17           | 26           | 346          | 160          | 159          | 6.4 AF/year<br>(4,200 gal/day)                                  |
| <b>Total</b>                 | <b>5,003</b>   | <b>4,989</b> | <b>5,231</b> | <b>5,453</b> | <b>5,077</b> | <b>5,619</b> |   |

<sup>(1)</sup> Treated water use information is provided as acre-feet per year. One acre-foot of water is the volume of water that cover one acre of land at a depth of one foot. One acre-foot of water is approximately 326,000 gallons of water.

<sup>(2)</sup> Average daily use per connection is based on the average of the historical usage for the period from 1999 to 2004

<sup>(3)</sup> Industrial use is treated water only. Only the Valero treated water use is included in Table 3-1. The untreated (raw) water supplied to Valero is not included in Table 3-1; it is discussed below in Section 3.2.

## 3.2 Historical Information for Other Demand Components

In addition to treated water use by customers, there are several other components of the City's total demand that must be provided by the City's water supplies. These components are summarized below.

- **Unaccounted-for Water (treated water).** This component includes treated water that is lost between the City treatment facility and the individual customer water meters. These losses are typically due to leaks or breaks in the water distribution system, inaccurate meters, fire flows, and other similar reasons. In 2004, the unaccounted-for water was approximately 10 percent of the total treated water delivered to the distribution system. An average value of 10 percent losses is similar to previous years. Typically, water agencies try to keep unaccounted-for water at 10 percent or less of their treated water use.
- **Operations and Emergency Water (untreated water).** This component includes water used at the treatment plant for treatment processes. It also includes surplus water supply that bypasses the plant and is stored in Lake Herman for emergencies. Water supply is pumped to the treatment plant at a constant rate. During periods of low demand, water is sometimes supplied at a higher rate than is being treated

to meet demand. The surplus water is stored in Lake Herman, and the lake serves as an emergency backup supply for the treatment plant.

- **Raw (untreated) Water for Valero.** The Valero refinery also contracts with the City for raw (untreated) water supply for industrial uses, such as cooling water. Raw water deliveries to Valero vary between 4,500 to 5,800 acre-feet per year (AF/year) depending on the number of refining processes in operation. Average deliveries provided to Valero since 1998 have been approximately 5,070 AF/year.

### 3.3 Projected Water Demand

Table 3-2 presents the projected water demands in 5-year increments from 2005 to 2030. The total projected demand must be provided by the City's water supplies. Key assumptions are noted below:

- Treated water projections are based on the average use per customer connection by category based on historical usage data and the projected future connections.
- Projections for unaccounted-for water and operations/emergency water were based on the historical average percentages for those categories.
- Valero untreated water use was assumed to increase linearly from its current level to the maximum historical usage of 5,800 AF/year.

| <b>Component/Year</b>  | <b>2005</b>   | <b>2010</b>   | <b>2015</b>   | <b>2020</b>   | <b>2025</b>   | <b>2030</b>   |
|--|---------------|---------------|---------------|---------------|---------------|---------------|
| <b>Treated Water Use</b>   |               |               |               |               |               |               |
| Single-Family Residential  | 3,401         | 3,411         | 3,420         | 3,430         | 3,430         | 3,430         |
| Multi-family Residential   | 555           | 573           | 590           | 607           | 607           | 607           |
| Commercial   | 1,181         | 1,223         | 1,264         | 1,306         | 1,306         | 1,306         |
| Industrial   | 163           | 200           | 236           | 272           | 272           | 272           |
| Irrigation   | 182           | 193           | 204           | 215           | 215           | 215           |
| Other  | 159           | 159           | 160           | 160           | 160           | 160           |
| <b>Total Treated Water Use</b>                                       | <b>5,642</b>  | <b>5,758</b>  | <b>5,874</b>  | <b>5,990</b>  | <b>5,990</b>  | <b>5,990</b>  |
| <b>Other Components of Demand</b>                                    |               |               |               |               |               |               |
| Unaccounted-for Water  | 564           | 576           | 587           | 599           | 599           | 599           |
| Operations and Emergency Water                                       | 1,016         | 1,036         | 1,057         | 1,138         | 1,138         | 1,138         |
| Valero Untreated Water <sup>(1)</sup>                                | 4,675         | 5,050         | 5,425         | 5,800         | 5,800         | 5,800         |
| <b>Total Demand including Treated Water Use and Other Components</b> |               |               |               |               |               |               |
| <b>Total Demand</b>  | <b>11,897</b> | <b>12,420</b> | <b>12,944</b> | <b>13,527</b> | <b>13,527</b> | <b>13,527</b> |

<sup>(1)</sup> Valero untreated water will be supplied by raw surface water and by recycled water when it becomes available in 2010.

# Section 4

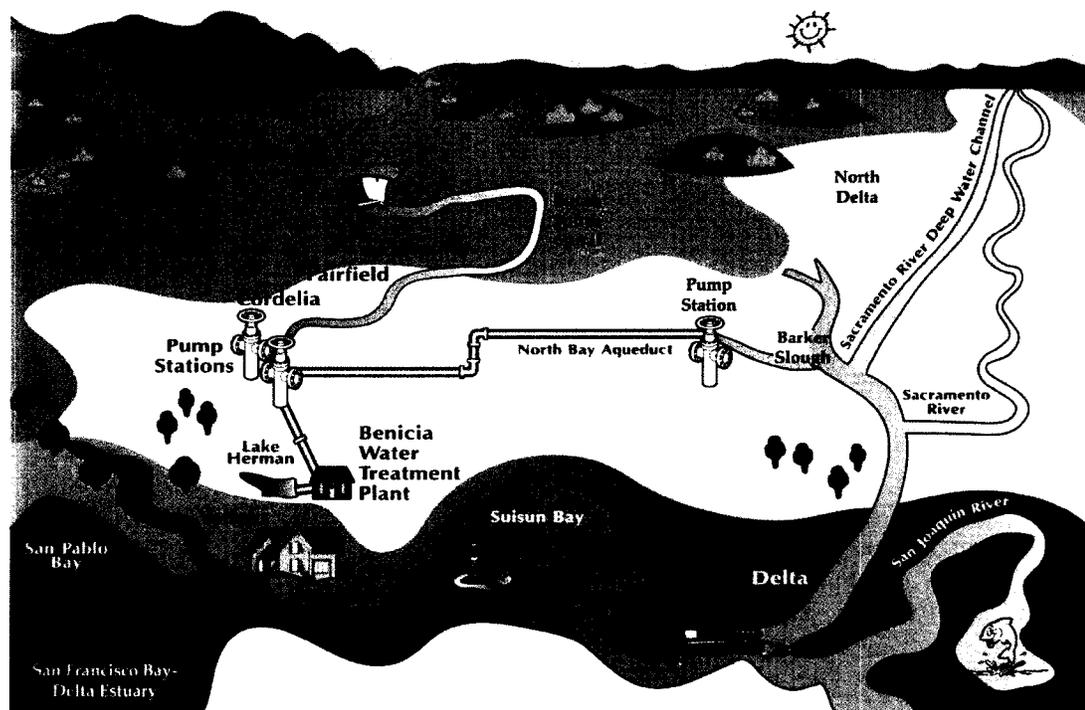
## Water Supply Sources

Section 4 provides an overview of the City's water supply and major water facilities, describes each of the City's current supply sources, and discusses other potential supply sources that the City may consider in the future. Section 5 discusses future recycled water supply. Section 6 provides an evaluation of the reliability of the City's supply sources.

### 4.1 Water Supply Overview

The City's water supply comes primarily from two surface water bodies. Lake Berryessa water transported through the Putah South Canal provides approximately 20 percent of the City's total consumption. Sacramento Delta water conveyed through the North Bay Aqueduct (NBA) provides the remaining needs of the City. Lake Herman is used as an emergency source of surface water only.

Figure 4-1 illustrates these major sources of surface water supply for the City. Section 4.2 describes the City's major water facilities. Section 4.3 describes the City's current contracts and water rights for supply from the surface water bodies. Section 2.1 discusses the City's local drainage watersheds, including the Sulphur Springs Creek watershed that includes Lake Herman.

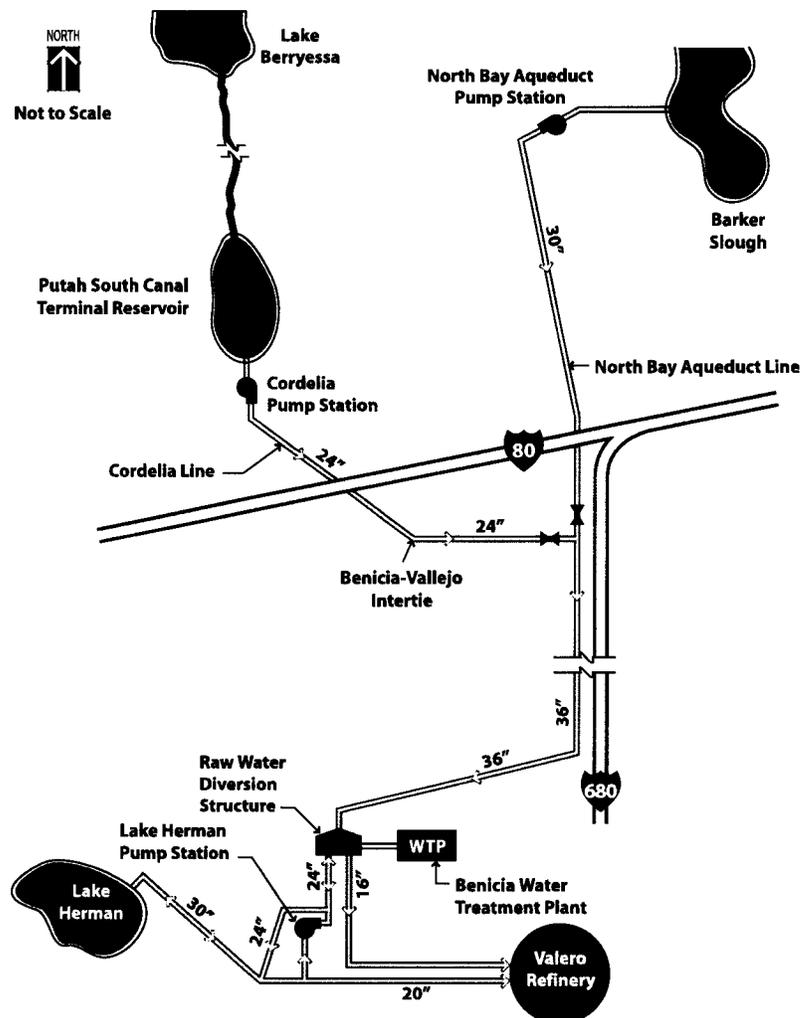


**Figure 4-1**  
City of Benicia Water Sources

In addition, the City is implementing a future recycled water supply as discussed in Section 5. The City does not get any of its supply from groundwater, and has no current plans to do so in the future due to the generally poor quality groundwater resources that underlie the City. However, the City may participate in future conjunctive use efforts on a regional level through the Solano County Water Agency.

## 4.2 Major City Water Facilities

Figure 4-2 shows the major components of the City's raw (untreated) water supply system and treatment facilities. Untreated water from the City's supply sources is conveyed to the City's water treatment plant. After treatment, treated water is conveyed to customers via the City's water distribution system.



**Figure 4-2**  
Raw Water Conveyance System

### **4.2.1 Raw (Untreated) Water Conveyance**

The North Bay Aqueduct conveys water from the Sacramento River to the City. The NBA pump station pumps water from Barker Slough through the North Bay Aqueduct to the City's water treatment facility. The pump station has a total capacity of 20.7 mgd. The North Bay Aqueduct is comprised of approximately 14 miles of 24-inch, 30-inch, and 36-inch diameter pipeline. These facilities are operated by the DWR as part of the State Water Project.

The City has the ability to obtain water from the City of Vallejo, which is Lake Berryessa water from the Putah South Canal Terminal Reservoir. This is typically done when raw water from the North Bay Aqueduct is unavailable or of poor quality due to high turbidity and organic content. During these periods, the City operates the Cordelia Pump Station to take water from the Canal and deliver it to the City's treatment facility through a 24-inch diameter pipeline that connects to the North Bay Aqueduct pipeline. The Cordelia Pump Station has a total capacity of 18.4 mgd and is operated manually by City staff during these periods.

Sections 4.2.3 and 6.3 discuss the water quality of these supply sources.

### **4.2.2 Raw Water Reservoir (Lake Herman)**

Pumped raw water from the NBA or Putah South Canal is delivered to the City's treatment facility at a diversion structure. Since the pump stations operate at a fixed speed, surplus flow not needed at the plant is diverted by gravity to Lake Herman through a 24-inch diameter pipeline.

The City has the ability to pump water from Lake Herman back to the treatment facility through the Lake Herman Pump Station. This is typically done during emergencies when supply from the North Bay Aqueduct or Putah South Canal is not available. The pump station has a total pumping capacity of 9.6 mgd.

Raw water is also diverted at the diversion structure to Valero through a 16-inch diameter pipeline. It is also possible to provide raw water to Valero directly from Lake Herman. Flows to Valero are metered.

### **4.2.3 Water Treatment Plant**

The City's existing water treatment plant was constructed in 1971 and was originally designed for a capacity of 6.0 mgd. Since that time, the plant has been expanded and now has a design capacity of 12 mgd.

The water treatment process involves a series of steps to remove suspended sediment and disinfect the water prior to distribution to customers. As a first step, incoming raw water is treated with coagulating chemicals and then held in a flocculation/sedimentation basin where some of the sediments settle out. The next treatment step involves filtration of the water using dual media filters equipped with granulated activated carbon and sand media. After filtration, the water is disinfected using

chlorine. After disinfection, the treated water is stored in reservoirs at the site for delivery to the distribution system.

Raw water quality varies throughout the year, which present challenges at the existing plant. During the winter months, especially after heavy rain, raw water from the Sacramento River (NBA) is very turbid with high total organic compound concentrations and low alkalinity. The existing water treatment plant (WTP) has not been able to treat this water effectively unless it is blended with Lake Berryessa (Putah South Canal) water.

The plant is currently being modified to increase its reliability, flexibility, and redundancy so that it can effectively treat 12 mgd throughout the year. The modifications will enable the plant to effectively treat water all year, and to stay in compliance with current and anticipated water quality regulations.

The current modifications provide additional sedimentation facilities, provide more flexibility to operate the filters, meet disinfection requirements, comply with future water quality regulations, and restore treated water storage capacity for more flexibility.

#### **4.2.4 Treated Water Distribution System**

The water distribution system delivers treated water to the residential, commercial, and industrial customers within the City's service area. The distribution system consists of three main pressure zones. The zones are served by 5 storage reservoirs, 3 pumping stations, and 9 pressure reducing stations. The water distribution pipeline system is composed of 4-inch to 36-inch diameter pipelines.

### **4.3 Current Water Supply Sources**

The City currently holds contracts and/or rights to water from the Sacramento Delta and Lake Berryessa, which are the two major surface water bodies providing supply to the City. Table 4-1 summarizes the City's contracts and the maximum amount that could be supplied from each water source. This is the amount of water for which the City has contracts or rights, but does not consider the reliability of supply due to the effects of droughts or other reductions.

This section describes each current supply source listed in Table 4-1. Section 5 discusses future recycled water supply. Section 6 discusses the reliability of current and future supply sources during dry weather periods.

**Table 4-1**  
**Current Supply Amounts by Contract or Water Rights**

| Source   | Contract or Water Rights<br>(AF/year) |
|--|---------------------------------------|
| Lake Herman  | 500 – 1,000 (average annual yield)    |
| State Water Project (SWP) <sup>(1)</sup>                     | 16,075                                |
| Water Rights Settlement                                      | 10,500                                |
| Vallejo Agreement (Solano Project water from Lake Berryessa) | 1,100                                 |
| Mojave Exchange  | 7,500                                 |
| Total  | 35,675 – 36,175                       |

<sup>(1)</sup> The City's current SWP contract amount is 17,200 AF/year. In 1985, the cities of Benicia, Fairfield, and Vacaville agreed to reduce their annual entitlements in order to provide SWP water to the cities of Rio Vista and Dixon. Rio Vista and Dixon must develop facilities to use the SWP water by 2016. If this occurs, the City's reduced amount is 16,075 AF/year. If the facilities are not built by 2016, then Benicia retains its full contract amount of 17,200 AF/year. To be conservative, this plan is based on the reduced amount of 16,075 AF/year, which assumes that Rio Vista and Dixon may take SWP water in the future.

### 4.3.1 State Water Project

The City receives State Water Project (SWP) water through an agreement with the SCWA. SCWA contracts with DWR for the SWP water (called Table A water), and in turn contracts with cities in Solano County to provide this supply. The water supply for the SWP comes from Lake Oroville and water rights for flows in the Sacramento and San Joaquin River systems. The SWP contract runs to year 2035 and is renewable.

The City's current SWP contract amount is 17,200 AF/year. In 1985, the cities of Benicia, Fairfield, and Vacaville agreed to reduce their annual entitlements in order to provide SWP water to the cities of Rio Vista and Dixon. Rio Vista and Dixon must develop facilities to use the SWP water by 2016. If this occurs, the City's reduced amount is 16,075 AF/year. If the facilities are not built by 2016, then Benicia retains its full contract amount of 17,200 AF/year. To be conservative, this plan is based on the reduced amount of 16,075 AF/year, which assumes that Rio Vista and Dixon may take SWP water in the future.

### 4.3.2 Water Rights Settlement

The City of Benicia, along with the cities of Fairfield and Vacaville, asserted a priority right with the State of California for water from the Sacramento/San Joaquin Delta pursuant to the Watershed-of-Origin Statute. The purpose of the statute, in part, is to reserve for the areas where water originates a right to such water for future needs that is preferential to the right of outside areas. The California Department of Water Resources (DWR), among others, filed a protest on the cities' applications with the State Water Resources Control Board (SWRCB). Prior to the SWRCB hearing, DWR and the cities negotiated a comprehensive settlement that would provide water to the cities. The subsequent settlement and conveyance agreements define the basis on

which water is made available to the Solano County Water Agency for use in the cities' service areas and how the existing DWR facilities would be used to convey the water to the cities.

The "Area of Origin" Water Rights Settlement with DWR provides the City with 10,500 AF/year of water from the Sacramento River that is not SWP water, it is non-Project water as defined by the settlement agreement. This is a permanent allocation of water supply. The amount of water was based on projected water needs to meet the city's General Plan demands. The Settlement Agreement allows the City to apply in the future to the State Water Resources Control Board for a Watershed of Origin appropriation higher than the Settlement Agreement amount if demands exceed those upon which the Agreement was based. The Settlement Agreement runs through 2035 and is renewable under the same terms as the SWP contract.

Settlement water is conveyed through the NBA when capacity is available and delivered to the City in the same manner as SWP water. The City can preferentially use settlement water during the periods when it is available and capacity is available. The City typically uses its settlement water in the spring and fall when it is most often available.

Settlement water is restricted or not available when Standard Water Right Term 91 is in effect. Term 91 is declared by the State Water Resources Control Board when it is determined that the SWP and Central Valley Projects are required to release stored water in excess of low natural flow to meet Sacramento Valley inbasin uses plus export demands. Natural flow is the flow that would have been in existence if the dams were not there. Term 91 is declared in the summer of all but very wet years.

Settlement water can be taken when the Delta is in excess conditions or when the Delta is in balanced conditions as long as Term 91 is not in effect. Balanced conditions in the Delta are defined as the periods when releases from upstream SWP and Central Valley Project reservoirs plus unregulated flow approximately equal the water supply needed to meet all Sacramento Valley inbasin uses plus export demands. During balanced conditions, the SWP and Central Valley Project are releasing water from reservoir storage to meet their water delivery obligations.

### **4.3.3 Lake Herman**

Lake Herman is located in the hills between Benicia and Vallejo and has a storage capacity of 1,800 acre-feet (AF). The dam that created Lake Herman was constructed in 1905 and raised in 1943 to its current height. Section 2.2 discusses the City's watersheds including the Sulphur Spring Creek watershed that includes Lake Herman. The average yield of its watershed is 500 to 1,000 AF annually, with no yield in dry years. The lake serves as terminal storage for excess supply delivered to the City through the North Bay Aqueduct, as described in Section 4.2.2.

#### **4.3.4 Vallejo Agreement (Solano Project Water)**

The City currently has one active water purchase agreement with the City of Vallejo. The agreement was executed in 1962 and has been amended twice. The second amendment extended the expiration date of the agreement to February 28, 2025. It is assumed that this agreement will be renewed at its expiration.

The agreement allows the City to purchase up to 1,100 AF/year of Vallejo's Solano Project water from Lake Berryessa. The agreement also provides that the City can receive up to 3 mgd of the water as treated water, in lieu of raw water, by means of an inter-connection between the Benicia and Vallejo treated water systems, which does not currently exist. Currently the City can only receive raw water from Vallejo by means of the Cordelia Pump Station and Cordelia Pipeline. In order to receive treated water, a new interconnection would be required. The agreement provides that shortages (reductions) experienced by Vallejo may be passed on to Benicia.

The City previously had a second agreement with Vallejo for purchase of 4,400 AF/year from various sources. This agreement was seldom exercised and was terminated in 2004.

#### **4.3.5 Mojave Banking and Water Exchange**

The City, as member of the SCWA, is entitled to participate in a banking and water exchange program with the Mojave Water Agency (Mojave), another SWP contractor. Mojave serves a portion of the high desert region north of the San Gabriel Mountains in Southern California. It overlies a large groundwater basin that can meet nearly all of its demands in dry years. This allows Mojave to operate the basin conjunctively with surface water supplies from the SWP. Available surface water is stored in the groundwater basin.

SCWA has an agreement with Mojave to exchange wet weather SWP water for dry year SWP water. Mojave and SCWA also have agreements with DWR to transport the exchange water through SWP facilities. According to the agreement, SCWA (or its members) can exchange two units of SWP water for a future return of one unit of SWP water to be provided at the Delta by Mojave. The future return would most likely occur in a dry year when there are SWP shortages.

Benicia, as a SCWA member, has taken advantage of this program since 1997. In wet years, the City sends SWP water to be "banked" or "stored" in Mojave's groundwater basin. During dry years, the City can recover one-half of its stored water through the NBA from Mojave's SWP allocation, while Mojave uses its groundwater to replace the SWP water that goes to the City. Therefore, the City does not pay conveyance costs because it is taking Mojave's water above the Delta. The City currently has delivered a total of 15,000 AF to Mojave, and can recover a total of 7,500 AF.

There is no termination date for the Mojave agreement. Either SCWA or Mojave may initiate termination by means of written notice to the other party. Following such notice, termination would occur when the available balance is reduced to zero.

The DWR currently requires that the water supply exchanged be returned within 10 years of the initial exchange. However, this may be amended so that if the water is not used within the 10-year period, the contract will be extended for another 10-year period (or periods) until used.

## 4.4 Other Water Sources

### 4.4.1 Transfer or Exchange Opportunities

The City is connected to a major water supply import system via the SWP and the North Bay Aqueduct, which could make a variety of short- or long-term options possible. Such transfers or exchanges might occur with other North Bay Aqueduct members, other SWP entities, or Solano Project members. These shared opportunities highlight the value of statewide and regional water management planning efforts. Four specific options currently available to the City are:

- ***Mojave Banking and Exchange Program*** – The City is a current participant in this program through the SCWA, as discussed in Section 4.3.5.
- ***Solano Irrigation District Purchase*** – The City will often negotiate informal purchases with Solano Irrigation District for Solano Project water to augment the City’s supplies, especially during the winter for blending due to poor quality of the SWP water or when North Bay Aqueduct water is unavailable.
- ***Storage Agreement for Solano Project Water*** – The City has a storage agreement with SCWA that provides an option to store up to 9,000 AF in Lake Berryessa for use as emergency supply. To exercise this agreement, Benicia must exchange a portion of its SWP water (Table A water) water for Solano Project water or purchase it from other members that have the capability to use either source. The other entity uses the North Bay Aqueduct water and foregoes the use of the Solano Project water. The City has not exercised this agreement to date since it specifies that the first Project water spilled (released over the dam), if the lake is full, is Benicia’s water whether the City needs it at the time or not. The City would only consider exercising this agreement if lake levels were low enough that it was not likely that the lake would spill.
- ***Solano Project Drought Measures Agreement*** - The Solano Project contracting cities (Fairfield, Vacaville, Vallejo, and Suisun City) have an agreement with the two agricultural Solano Project contracting districts (Solano Irrigation and Maine Prairie) to share water supplies during drought periods. Benicia is not a member of the Project, since the City relinquished its contractual rights to Solano Project water when SWP water was made available. However, Project members may transfer water from the Project to Benicia. The region has historically cooperated in this

regard to collectively maintain the interdependent urban and agricultural economies of the region.

The general types of transfers or exchanges that the City can continue to use, if needed, are summarized below:

- **Core Transfers** make water available through multi-year contracts that convey a specific amount of water to the purchaser each year. The specific conditions depend on the agencies involved and contract terms. An example would be a transfer of SWP long-term water supply (Table A) contract water from an agricultural contractor to urban uses.
- **Spot Transfers** make water available for a limited duration (typically one-year or less) through a contract executed during the year of delivery. Some examples of spot transfers are the State Drought Water Bank in the critically dry year of 1991, the State's voluntary water purchase program in 2001, and Benicia's short-term agreements with the Solano Irrigation District.
- **Option Transfers** are multi-year contracts that allow the purchaser to obtain a specified quantity of water at some future date. They usually require a minimum payment for water even if the water is not needed in a given year. An option or "take" price is established in years water is drawn.
- **Storage Agreements** allow one entity to lease or purchase storage in another entity's surface or groundwater storage facility. An example is Benicia's storage agreement for Solano Project water.
- **Water Exchanges** are agreements that allow two agencies to exchange water from one source for water from another source, typically during the same year. Exchanges can also occur with the same source where one agency exchanges its right to take water at a given time from the source with another agency, and then can take the water from the source at another time. Exchanges can also involve storage agreements. An example is Benicia's participation in the Mojave Banking and Water Exchange.

#### 4.4.2 Desalination

Desalination involves removing salts and impurities from seawater or non-potable surface water or groundwater using treatment technologies such as reverse osmosis membranes or distillation methods. After treatment, the water is suitable for all drinking water purposes.

There are potential opportunities for development of desalinated water from the Carquinez Strait, which is located adjacent to the City, or perhaps from brackish (non-potable) groundwater if the hydrogeology in the area is suitable. However, feasibility studies would be needed to evaluate its cost-effectiveness relative to other sources.

Desalination facilities are costly to construct and operate relative to the City's current supply sources. There are also significant environmental and permitting issues associated with disposal of brine from the treatment process. Alternatives would need to be investigated for discharging brine into the Bay that would not have adverse environmental effects.

At this time, the City is participating in regional planning that is considering desalination. SCWA's regional Integrated Water Management Plan identifies desalinating Carquinez Strait water as a long-term action to develop new permanent water supply for Solano County. Potential locations include offshore of Benicia and Vallejo. Currently, there are no planned desalination projects in Solano County. Such projects could be pursued by SCWA if grant funding becomes available or other actions are taken to improve the economics of such projects.

The City does not need to develop a local desalination supply to meet its supply needs, although it may be considered as a potential local emergency supply source, as discussed in Section 9. Implementation of a desalination supply would be a long-term project requiring an additional feasibility study and evaluation to determine its cost-effectiveness.

#### **4.4.3 Potential Future Water Supply and Storage Opportunities**

SCWA's Integrated Regional Water Management Plan, with the City as a participant, includes a high priority action to work with the Department of Water Resources and other agencies to explore water supply and storage opportunities that could increase the reliability of Solano County's water supplies. Storing water in wet years for later use in drier years would help Solano water agencies maintain reliable water supplies. Storage could be in the form of groundwater banking (groundwater storage) or surface water storage. The City participates in these regional planning efforts through the SCWA.

The Integrated Regional Water Management Plan includes a high priority item to identify opportunities for conjunctive groundwater use as a means of increasing water supply and reliability. Conjunctive use projects integrate the use of groundwater and surface water. The surface water provides supplies to local users and recharges the groundwater basin in normal or wet years. Groundwater in storage then provides supply during drier years when surface supplies are reduced. Agencies within the County with good groundwater resources would use groundwater during dry years, which would free up more surface water for those agencies that have poor quality groundwater, such as the City of Benicia.

SCWA's Integrated Regional Water Management Plan also identifies new surface water storage within Solano County as a potential long-term option to help meet future demands by storing water during normal-to-wet years when water is available so that the stored water would be available during drier years when other supplies, such as the SWP, are reduced. Additional evaluations are needed to determine

whether such facilities are feasible. For example, the idea of using Delta Islands as surface storage sites has been discussed; however, there are major issues with respect to levee stability/vulnerability and seepage. This potential supply option would be investigated as part of the regional water management planning efforts that include the City as an active participant.

# Section 5

## Recycled Water

Section 5 provides a summary of the City of Benicia's wastewater facilities, wastewater flows, and recycled water use within the service area.

### 5.1 Wastewater Generation, Collection, and Treatment

The City provides wastewater collection, treatment, and disposal services to customers within its service area.

#### 5.1.1 Wastewater Collection System

The City's wastewater collection system consists of approximately 150 miles of pipelines and 24 lift stations. The majority of the collection system relies on gravity flow through the pipelines. Due to terrain restrictions, it also relies on the 24 pump stations to transport the collected wastewater from low points to suitable locations for continued transmission by gravity.

#### 5.1.2 Wastewater Treatment Plant

The City operates and maintains a 4.5 million gallons per day wastewater treatment plant (WWTP) facility located on 7 acres of land at the south end of East 5<sup>th</sup> Street. The WWTP provides secondary treatment to domestic, commercial and industrial wastewater. The facility receives flows from two main service areas: the predominantly residential area located west of the plant and the predominantly industrial area located east of the plant.

The untreated wastewater enters the WWTP headworks from two main gravity sewer pipelines and a third wet weather gravity interceptor pipeline. Flow entering the facility is screened to remove larger objects. Flow then goes through primary sedimentation, solids treatment, and secondary sedimentation to remove small particles and contaminants. Flow is disinfected prior to disposal of the treated effluent.

The treated effluent is discharged into the Carquinez Strait. The effluent discharge is authorized through a permit issued by the California Regional Water Quality Control Board under the National Pollutant Discharge Elimination System.

#### 5.1.3 Historical and Projected Wastewater Flows

Currently, average dry weather flow of about 3 million gallons per day (mgd) is treated at the wastewater plant. The average dry weather flow at the plant is generated primarily from indoor water uses.

Ultimately, the average dry weather flow is anticipated to increase to approximately 3.2 mgd based on the growth in treated water use identified in Section 3. As discussed

in Section 2, the City is close to buildout, so the future increase in wastewater flow is expected to be small.

## 5.2 Recycled Water Use within Service Area

The City and the Valero Refinery are partnering on a project to supply recycled water to the refinery. This project is a significant effort by the City to implement recycled water supply for its service area. Upon completion, the project will divert a large fraction of the City's treated wastewater to the refinery for industrial uses on a year-round basis.

The most feasible and largest potential application of recycled water identified at the refinery is the cooling towers, although other potential refinery applications include boiler feed water. Significant progress has been made to date in determining water quality requirements, evaluating impacts on the City's and refinery's discharge permit compliance, and identifying a treatment process design.

The recycled water will be treated to meet California Title 22 water quality requirements for unrestricted access reuse. In addition, the treatment must address the refinery's high water quality and operational requirements, especially with respect to mineral content (ammonia, hardness, chloride, and silica).

The recycled water supply of approximately 2,240 AF/year will offset roughly half of the refinery's current demand on the City's water supply. This unused supply will then be available for use by City residents and businesses, most importantly lessening impacts during periods of water supply reductions, such as major droughts.

Construction of the recycled water facilities is scheduled to be completed in 2009, with delivery of recycled water commencing by 2010.

# Section 6

## Water Supply Reliability

Section 6 discusses the reliability of each of the City’s supply sources that are identified in Sections 4 and 5, provides estimates of the available supply for normal and dry years, and discusses water quality impacts on reliability. Section 7 compares the supply and demand projections.

### 6.1 Summary of Supply Availability

Table 6-1 summarizes the reliability and amount available from each of the City’s supply sources for a normal year, single dry year, and multiple dry years. The state guidelines require that the plan consider at least 3 consecutive dry years, but leaves determination of the specific length to the individual water agency.

The reliability percentages shown in Table 6-1 are the percentage of the City’s full amount by contract or water rights that is anticipated to be available to the City for each condition at buildout. Table 4-1 in Section 4 shows the full contract/water rights amounts for surface water supply. Section 5 describes the recycled water supply. The basis for the reliability percentages for each of the sources is discussed in the following sections.

**Table 6-1**  
**Supply Availability at Buildout (2020) during Normal, Single Dry and Multiple Dry Years**

| Source                                   | Normal Year     |                       | Single Dry Year   |                  | Multiple Dry Years <sup>(1)</sup><br>(4-Year Period) |                  |
|--|-----------------|-----------------------|-------------------|------------------|--|------------------|
|  | Reliability (%) | Amount (AF/year)      | Reliability (%)   | Amount (AF/year) | Reliability (%)                                      | Amount (AF/year) |
| Lake Herman                              | 100             | 500                   | 0                 | 0                | 0  | 0                |
| State Water Project                      | 90              | 14,468 <sup>(2)</sup> | 61 <sup>(3)</sup> | 9,806            | 44 <sup>(3)</sup>                                    | 7,073            |
| Water Rights Settlement                  | 72              | 7,560                 | 72                | 7,560            | 70   | 7,350            |
| Vallejo Agreement (Solano Project Water) | 99              | 1,089                 | 98                | 1,078            | 92   | 1,012            |
| Mojave Exchange                          | 0               | 0                     | 0                 | 0                | 100  | 1,875            |
| Recycled Water <sup>(4)</sup>            | 100             | 2,240                 | 100               | 2,240            | 100  | 2,240            |
| <i>Total</i>                             |                 | 25,357                |                   | 20,684           |  | 19,550           |

<sup>(1)</sup> The City defines a multiple dry year period as 4 consecutive dry years. The City’s wholesaler (SCWA) uses a 6-year period. If the City uses a period of 6 consecutive dry years, this reduces the SWP reliability to 39%, and the total supply to 18,746 AF/year, which is more than the buildout demand (see Section 7).

<sup>(2)</sup> The 100% supply contract amount for SWP water is 16,075 acre-feet per year for purposes of this UWMP, which conservatively assumes that Rio Vista and Dixon build facilities to take SWP water by 2016. This amount would be available only during wet or very wet years. During a normal year, 90% of the contract amount is anticipated to be available.

<sup>(3)</sup> Even if the City were to only get 9 percent of its SWP amount, which is the worst case single dry year on record, it would be an additional cutback of 5,626 AF per year, which could still be accommodated with its planned supply.

<sup>(4)</sup> Recycled water is a future supply and will be available after 2010. Section 5 describes the recycled water supply.

The City defines a multiple dry year period as 4 consecutive dry years. The City's previous plan used 3 consecutive years; to be conservative, this plan uses 4 years. The longest dry period on record from 1906 in DWR's Sacramento Valley Index has been 6 consecutive years (1929-1935, 1987-1992). It should be noted that the City has adequate supply to meet buildout demand even for a 6-year drought (see Footnote 1 of Table 6-1).

## 6.2 Reliability of Supply Sources

### 6.2.1 State Water Project

The biggest issue with SWP supply is dry year reliability. SWP contracts specify that all SWP contractors be reduced proportionally when there is a shortage.

When the SWP was first envisioned, it was assumed that the water supply would be very reliable. Additional dams and reservoirs were to be built to meet the ultimate contractual demand of its contractors. However, in previous dry years, and even many normal years, it has not been able to deliver its full contractual amount due to fishery and water quality constraints in the Delta.

The endangered species, delta smelt, spawns in Barker Slough, which is the pumping plant intake for the North Bay Aqueduct that conveys SWP water to Solano County agencies. In order to protect larval delta smelt, the U.S. Fish and Wildlife Service imposes pumping restrictions on the North Bay Aqueduct from time to time when larval delta smelt are present. These pumping restrictions have not impacted the annual availability of SWP water because the North Bay Aqueduct water can be used at other times of the year. Agencies can use other supplies during the time when pumping restrictions are needed to avoid impacting the delta smelt.

In 2002, as a result of the Monterey Settlement Agreement, the DWR prepared an extensive report entitled "The State Water Project Delivery Reliability Report". The report provides a thorough historical analysis of the delivery capabilities of the SWP supply. There are many variables that affect SWP deliveries including regulatory standards, operating rules, reservoir carryover supplies, demand in services areas, and precipitation. The DWR analyses incorporate these variables.

The 2002 analyses were updated by DWR in draft form in early 2005 in a "Notice to State Water Project Contractors" dated May 25, 2005. The updated information from DWR was used as the basis for the reliability analysis of the City's SWP supply.

The City's reliability analysis uses a similar methodology as SCWA, the wholesale provider, with the exception that the City uses a 4-year multiple dry period rather than a 6-year period. This methodology is based on DWR's recommendation to use the results of Studies 6 and 7 in the May 25, 2005 Notice. DWR provided the SWP deliveries as a percentage of the full amount for each year of the historical record. Each year was classified using the Sacramento Valley Water Year Index (also known

as the 40/30/30 index) into a wet, normal, or dry year. Using this information, the average SWP delivery capability for each condition was calculated.

The reliability factors are shown below. Appendix F provides the derivation of these reliability factors.

| <i>Condition</i>   | <i>State Water Project Reliability (% of entitlement)</i> |                  |
|--------------------|---|------------------|
|                    | <i>2001/2005</i>  | <i>2020/2025</i> |
| Normal Year        | 81%   | 90%              |
| Single Dry Year    | 64%   | 61%              |
| Multiple Dry Years | 44%   | 44%              |

As a sensitivity analysis, the SWP supply reliability analysis also considered the impact of the worst case single dry year on record, which had a reliability percentage of 9 percent. The results of this sensitivity analysis showed that the City’s planned supply is adequate even under this worst case condition (see Footnote 3 of Table 6-1 and Footnote 2 of Table 7-1).

Additionally, the reliability analysis for the City’s SWP supply assumes that Rio Vista and Dixon claim their entitlement and therefore the City’s full contract amount is only 16,075 AF/year. If Rio Vista and Dixon do not build the required facilities by 2016, the full contract amount will remain at 17,200 AF/year. To be conservative, the reduced amount is used in this plan.

The SWP is making some efforts to increase its water supply reliability, but only marginal improvements are anticipated due to high costs and environmental constraints. Most SWP contractors are developing their own projects to augment SWP supplies. In recent years, the SWP has modified its operating rules to encourage local projects to stretch SWP water supplies, such as those measures included in the “Monterey Amendments” which would allow modifications to contract provisions to enable more efficient use of statewide supplies.

Many of the ways to increase SWP supply are tied to statewide water issues. The California Bay Delta Authority (CALFED) is addressing plans to enhance ecosystem restoration, increase water supply, promote efficient water use, improve water quality, and improve Delta levees. CALFED has been hampered in implementation of its program due to lower than expected levels of funding, in particular from the federal government. The controversial nature of water issues in California makes it difficult to implement projects that benefit SWP water supply.

## 6.2.2 Water Rights Settlement

Settlement water is conveyed through the NBA when capacity is available and delivered to the City in the same manner as SWP water. The City can preferentially use settlement water during the periods when it is available and NBA capacity is available.

The City conducted an analysis based on the CAL\_SIM model to determine the delivery capability for settlement water over the same period of historical record as for the SWP deliveries. The analysis included constraints in NBA delivery capacity and deliveries to other agencies receiving settlement water.

Based on this analysis, the reliability factors for the City's settlement water are shown below. The City can preferentially use its settlement water, even during multiple dry years, at 70 percent of its full entitlement. Appendix G contains a description of the reliability analysis for settlement water availability.

| <i>Condition</i>   | <i>Settlement Water Reliability at Buildout<br/>(% of entitlement)</i> |
|--------------------|--|
| Normal Year        | 72%  |
| Single Dry Year    | 72%  |
| Multiple Dry Years | 70%  |

## 6.2.3 Lake Herman

Lake Herman was assumed to have no runoff from its watershed, which is no water supply yield, during dry years. Therefore, its reliability during single or multiple dry years is considered to be zero.

However, Lake Herman does serve as an emergency storage reservoir for the City, if there is water already stored in the lake. As discussed in Section 4.2, excess supply conveyed to the City's treatment plant from the NBA is diverted into the lake if not needed to meet the City's demands. Its use for emergency supply is discussed further in Section 8.

## 6.2.4 Vallejo Agreement (Solano Project Water)

Historically, the City has never experienced cutbacks on Solano Project water from Lake Berryessa received through their Vallejo Agreement. For the Solano Project, the full contract amount is delivered to its member agencies, including Vallejo, unless it is physically impossible to do so due to low lake levels.

The Solano Project member agencies have agreed to reduce deliveries based upon storage levels in Lake Berryessa. Once the storage level drops below 800,000 AF, as measured on April 1, 95 percent of the contract amounts are delivered with 5 percent

being stored in the reservoir as carryover. If the reservoir drops below 550,000 AF by April 1, 90 percent can be delivered and 10 percent is stored as carryover.

SCWA provided an analysis of reliability of Solano Project supply based on lake levels during the historical period of record from 1906 through 1993. Appendix H contains a copy of the SCWA reliability estimates for the Solano Project. The reliability factors are shown below.

| <i>Condition</i>   | <i>Solano Project Reliability (% of entitlement)</i> |                 |
|--------------------|--|-----------------|
|                    | <i>Current</i>                                       | <i>Ultimate</i> |
| Normal Year        | 99%  | 99%             |
| Single Dry Year    | 99%  | 98%             |
| Multiple Dry Years | 96%  | 92%             |

The main factor affecting Solano Project reliability is the frequency of long droughts which could result in major drawdown of Lake Berryessa. Environmental issues have been addressed in a legal settlement regarding downstream flows from the Solano Project with respect to instream flows in lower Putah Creek, and the settlement has been ratified by the State Water Resources Control Board.

### 6.2.5 Mojave Banking and Water Exchange

The City currently has stored 15,000 AF with Mojave. Per the agreement, one-half of the banked storage is available to the City, or 7,500 AF. The City intends to reserve this storage for use during dry years when other supplies are not available.

For the reliability analysis, the amount of available water was divided by the number of drought years to determine the amount of annual supply. It was also assumed that the City will replenish withdrawn water to maintain the available amount. It is also assumed that the 10-year withdrawal requirement will be extended to avoid having to take water if not needed for droughts.

### 6.2.6 Recycled Water

The City will have the ability to provide 2,240 AF of recycled water annually to the Valero refinery by 2010. The reliability analysis assumes this supply source to be 100 percent reliable during normal and dry years. Although water consumption will decrease during prolonged drought periods, the reduction will primarily affect the amount of water used in outdoor landscape irrigation. The annual recycled supply is based on the average dry weather flow, which are primarily indoor uses. The amount of water returned to the wastewater collection system and treatment facility will remain fairly constant during drought conditions.

## 6.3 Water Quality

Water quality from the Solano Project (Lake Berryessa) is good for municipal and industrial uses. Much of its watershed is in a natural state, although there is some urban and agricultural development. No water quality degradation is expected that would impact its reliability.

Delta water from the NBA is generally of lesser quality and requires more treatment than water from the Solano Project. Poor NBA water quality particularly occurs in the winter when runoff from the Barker Slough watershed is pumped into the NBA. During the winter months, especially after heavy rain, water supplied from the NBA can be very turbid with high total organic content from grazing lands and low alkalinity, which make it difficult to treat effectively.

Although NBA water quality is an important issue, it does not significantly impact the reliability of the City's water supply. The City has taken measures to address water quality issues both operationally and with treatment plant improvements. The City currently uses its better quality Solano Project water from Vallejo to blend with NBA water during parts of the year that NBA water quality is poor. In addition, the City is currently implementing significant modifications at its water treatment plant to increase its reliability, flexibility, and redundancy so that it can effectively treat NBA water all year, and stay in compliance with current and anticipated water quality regulations.

As part of SCWA's Integrated Water Management Plan efforts, with the City as a participant, several regional actions have also been taken. SCWA has implemented best management land use practices in the Barker Slough watershed, primarily to reduce erosion from livestock grazing and other sources, which would reduce turbidity in the winter runoff season. Alternative treatment studies have been conducted to determine if there are more effective treatment technologies to improve water quality. In addition, SCWA has completed a feasibility study to determine if an alternate intake for the NBA could be constructed at a different location closer to the Sacramento River to improve the quality and reliability of NBA water. SCWA, as part of the regional planning efforts, is currently evaluating the cost of implementing these various measures to reduce water quality impacts.

# Section 7

## Supply and Demand Comparison

Section 7 summarizes the supply and demand projections for existing and future land use conditions within the City service area. Assumptions used in the projections are presented in Sections 3 through 6 of this report.

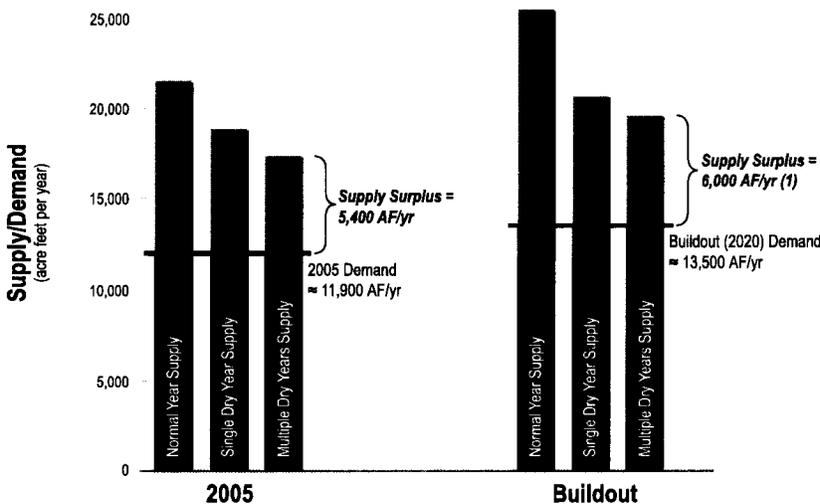
### 7.1 Summary Comparison

Table 7-1 and Figure 7-1 summarize the comparison of supply and demand at 2005 and buildout (2020) for a normal year, single dry year, and multiple dry years. The City has adequate existing supply sources to meet future needs under all conditions, and does not need to obtain additional supply sources.

|   | 2005        |                                |                    | Buildout (2020) |                                |                    |
|---|-------------|--------------------------------|--------------------|-----------------|--------------------------------|--------------------|
|   | Normal Year | Single Dry Year <sup>(2)</sup> | Multiple Dry Years | Normal Year     | Single Dry Year <sup>(2)</sup> | Multiple Dry Years |
| Supply <sup>(1)</sup>                                       | 21,670      | 18,937                         | 17,354             | 25,357          | 20,684                         | 19,550             |
| Demand  | 11,897      | 11,897                         | 11,897             | 13,527          | 13,527                         | 13,527             |
| Surplus of Supply<br>(Difference between Supply and Demand) | 9,773       | 7,040                          | 5,457              | 11,830          | 7,157                          | 6,023              |

<sup>(1)</sup> 2005 supply does not include recycled water. Recycled water supply will be available starting in 2010, so it is included in the buildout supply.

<sup>(2)</sup> Even if the City were to only get 9 percent of its SWP amount, which is the worst case single dry year on record, it would be an additional cutback of 5,626 AF/year, which could still be accommodated with its planned supply.



(1) Supply surplus increases at buildout due to future recycled water supply.

**Figure 7-1**  
Comparison of Supply and Demand

The City has a variety of sources that can be flexibly operated to meet changing conditions and optimize its use of the various sources. The supply surplus is based on an assumed reduced SWP contract amount of 16,075 AF/year if Rio Vista and Dixon take North Bay Aqueduct water by 2016, rather than the City's full contract amount of 17,200 AF/year. In addition, the demand projections assume a continuation of current conservation measures, and do not assume additional future conservation savings.

The City's supply surplus incorporates a factor of safety that will allow it to meet unusually severe cutbacks. For example, the worst case delivery of SWP water during any single year of historic record was 9 percent of the contracted amounts. If the City were to only get 9 percent of its SWP amount rather than the assumed 44 percent, it would be an additional cutback of 5,626 AF/year, which could still be accommodated with its current supply.

## 7.2 Comparisons by 5-Year Increments

Tables 7-2, 7-3, and 7-4 compare the supply and demand projections by 5-year increments to 2030 for a normal year, a single dry year, and multiple dry years.

| <b>Table 7-2</b><br><b>Normal Year Comparison</b><br><b>of Supply and Demand Projections, AF/year</b> |              |               |               |               |               |               |
|---|--------------|---------------|---------------|---------------|---------------|---------------|
|   | <b>2005</b>  | <b>2010</b>   | <b>2015</b>   | <b>2020</b>   | <b>2025</b>   | <b>2030</b>   |
| Supply  | 21,670       | 25,357        | 25,357        | 25,357        | 25,357        | 25,357        |
| Demand  | 11,897       | 12,440        | 12,984        | 13,527        | 13,527        | 13,527        |
| <i>Surplus of Supply<br/>(Difference between<br/>Supply and Demand)</i>                               | <i>9,773</i> | <i>12,917</i> | <i>12,373</i> | <i>11,830</i> | <i>11,830</i> | <i>11,830</i> |

| <b>Table 7-3</b><br><b>Single Dry Year Comparison</b><br><b>of Supply and Demand Projections, AF/year</b> |              |              |              |              |              |              |
|---|--------------|--------------|--------------|--------------|--------------|--------------|
|   | <b>2005</b>  | <b>2010</b>  | <b>2015</b>  | <b>2020</b>  | <b>2025</b>  | <b>2030</b>  |
| Supply  | 18,937       | 20,684       | 20,684       | 20,684       | 20,684       | 20,684       |
| Demand  | 11,897       | 12,440       | 12,984       | 13,527       | 13,527       | 13,527       |
| <i>Surplus of Supply<br/>(Difference between<br/>Supply and Demand)</i>                                   | <i>7,040</i> | <i>8,244</i> | <i>7,700</i> | <i>7,157</i> | <i>7,157</i> | <i>7,157</i> |

| <b>Table 7-4</b>  |              |              |              |              |              |              |
|---|--------------|--------------|--------------|--------------|--------------|--------------|
| <b>Multiple Dry Years Comparison</b>                                    |              |              |              |              |              |              |
| <b>of Supply and Demand Projections, AF/ year</b>                       |              |              |              |              |              |              |
|   | <b>2005</b>  | <b>2010</b>  | <b>2015</b>  | <b>2020</b>  | <b>2025</b>  | <b>2030</b>  |
| Supply  | 17,354       | 19,550       | 19,550       | 19,550       | 19,550       | 19,550       |
| Demand  | 11,897       | 12,440       | 12,984       | 13,527       | 13,527       | 13,527       |
| <i>Surplus of Supply<br/>(Difference between<br/>Supply and Demand)</i> | <i>5,457</i> | <i>7,110</i> | <i>6,566</i> | <i>6,023</i> | <i>6,023</i> | <i>6,023</i> |

# Section 8

## Water Demand Management Measures

Section 8 summarizes how the City is addressing each of the 14 demand management measures identified in the Urban Water Management Planning Act.

### 8.1 Overview of Implementation Status

The City has continuously implemented a water conservation program since 1991. The City is a signatory to the Memorandum of Understanding Regarding Urban Water Conservation in California through the California Urban Water Conservation Council (CUWCC).

The City is only required to implement those measures that are found to be cost-effective (those with a benefit-cost ratio greater than 1). The measures that are not fully implemented are not cost effective. In some cases, the City has partially implemented some measures, even though they are not cost effective.

Table 8-1 lists each of the Demand Management Measures (DMM) and their current implementation status.

| <b>DMM</b>  | <b>Implementation Status</b>                           |
|---|--|
| 1—Interior and Exterior Residential Water Audits              | Not implemented - not cost effective                   |
| 2—Residential Plumbing Fixture Retrofits                      | Partially implemented although not cost effective      |
| 3—Water Delivery System Audits                                | Fully implemented                                      |
| 4—Metering with Commodity Rates                               | Fully implemented                                      |
| 5—Large Landscape Conservation                                | Partially implemented – although not cost effective    |
| 6—High-Efficiency Washing Machine Rebates                     | Not implemented – not cost effective                   |
| 7—Public Information  | Fully implemented                                      |
| 8—School Education  | Fully implemented                                      |
| 9—Commercial, Industrial and Institutional Water Conservation | Partially implemented – although not cost effective    |
| 10—Wholesale Agency Assistance                                | Not applicable - the City is not a wholesale supplier. |
| 11—Conservation Pricing                                       | Fully implemented                                      |
| 12—Conservation Coordinator                                   | Fully implemented                                      |
| 13—Waste Water Prohibition                                    | Fully implemented                                      |
| 14—Ultra Low Flow Toilets                                     | Partially implemented although not cost effective      |

Appendix I contains the City’s most recent annual reports to CUWCC regarding implementation of the demand management measures. The City has applied for an exemption from implementing those measures that would not be cost-effective overall when total program benefits and costs are considered (i.e., those measures that have a benefit-cost ratio less than 1). Appendix J provides a cost-effectiveness analysis of the

demand management measures that the City is not fully implementing, in support of the City's exemption request.

For the cost-effectiveness analysis, the value to the City of saved water (benefit) was based on the avoided cost to acquire, treat, and distribute water. In the case of indoor water savings, the valuation also includes the avoided cost to collect, treat, and dispose of wastewater. An estimate of the City's incremental cost of supply was derived by identifying the supply source with the highest avoidable cost to the City. The variable costs of treatment, distribution and, when appropriate, wastewater treatment was then added to get the incremental cost of water supply.

The cost effectiveness analysis also considered potential energy savings from implementation of the demand management measures. The effect of energy savings on the City's cost of water was not significant, since many costs are fixed and the amount of water saved is a small percentage of the total demand. However, the analysis found that some measures may provide customers with significant energy savings, e.g., lower PG&E bills from reduced use of hot water. The discussion in this section highlights those measures with respect to potential linkages with PG&E energy efficiency programs.

Below is a summary description of the demand management measures.

## **8.2 Fully Implemented Measures**

The City currently has fully implemented Demand Management Measures 3, 4, 7, 8, 11, 12, and 13.

### **8.2.1 System Water Audits, Leak Detection and Repair (DMM 3)**

This measure requires water suppliers to conduct audits of the water system consistent with American Water Works Association (AWWA) guidelines if unaccounted-for water exceeds 10 percent. Prior to the 2001 Urban Water Management Plan, unaccounted for water in the City averaged over 10 percent historically. Since that time, the City has instituted a service line replacement program to replace failing plastic service lines. The City also has a water line replacement program aimed at replacing undersized and aging infrastructure. Due to these programs, the City has achieved the 10 percent threshold for unaccounted-for losses. Therefore, the City is not required to conduct audits.

### **8.2.2 Metering with Commodity Rates (DMM 4)**

The City has been fully metered since 1962. Customer billing is based on volume of use. The City's current rate structure is an increasing block rate design.

### **8.2.3 Public Information Programs (DMM 7)**

The City maintains an active public information program. This program addresses water supply, water quality, and water use efficiency issues. Information outreach

includes periodic bill inserts addressing water use efficiency, distribution of conservation pamphlets and irrigation booklets, and distribution of conservation information at community events. During periods of reduced surface water deliveries, the City increases public outreach and dissemination of conservation information.

#### **8.2.4 School Education Programs (DMM 8)**

The City offers a Water Education Program for grades 3 through 5. This program includes classroom presentations; field trips to the City's water and wastewater treatment plants, local reservoir, and wetlands; and public library displays. Topics covered by the program include water conservation, pollution prevention, and water quality. The City has hired professional teaching staff to conduct the classroom presentations and field trips.

#### **8.2.5 Conservation Pricing (DMM 11)**

Volumetric charges are based on measured use and follow an increasing block schedule for all classes of service. Rates for wastewater service are volumetric for commercial and industrial customer classes according to an increasing block schedule, and are non-volumetric flat rates for residential sewer customers. Overall, the City's rate structure meets the DMM requirements.

#### **8.2.6 Conservation Coordinator (DMM 12)**

The City has a designated water conservation coordinator. The water conservation coordinator is responsible for developing and implementing the City's conservation programs and initiatives.

#### **8.2.7 Water Waste Prohibition (DMM 13)**

The City has an ordinance for emergency water conservation planning that incorporates water waste prohibitions consistent with implementation of DMM 13. These prohibitions include: not allowing treated water runoff to gutters, ditches, drains; failure to repair controllable leaks; no washing sidewalks, driveways, parking lots or other paved areas; no water from hydrants except fire fighting.

The current ordinance does not specifically prohibit single pass cooling systems in new connections, or non-recirculating systems in new car washes and laundry systems. However, the current ordinance specifies maximum residential and non-residential water use by shortage stage that effectively eliminates non-essential uses.

Section 9 contains a more detailed discussion of the current water waste prohibitions, and proposed changes to the ordinance to include additional prohibitions.

## 8.3 Partially Implemented Measures

The City has partially implemented Demand Management Measures 2, 5, 9 and 14; although they are not cost effective as documented in Appendix J. Although not cost-effective, the City may consider some additional future limited actions even though not required to implement these measures. Based on input from the City’s Task Force, several potential actions have been identified for further evaluation over the next five years to determine if the non-economic benefits warrant implementation.

### 8.3.1 Residential Plumbing Retrofit (DMM 2)

The purpose of this measure is to make available low-flow showerheads, aerators, toilet displacement devices, and other water savings fixtures or devices to single- and multi-family residences constructed prior to 1992 when building standards were modified to require water saving fixtures in new construction. This measure would require that the City distribute these devices to not less than 10 percent of their single- and multi-family customers every two years until such time the City can demonstrate that at least 75 percent of residences constructed prior to 1992 have been retrofitted.

City analyses have indicated the cost to fully implement this program is much higher than the water savings costs. However, the City has periodically distributed free kits; first in 1991 during the last major drought, and infrequently since then when kits are available. Over time, it is anticipated that replacement with low water use fixtures will occur naturally as a result of normal maintenance and remodeling projects.

As summarized below, this measure is not cost effective for the City with a benefit-cost ratio of only 0.27. However, there are energy savings for customers in reducing hot water use that imply that this measure should be implemented by Pacific Gas & Electric (PG&E) through its energy efficiency programs. Based on input from the City’s Task Force, the potential actions identified below will be further evaluated over the next five years for implementation if the non-economic benefits to the City appear warranted. This measure is related to DMM 14 Ultra Low Flow Toilet Replacement, which is discussed below in Section 8.3.4.

|                        |   |
|------------------------|---|
| Description of DMM 2   | Distribute free kits of low-flow showerheads, aerators, toilet displacement devices   |
| Resources to Implement | City publicizes, purchases and distributes devices  |
| Water Savings          | 30 AF over 25 years<br>(1.2 AF per year on average)   |
| Benefit-Cost Ratio     | 0.27 to City<br>Benefit to homeowner from energy savings  |
| Potential Actions      | Include link to PG&E energy efficiency program in City conservation info?<br>Investigate potential regional funding for kits via SCWA?<br>Wait until normal maintenance or remodeling naturally results in retrofits? |

### 8.3.2 Large Landscape Conservation Programs (DMM 5)

This measure consists of two parts. The first part requires developing evapotranspiration (ET)-based water budgets for accounts with dedicated irrigation meters. The City currently has about 50 irrigation meters. The second part involves providing large landscape surveys to not less than 15 percent of commercial, industrial, and institutional accounts with mixed-use meters within 10 years of program initiation. For the 760 commercial/institutional and industrial meters in 2004, the City would need to provide approximately 12 large landscape water surveys annually for 10 years.

City analyses have indicated the cost to fully implement this program is much higher than the water savings costs. However, the City has undertaken actions even though the measure is not cost-effective.

The City's Water Efficient Landscape Standards were adopted December 15, 1992. They apply to all new landscaping for commercial, industrial, institutional, multi-family residential, public and private recreational/open space areas (common areas), roadways, medians, model home complexes, and all new landscaping for new single-family residential units where the landscaping is installed by the developer as part of the purchase price. Projects exempted from, but encouraged to use, these regulations as guidelines are rehabilitated landscapes, single family residential landscapes which are installed by the homeowner or builder of one single family unit, and any project with a landscaped area less than 2,500 square feet with the exception of projects zoned industrial which is exempted for landscaped area less than 5,000 square feet.

In addition, the City:

- Publicizes information on the landscape guidelines to the public and provides the guidelines to new development projects;
- Has installed an evapo-transpiration (ET) controlled irrigation system at the 50-acre community park to reduce irrigation water use. Funds saved from lower water use will be used to install similar systems at other parks.

As summarized below, this measure is not cost effective for the City with a benefit-cost ratio of only 0.64. Based on input from the City's Task Force, the potential actions identified below will be further evaluated over the next five years for implementation if the non-economic benefits to the City appear warranted.

|                               |  |
|-------------------------------|--|
| Description of DMM 5          | Develop landscape water budgets, conduct landscape surveys, technical assistance   |
| Resources Needed to Implement | Staff to develop and provide info, and conduct surveys; staff training on procedures   |
| Water Savings                 | 1,178 AF over 25 years<br>(47 AF per year on average)  |
| Benefit-Cost Ratio            | 0.64   |
| Potential Actions             | Continue converting parks to ET controlled irrigation as funds become available?<br>Review and update current landscape standards developed in 1992?<br>Develop landscape standards for projects exempted from current standards, e.g., single family homes, rehabilitated landscapes?<br>Install example drip system and landscaping at water treatment plant?<br>Publicize examples of drought tolerant landscaping?<br>Identify largest irrigation users and evaluate potential measures? |

### 8.3.3 Commercial, Industrial and Institutional Conservation Programs (DMM 9)

This measure requires water suppliers to provide facility water audits to not less than 10 percent of their commercial, industrial, and institutional customers within 10 years of program initiation. To meet this coverage requirement, the City would need to complete approximately seven audits annually for 10 years.

In 2004, a full audit of the Benicia Unified School District facilities was conducted by City staff working in conjunction with school district staff.

These water audits are essentially one-on-one public education efforts. Other agencies have found that the savings from water audits, whether commercial or residential, typically last for about a 3-year period, and then must be repeated due to owner/staff turnover. Instead of these individual audit efforts, the City has focused on group public education efforts.

As summarized below, this measure is not cost effective for the City with a benefit-cost ratio of only 0.55. Based on input from the City's Task Force, the potential actions identified below will be further evaluated over the next five years for implementation if the non-economic benefits to the City appear warranted.

|                               |  |
|-------------------------------|--|
| Description of DMM 9          | On-site water audits of at least 10% of commercial & industrial customers  |
| Resources Needed to Implement | Staff to arrange, conduct and follow-up on audits; staff training on procedures for various types of businesses                                |
| Water Savings                 | 19 AF over 25 years<br>(0.8 AF per year on average)  |
| Benefit-Cost Ratio            | 0.55   |
| Potential Actions             | Identify largest users for evaluation?<br>Investigate feasibility of contracting for outside services to conduct evaluations of largest users? |

### 8.3.4 Residential Ultra Low Flow Toilet (ULFT) Replacement Programs (DMM 14)

This measure requires water suppliers to implement a ULFT distribution program that is at least as effective as requiring retrofit of existing residential high-flow toilets with toilets rated 1.6 gallons per flush (gpf) or less upon property resale. Alternatively, suppliers can offer a toilet rebate to customers of at least \$100.

In 2004, the City implemented a pilot ULFT replacement program for a limited number of multi-family units. The program offered a \$100 rebate for each toilet that was replaced. The City contacted the complexes to request participation and provided information on the program. Rebates were provided to 13 units that were retrofit with new toilets.

As summarized below, this measure is not cost effective for the City with a benefit-cost ratio of only 0.66. Based on input from the City’s Task Force, the potential actions identified below will be further evaluated over the next five years for implementation if the non-economic benefits to the City appear warranted.

Over time, it is anticipated that replacement with low water use fixtures will occur naturally as a result of normal maintenance and remodeling projects.

|                       |   |
|-----------------------|---|
| Description of DMM 14 | City provides \$100 rebate for ULFT installation  |
| Water Savings         | 145 AF over 25 years<br>(6 AF per year on average)  |
| Benefit-Cost Ratio    | 0.66  |
| Potential Actions     | Investigate potential regional funding through SCWA?<br>Investigate feasibility of policy to have new development finance retrofit of existing fixtures in existing development?<br>Investigate feasibility of City partnering with local plumbing company to purchase large volume of ULFTs to sell at discount price?<br>Additional pilot efforts as part of overall public education program?<br>Wait until normal maintenance or remodeling naturally results in retrofits? |

## 8.4 Non-Implemented Measures

The City has not implemented Demand Management Measures 1 and 6, . These measures are not cost-effective as described in Appendix J; all have benefit-to-cost ratios less than 1. Although not cost-effective, the City may consider some limited actions even though not required to implement them. Based on input from the City’s Task Force, several potential actions have been identified for evaluation to determine if the non-economic benefits warrant implementation.

### 8.4.1 Water Survey Programs for Single-Family and Multi-Family Residential Customers (DMM 1)

This measure involves offering water conservation surveys to not less than 20 percent of single- and multi-family residential customers every two years, and completing surveys for not less than 15 percent of single- and multi-family residential customers within 10 years of program initiation. The City would need to complete more than 100 single-family surveys and over 50 multi-family surveys annually over the next 10 years.

These water audits are essentially one-on-one public education efforts. Other agencies have found that the savings from water audits, whether residential or commercial, typically last for about a 3-year period, and then must be repeated due to owner/staff turnover. Instead of these individual audit efforts, the City has focused on group public education efforts.

As summarized below, this measure is not cost effective for the City with a benefit-cost ratio of only 0.19. Based on input from the City’s Task Force, the potential actions identified below will be further evaluated over the next five years for implementation if the non-economic benefits to the City appear warranted.

|                        |   |
|------------------------|---|
| Description of DMM 1   | In-home surveys of single and multiple family residential customers   |
| Resources to Implement | Staff to arrange, conduct and follow-up on audits; staff training on procedures   |
| Water Savings          | 17 AF over 25 years<br>(0.8 AF per year on average)   |
| Benefit-Cost Ratio     | 0.19  |
| Potential Actions      | Include additional information on water bills to show how each customer’s use compares with the average use of other similar customers? |

### 8.4.2 High-Efficiency Washing Machine Rebate Programs (DMM 6)

This measure calls on water suppliers to offer cost-effective rebates to their customers for the purchase of high-efficiency washing machines. If the maximum cost-effective rebate is less than \$50 per machine, the supplier is not required to implement the measure. If 10 percent of the City’s residential customers participated in the program, over 775 rebates would be issued.

As summarized below, this measure is not cost effective for the City with a benefit-cost ratio of only 0.40. However, there are energy savings for customers in using high efficiency washers that imply that this measure should be implemented by PG&E through its energy efficiency programs. Based on input from the City’s Task Force, the

potential actions identified below will be further evaluated over the next five years for implementation if the non-economic benefits to the City appear warranted.

|                        |  |
|------------------------|--|
| Description of DMM 6   | Offer rebates (\$50 or more) for purchase of high efficiency washing machines  |
| Resources to Implement | City advertises program and provides rebates   |
| Water Savings          | 131 AF over 25 years<br>(5 AF per year on average)   |
| Benefit-Cost Ratio     | 0.40 to City<br>Benefit to homeowner from energy savings   |
| Potential Actions      | Include link to PG&E energy efficiency program in City conservation information?<br>Investigate potential regional funding through SCWA? |

# Section 9

## Water Shortage Contingency Plan

Section 9 describes the City's water shortage contingency plan to address potential catastrophic shortages of supply. The plan discusses temporary emergency water management actions, provides an estimate of the minimum supply over the next three years, and discusses potential revenue impacts and monitoring during shortages.

### 9.1 Purpose of Emergency Shortage Planning

The purpose of the water shortage contingency plan is to be prepared to impose temporary demand reductions in case available supply falls below the planned-for levels discussed in Sections 6 and 7. Supplies may be reduced below the planned levels due to such causes as extreme (worst case) drought conditions, unplanned outages of water supply facilities due to earthquakes or other major disasters, prolonged power outages, or any other catastrophic loss of supply.

The City of Benicia adopted its current Emergency Water Conservation Plan in September 1991 through an ordinance adding to the City Code, Title 13, Chapter 13.35. This ordinance provides for emergency water supply management related to general supply shortages due to severe droughts, infrastructure failure, or any other cause. While the current ordinance provides an adequate framework for managing supply shortages, it is in need of updating to reflect current conditions. The City's Task Force has provided input in recommending changes to the current ordinance, as described in this section.

The City also coordinates regionally through the Solano County Water Agency with respect to emergency water shortage planning and response, as well as integrated resource management. Section 9.5 further discusses this coordination.

### 9.2 Potential Catastrophic Events

The major catastrophic events that may affect the City's major water sources are extreme (worst case) drought, earthquake, power outage, contamination or landslide. Section 9.3 provides an estimate of the minimum supply based on the driest (worst case) three-year historical period. As indicated in Section 9.3, the City has adequate supply for the worst case three-year dry period.

Below is a brief summary of how catastrophic events, other than extreme drought, may affect the NBA and the Solano Project facilities, as provided by SCWA, the City's wholesale supplier of water through these regional supply facilities.

The NBA supplies water to the City from the SWP, settlement water, and Mojave Exchange water. Potential catastrophic outages may occur from earthquakes that cause major damage to the NBA facilities, prolonged loss of PG&E power required for

pumping water through the NBA, or contamination at the intake to the NBA. The NBA is an underground pipeline and not subject to landslide damage.

In the event of loss of NBA supply for any reason, the member agencies including the City would switch to Solano Project Water supplies while the emergency condition is being resolved and water supply restored. All the NBA water users have access to Solano Project supplies in emergencies.

The Solano Project supplies some water to the City under normal conditions, in addition to being an emergency supply source. In the event of an earthquake, the Solano Project Emergency Response Plan is invoked. The Plan, developed in coordination with the U.S. Bureau of Reclamation, provides a detailed response for various levels of seismic activities both at the dam site and within a specified geographical area surrounding the Solano Project.

The Putah South Canal is susceptible to a landslide which could either block or damage its ability to deliver Solano Project water. SCWA recently invested in a \$3 million project to provide an underground pipeline bypass of an area that is most susceptible to a landslide. Any detection of contamination of Solano Project water would result in a shut-down of the Solano Project deliveries. The Solano Project is a gravity system and is not dependent upon power to operate.

In the event of loss of Solano Project water, the City would shift to supplies delivered through the NBA including SWP water, settlement water, and Mojave Exchange water.

As future actions, the City could consider partnering with SCWA on a regional project to comprehensively assess the vulnerability of the regional facilities supplying the City with respect to seismic, flooding and other relevant issues. In addition, the City could undertake a seismic vulnerability assessment of its distribution system facilities. The City has already prepared and implemented a Vulnerability Assessment addressing security of the City's distribution system facilities. Depending on the outcome of such studies, improvements may be identified for implementation to increase system reliability during non-drought events. The City should work cooperatively with SCWA to investigate regional funding opportunities for measures to improve the reliability of key water supply facilities.

SCWA, on behalf of its member agencies, including the City of Benicia, has already undertaken a Barker Slough hydrodynamic study. The first phase of the effort concluded that both a hydrodynamic and water quality model of Barker Slough is feasible. The effort currently underway is the development of the model, including the water quality and flow-monitoring program necessary for calibration. This type of modeling is necessary to determine the sources of water being pumped at the NBA intake during different times of the year and different hydrologic conditions. It will also show how NBA water quality will be affected by changes in the Delta, such as levee failures.

While this effort was initiated prior to the current heightened interest in Delta levee failures after the recent Gulf Coast hurricane disaster, it is extremely timely and can be viewed as a companion effort to work underway by the State. In January, the State released a flood management report to the Legislature (the Table of Contents of this UWMP provides a reference web-link) that offers a set of strategies involving policy changes, program reforms, and funding proposals to better protect California from the devastating consequences and economic impacts caused by floods. Additionally, the Governor signed two bills – one directing the Department of Water Resources (DWR) and the Department of Fish and Game to study island subsidence, floods, earthquakes and other issues affecting the Delta and the other extending the Delta Flood Protection Fund for two years.

In November, the director of DWR appeared before a joint legislative committee and outlined the catastrophic impact a significant earthquake would have on Delta levees (see the Table of Contents for a web-link to the presentation). DWR modeled a 6.5 earthquake on a fault under the west Delta. The State’s modeling will be used to establish “boundary conditions” for evaluation as part of the SCWA’s Barker Slough hydrodynamic study.

In addition, the Association of Bay Area Governments (ABAG) provides numerous hazard planning resources on their website, including hazard maps showing areas prone to earthquake shaking, liquefaction, landslides, flooding and wildfires (see the Table of Contents of this report for the website link). ABAG is leading region-wide efforts for local hazard mitigation planning. The goal is to reduce and avoid risks from natural hazards. In March 2005, the ABAG Executive Board adopted a “Multi-Jurisdictional Local Government Hazard Mitigation Plan for the San Francisco Bay Area”. This plan provides an array of potential strategies to reduce risks involving infrastructure, health, housing, the economy, government services, education, the environment, and land use. Each city in the region, including the City of Benicia, is preparing an annex to the plan identifying specific strategies appropriate for its community. There are potential funding opportunities for implementation of local hazard mitigation projects.

### **9.3 Estimate of Minimum Supply for Next Three Years**

The UWMP is required to estimate the minimum water supply available during each of the next three water years based on the driest 3-year historic sequence for the agency’s water supply. Table 9-1 shows the driest 3-year sequence for the City’s water sources, and the availability of each source for the driest 3-year period.

**Table 9-1**  
**Minimum Supply Availability for Driest 3-Year Historic Sequence**

| <b>Supply Source</b>                                    | <b>Timeframe for Driest 3-Year Sequence</b>                             | <b>Availability over Driest 3-Year Sequence (%)</b> |
|---|---|---|
| Lake Herman   | Assumes 0 yield during dry years.                                       | 0   |
| State Water Project <sup>(1)</sup>                      | 1990-1993   | 27%, 26%, 35%                                       |
| Water Rights Settlement <sup>(1)</sup>                  | 1932-1934   | 68%, 59%, 64%                                       |
| Vallejo Agreement (Solano Project Water) <sup>(1)</sup> | 1932-1934   | 100%, 34%, 33%                                      |
| Mojave Exchange   | Not applicable – this source is banked for drought supply.              | 100%  |
| Recycled Water  | Not applicable – negligible impact on wastewater flow from indoor uses. | 100%  |

<sup>(1)</sup> The driest 3-year sequence from determined from the historical availability of SWP water, settlement water and Solano Project water. Appendices F, G, and H provide information on the historical availability of each of these sources. These are the 3 years with the lowest average availability for each source over the 3-year period.

Table 9-2 shows the estimated total minimum supply from all the City’s sources over the next three years based on the percentage availabilities in Table 9-1. This estimate is very conservative since it is based on the driest 3-year historic sequence for each water source, even though they did not all occur during the same period. It is unlikely that all sources would experience minimum deliveries at the same time.

Even under the worst case dry year conditions, the City would have adequate supply to meet their projected demand in the near-term without recycled supply, and at buildout with recycled supply. However, as required, the emergency plan still addresses up to a 50 percent cutback due to catastrophic events.

**Table 9-2**  
**Estimated Minimum Water Supply over Next Three Years**

| <b>Supply Source</b>                     | <b>Estimated Supply (AF/year)</b> |               |               |                                      |
|--|-----------------------------------|---------------|---------------|--------------------------------------|
|  | <b>Year 1</b>                     | <b>Year 2</b> | <b>Year 3</b> | <b>Normal Year</b>                   |
| Lake Herman                              | 0                                 | 0             | 0             | 500                                  |
| State Water Project                      | 4,340                             | 4,180         | 5,626         | 13,021                               |
| Water Rights Settlement                  | 7,140                             | 6,195         | 6,720         | 7,560                                |
| Vallejo Agreement (Solano Project Water) | 1,100                             | 374           | 363           | 1,089                                |
| Mojave Exchange                          | 2,500                             | 2,500         | 2,500         | 0 (for droughts or emergencies only) |
| Recycled Water <sup>(1)</sup>            | Not available until 2010.         |               |               |                                      |
| <b>Total</b>                             | <b>15,080</b>                     | <b>13,249</b> | <b>15,209</b> | <b>22,170</b>                        |

<sup>(1)</sup> Starting in 2010, the City will have an additional 2,240 AF/year of recycled water supply.

## 9.4 Priority by Use

When demand reductions are required due to supply shortages, priorities for potable water use must be considered. Priorities for demand reductions considered in the City's plan are discussed below:

- *First priority – maintain essential health and safety uses* (e.g., drinking, food preparation, sanitation, fire protection).

The minimum amount per person for drinking, food preparation, and sanitation ranges from 38 to 68 gallons per day per person, depending on whether there are water conserving fixtures. For a 3-person household, this would be equivalent to 114 to 204 gallons per day per dwelling unit.

- *Second priority – maintain the community's economic and jobs base.*

Some special categories, such as gasoline and diesel fuel manufacturing (e.g., Valero Refinery) are of statewide importance. A curtailment of petroleum fuel production due to water supply shortages would cause statewide economic impacts.

- *Third priority – discretionary/non-essential uses of existing customers.*

Many of the non-essential uses involve outdoor water for irrigating landscape, filling swimming pools, and other similar uses. Required demand reductions typically focus heavily on reducing outdoor uses. Prohibitions for irrigation sometimes differentiate between established trees and shrubs which represent a significant investment and may take 5- to 10- years to replace, versus annual landscaping which is a lesser investment and is easily replaced.

- *Fourth priority – new water service connections.*

During severe supply shortages, approval of new water connections would be delayed until the shortage was resolved.

## 9.5 Stages of Action

The Act requires water agencies to plan for varying levels of temporary or prolonged shortages of up to 50 percent of normal supplies regardless of whether it may or may not happen. The City's plan provides for five stages of implementation as shown in Table 9-3.

**Table 9-3  
Stages of Action**

| <b>Stage</b> | <b>Description</b>     | <b>Reduction</b> | <b>Type</b> | <b>Water Use Prohibitions</b> | <b>Penalties for Excessive Water Use</b> |
|--------------|------------------------|------------------|-------------|-------------------------------|--|
| 1            | Voluntary Conservation | 0                | Voluntary   | Yes                           | No                                       |
| 2            | Water Alert            | 10%              | Mandatory   | Yes                           | Yes                                      |
| 3            | Water Warning          | 25%              | Mandatory   | Yes                           | Yes                                      |
| 4            | Water Emergency        | 35%              | Mandatory   | Yes                           | Yes                                      |
| 5            | Water Crisis           | 50%              | Mandatory   | Yes                           | Yes                                      |

The City is always operating in Stage 1 Voluntary Conservation that provides public information/education to promote water conservation. Additional stages are implemented as needed. It is important to note that a reduction in a supply source, such as SWP water, does not necessarily trigger higher stages of action above Stage 1, since the City has many diverse sources and considerable flexibility to handle cutbacks. The overall supply available from all the City's sources is evaluated before higher stages are triggered, as appropriate for the specific conditions at the time.

Normal conservation conditions (Stage 1) are in effect anytime when shortage or emergency conditions are not in effect. Shortage conditions (Stages 2 and 3) will be in effect when there is a shortage requiring up to a 25 percent reduction in water use, either city-wide or in a subarea or user category within the City. Emergency conditions (Stages 4 and 5) will be in effect when there is a shortage requiring over a 25 percent reduction in water use, either city-wide or in a subarea or user category within the City. The City's Public Works Department monitors water supply and water use to determine whether a shortage or emergency condition is projected to occur and to estimate its anticipated magnitude.

Representatives from the City's Public Works Department meet monthly as an advisory committee with representatives from the Solano County Water Agency and its member agencies to coordinate about water issues, including whether it is a dry year or wet year as defined by DWR, and potential impacts on water supplies. The representatives meet more frequently, if conditions indicate the need to communicate more frequently than monthly, such as during water shortages or emergencies.

The City's Public Works Department reviews the projected water supply information on an ongoing basis and compares with projected demands, in order to determine if its primary water supply sources (SWP, water rights settlement, Vallejo agreement) will be sufficient to meet demands, or if supplemental water may be needed from the Mojave Exchange or Lake Herman. If the total projected supplies available to the City from all its sources are anticipated to be less than that needed to meet demands, then the City Public Works Department determines the percent shortage and takes actions

to implement the appropriate shortage or emergency stage according to the procedures specified in the City's Emergency Water Conservation Ordinance.

Water use prohibitions for each stage are discussed in Section 9.6. Section 9.7 discusses threshold levels at each stage for imposing penalties for excessive water use.

## 9.6 Emergency Preparedness

Section 9.5 describes the stages of action for the City's water shortage contingency planning, from a 10 percent up to a 50 percent cutback in water use, as required by the UWMP Act. These stages of action assume that there may be reduced supplies from the City's normal sources, under conditions that may be months in duration.

The City should also be prepared for a catastrophic event that would result in complete loss of supply from its normal sources. It is likely that a complete loss of supply would be short-term, lasting from a day to a week or so, until some reduced supply is restored from normal sources. As discussed in Section 9.2, the City as a cooperating agency should work through SCWA to investigate undertaking vulnerability studies of the regional water supply system in order to quantitatively assess the level of risk and potential duration and magnitude of catastrophic supply outages.

As part of its public education efforts, the City encourages individual preparedness and in-home storage of emergency water supply. The purpose of the in-home preparedness is to provide an immediately accessible supply for the first few days until some City supply was restored. Examples of such public information are available from ABAG, and from large water agencies in the Bay Area, such as the San Francisco Public Utilities Commission.

A catastrophic event, such as a major earthquake, would likely be a regional emergency. An emergency of the magnitude to cause complete loss of water supply would trigger the City's Disaster/Emergency Response Plan, and would involve regional coordination with other cities and the County to effectively address the emergency situation. A major disaster may also involve State and Federal agencies, as outlined in the Disaster/Emergency Response Plan.

The City has a comprehensive Disaster/Emergency Response Plan for the water and wastewater systems, as well as other City functions. This plan provides a broad-based framework that guides the overall City emergency response, of which water supply is one part. It includes operational provisions for handling water emergencies, including criteria for unsafe water alerts and boil water orders, emergency notification and operations procedures, transmission and distribution system checklists, and notification templates and procedures. The Disaster/Emergency Response Plan is updated periodically.

During catastrophic emergencies with complete loss of supply, only essential health and safety needs would be met. During such an event, businesses and households would not be operating as normal. For example, critical drinking water for sustaining life is estimated at 1 gallon per person per day by such organizations as the American Red Cross, Federal Emergency Management Agency, and California Office of Emergency Services. The appropriate level of critical emergency water and the method of distributing the water to residents is defined as part of the Disaster/Emergency Response Plan.

Public education is a key component of handling water shortages. If the emergency is such that the Disaster/Emergency Response Plan has been invoked, the emergency communication procedures set out in that plan would take precedence. In emergencies, notification will be given to residents using any means available to communicate this information (e.g., door-to-door) if typical means of communication are not available.

The City's current ordinance allows for declaration of water shortages by the City Manager upon recommendation of the Director of Public Works. Upon such declaration, the City will provide notification to the local media, post the shortage stage and applicable ordinance requirements on its website and mail notices to its customers in its next regular billing cycle. Additional information on regional and statewide water shortage conditions will be provided through a link on the City's websites to the DWR location for water supply information.

Lake Herman is a key component of the City's emergency supply, in the event of loss of NBA and Solano Project supplies. The City manages and operates Lake Herman as an emergency water supply. This emergency water supply is available locally for treatment assuming that the Lake Herman Pump Station is operational. The lake has a storage capacity of 1,800 acre-feet, which can provide a significant emergency supply on a short-term basis. For example, if Lake Herman were full, it could supply the City's current average day demand of about 10 million gallons per day for about 1.5 months with no demand reductions; and could provide supply for an even longer period with demand restrictions that would be in effect during a water shortage. The City should maintain the storage capacity of Lake Herman, and continue to manage it for emergency supply.

The City could also consider investigating the feasibility of and implementing other potential emergency source options, such as:

- Vendor contract mechanisms that could be implemented quickly to provide emergency bottled water, emergency water trucks (bulk water), and emergency water system repairs.
- Backup interconnection with Vallejo – potential for a new pipeline from a new development in the hills adjacent to City (Hiddenbrook). This interconnection would allow the City to obtain treated water from Vallejo.

- Desalination of non-potable water (e.g., Carquinez Strait, brackish or non-potable groundwater) – package units are available for reverse osmosis treatment in sizes ranging from 0.5 to 2.0 mgd modules).

## 9.7 Water Use Prohibitions

Table 9-4 summarizes the water use prohibitions contained in the current emergency water conservation ordinance. It also shows recommended modifications identified by the City Task Force.

| <b>Stage</b>                    | <b>Current Prohibitions</b>  | <b>Proposed/Recommended Prohibitions</b>  |
|---------------------------------|--|---|
| 1 – Voluntary Conservation      | <ul style="list-style-type: none"> <li>• No runoff from treated water system to gutter, ditch or drain.</li> <li>• Failing to repair controllable leaks.</li> <li>• Washing sidewalks, driveways, parking areas, tennis courts, patios or other paved areas (except as part of concrete curing during construction)</li> </ul> | <ul style="list-style-type: none"> <li>• Modify current prohibition as shown in italics: “Allowing water to run off <i>unused</i> to a gutter, ditch or drain.”</li> <li>• Add an exception for washing paved areas in case needed for health &amp; safety reasons.</li> <li>• Add following prohibitions:               <ul style="list-style-type: none"> <li>○ No use of hand-held hoses without automatic shut-off fixtures.</li> <li>○ No irrigation during rain.</li> </ul> </li> <li>• Add following prohibitions for new development:               <ul style="list-style-type: none"> <li>○ No single pass cooling connections.</li> <li>○ Require recirculating systems for commercial car washes and commercial laundries.</li> <li>○ Require recirculating systems for decorative fountains.</li> </ul> </li> </ul> |
| 2 – Water Alert (10%)           | All from Stage 1 plus the following: <ul style="list-style-type: none"> <li>• No water from hydrants except for fire fighting and other health &amp; safety purposes.</li> </ul>   | All from Stage 1 plus add the following: <ul style="list-style-type: none"> <li>• Restrict lawn watering and landscape irrigation only when necessary and only between 6 pm and 9 am.</li> <li>• Vehicle washing only with bucket or hand-held hose with automatic shut-off nozzle, or at commercial car wash.</li> <li>• Restaurant water served only upon request.</li> <li>• Non-potable water used for construction purposes unless health &amp; safety issue.</li> </ul>   |
| Stage 3 – Water Warning (25%)   | All from Stages 1 and 2  | All from Stages 1 and 2   |
| Stage 4 – Water Emergency (35%) | All from Stages 1 through 3  | All from Stages 1 through 3 plus add the following: <ul style="list-style-type: none"> <li>• Limit landscape watering to specified days</li> <li>• No landscape watering without using hand-held hose with automatic shut-off nozzle or micro-irrigation system.</li> <li>• Sprinkler systems can only be used for active public areas, e.g., park and school grounds.</li> </ul>   |
| Stage 5 – Water Crisis (50%)    | All from Stages 1 through 4  | All from Stages 1 through 4   |

## 9.8 Baseline Amounts for Water Use Penalties

Beginning with Stage 2, penalties are applied on water use in excess of a baseline amount. The purpose of the penalty is to encourage customers to reduce use to or below baseline amounts.

Table 9-5 shows the current baseline amounts specified in the 1991 ordinance. In the 1991 ordinance, the baseline amount is determined as the usage in the base year of 1989.

| <b>Stage</b>            | <b>Residential</b>        | <b>Commercial/Industrial</b> | <b>Landscape Irrigation<br/>(dedicated meter)</b> |
|-------------------------|---------------------------|------------------------------|---|
| 1-Voluntary             | Voluntary Conservation    | Voluntary Conservation       | Voluntary Conservation                            |
| 2-Water Alert (10%)     | 350 gallons per day (gpd) | >95% of 1989 base use        | >75% of 1989 base use                             |
| 3-Water Warning (25%)   | 320 gpd                   | >90% of 1989 base use        | >75% of 1989 base use                             |
| 4-Water Emergency (35%) | 295 gpd                   | >85% of 1989 base use        | >75% of 1989 base use                             |
| 5-Water Crisis (50%)    | 230 gpd                   | >71% of 1989 base use        | >50% of 1989 base use                             |

The City Task Force provided input on the current baseline amounts. It was recommended that the ordinance be modified to have the City Manager select an appropriate base year if an emergency condition is invoked. Typically, water use during drier years is higher than during wetter years due to higher irrigation uses (assuming that no prohibitions are in place). Selecting a base year with low water use would have greater impacts on customers than selecting a base year with higher use.

DWR's Sacramento Valley Index classifies water years (October 1 through September 30) into five types: wet, above normal, below normal, dry, and critically dry. The current ordinance is based on calendar year 1989 as the base year. The water year 1988 (October 1, 1988 through September 30, 1989) was a critically dry year; and water year 1989 (October 1, 1989 through September 30, 1990) was a dry year. This was a very dry period prior to imposition of prohibitions during the last major extended drought period. Therefore, water use during this base year would reflect the high end of the City's pre-drought usage. However, this base year is 16 years ago and the City's customers have changed over time, making it very difficult to compare with usage by current customers.

The City's treated water use in calendar year 2004 was the highest usage over the last 10 years, and reflects drier conditions. Water year 2003 (October 1, 2003 through September 30, 2004) was an above normal year; while water year 2004 (October 1, 2004 through September 30, 2005) was a below normal year.

The City's treated water use in calendar year 2000 was the lowest usage over the last 10 years, and reflects wetter conditions. Water year 1999 (October 1, 1999 through September 30, 2000) was a wet year; and water year 2000 (October 1, 2000 through September 30, 2001) was an above normal year.

Table 9-6 shows the recommended baseline amounts. The residential category shows a range of usage in gallons per person per day depending on the selected base year. The high end of the range is a 2004 base year; the low end is a 2000 base year. The City Manager would select the appropriate base year based on the recommendation of the Public Works Director.

| <b>Table 9-6</b>  |   |  |  |
|---|---|--|--|
| <b>Recommended Baseline Amounts for Water Use Penalties</b> |   |  |  |
| <b>Stage</b>  | <b>Residential</b>  | <b>Commercial/Industrial</b>                                 | <b>Landscape Irrigation<br/>(dedicated meter)</b>            |
| 1-Voluntary   | Voluntary Conservation  | Voluntary Conservation                                       | Voluntary Conservation                                       |
| 2-Water Alert (10%)   | 315 - 335 gpd<br>(High end is 90% of 2004 base use; low end is 90% of 2000 base use. City Manager to select appropriate base year.) | >90% of base year use<br>(City Manager to select base year.) | >75% of base year use<br>(City Manager to select base year.) |
| 3-Water Warning (25%)                                       | 265 - 280 gpd<br>(Note: 75% of base use)  | >85% of base year use  | >70% of base year use  |
| 4-Water Emergency (35%)                                     | 230 - 245 gpd<br>(Note: 65% of base use)  | >70% of base year use  | >60% of base year use  |
| 5-Water Crisis (50%)  | 175 - 190 gpd<br>(Note: 50% of base use)  | >50% of base year use  | >50% of base year use  |

The current ordinance contains an exception process to allow customers to apply to the Public Works Director to increase their baseline amounts due to the following reasons:

1. Medical requirements;
2. More than four residents in a single-family residential household. The additional amount allotted shall be fifty gallons per day per person.
3. Incorrect customer classification based on predominant use;
4. When failure to do so would cause severe economic hardship to the applicant, including, but not limited to, threat of imminent insolvency;
5. When failure to do so would cause an emergency condition affecting the health, sanitation, fire protection, or safety of the applicant or the public.

Upon review of the written application, such exceptions may be granted that one or more condition has been satisfied and it is in the public interest to grant the exception.

The quantity of additional water allowed by the exception to alleviate the condition is determined by the Public Works Director.

It is recommended that the following changes be made to the current exception process:

- Add “Protect mature trees providing community benefit” as an acceptable condition to apply for an exception.

## 9.9 Penalties for Excessive Use

Table 9-7 summarizes the penalties for excess water use when the emergency conservation plan is in effect. Penalties are applied to water use above the baseline amounts defined by the ordinance.

| <i>Water Use Amounts</i>  | <i>Penalty</i>            |
|---|---------------------------|
| Amount below baseline allotment   | None - Regular water rate |
| Amount between baseline allotment and 10% higher than the allotment   | 2 times regular rate      |
| Amount between 10% to 20% higher than the baseline allotment  | 3 times the regular rate  |
| Amount over 20% higher than the baseline allotment  | 4 times the regular rate  |
| Example of how penalties would be applied: A customer who exceeded their baseline allotment by 25 percent would pay regular rates for the amount up to the baseline, twice the regular rate on the first 10 percent above the baseline, three times the amount for the use above 10 percent and up to 20 percent, and four times the rate for the amount beyond 20 percent. |                           |

Enforcement of the ordinance stresses public education and a cooperative approach to encourage compliance. Additional enforcement options currently include the following in ascending order of severity:

1. Use penalties (incentive due to higher cost)
2. Verbal warnings
3. Written warnings
4. Infractions with fines up to \$500 for continued violations
5. Placement of flow restriction devices or termination of service
6. Court proceedings

The current ordinance (Section 13.35.120) makes all violations an infraction. In the interest of minimizing burdens on the criminal justice system, it is recommended that the ordinance be modified to allow the Director of Public Works to levy additional flat

fee penalties of up to \$500 per billing period for continued violations of the ordinance, prior to considering each violation an infraction. For severe continuing violations, an infraction could then be issued for each violation for persistent offenders. This would provide more enforcement options and flexibility.

## 9.10 Revenue and Expenditure Impacts

The Act requires an analysis of impacts on a water supplier's revenues and expenditures from a water shortage that reduces water use.

One concern is that reduced water consumption may result in reduced revenues. Another concern is that there may be higher costs to operate the system due to the shortage (e.g., if it is necessary to hire additional staff, purchase emergency short-term supplies at higher costs than normal supplies, make computer program modifications for billing, or increased public information costs).

The City's ordinance (Section 13.35.095) provides for drought surcharges which will act to mitigate the effect of revenue losses due to lower water consumption. Additionally, revenue from ordinance violations will also be used to offset increased costs due to ordinance implementation and enforcement.

A drought surcharge may be imposed by the City Council, upon recommendation by the Finance Director, to compensate for loss of water revenue or to pay an additional cost for the purchase of water by the city. The current ordinance should be modified to remove the monthly surcharge amounts and duration of the surcharge from the ordinance. The specific amounts and duration should be determined when a drought surcharge is imposed.

During shortages, drought surcharge levels should be reviewed periodically to determine their adequacy to maintain the required revenues. To provide flexibility to handle a variety of conditions, it is recommended that the ordinance be modified to allow the City Manager to modify the surcharge levels upon 30 days notice in order to provide for continued revenue sufficiency to maintain a safe and reliable water system.

The City does not anticipate hiring additional staff during shortages, and the computer billing system is able to handle the drought surcharge program. The City already has an extensive public information program, and would just re-focus the public messages as relevant for the emergency situation. In addition, the City has the ability to access emergency short-term supplies at costs consistent with its normal supply, as discussed in Section 9.2.

## 9.11 Reduction Measurement Mechanisms

Frequent monitoring is required during emergency water shortages to enable the City to effectively balance supply and demand. Water supply (production) is provided to meet demands. Therefore, if the City monitors its water production, it will be an indicator of the reduction in demands. The information on water production is more easily accessible in a more timely fashion than corresponding information on demands.

During normal supply and Stage 1 conditions, water production is recorded on a daily basis, and reported monthly.

During a Stage 2 or Stage 3 water shortage, water production will be reported weekly and reviewed by the Assistant Director of Public Works/Utilities Manager. The Utilities Department will compare the weekly production to the target weekly production to determine if the reduction goal is being met. If not, the Utilities Manager will notify the Director of Public Works that corrective action is needed.

During a Stage 4 or Stage 5 water shortage, the procedures listed above for Stage 2 or Stage 3 will be followed on a daily, rather than weekly, basis.

*Appendix A*  
Urban Water Management Planning Act  
(Current Version)

**Established:** AB 797, Klehs, 1983

**Amended:** AB 2661, Klehs, 1990

AB 11X, Filante, 1991

AB 1869, Speier, 1991

AB 892, Frazee, 1993

SB 1017, McCorquodale, 1994

AB 2853, Cortese, 1994

AB 1845, Cortese, 1995

SB 1011, Polanco, 1995

AB 2552, Bates, 2000

SB 553, Kelley, 2000

SB 610, Costa, 2001

AB 901, Daucher, 2001

SB 672, Machado, 2001

SB 1348, Brulte, 2002

SB 1384, Costa, 2002

SB 1518, Torlakson, 2002

AB 105, Wiggins, 2004

SB 318, Alpert, 2004

## **CALIFORNIA WATER CODE DIVISION 6 PART 2.6. URBAN WATER MANAGEMENT PLANNING**

### **CHAPTER 1. GENERAL DECLARATION AND POLICY**

10610. This part shall be known and may be cited as the "Urban Water Management Planning Act."

10610.2. (a) The Legislature finds and declares all of the following:

- (1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.
- (2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.
- (3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.
- (4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in

its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.

- (5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.
- (6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.
- (7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.
- (8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.
- (9) The quality of source supplies can have a significant impact on water management strategies and supply reliability.

(b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.

10610.4. The Legislature finds and declares that it is the policy of the state as follows:

- (a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.
- (b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.
- (c) Urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies.

## **CHAPTER 2. DEFINITIONS**

10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.

10611.5. "Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.

10612. "Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.

10613. "Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

10614. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.

10615. "Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

10616. "Public agency" means any board, commission, county, city and county, city, regional agency, district, or other public entity.

10616.5. "Recycled water" means the reclamation and reuse of wastewater for beneficial use.

10617. "Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

### **CHAPTER 3. URBAN WATER MANAGEMENT PLANS**

#### **Article 1. General Provisions**

10620.

- (a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

- (b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.
- (c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.
- (d)
  - (1) An urban water supplier may satisfy the requirements of this part by participation in areawide, regional, watershed, or basinwide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.
  - (2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.
- (e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.
- (f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

10621.

- (a) Each urban water supplier shall update its plan at least once every five years on or before December 31, in years ending in five and zero.
- (b) Every urban water supplier required to prepare a plan pursuant to this part shall notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.
- (c) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

## **Article 2. Contents of Plans**

10630. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

- (a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.
- (b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:
  - (1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.
  - (2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree.

For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

- (3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

- (4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.
- (c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:
    - (1) An average water year.
    - (2) A single dry water year.
    - (3) Multiple dry water years.

For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

- (d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.
- (e)
  - (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:
    - (A) Single-family residential.
    - (B) Multifamily.
    - (C) Commercial.
    - (D) Industrial.
    - (E) Institutional and governmental.
    - (F) Landscape.
    - (G) Sales to other agencies.
    - (H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.
    - (I) Agricultural.
  - (2) The water use projections shall be in the same five-year increments described in subdivision (a).

- (f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:
- (1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:
    - (A) Water survey programs for single-family residential and multifamily residential customers.
    - (B) Residential plumbing retrofit.
    - (C) System water audits, leak detection, and repair.
    - (D) Metering with commodity rates for all new connections and retrofit of existing connections.
    - (E) Large landscape conservation programs and incentives.
    - (F) High-efficiency washing machine rebate programs.
    - (G) Public information programs.
    - (H) School education programs.
    - (I) Conservation programs for commercial, industrial, and institutional accounts.
    - (J) Wholesale agency programs.
    - (K) Conservation pricing.
    - (L) Water conservation coordinator.
    - (M) Water waste prohibition.
    - (N) Residential ultra-low-flush toilet replacement programs.
  - (2) A schedule of implementation for all water demand management measures proposed or described in the plan.
  - (3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

- (4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.
- (g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:
- (1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors.
  - (2) Include a cost-benefit analysis, identifying total benefits and total costs.
  - (3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.
  - (4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.
- (h) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.
- (i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.
- (j) Urban water suppliers that are members of the California Urban Water Conservation Council and submit annual reports to that council

in accordance with the "Memorandum of Understanding Regarding Urban Water Conservation in California," dated September 1991, may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g).

- (k) Urban water suppliers that rely upon a wholesale agency for a source of water, shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c), including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

10631.5. The department shall take into consideration whether the urban water supplier is implementing or scheduled for implementation, the water demand management activities that the urban water supplier identified in its urban water management plan, pursuant to Section 10631, in evaluating applications for grants and loans made available pursuant to Section 79163. The urban water supplier may submit to the department copies of its annual reports and other relevant documents to assist the department in determining whether the urban water supplier is implementing or scheduling the implementation of water demand management activities.

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

- (a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.
- (b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.
- (c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including,

but not limited to, a regional power outage, an earthquake, or other disaster.

- (d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.
- (e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.
- (f) Penalties or charges for excessive use, where applicable.
- (g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.
- (h) A draft water shortage contingency resolution or ordinance.
- (i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

- (a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.
- (b) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.
- (c) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

- (d) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.
- (e) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.
- (f) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

### **Article 2.5 Water Service Reliability**

10635.

- (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.
- (b) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.
- (c) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

- (d) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

### **Articl 3. Adoption and Implementation of Plans**

10640. Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630).

The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

10641. An urban water supplier required to prepare a plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.

10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

10644.

- (a) An urban water supplier shall file with the department and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be filed with the department and any city or county within which the supplier provides water supplies within 30 days after adoption.
- (b) The department shall prepare and submit to the Legislature, on or before December 31, in the years ending in six and one, a report summarizing the status of the plans adopted pursuant to this part. The report prepared by the department shall identify the outstanding elements of the individual plans. The department shall provide a copy of the report to each urban water supplier that has filed its plan with the department. The department shall

also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans submitted pursuant to this part.

10645. Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

#### **CHAPTER 4. MISCELLANEOUS PROVISIONS**

10650. Any actions or proceedings to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:

- (a) An action or proceeding alleging failure to adopt a plan shall be commenced within 18 months after that adoption is required by this part.
- (b) Any action or proceeding alleging that a plan, or action taken pursuant to the plan, does not comply with this part shall be commenced within 90 days after filing of the plan or amendment thereto pursuant to Section 10644 or the taking of that action.

10651. In any action or proceeding to attack, review, set aside, void, or annul a plan, or an action taken pursuant to the plan by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.

10652. The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

10653. The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the State Water Resources Control Board and the Public Utilities Commission, for the preparation of water management plans or conservation plans; provided, that if the State Water Resources Control Board or the Public Utilities Commission requires additional information concerning water conservation to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan prepared to meet federal laws

or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

10654. An urban water supplier may recover in its rates the costs incurred in preparing its plan and implementing the reasonable water conservation measures included in the plan. Any best water management practice that is included in the plan that is identified in the "Memorandum of Understanding Regarding Urban Water Conservation in California" is deemed to be reasonable for the purposes of this section.

10655. If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.

10656. An urban water supplier that does not prepare, adopt, and submit its urban water management plan to the department in accordance with this part, is ineligible to receive funding pursuant to Division 24 (commencing with Section 78500) or Division 26 (commencing with Section 79000), or receive drought assistance from the state until the urban water management plan is submitted pursuant to this article.

10657.

- (a) The department shall take into consideration whether the urban water supplier has submitted an updated urban water management plan that is consistent with Section 10631, as amended by the act that adds this section, in determining whether the urban water supplier is eligible for funds made available pursuant to any program administered by the department.
- (b) This section shall remain in effect only until January 1, 2006, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2006, deletes or extends that date.

*Appendix B*  
Ahwanhee Water Principles for  
Resource Efficient Land Use

## The Ahwahnee Water Principles for Resource Efficient Land Use

### Preamble

Cities and counties are facing major challenges with water contamination, storm water runoff, flood damage liability, and concerns about whether there will be enough reliable water for current residents as well as for new development. These issues impact city and county budgets and taxpayers. Fortunately there are a number of stewardship actions that cities and counties can take that reduce costs and improve the reliability and quality of our water resources.

The Water Principles below complement the Ahwahnee Principles for Resource-Efficient Communities that were developed in 1991. Many cities and counties are already using them to improve the vitality and prosperity of their communities.

### Community Principles

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1. Community design should be compact, mixed use, walkable and transit-oriented so that automobile-generated urban runoff pollutants are minimized and the open lands that absorb water are preserved to the maximum extent possible.
2. Natural resources such as wetlands, flood plains, recharge zones, riparian areas, open space, and native habitats should be identified, preserved and restored as valued assets for flood protection, water quality improvement, groundwater recharge, habitat, and overall long-term water resource sustainability.
3. Water holding areas such as creek beds, recessed athletic fields, ponds, cisterns, and other features that serve to recharge groundwater, reduce runoff, improve water quality and decrease flooding should be incorporated into the urban landscape.
4. All aspects of landscaping from the selection of plants to soil preparation and the installation of irrigation systems should be designed to reduce water demand, retain runoff, decrease flooding, and recharge groundwater.
5. Permeable surfaces should be used for hardscape. Impervious surfaces such as driveways, streets, and parking lots should be minimized so that land is available to absorb storm water, reduce polluted urban runoff, recharge groundwater and reduce flooding.
6. Dual plumbing that allows grey water from showers, sinks and washers to be reused for landscape irrigation should be included in the infrastructure of new development.
7. Community design should maximize the use of recycled water for appropriate applications including outdoor irrigation, toilet flushing, and commercial and industrial processes. Purple pipe should be installed in all new construction and remodeled buildings in anticipation of the future availability of recycled water.
8. Urban water conservation technologies such as low-flow toilets, efficient clothes washers, and more efficient water-using industrial equipment should be incorporated in all new construction and retrofitted in remodeled buildings.
9. Ground water treatment and brackish water desalination should be pursued when necessary to maximize locally available, drought-proof water supplies.

## **Implementation Principles**

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1. Water supply agencies should be consulted early in the land use decision-making process regarding technology, demographics and growth projections.
2. City and county officials, the watershed council, LAFCO, special districts and other stakeholders sharing watersheds should collaborate to take advantage of the benefits and synergies of water resource planning at a watershed level.
3. The best, multi-benefit and integrated strategies and projects should be identified and implemented before less integrated proposals, unless urgency demands otherwise.
4. From start to finish, projects and programs should involve the public, build relationships, and increase the sharing of and access to information. The participatory process should focus on ensuring that all residents have access to clean, reliable and affordable water for drinking and recreation.
5. Plans, programs, projects and policies should be monitored and evaluated to determine if the expected results are achieved and to improve future practices.

**Authors:** Celeste Cantu, Martha Davis, Jennifer Hosterman, Susan Lien Longville, Jonas Minton, Mary Nichols, Virginia Porter, Al Wanger, Robert Wilkinson, Kevin Wolf

**Editor:** Judy Corbett

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**Source:** *Local Government Commission website*

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*Appendix C*  
**Task Force Meeting Minutes**

## **Memorandum**

*To: Task Force Members; City Staff*

*From: Lisa House, CDM  
Brian Hammer, CDM*

*Date: June 30, 2005*

*Subject: City of Benicia Urban Water Management Plan Update  
Task Force Meeting No. 1 Summary  
Meeting Date – May 26, 2006*

### **Task Force Meeting No. 1 Attendees**

- Task Force Members -Kathleen Van Velsor (elected Chair at meeting), Fred Railsback (elected Vice Chair at meeting), Brad MacLane, Greg Gartrell, Veronica Stone and Elizabeth Patterson (Dennis Lund---not present)
- City Staff - Chris Tomasik, David Wenslawski, Heather McLaughlin
- CDM - Brian Hammer and Lisa House

### **Action Items**

- City staff will look into arranging a tour for the Task Force to see the water supply facilities.
- City staff will look into getting information on the UWMP posted on the City website, included in billing statements, the City's public access channel and prepare press releases.

### **Next Task Force Meeting**

- The next task force meeting will be July 28, 2005 from 7 to 9 pm.
- Topics for next meeting are anticipated to include:
  - CDM to present preliminary findings on demand and supply updates, evaluation of demand management measures, and evaluation of emergency water conservation plan.
  - Task force to discuss public perspective on City's water conservation measures (demand management measures) and emergency water conservation plan.
  - Task force to discuss public communication methods for UWMP.

- The Task Force will communicate with City staff (Chris Tomasik, David Wenslawski) on issues related to the UWMP.

### **Presentation Items**

- Heather McLaughlin, City Attorney, gave a summary presentation of the key points of the Brown Act regarding public access to public meetings, such as the task force meetings.
- Lisa House (CDM) gave an overview presentation on the key elements of the UWMP.
- Chris Tomasik, City Assistant Director of Public Works/Utilities Manager, distributed the following informational documents to the task force members:
  - 2005 UWMP Preparation Guidebook – California Department of Water Resources
  - 2005 UWMP Completeness Checklist – California Department of Water Resources
  - City of Benicia 2001 UWMP
  - Example UWMPs – California Department of Water Resources
  - California Water Plan Highlights (April 2005 Public Review Draft) – California Department of Water Resources [Note: The entire draft plan is available on-line at <http://www.waterplan.water.ca.gov/>. The entire plan is five volumes of about 1,000 pages total, plus appendices.]
  - Waste Not, Want Not: The Potential for Urban Water Conservation in California – Pacific Institute; and the California Urban Water Agencies (CUWA) Response to the Waste Not, Want Not Report
- Task force discussion items during and after the presentations are summarized below.

### **Key Task Force Discussion Items**

- Natural hazards, such as earthquakes, that might affect the supply system will be included in the supply reliability analysis and addressed as part of the emergency water conservation plan.
- The type of occupancy for the Benicia Business Park has not been finalized; CDM will use the best planning information available at this time in developing future water use projections for the Business Park. Future demand projections for this area should be conservative to allow for potential variations in types of facilities and corresponding water use that would be allowable according to the zoning.
- Two important components of the UWMP for task force input are the Demand Management Measures and the Emergency Water Conservation Plan (Water Shortage Contingency Plan), which relate to water conservation. CDM will be re-evaluating both the components as part of the update; and task force input from the public perspective will be very valuable.

- The Emergency Water Conservation Plan (Water Shortage Contingency Plan) needs to address certain levels of cutbacks per the State requirements. It must address measures that would be taken up to at least a 50 percent cutback, regardless of the probability of such an occurrence.
- Implementation strategies for recommendations regarding demand management measures and the emergency water conservation plan will be important for the task force to consider from a public perspective.
- If the UWMP analysis indicates a decrease in unit demand factors, the public should not expect a decrease in their billing rates, because the same facilities are still required to provide service.
- The UWMP report should be a document that the public could pick-up and easily understand. The UWMP should consider the “25 strategies” outlined in the draft California Water Plan, as applicable to Benicia.
- Task force members noted that the City is a very vocal community and suggested moving the public meeting on the draft report into November to provide adequate time to respond to public comment, and still meet the December 31 deadline for submittal.
- There was significant amount of discussion on potential measures to increase public involvement in the UWMP update. These potential measures are summarized below and will be discussed again at the next task force meeting.
  - Adding one more public meeting on the draft report, in order to have two opportunities for input from the general public. The current schedule calls for one public hearing. City staff will look into potential approaches, such as combining the 4<sup>th</sup> task force meeting with a general public meeting or holding a second public meeting without CDM participation.
  - Having information on the UWMP made available on a website. City staff indicated information could be made available in the “what’s new” section of the City website.
  - Listing information on the Benicia Public TV channel.
  - Putting an announcement regarding the UWMP in the local newspaper and including an insert within the water bill text (or a separate flyer to be sent with the water bill).
- A task force member noted that it may be possible to get a guest speaker from the Department of Water Resources to provide the task force with an overview of the draft California Water Plan. Task force members will look into this and discuss further at a future meeting.

## **Memorandum**

*To: Task Force Members; City Staff*

*From: Lisa House, CDM  
Brian Hammer, CDM*

*Date: September 13, 2005*

*Subject: City of Benicia Urban Water Management Plan Update  
Task Force Meeting No. 2 Summary  
Meeting Date – July 28, 2005*

### **Task Force Meeting No. 2 Attendees**

- Task Force Members - Kathleen Van Velsor--Chair, Fred Railsback--Vice Chair, Greg Gartrell, Dennis Lund, and Elizabeth Patterson (Absent: Veronica Stone, Brad MacLane)
- City Staff - Chris Tomasik, David Wenslawski
- CDM - Brian Hammer, Lisa House

### **Action Items**

- City staff will add CDM staff to contact list for Urban Water Management Plan (UWMP).
- City staff will consider sending e-mails regarding the UWMP and Task Force Meetings to developers and other organizations that could benefit from the information.
- Elizabeth Patterson will bring the 1970 Water Plan to the next meeting, as an example of a nice report format.

### **Next Task Force Meeting**

- The next task force meeting will be either September 15<sup>th</sup>, 22<sup>nd</sup> or 29<sup>th</sup>, 2005 from 7 to 9 pm. City staff will advise members of the selected date.
- Topics for next meeting are anticipated to include:
  - CDM to present evaluation of emergency water conservation plan for discussion and input by Task force.
  - Task force to discuss editorial style for the 2005 UWMP report.
  - Task force to further discuss public communication methods for UWMP.

## **Revisions to Previous Minutes**

- The minutes of the Task Force Meeting held May 26, 2005 were approved with the following additions:
  - Water use classifications used in the City's UWMP should be based on standardized classes.
  - As applicable to the UWMP, it is important to indicate that the City is sensitive to water rates and any impact on rates.

## **Presentation Items**

- Lisa House (CDM) presented a summary of the supply and demand projections and demand management measures for the UWMP.
- Chris Tomasik, City Assistant Director of Public Works/Utilities Manager, distributed the following articles from the Monterey Herald:
  - "No Alternative Water Source in 10 Years?" – July 3, 2005
  - "FORA Directors Approve University Villages" – July 9, 2005
- A copy of the City's Annual Water Quality Report was displayed. It contains a nice graphic showing the City's water sources that should be considered for inclusion in the UWMP report.
- Task force discussion items during and after the presentations are summarized below.

## **Key Task Force Discussion Items**

### **Demand Projections**

- Tables and discussion of the demand projections and per capita demand factors should clearly indicate if unaccounted-for water is included.
- Population projections should consider whether there may be impacts of increased housing costs on the number of occupants per single family home, i.e., higher housing costs resulting in more people/families in a single dwelling. Discussion indicated that this does not appear to be applicable to Benicia due to its demographics, although it may occur in other parts of the Bay Area.
- UWMP report should indicate how the non-resident (visitor/worker) population in the City is accounted for in the demand projections. This demand is included as part of the commercial, institutional, and industrial demands.

- Clarify in report that the irrigation customers are dedicated irrigation meters for large landscape areas, such as parks, school play fields, and some large commercial/industrial landscape areas.
- The use of a “pie chart” in the UWMP would be a beneficial method of presenting the demand projections in the report.

### **Supply Sources**

- The UWMP should summarize the City’s existing agreements with each raw water supplier, and indicate the expiration dates if applicable.

### **Recycled Water**

- No discussion except to note that the City will be recycling a very high percentage of its average dry weather wastewater flow for use by Valero instead of raw water. This is a significant new project currently under design.

### **Supply Reliability**

- There was some discussion about whether the reliability assessment methodology used by Solano County Water Agency was consistent with the State of California information. It was noted that the State does not specify a required methodology for developing the reliability estimates. The Solano County Water Agency reliability estimates is based on the information provided by the Department of Water Resources in their May 2005 Reliability Update Report. Generally, DWR asks that water agencies base their reliability estimates on the information provided by the wholesale supplier, which is Solano County Water Agency.
- The UWMP will include a description of the methodology used for the reliability estimates and how they are consistent with the DWR information.
- The Task Force questioned whether recycled water could be considered 100 percent reliable during a multiple dry year event due to the decrease in wastewater flow from water conservation. It was noted that recycled water supply is based on the average dry weather flow, which is from indoor water use. Water conservation measures during droughts are directed primarily at decreasing outdoor water use and water waste.
- The demand estimates are based on a continuation of current conservation patterns and do not assume there will be greater water conservation savings in the future from additional conservation measures that may be implemented. Therefore, the reliability analysis is conservative.

### **Comparison of Supply and Demand**

- Footnote the table comparing supply and demand to indicate how many houses could be accommodated by the surplus of supply available in a multiple year drought (typically assume about 0.5 acre-foot of supply per house).

### **Demand Management Measures (DMM) - measures currently implemented**

- DMM 13 – As part of the emergency water conservation ordinance, the City may want to consider expanding prohibitions on water use for new development to include:
  - No single pass cooling systems for new connections
  - Require recirculating systems for commercial car washes and commercial laundries
  - Require recirculating systems for decorative fountains

### **Demand Management Measures - measures partially implemented**

- DMM 2/14 Residential Plumbing Retrofits and Ultra Low Flow Toilet Retrofits – City may want to consider additional implementation of these practices. Although not cost-effective from the City's perspective, the saving in cost to the customers (e.g., senior citizens) may be more important than the savings in water. However, it was noted that a large portion of a customer's water bill covers the cost to treat and transport the water, not the actual volume of water supplied to the customer. The City may also want to consider having new development finance retrofitting of existing fixtures as EBMUD required for the Dougherty Valley development. It was noted that these BMPs would occur naturally over time regardless of City actions. As buildings are maintained/remodeled, new fixtures would be ultra low water use since that is all that is currently available/allowed.
- DMM 5 Large Landscape Irrigation Conservation – Since 1992, the City has had water efficient landscape standards that apply to all new landscaping for commercial, industrial, institutional, multi-family residential, public and private recreation/open space areas (common areas), roadways, medians, model home complexes, and new single-family residential units where the landscaping installed by the developer as part of the purchase price. The City may want to consider developing similar standards for projects that are currently exempted, which include single family residential landscapes installed by homeowner and rehabilitated landscapes. It was noted that City Hall has an example of drought tolerant landscaping. The location should be clearly marked as such, and publicized on the website. UWMP should note this example, and also any other similar examples in the City.

**Demand Management Measures - measures not implemented (not cost effective)**

- DMM 1 Residential Water Audits – City may want to consider providing water audits to single family residences with high water bills.
- DMM 6 High Efficiency Washing Machine Rebates – Including a link to PG&E energy efficiency program as part of City’s conservation information would be a good idea. PG&E provides rebates for these types of washing machines.
- DMM 9 Commercial/Industrial Water Audits – It was noted that is difficult and expensive to have staff qualified to perform water audits for commercial and industrial establishments.
- Water audits are essentially an individualized public education measure. For any type of water audit – either residential or commercial – the savings only last for about a 3-year period due to owner/staff turnover. So the process must be repeated on an ongoing basis for the same properties. Instead of these individual efforts, which require significant staff resources and training, the City has focused on group public education efforts – particularly the school education program.

**Demand Management Measures - general**

- CDM will inquire if its Southern California offices have any readily available information regarding water demand and supply management measures in the Los Angeles area. A Task Force member indicated they had heard of some innovative approaches in the Los Angeles area. If there is any readily available relevant information, CDM will provide to City staff for distribution to the Task Force as informational material.

**Emergency Water Shortage Plan**

- This topic will be presented and discussed at the next meeting. An initial comment was made that it will be important to consider how Valero supply will be affected. A 50% cutback of Valero supply would be major business disruption and affect the statewide energy supply.

## **Memorandum**

*To: Task Force Members; City Staff*

*From: Lisa House, CDM  
Brian Hammer, CDM*

*Date: September 29, 2005*

*Subject: City of Benicia Urban Water Management Plan Update  
Task Force Meeting No. 3 Summary  
Meeting Date – September 15, 2005*

### **Task Force Meeting No. 3 Attendees**

- Task Force Members - Kathleen Van Velsor--Chair, Fred Railsback--Vice Chair, Greg Gartrell, Brad MacLane, Elizabeth Patterson and Veronica Stone. (Absent: Dennis Lund)
- City Staff - Chris Tomasik, David Wenslawski
- CDM - Brian Hammer, Lisa House
- State Department of Water Resources - Kamyar Guivetchi, guest speaker
- ABAG Earthquakes and Hazards Program - Jeanne Perkins, guest speaker

### **Action Items**

- CDM will prepare and distribute the administrative draft urban water management plan report by September 26, 2005 for Task Force review and input. This report contains the technical information that must be provided to DWR.
- CDM will also prepare an executive summary that will be written for a general public audience that will summarize plan highlights. The executive summary is not included in the administrative draft report. It will be a separate stand-alone document that will be distributed along with the public review draft report in October.

### **Next Task Force Meeting**

- The next task force meeting will be October 13th, 2005. The meeting will start at 6 pm and last three hours due to the large amount of material to cover.

- Topics for next meeting are anticipated to include:
  - CDM to present evaluation of current emergency water conservation plan for discussion and input by Task force.
  - Task force input and comments on administrative draft report.
  - Task force to further discuss editorial style for the 2005 UWMP report and Executive Summary.
  - Task force to further discuss public communication methods for UWMP.

### **Presentation Items**

- Kamyar Guivetchi, State Department of Water Resources, gave a presentation on highlights of the California Water Plan.
- Jeanne Perkins, ABAG Earthquake and Hazards Program, gave a presentation on the Bay Areas regional hazard mitigation planning program.
- Lisa House (CDM) presented a summary of the demand management measures that have not been implemented or only partially implemented by the City.
- Chris Tomasik, City Assistant Director of Public Works/Utilities Manager, distributed the following articles:
  - "Ahwahnee Water Principles for Resource Efficient Land Use"
  - "Delta levee vulnerability news article"
  - "California Watershed Management Initiative" information
  - Western Water Education Foundation article "Smart Water Use: Stretching the Urban Supply"
  - Research Brief from Public Policy Institute of California "Does California Have the Water to Support Population Growth?"
  - Abstract from Center for Integrated Watershed Science and Management on "Subsidence, Sea Level Rise and Seismicity: Hell and High Water in the Delta"
- Task force discussion items during and after the presentations are summarized below.

### **Key Task Force Discussion Items**

#### **Demand Management Measures - measures partially implemented (although not cost effective)**

- DMM 2/14 Residential Plumbing Retrofits and Ultra Low Flow Toilet Retrofits – City may want to consider additional implementation of these practices. Potential actions include:
  - Include link to PG&E energy efficiency program (energy rebates) as part of City's conservation information.

- Investigate potential regional funding for rebates and/or retrofit kits through Solano County Water Agency.
- Investigate feasibility of the City partnering with a local plumbing company that could purchase a large volume of ULFTs and sell at a discount price, in order to increase the replacement rate.
- Investigate feasibility of policy to have new development finance retrofit of existing fixtures in existing development.
- It was acknowledged that retrofits will occur naturally over time regardless of City actions. As buildings are maintained or remodeled, new fixtures would be ultra low water use since that is all that is currently available/allowed.
- It was also noted that 100 percent of the water used in either older type or ultra low use toilets will be recycled in the near future.
- DMM 5 Large Landscape Irrigation Conservation – Since 1992, the City has had water efficient landscape standards that apply to all new landscaping for commercial, industrial, institutional, multi-family residential, public and private recreation/open space areas (common areas), roadways, medians, model home complexes, and new single-family residential units where the landscaping installed by the developer as part of the purchase price. Additional actions that the City may consider implementing include:
  - Developing similar standards for projects that are currently exempted, which include single family residential landscapes installed by the homeowner and rehabilitated landscapes.
  - City Hall already has an example of drought tolerant landscaping. Additionally, the City should consider installing an example of a drip irrigation system and landscaping at the existing water treatment plant. The locations should be clearly marked as such, and publicized on the website.
  - The City adopted their current landscape design standards in 1992 after an extended drought. The City may want to consider updating the design standards to reflect the information in the new Urban Water Management Plan

**Demand Management Measures - measures not implemented (not cost effective)**

- DMM 1 Residential Water Audits – City could include additional information on customer water bills. This information could include how each customer compares with the average use of other similar customers in the service area, instead of just comparing this year's use to last year's use by the same customer.

- DMM 6 High Efficiency Washing Machine Rebates – Including a link to PG&E energy efficiency program as part of City’s conservation information would be a good idea. PG&E provides rebates for these types of washing machines. However, funding for the rebate program is not always available and the high efficiency washing machines are much more expensive than the typical machines. It would also be good to investigate potential regional funding for rebates through Solano County Water Agency.
- DMM 9 Commercial/Industrial Water Audits – With any type of water audit – either residential or commercial – the savings only last for about a 3-year period due to owner/staff turnover. So the process must be repeated on an ongoing basis for the same properties. Instead of these individual efforts, which require significant staff resources and training, the City has focused on group public education efforts. The City may want to consider outsourcing the audit work if they choose to further pursue these measures.

#### **Other Items**

- Some task force members noted the linkage of land use planning with water demand and conservation. Although land use planning is done through the General Plan process, the plan should discuss how there are ways of developing properties to reduce water demand that should be considered as part of land use planning. It was also noted that although these new types of development may not require as much water they may have an adverse effect on other utilities or community features or policies. The General Plan covers all aspects of community planning in order to look at the overall effect of all the planning elements. The Urban Water Management Plan is focused on water demand and supply.

## **Memorandum**

*To: Task Force Members; City Staff*

*From: Lisa House, CDM  
Brian Hammer, CDM*

*Date: November 14, 2005*

*Subject: City of Benicia Urban Water Management Plan Update  
Task Force Meeting No. 4 Summary  
Meeting Date – October 13, 2005*

### **Task Force Meeting No. 4 Attendees**

- Task Force Members - Kathleen Van Velsor--Chair, Fred Railsback--Vice Chair, Greg Gartrell, Dennis Lund, Brad MacLane, Elizabeth Patterson and Veronica Stone.
- City Staff - Chris Tomasik, David Wenslawski
- CDM - Brian Hammer, Lisa House

### **Action Items**

- CDM will prepare the draft urban water management plan report and separate Executive Summary, and submit to City by October 25, 2005 for distribution to public.

### **Potential Special Task Force Meeting**

- A special meeting of the Task Force was tentatively scheduled for November 14, 2005. The purpose of the meeting would be to review public comments prior to the public hearing. This meeting will depend on the extent and significance of comments received and will only be held if necessary.

### **Public Meeting**

- A meeting to receive comments from the public on the draft plan will be held on November 15, 2005. Comments will be addressed in the final plan, which will be ready for adoption at the City council meeting on December 6, 2005.

### **Corrections to Minutes from Task Force Meeting No. 3**

- The minutes of the Task Force Meeting held September 15, 2005 were approved with the following clarifications:

- It was noted that 100 percent of the water used in either older type of ultra low water use toilets will be recycled in the future due to discharge of treated effluent into waterways, and then the water is treated and re-used later at some downstream location. This recycling is not due to dual plumbing for residential recycled water systems.
- Clarify the following under "Other Items" by adding the phrases in bold: *"Some task force members noted the linkage of land use planning with water demand and conservation. Although land use planning is done through the General Plan process, the plan should discuss how there are ways of **designing and** developing properties to reduce water demand that should be considered as part of land use planning **and the urban water management planning process**. It was also noted that although these new types of development may not require as much water they may have an adverse effect on other utilities or community features or policies. The General Plan covers all aspects of community planning in order to look at the overall effect of all the planning elements. The Urban Water Management Plan is focused on water demand and supply."*

## Key Task Force Discussion Items

### Emergency Water Conservation Plan—Ordinance Revisions

CDM presented a summary of the City's existing emergency water conservation ordinance and enforcement provisions. Listed below are the recommended modifications for each stage in the ordinance, with Task Force comments noted.

#### Stage 1: Voluntary Conservation

- Modify prohibition: "Allowing water to run off unused to a gutter, ditch or drain."
- Add an exception to allow washing paved areas in case needed for health & safety reasons.
- Add following prohibitions:
  - No use of hoses without automatic shut-off fixtures. Comment from Task Force: Clarify that this refers to hand-held hoses.
  - No irrigation during rain.
- Add following prohibitions for new development (and also add substantial re-development):
  - No single pass cooling connections.
  - Require recirculating systems for commercial car washes and commercial laundries.
  - Require recirculating systems for decorative fountains.

Stage 2: Water Alert (10 percent reduction) and Stage 3: Water Warning (25 percent reduction) This stage includes the recommended modifications to Stage 1 plus the following prohibitions:

- Restrict lawn watering and landscape irrigation only when necessary and only between 6 pm and 9 am.
- Vehicle washing only with bucket or hand-held hose with automatic shut-off nozzle, or at commercial car wash.
- Restaurant water served only upon request.
- Non-potable water used for construction purposes unless health & safety issue.

Stage 4: Water Emergency (35 percent reduction) and Stage 5: Water Crisis (25 percent reduction)

This stage includes the recommended modifications from Stage 1 through Stage 3 plus the following prohibitions:

- Limit landscape watering to specified days.
  - No landscape watering without using hand-held hose with automatic shut-off muzzle or micro-irrigation system. Sprinkler systems can only be used for active areas, e.g., park and school grounds.
- The importance of public information during water shortages should be noted in report.
  - It was also noted that initiation of each water stage should be regionally coordinated with SCWA. Chris Tomasik indicated that regional coordination occurs regularly in both normal and emergency conditions, with more frequent contact during emergencies.

**Emergency Water Conservation Plan – Baseline Water Usage**

CDM presented a summary of the City’s existing baseline amounts for water use penalties. Recommended modifications to the baseline amounts are listed in the following table:

| <b>Recommended Baseline Amounts for Water Use Surcharges</b> |   |                              |   |
|--|---|------------------------------|---|
| <b>Stage</b>   | <b>Residential</b>  | <b>Commercial/Industrial</b> | <b>Landscape Irrigation (dedicated meter)</b> |
| 1-Voluntary  | Voluntary   | Voluntary                    | Voluntary                                     |
| 2-Water Alert (10%)  | Range based on 90% of base year use for normal versus dry conditions. | >90% of base year use        | >75% of base year use                         |
| 3-Water Warning (25%)  | Range based on 75% of base year use for normal versus dry conditions. | >85% of base use             | >70% of base use                              |
| 4-Water Emergency (35%)                                      | Range based on 65% of base year use for normal versus dry conditions. | >70% of base use             | >60% of base use                              |
| 5-Water Crisis (50%)   | Range based on 50% of base year use for normal versus dry conditions. | >50% of base use             | >50% of base use                              |

- It was noted that the City manager should have the authority to define the base year water usage.
- It was also noted that a dry base year may have higher usage than a normal base year, due to greater use of water during dry years for irrigation. A range of residential usage rates should be shown that are linked to the type of water year, normal versus dry year conditions.
- Plan should include an exception process to allow additional water for certain uses.

### **Potential Emergency Source Options**

CDM presented a summary of emergency water source options. Options include Lake Herman, backup interconnection with Vallejo and desalination.

- Task force would like a discussion of emergency preparedness if the City lost all supply sources, i.e., catastrophic loss of supply.
- Task force would like the draft plan to note the importance of Lake Herman as emergency supply, and the importance of maintaining its storage capacity.
- Task force would like the draft plan to recommend the City investigate working with SCWA about a vulnerability study of the water supply system and potential funding for supply reliability improvements.

### **Comments on Administrative Draft Urban Water Management Plan Draft Report**

Comments on the administrative draft plan were provided by the task force members, either verbally at the meeting or in marked up report copies. Major comments made at the meeting are noted below. All comments will be incorporated into a revised report for public review.

- The Task Force discussed whether the plan should include a recommendation that the City Council adopt the Ahwanhee Principles as part of the plan. It was decided not to do so, since many of the principles are addressed as part of the General Plan process and address broader land use issues that go beyond the urban water management plan. It was discussed that a broader review process may be more suitable when considering adoption of the Ahwanhee Principles. The Task Force decision, by consensus, was to reference the information in the plan as it is currently included, but not recommend adoption as part of the plan.
- Include web links to various key references, such as the California Water Plan, the ABAG hazard information, SCWA Integrated Regional Water Management Plan.
- In Section 1 discussion of California Water Plan, mention the concept of water portfolios and diverse strategies for water supply on a regional basis.

- Add information on watersheds within City to Section 2 service area description. Information can be found in General Plan.
- Global comment - clarify that buildout is 2020.
- If information is available, add brief paragraph in Section 2 as to where the City got its water historically.
- Section 4 - remove reference to potential Prospect Island storage. Revise discussion consistent with SCWA integrated water management plan as it addresses potential future surface and groundwater storage (conjunctive use).
- Section 4 - clarify that the City's contract for Mojave water may be amended so that if the water is not used within the 10-year period, the contract will be extended. Clarify that the City does not pay conveyance costs from Mojave because it is taking Mojave's water above the Delta.
- Footnote Figure 7-1 to indicate why supply surplus is larger at buildout than existing.
- Task Force recommended leaving in all the potential actions for demand management measures in Section 8 that were in the Administrative Draft, pending public comments.
- Comments on Section 9 are noted in the above discussion items for the Emergency Water Conservation Plan.

*Appendix D*  
**Public Notice, Public Hearing Agenda,  
and Minutes of Public Hearing**

**BENICIA CITY COUNCIL  
NOTICE OF PUBLIC HEARING**

**NOTICE IS HEREBY GIVEN** that a **PUBLIC HEARING** will be held Tuesday, November 15, 2005 at 7:30 p.m., in the City Council Chambers, 250 East L Street, on the following:

**CONDUCT A PUBLIC HEARING TO RECEIVE ORAL  
COMMENTS OR WRITTEN STATEMENTS CONCERNING THE  
2005 UPDATE TO THE CITY'S URBAN WATER MANAGEMENT  
PLAN**

**REVIEW PROCESS:** A copy of this draft report is currently available for public review at the City Clerk's Office and the Public Works Department, 250 East L Street, Benicia, Monday through Friday (except legal holidays) between the hours of 8:30 a.m. to noon and 1:00 p.m. to 5:00 p.m. Persons wishing to comment can do so either in writing or in person. Written comments should be addressed to the City Council, 250 East L Street, Benicia, Ca. 94510.

Pursuant to Government Code Section 65009:

If you challenge a decision of the City Council in court, you may be limited to raising only those issues you or someone else raised at the Public Hearing described in this notice, or in written correspondence delivered to the City of Benicia at, or prior to, the Public Hearing. You may also be limited by the ninety (90) day statute of limitations in which to file and serve a petition for administrative writ of mandate challenging any final City decisions regarding planning or zoning.

**BY ORDER OF THE COUNCIL:**

\_\_\_\_\_  
Lisa Wolfe, City Clerk

PUBLIC NOTICE POSTED ON CITY WEB SITE  
DRAFT URBAN WATER MANAGEMENT PLAN AVAILABLE FOR REVIEW

The City of Benicia is revising its Urban Water Management Plan (UWMP) as required by the California Water Code. The Urban Water Management Plan Task Force is seeking your participation in the process to update the City's UWMP. The task force members are encouraging an innovative and inclusive public process in updating this important water resource planning document in recognition of:

- the essential need for a long-term, reliable supply of water to satisfy residential and critical environmental demands and to protect the productivity of Benicia's businesses and economic climate;
- the City's desire to continue to make every effort to ensure the appropriate level of reliability of its water service sufficient to meet all of Benicia's uses during wet and dry years; and
- planning for urban water management can be a complex process requiring data collection and analysis, a vision of water policy consistency, and a meaningful public review process.

The draft 2005 UWMP is available for review at the City Clerk's office, the Benicia Public Library, and the Public Works offices at 250 East L St.

Please return written comments on the draft UWMP to David Wenslawski by 5:00 p.m. on Monday, November 7<sup>th</sup>. Comments can be submitted by email to [davidw@ci.benicia.ca.us](mailto:davidw@ci.benicia.ca.us) or by regular mail to 614 East 5<sup>th</sup> St, Benicia, CA, 94510.

Comments can also be presented at the public hearing scheduled for November 15, 2005 at 7:30 p.m. The meeting is being held in the Council Chambers at City Hall, 250 East L St.

For further information, please contact:  
David Wenslawski, Water Quality Technician, at 746-4336.



**BENICIA CITY COUNCIL  
CITY COUNCIL CHAMBERS**

**REGULAR MEETING AGENDA**

**November 15, 2005  
7:30 P.M.**

- I. CALL TO ORDER:**
- II. CONVENE OPEN SESSION:**
- III. ROLL CALL :**
  - A. PLEDGE OF ALLEGIANCE**
  - B. REFERENCE TO THE FUNDAMENTAL RIGHTS OF PUBLIC**
- IV. ANNOUNCEMENTS/APPOINTMENTS/PRESENTATIONS/PROCLAMATIONS:**
  - A. ANNOUNCEMENTS:**
    - 1. Announcement of action taken at Closed Session, if any.**
    - 2. Openings on Boards and Commissions:**
      - Open Government Commission: 5 terms ranging from 1-4 years**
      - Library Board of Trustees - 2 terms**
  - B. APPOINTMENTS:**
    - 1. Atiba Murphy, Benicia Housing Authority Board of Commissioners**
    - 2. Richard Sprankle, Benicia Housing Authority Board of Commissioners**
    - 3. Joel Fallon, Benicia Poet Laureate**
  - C. PRESENTATIONS:**

**Steve Booth, Benicia Firefighters Association**

**D. PROCLAMATIONS:**

**V. ADOPTION OF AGENDA:**

**VI. COMMUNICATIONS:**

**A. WRITTEN**

**B. PUBLIC COMMENT**

**VII. CONSENT CALENDAR:**

**A. Approval of Minutes of Special and Regular Meetings of October 31, 2005 and November 1, 2005. (City Clerk)**

**B. Denial of the claims against the City and referral to insurance carrier. (City Attorney)**

1. Maria Daffon: This claim was submitted for reimbursement of injuries that resulted from having a bus door closed on Ms. Daffon as she was boarding the bus. (Continued from November 1, 2005 City Council Meeting.)
2. Barbara Gates: This claim involves the repair of a cracked window and dents in the siding of her mobile home from being hit by baseballs from Fitzgerald Field.

**Recommendation: Deny the claim against the City by Maria Daffon and Barbara Gates.**

**C. Approval of engineering services agreement for design of the State Park Road Bike/Pedestrian Bridge Project. (Public Works Director)**

Conceptual plans for the State Park Road Bike/Pedestrian Bridge Project have been completed and it is proposed to continue to use the same consulting firm to complete the environmental and 35% engineering work. The \$124,573 available in grant monies will fully fund the consultant fees for this work and no local matching funds are required.

**Recommendation: Adopt the resolution approving a consultant agreement with Pakpour Consulting Group for engineering services for the State Park Road/Pedestrian Bridge Project, approving Task Order No. 1 in the amount of \$124,445 and authorizing the City Manager to execute the agreement on behalf of the City.**

**D. Selection of Downtown Parking Directional Signs. (Public Works Director)**

After input from three community groups and a public workshop, the graphic design of the existing signs that direct motor vehicle drivers to downtown parking areas is proposed to be changed to include the "Downtown Benicia" logo so that there is consistency with the directional signs elsewhere in the city. Funding for this work, estimated at \$2,500, is available in the Street Signs and Paint Supplies account.

**Recommendation: Adopt the resolution approving the selection of the "Downtown Benicia" design as the official directional sign to downtown parking.**

- E. **Approval to waive the reading of all ordinances introduced and adopted pursuant to this agenda.**

**VIII. PUBLIC HEARINGS:**

- A. **Review of City of Benicia Urban Water Management Plan – 2005 Update. (Public Works Director)**

The State Urban Water Management Planning Act (Act) requires water suppliers to update their plans at least every five years and to submit them to the Department of Water Resources by December 31 in the years ending in 0 and 5. An Urban Water Management Plan (UWMP) serves as a long-range planning document for water supply and demand management measures, is a key component to integrated regional water management plans, and is an important source and interdependent document for cities and counties in the preparation and implementation of their general plans. There are no direct budget impacts associated with this action.

**Recommendation: Conduct a public hearing to receive oral comments or written statements concerning the 2005 update to the City’s Urban Water Management Plan.**

**IX. UNFINISHED BUSINESS:**

- A. **Discussion of policy for City assistance to disaster victims – continued from November 1, 2005 City Council Meeting. (City Manager)**

Current policy authorizes assistance to disaster victims through official requests from the Federal Emergency Management Agency (FEMA) and the Office of Emergency Services (OES). This report will discuss pertinent issues related to allowing City employees to volunteer to be relief workers outside of a request by FEMA or OES to the City.

**Recommendation: Discuss and provide direction to staff, as needed.**

**X. NEW BUSINESS:**

- A. **Discussion of Vice Mayor Patterson’s proposed Grading Ordinance amendments – continued from November 1, 2005 City Council Meeting. (Public Works Director/Community Development Director)**

The Vice Mayor submitted proposed changes to the Grading Ordinance that would establish limits on grading, including building construction for hillsides with slopes greater than 25%. City staff requests direction from Council before proceeding with further analysis on these changes.

**Recommendation: Discuss and provide direction to staff on proposed changes to the City of Benicia Grading Ordinance.**

**B. Cancellation of the December 20, 2005 City Council Meeting. (City Manager)**

Staff recommends the cancellation of the December 20, 2005 City council meeting due to decreased availability of staff and members of the public during the holiday season.

**Recommendation: Authorize, by motion, cancellation of the December 20, 2005 meeting.**

**C. Review of request to televise Historic Preservation Review Commission Meetings. (Vice Mayor Patterson)**

This report is in response to a request from Vice Mayor Patterson that the Historic Preservation Review Commission meetings be made available for viewing on the public cable channel. This request was prompted by a comment made by a citizen during Public Comment at a recent City Council meeting that these meetings should be televised.

**Recommendation: Review request and provide direction to staff, as needed.**

**XI. REPORTS FROM CITY MANAGER:**

**A. Review of proposed joint use agreements with Benicia Unified School District (BUSD) – continued from November 1, 2005 City Council Meeting. (City Manager)**

The Superintendent and the City Manager are currently working on proposed recommendations for addressing differences in the proposed agreements for City maintenance of BUSD fields.

**Recommendation: Status report, for information only.**

**XII. REPORTS FROM CITY COUNCIL COMMITTEES:**

**A. Committee Reports:**

- 1. Mayors' Committee Meeting (Mayor Messina)**  
Next Meeting Date: December 21, 2005
- 2. Arsenal Restoration Advisory Board (Council Member Campbell)**  
Next Meeting Date: Not yet scheduled.
- 3. Association of Bay Area Governments (ABAG) (Vice Mayor Patterson)**  
Next Meeting Date: April 20, 2006
- 4. Audit & Finance Committee (Council Member Campbell and Vice Mayor Patterson)** Next Meeting Date: December 9, 2005
- 5. Carquinez Strait Preservation Trust (Council Member Smith)**  
Next Meeting Date: Not yet scheduled.

6. **First Street Revitalization Committee (Council Member Smith and Campbell)**  
Next Meeting Date: December 8, 2005
  7. **League of California Cities (Council Member Smith)**  
Next Meeting Date: Not yet scheduled.
  8. **Police Station and Civic Center Restoration Committee (Council Member Smith and Mayor Messina)** Next meeting date: Not scheduled
  9. **School District Liaison (Council Members Whitney and Smith)**  
Next Meeting Date: November 17, 2005
  10. **Sky Valley Area Open Space (Vice Mayor Patterson and Council Member Smith)** Next Meeting Date: To be determined at November 9, 2005 meeting.
  11. **Solano EDC Board of Directors (Vice Mayor Patterson)**  
Next Meeting Date: November 17, 2005
  12. **Solano Transportation Authority (STA) (Mayor Messina)**  
Next Meeting Date: December 14, 2005
  13. **Solano Water Authority/Solano County Water Agency (Mayor Messina)**  
Next Meeting Date: December 8, 2005
  14. **Traffic, Pedestrian and Bicycle Safety Committee (Vice Mayor Patterson and Council Member Campbell)** Next Meeting Date: January 19, 2006
  15. **Tri-City and County Regional Parks and Open Space (Council Member Whitney)** Next Meeting Date: December 12, 2005
  16. **Urban Water Management Planning Task Force (Vice Mayor Patterson and Mayor Messina)** Next Meeting Date: No further meetings are scheduled.
  17. **Valero Community Advisory Panel (CAP) (Council Member Whitney)**  
Next Meeting Date: January 26, 2006
  18. **Youth Action Task Force (Council Member Whitney)**  
Next Meeting Date: December 7, 2005
- B. **ABAG/CAL FED Task Force/Bay Area Water Forum (Vice Mayor Patterson)**  
Next Meeting Date: Not yet scheduled.

**XIII. ADJOURNMENT:**

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## **Public Participation**

The Benicia City Council welcomes public participation.

Pursuant to the Brown Act, each public agency must provide the public with an opportunity to speak on any matter within the subject matter jurisdiction of the agency and which is not on the agency's agenda for that meeting. The City Council allows speakers to speak on agenda and non-agenda matters under public comment. Comments are limited to no more than 5 minutes per speaker. By law, no action may be taken on any item raised during the public comment period although informational answers to questions may be given and matters may be referred to staff for placement on a future agenda of the City Council.

Should you have material you wish to enter into the record, please submit it to the City Manager.

## **Disabled Access**

In compliance with the Americans with Disabilities Act (ADA), if you need special assistance to participate in this meeting, please contact Diane O'Connell, the ADA Coordinator, at (707) 746-4211. Notification 48 hours prior to the meeting will enable the City to make reasonable arrangements to ensure accessibility to this meeting.

## **Meeting Procedures**

All items listed on this agenda are for Council discussion and/or action. In accordance with the Brown Act, each item is listed and includes, where appropriate, further description of the item and/or a recommended action. The posting of a recommended action does not limit, or necessarily indicate, what action may be taken by the City Council.

Pursuant to Government Code Section 65009, if you challenge a decision of the City Council in court, you may be limited to raising only those issues you or someone else raised at the public hearing described in this notice, or in written correspondence delivered to the City Council at, or prior to, the public hearing.

The decision of the City Council is final as of the date of its decision unless judicial review is initiated pursuant to California Code of Civil Procedure Section 1094.5. Any such petition for judicial review is subject to the provisions of California Code of Civil Procedure Section 1094.6.

# DRAFT

## MINUTES OF THE REGULAR MEETING – CITY COUNCIL NOVEMBER 15, 2005

The regular meeting of the City Council of the City of Benicia was called to order by Mayor Steve Messina at 7:30 p.m. on Tuesday, November 15, 2005, in the City Council Chambers, City Hall, 250 East L Street, complete proceedings of which are recorded on tape.

### ROLL CALL:

Present: Council Members Campbell, Patterson, Smith, and Mayor Messina

Absent: Council Member Whitney

### PLEDGE OF ALLEGIANCE:

Mayor Messina led the pledge to the flag.

### FUNDAMENTAL RIGHTS:

A plaque stating the Fundamental Rights of each member of the public is posted at the entrance to the Council Chambers per Section 4.04.030 of City of Benicia Ordinance No. 05-6 (Open Government Ordinance)

### ANNOUNCEMENTS/APPOINTMENTS/PRESENTATIONS/PROCLAMATIONS:

#### ANNOUNCEMENTS:

##### Action taken in Closed Session:

Ms. McLaughlin stated that Council authorized the waiver of the Attorney-Client Privilege in respect to this case (Togonon v. City of Benicia) for advice received from Liebert Cassidy Whitmore Law Firm.

##### Openings on Boards and Commissions:

- Open Government Commission: Five terms ranging from 1-4 years
- Library Board of Trustees: Two terms

The Solano County LAFCO will be holding a public meeting regarding the Bordoni Ranch annexation on 12/12/05 at 6:00 p.m. in the Board of Supervisor's Chamber at the County Government Center in Fairfield.

### APPOINTMENTS:

#### RESOLUTION 05-172 - A RESOLUTION CONFIRMING THE MAYOR'S REAPPOINTMENT OF ATIBA MURPHY TO THE BENICIA HOUSING AUTHORITY BOARD OF COMMISSIONERS TO A FULL TERM ENDING DECEMBER 31, 2007

The above Resolution was adopted, on roll call by the following vote:

Ayes: Council Members Campbell, Patterson, Smith, and Mayor Messina

Noes: None

# DRAFT

Absent: Council Member Whitney

RESOLUTION 05-173 - A RESOLUTION CONFIRMING THE MAYOR'S REAPPOINTMENT OF RICHARD SPRANKLE TO THE BENICIA HOUSING AUTHORITY BOARD OF COMMISSIONERS TO A FULL TERM ENDING DECEMBER 31, 2007

The above Resolution was adopted, on roll call by the following vote:

Ayes: Council Members Campbell, Patterson, Smith, and Mayor Messina

Noes: None

Absent: Council Member Whitney

RESOLUTION 05-174 - A RESOLUTION CONFIRMING THE MAYOR'S APPOINTMENT OF JOEL FALLON AS BENICIA POET LAUREATE TO A TERM THAT IS EFFECTIVE IMMEDIATELY AND ENDS AUGUST 31, 2007

The above Resolution was adopted, on roll call by the following vote:

Ayes: Council Members Campbell, Patterson, Smith, and Mayor Messina

Noes: None

Absent: Council Member Whitney

PROCLAMATIONS:

Mayor Messina presented a proclamation naming Mr. Joel Fallon Benicia's Poet Laureate.

Mr. Fallon thanked Sandy Stillwell for helping this position come to fruition. He also thanked Mary Eichbauer, his wife, and many others who have supported him in this endeavor. He recited a poem titled 'Return to Benicia.'

PRESENTATIONS:

Benicia Firefighters Association (BFA):

Mr. Steve Booth, BFA, thanked Council Members Campbell and Smith for their distinguished service on the City Council. He wished them well in their future endeavors. He had originally requested this item be placed on the agenda in anticipation of a negotiation session scheduled for 11/14. That bargaining session was postponed. For that reason, he requested the presentation be pulled off the current agenda and be rescheduled for a future date.

ADOPTION OF AGENDA:

On motion of Vice Mayor Patterson, seconded by Council Member Smith, the Agenda was adopted as presented, on roll call by the following vote:

Ayes: Council Members Campbell, Patterson, Smith, and Mayor Messina

Noes: None

Absent: Council Member Whitney

COMMUNICATIONS:

WRITTEN:

Various letters submitted (copies on file).

PUBLIC COMMENT:

1. Tracee Devincenzi - Ms. Devincenzi discussed the property formerly known as the Girl Scout House. The Girl Scouts need a house and want to work with the City to get a new house built for the Scouts.
2. Debbie Bozanich – Ms. Bozanich discussed the need for a Girl Scout House.

Council Member Smith asked Staff about the status of this project (Community Center/Scout house). Mr. Erickson stated that the plans for this project are near completion. This is a budgeted project and Staff hopes to bring a report back to Council for action within 60 days.

Council Member Campbell stated that we should forget about the Mills school site and just build a building.

Mayor Messina stated that he has been supportive of this project from day one.

Vice Mayor Patterson stated that they were welcome to contact her to set up a meeting to discuss the issue.

Ms. Betsy Radke passed out cards and nuts for Council.

3. Bill Royal – Mr. Royal stated that the bad, evil man (Mr. Golick) was not at tonight’s meeting. He discussed specifics on the problems he has encountered while trying to get his project going. He wanted to be placed on the next Planning Commission agenda to discuss his project. He is out \$40,000 because of Mr. Golick and the City. He discussed Mr. Golick’s dismissal from employment by the City. He stated that his (Mr. Royal’s) problem with Mr. Golick interlocks with the reason he was dismissed from the City.

Mr. Erickson requested that Mr. Royal not discuss personnel issues. Mr. Royal stated that the City Attorney told him he could speak his mind. Ms. McLaughlin cautioned Mr. Royal that he could be liable for actions if his words were incorrect. Mr. Royal stated that he challenged anyone to try and dispute his comments. He has copies of emails that back up his comments. He asked if the City of Benicia was going to act like the Catholic Church and give Mr. Golick a recommendation so that he could go to another community and harass them.

Ms. McLaughlin stated that Mr. Golick was not dismissed, but chose to leave the City’s employment of his own accord. She has advised Mr. Royal that if he wants to file a claim against the City he is free to do so. Claim forms are available at the offices of the City Clerk and the City Attorney.

## DRAFT

4. Bob Craft – Mr. Craft urged citizens to join Benicia Education Foundation (BEF). He talked about BEF’s supplemental tuition drive.
5. Mary Frances Kelly Poh – Ms. Poh announced the Community Thanksgiving Dinner at the Clocktower put on by the Community Action Council. She invited everyone in the community. This is a free event.
6. James Farr – Mr. Farr stated that he asked (in writing) the City Manager to put his request for discussion of 153 East D Street on the next Council agenda. The request was denied by the City Manager. He asked how to go about getting his item on the agenda. Mayor Messina stated that he should contact any of the Council Members, but not himself, as he has a conflict of interest on this item.

Mr. Erickson stated that Council gave Staff specific direction to check out four particular issues. Staff should have a report for Council (and Mr. Farr) in the next few days. Staff’s interest is in assuring compliance with all codes and regulations.

7. Council Member Smith – Council Member Smith congratulated all the recent winners of the election. He wished them well and asked them to make the City proud. He stated that the City deserves the best. He stated that there is a need for poll workers at future elections. He announced the following events:
  - 11/17/05 - Blood Drive at the First Baptist Church
  - 11/19/05 – VOENA concert
  - 11/19/05 – Concert at the Majestic Theatre featuring Ken Maffeo
  - 11/26-11/27/05 – Benicia Ballet’s annual production of ‘The Nutcracker’
  - 12/2/05 – Downtown Open House and Tree Lighting ceremony
  - 12/2/05 – Glass Studio’s Annual Open House
  - 12/10/05 – Concert at the Majestic Theatre featuring ‘King of Strings’
8. Council Member Campbell stated that he did not get re-elected so he would now speak as a citizen. He wanted to discuss the Firefighter’s negotiations. His comments would not represent the views of the Council. Ms. McLaughlin stated that he was still a Council Member. Even after he is no longer a Council Member, he cannot disclose information obtained in Closed Session without the permission of the Council. Council Member Campbell stated that at some point, the City would need to meet and maybe go over the average pay scale of other cities. In the future, if we don’t get the average of the other cities, we are going to have an attrition problem. It is tough to track people because the City is not paying them enough. This should happen fairly soon. He hoped the future City Council Members would take his comments into consideration.
9. Vice Mayor Patterson – Vice Mayor Patterson acknowledged the great public service that Council Members Campbell and Smith have provided to the City. The citizens have benefited from their service. She hopes they continue to provide service to Benicia. It would be good for Benicia.

CONSENT CALENDAR:  
Council pulled items VII-C.

# DRAFT

On motion of Council Member Smith, seconded by Vice Mayor Patterson, the Agenda was adopted as amended, on roll call by the following vote:

Ayes: Council Members Campbell, Patterson, Smith, and Mayor Messina

Noes: None

Absent: Council Member Whitney

The minutes of the October 31, 2005 Special Council meeting and the November 1, 2005 Special and Regular meetings were approved.

Council approved denial of the following claims against the City and referral to insurance carrier:

- Maria Daffon
- Barbara Gates

## RESOLUTION 05-175 - A RESOLUTION APPROVING THE SELECTION OF THE "DOWNTOWN BENICIA" DESIGN AS THE OFFICIAL DIRECTIONAL SIGN TO DOWNTOWN PARKING

Approval to waive the reading of all ordinances introduced and adopted pursuant to this agenda.

(END OF CONSENT CALENDAR)

Council took the following actions:

Approval of engineering services agreement for design of the State Park Road Bike/Pedestrian Bridge Project:

Vice Mayor Patterson asked Staff to explain the use of the consultant for this project and offered a substitute resolution for approval. Mr. Erickson stated that Staff does not have the resources to do the detailed design work. The project is completely funded by federal money. Vice Mayor Patterson reviewed her suggested changes to the proposed Resolution (copy on file).

Council did not have objections to the changes proposed by Vice Mayor Patterson.

## RESOLUTION 05-176 - A RESOLUTION APPROVING A CONSULTANT AGREEMENT WITH PAKPOUR CONSULTING GROUP FOR ENGINEERING SERVICES FOR THE STATE PARK ROAD BIKE/PEDESTRIAN BRIDGE PROJECT, APPROVING TASK ORDER NO. 1 IN THE AMOUNT OF \$124,445, AND AUTHORIZING THE CITY MANAGER TO SIGN THE AGREEMENT AND TASK ORDER ON BEHALF OF THE CITY

On motion of Vice Mayor Patterson, seconded by Council Member Smith, the above Resolution was adopted as amended, on roll call by the following vote:

Ayes: Council Members Campbell, Patterson, Smith, and Mayor Messina

Noes: None

Absent: Council Member Whitney

## **DRAFT**

### PUBLIC HEARINGS:

#### Review of City of Benicia Urban Water Management Plan (UWMP) – 2005 Update:

Chris Tomasik, Assistant Director/Utility Manager, reviewed the Staff report.

Lisa House, Consultant, CDM, reviewed a PowerPoint presentation on the Urban Water Management Plan (hard copy on file).

Ms. Kathleen Van Velsor, Member, Urban Water Management Plan Task Force, stated that it has been a great experience being on the task force. The plan stands head and shoulders above the other plans she had the chance to review. It is concise and to the point. The plan should serve the City well for the next five years.

Vice Mayor Patterson acknowledged the skillful chairing of the committee that Ms. Van Velsor brought. She discussed the issue of the potential catastrophic loss of water that Ms. Van Velsor discussed. There is a recommendation on that issue in the report that she hopes that the City acknowledges in some action that could be taken between now and the next UWMP update. She suspects Staff will have a proposal for that. She acknowledged the participants involved in the task force meetings. They spent a lot of time on the plan.

### Public Comment:

1. Greg Gartrell – Mr. Gartrell acknowledged the efforts of the task force. It is important to acknowledge where the City is now compared to where it was 10-15 years ago during the last drought. There is a huge difference. He discussed the Ahwahnee Principles and how it relates to the UWMP. He urged Council to make sure the UWMP and the General Plan line up with the Principles and Policies. He does not know whether or not they line up at this time.

Ms. Tomasik stated that there was a section in the plan that discusses which of the Ahwahnee Principles is addressed. The other principles are something that has been presented to the City Manager for Council to look at in the context of Staff's priorities.

Vice Mayor Patterson stated that the Ahwahnee Principles embody in more detail the essential principles in the General Plan. In the current UWMP, it is an appendix and it would be something that would have to come back to Council for adoption. That is something she would like Council to consider. Right now, it is just an appendix to be used as a reference point.

Staff will bring this back for a vote from Council at the 12/6/05 Council meeting.

Vice Mayor Patterson stated that it would be helpful to iterate the recommendations in the plan and suggest for future Council action to take those under consideration. The recommendations are excellent. It would be helpful to have those available in one place. She would like to include in the recommendations that the Ahwahnee Principles be considered for future Council action.

# DRAFT

## UNFINISHED BUSINESS:

Discussion of policy for City assistance to disaster victims – continued from November 1, 2005 City Council meeting:

Jim Erickson, City Manager, reviewed the Staff report.

Vice Mayor Patterson stated that the intent was to ask an informal employee survey to demonstrate interest in this. If there is a level of interest, perhaps management could begin developing policies to deal with this issue. She discussed the levies and what would happen if they collapsed. She wanted to have Council direct staff to do an informal survey see if there was an interest and develop the policies that are appropriate to that.

Council Member Smith asked if there was a specific policy in place that deals with this. Mr. Erickson stated that issues are reviewed on a case-by-case basis and he was not aware of a policy. He is not sure if it would take a survey to find out the information Council wants. Council Member Smith stated that he would support Staff to look come up with some sort of recommendation on a policy for this.

## NEW BUSINESS:

Discussion of Vice Mayor Patterson's proposed Grading Ordinance amendments – continued from November 1, 2005 City Council meeting:

Vice Mayor Patterson requested this item be continued to January 2006 so the new Council could spend the amount of time needed on this.

## Public Comment:

1. Marilyn Bardet – Ms. Bardet thanked Council Members Campbell and Smith for their service. She discussed the issue of grading with respect to the Seeno project. She was concerned how the project will look. There are more opportunities this time to look at that. She discussed the slopes on Columbus Parkway, Lake Herman Road, Blue Rock Springs area, etc. It is hard to repair issues like those areas have. It is hard to grow things in those types of areas. She urged Council to look strongly at the requirements make slopes that are more gradual and obey the topography of the land that we have. The way this ends up looking is very important.

## Cancellation of the December 20, 2005 City Council Meeting:

Jim Erickson, City Manager, reviewed the Staff report.

Mayor Messina stated that he is opposed to canceling the meeting.

Council Member Campbell stated that he is inclined to let the new Council Members earn their money.

Council agreed to hold the 12/20/05 Council meeting as scheduled.

## Review of request to televise Historic Preservation Review Commission (HPRC)

### Meetings:

Jim Erickson, City Manager, reviewed the Staff report.

Council Member Smith asked how much more difficult it would be for the HPRC to change meeting dates to accommodate the availability of Council chambers. Mr. Erickson stated that was why he would like to see this go back to the HPRC for discussion. Council Member Smith stated that he was in favor of sending this to the HPRC to investigate the issues and present its recommendations.

Vice Mayor Patterson stated that it would be important to find out if changing the regular meeting time of the HPRC would conflict with Council's schedule.

Council Member Campbell stated that it is generally a good idea to have commission meetings televised. The issues being discussed by the HPRC are becoming more and more important.

### Public Comment:

1. Bonnie Silveria – Ms. Silveria stated that the Planning Commission reviews the minutes of the HPRC. However, it would be easier to see what was actually happening. It would be good for the public to be able to see the meetings.
2. Marilyn Bardet – Ms. Bardet concurred with Ms. Silveria on her comments. The public would benefit from seeing the meetings. The decisions being made are crucial.

Mayor Messina stated that when people watch the meetings on TV, there is no public participation. There are hot issues at many of the different commission meetings. He welcomed the opportunity to send this back to the HPRC to get their take on this.

Vice Mayor Patterson stated that the HPRC is in a quasi-judiciary position. Council benefits from being able to have access to the deliberations by these commissions. Because the role of the HPRC was expanded to include things historically handled by the Planning Commission, it is important that we consider that. She asked how much extra money is spent on having additional meetings because we have not been able to get the information across to the public. People who are monitoring issues and are persuaded by someone else's interpretation may actually add to the length of the processing of the project because they have not been able to see the discussion. She would like Staff to consider looking into the Community College to see if there is a possible role for them. She does not know if it would be feasible. She would like Staff to convey Council's suggestions to the Commission for review. She asked for a Staff explanation for the meeting of 11/17.

Mr. Erickson stated that there is a public hearing on the historic resources inventory. The issue has received a lot of comments and interest from the community. The intent is to open the public hearing and receive comments. The intent is not to finish the item. It is to take input and perhaps set up another process or another public workshop for education,

## DRAFT

input, and public comment. It will be the first opportunity for the public to have opportunity for input and then get into an interactive community place for further discussion before it goes back to the HPRC for action.

Vice Mayor Patterson stated that it would be helpful to have the 11/17 meeting televised. It is an important presentation by a consultant of the City. There are people that might feel that they are left out of the process, not understanding that this is an opportunity to comment on errors and omissions and corrections to the report and to seek some policy issues.

Council Member Smith stated that it is contradictory to ask the HPRC if they want the meetings televised, and then tell them the next meeting will be televised with two days notice.

### REPORTS FROM CITY MANAGER:

Jim Erickson stated that the new Interim Community Development Director, Bob Brown, would be starting on 11/17/05. He briefly reviewed Mr. Brown's past work experience.

### Review of proposed joint use agreements with Benicia Unified School District (BUSD) - continued from November 1, 2005 City Council meeting:

Jim Erickson, City Manager, reviewed the Staff report.

Council Member Smith stated that was the same report that was given three months ago. He is extremely disappointed at Staff's unwillingness to continually respond to his request for a public meeting on this issue. He thinks there were political considerations as to why the City has not yet accomplished this.

Council Member Campbell stated that Staff does a great job. He will miss working with them.

Mayor Messina stated that the new Council and the new School Board should be able to comment and have buy-in on this issue. He would like to be able to present a complete project to the School Board and Council at one of the next meetings. We may need to arrange a joint meeting to get that accomplished.

### REPORTS FROM CITY COUNCIL COMMITTEES:

1. Mayors' Committee Meeting -- Mayor Messina -- Next meeting date: December 21, 2005
2. Arsenal Restoration Advisory Board -- Council Member Campbell -- Next meeting date: Not yet scheduled
3. Association of Bay Area Governments (ABAG) -- Vice Mayor Patterson -- Next meeting date: April 20, 2006
4. Audit & Finance Committee -- Council Members Campbell and Patterson -- Next meeting date: December 9, 2005
5. Carquinez Strait Preservation Trust -- Council Member Smith -- Next meeting date: Not yet scheduled

## **DRAFT**

6. First Street Revitalization Committee – Council Members Campbell and Smith – Next meeting date: December 8, 2005
7. League of California Cities – Council Member Smith – Next meeting date: Not yet scheduled
8. Police Station and Civic Center Restoration Committee – Mayor Messina and Council Member Smith – Next meeting date: Not scheduled
9. School District Liaison – Council Members Smith and Whitney – Next meeting date: November 17, 2005
10. Sky Valley Area Open Space – Council Members Patterson and Smith – Next meeting date: January 18, 2006
11. Solano EDC Board of Directors – Vice Mayor Patterson – Next meeting date: November 17, 2005
12. Solano Transportation Authority (STA) – Mayor Messina – Next meeting date: December 14, 2005
13. Solano Water Authority/Solano County Water Agency – Mayor Messina – Next meeting date: December 8, 2005
14. Traffic, Pedestrian and Bicycle Safety Committee – Council Members Campbell and Patterson – Next meeting date: January 19, 2006
15. Tri-City and County Regional Parks and Open Space – Council Member Whitney – Next meeting date: December 12, 2005
16. Urban Water Management Planning Task Force – Vice Mayor Patterson and Mayor Messina – Next meeting date: No further meetings scheduled
17. Valero Citizens Advisory Panel (CAP) - Council Member Whitney – Next meeting date: January 26, 2006
18. Youth Action Task Force – Council Member Whitney – Next meeting date: December 7, 2005

ABAG/CAL FED Task Force/Bay Area Water Forum – Vice Mayor Patterson – Next meeting date: Not yet scheduled

### ADJOURNMENT:

Mayor Messina adjourned the meeting at 9:17 p.m.

*Appendix E*  
**Signed Copy of UWMP Adoption Resolution**

**RESOLUTION NO. 05-177**

**A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF BENICIA  
ADOPTING THE 2005 URBAN WATER MANAGEMENT PLAN AND  
DIRECTING STAFF TO SUBMIT THE PLAN BY THE DECEMBER 31, 2005  
DEADLINE**

**WHEREAS**, the Urban Water Management Planning Act requires all urban water suppliers providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet annually to update their Urban Water Management Plan (UWMP) at least every five years and to submit the UWMP to the Department of Water Resources by December 31 in the years ending in 0 and 5; and

**WHEREAS**, an UWMP is required in order for a water supplier to be eligible for State administered grants, loans, and drought assistance; and

**WHEREAS**, the City is an urban supplier providing water to a population of approximately 28,000; and

**WHEREAS**, the City has updated its UWMP in compliance with the California Water Code; and

**WHEREAS**, the UWMP was available for public review and comment; and

**WHEREAS**, a public hearing was held on November 15, 2005 to receive oral or written statements.

**NOW, THEREFORE, BE IT RESOLVED THAT** the City Council of the City of Benicia hereby adopts the 2005 Urban Water Management Plan.

**BE IT FURTHER RESOLVED THAT** City staff is directed to submit the document to the Department of Water Resources by the December 31, 2005 deadline.

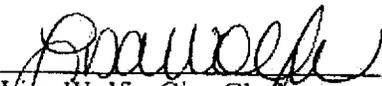
**\*\*\*\*\***

On motion of Council Member **Smith**, seconded by Council Member **Whitney**, the above Resolution was introduced and passed by the City Council of the City of Benicia at a regular meeting of said Council held on the 6<sup>th</sup> day of December, 2005 and adopted by the following vote:

Ayes: **Council Members Campbell, Patterson, Smith, Whitney and Mayor Messina**  
Noes: **None**  
Absent: **None**

  
\_\_\_\_\_  
Steve Messina, Mayor

ATTEST:

  
\_\_\_\_\_  
Lisa Wolfe, City Clerk

*Appendix F*  
**SWP Reliability Estimates**

**Appendix F**  
**SWP Reliable Delivery Percentages**

| Year | Sacramento Valley Index (2) | Year 2001 and 2005 (1) |                                    |  |  | Year 2020 and 2025 (2) |                                    |  |   |
|------|-----------------------------|------------------------|------------------------------------|--|--|------------------------|------------------------------------|--|---|
|      |                             | % Full Table A         | % Full Table A for Normal Year (N) | % Full Table A for Single Dry Year (D) (3) | % Full Table A for Multiple Dry Year (4 Dry Years) | % Full Table A         | % Full Table A for Normal Year (N) | % Full Table A for Single Dry Year (D) (3) | % Full Table A for Multiple Dry Years (4 Dry Years) |
| 1922 | N                           | 0.91                   | 0.91                               |  |  | 1.00                   | 1.00                               |  |   |
| 1923 | N                           | 0.79                   | 0.79                               |  |  | 1.00                   | 1.00                               |  |   |
| 1924 | D                           | 0.30                   |                                    | 0.30                                       |  | 0.09                   |                                    | 0.09                                       |   |
| 1925 | D                           | 0.45                   |                                    |  |  | 0.36                   |                                    |  |   |
| 1926 | D                           | 0.72                   |                                    |  |  | 0.66                   |                                    |  |   |
| 1927 | W                           | 0.93                   |                                    |  |  | 1.00                   |                                    |  |   |
| 1928 | N                           | 0.82                   | 0.82                               |  |  | 0.82                   | 0.82                               |  |   |
| 1929 | D                           | 0.27                   |                                    | 0.27                                       | 0.27   | 0.27                   |                                    | 0.27                                       | 0.27  |
| 1930 | D                           | 0.69                   |                                    |  | 0.69   | 0.66                   |                                    |  | 0.66  |
| 1931 | D                           | 0.25                   |                                    |  | 0.25   | 0.26                   |                                    |  | 0.26  |
| 1932 | D                           | 0.34                   |                                    |  | 0.34   | 0.38                   |                                    |  | 0.38  |
| 1933 | D                           | 0.32                   |                                    |  |  | 0.32                   |                                    |  |   |
| 1934 | D                           | 0.37                   |                                    |  |  | 0.36                   |                                    |  |   |
| 1935 | N                           | 0.92                   | 0.92                               |  |  | 0.98                   | 0.98                               |  |   |
| 1936 | N                           | 0.87                   | 0.87                               |  |  | 0.90                   | 0.90                               |  |   |
| 1937 | N                           | 0.82                   | 0.82                               |  |  | 0.82                   | 0.82                               |  |   |
| 1938 | W                           | 0.81                   |                                    |  |  | 1.00                   |                                    |  |   |
| 1939 | D                           | 0.79                   |                                    | 0.79                                       |  | 0.83                   |                                    | 0.83                                       |   |
| 1940 | N                           | 0.78                   | 0.78                               |  |  | 1.00                   | 1.00                               |  |   |
| 1941 | W                           | 0.61                   |                                    |  |  | 0.95                   |                                    |  |   |
| 1942 | W                           | 0.77                   |                                    |  |  | 1.00                   |                                    |  |   |
| 1943 | W                           | 0.75                   |                                    |  |  | 0.92                   |                                    |  |   |
| 1944 | D                           | 0.75                   |                                    | 0.75                                       |  | 0.86                   |                                    | 0.86                                       |   |
| 1945 | N                           | 0.75                   | 0.75                               |  |  | 0.94                   | 0.94                               |  |   |
| 1946 | N                           | 0.78                   | 0.75                               |  |  | 0.93                   | 0.93                               |  |   |
| 1947 | D                           | 0.80                   |                                    | 0.80                                       |  | 0.67                   |                                    | 0.67                                       |   |
| 1948 | N                           | 0.72                   | 0.72                               |  |  | 0.71                   | 0.71                               |  |   |
| 1949 | D                           | 0.55                   |                                    | 0.55                                       |  | 0.49                   |                                    | 0.49                                       |   |
| 1950 | N                           | 0.78                   | 0.78                               |  |  | 0.82                   | 0.82                               |  |   |
| 1951 | N                           | 0.85                   | 0.85                               |  |  | 1.00                   | 1.00                               |  |   |
| 1952 | W                           | 0.63                   |                                    |  |  | 0.95                   |                                    |  |   |
| 1953 | W                           | 0.81                   |                                    |  |  | 1.00                   |                                    |  |   |
| 1954 | N                           | 0.80                   | 0.80                               |  |  | 1.00                   | 1.00                               |  |   |
| 1955 | D                           | 0.54                   |                                    | 0.54                                       |  | 0.36                   |                                    | 0.36                                       |   |
| 1956 | W                           | 0.87                   |                                    |  |  | 1.00                   |                                    |  |   |
| 1957 | N                           | 0.79                   | 0.79                               |  |  | 0.86                   | 0.86                               |  |   |
| 1958 | W                           | 0.72                   |                                    |  |  | 1.00                   |                                    |  |   |
| 1959 | N                           | 0.85                   | 0.85                               |  |  | 0.92                   | 0.92                               |  |   |
| 1960 | D                           | 0.45                   |                                    | 0.45                                       |  | 0.39                   |                                    | 0.39                                       |   |
| 1961 | D                           | 0.65                   |                                    |  |  | 0.66                   |                                    |  |   |
| 1962 | N                           | 0.79                   | 0.79                               |  |  | 0.80                   | 0.80                               |  |   |
| 1963 | W                           | 0.93                   |                                    |  |  | 1.00                   |                                    |  |   |
| 1964 | D                           | 0.81                   |                                    | 0.81                                       |  | 0.70                   |                                    | 0.70                                       |   |
| 1965 | W                           | 0.74                   |                                    |  |  | 0.84                   |                                    |  |   |
| 1966 | N                           | 0.80                   | 0.80                               |  |  | 1.00                   | 1.00                               |  |   |
| 1967 | W                           | 0.72                   |                                    |  |  | 1.00                   |                                    |  |   |
| 1968 | N                           | 0.81                   | 0.81                               |  |  | 0.82                   | 0.82                               |  |   |
| 1969 | W                           | 0.64                   |                                    |  |  | 0.95                   |                                    |  |   |
| 1970 | W                           | 0.79                   |                                    |  |  | 1.00                   |                                    |  |   |
| 1971 | W                           | 0.81                   |                                    |  |  | 1.00                   |                                    |  |   |
| 1972 | N                           | 0.81                   | 0.81                               |  |  | 0.66                   | 0.66                               |  |   |
| 1973 | N                           | 0.75                   | 0.75                               |  |  | 0.98                   | 0.98                               |  |   |
| 1974 | W                           | 0.77                   |                                    |  |  | 1.00                   |                                    |  |   |
| 1975 | W                           | 0.79                   |                                    |  |  | 1.00                   |                                    |  |   |
| 1976 | D                           | 0.79                   |                                    | 0.79                                       |  | 0.76                   |                                    | 0.76                                       |   |
| 1977 | D                           | 0.04                   |                                    |  |  | 0.05                   |                                    |  |   |
| 1978 | N                           | 0.88                   | 0.88                               |  |  | 0.94                   | 0.94                               |  |   |
| 1979 | N                           | 0.85                   | 0.85                               |  |  | 0.91                   | 0.91                               |  |   |
| 1980 | N                           | 0.66                   | 0.66                               |  |  | 0.85                   | 0.85                               |  |   |

**Appendix F  
SWP Reliable Delivery Percentages**

| Year | Sacramento Valley Index (2) | Year 2001 and 2005 (1)        |                                    |  | Year 2020 and 2025 (2)                             |                               |                                    |  |   |
|------|-----------------------------|-------------------------------|------------------------------------|--|--|-------------------------------|------------------------------------|--|---|
|      |                             | % Full Table A                | % Full Table A for Normal Year (N) | % Full Table A for Single Dry Year (D) (3) | % Full Table A for Multiple Dry Year (4 Dry Years) | % Full Table A                | % Full Table A for Normal Year (N) | % Full Table A for Single Dry Year (D) (3) | % Full Table A for Multiple Dry Years (4 Dry Years) |
| 1981 | D                           | 0.82                          |                                    | 0.82                                       |  | 0.92                          |                                    | 0.92                                       |   |
| 1982 | W                           | 0.70                          |                                    |  |  | 1.00                          |                                    |  |   |
| 1983 | W                           | 0.61                          |                                    |  |  | 0.95                          |                                    |  |   |
| 1984 | W                           | 0.67                          |                                    |  |  | 1.00                          |                                    |  |   |
| 1985 | D                           | 0.78                          |                                    | 0.78                                       |  | 0.83                          |                                    | 0.83                                       |   |
| 1986 | W                           | 0.56                          |                                    |  |  | 0.69                          |                                    |  |   |
| 1987 | D                           | 0.70                          |                                    | 0.70                                       | 0.70   | 0.80                          |                                    | 0.80                                       | 0.80  |
| 1988 | D                           | 0.21                          |                                    |  | 0.21   | 0.10                          |                                    |  | 0.10  |
| 1989 | D                           | 0.77                          |                                    |  | 0.77   | 0.85                          |                                    |  | 0.85  |
| 1990 | D                           | 0.27                          |                                    |  | 0.27   | 0.21                          |                                    |  | 0.21  |
| 1991 | D                           | 0.26                          |                                    |  |  | 0.21                          |                                    |  |   |
| 1992 | D                           | 0.35                          |                                    |  |  | 0.35                          |                                    |  |   |
| 1993 | N                           | 0.94                          | 0.94                               |  |  | 1.00                          | 1.00                               |  |   |
| 1994 |                             | 0.80                          |                                    |  |  | 0.76                          |                                    |  |   |
|      |                             | <b>Average for 2000, 2005</b> | <b>0.81</b>                        | <b>0.64</b>                                | <b>0.44</b>  | <b>Average for 2020, 2025</b> | <b>0.90</b>                        | <b>0.61</b>                                | <b>0.44</b>   |

(1) Based on DWR Study 7 for 2020 level of development, 2004 OCAP. Per DWR, this can be used for 2025 estimates.

(2) Based on DWR Study 6 for 2001 level of development, 2004 OCAP. Per DWR, this can be used for 2005 estimates.

(3) Sacramento Valley Index: W = Wet Year; N = Below Normal, Normal, or Above Normal Year; D = Dry or Critically Dry Year

(4) Single dry year is based on only the first year only of consecutive dry years periods.

*Appendix G*  
**Settlement Water Reliability Analysis (CH2M-Hill)**

# Supplemental Water Supply Assessment in Support of the City of Benicia Urban Water Management Plan

PREPARED FOR: Chris Tomasik, Assistant Director of Public Works, City of Benicia

PREPARED BY: Ben Everett, P.E.  
Jeanne Brantigan, P.E.

REVIEWED BY: Greg Eldridge, P.E.

DATE: October 23, 2005

## I. Introduction

This technical memorandum (TM) provides supporting water supply analysis to the City of Benicia's Urban Water Management Plan. This analysis addresses the expected reliability of water to be provide to the City in accordance with (1) Table A entitlement supplies as proposed in the modified State Water Project (SWP) Delivery Reliability Report; and (2) the *Settlement Agreement Among the Department of Water Resources of the State of California, Solano County Water Agency, and Cities of Fairfield, Vacaville, and Benicia for Purposes of Water Supply*, dated May 19, 2003. This water is referred to as "Settlement Water."

The analysis will be consistent with studies supporting (1) the *Agreement for Conveying Settlement Water Through the North Bay Aqueduct by the Department of Water Resources to the Solano County Water Agency for the Cities of Fairfield, Vacaville, and Benicia*, dated May 19, 2003; (2) the *Agreement Regarding Priorities for Non-Project Water Transported through the North Bay Aqueduct by and between the Solano County Water Agency and the Cities of Fairfield, Benicia, Vallejo, and Vacaville*, dated March 18, 2003; and (3) the *"Supplemental Analysis in Support of the City of Vacaville SB 610 Water Supply Assessment"*, dated January 9, 2004.

This study addresses the expected reliability of Settlement Water and SWP water to meet projected City of Benicia water demands. This analysis is not inclusive of all water supply sources available to the City of Benicia and does not address the City's ability to meet their full water demand with all available supply sources.

## II. Analysis Methods

To determine the expected reliability of Benicia's water supplies, a supply simulation model was utilized. Water supply reliability was analyzed on an annual basis in the context of two water supply sources used by the City, SWP and Settlement Water. The model used in this supplemental analysis, SOLANO\_SIM, was developed for the Draft Environmental Impact Report (DEIR) for the *Cities of Fairfield, Vacaville, and Benicia Water Rights Appropriations Project* (2001). The Settlement Agreement with DWR was a result of negotiations to protests by DWR and the State Water Contractors to the area of origin water right applications filed by the Cities of Vacaville, Fairfield and Benicia.

## Simulation Modeling for Benicia Water Supplies

SOLANO\_SIM model simulation runs were performed using a monthly timestep. The model simulated the SWP's North Bay Aqueduct (NBA), the primary conveyance facility needed to serve the cities of Vacaville, Fairfield, and Benicia. The model determines deliveries to these cities monthly while adhering to the physical and operational limitations of the NBA.

The NBA was constructed to serve areas in Solano and Napa Counties. SWP Table A contract deliveries to Solano County Water Agency (purveyor to Vacaville, Fairfield, and Benicia), the Cities of Vallejo and Napa, and other contractors are simulated in SOLANO\_SIM. Barker Slough Pumping Plant (BSPP) lifts water from Barker Slough into the NBA with a stated physical capacity of 175 cubic feet per second<sup>1</sup>. Settlement Water is assumed delivered through any remaining BSPP and NBA simulated conveyance capacities. The simulation model, additionally, performs tests for excess NBA capacity at (1) the North Bay Regional Water Treatment Plant, and (2) the turnouts to Vallejo and Napa.

Excess capacity is computed monthly to determine the physical potential to deliver Settlement Water to each city. Excess capacity is shared in proportion to the maximum settlement amount (Vacaville/Fairfield/Benicia – 9.32/11.80/10.50). Simulations of delivery of Settlement Water consider all senior users of the NBA. Deliveries are not simulated if physical capacity of the NBA has been reached in any month.

SOLANO\_SIM utilizes monthly distributions of the aforementioned supplies. The deliveries of water through the NBA to the three cities are premised on the 73-year output (1922 – 1994 simulation) from updated CALSIM II simulation results provided by DWR. DWR is preparing an update of the SWP Delivery Reliability Report issued in 2003. Many SWP Contractors (including Benicia) have begun preparation of their 2005 Urban Water Management Plan (UWMP). While the final report will not be available until after September 2005, DWR has released preliminary results regarding simulated annual deliveries acceptable for use in updating UWMPs. In this analysis, simulated monthly NBA deliveries were determined by using the previous study's monthly NBA values to prorate the new annual values on a monthly basis.

Another water delivery provision critical to evaluating the overall water supply reliability for the City of Benicia involves the contract provision limiting SWP deliveries in a single month to 11% of the SWP contract total. The simulation model is consistent with this contract provision.

State Water Resources Control Board (SWRCB) Standard Term 91 applies to months when the Delta is in balanced conditions and the SWP and the Central Valley Project are releasing water to meet minimum Delta flow and water quality standards.<sup>2</sup> Since Settlement Water is not available to Benicia when Term 91 is in effect, SOLANO\_SIM restricts use of that source during those months.

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<sup>1</sup> The existing available capacity of the NBA may be less than that originally designed. Studies are underway to assess and address any capacity limitations. However, minor reductions in the capacity of the NBA are unlikely to affect the results of this technical memorandum.

<sup>2</sup> Term 91 months were established in SWRCB Decision 1641.

## Analysis Model Run

Benicia’s projected water supply under the 2020 buildout demand<sup>3</sup> of 13,527 acre-feet per year was simulated for the hydrology record 1922 - 1994. This value was used to simulate all year types. On a monthly basis, Benicia’s total demand consists of water needed by both the City of Benicia and Valero. All non-Valero water is provided on a seasonal usage pattern, as described by the City of Benicia. This monthly demand pattern at buildout is described in Table 1. The annual use ratio for a given month is used to determine Benicia’s monthly water demand without accounting for deliveries to Valero. Valero’s raw water demand is considered steady year-round. Projected deliveries to Valero are added to Benicia’s demand each month to determine Benicia’s total demand.

**TABLE 1**  
City of Benicia – Monthly Average Demand Pattern at 2020 Buildout

|                      | Oct   | Nov  | Dec  | Jan  | Feb  | Mar  | Apr   | May   | Jun   | Jul   | Aug   | Sep   | Total  |
|----------------------|-------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|--------|
| Annual use %         | 8.92  | 6.42 | 6.25 | 6.00 | 5.67 | 6.00 | 7.50  | 9.17  | 11.17 | 11.67 | 11.25 | 10.00 | 100.00 |
| Benicia (Ac-ft)      | 689   | 496  | 483  | 463  | 438  | 463  | 579   | 708   | 862   | 901   | 869   | 772   | 7,727  |
| Valero (Ac-ft)       | 493   | 477  | 493  | 493  | 445  | 493  | 477   | 493   | 477   | 493   | 493   | 477   | 5,800  |
| Total Demand (Ac-ft) | 1,182 | 973  | 976  | 956  | 883  | 956  | 1,056 | 1,201 | 1,339 | 1,394 | 1,362 | 1,249 | 13,527 |
| Total % Distribution | 8.74  | 7.19 | 7.22 | 7.07 | 6.53 | 7.07 | 7.81  | 8.88  | 9.90  | 10.31 | 10.07 | 9.23  | 100.00 |

Source: City of Benicia

To determine the expected reliability of Settlement Water over an entire year, it must be analyzed in conjunction with other sources used by the City of Benicia – in the case of this analysis, SWP supplies only. As noted above, this analysis is not inclusive of all water supply sources available to the City of Benicia and does not address the City’s ability to meet their full water demand with all available supply sources. The simulation modeling objective is to meet the monthly Benicia water demand with available SWP and Settlement Water. The model has a predefined priority system to determine which supplies are used within operational and physical constraints.

For example, under the terms of the Settlement Agreement, DWR is not required to make Settlement Water available to SCWA and Benicia when Term 91 condition is in effect. This condition typically occurs during the late spring and summer months of the year and ranges from three to five months in duration. During these months, the simulation model indicates that Benicia will rely on SWP water. The model simulates delivery of this water while adhering to all allocated capacity rules on the NBA and SWP contract peak monthly flow constraints.

The model maximizes use of Settlement Water in months when Term 91 is not in effect. By utilizing Settlement Water during these months, the city is able to maximize its use of Settlement Water on an annual basis and use SWP water to meet demands during Term 91 months.

<sup>3</sup> Year 2020 and beyond build-out demand provided by City of Benicia.

### III. Expected Reliability of Water Supplies

The expected reliability Benicia's water supplies were analyzed on an annual basis within the context of SWP and Settlement Water. Table 2 shows the annual results from the SOLANO\_SIM run for Benicia's buildout level of demand. The table shows how the mix of water supply changes from year to year. In most years, full demand is met on an annual basis by a combination of SWP and Settlement Water. In some years, other supply sources will be needed to meet the City's full water demand.

**TABLE 2**  
SOLANO\_SIM Model Results over 73-year Hydrology for Benicia Under Buildout (2020) Demand Conditions  
1922-1994 Hydrology (thousand acre-feet)

| Calendar Year | Demand | Settlement Water | SWP  | Total of Settlement Water and SWP | Shortage |
|---------------|--------|------------------|------|-----------------------------------|----------|
| 1922          | 13.53  | 7.16             | 6.37 | 13.53                             | 0.00     |
| 1923          | 13.53  | 7.56             | 5.97 | 13.53                             | 0.00     |
| 1924          | 13.53  | 7.18             | 0.65 | 7.82                              | 5.71     |
| 1925          | 13.53  | 8.23             | 2.23 | 10.46                             | 3.07     |
| 1926          | 13.53  | 8.03             | 5.49 | 13.53                             | 0.00     |
| 1927          | 13.53  | 6.88             | 6.65 | 13.53                             | 0.00     |
| 1928          | 13.53  | 8.39             | 5.14 | 13.53                             | 0.00     |
| 1929          | 13.53  | 7.18             | 1.73 | 8.90                              | 4.63     |
| 1930          | 13.53  | 8.02             | 5.51 | 13.53                             | 0.00     |
| 1931          | 13.53  | 7.18             | 1.68 | 8.86                              | 4.67     |
| 1932          | 13.53  | 8.23             | 2.72 | 10.95                             | 2.58     |
| 1933          | 13.53  | 7.18             | 3.81 | 10.98                             | 2.55     |
| 1934          | 13.53  | 7.18             | 2.95 | 10.13                             | 3.40     |
| 1935          | 13.53  | 6.18             | 7.34 | 13.53                             | 0.00     |
| 1936          | 13.53  | 6.72             | 6.80 | 13.53                             | 0.00     |
| 1937          | 13.53  | 7.55             | 5.98 | 13.53                             | 0.00     |
| 1938          | 13.53  | 7.38             | 6.15 | 13.53                             | 0.00     |
| 1939          | 13.53  | 7.45             | 6.08 | 13.53                             | 0.00     |
| 1940          | 13.53  | 6.67             | 6.85 | 13.53                             | 0.00     |
| 1941          | 13.53  | 7.79             | 5.73 | 13.53                             | 0.00     |
| 1942          | 13.53  | 6.98             | 6.55 | 13.53                             | 0.00     |
| 1943          | 13.53  | 7.65             | 5.88 | 13.53                             | 0.00     |
| 1944          | 13.53  | 7.18             | 6.35 | 13.53                             | 0.00     |
| 1945          | 13.53  | 6.83             | 6.70 | 13.53                             | 0.00     |
| 1946          | 13.53  | 7.19             | 6.33 | 13.53                             | 0.00     |
| 1947          | 13.53  | 7.96             | 5.57 | 13.53                             | 0.00     |

**TABLE 2**  
**SOLANO\_SIM Model Results over 73-year Hydrology for Benicia Under Buildout (2020) Demand Conditions**  
**1922-1994 Hydrology (thousand acre-feet)**

| Calendar Year | Demand | Settlement Water | SWP  | Total of Settlement Water and SWP | Shortage |
|---------------|--------|------------------|------|-----------------------------------|----------|
| 1948          | 13.53  | 8.87             | 4.66 | 13.53                             | 0.00     |
| 1949          | 13.53  | 8.23             | 5.23 | 13.46                             | 0.07     |
| 1950          | 13.53  | 8.49             | 5.04 | 13.53                             | 0.00     |
| 1951          | 13.53  | 6.57             | 6.96 | 13.53                             | 0.00     |
| 1952          | 13.53  | 7.66             | 5.87 | 13.53                             | 0.00     |
| 1953          | 13.53  | 6.46             | 7.07 | 13.53                             | 0.00     |
| 1954          | 13.53  | 6.22             | 7.31 | 13.53                             | 0.00     |
| 1955          | 13.53  | 8.23             | 2.09 | 10.33                             | 3.20     |
| 1956          | 13.53  | 7.16             | 6.37 | 13.53                             | 0.00     |
| 1957          | 13.53  | 8.60             | 4.93 | 13.53                             | 0.00     |
| 1958          | 13.53  | 7.38             | 6.15 | 13.53                             | 0.00     |
| 1959          | 13.53  | 7.59             | 5.94 | 13.53                             | 0.00     |
| 1960          | 13.53  | 8.23             | 2.65 | 10.88                             | 2.65     |
| 1961          | 13.53  | 7.81             | 5.72 | 13.53                             | 0.00     |
| 1962          | 13.53  | 8.37             | 5.15 | 13.53                             | 0.00     |
| 1963          | 13.53  | 6.88             | 6.65 | 13.53                             | 0.00     |
| 1964          | 13.53  | 8.22             | 4.66 | 12.88                             | 0.65     |
| 1965          | 13.53  | 8.69             | 4.84 | 13.53                             | 0.00     |
| 1966          | 13.53  | 6.86             | 6.66 | 13.53                             | 0.00     |
| 1967          | 13.53  | 7.23             | 6.29 | 13.53                             | 0.00     |
| 1968          | 13.53  | 8.46             | 5.07 | 13.53                             | 0.00     |
| 1969          | 13.53  | 7.86             | 5.67 | 13.53                             | 0.00     |
| 1970          | 13.53  | 6.63             | 6.90 | 13.53                             | 0.00     |
| 1971          | 13.53  | 7.16             | 6.37 | 13.53                             | 0.00     |
| 1972          | 13.53  | 9.43             | 2.97 | 12.40                             | 1.13     |
| 1973          | 13.53  | 7.15             | 6.38 | 13.53                             | 0.00     |
| 1974          | 13.53  | 7.16             | 6.37 | 13.53                             | 0.00     |
| 1975          | 13.53  | 6.87             | 6.66 | 13.53                             | 0.00     |
| 1976          | 13.53  | 7.07             | 5.98 | 13.05                             | 0.48     |
| 1977          | 13.53  | 7.18             | 0.47 | 7.65                              | 5.88     |
| 1978          | 13.53  | 7.94             | 5.59 | 13.53                             | 0.00     |
| 1979          | 13.53  | 7.75             | 5.78 | 13.53                             | 0.00     |
| 1980          | 13.53  | 8.34             | 5.19 | 13.53                             | 0.00     |

**TABLE 2**  
**SOLANO\_SIM Model Results over 73-year Hydrology for Benicia Under Buildout (2020) Demand Conditions**  
*1922-1994 Hydrology (thousand acre-feet)*

| Calendar Year  | Demand | Settlement Water | SWP  | Total of Settlement Water and SWP | Shortage |
|----------------|--------|------------------|------|-----------------------------------|----------|
| 1981           | 13.53  | 7.19             | 6.34 | 13.53                             | 0.00     |
| 1982           | 13.53  | 7.37             | 6.15 | 13.53                             | 0.00     |
| 1983           | 13.53  | 7.86             | 5.67 | 13.53                             | 0.00     |
| 1984           | 13.53  | 7.04             | 6.48 | 13.53                             | 0.00     |
| 1985           | 13.53  | 7.52             | 6.01 | 13.53                             | 0.00     |
| 1986           | 13.53  | 9.40             | 3.68 | 13.07                             | 0.46     |
| 1987           | 13.53  | 7.41             | 6.11 | 13.53                             | 0.00     |
| 1988           | 13.53  | 7.18             | 0.57 | 7.75                              | 5.78     |
| 1989           | 13.53  | 7.07             | 6.46 | 13.53                             | 0.00     |
| 1990           | 13.53  | 7.18             | 1.16 | 8.33                              | 5.20     |
| 1991           | 13.53  | 7.18             | 1.67 | 8.84                              | 4.69     |
| 1992           | 13.53  | 7.18             | 2.05 | 9.22                              | 4.31     |
| 1993           | 13.53  | 7.45             | 6.08 | 13.53                             | 0.00     |
| 1994           | 13.53  | 7.83             | 5.70 | 13.53                             | 0.00     |
| <b>Maximum</b> | 13.53  | 9.43             | 7.34 | 13.53                             | 5.88     |
| <b>Average</b> | 13.53  | 7.53             | 5.16 | 12.69                             | 0.84     |
| <b>Minimum</b> | 13.53  | 6.18             | 0.47 | 7.65                              | 0.00     |

## Conclusions

Table 3 gives the average monthly distribution of Benicia’s water supply in Single Normal Years, Single Dry Years, and Multiple Dry Years to conform to Water Code section 10631. The definitions of these three year types are consistent with the City of Benicia’s Urban Water Management Plan. The water type designations were based on the DWR Sacramento Valley Water Year Index and provided to the City of Benicia by the City of Vacaville (as shown in Attachment 1.) Based on the City of Benicia’s definitions for Normal Year, Single Dry Year, and Multiple Dry Years, SWP Table A entitlements were averaged to determine Benicia deliveries.

As shown in Table 3, months without Settlement Water delivery are generally months when Term 91 is in effect. Demand during these months is met with SWP water, adhering to physical and operational constraints. This table illustrates that, on average, Benicia must rely on its other supply sources periodically during all three year types.

**TABLE 3**  
**SOLANO\_SIM Model Results on Monthly Basis for Benicia Under Buildout (2020) Demand Conditions**  
**1922-1994 Hydrology (thousand acre-feet)**

| <b>Single Normal Year<sup>1</sup></b> |            |            |            |            |            |            |            |            |            |            |            |            |              |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|
|                                       | <b>JAN</b> | <b>FEB</b> | <b>MAR</b> | <b>APR</b> | <b>MAY</b> | <b>JUN</b> | <b>JUL</b> | <b>AUG</b> | <b>SEP</b> | <b>OCT</b> | <b>NOV</b> | <b>DEC</b> | <b>Total</b> |
| <b>Settlement Water</b>               | 096        | 0.88       | 0.96       | 0.90       | 0.72       | 0.00       | 0.00       | 0.00       | 0.61       | 0.65       | 0.95       | 0.98       | 7.60         |
| <b>SWP Supply</b>                     | 0.00       | 0.00       | 0.00       | 0.16       | 0.48       | 1.33       | 1.38       | 1.35       | 0.64       | 0.53       | 0.03       | 0.00       | 5.88         |
| <b>Total Supply</b>                   | 0.96       | 0.88       | .96        | 1.06       | 1.20       | 1.33       | 1.38       | 1.35       | 1.25       | 1.18       | 0.97       | 0.98       | 13.48        |
| <b>Shortage</b>                       | 0.00       | 0.00       | 0.00       | 0.00       | 0.00       | 0.01       | 0.02       | 0.02       | 0.00       | 0.00       | 0.00       | 0.00       | 0.05         |
| <b>Single Dry Year<sup>2</sup></b>    |            |            |            |            |            |            |            |            |            |            |            |            |              |
|                                       | <b>JAN</b> | <b>FEB</b> | <b>MAR</b> | <b>APR</b> | <b>MAY</b> | <b>JUN</b> | <b>JUL</b> | <b>AUG</b> | <b>SEP</b> | <b>OCT</b> | <b>NOV</b> | <b>DEC</b> | <b>Total</b> |
| <b>Settlement Water</b>               | 0.96       | 0.88       | 0.96       | 0.81       | 0.00       | 0.00       | 0.00       | 0.00       | 1.04       | 1.03       | 0.97       | 0.98       | 7.62         |
| <b>SWP Supply</b>                     | 0.00       | 0.00       | 0.00       | 0.12       | 0.96       | 1.03       | 1.06       | 1.05       | 0.21       | 0.15       | 0.00       | 0.00       | 4.57         |
| <b>Total Supply</b>                   | 0.96       | 0.88       | 0.96       | 0.92       | 0.96       | 1.03       | 1.06       | 1.05       | 1.25       | 1.18       | 0.97       | 0.98       | 12.19        |
| <b>Shortage</b>                       | 0.00       | 0.00       | 0.00       | 0.14       | 0.24       | 0.31       | 0.34       | 0.32       | 0.00       | 0.00       | 0.00       | 0.00       | 1.34         |
| <b>Multiple Dry Years<sup>3</sup></b> |            |            |            |            |            |            |            |            |            |            |            |            |              |
|                                       | <b>JAN</b> | <b>FEB</b> | <b>MAR</b> | <b>APR</b> | <b>MAY</b> | <b>JUN</b> | <b>JUL</b> | <b>AUG</b> | <b>SEP</b> | <b>OCT</b> | <b>NOV</b> | <b>DEC</b> | <b>Total</b> |
| <b>Settlement Water</b>               | 0.96       | 0.88       | 0.96       | 0.52       | 0.00       | 0.00       | 0.00       | 0.00       | 1.09       | 1.07       | 0.97       | 0.96       | 7.43         |
| <b>SWP Supply</b>                     | 0.00       | 0.00       | 0.00       | 0.12       | 0.67       | 0.72       | 0.74       | 0.73       | 0.16       | 0.11       | 0.00       | 0.00       | 3.24         |
| <b>Total Supply</b>                   | 0.96       | 0.88       | 0.96       | 0.64       | 0.67       | 0.72       | 0.74       | 0.73       | 1.25       | 1.18       | 0.97       | 0.98       | 10.67        |
| <b>Shortage</b>                       | 0.00       | 0.00       | 0.00       | 0.42       | 0.53       | 0.62       | 0.65       | 0.63       | 0.00       | 0.00       | 0.00       | 0.00       | 2.86         |

Notes:

<sup>1</sup> Normal year delivery calculated based on an average of all SWP Table A entitlements in year types 2 and 3 (above normal and below normal) over the 73-year study period.

<sup>2</sup> Single dry year delivery calculated based on an average of all SWP Table A entitlements in year types 4 and 5 (solitary dry/critical dry year or the first year of multiple dry/critical dry years.)

<sup>3</sup> Multiple dry years delivery calculated based on an average all SWP Table A entitlements in year types 4 and 5 for four consecutive years.

## **Attachment 1: SWP Water Supply Availability**

*Table created for the City of Vacaville and provided to CH2M HILL by the City of Benicia.*

**STATE WATER PROJECT WATER SUPPLY AVAILABILITY**  
**SWP M&I Allocations**

July 20, 2005

**TABLE DEVELOPMENT**

The following table is based on the DWR CALSIM II Model Studies for State Water Project Delivery Capability and the Notice to State Water Project Contractors, May 25, 2005, using the City of Vacaville's definitions for normal year, single dry year, and multiple dry years. (Reference notes (2), (3), and (4) below).

- A. The Sacramento Valley 40/30/30 Index is used to identify yeartypes.
- B. Based on definitions for normal, single dry, and multiple dry year conditions, as outlined in the City's adopted Urban Water Mgmt Plan, entitlement figures are placed in the corresponding columns for each defined year condition. Figures for wet years (Value 1) are omitted.
- C. The columns are averaged to obtain a reliable percentage of available water supply under each of the stated conditions.

Sacramento Valley 40/30/30 Index

| Value | Yeartype     |
|-------|--------------|
| 1     | Wet          |
| 2     | Above Normal |
| 3     | Below Normal |
| 4     | Dry          |
| 5     | Critical Dry |

| Year | Sacramento Valley 40/30/30 Index (1) | 2020 Level of Development Full Table A (1) | 2020 Full Entitlement Numbers for Normal Year (2) | 2020 Full Entitlement Numbers for Single Dry Year (3) | 2020 Full Entitlement Numbers for Multiple Dry Years (4) |
|------|--------------------------------------|--|---|---|--|
| 1922 | 2                                    | 1.00                                       | 1.00  |   |  |
| 1923 | 3                                    | 1.00                                       | 1.00  |   |  |
| 1924 | 5                                    | 0.09                                       |   | 0.09  |  |
| 1925 | 4                                    | 0.36                                       |   |   |  |
| 1926 | 4                                    | 0.66                                       |   |   |  |
| 1927 | 1                                    | 1.00                                       |   |   |  |
| 1928 | 2                                    | 0.82                                       | 0.82  |   |  |
| 1929 | 5                                    | 0.27                                       |   | 0.27  | 0.27   |
| 1930 | 4                                    | 0.66                                       |   |   | 0.66   |
| 1931 | 5                                    | 0.26                                       |   |   | 0.26   |
| 1932 | 4                                    | 0.38                                       |   |   | 0.38   |
| 1933 | 5                                    | 0.32                                       |   |   |  |
| 1934 | 5                                    | 0.36                                       |   |   |  |
| 1935 | 3                                    | 0.98                                       | 0.98  |   |  |
| 1936 | 3                                    | 0.90                                       | 0.90  |   |  |
| 1937 | 3                                    | 0.82                                       | 0.82  |   |  |
| 1938 | 1                                    | 1.00                                       |   |   |  |
| 1939 | 4                                    | 0.83                                       |   | 0.83  |  |
| 1940 | 2                                    | 1.00                                       | 1.00  |   |  |
| 1941 | 1                                    | 0.95                                       |   |   |  |
| 1942 | 1                                    | 1.00                                       |   |   |  |
| 1943 | 1                                    | 0.92                                       |   |   |  |
| 1944 | 4                                    | 0.86                                       |   | 0.86  |  |
| 1945 | 3                                    | 0.94                                       | 0.94  |   |  |
| 1946 | 3                                    | 0.93                                       | 0.93  |   |  |
| 1947 | 4                                    | 0.67                                       |   | 0.67  |  |
| 1948 | 3                                    | 0.71                                       | 0.71  |   |  |
| 1949 | 4                                    | 0.49                                       |   | 0.49  |  |
| 1950 | 3                                    | 0.82                                       | 0.82  |   |  |
| 1951 | 2                                    | 1.00                                       | 1.00  |   |  |
| 1952 | 1                                    | 0.95                                       |   |   |  |
| 1953 | 1                                    | 1.00                                       |   |   |  |
| 1954 | 2                                    | 1.00                                       | 1.00  |   |  |
| 1955 | 4                                    | 0.36                                       |   | 0.36  |  |
| 1956 | 1                                    | 1.00                                       |   |   |  |
| 1957 | 2                                    | 0.86                                       | 0.86  |   |  |

|      |   |      |      |      |      |
|------|---|------|------|------|------|
| 1958 | 1 | 1.00 |      |      |      |
| 1959 | 3 | 0.92 | 0.92 |      |      |
| 1960 | 4 | 0.39 |      | 0.39 |      |
| 1961 | 4 | 0.66 |      |      |      |
| 1962 | 3 | 0.80 | 0.80 |      |      |
| 1963 | 1 | 1.00 |      |      |      |
| 1964 | 4 | 0.70 |      | 0.70 |      |
| 1965 | 1 | 0.84 |      |      |      |
| 1966 | 3 | 1.00 | 1.00 |      |      |
| 1967 | 1 | 1.00 |      |      |      |
| 1968 | 3 | 0.82 | 0.82 |      |      |
| 1969 | 1 | 0.95 |      |      |      |
| 1970 | 1 | 1.00 |      |      |      |
| 1971 | 1 | 1.00 |      |      |      |
| 1972 | 3 | 0.66 | 0.66 |      |      |
| 1973 | 2 | 0.98 | 0.98 |      |      |
| 1974 | 1 | 1.00 |      |      |      |
| 1975 | 1 | 1.00 |      |      |      |
| 1976 | 5 | 0.76 |      | 0.76 |      |
| 1977 | 5 | 0.05 |      |      |      |
| 1978 | 2 | 0.94 | 0.94 |      |      |
| 1979 | 3 | 0.91 | 0.91 |      |      |
| 1980 | 2 | 0.85 | 0.85 |      |      |
| 1981 | 4 | 0.92 |      | 0.92 |      |
| 1982 | 1 | 1.00 |      |      |      |
| 1983 | 1 | 0.95 |      |      |      |
| 1984 | 1 | 1.00 |      |      |      |
| 1985 | 4 | 0.83 |      | 0.83 |      |
| 1986 | 1 | 0.69 |      |      |      |
| 1987 | 4 | 0.80 |      | 0.80 | 0.80 |
| 1988 | 5 | 0.10 |      |      | 0.10 |
| 1989 | 4 | 0.85 |      |      | 0.85 |
| 1990 | 5 | 0.21 |      |      | 0.21 |
| 1991 | 5 | 0.21 |      |      |      |
| 1992 | 5 | 0.35 |      |      |      |
| 1993 | 2 | 1.00 | 1.00 |      |      |

Source: City of Vacaville, Utilities Division

|         |      |      |      |
|---------|------|------|------|
| Average | 0.90 | 0.61 | 0.44 |
|---------|------|------|------|

(1) Source: CALSIM II Model Studies for SWP Delivery Capability Report, May 17, 2002; and DWR Notice to State Water Project Contractors, May 25, 2005.

(2) Normal delivery calculated based on average of yeartypes 2 & 3, above normal and below normal.

(3) Single dry year delivery calculated based on average of yeartypes 4 & 5, solitary dry/critical dry year or the first year of multiple dry/critical dry years.

(4) Multiple dry delivery calculated based on average of yeartypes 4 & 5 for four (4) consecutive years. This is consistent with the City of Vacaville 2000 Urban Water Management Plan Update.

# Modeling Assumptions for the City of Benicia UWMP Water Supply Assessment

PREPARED FOR: Chris Tomasik, Assistant Director of Public Works, City of Benicia

PREPARED BY: Ben Everett, P.E.  
Jeanne Brantigan, P.E.

REVIEWED BY: Greg Eldridge, P.E.

DATE: October 23, 2005

## I. Introduction

This memorandum presents the modeling assumptions proposed for use in assessing the City of Benicia's State Water Project (SWP) water supply reliability. This analysis will address the expected reliability of the water to be provided to the City in accordance with 1) Table A entitlement supplies as proposed in the modified SWP Delivery Reliability Report, and 2) the *Settlement Agreement Among the Department of Water Resources (DWR) of the State of California, Solano County Water Agency, and Cities of Fairfield, Vacaville, and Benicia for Purposes of Water Supply*, dated May 19, 2003. This water is referred to as "Settlement Water".

The analysis will be consistent with studies supporting (1) the *Agreement for Conveying Settlement Water Through the North Bay Aqueduct by the Department of Water Resources to the Solano County Water Agency for the Cities of Fairfield, Vacaville, and Benicia*, dated May 19, 2003; (2) the *Agreement Regarding Priorities for Non-Project Water Transported through the North Bay Aqueduct by and between the Solano County Water Agency and the Cities of Fairfield, Benicia, Vallejo, and Vacaville*, dated March 18, 2003; and, (3) the *"Supplemental Analysis in Support of the City of Vacaville SB 610 Water Supply Assessment"*, dated January 9, 2004.

The expected reliability of Benicia's water supplies will be assessed using SOLANO\_SIM, a planning simulation model developed for the Draft Environmental Impact Report (DEIR) for the *Cities of Fairfield, Vacaville, and Benicia Water Rights Appropriations Project* (2001). The model simulated the SWP's North Bay Aqueduct (NBA), the primary conveyance facility needed to serve the cities of Vacaville, Fairfield, and Benicia.

## II. Model Assumptions

Model criteria can be separated into two main categories: 1) existing assumptions that are consistent with previous studies and common to Fairfield, Vacaville, and Benicia, and 2) new assumptions unique to this study.

## 1. Existing Assumptions Consistent With Previous Studies

The following water supply assumptions are common to the cities of Fairfield, Vacaville, and Benicia and have been used with SOLANO\_SIM for previous water supply studies.

- Time step: All model inputs and outputs will be monthly.
- Study period: The model will analyze a 73-year period of record, from 1922 through 1994.
- Barker Slough Pumping Plant (BSPP) capacity: The physical capacity of the BSPP is 175 cubic feet per second (cfs)<sup>1</sup>.
- Settlement Water deliveries: Settlement water is delivered through any excess BSPP and NBA simulated conveyance capacities, which is shared in proportion to the maximum settlement amount (Vacaville/Fairfield/Benicia - 9.32/11.80/10.50). Excess capacity is computed monthly to determine the physical potential to deliver Settlement Water to each city. Simulations of delivery of settlement water considers all senior users of the NBA. Deliveries are not simulated if physical capacity of the NBA has been reached in any month.
- Settlement Water restrictions under Term 91: State Water Resources Control Board (SWRCB) Standard Term 91 applies to months when the Sacramento – San Joaquin River Delta (Delta) is in balanced conditions and the SWP and CVP are releasing water to meet minimum Delta flow and water quality standards.<sup>2</sup> Since Settlement Water is not available to the City of Benicia when Term 91 is in effect, SOLANO\_SIM restricts use of that source during those months.
- Monthly peak SWP deliveries: The simulation model will use the contract provision limiting SWP deliveries in a single month to 11% of the SWP contract total. This delivery provision is critical to evaluating the overall water supply reliability for Benicia.

## 2. New Assumptions Unique to This Study

The following water supply assumptions are unique to the water supply assessment for the City of Benicia's UWMP.

- Buildout demand: The maximum target demand for the City of Benicia is 13,527 acre-feet per year.<sup>3</sup> This value will be used to simulate all year types. Model runs will assume no city-mandated conservation measures will be in place during drought years.
- Demand pattern: Benicia's monthly demand pattern at buildout is described in Table 1. All non-Valero water is provided on a seasonal usage pattern, as described by the City of Benicia. The annual use ratio for a given month is used to determine Benicia's monthly water demand without accounting for deliveries to Valero. Valero's raw water

<sup>1</sup> The existing available capacity of the NBA may be less than that originally designed. Studies are underway to assess and address any capacity limitations. However, minor reductions in the capacity of the NBA are unlikely to affect the results of Benicia's water supply reliability study.

<sup>2</sup> Term 91 months were established in SWRCB Decision 1641.

<sup>3</sup> Year 2020 and beyond build-out demand provided by City of Benicia.

demand is assumed steady year-round. Projected deliveries to Valero are added to Benicia's demand each month to determine Benicia's total demand.

TABLE 1  
City of Benicia – Monthly Average Demand Pattern at 2020 Buildout

|                              | Oct   | Nov  | Dec  | Jan <sup>2</sup> | Feb  | Mar  | Apr   | May   | Jun    | Jul   | Aug   | Sep   | Total  |
|------------------------------|-------|------|------|------------------|------|------|-------|-------|--------|-------|-------|-------|--------|
| Annual use<br>% <sup>1</sup> | 8.92  | 6.42 | 6.25 | 6.00             | 5.67 | 6.00 | 7.50  | 9.17  | 11.17  | 11.67 | 11.25 | 10.00 | 100.00 |
| Benicia                      | 689   | 496  | 483  | 463              | 438  | 463  | 579   | 708   | 862    | 901   | 869   | 772   | 7,727  |
| Valero                       | 493   | 477  | 493  | 493              | 445  | 493  | 477   | 493   | 477    | 493   | 493   | 477   | 5,800  |
| Total<br>Demand<br>(Ac-ft)   | 1,182 | 973  | 976  | 956              | 883  | 956  | 1,056 | 1,201 | 1,3397 | 1,394 | 1,362 | 1,249 | 13,527 |
| Total %<br>Distribution      | 8.74  | 7.19 | 7.22 | 7.07             | 6.53 | 7.07 | 7.81  | 8.88  | 9.90   | 10.31 | 10.07 | 9.23  | 100.00 |

Source: City of Benicia

- **SWP Table A water supplies:** The NBA will be simulated to deliver SWP Table A entitlement water to areas in Solano and Napa County, including Solano County Water Agency (purveyor to Vacaville, Fairfield, and Benicia), the Cities of Vallejo and Napa, and other contractors. Simulated Table A deliveries for the 73-year period of record will be derived from updated CALSIM II results.

DWR is preparing an update to the SWP Delivery Reliability Report which was issued in 2003. While the 2005 Draft Report will not be available in final form until September 2005, DWR has released preliminary results regarding simulated annual deliveries. Simulated monthly NBA deliveries will be determined by using the previous study's monthly NBA values to prorate the new annual values on a monthly basis. It is expected that any differences, if any, to final monthly NBA deliveries will be minor.

### III. Analysis

Output will be presented as available Settlement Water on an annual basis over the 73-year study period. Model results will be summarized on a monthly basis for 1) a single normal year, 2) a single-dry year, and 3) multiple-dry years to conform to Water Code section 10631. In this analysis, the Sacramento River Basin 40/30/30 Index<sup>4</sup> will be used to identify year types over the 73-year study period. Based on the City of Benicia's definitions for normal year, single-dry year, and multiple-dry years, SWP Table A entitlements (see Attachment 1) will be averaged to determine Benicia deliveries. To be consistent with the City of Benicia Urban Water Management Plan Update, the following definitions will be used:

**Normal year:** Delivery calculated based on an average of all SWP Table A entitlements in year types 2 and 3 (above normal and below normal) over the 73-year study period.

<sup>4</sup> CALSIM II Model Studies for SWP Delivery Capability Report, May 17, 2002; and DWR Notice to State Water Project Contractors, May 25, 2005.

Single-dry year: Delivery calculated based on an average of all SWP Table A entitlements in year types 4 and 5 (solitary dry/critical dry year or the first year of multiple dry/critical dry years.)

Multiple-dry years: Delivery calculated based on an average all SWP Table A entitlements in year types 4 and 5 for four consecutive years.

## **Attachment 1: SWP Water Supply Availability**

*Table created for the City of Vacaville and provided to CH2M HILL by the City of Benicia.*

**STATE WATER PROJECT WATER SUPPLY AVAILABILITY**  
SWP M&I Allocations

July 20, 2005

## TABLE DEVELOPMENT

The following table is based on the DWR CALSIM II Model Studies for State Water Project Delivery Capability and the Notice to State Water Project Contractors, May 25, 2005, using the City of Vacaville's definitions for normal year, single dry year, and multiple dry years.

(Reference notes (2), (3), and (4) below).

A. The Sacramento Valley 40/30/30 Index is used to identify yeartypes.

B. Based on definitions for normal, single dry, and multiple dry year conditions, as outlined in the City's adopted Urban Water Mgmt Plan, entitlement figures are placed in the corresponding columns for each defined year condition. Figures for wet years (Value 1) are omitted.

C. The columns are averaged to obtain a reliable percentage of available water supply under each of the stated conditions.

Sacramento Valley 40/30/30 Index

| Value | Yeartype     |
|-------|--------------|
| 1     | Wet          |
| 2     | Above Normal |
| 3     | Below Normal |
| 4     | Dry          |
| 5     | Critical Dry |

| Year | Sacramento Valley<br>40/30/30 Index (1) | 2020 Level of Development<br>Full Table A (1) | 2020 Full Entitlement<br>Numbers for Normal<br>Year (2) | 2020 Full Entitlement<br>Numbers for Single<br>Dry Year (3) | 2020 Full Entitlement Numbers<br>for Multiple Dry Years (4) |
|------|---|---|---|---|---|
| 1922 | 2                                       | 1.00  | 1.00  |   |   |
| 1923 | 3                                       | 1.00  | 1.00  |   |   |
| 1924 | 5                                       | 0.09  |   | 0.09  |   |
| 1925 | 4                                       | 0.36  |   |   |   |
| 1926 | 4                                       | 0.66  |   |   |   |
| 1927 | 1                                       | 1.00  |   |   |   |
| 1928 | 2                                       | 0.82  | 0.82  |   |   |
| 1929 | 5                                       | 0.27  |   | 0.27  | 0.27  |
| 1930 | 4                                       | 0.66  |   |   | 0.66  |
| 1931 | 5                                       | 0.26  |   |   | 0.26  |
| 1932 | 4                                       | 0.38  |   |   | 0.38  |
| 1933 | 5                                       | 0.32  |   |   |   |
| 1934 | 5                                       | 0.36  |   |   |   |
| 1935 | 3                                       | 0.98  | 0.98  |   |   |
| 1936 | 3                                       | 0.90  | 0.90  |   |   |
| 1937 | 3                                       | 0.82  | 0.82  |   |   |
| 1938 | 1                                       | 1.00  |   |   |   |
| 1939 | 4                                       | 0.83  |   | 0.83  |   |
| 1940 | 2                                       | 1.00  | 1.00  |   |   |
| 1941 | 1                                       | 0.95  |   |   |   |
| 1942 | 1                                       | 1.00  |   |   |   |
| 1943 | 1                                       | 0.92  |   |   |   |
| 1944 | 4                                       | 0.86  |   | 0.86  |   |
| 1945 | 3                                       | 0.94  | 0.94  |   |   |
| 1946 | 3                                       | 0.93  | 0.93  |   |   |
| 1947 | 4                                       | 0.67  |   | 0.67  |   |
| 1948 | 3                                       | 0.71  | 0.71  |   |   |
| 1949 | 4                                       | 0.49  |   | 0.49  |   |
| 1950 | 3                                       | 0.82  | 0.82  |   |   |
| 1951 | 2                                       | 1.00  | 1.00  |   |   |
| 1952 | 1                                       | 0.95  |   |   |   |
| 1953 | 1                                       | 1.00  |   |   |   |
| 1954 | 2                                       | 1.00  | 1.00  |   |   |
| 1955 | 4                                       | 0.36  |   | 0.36  |   |
| 1956 | 1                                       | 1.00  |   |   |   |
| 1957 | 2                                       | 0.86  | 0.86  |   |   |

|      |   |      |      |      |      |
|------|---|------|------|------|------|
| 1958 | 1 | 1.00 |      |      |      |
| 1959 | 3 | 0.92 | 0.92 |      |      |
| 1960 | 4 | 0.39 |      | 0.39 |      |
| 1961 | 4 | 0.66 |      |      |      |
| 1962 | 3 | 0.80 | 0.80 |      |      |
| 1963 | 1 | 1.00 |      |      |      |
| 1964 | 4 | 0.70 |      | 0.70 |      |
| 1965 | 1 | 0.84 |      |      |      |
| 1966 | 3 | 1.00 | 1.00 |      |      |
| 1967 | 1 | 1.00 |      |      |      |
| 1968 | 3 | 0.82 | 0.82 |      |      |
| 1969 | 1 | 0.95 |      |      |      |
| 1970 | 1 | 1.00 |      |      |      |
| 1971 | 1 | 1.00 |      |      |      |
| 1972 | 3 | 0.66 | 0.66 |      |      |
| 1973 | 2 | 0.98 | 0.98 |      |      |
| 1974 | 1 | 1.00 |      |      |      |
| 1975 | 1 | 1.00 |      |      |      |
| 1976 | 5 | 0.76 |      | 0.76 |      |
| 1977 | 5 | 0.05 |      |      |      |
| 1978 | 2 | 0.94 | 0.94 |      |      |
| 1979 | 3 | 0.91 | 0.91 |      |      |
| 1980 | 2 | 0.85 | 0.85 |      |      |
| 1981 | 4 | 0.92 |      | 0.92 |      |
| 1982 | 1 | 1.00 |      |      |      |
| 1983 | 1 | 0.95 |      |      |      |
| 1984 | 1 | 1.00 |      |      |      |
| 1985 | 4 | 0.83 |      | 0.83 |      |
| 1986 | 1 | 0.69 |      |      |      |
| 1987 | 4 | 0.80 |      | 0.80 | 0.80 |
| 1988 | 5 | 0.10 |      |      | 0.10 |
| 1989 | 4 | 0.85 |      |      | 0.85 |
| 1990 | 5 | 0.21 |      |      | 0.21 |
| 1991 | 5 | 0.21 |      |      |      |
| 1992 | 5 | 0.35 |      |      |      |
| 1993 | 2 | 1.00 | 1.00 |      |      |

Source: City of Vacaville, Utilities Division

Average 

|      |      |      |
|------|------|------|
| 0.90 | 0.61 | 0.44 |
|------|------|------|

(1) Source: CALSIM II Model Studies for SWP Delivery Capability Report, May 17, 2002; and DWR Notice to State Water Project Contractors, May 25, 2005.

(2) Normal delivery calculated based on average of yeartypes 2 & 3, above normal and below normal.

(3) Single dry year delivery calculated based on average of yeartypes 4 & 5, solitary dry/critical dry year or the first year of multiple dry/critical dry years.

(4) Multiple dry delivery calculated based on average of yeartypes 4 & 5 for four (4) consecutive years. This is consistent with the City of Vacaville 2000 Urban Water Management Plan Update.

*Appendix H*  
**Solano Project Reliability Estimates (SCWA)**

**Appendix H**  
**Solano Project Reliability (prepared by SCWA)**

Ultimate level of development-of Lake Berryessa watershed @ 30,000 AF/yr

Lake Berryessa Index

| Value | Year Type      |
|-------|----------------|
| W     | Wet            |
| N     | Below Normal   |
| N     | Above Normal   |
| D     | Dry            |
| D     | Critically Dry |

| Year | Index Value | % Full Alloc | % Full Alloc for Normal Year (N) | % Full Alloc for Single Dry Year (D) * | % Full Alloc for Multiple Dry Years (3 or more Dry years) |
|------|-------------|--------------|----------------------------------|--|---|
| 1906 | W           | 100%         |                                  |  |   |
| 1907 | W           | 100%         |                                  |  |   |
| 1908 | N           | 100%         | 100%                             |  |   |
| 1909 | W           | 100%         |                                  |  |   |
| 1910 | N           | 100%         | 100%                             |  |   |
| 1911 | N           | 100%         | 100%                             |  |   |
| 1912 | D           | 100%         |                                  | 100%                                   |   |
| 1913 | D           | 100%         |                                  |  |   |
| 1914 | W           | 100%         |                                  |  |   |
| 1915 | W           | 100%         |                                  |  |   |
| 1916 | W           | 100%         |                                  |  |   |
| 1917 | N           | 100%         | 100%                             |  |   |
| 1918 | D           | 100%         |                                  | 100%                                   | 100%  |
| 1919 | D           | 100%         |                                  |  | 100%  |
| 1920 | D           | 100%         |                                  |  | 100%  |
| 1921 | N           | 100%         | 100%                             |  |   |
| 1922 | N           | 100%         | 100%                             |  |   |
| 1923 | N           | 100%         | 100%                             |  |   |
| 1924 | D           | 95%          |                                  | 95%                                    |   |
| 1925 | N           | 95%          | 95%                              |  |   |
| 1926 | N           | 95%          | 95%                              |  |   |
| 1927 | W           | 95%          |                                  |  |   |
| 1928 | N           | 100%         | 100%                             |  |   |
| 1929 | D           | 95%          |                                  | 95%                                    | 95%   |
| 1930 | D           | 95%          |                                  |  | 95%   |
| 1931 | D           | 100%         |                                  |  | 100%  |
| 1932 | D           | 100%         |                                  |  | 100%  |
| 1933 | D           | 34%          |                                  |  | 34%   |
| 1934 | D           | 44%          |                                  |  | 44%   |
| 1935 | N           | 100%         | 100%                             |  |   |
| 1936 | N           | 100%         | 100%                             |  |   |
| 1937 | N           | 100%         | 100%                             |  |   |
| 1938 | W           | 100%         |                                  |  |   |
| 1939 | D           | 95%          |                                  | 95%                                    |   |
| 1940 | W           | 100%         |                                  |  |   |
| 1941 | W           | 100%         |                                  |  |   |
| 1942 | W           | 100%         |                                  |  |   |
| 1943 | N           | 100%         | 100%                             |  |   |
| 1944 | N           | 100%         | 100%                             |  |   |
| 1945 | D           | 100%         |                                  | 100%                                   | 100%  |
| 1946 | D           | 100%         |                                  |  | 100%  |
| 1947 | D           | 100%         |                                  |  | 100%  |

| Year | Index Value | % Full Alloc   | % Full Alloc for Normal Year (N) | % Full Alloc for Single Dry Year (D) * | % Full Alloc for Multiple Dry Years (3 or more Dry years) |
|------|-------------|----------------|----------------------------------|--|---|
| 1948 | D           | 95%            |                                  |  | 95%   |
| 1949 | D           | 95%            |                                  |  | 95%   |
| 1950 | D           | 95%            |                                  |  | 95%   |
| 1951 | N           | 95%            | 95%                              |  |   |
| 1952 | W           | 100%           |                                  |  |   |
| 1953 | N           | 100%           | 100%                             |  |   |
| 1954 | N           | 100%           | 100%                             |  |   |
| 1955 | D           | 95%            |                                  | 95%                                    |   |
| 1956 | W           | 100%           |                                  |  |   |
| 1957 | N           | 100%           | 100%                             |  |   |
| 1958 | W           | 100%           |                                  |  |   |
| 1959 | N           | 100%           | 100%                             |  |   |
| 1960 | D           | 100%           |                                  | 100%                                   |   |
| 1961 | D           | 100%           |                                  |  |   |
| 1962 | N           | 100%           | 100%                             |  |   |
| 1963 | W           | 100%           |                                  |  |   |
| 1964 | D           | 100%           |                                  | 100%                                   |   |
| 1965 | W           | 100%           |                                  |  |   |
| 1966 | N           | 100%           | 100%                             |  |   |
| 1967 | W           | 100%           |                                  |  |   |
| 1968 | N           | 100%           | 100%                             |  |   |
| 1969 | W           | 100%           |                                  |  |   |
| 1970 | W           | 100%           |                                  |  |   |
| 1971 | W           | 100%           |                                  |  |   |
| 1972 | D           | 100%           |                                  | 100%                                   |   |
| 1973 | W           | 100%           |                                  |  |   |
| 1974 | W           | 100%           |                                  |  |   |
| 1975 | W           | 100%           |                                  |  |   |
| 1976 | D           | 100%           |                                  | 100%                                   |   |
| 1977 | D           | 100%           |                                  |  |   |
| 1978 | W           | 100%           |                                  |  |   |
| 1979 | N           | 100%           | 100%                             |  |   |
| 1980 | W           | 100%           |                                  |  |   |
| 1981 | N           | 100%           | 100%                             |  |   |
| 1982 | W           | 100%           |                                  |  |   |
| 1983 | W           | 100%           |                                  |  |   |
| 1984 | W           | 100%           |                                  |  |   |
| 1985 | N           | 100%           | 100%                             |  |   |
| 1986 | W           | 100%           |                                  |  |   |
| 1987 | N           | 100%           | 100%                             |  |   |
| 1988 | D           | 100%           |                                  | 100%                                   | 100%  |
| 1989 | D           | 100%           |                                  |  | 100%  |
| 1990 | D           | 100%           |                                  |  | 100%  |
| 1991 | D           | 95%            |                                  |  | 95%   |
| 1992 | D           | 95%            |                                  |  | 95%   |
| 1993 | N           |                |                                  |  |   |
|      |             | <b>Average</b> | <b>99%</b>                       | <b>98%</b>                             | <b>92%</b>  |

\*Includes first year of consecutive dry years

*Appendix I*  
**Annual Report to CUWCC on  
Demand Management Measures**

Reported as of 2/24/05

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

Reporting Unit: **City of Benicia**      BMP Form Status: **0% Complete**      Year: **2004**

### A. Implementation

1. Based on your signed MOU date, 08/26/2002, your Agency STRATEGY DUE DATE is: **08/25/2004**
2. Has your agency developed and implemented a targeting/marketing strategy for SINGLE-FAMILY residential water use surveys?
  - a. If YES, when was it implemented?
3. Has your agency developed and implemented a targeting/marketing strategy for MULTI-FAMILY residential water use surveys?
  - a. If YES, when was it implemented?

### B. Water Survey Data

|                       |                                       |                               |
|-----------------------|---------------------------------------|-------------------------------|
| <b>Survey Counts:</b> | <b>Single<br/>Family<br/>Accounts</b> | <b>Multi-Family<br/>Units</b> |
|-----------------------|---------------------------------------|-------------------------------|

1. Number of surveys offered:
2. Number of surveys completed:

#### Indoor Survey:

3. Check for leaks, including toilets, faucets and meter checks
4. Check showerhead flow rates, aerator flow rates, and offer to replace or recommend replacement, if necessary
5. Check toilet flow rates and offer to install or recommend installation of displacement device or direct customer to ULFT replacement program, as necessary; replace leaking toilet flapper, as necessary

#### Outdoor Survey:

6. Check irrigation system and timers
7. Review or develop customer irrigation schedule
8. Measure landscaped area (Recommended but not required for surveys)
9. Measure total irrigable area (Recommended but not required for surveys)
10. Which measurement method is typically used (Recommended but not required for surveys)
11. Were customers provided with information packets that included evaluation results and water savings recommendations?

12. Have the number of surveys offered and completed, survey results, and survey costs been tracked?

- a. If yes, in what form are surveys tracked?
- b. Describe how your agency tracks this information.

### C. Water Survey Program Expenditures

This Year      Next Year

1. Budgeted Expenditures
2. Actual Expenditures

### D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?

- a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

### E. Comments

Reported as of 2/24/05

## BMP 02: Residential Plumbing Retrofit

Reporting Unit: **City of Benicia**      BMP Form Status: **0% Complete**      Year: **2004**

### A. Implementation

1. Is there an enforceable ordinance in effect in your service area requiring replacement of high-flow showerheads and other water use fixtures with their low-flow counterparts?
  - a. If YES, list local jurisdictions in your service area and code or ordinance in each:
  
2. Has your agency satisfied the 75% saturation requirement for single-family housing units?
3. Estimated percent of single-family households with low-flow showerheads: %
4. Has your agency satisfied the 75% saturation requirement for multi-family housing units? %
5. Estimated percent of multi-family households with low-flow showerheads: %
6. If YES to 2 OR 4 above, please describe how saturation was determined, including the dates and results of any survey research.

### B. Low-Flow Device Distribution Information

1. Has your agency developed a targeting/ marketing strategy for distributing low-flow devices?
  - a. If YES, when did your agency begin implementing this strategy?
  - b. Describe your targeting/ marketing strategy.

| Low-Flow Devices Distributed/ Installed | SF<br>Accounts | MF Units |
|---|----------------|----------|
|---|----------------|----------|

2. Number of low-flow showerheads distributed.
3. Number of toilet-displacement devices distributed:
4. Number of toilet flappers distributed:
5. Number of faucet aerators distributed:
6. Does your agency track the distribution and cost of low-flow devices?
  - a. If YES, in what format are low-flow devices tracked?
  - b. If yes, describe your tracking and distribution system :

### C. Low-Flow Device Distribution Expenditures

|  | This Year | Next Year |
|--|-----------|-----------|
|--|-----------|-----------|

1. Budgeted Expenditures

2. Actual Expenditures

**D. "At Least As Effective As"**

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

**E. Comments**

Reported as of 2/24/05

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

Reporting Unit: **City of Benicia**      BMP Form Status: **100% Complete**      Year: **2004**

#### A. Implementation

- 1. Has your agency completed a pre-screening system audit for this reporting year? yes
- 2. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:
  - a. Determine metered sales (AF) 5459.7
  - b. Determine other system verifiable uses (AF) 159
  - c. Determine total supply into the system (AF) 6271
  - d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required. 0.90
- 3. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production? yes
- 4. Did your agency complete a full-scale audit during this report year? no
- 5. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit? no
- 6. Does your agency operate a system leak detection program? no
  - a. If yes, describe the leak detection program:

#### B. Survey Data

- 1. Total number of miles of distribution system line. 96
- 2. Number of miles of distribution system line surveyed. 0

#### C. System Audit / Leak Detection Program Expenditures

|                          | This Year | Next Year |
|--------------------------|-----------|-----------|
| 1. Budgeted Expenditures | 586802    | 273914    |
| 2. Actual Expenditures   | 160502.6  |           |

#### D. "At Least As Effective As"

- 1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? yes
  - a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

The City has a service line replacement program to replace failing service lines. In certain areas of the City plastic service lines were installed. These lines are failing and the City is replacing them. It is

anticipated that approximately 250 service lines will be replaced each year until all plastic lines have been replaced. The City also has a water line replacement program aimed at replacing undersized and aging infrastructure.

#### **E. Comments**

Reported as of 2/24/05

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

Reporting Unit: **City of Benicia**      BMP Form Status: **100% Complete**      Year: **2004**

### A. Implementation

- 1. Does your agency require meters for all new connections and bill by volume-of-use? yes
- 2. Does your agency have a program for retrofitting existing unmetered connections and bill by volume-of-use? no
  - a. If YES, when was the plan to retrofit and bill by volume-of-use existing unmetered connections completed?
  - b. Describe the program:
- 3. Number of previously unmetered accounts fitted with meters during report year. 0

### B. Feasibility Study

- 1. Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters? no
  - a. If YES, when was the feasibility study conducted? (mm/dd/yy)
  - b. Describe the feasibility study:
- 2. Number of CII accounts with mixed-use meters. 715
- 3. Number of CII accounts with mixed-use meters retrofitted with dedicated irrigation meters during reporting period. 0

### C. Meter Retrofit Program Expenditures

|                          | This Year | Next Year |
|--------------------------|-----------|-----------|
| 1. Budgeted Expenditures | 0         | 0         |
| 2. Actual Expenditures   | 0         |           |

### D. "At Least As Effective As"

- 1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No
  - a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

### E. Comments

Benicia has been fully metered since 1962 with customers billed on volume of use.

Reported as of 2/24/05

## BMP 05: Large Landscape Conservation Programs and Incentives

Reporting Unit:  
City of Benicia

BMP Form Status: Year:  
0% Complete 2004

### A. Water Use Budgets

1. Number of Dedicated Irrigation Meter Accounts:
2. Number of Dedicated Irrigation Meter Accounts with Water Budgets:
3. Budgeted Use for Irrigation Meter Accounts with Water Budgets (AF):
4. Actual Use for Irrigation Meter Accounts with Water Budgets (AF):
5. Does your agency provide water use notices to accounts with budgets each billing cycle?

### B. Landscape Surveys

1. Has your agency developed a marketing / targeting strategy for landscape surveys?
  - a. If YES, when did your agency begin implementing this strategy?
  - b. Description of marketing / targeting strategy.
2. Number of Surveys Offered.
3. Number of Surveys Completed
4. Indicate which of the following Landscape Elements are part of your survey:
  - a. Irrigation System Check
  - b. Distribution Uniformity Analysis
  - c. Review / Develop Irrigation Schedules
  - d. Measure Landscape Area
  - e. Measure Total Irrigable Area
  - f. Provide Customer Report / Information
5. Do you track survey offers and results?
6. Does your agency provide follow-up surveys for previously completed surveys?
  - a. If YES, describe below:

### C. Other BMP 5 Actions

1. An agency can provide mixed-use accounts with ETo-based landscape budgets in lieu of a large landscape survey program. Does your agency provide mixed-use accounts with landscape budgets?
2. Number of CII mixed-use accounts with landscape budgets

- 3. Do you offer landscape irrigation training?
- 4. Does your agency offer financial incentives to improve landscape water use efficiency?

**Type of Financial Incentive:**

| Budget<br>(Dollars/<br>Year) | Number<br>Awarded<br>to Awarded<br>Customers | Total<br>Amount |
|------------------------------|--|-----------------|
|------------------------------|--|-----------------|

- a. Rebates
- b. Loans
- c. Grants

- 5. Do you provide landscape water use efficiency information to new customers and customers changing services?

- a. If YES, describe below:

- 6. Do you have irrigated landscaping at your facilities?

- a. If yes, is it water-efficient?
- b. If yes, does it have dedicated irrigation metering?

- 7. Do you provide customer notices at the start of the irrigation season?

- 8. Do you provide customer notices at the end of the irrigation season?

**D. Landscape Conservation Program Expenditures**

| This Year | Next<br>Year |
|-----------|--------------|
|-----------|--------------|

- 1. Budgeted Expenditures
- 2. Actual Expenditures

**E. "At Least As Effective As"**

- 1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?
  - a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

**F. Comments**

Reported as of 2/24/05

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

Reporting Unit: **City of Benicia**      BMP Form Status: **0% Complete**      Year: **2004**

### A. Implementation

1. Do any energy service providers or waste water utilities in your service area offer rebates for high-efficiency washers?
  - a. If YES, describe the offerings and incentives as well as who the energy/waste water utility provider is.
  
2. Does your agency offer rebates for high-efficiency washers?
3. What is the level of the rebate?
4. Number of rebates awarded.

### B. Rebate Program Expenditures

|  | This Year | Next Year |
|--|-----------|-----------|
|--|-----------|-----------|

1. Budgeted Expenditures
2. Actual Expenditures

### C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?
  - a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

### D. Comments

Reported as of 2/24/05

## BMP 07: Public Information Programs

Reporting Unit: **City of Benicia**      BMP Form Status: **100% Complete**      Year: **2004**

### A. Implementation

1. Does your agency maintain an active public information program to promote and educate customers about water conservation? yes

a. If YES, describe the program and how it's organized.

The City maintains an active public information program. This program addresses water supply, water quality, and water use efficiency issues. Information outreach includes periodic bill inserts addressing water use efficiency, distribution of conservation pamphlets and irrigation booklets, and distribution of conservation information at community events.

2. Indicate which and how many of the following activities are included in your public information program.

| Public Information Program Activity  | Yes/No | Number of Events |
|--|--------|------------------|
| a. Paid Advertising  | yes    | 1                |
| b. Public Service Announcement   | no     |                  |
| c. Bill Inserts / Newsletters / Brochures  | yes    | 2                |
| d. Bill showing water usage in comparison to previous year's usage                                     | yes    |                  |
| e. Demonstration Gardens   | yes    | 1                |
| f. Special Events, Media Events  | yes    | 1                |
| g. Speaker's Bureau  | no     |                  |
| h. Program to coordinate with other government agencies, industry and public interest groups and media | yes    |                  |

### B. Conservation Information Program Expenditures

|                          | This Year | Next Year |
|--------------------------|-----------|-----------|
| 1. Budgeted Expenditures | 10000     | 10000     |
| 2. Actual Expenditures   | 8900      |           |

### C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

### D. Comments

Reported as of 2/24/05

### BMP 08: School Education Programs

Reporting Unit: **City of Benicia**      BMP Form Status: **100% Complete**      Year: **2004**

#### A. Implementation

1. Has your agency implemented a school information program to promote water conservation? yes

2. Please provide information on your school programs (by grade level):

| Grade          | Are grade-appropriate materials distributed? | No. of class presentations | No. of students reached | No. of teachers' workshops |
|----------------|--|----------------------------|-------------------------|----------------------------|
| Grades K-3rd   | yes  | 33                         | 600                     | 0                          |
| Grades 4th-6th | yes  | 27                         | 780                     | 0                          |
| Grades 7th-8th | no   | 0                          | 0                       | 0                          |
| High School    | no   | 0                          | 0                       | 0                          |

3. Did your Agency's materials meet state education framework requirements? yes

4. When did your Agency begin implementing this program? 10/01/1998

#### B. School Education Program Expenditures

|                          | This Year | Next Year |
|--------------------------|-----------|-----------|
| 1. Budgeted Expenditures | 13186     | 12000     |
| 2. Actual Expenditures   | 13186     |           |

#### C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

#### D. Comments

Reported as of 2/24/05

### BMP 09: Conservation Programs for CII Accounts

Reporting Unit: **City of Benicia**      BMP Form Status: **0% Complete**      Year: **2004**

#### A. Implementation

1. Has your agency identified and ranked COMMERCIAL customers according to use?
2. Has your agency identified and ranked INDUSTRIAL customers according to use?
3. Has your agency identified and ranked INSTITUTIONAL customers according to use?

#### Option A: CII Water Use Survey and Customer Incentives Program

4. Is your agency operating a CII water use survey and customer incentives program for the purpose of complying with BMP 9 under this option?

| CII Surveys  | Commercial<br>Accounts | Industrial<br>Accounts            | Institutional<br>Accounts     |
|--|------------------------|-----------------------------------|-------------------------------|
| a. Number of New Surveys Offered   |                        |                                   |                               |
| b. Number of New Surveys Completed   |                        |                                   |                               |
| c. Number of Site Follow-ups of Previous Surveys (within 1 yr)                                 |                        |                                   |                               |
| d. Number of Phone Follow-ups of Previous Surveys (within 1 yr)                                |                        |                                   |                               |
| CII Survey Components  | Commercial<br>Accounts | Industrial<br>Accounts            | Institutional<br>Accounts     |
| e. Site Visit  |                        |                                   |                               |
| f. Evaluation of all water-using apparatus and processes                                       |                        |                                   |                               |
| g. Customer report identifying recommended efficiency measures, paybacks and agency incentives |                        |                                   |                               |
| Agency CII Customer Incentives   | Budget<br>(\$/Year)    | No.<br>Awarded<br>to<br>Customers | Total \$<br>Amount<br>Awarded |
| h. Rebates   |                        |                                   |                               |
| i. Loans   |                        |                                   |                               |
| j. Grants  |                        |                                   |                               |
| k. Others  |                        |                                   |                               |

#### Option B: CII Conservation Program Targets

5. Does your agency track CII program interventions and water savings for the purpose of complying with BMP 9 under this option?

6. Does your agency document and maintain records on how savings were realized and the method of calculation for estimated savings?

7. Estimated annual savings (AF/yr) from site-verified actions taken by agency since 1991.

8. Estimated annual savings (AF/yr) from non-site-verified actions taken by agency since 1991.

## **B. Conservation Program Expenditures for CII Accounts**

**This Year    Next Year**

1. Budgeted Expenditures

2. Actual Expenditures

## **C. "At Least As Effective As"**

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

## **D. Comments**

Reported as of 2/24/05

## BMP 09a: CII ULFT Water Savings

Reporting Unit: **City of Benicia**      BMP Form Status: **0% Complete**      Year: **2004**

1. Did your agency implement a CII ULFT replacement program in the reporting year?  
If No, please explain why on Line B. 10.

### A. Targeting and Marketing

1. What basis does your agency use to target customers for participation in this program?  
Check all that apply.

a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

2. How does your agency advertise this program? Check all that apply.

a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

### B. Implementation

1. Does your agency keep and maintain customer participant information? (Read the Help information for a complete list of all the information for this BMP.)

2. Would your agency be willing to share this information if the CUWCC did a study to evaluate the program on behalf of your agency?

3. What is the total number of customer accounts participating in the program during the last year ?

| CII Subsector         | Number of Toilets Replaced |              |                   |                  |
|-----------------------|----------------------------|--------------|-------------------|------------------|
|                       | Standard Gravity Tank      | Air Assisted | Valve Floor Mount | Valve Wall Mount |
| 4.                    |                            |              |                   |                  |
| a. Offices            |                            |              |                   |                  |
| b. Retail / Wholesale |                            |              |                   |                  |
| c. Hotels             |                            |              |                   |                  |
| d. Health             |                            |              |                   |                  |
| e. Industrial         |                            |              |                   |                  |
| f. Schools: K to 12   |                            |              |                   |                  |
| g. Eating             |                            |              |                   |                  |

- h. Govern-  
ment
- i. Churches
- j. Other

5. Program design.

6. Does your agency use outside services to implement this program?

a. If yes, check all that apply.

7. Participant tracking and follow-up.

8. Based on your program experience, please rank on a scale of 1 to 5, with 1 being the least frequent cause and 5 being the most frequent cause, the following reasons why customers refused to participate in the program.

- a. Disruption to business
- b. Inadequate payback
- c. Inadequate ULFT performance
- d. Lack of funding
- e. American's with Disabilities Act
- f. Permitting
- g. Other. Please describe in B. 9.

9. Please describe general program acceptance/resistance by customers, obstacles to implementation, and other issues affecting program implementation or effectiveness.

10. Please provide a general assessment of the program for this reporting year. Did your program achieve its objectives? Were your targeting and marketing approaches effective? Were program costs in line with expectations and budgeting?

**C. Conservation Program Expenditures for CII ULFT**

1. CII ULFT Program: Annual Budget & Expenditure Data

|                                 | <b>Budgeted</b> | <b>Actual<br/>Expenditure</b> |
|---------------------------------|-----------------|-------------------------------|
| a. Labor                        |                 |                               |
| b. Materials                    |                 |                               |
| c. Marketing &<br>Advertising   |                 |                               |
| d. Administration &<br>Overhead |                 |                               |
| e. Outside Services             |                 |                               |
| f. Total                        | 0               | 0                             |

2. CII ULFT Program: Annual Cost Sharing

- a. Wholesale agency contribution
- b. State agency contribution
- c. Federal agency contribution
- d. Other contribution
- e. Total

0

**D. Comments**

Reported as of 2/24/05

**BMP 11: Conservation Pricing**

|                 |                  |       |
|-----------------|------------------|-------|
| Reporting Unit: | BMP Form Status: | Year: |
| City of Benicia | 100% Complete    | 2004  |

**A. Implementation****Rate Structure Data Volumetric Rates for Water Service by Customer Class****1. Residential**

|  |                          |
|--|--------------------------|
| a. Water Rate Structure  | Increasing Block         |
| b. Sewer Rate Structure  | Non-volumetric Flat Rate |
| c. Total Revenue from Volumetric Rates                                       | \$3795617.28             |
| d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources | \$107114.28              |

**2. Commercial**

|  |                  |
|--|------------------|
| a. Water Rate Structure  | Increasing Block |
| b. Sewer Rate Structure  | Increasing Block |
| c. Total Revenue from Volumetric Rates                                       | \$1223095.4      |
| d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources | \$31251.68       |

**3. Industrial**

|  |                  |
|--|------------------|
| a. Water Rate Structure  | Increasing Block |
| b. Sewer Rate Structure  | Increasing Block |
| c. Total Revenue from Volumetric Rates                                       | \$191968.65      |
| d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources | \$5545.46        |

**4. Institutional / Government**

|  |                  |
|--|------------------|
| a. Water Rate Structure  | Increasing Block |
| b. Sewer Rate Structure  | Increasing Block |
| c. Total Revenue from Volumetric Rates                                       | \$71620          |
| d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources | \$0              |

**5. Irrigation**

|  |                      |
|--|----------------------|
| a. Water Rate Structure                | Increasing Block     |
| b. Sewer Rate Structure                | Service Not Provided |
| c. Total Revenue from Volumetric Rates | \$0                  |

d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources \$0

**6. Other**

a. Water Rate Structure Increasing Block

b. Sewer Rate Structure Increasing Block

c. Total Revenue from Volumetric Rates \$905563.45

d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources \$0

**B. Conservation Pricing Program Expenditures**

|                          | This Year | Next Year |
|--------------------------|-----------|-----------|
| 1. Budgeted Expenditures | 0         | 0         |
| 2. Actual Expenditures   | 0         |           |

**C. "At Least As Effective As"**

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

**D. Comments**

Irrigation revenue is included with the commercial revenue data. All revenue from institutional accounts is lumped into the volumetric totals. The non-volumetric revenue couldn't be seperated.

Reported as of 2/24/05

**BMP 12: Conservation Coordinator**

|   |  |                      |
|---|--|----------------------|
| Reporting Unit:<br><b>City of Benicia</b> | BMP Form Status:<br><b>100% Complete</b> | Year:<br><b>2004</b> |
|---|--|----------------------|

**A. Implementation**

1. Does your Agency have a conservation coordinator? yes
2. Is this a full-time position? no
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program? no
4. Partner agency's name:
5. If your agency supplies the conservation coordinator:
  - a. What percent is this conservation coordinator's position? 50%
  - b. Coordinator's Name David Wenslawski
  - c. Coordinator's Title Water Quality Technician
  - d. Coordinator's Experience and Number of Years One year of experience
  - e. Date Coordinator's position was created (mm/dd/yyyy) 12/09/1991
6. Number of conservation staff, including Conservation Coordinator. 1

**B. Conservation Staff Program Expenditures**

|                          | This Year | Next Year |
|--------------------------|-----------|-----------|
| 1. Budgeted Expenditures | 38189     | 42000     |
| 2. Actual Expenditures   | 38189     |           |

**C. "At Least As Effective As"**

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no
  - a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

**D. Comments**

Reported as of 2/24/05

**BMP 13: Water Waste Prohibition**

Reporting Unit: City of Benicia      BMP Form Status: 100% Complete      Year: 2004

**A. Requirements for Documenting BMP Implementation**

1. Is a water waste prohibition ordinance in effect in your service area? yes

a. If YES, describe the ordinance:

The City of Benicia adopted an emergency water conservation plan in 1991 that incorporates water waste prohibitions consistent with implementation of BMP 13. The ordinance specifies maximum residential and non-residential water use by shortage stage that effectively eliminates non-essential uses. For users who exceed the amount of water allowed per shortage stage they are subject to a drought penalty.

2. Is a copy of the most current ordinance(s) on file with CUWCC? yes

a. List local jurisdictions in your service area in the first text box and water waste ordinance citations in each jurisdiction in the second text box:

City of Benicia

No citations were issued.

**B. Implementation**

1. Indicate which of the water uses listed below are prohibited by your agency or service area.

- |   |     |
|---|-----|
| a. Gutter flooding  | yes |
| b. Single-pass cooling systems for new connections  | no  |
| c. Non-recirculating systems in all new conveyor or car wash systems                                    | no  |
| d. Non-recirculating systems in all new commercial laundry systems                                      | no  |
| e. Non-recirculating systems in all new decorative fountains  | no  |
| f. Other, please name   |     |
| Failing to repair controllable leaks, washing sidewalks, driveways, parking areas and other paved areas | yes |

2. Describe measures that prohibit water uses listed above:

The ordinance sets maximum water use limits based on the conservation stage. If the limit is exceeded a drought surcharge is assessed.

**Water Softeners:**

3. Indicate which of the following measures your agency has supported in developing state law:

- |  |     |
|--|-----|
| a. Allow the sale of more efficient, demand-initiated regenerating DIR models. | yes |
| b. Develop minimum appliance efficiency standards that:                        |     |

- i.) Increase the regeneration efficiency standard to at least 3,350 grains of hardness removed per pound of common salt used. yes
    - ii.) Implement an identified maximum number of gallons discharged per gallon of soft water produced. yes
  - c. Allow local agencies, including municipalities and special districts, to set more stringent standards and/or to ban on-site regeneration of water softeners if it is demonstrated and found by the agency governing board that there is an adverse effect on the reclaimed water or groundwater supply. yes
- 4. Does your agency include water softener checks in home water audit programs? no
- 5. Does your agency include information about DIR and exchange-type water softeners in educational efforts to encourage replacement of less efficient timer models? no

**C. Water Waste Prohibition Program Expenditures**

|                          | This Year | Next Year |
|--------------------------|-----------|-----------|
| 1. Budgeted Expenditures | 0         | 0         |
| 2. Actual Expenditures   | 0         |           |

**D. "At Least As Effective As"**

- 1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? yes

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

The plan does not specifically prohibit single pass cooling systems in new connections, or non-recirculating systems in new car wash and laundry systems. However, the plan specifies maximum residential and non-residential water use by shortage stage that effectively eliminates non-essential uses. Therefore the implementation status is considered at least as effective.

**E. Comments**

Reported as of 2/24/05

## BMP 14: Residential ULFT Replacement Programs

Reporting Unit: **City of Benicia**      BMP Form Status: **100% Complete**      Year: **2004**

### A. Implementation

|  | Single-Family Accounts | Multi-Family Units |
|--|------------------------|--------------------|
| 1. Does your Agency have program(s) for replacing high-water-using toilets with ultra-low flush toilets? | no                     | yes                |

#### Number of Toilets Replaced by Agency Program During Report Year

| Replacement Method  | SF Accounts | MF Units  |
|---------------------|-------------|-----------|
| 2. Rebate           | 0           | 13        |
| 3. Direct Install   | 0           | 0         |
| 4. CBO Distribution | 0           | 0         |
| 5. Other            | 0           | 0         |
| <b>Total</b>        | <b>0</b>    | <b>13</b> |

6. Describe your agency's ULFT program for single-family residences.

7. Describe your agency's ULFT program for multi-family residences.

The City implemented a pilot ULFT program in 2004. The program targeted multi-family residential properties that were constructed prior to 1992. Do to limited financial resources and that it was a pilot project the program was not offered to all properties. A \$100 rebate was offered for each high flow toilet that was replaced with a ULFT. The rebate was good for the cost of the toilet tank, bowl, and wax ring (not including seat, fittings, installation, and disposal charges). Participants must be a multi-family property owner. The customer was responsible for selecting, purchasing, and arranging for installation and disposal of the old toilet. Letters were mailed to selected complexes. Rebates were offered on a first come first serve basis. The ULFT pilot program will be evaluated for cost-effectiveness to determine how the program will be implemented in the future.

8. Is a toilet retrofit or resale ordinance in effect for your service area?      no

9. List local jurisdictions in your service area in the left box and ordinance citations in each jurisdiction in the right box:

### B. Residential ULFT Program Expenditures

|                          | This Year | Next Year |
|--------------------------|-----------|-----------|
| 1. Budgeted Expenditures | 5000      | 0         |
| 2. Actual Expenditures   | 1300      |           |

### C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?  no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

**D. Comments**

*Appendix J*  
**City of Benicia BMP Exemption Application Analysis  
(M-Cubed)**

# City of Benicia BMP Exemption Application Analysis

Prepared by M.Cubed

July 8, 2005

## 1 Introduction

This document presents the analysis of the 2005 Best Management Practices (BMP) Exemption requests for the City of Benicia. A signatory water supplier to the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU) can apply for an exemption from implementing a BMP if the supplier provides an analysis finding that the BMP would not be cost-effective (i) overall when total program benefits and costs are considered, or (ii) to the individual water supplier even after the water supplier has made a good faith effort to share costs with other program beneficiaries.<sup>1</sup>

In analysis performed for the 2000 Urban Water Management Plan (UWMP) Update, the City found that BMPs 1, 2, 3, 5, 6, 9, and 14 were not cost-effective and chose not to implement those programs. This analysis uses the BMP cost-effectiveness spreadsheets developed by M.Cubed and currently in the final stages of review by the CUWCC. Once again, BMPs 1, 2, 5, 6, 9 and 14 are found not cost-effective and eligible for exemption from the agency perspective. BMP 3 no longer is applicable. BMPs 2 and 6 were found to have positive total benefits, but those benefits arose from energy savings. Those BMPs either already are being implemented by the serving energy utility or should be given the relative magnitude of the benefits. Thus, the City is relieved of its obligation to make a separate effort through cost-sharing with the utility.

In the 2000 UWMP, BMPs 3 and 14 were found to warrant additional study. The City has since replaced extensive sections of its distribution network and has achieved the 10% threshold for unaccounted for losses. The City initiated a pilot program for ultra-low flow toilets with few takers. The analysis in this application shows that it is still not cost effective.

## 2 Description of Service Area

The city of Benicia provides water service to a population of approximately 29,000 in Solano County. Total water deliveries are around 12,900 acre-feet (AF), with treated water use of 6,800 AF. The majority of untreated water deliveries are for industrial use at the Valero refinery located in Benicia. According to the baseline data drawn from the 2000 UWMP and filed when the City signed the MOU in 2002, the City served 6,774 single family households and 3,343 multi family households. These figures have been updated as shown in Table 1 below.

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<sup>1</sup> California Urban Water Conservation Council, "Memorandum of Understanding Regarding Urban Water Conservation in California," (Sacramento, California, 1991), Section 4.5(a).

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**Table 1. Households**

|                          | <b>1990</b> | <b>2000</b> | <b>2005</b> |
|--------------------------|-------------|-------------|-------------|
| Population               | 24,437      | 26,865      | 27,780      |
| Single family households | 7,102       | 8,134       | 7,987       |
| Multi family households  | 2,465       | 2,582       | 2,823       |

**Table 2. 2000 Water System Information**

| <b>Customer Type</b>  | <b>Meters</b> | <b>Water Use</b> |
|-----------------------|---------------|------------------|
| Residential           | 7,771         | 3,103            |
| Multi-residential     | 254           | 575              |
| Commercial/Industrial | 620           | 984              |
| Heavy Industrial      | 93            | 154              |
| Landscape Irrigation  | 53            | 158              |
| Fire                  | 18            | 17               |

Miles of pipeline: 120

### **3 Evaluation Methodology**

The BMPs were evaluated using the BMP coverage calculators and the BMP simple cost-effectiveness tool spreadsheets developed by M.Cubed for the CUWCC. BMP coverage requirements are based on the year in which The City signed the MOU (2002). Updated demographic information from the 2000 Census was used in the BMP coverage calculators to determine the appropriate requirements for each BMP.

#### **3.1 Value of Saved Water**

The value of saved water to the City (program benefits) was based on the avoided cost to acquire, treat, and distribute water. In the case of indoor water savings, the valuation also includes the avoided cost to collect, treat, and dispose of waste water. An estimate of the City's incremental cost of supply was derived by identifying the supply source with the highest avoidable cost to the City. The variable costs of treatment, distribution and, when appropriate, wastewater treatment were then added to this to get the incremental cost of water supply. Supply sources and associated avoidable costs are listed in Table 3.

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**Table 3. City of Benicia Incremental Cost of Water**

| <b>Source</b>   | <b>Contract (AF)</b> | <b>Avg. Yield (AF)</b> | <b>Cost (\$/AF)</b>  |
|---|----------------------|------------------------|----------------------|
| Solano CWA (SWP)                                      | 17,200               | 7,987                  | \$30.22 <sup>2</sup> |
| 1962 Vallejo agreement                                | 1,100                | 935                    | 37.55 <sup>3</sup>   |
| Solano Irrigation District                            | Negotiable           | 557                    | 100 <sup>4</sup>     |
| Area of Origin Settlement Water                       | 10,500               | 2,016                  | 23.58 <sup>5</sup>   |
| Mojave WA Conjunctive Use                             | 6,500                | (2,000) <sup>6</sup>   | 95.38 <sup>7</sup>   |
| Highest Incremental Source Cost                       |                      |                        | \$95.38              |
| Variable Cost of Treatment                            |                      |                        | 48.49                |
| Variable Cost of Distribution                         |                      |                        | 39.13                |
| <b>Incremental Cost of Supply</b>                     |                      |                        | <b>\$183.00</b>      |
| <b>Variable Cost of Wastewater</b>                    |                      |                        | <b>\$181.06</b>      |
| <b>Avoided Cost Benefit: Outdoor Demand Reduction</b> |                      |                        | <b>\$183.00</b>      |
| <b>Avoided Cost Benefit: Indoor Demand Reduction</b>  |                      |                        | <b>\$364.06</b>      |

The City pays a fixed amount for its State Water Project (SWP) Contract through the Solano County Water Agency regardless of the level of deliveries. The incremental cost for SWP deliveries is therefore the Delta Water Rate of \$23.58 per AF.<sup>8</sup> In 2003 the cities of Benicia, Fairfield and Vacaville entered into a settlement with the California Department of Water Resources (DWR) regarding Area of Origin claims for water delivered through the State Water Project. This so called "Area of Origin Settlement Water" is of lower priority than SWP contract water (also known as "Table A" water) and is available for delivery to the City only when "excess" conditions in the Delta permit additional exports. In years when supply conditions prevent the full delivery of the City's Table A water, the charge for delivering Settlement Water is simply the Delta Water Rate, as the City pays for a fixed amount of supply and conveyance capacity in its existing SWP contract. If the City were to take delivery of Settlement Water in

<sup>2</sup> Solano County Water Agency average charge based on average deliveries.

<sup>3</sup> The \$37.55 per AF will remain in effect until 3/1/06. At that time Vallejo will review and determine if it will be increased. This supply is now taken at full delivery, and is used for reliability and water quality management.

<sup>4</sup> SID water is used almost exclusively for water quality purposes during winter months when the SWP water is difficult to treat. It also is used when the NBA pipeline is shutdown for maintenance and we can not receive SWP. Therefore, it is a "must-take" resource and an unavoidable cost.

<sup>5</sup> Benicia may take up to its total Table A allotment, including both this and its contractual amount, at the rate charged by the Solano County Water Agency for its SWP allotment. If Benicia exceeds its Table A allotment, then it pays additional capital charges equal to its full contract amount of \$145.50. However, demand for SWP water by the City is not expected to exceed Table A amounts over the analytic horizon.

<sup>6</sup> Currently the City sends an average of 2,000 AF each year to MWA to be banked for future delivery. MWA has stored 7,500 AF to date.

<sup>7</sup> City of Benicia has not taken delivery of this water, and is unlikely to do so in the near future due to Area of Origin Settlement. However, the City continues to bank discretionary water deliveries.

<sup>8</sup> California Department of Water Resources, *Management of the State Water Project*, Bulletin 132-03 (Sacramento, California, December, 2004), Appendix B, Table B-17 and B-24.

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addition to a full Table A allocation, there would be a conveyance fee of \$145 to cover allocated fixed costs for a total charge of \$168.58 per AF. However, particularly given its lower priority, it is unlikely at currently anticipated demand levels that the City will utilize Settlement Water over and above a full allocation of Table A water. The City currently receives on average less than half of its Table A amount directly through its contract.

The cost to bank Mojave Water Agency Conjunctive Use Storage water is \$47.69 per AF. However, the cost of the water is effectively doubled because the City sends down two AF for every one that it will get in return. This raises the effective cost of the water to \$95.38 per AF. Because the water sent down to MWA is originally SWP water, the added cost for SWP delivery at the same two-for-one price which would add another \$41 per AF to bring the cost up to \$136.38 for the MWA water. However, the SWP charge, reflected in the SCWA rates, is not an avoidable cost because the City has to pay for it whether or not the water is delivered. So when making analytical assumptions about the avoidable costs to use in the BMP analysis, the \$41 AF for SWP is removed from the total cost. Thus, the avoided cost for purposes of calculating BMP cost effectiveness is \$95.38 per AF.

The City's existing capacity for wastewater treatment is adequate through system buildout. However, BMP savings at specified MOU coverage levels do not provide sufficient peak-day demand reduction to alter the sizing of the expansion, should one be needed. Therefore, infrastructure avoided costs were not included as part of the analysis.

### 4 Analytic Assumptions

The assumptions used in the BMP cost-effectiveness spreadsheets are listed below in Table 4. Avoided cost figures are from Table 3 above. Hourly rates, including overhead, are \$60 for staff and \$26 for field labor. Energy costs are used in some cases to calculate societal benefits and are based on current Pacific Gas and Electric Co. rates. The real (inflation adjusted) discount rate for the City is 2.5%<sup>9</sup> while the real social discount rate is 2.0%. Annual real escalation rates for water and energy related costs are also assumed to be 2.0%.

**Table 4. Assumptions used in cost-effectiveness analysis**

|   |          |          |
|---|----------|----------|
| Avoidable supply cost                   | \$95.38  | \$/AF    |
| Avoidable treatment costs               | \$48.49  | \$/AF    |
| Avoidable distribution costs            | \$39.13  | \$/AF    |
| Avoidable wastewater cost               | \$181.06 | \$/AF    |
| Staff hourly rate (with overhead)       | \$60.00  | \$/hr    |
| Field labor hourly rate (with overhead) | \$26.00  | \$/hr    |
| Natural gas cost                        | \$1.34   | \$/therm |
| Electricity cost                        | \$0.1299 | \$/kWh   |
| Agency discount rate (real)             | 2.5      | %        |
| Social discount rate (real)             | 2.0      | %        |
| Annual escalation rates (real)          | 2.0      | %        |

<sup>9</sup> Based on a 4.5% municipal bond yield rate for California cities with Benicia's credit rating.

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## 5 BMP Cost-Effectiveness Analyses

### 5.1 BMP 1: Residential Surveys

BMP 1 implementation involves offering water conservation surveys to not less than 20% of single and multi family residential customers every two years, and completing surveys for not less 15% of single and multi family residential customers within 10 years of program initiation. Based on the 2000 service area data used in the BMP coverage calculator spreadsheets, the City would need to complete approximately 102 single family surveys and 52 multi family surveys annually over the next 10 years to implement the BMP per the MOU.

The materials provided with each survey, and costs and water savings (in gallons per day or gpd) associated with each item are shown in Table 5. Single family kits cost \$37.10 and produce initial savings of 22.5 gpd while multi family kits cost \$10.60 and produce initial savings of 15.5 gpd.

**Table 5. Device Distribution**

| Unit Cost (\$/item) | Unit Savings (gpd) | Item            | SF  |        |               | MF  |        |               |
|---------------------|--------------------|-----------------|-----|--------|---------------|-----|--------|---------------|
|                     |                    |                 | Qty | Cost   | Savings (gpd) | Qty | Cost   | Savings (gpd) |
| 8                   | 2                  | Hose timer      | 2   | \$16   | 4             | 0   | \$0    | 0             |
| 5.25                | 1.5                | Hose nozzle     | 2   | 10.5   | 3             | 0   | 0      | 0             |
| 2.75                | 5.5                | Showerhead      | 2   | 5.5    | 11            | 2   | 5.5    | 11            |
| 1.5                 | 1.5                | Aerator         | 2   | 3      | 3             | 2   | 3      | 3             |
| 2.1                 | 1.5                | Kitchen Aerator | 1   | 2.1    | 1.5           | 1   | 2.1    | 1.5           |
| Total               |                    |                 |     | \$37.1 | 22.5          |     | \$10.6 | 15.5          |

Source: 2000 City of Benicia UWMP

The cost assumptions are shown in Table 6. Field labor for the 154 surveys would total \$5,915 while the material costs (from Table 5) would total \$4,335. With overhead and marketing costs of \$6,000 the annual implementation costs total \$16,505.

**Table 6. BMP 1 Cost Assumptions**

| Item                                    | Single Family | Multi Family | Annual Costs |
|---|---------------|--------------|--------------|
| Surveys                                 | 102           | 52           |              |
| Field hours (hrs/survey) <sup>10</sup>  | 1.25          | 0.5          | \$5,915      |
| Material cost (\$/survey) <sup>11</sup> | \$37.10       | \$10.60      | \$4,335      |
| Overhead                                |               |              | \$3,000      |
| Marketing                               |               |              | \$3,000      |
| Total                                   |               |              | \$16,250     |

The savings calculations are shown in Table 7. First year savings are 2.6 AF for the single family surveys (including landscape) and 0.9 AF for multi family surveys (not including landscape). With a decay rate of 20% total savings are 17.3 AF over 25 years.

<sup>10</sup> BMP Cost and Savings Study (2003)

<sup>11</sup> Table 5

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**Table 7. BMP 1 Savings Assumptions**

| <b>Item</b>                                | <b>Single Family</b> | <b>Multi Family</b> |     |
|--|----------------------|---------------------|-----|
| Savings per unit <sup>12</sup>             | 22.5                 | 15.5                | gpd |
| First year savings                         | 2.6                  | 0.9                 | AF  |
| Savings decay <sup>13</sup>                | 20%                  | 20%                 |     |
| Total water savings                        | 12.8                 | 4.5                 | AF  |
| Hot water use (% of savings) <sup>14</sup> | 20%                  | 40%                 |     |
| % Gas hot water heater <sup>15</sup>       | 95%                  | 95%                 |     |

Analysis results are shown in Table 8. Program costs are \$16,250 with agency benefits of only \$3,107. With an NPV of negative \$13,146 and a benefit-cost ratio of 0.19, BMP 1 is not cost-effective for the City.

**Table 8. BMP 1 Results**

| <b><i>Program Present Value Costs</i></b>    | <b>Agency Perspective</b> | <b>Society Perspective</b> |
|--|---------------------------|----------------------------|
| 1. Total surveys                             | 154                       | 154                        |
| 2. Total water savings                       | 17.3 AF                   | 17.3 AF                    |
| 3. Agency program costs                      | \$16,250                  | \$16,250                   |
| 4. Customer program costs                    | NA                        | \$0                        |
| 5. Cost share                                | \$0                       | NA                         |
| 6. Net Program Cost                          | <u>\$16,250</u>           | <u>\$16,250</u>            |
| <b><i>Program Present Value Benefits</i></b> |                           |                            |
| 7. Agency supply & wastewater benefits       | \$3,107                   | \$3,166                    |
| 8. Environmental benefits                    | \$0                       | \$0                        |
| 9. Customer program benefits                 | NA                        | \$8,948                    |
| 10. Other utility benefits                   | NA                        | \$3,132                    |
| 11. Total benefits                           | <u>\$3,107</u>            | <u>\$15,246</u>            |
| <b>12. Net Present Value</b>                 | <b>(\$13,144)</b>         | <b>(\$1,004)</b>           |
| 13. Benefit-Cost Ratio                       | 0.19                      | 0.94                       |
| 14. Simple Unit Supply Cost                  | \$939 /AF                 | \$939 /AF                  |
| 15. Discounted Unit Supply Cost              | \$1,029 /AF               | \$1,012 /AF                |

<sup>12</sup> Table 5

<sup>13</sup> BMP Cost and Savings Study (2003)

<sup>14</sup> Indoor water use represents 42% of total residential water use (AWWARF 1999) and hot water represents 40% of indoor water use (William DeOreo 2000).

<sup>15</sup> KEMA-XENERGY (2004)

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### 5.2 BMP 2: Residential Plumbing Retrofit

Implementation of BMP 2 requires making available low-flow showerheads, aerators, toilet displacement devices, and other water savings fixtures or devices to single and multi family residences constructed prior to 1992. The BMP requires the City to distribute these devices to not less than 10% of their single and multi family customers every two years until such time the City can demonstrate that at least 75% of residences constructed prior to 1992 have been retrofitted. To meet the MOU coverage requirement for BMP 2 the City would need to distribute retrofit kits to approximately 330 pre-1992 single family residences and 163 pre 1992 multi family residences annually for 7 years.

The materials provided with each survey, and costs and water savings (in gpd) associated with each item are shown in Table 9. Single family kits cost \$37.10 and produce initial savings of 22.5 gpd while multi family kits cost \$10.60 and produce initial savings of 15.5 gpd.

**Table 9. BMP 2 Device Distribution**

| Unit Cost (\$/item) | Unit Savings (gpd) | Item            | SF  |        |               | MF  |        |               |
|---------------------|--------------------|-----------------|-----|--------|---------------|-----|--------|---------------|
|                     |                    |                 | Qty | Cost   | Savings (gpd) | Qty | Cost   | Savings (gpd) |
| 8                   | 2                  | Hose timer      | 2   | \$16   | 4             | 0   | \$0    | 0             |
| 5.25                | 1.5                | Hose nozzle     | 2   | 10.5   | 3             | 0   | 0      | 0             |
| 2.75                | 5.5                | Showerhead      | 2   | 5.5    | 11            | 2   | 5.5    | 11            |
| 1.5                 | 1.5                | Aerator         | 2   | 3      | 3             | 2   | 3      | 3             |
| 2.1                 | 1.5                | Kitchen Aerator | 1   | 2.1    | 1.5           | 1   | 2.1    | 1.5           |
| Total               |                    |                 |     | \$37.1 | 22.5          |     | \$10.6 | 15.5          |

Source: 2000 City of Benicia UWMP

Materials cost for the program total \$14,770. With overhead and marketing, total program costs are \$20,170 (Table 10).

**Table 10. BMP 2 Cost Assumptions**

|   | Single Family | Multi Family | Annual Costs |
|---|---------------|--------------|--------------|
| Surveys                                 | 330           | 163          |              |
| Material cost (\$/survey) <sup>16</sup> | \$37.10       | \$10.60      | \$14,770     |
| Overhead                                |               |              | \$2,400      |
| Marketing                               |               |              | \$3,000      |
| Total                                   |               |              | \$20,170     |

The analysis assumes that 54% of the kits are actually installed. Total first year savings are estimated at 4.5 and 1.5 AF for single family multi family units respectively. With a decay rate of 20% total savings over 25 years are 22.4 AF for the single family units and 7.6 for the multi family units, a total of 30 AF.

<sup>16</sup> Table 9

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**Table 11. BMP 02 Savings Assumptions**

|  | <b>Single Family</b> | <b>Multi Family</b> |     |
|--|----------------------|---------------------|-----|
| Savings per unit <sup>17</sup>             | 22.5                 | 15.5                | Gpd |
| % installed <sup>18</sup>                  | 54%                  | 54%                 |     |
| First year savings                         | 4.5                  | 1.5                 | AF  |
| Savings decay <sup>19</sup>                | 20%                  | 20%                 |     |
| Total savings                              | 22.37                | 7.61                | AF  |
| Hot water use (% of savings) <sup>20</sup> | 20%                  | 40%                 |     |
| % Gas hot water heater <sup>21</sup>       | 95%                  | 95%                 |     |

Total program costs are \$20,170 with agency benefits of \$5,384. With an NPV of negative \$14,786 and a benefit-cost ratio of 0.27, it is not economic for The City to implement BMP 2. BMP 2 shows net positive society benefits. These arise from energy savings which are already targeted by energy efficiency programs administered by the Pacific Gas and Electric Company (PG&E) under Public Purpose Program (PPP) funding approved by the California Public Utilities Commission (CPUC).

<sup>17</sup> Table 9

<sup>18</sup> BMP Cost and Savings Study (2003)

<sup>19</sup> Ibid.

<sup>20</sup> Indoor water use represents 42% of total residential water use (AWWARF 1999) and hot water represents 40% of indoor water use (William DeOreo 2000).

<sup>21</sup> KEMA-XENERGY (2004). <http://websafe.kemainc.com/RASSWEB>

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**Table 12. BMP 2 Results**

| <b><i>Program Present Value Costs</i></b>    | <b>Agency<br/>Perspective</b> | <b>Society<br/>Perspective</b> |
|--|-------------------------------|--------------------------------|
| 1. Total devices distributed                 | 493                           | 493                            |
| 2. Total water savings                       | 30.0 AF                       | 30.0 AF                        |
| 3. Agency program costs                      | \$20,170                      | \$20,170                       |
| 4. Customer program costs                    | NA                            | \$0                            |
| 5. Cost share                                | \$0                           | NA                             |
| 6. Net Program Cost                          | \$20,170                      | \$20,170                       |
| <b><i>Program Present Value Benefits</i></b> |                               |                                |
| 7. Agency supply & wastewater benefits       | \$5,384                       | \$5,486                        |
| 8. Environmental benefits                    | \$0                           | \$0                            |
| 9. Customer program benefits                 | NA                            | \$15,433                       |
| 10. Other utility benefits                   | NA                            | \$5,428                        |
| 11. Total benefits                           | \$5,384                       | \$26,347                       |
| <b>12. Net Present Value</b>                 | <b>(\$14,786)</b>             | <b>\$6,177</b>                 |
| 13. Benefit-Cost Ratio                       | 0.27                          | 1.31                           |
| 14. Simple Unit Supply Cost                  | \$673 /AF                     | \$673 /AF                      |
| 15. Discounted Unit Supply Cost              | \$737 /AF                     | \$724 /AF                      |

### 5.3 BMP 3: System Leak Detection and Audit

BMP 3 requires water suppliers to conduct full-scale system water audits consistent with AWWA guidelines if unaccounted water (UAW) as a percent of system intake exceeds 10%. The BMP also calls upon the supplier to perform distribution system leak detection when warranted and cost-effective.

The 2000 UWMP Update proposed that the City further assess this situation. The City implemented a service line replacement program to replace service lines that were leaking. The City also has a water main replacement program to replace aging mains. For 2004, the City had 6,271 AF delivered to domestic users, excluding deliveries to the refinery and to Lake Hermann. Total metered deliveries for 2004 was 5618.8 AF. The City currently estimates an 10% UAW for its domestic water deliveries, which meets the target threshold established in the MOU.

### 5.4 BMP 5a: Large Landscape Water Budgets

BMP 5 consists of two parts. The first part requires developing ETo-based water budgets for accounts with dedicated irrigation meters. With 233 active dedicated irrigation meters, the MOU would require The City to develop 52 budgets per year for four years. Budgets cost about \$126/site to develop (CCWD 1999). Program development and management is assumed to require 30 and 20 hours of staff time annually (CUWCC 1999). Approximately 10% of the sites are expected to require a follow up survey at a cost of \$720 (CUWCC 1999). The total first year costs for program implementation are \$12,672 (Table 13).

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**Table 13. BMP 5a Cost Assumptions (First Year)**

| Item                                    | No. | \$/Item | Annual Costs |
|---|-----|---------|--------------|
| Budget development <sup>22</sup>        | 52  | \$126   | \$6,552      |
| Program development <sup>23</sup> (hrs) | 30  | \$60    | \$1,800      |
| Program management <sup>24</sup> (hrs)  | 20  | \$60    | \$1,200      |
| Customer follow up <sup>25</sup> (10%)  | 5.2 | \$720   | \$3,774      |
| Total                                   |     |         | \$13,298     |

Irrigation metered sites use on average 579 gpd or 0.65 AF/year (Benicia billing records). Estimates of savings per site range from 20-37% (BMP Cost & Savings Study 2003). Using a savings estimate of 35%, on the high end of potential savings estimates, yields first year savings of 12 AF and total savings over 25 years of 1,070 AF.

**Table 14. BMP 5a Savings Assumptions**

| Item                               | Single Family |     |
|------------------------------------|---------------|-----|
| Average use per site <sup>26</sup> | 579           | gpd |
| Annual use per site                | 0.65          | AF  |
| Savings <sup>27</sup>              | 35%           |     |
| First year savings                 | 12            | AF  |
| Total savings                      | 1,070         | AF  |

Once fully implemented, managing 210 water budgets will cost \$16,298 per year for a total cost of \$301,990. With saved water benefits of only \$183,576, the NPV for BMP 5a is negative \$118,414, a benefit-cost ratio of 0.61.

<sup>22</sup> CCWD 1999 as cited in BMP 05 cost-evaluation spreadsheet

<sup>23</sup> CUWCC 1999

<sup>24</sup> Ibid.

<sup>25</sup> Ibid.

<sup>26</sup> City of Benicia billing records

<sup>27</sup> BMP Cost & Savings Study (2003)

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**Table 15. BMP 5a Results**

| <b><i>Program Present Value Costs</i></b>    | <b>Agency Perspective</b> | <b>Society Perspective</b> |
|--|---------------------------|----------------------------|
| 1. Total budgets                             | 210                       | 210                        |
| 2. Total water savings                       | 1,070 AF                  | 1,070 AF                   |
| 3. Agency program costs                      | \$301,990                 | \$318,817                  |
| 4. Customer program costs                    | NA                        | \$20,356                   |
| 5. Cost share                                | \$0                       | NA                         |
| 6. Net Program Cost                          | <u>\$301,990</u>          | <u>\$339,173</u>           |
| <b><i>Program Present Value Benefits</i></b> |                           |                            |
| 7. Agency supply & wastewater benefits       | \$183,576                 | \$195,743                  |
| 8. Environmental benefits                    | \$0                       | \$0                        |
| 11. Total benefits                           | <u>\$183,576</u>          | <u>\$195,743</u>           |
| <b>12. Net Present Value</b>                 | <b>(\$118,414)</b>        | <b>(\$143,430)</b>         |
| 13. Benefit-Cost Ratio                       | 0.61                      | 0.58                       |
| 14. Simple Unit Supply Cost                  | \$282 /AF                 | \$317 /AF                  |
| 15. Discounted Unit Supply Cost              | \$386 /AF                 | \$409 /AF                  |

**5.5 BMP 5b: Large Landscape Surveys**

The second part of BMP 5 involves providing large landscape surveys to not less than 15% of CII accounts with mixed-use meters within 10 years of program initiation. With 967 mixed-use meter accounts in 2000, the City would need to provide approximately 15 large landscape water surveys annually for 10 years.

Estimated program costs, presented in Table 16, are estimated at \$17,880 in the first year (CUWCC 1999). This includes 220 hours of staff time to develop and monitor the survey program, and 12 hours of field work per survey.

**Table 16. BMP 5b Cost Assumptions<sup>28</sup> (First Year)**

| <b>Item</b>                 | <b>No.</b> | <b>\$/Item</b> | <b>Annual Costs</b> |
|-----------------------------|------------|----------------|---------------------|
| Inventory of Accounts (hrs) | 40         | \$60           | \$2,400             |
| Targeting & marketing (hrs) | 80         | \$60           | \$4,800             |
| Monitoring & tracking (hrs) | 100        | \$60           | \$6,000             |
| Survey implementation (hrs) | 180        | \$26           | \$4,680             |
| Total                       |            |                | \$17,880            |

The analysis assumes an average of 1.25 acres per site with an average annual water use of 3.35 AF/acre. Again using a relatively high savings estimate of 35%, the first year savings are estimated at 22 AF. A decay rate of 20% yields a total savings of 108 AF over 25 years.

<sup>28</sup> CCWD 1999 as cited in BMP Cost & Savings Study (2003)

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**Table 17. BMP 5b Savings Assumptions**

| Item                              | No.   | Units   |
|-----------------------------------|-------|---------|
| Acres per site <sup>29</sup>      | 1.25  | acres   |
| Annual use per site <sup>30</sup> | 3.35  | AF/acre |
| Savings <sup>31</sup>             | 35%   |         |
| First year savings                | 21.66 | AF      |
| Savings decay                     | 20%   |         |
| Total savings                     | 108   | AF      |

Total program costs are \$17,880, with benefits of \$19,685 and NPV of negative \$1,785. The benefit-cost ratio is 1.10. However, the net societal costs are \$25,380, with benefits of \$21,729, for NPV benefits of (\$3,561). The benefit-cost ratio is 0.86, and BMP 5b is not cost effective to implement from a societal perspective.

**Table 18. BMP 5b Results**

| <b>Program Present Value Costs</b>     | <b>Agency Perspective</b> | <b>Society Perspective</b> |
|--|---------------------------|----------------------------|
| 1. Total surveys                       | 15                        | 15                         |
| 2. Total water savings                 | 109.5 AF                  | 109.5 AF                   |
| 3. Agency program costs                | \$17,880                  | \$17,880                   |
| 4. Customer program costs              | NA                        | 7,500                      |
| 5. Cost share                          | \$0                       | NA                         |
| 6. Net Program Cost                    | <u>\$17,880</u>           | <u>\$25,380</u>            |
| <b>Program Present Value Benefits</b>  |                           |                            |
| 7. Agency supply & wastewater benefits | \$19,665                  | \$21,729                   |
| 8. Environmental benefits              | \$0                       | \$0                        |
| 9. Total benefits                      | <u>\$19,665</u>           | <u>\$21,729</u>            |
| <b>10. Net Present Value</b>           | <b>\$1,785</b>            | <b>(\$3,651)</b>           |
| 11. Benefit-Cost Ratio                 | 1.10                      | 0.86                       |
| 12. Simple Unit Supply Cost            | \$163 /AF                 | \$232 /AF                  |
| 13. Discounted Unit Supply Cost        | \$179 /AF                 | \$250 /AF                  |

**5.6 BMP 6 High-Efficiency Washer Rebate Programs**

BMP 6 calls on water suppliers to offer to their customers cost-effective rebates for the purchase of high-efficiency washing machines. If the maximum cost-effective rebate is less than \$50 per machine, the supplier is not required to implement the BMP.

<sup>29</sup> Survey of water conservation coordinators

<sup>30</sup> California Model Water Efficient Landscape Ordinance table for Benicia  
<http://www.owue.water.ca.gov/docs/WaterOrdIndex.cfm>

<sup>31</sup> BMP Cost & Savings Study (2003)

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If 10% of the City's residential customers participated in the program, 777 rebates would be issued. At \$50 per rebate with \$25 in overhead the total cost per rebate would be \$75 with a total cost of \$58,275.

**Table 19. BMP 6 Cost Assumptions<sup>32</sup> (First Year)**

| Item     | No. | \$/Item | Annual Costs |
|----------|-----|---------|--------------|
| Rebate   | 777 | \$50    | \$38,850     |
| Overhead | 777 | \$25    | \$19,425     |
| Total    |     | \$75    | \$58,275     |

The CUWCC reliable savings estimate is 5,250 gallons per year for each high efficiency washing machine. This would produce a total of 8.8 AF per year in savings for the 777 residential customers. Assuming free ridership of 30%, the total savings over 25 years would be 131 AF.

For the customer, the energy savings can be significant. With approximately 95% of customers owning gas water heaters and 43% owning gas clothes dryers, the average savings per machine per year is \$45.

**Table 20. BMP 6 Savings Assumptions**

| Item                                   | No.   | Units |
|--|-------|-------|
| Average savings per unit <sup>33</sup> | 5,250 | gpy   |
| First year savings                     | 8.8   | AF    |
| Useful life                            | 15    | years |
| Free riders                            | 30%   |       |
| Total savings                          | 131   | AF    |
| Gas hot water heater <sup>34</sup>     | 95%   |       |
| Gas clothes dryers <sup>35</sup>       | 32%   |       |

Total program costs are \$58,275 with benefits of \$23,124. With a NPV of negative \$35,141 and an agency benefit-cost ratio of 0.40, it is not economic for the City to implement BMP 06. With the energy savings, the societal benefits are positive. However, this result implies that this measure should be implemented by PG&E through its PPP-funded energy efficiency programs upon approval by the CPUC.

<sup>32</sup> CCWD 1999 as cited in BMP Cost & Savings Study (2003)

<sup>33</sup> CUWCC reliable savings estimate from BMP cost-effectiveness spreadsheet

<sup>34</sup> KEMA-XENERGY (2004), <http://websafe.kemainc.com/RASSWEB>

<sup>35</sup> Ibid.

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**Table 21. BMP 6 Results**

| <b>Program Present Value Costs</b>     | <b>Agency Perspective</b> | <b>Society Perspective</b> |
|--|---------------------------|----------------------------|
| 1. Total rebates distributed           | 777                       | 777                        |
| 2. Total water savings                 | 131.4 AF                  | 131.4 AF                   |
| 3. Agency program costs                | \$58,275                  | \$58,275                   |
| 4. Customer program costs              | NA                        | NA                         |
| 5. Cost share                          | \$0                       | NA                         |
| 6. Net Program Cost                    | <u>\$58,275</u>           | <u>\$58,275</u>            |
| <b>Program Present Value Benefits</b>  |                           |                            |
| 7. Agency supply & wastewater benefits | \$23,134                  | \$24,051                   |
| 8. Environmental benefits              | \$0                       | \$0                        |
| 9. Customer program benefits           | NA                        | \$520,871                  |
| 10. Other utility benefits             | NA                        | \$23,796                   |
| 11. Total benefits                     | <u>\$23,134</u>           | <u>\$568,718</u>           |
| <b>12. Net Present Value</b>           | <b>(\$35,141)</b>         | <b>\$510,443</b>           |
| 13. Benefit-Cost Ratio                 | 0.40                      | 9.76                       |
| 14. Simple Unit Supply Cost            | \$443 /AF                 | \$443 /AF                  |
| 15. Discounted Unit Supply Cost        | \$537 /AF                 | \$518 /AF                  |

**5.7 BMP 9 Commercial, Industrial and Institutional Conservation Programs**

BMP 9 calls upon water suppliers to provide facility water audits to not less than 10% of their commercial, industrial, and institutional (CII) customers within 10 years of program initiation. To meet this coverage requirement, the City would need to complete approximately seven audits annually for 10 years.

The lowest cost per survey presented in the BMP Cost & Savings study is \$600 for an in-house analyst survey. With overhead the total annual program costs are \$6,000 for the seven surveys.

**Table 22. BMP 9 Cost Assumptions**

| <b>Item</b>           | <b>No.</b> | <b>\$/Item</b> | <b>Annual Costs</b> |
|-----------------------|------------|----------------|---------------------|
| Surveys <sup>36</sup> | 7          | \$600          | \$4,200             |
| Overhead              | 30         | \$60           | \$1,800             |
| <b>Total</b>          |            |                | <b>\$6,000</b>      |

The BMP Cost & Savings study suggests average savings of 3.3 AF/year. However, the average use for the City's CII accounts is only 1.6 AF/year. Assuming savings of 18%, the average savings per site would be 0.29 AF/year for a total of 2.0 AF/year for the seven surveys. With a relatively low savings decay rate of 10%, the total savings over 25 years is 18.7 AF.

<sup>36</sup> BMP Cost & Savings Study 2003

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**Table 23. BMP 9 Savings Assumptions**

| Item                 | No.   | Units   |
|----------------------|-------|---------|
| Avg. use per account | 1.6   | AF/year |
| Savings              | 18%   |         |
| Savings per account  | 0.29  | AF/year |
| First year savings   | 2.0   | AF      |
| Savings decay        | 10%   |         |
| Total savings        | 18.71 | AF      |

Total program costs are \$6,000 with benefits of \$3,310. With an NPV of negative \$2,690 and a benefit-cost ratio of 0.55, it is not economic for the City to implement BMP 9.

**Table 24. BMP 9 Results**

| <b>Program Present Value Costs</b>     | <b>Agency Perspective</b> | <b>Society Perspective</b> |
|--|---------------------------|----------------------------|
| 1. Total surveys                       | 7                         | 7                          |
| 2. Total water savings                 | 18.7 AF                   | 18.7 AF                    |
| 3. Agency program costs                | \$6,000                   | \$6,000                    |
| 4. Customer program costs              | NA                        | 25,186                     |
| 5. Cost share                          | \$0                       | NA                         |
| 6. Net Program Cost                    | <u>\$6,000</u>            | <u>\$31,186</u>            |
| <b>Program Present Value Benefits</b>  |                           |                            |
| 7. Agency supply & wastewater benefits | \$3,310                   | \$3,969                    |
| 8. Environmental benefits              | \$0                       | \$0                        |
| 9. Customer energy benefits            | NA                        | \$0                        |
| 10. Other utility benefits             | NA                        | \$2,967                    |
| 11. Total benefits                     | <u>\$3,310</u>            | <u>\$6,936</u>             |
| <b>12. Net Present Value</b>           | <b>(\$2,690)</b>          | <b>(\$24,250)</b>          |
| 13. Benefit-Cost Ratio                 | 0.55                      | 0.22                       |
| 14. Simple Unit Supply Cost            | \$321 /AF                 | \$1,667 /AF                |
| 15. Discounted Unit Supply Cost        | \$378 /AF                 | \$1,903 /AF                |

**5.8 BMP 14 Residential ULFT Replacement**

BMP 14 requires water suppliers to implement a ULFT distribution program that is at least as effective as requiring retrofit of existing residential high-flow toilets with toilets rated 1.6 gallons per flush (gpf) or less upon property resale. Alternatively, suppliers can satisfy the BMP by offering a toilet rebate to customers of at least \$100. To meet the coverage under the first alternative, the City would need to rebate approximately 3,000 toilets over 10 years.

In 2004, the City implemented a pilot ULFT replacement program targeted at multi-family residential complexes. Prior to 2004 the City did not have a ULFT program for BMP 14. The program offered a \$100 rebate for each toilet that was replaced. Interest in the program was lacking and the City only gave out 13 rebates.

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To match a time of sale replacement program, according to the BMP coverage calculation, the City would have to offer 186 single family and 15 multi family rebates in the first year. With a rebate of \$75 and administrative costs of \$40 per rebate, the total program cost would be \$38,065.

**Table 25. BMP 14 Cost Assumptions**

| <b>Item</b>                  | <b>Single Family</b> | <b>Multi Family</b> | <b>Annual Costs</b> |
|------------------------------|----------------------|---------------------|---------------------|
| Surveys                      | 186                  | 145                 |                     |
| Rebate <sup>37</sup>         | \$75                 | \$75                | \$24,825            |
| Administration <sup>38</sup> | \$40                 | \$40                | \$13,240            |
| <b>Total</b>                 |                      |                     | <b>\$38,065</b>     |

With savings per toilet of 22.4 gpd for single family units and 41.2 gpd for multi family units the total first year savings are 3.7 and 5.4 AF respectively, assuming free ridership of 20%. The total savings over 25 years is 145 AF.

**Table 26. BMP 14 Savings Assumptions**

| <b>Item</b>                    | <b>Single Family</b> | <b>Multi Family</b> |     |
|--------------------------------|----------------------|---------------------|-----|
| Savings per unit <sup>39</sup> | 22.4                 | 41.2                | gpd |
| Free riders                    | 20%                  | 20%                 |     |
| First year savings             | 3.7                  | 5.4                 | AF  |
| Total water savings            | 59.7                 | 85.6                | AF  |

The total program costs are \$38,065 with benefits of \$25,234. With an NPV of negative \$12,831 and a benefit cost ratio of 0.66, it is not economic for the City to implement BMP 14.

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<sup>37</sup> BMP Cost & Savings Study 2003

<sup>38</sup> Ibid.

<sup>39</sup> CUWCC reliable savings estimate from BMP cost-effectiveness spreadsheet

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**Table 27. BMP 14 Results**

| <b><u>Program Present Value Costs</u></b>    | <b><u>Agency Perspective</u></b> | <b><u>Society Perspective</u></b> |
|--|----------------------------------|-----------------------------------|
| 1. Total ULFTs distributed                   | 331                              | 331                               |
| 2. Total water savings                       | 145.4 AF                         | 145.4 AF                          |
| 3. Agency program costs                      | \$38,065                         | \$38,065                          |
| 4. Customer program costs                    | NA                               | \$9,268                           |
| 5. Cost share                                | \$0                              | NA                                |
| 6. Net Program Cost                          | <u>\$38,065</u>                  | <u>\$47,333</u>                   |
| <b><u>Program Present Value Benefits</u></b> |                                  |                                   |
| 7. Agency supply & wastewater benefits       | \$25,234                         | \$23,970                          |
| 8. Environmental benefits                    | \$0                              | \$0                               |
| 9. Other utility benefits                    | NA                               | \$23,716                          |
| 10. Total benefits                           | <u>\$25,234</u>                  | <u>\$47,687</u>                   |
| <b>11. Net Present Value</b>                 | <b>(\$12,831)</b>                | <b>\$354</b>                      |
| 12. Benefit-Cost Ratio                       | 0.66                             | 1.01                              |
| 13. Simple Unit Supply Cost                  | \$262 /AF                        | \$326 /AF                         |
| 14. Discounted Unit Supply Cost              | \$338 /AF                        | \$440 /AF                         |

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### References

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