

CHAPTER 5

Water Conservation

The City of Bellevue has a long standing commitment to water conservation.

Bellevue's conservation program began in 1987 and has evolved significantly since then. Bellevue is committed to participating fully in the development and implementation of future water conservation programs. This chapter has four purposes:

- Review compliance with conservation planning requirements,
- Describe recent conservation measures,
- Document conservation's effect on demand, and
- Describe the City's conservation program for the next six years.

Bellevue's conservation program is comprised of both local and regional programs. Local programs are implemented only in Bellevue's service area and are managed by Bellevue staff. Local programs complement regional efforts and allow for customization to Bellevue's service area, goals, and policies. Regional programs are implemented throughout broader geographic regions and have been managed by Seattle Public Utilities (SPU), Cascade Water Alliance (Cascade), the Water Conservation Coalition of Puget Sound, and King County. Regional programs are beneficial since they are often more cost effective due to economies of scale, bulk purchase discounts, and enhanced marketing effectiveness.

Until recently, much of Bellevue's regional program was administered by SPU under its 1% Conservation Program. In January 2004, Bellevue switched from buying water directly from SPU to buying SPU water indirectly through Cascade. At that time, Cascade also took on the responsibility of administering a regional conservation program on behalf of its members. Per the Cascade Interlocal Agreement, Cascade will develop and implement a conservation management plan that provides a mandatory base conservation program that functions to reduce both average and peak demand.

During 2004 and 2005, Cascade operated under a "Transition Water Conservation Program". Cascade's Transmission and Supply Plan (2005) provides a general framework for its long range conservation program. Details and refinement of that program will be completed in 2006. The program is anticipated to be similar to the conservation activities pursued in recent years.

OBJECTIVES

Bellevue's conservation objectives are as follows:

- Comply with the conservation planning requirements of DOH.
- Promote the efficient use of water within Bellevue's water service area.
- Implement activities that will slow the increase of average and peak water use demands.

- Implement conservation measures that provide value to Bellevue customers cost effectively.
- Work in partnership with Cascade to foster consistency with Cascade’s regional conservation objectives and supply management goals.

COMPLIANCE WITH CONSERVATION PLANNING REQUIREMENTS

Current state conservation planning requirements are contained in the following Washington State Department of Health (DOH) documents and have been incorporated into this Water Comprehensive Plan:

- Conservation Planning Requirements: Guidelines and Requirements for Public Water Systems Regarding Water Use Reporting, Demand Forecasting Methodology, and Conservation Programs (March 1994)
- Water System Planning Handbook (April 1997)
- Municipal Water Law: Interim Planning Guidance For Water System Plan / Small System Management Program Approvals (March 2004)

The State of Washington is currently in the process of revising water conservation planning requirements as a result of the 2003 Municipal Water Law. A draft conservation rule was released in June 2005 and the final rule was originally intended to be adopted by the end of 2005. In September 2005, DOH announced it would delay adoption until June 2006 in order to address technical issues raised during an informal comment period. The new requirements will be phased in. This Water Comprehensive Plan is not subject to the new requirements since it is being prepared prior to final rule language, adoption, and effective date. However, Bellevue intends to be proactive about the new requirements and has prepared this chapter based on the draft rule. It is anticipated that Bellevue’s conservation program will meet the substantive requirements of both the draft and final rules.

Two other documents are relevant to Bellevue’s conservation program, as a member of Cascade:

- Cascade Interlocal Contract: Section 7.2 of the contract states, in part, that “Cascade shall develop and carry out, and Members must participate in, water conservation programs that are uniform among Members. The Board shall develop and implement a Cascade conservation management plan that provides a mandatory base conservation program that functions to reduce both average and peak demands....Members that fail to comply with base programs as set forth in Cascade’s conservation management plan may be required to assume a disproportionate reduction in water supply or to pay penalty charges, or both.”
- Cascade-SPU Contract: Article VI of the contract states that “Each party is committed to the principles of water conservation and each intends to achieve its anticipated savings by implementing water conservation programs either unilaterally or in partnership with other agencies.”

Table 5-1 lists the state’s current conservation guidelines and recommendations for a public water system of Bellevue’s size, and shows that Bellevue is in full compliance. The table

identifies the main categories of a conservation plan: data collection, demand forecasting, and a conservation program.

Most of the data for the first category is supplied in Chapter 4 Water Requirements, although the rate information (subcategory 1e) is provided later in this chapter.

Category	Sub-Category	Element	Required or Recommended	Bellevue In Compliance?
1. Data Collection	1a. Production/ Purchases	Production	Required	Yes
		Wholesale Amount Imported	Required	Yes
		Emergency Interties Imported	Required	Yes
		Peak Day / Peak Month	Required	Yes
	1b. Sales	Single Family Sales	Required	Yes
		Multifamily Sales	Required	Yes
		Commercial, Government, Industrial Sales	Required	Yes
		Agriculture Sales	Required	n/a
		Wholesale Amount Exported	Required	Yes
		Emergency Interties Exported	Required	Yes
		1c. Non-Revenue Water	Accounted For Water	Required
		Unaccounted For Water	Required	Yes
	1d. Connections	Number of Connections and Customers	Required	Yes
1e. Rates	Water Rates	Required	Yes	
2. Demand Forecast		Demand Forecasts With and Without Conservation	Required	Yes
3. Conservation Program	3a. Objectives		Required	Yes
	3b. Public Education	School Outreach	Recommended	Yes
		Speakers Bureau	Recommended	Yes
		Program Promotion	Required	Yes
		Theme Shows and Fairs	Recommended	Yes
	3c. Technical Assistance	Purveyor Assistance	Recommended	n/a
		Customer Assistance	Recommended	Yes
		Technical Studies	Recommended	Yes
		Bill Showing Consumption History	Recommended	Yes
	3d. System Measures	Source Meters	Required	Yes
		Service Meters	Recommended	Yes
		Leak Detection (If Unaccounted Water >20%)	Recommended	Yes
	3e. Incentives / Other Measures	Single Family / Multifamily Kits	Recommended	Yes
		Nurseries / Agriculture	Recommended	n/a
		Landscape Management / Playfields	Recommended	Yes
Conservation Pricing		Recommended	Yes	
Utility Financed Retrofit		Recommended	Yes	
Seasonal Demand Management		Recommended	Yes	
	Recycling/Reuse	Recommended	Yes	

For the demand forecasting category, the information is found in Chapter 4, Water Requirements.

For the five sub-categories of the conservation program category, DOH guidelines recommend that Bellevue evaluate all listed measures and implement those that are cost effective. Bellevue is actively implementing all measures, except the two that are not applicable to Bellevue's circumstances. The conservation objectives were discussed in the Compliance with Conservation Planning Requirements section of this chapter, and Bellevue's activity in each of the other categories is discussed in the Conservation Savings section of this chapter.

HISTORICAL CONSERVATION PROGRAMS

General Overview

Key milestones in Bellevue's water conservation program are as follows:

- 1987 - Bellevue begins its conservation program.
- 1989 - Bellevue hires a full time Conservation Program Coordinator.
- 1992 - Bellevue develops its first comprehensive conservation program, as part of its Water Comprehensive Plan.
- 1998 - Bellevue updates its comprehensive conservation program, as part of its Water Comprehensive Plan Update.
- 2000 - Bellevue, SPU, and SPU's other wholesale customers create the regional 1% Water Conservation Program, with a goal of reducing demand by 1% per capita per year through 2010.
- 2004 - Bellevue joins Cascade and responsibility for the SPU-administered regional conservation programs transfers from SPU to Cascade.

A summary of the measures Bellevue has implemented is provided in Table 5-2. For each measure, the table indicates the category type (e.g. public education), the years it has been implemented, and the most recent primary lead entity. Since the last six years (1999-2004) are of most interest, the table highlights the beginning of that time period with a dark line. Generally, measures with Bellevue listed as "Most Recent Primary Lead Entity" are local measures; the others are considered regional. The term "SPU/Cascade" identifies regional measures where administration switched from SPU to Cascade when Bellevue joined Cascade. The details of each measure are discussed in the remainder of this chapter.

**Table 5-2
Historical Conservation Measures**

Category	Measure	Year																		Most Recent Primary Lead Entity
		87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	
N/A	Full Time Conservation Coordinator*			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Bellevue
Public Education	School Outreach			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Bellevue, PSE
	Speakers Bureau	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Bellevue
	Program Promotion	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Bellevue, SPU/Cascade
	Theme Shows & Fairs				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Bellevue
Technical Assistance	General Customer Service			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Bellevue
	Customer Assistance: Residential Audits														X				SPU/Cascade	
	Customer Assistance: Commercial Audits							X	X	X	X	X	X	X	X	X	X	X	X	SPU/Cascade
	Technical Studies					X	X	X	X	X	X	X	X	X	X	X	X	X	X	SPU/Cascade
System Measures	Bill Showing Consumption History					X	X	X	X	X	X	X	X	X	X	X	X	X	X	Bellevue
	Source Meters	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Bellevue, SPU
	Service Meters	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Bellevue
	Leak Detection			X	X	X									X		X			Bellevue
Incentives /Other Measures	Single Family / Multifamily Kits	X	X	X			X	X	X	X	X	X		X	X	X	X	X	X	Bellevue, SPU/Cascade
	Landscape Mgmt: Water Efficient Landscape & Irrigation Requirements			X						X	X	X	X	X	X	X	X	X	X	Bellevue
	Landscape Mgmt: Waterwise Demo Garden & Classes								X	X	X	X	X	X	X	X	X	X	X	Bellevue
	Landscape Mgmt: Water Efficient Irrigation Program									X	X	X	X	X	X	X	X	X	X	SPU/Cascade
	Landscape Mgmt: Summer Lawn Care (Watering) Campaign					X	X	X	X	X	X	X	X	X	X	X	X	X	X	Multiple Partners
	Landscape Mgmt: Natural Yard Care Neighborhood Program																	X		King County/Bellevue
	Landscape Mgmt: Soaker Hose Rebates															X	X			SPU/Cascade
	Landscape Mgmt: Soil Building/Compost Promotion																X			SPU/Bellevue
	Landscape Mgmt: Rain Gauges		X									X								Bellevue
	Conservation Pricing					X	X	X	X	X	X	X	X	X	X	X	X	X	X	Bellevue
	Utility Financed Retrofits: Residential Toilet Rebates									X	X	X	X	X	X	X	X	X	X	SPU/Cascade/Bellevue
	Utility Financed Retrofits: Residential Clotheswasher Rebates											X	X	X	X	X	X	X	X	SPU/Cascade
	Utility Financed Retrofits: Commercial Rebates									X	X	X	X	X	X	X	X	X	X	SPU/Cascade
	Seasonal Demand Management				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Bellevue, Multiple Partners
Recycling and Reuse						X												X	Bellevue/Cascade	

* Not required by DOH guidelines.

Public Education

School Outreach

This measure is defined by DOH as “education programs targeted to increase awareness of local water resources and encourage water conservation practices.” Bellevue’s school outreach programs aggressively target students at multiple levels of their education.

In the past six years, curriculum-based programs have reached more than 13,000 elementary students in the 16 public elementary schools within Bellevue’s service area. Bellevue worked directly with the Bellevue School District to develop a science curriculum called “Shared Waters” used in the fourth grade, that teaches students about water conservation, as well as the water cycle, water as a renewable resource, northwest geography, the function of watersheds, flow patterns of water, characteristics of surface water and drinking water, why water quality is important to humans, and water quality protection actions. Bellevue provides all fourth graders with a water conservation kit and a 5-minute shower timer coincident with the Shared Waters lesson plan.

In the past six years, Bellevue helped more than 1,500 elementary school students to visit the Cedar River Watershed. The watershed tour lectures cover water conservation, as well as explaining where the students’ water comes from and what is required to preserve the watershed and provide them quality drinking water.

In 2004, Bellevue began offering assembly programs to all elementary schools in the service area which include public and private schools. The assemblies help students understand how their choices affect the environment around them, including water conservation. In 2004, over 3,000 elementary students attended the “Hop on the Habitat Express” assemblies at eight elementary schools. An updated assembly will be launched in the Fall of 2005 called “Earth Smart Adventures: Choices for Our Planet.” Free workshops are offered as a follow-up to the assembly. Workshops available to classroom teachers include “Healthy Habitat,” which explores the basic components of habitat, and “Habitat Stewardship,” which introduces the concept of stewardship.

For more than a decade, Bellevue has teamed with Puget Sound Energy to provide an in-depth conservation program to more than 13,000 middle school students. Previously known as “In Concert With The Environment,” the program went through an extensive revision of its curriculum and is now known as “Powerful Choices for the Environment.” The four-day program is integrated into the sixth grade science curriculum. It focuses on water conservation as well as ecosystems, air quality, waste/reuse/recycling, and energy conservation through hands-on activities, classroom presentations, and computer analysis. During the water conservation section, each student is given a digital shower timer and challenged to see how much water they can personally conserve. Their individual water savings are tallied so the students can see how a small personal change in behavior can have a large cumulative impact.

Bellevue regularly partners with other regional purveyors to update educational materials and conduct outreach/educational programs that target children and families.

Speakers Bureau

This measure is defined by DOH as “seeking speaking opportunities and making speakers available to a wide cross-section of service, community, and other groups.” Bellevue provides staff to groups requesting presentations on water conservation and pursues opportunities to address audiences.

Program Promotion

This measure is defined by DOH as “publicizing the need for water conservation through television and radio public service announcements, news articles, public water system bill inserts, or other means.” In addition to program-specific outreach, Bellevue engages in general program promotion intended to continue to build and reinforce a water conservation ethic among customers.

Bellevue distributes several locally-produced and regionally-produced water conservation brochures. Distribution methods include direct mail, utility billing insertion, and displays at public access locations including the Bellevue Botanical Gardens, key City outreach facilities, local libraries, City Hall, and the Utility’s offices. In 2002, Bellevue created a “new residents” brochure, which includes a reply card residents can use to request further information. The reply cards often request watering and other yard care related information.

Bellevue employs media releases such as conservation articles and tips to the *Seattle Times*, the *Seattle PI*, the *King County Journal*, the *Northwest Garden News*, and the *Bellevue Botanical Garden Newsletter*. Bellevue regularly includes water conservation news and water savings tips in the City’s quarterly newspaper *It’s Your City* and on the Utilities’ website.

Bellevue promotes regional conservation websites including www.savingwater.org, Cascade’s website, and financially supports the *Water Use It Wisely* regional radio campaign sponsored by the Water Conservation Coalition of Puget Sound.

Bellevue employs interpretive features, such as interactive displays, water related art, signs, and demonstration projects in key areas around the City to raise awareness about the need to conserve and protect water resources. Projects include the Cherry Creek Reservoir, the Lakehills Demonstration gardens, the Bellevue Botanical Gardens, and Lakemont Park.

Theme Shows & Fairs

This measure is defined by DOH as “preparing a portable display on water conservation and selected written material.” Bellevue provides display materials and water conservation staff to local and regional theme shows and events. The displays, along with other education

materials, are regularly exhibited at a variety of Bellevue's special events, mini city halls, community meetings, public meetings, classes, and the Bellevue Botanical Garden.

Technical Assistance

Customer Assistance

This measure is defined by DOH as "providing assistance and information to customers which facilitate water conservation."

Bellevue provides general technical assistance to customers upon request, including water use assessments and strategies for reducing water use. Assistance includes providing toilet leak detection dye tablets, and providing retrofit devices such as low-flow showerheads and faucet aerators.

Bellevue has a residential audit program for high summer water users. The program provides assistance through water usage audits and materials on efficient outdoor watering practices. Bellevue has a commercial audit program for large commercial water users. The program identifies conservation measures and associated costs and benefits of implementation. The program began in 1993 under SPU and continues via Cascade.

Technical Studies

This measure is defined by DOH as "collecting data and researching new technology to develop programs which would produce measurable water savings."

Since 1991, Bellevue has participated in regional research of potential conservation measures. Studies have included an outdoor water use study; a residential evapotranspiration pilot program; evapotranspiration station research; reclaimed water use feasibility research; a conservation potential assessment for SPU's retail and wholesale service area; and residential and commercial water conservation studies. In 2005, Bellevue, along with the other Cascade members, conducted a conservation potential assessment for the Cascade service area, including baseline market research on customer attitudes, water use behaviors, and water fixture status.

The studies have yielded information on customer water use including attitudes, behaviors, barriers and motivation to change; the level of complexity that can successfully be designed into residential and commercial programs; improved water management at centrally controlled irrigation systems; the development of a temporary reclaimed water treatment plant, and continued evaluation of uses for reclaimed water. These results have been used to guide program expansion and refine existing efforts.

Bill Showing Consumption History

This measure is defined by DOH as “showing the percentage increase or decrease in water use over the same period from the previous year.” Bellevue continues to include water consumption histograms on water bills, a practice initiated in 1991.

System Measures

Source Meters

This measure is defined by DOH as “installing master source meters for all sources and maintaining a periodic meter testing and repair program.” All of Bellevue’s connections to SPU’s transmission supply lines are jointly metered by SPU and Bellevue. Telemetry was added in 1991 to monitor the flow from the source meters.

Service Meters

This measure is defined by DOH as “installing individual meters for all water uses and maintaining a periodic meter testing and repair program.” Bellevue requires service meters on all connections and recently required a non-metered water district to install service meters before agreeing to assume operation of the District. Bellevue has an ongoing meter repair and replacement program.

Leak Detection

This measure is currently defined by DOH as “conducting a regular and systematic program of finding and repairing leaks” and is currently required if unaccounted water is in excess of 20%.

Two changes are on the horizon related to this measure. First, the American Water Works Association (AWWA) is moving away from using the term “unaccounted water”. Second, leakage is one of the areas the State’s new conservation rule will address. As mentioned previously, the state’s preliminary draft rule is being revised, so the following information may be amended. The preliminary draft rule requires annual calculation of the distribution system leakage, and requires a water loss control action plan if the leakage exceeds 10%.

The distribution system leakage number in the preliminary draft conservation rule is defined as “total water produced and purchased” minus “authorized consumption.” Bellevue’s 2003 water balance, as provided in Chapter 4, shows Bellevue’s system unmetered water to be 5.1% of water purchases, even if all of the unmetered water is assumed to be leakage, it is still well below the preliminary draft rule requirement.

While Bellevue will likely not be required to have a water loss control action plan, Bellevue is proactive about leak control. Bellevue relies on system break history, pipeline condition

assessments, and annual leak detection surveys to help prioritize water system rehabilitation and replacement projects.

Incentives/Other Measures

Single Family/Multifamily Kits

This measure is defined by DOH as “distributing kits containing easily installed water saving devices to single family residential homes and the owners and managers of apartment buildings and condominiums.”

Between 1992 and 1997, Bellevue, in conjunction with SPU, Seattle City Light, Puget Power, Bonneville Power Administration, and Washington Natural Gas, conducted a kit program. Free kits including low flow showerheads, toilet flow regulators, faucet aerators, and water conservation information were delivered to 18,000 single family households and 7,600 multifamily households in Bellevue. Showerheads were also installed in an undetermined number of gyms.

In 1999 and 2000, retrofit kits were distributed in conjunction with the single family toilet rebate program.

Since 2001, showerheads and faucet aerators have been offered to multifamily customers under the umbrella of a multifamily toilet program.

Retrofit items and conservation information were also made available during the 2001-2002 drought. Approximately 2,500 kits which included showerheads, shower timers, toilet leak detection dye tabs, bathroom faucet aerators, and hose shutoff devices were distributed.

Landscape Management/Playfields

This measure is defined by DOH as “promoting low water demand landscaping in all retail customer classes.” Bellevue is particularly active in this area.

Bellevue implemented water efficient landscape and irrigation requirements in 1995 as follow up to the 1989 Wise Water Use Ordinance. The goal of the requirements is to reduce landscape irrigation for commercial properties, street projects, and park sites. It achieves this by requiring proper planning, installation, and maintenance of new or modified landscapes and irrigation systems. The code applies to lots larger than 500 square feet, excluding single family lots. Specific elements include limiting irrigated turf; requiring drought-resistant and native plants; irrigation system specifications; and evapotranspiration based irrigation system scheduling.

In 1994, Bellevue’s Utilities and Parks Departments cooperatively developed the Waterwise Garden and Education Program. The program centers around the Waterwise Demonstration Garden at the Bellevue Botanical Garden. Signage, brochures, staff, and volunteers at the

garden provide conservation information on site planning, plant selection, soils, watering schedules, and efficient irrigation systems. Classes are also offered by local experts and are well attended and highly evaluated by participants.

Since 1996, Bellevue has offered a water efficient irrigation program to large volume irrigators. The program provides irrigation audits, technical assistance based on best management guidelines, and financial incentives for cost effective improvements. In the past six years, 35 large volume customers have participated in audit and incentive offerings.

Bellevue participates in a regional summer yard care program that features several elements of natural yard care, including water conservation. The program began in 1991 as a summer watering campaign by the Water Conservation Coalition of Puget Sound. The program was aimed at educating the public about irrigation conservation needs and methods. Since then, Bellevue has participated in *Northwest Natural Yard Days* which integrates water conservation messages with related landscape messages. This program includes broader agency support, partnership with local retailers, and more comprehensive advertising and communications effort than the preceding program. The campaign includes bill stuffers, public service announcements, seminars, information available at gardening centers and nurseries, radio ads, publications, and community outreach efforts.

In 2003, Bellevue participated in a pilot program called the *Natural Yard Care Neighborhood Program*. This effort, in partnership with King County, brought trainings to targeted neighborhoods and promoted community “norms” around natural yard care practices, including efficient water use.

In 2002 and 2003, Bellevue promoted soaker hose “instant” rebates, as part of SPU’s regional conservation program. In 2002, the program also offered “instant” rebates for compost, in an effort to promote building healthy soils as a means to conserve water.

In the past, Bellevue promoted awareness of summer watering conservation through the distribution of rain gauges. In 1997, Bellevue distributed gauges at special events, workshops, and lectures held in conjunction with the Waterwise Garden at the Bellevue Botanical Garden.

Conservation Pricing

This measure is defined by DOH as “implementing rate design techniques to provide economic incentives to conserve water.”

Bellevue has used conservation pricing since 1990. The current pricing structure is shown in Table 5-3, and encourages the wise and efficient use of water for each customer class. The single family customer class has an inverted block rate structure with four blocks. The multifamily customer class has an inverted block rate structure with three blocks. The commercial customer class uses seasonal rates, charging more for water in the peak season. Dedicated irrigation meters are charged a premium rate, the highest rate of all the water uses.

Utility Financed Retrofits

This measure is defined by DOH as “installing water efficient fixtures in existing residences and commercial/industrial facilities.”

Bellevue has offered residential toilet rebates since 1994. In the past six years, Bellevue, in conjunction with SPU and Cascade, has rebated 695 toilets for single family households in Bellevue. In 2001, a multifamily toilet rebate program, which also includes showerheads and faucet aerators, was launched. This program has replaced 1,314 toilets in Bellevue.

Table 5-3	
Rate Structure	
Volume	\$/ccf
<i>Single Family - Inverted Block Rate</i>	
0 - 20 ccf	\$2.17
21 - 30 ccf	\$3.00
31 - 100 ccf	\$3.86
Over 100 ccf	\$5.73
<i>Multifamily - Inverted Block Rate</i>	
0 - 11 ccf	\$2.61
12 - 15 ccf	\$2.92
Over 15 ccf	\$3.45
<i>Commercial - Season Rates</i>	
Non-Peak	\$2.22
Peak	\$3.11
<i>Irrigation - Premium Rate</i>	
All consumption	\$4.49
*2005 Rates shown	

Bellevue has offered rebates for residential capacity washing machines since 1997. The program was originally implemented in conjunction with SPU and administrative responsibility has now been transferred to Cascade. The energy utilities Seattle City Light and Puget Sound Energy have often partnered with the program to increase the rebate amount offered to customers. 4,143 rebates have been issued to Bellevue residents in the last six years.

Bellevue has offered financial incentives, as well as technical support, to commercial customers since 1995. The program will pay up to 50 percent of the installed cost for pre-approved conservation projects. Opportunities include replacing toilets and urinals; replacing commercial washers; converting water cooled ice machines to air cooled; eliminating single pass cooling; cooling tower improvements; and more. To date 1,340 toilets and urinals have been replaced in Bellevue under this program.

Seasonal Demand Management

This measure is defined by DOH as “implementing measures aimed at controlling peak seasonal demand.” Bellevue’s conservation pricing and landscaping management measures described above, are aimed directly at controlling peak seasonal demand.

Recycling/Reuse

This measure is defined by DOH as “examining opportunities for water reuse and recycling as an approach to providing additional water.”

Cascade’s 2005 Transmission and Supply Plan analyzed reclaimed water opportunities for Bellevue. Sources of reclaimed water include several King County wastewater treatment facilities: the south treatment plant, the future Brightwater treatment plant, and potentially other satellite facilities. Bellevue has no specific plans for water reuse due to the highly developed nature of its service area. That situation makes provision of reclaimed water to existing customers costly. Minimal opportunities will likely be available with regard to new development for which reclaimed water application is feasible. However, Bellevue has identified potential application sites in the irrigable areas, as shown in Table 5-4.

Customer	2003 Total Consumption (ccf)⁽²⁾	2003 Total Consumption (gal)⁽³⁾	2003 Average Day Demand (gpd)⁽⁴⁾	2003 Peak Season Demand (gpd)⁽⁵⁾
Bellevue Community College	4,571	3,419,108	9,367	28,025
Bentall Capital/Five Newport	10,040	7,509,920	20,575	61,557
Foothill Commons Apts.	4,062	3,038,376	8,324	24,905
Double Tree Inn	5,251	3,927,748	10,761	32,195
Boeing Computer Services	5,145	3,848,460	10,544	31,545
Central Park East Apts.	5,332	3,988,336	10,927	32,691
Colony Woods Apts.	6,223	4,654,804	12,753	38,154
Overlook at Lakemont	4,023	3,009,204	8,244	24,666
Tam O’Shanter Golf Course	10,066	7,529,368	20,628	61,716
Total	54,713	40,925,324	112,123	335,454
NA = Not Applicable 1. These sites represent either planned opportunities (where specifically noted) or potential opportunities based on analysis of the largest current irrigation and industrial water customers. 2. From billing records. 3. Converted from ccf to gal. 4. Annual amount divided by 365 days per year. 5. Converted from annual amount to average day demand during peak season. The following assumptions are made: Irrigation sites - Peak season use only. Peak season assumed to be 122 days (4 months) long. Industrial sites - Annual use divided by 365 days (full year).				

The Bellevue Convention Center Authority operates a pulp-extractor food waste system. The system reduces the facility's water consumption by recycling garbage disposal rinse water instead of using a flow through system, saving approximately 1 million gallons per year. The system serves as a demonstration project for other such facilities, and led to the installation of another system by the Bellevue Public Schools in their central school lunch kitchen facility at Tyee Middle School.

HISTORICAL CONSERVATION SAVINGS

The conservation savings Bellevue has achieved through 2004 are shown in Table 5-5. The table shows demand with and without conservation for various categories including Bellevue's single family, multifamily, and commercial customer categories. The methodology for calculating these numbers is described below and differs between residential and commercial categories.

The main steps to determine the conservation savings for the single family and multifamily sectors shown in Table 5-5 are as follows:

1. "Number of Housing Units" and "Number of Accounts" in the year of interest (rows 2-3) are obtained from the billing system. The numbers are 33,912 housing units for single family and 24,206 housing units for multifamily.
2. "Water Use Per Housing Unit" and "Water Use Per Account" in the baseline period (rows 5-6) are calculated from data from the billing system. The baseline period of 1986-1990 was chosen for three reasons. First, DOH suggests beginning calculating demand reductions in 1991, which implies using a baseline period prior to 1991. Second, using multiple years helps adjust for weather and other factors that may make a single year unrepresentative; therefore extending back several years before 1990 is reasonable. Third, this was the five highest-use years in the City's history. The results per housing units are 283 gpd for single family and 152 gpd for multifamily.
3. "Water Use Per Housing Unit" and "Water Use Per Account" in the three year average (rows 8-9) are calculated from data from the billing system. A three year average is used to correct for weather and other factors that may make the most recent year, or any single year, unrepresentative. The results per housing unit are 240 gpd for single family and 114 gpd for multifamily.
4. "Normalized Demand Without Conservation" (row 11) is calculated by multiplying the "Number of Housing Units" in the year of interest (row 2) by the "Water Use Per Housing Unit" in the baseline period (row 5). The results are 9,597,096 gpd for single family and 3,679,312 gpd for multifamily.
5. "Normalized Demand With Conservation" (row 12) is calculated by multiplying the "Number of Housing Units" in the year of interest (row 2) by the "Water Use Per Housing Unit" in the three year average (row 8). The results are 8,138,880 gpd for single family and 2,759,484 gpd for multifamily.

**Table 5-5
Conservation Savings Achieved Through 2004**

Row		Single Family	Multi Family	Commer- cial	Total Billed	Unbilled	Purchased Water ⁴
1	Demographics in Year of Interest (2004)						
2	Number of Housing Units ⁵	33,912	24,206	N/A	N/A	N/A	N/A
3	Number of Accounts ⁵	33,912	658	N/A	N/A	N/A	N/A
4	Water Use Factors in Baseline Period (1986-1990)						
5	Water Use per Housing Unit (gpd) ^{1,6}	283	152	N/A	N/A	N/A	N/A
6	Water Use per Account (gpd) ^{1,6}	283	4,872	N/A	486	N/A	N/A
7	Water Use Factors in 3 Year Average (2002-2004)						
8	Water Use per Housing Unit (gpd) ^{1,6}	240	114	N/A	N/A	N/A	N/A
9	Water Use per Account (gpd) ^{1,6}	240	4,594	N/A	N/A	N/A	N/A
10	Demand and Savings For Year of Interest (2004)						
11	Normalized Demand Without Conservation (gpd) ²	9,597,096	3,679,312	4,112,421	17,388,829	1,139,240	18,528,069
12	Normalized Demand With Conservation (gpd) ^{3,6}	8,138,880	2,759,484	3,869,918	14,768,282	748,598	15,516,879
13	Actual Demand With Conservation (gpd) ⁵ <i>(Uses actual data for year of interest)</i>	8,240,536	2,828,653	3,717,740	14,786,929	626,480	15,413,409
14	Savings Volume (gpd) ⁶ <i>(Based on normalized demands)</i>	1,458,216	919,828	242,503	2,620,547	390,643	3,011,190
15	Savings Percent <i>(Based on normalized demands)</i>	15%	25%	6%	15%	34%	16%

1. Baseline and 3 year average water use per housing unit or account are rounded to zero decimals.
2. For residential, uses baseline period water use factors. For commercial, uses 3-yr average of actual demand plus estimated conservation savings.
3. For residential, uses 3-year average water use factors. For commercial, uses 3-yr average of actual demand.
4. Exclusive of wheeled/wholesale water.
5. Data obtained from the billing system.
6. Calculated from data obtained from the billing system.
7. Source of data is from local and regional commercial sector reports that estimate savings from implemented projects.

6. “Actual Demand With Conservation” (row 13) is obtained from the billing system. The numbers are 8,240,536 gpd for single family and 2,828,653 gpd for multifamily.

7. “Saving Volume” (row 14) is calculated by subtracting “Normalized Demand With Conservation” (row 12) from “Normalized Demand Without Conservation” (row 11). The results are 1,458,216 gpd for single family and 919,828 gpd for multifamily.
8. “Savings Percent” (row 15) is calculated by dividing the “Savings Volume” (row 14) by the “Normalized Demand Without Conservation” (row 11). The results are 15% savings for single family and 25% savings for multifamily.

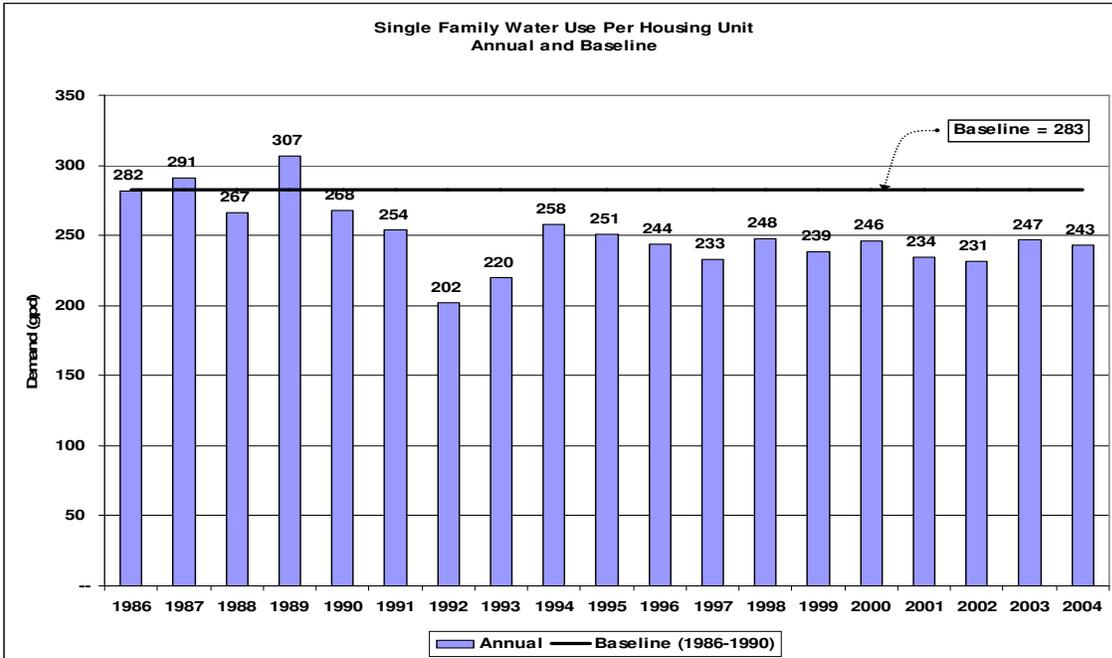
The main steps to analyze the conservation savings for the commercial sector are as follows:

9. “Normalized Demand Without Conservation” (row 11) is calculated by adding the “Normalized Demand With Conservation” (row 12) and the “Saving Volume” (row 14). The result is 4,112,421 gpd.
10. “Normalized Demand With Conservation” (row 12) is calculated from data from the billing system. It is the average of the actual demands for the year of interest and the two previous years. The result is 3,869,918.
11. “Actual Demand With Conservation” (row 13) is obtained from the billing system. The number is 3,717,740.
12. “Saving Volume” (row 14) is the estimated cumulative amount of water saved by projects implemented in the commercial sector since 1990. The source for this data is from local and regional commercial sector reports that estimate savings from implemented projects.. The number is 242,503 gpd.
13. “Savings Percent” (row 15) is calculated by dividing the “Savings Volume” (row 14) by the “Normalized Demand Without Conservation” (row 11). The result is 6% savings.

The conservation savings and their effects on demand are shown graphically in Figures 5-1 to 5-4. The figures demonstrate that water conservation has resulted in steadily decreasing water use for single and multifamily units and the commercial sector.

For the single family sector, Figure 5-1 compares the water use per housing unit for each year to the baseline period. The baseline period water use number is 283 gpd. The numbers for the most recent three years average 240 gpd, a 15% reduction compared to the baseline period.

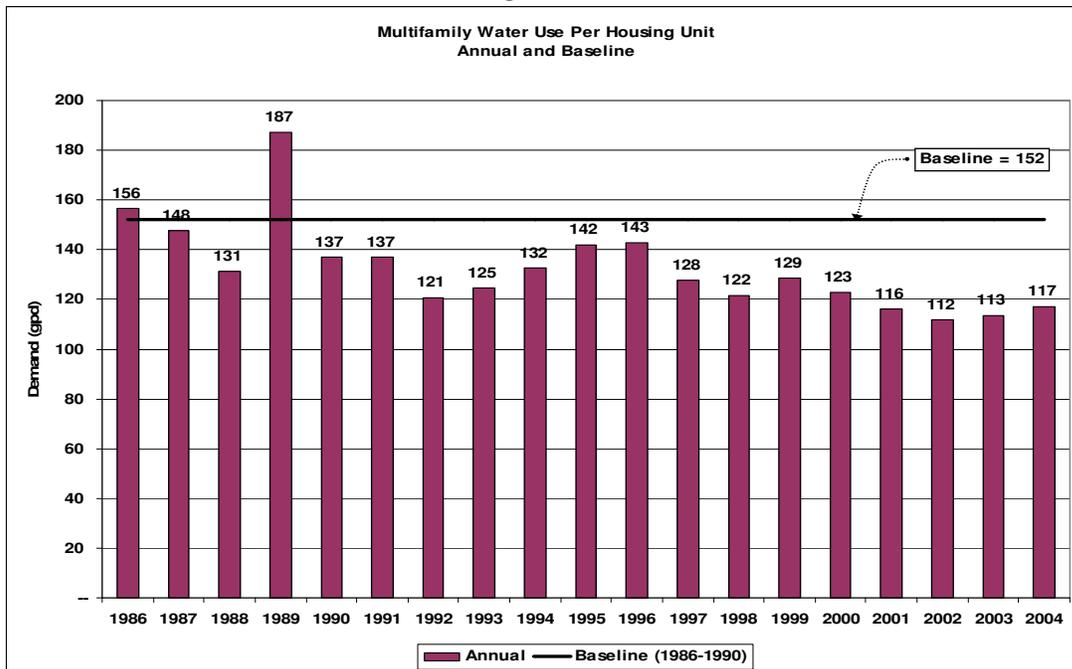
Figure 5-1



Note: The decreased demand in 1992 was the result of drought related mandatory watering restrictions. The decreased demand in 1993 was due to an unusually wet summer and rollover effects from the 1992 drought.

For the multifamily sector, Figure 5-2 compares the water use per housing unit for each year to the baseline number of 152 gpd. The most recent 3-year average (114 gpd) reflects a 25% reduction compared to the baseline period.

Figure 5-2



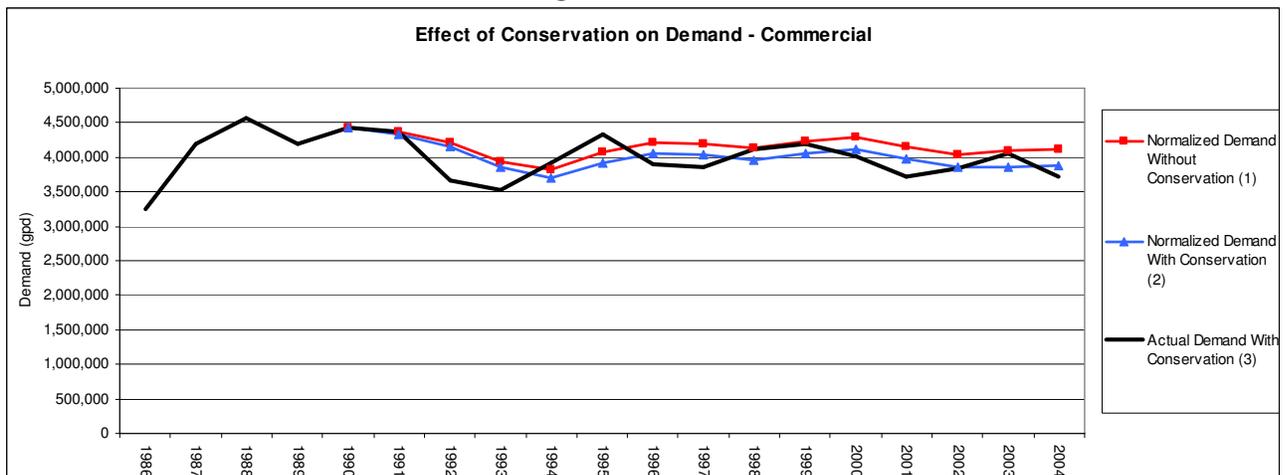
Note: The decreased demand in 1992 was the result of drought related mandatory watering restrictions. The decreased demand in 1993 was due to an unusually wet summer and rollover effects from the 1992 drought.

Figure 5-3 shows the effect of conservation on commercial demand. The figure plots:

- Normalized Demand Without Conservation – This is the normalized demand with conservation plus estimated savings from commercial conservation projects.
- Normalized Demand With Conservation – This is the 3 year average of actual demands.
- Actual Demand With Conservation – This is the actual demand.

Since the post-conservation era began in 1991, the actual demand with conservation has been lower than the normalized demand without conservation, aside from 1994 and 1995 (as noted in footnote 3 to Figure 5-3.) By 2004, the normalized demand with conservation was 6% less than what it would have been without conservation.

Figure 5-3



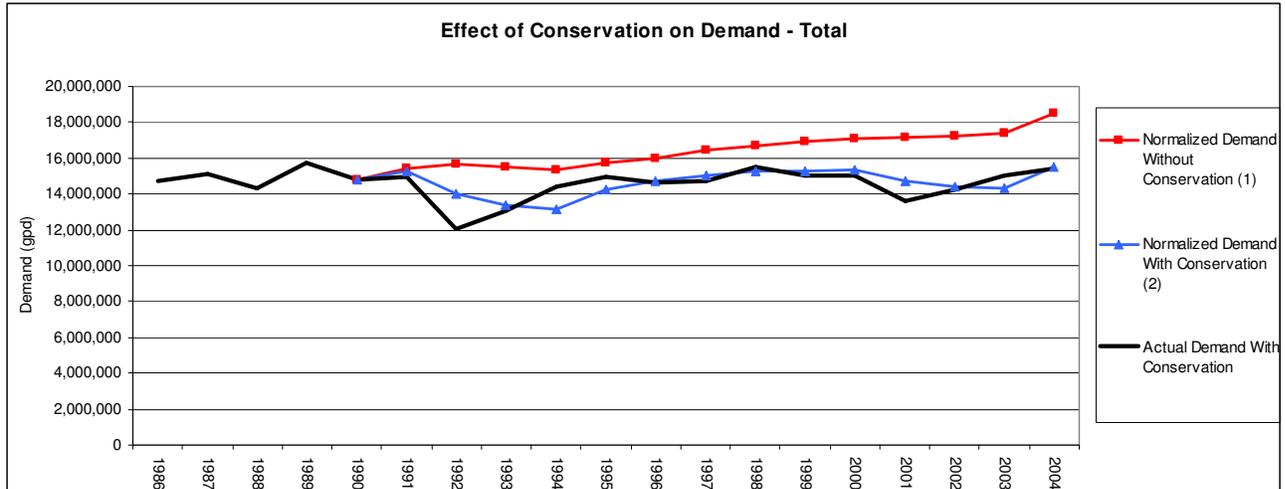
1. 3-year average of actual demands plus estimated conservation savings.
2. 3-year average of actual demands.
3. Any year where the "actual demand with conservation line" is higher than the "normalized demand without conservation" line does not imply that no conservation occurred that year. Rather, it is because the normalized demand without conservation uses a 3-year average of actual demands. Therefore, if the year of interest demand is significantly higher than the two preceding years, the actual demand with conservation line will be higher than the normalized demand without conservation line.

Figure 5-4 shows the cumulative effect of conservation on the entire system. The figure plots:

- Normalized Demand Without Conservation – For the residential sector, this uses baseline period water use factors. For the commercial sector, this uses a 3-yr average of actual demand plus estimated conservation savings.
- Normalized Demand With Conservation – For the residential sector, this uses 3-year average water use factors. For the commercial sector, this uses a 3-yr average of actual demand.
- Actual Demand With Conservation – This is the actual demand.

Since the post-conservation era began in 1991, both the normalized demand with conservation and the actual demand with conservation have consistently been lower than the normalized demand without conservation. By 2004, the demand (normalized) with conservation was 16% less than what it would have been without conservation.

Figure 5-4



1. For residential, uses baseline period water use factors. For commercial, uses 3-yr average of actual demand plus estimated conservation savings.
2. For residential, uses 3-year average water use factors. For commercial, uses 3-yr average of actual demand.

CONSERVATION PROGRAM FOR 2006-2011

Bellevue’s conservation program for the next six years, 2006-2011, is designed to continue the historical success, as well as to meet the stated objectives listed in Chapter 5.2. As noted above, by 2004 Bellevue had achieved a 16% reduction in overall demand compared to what demand would have been without conservation.

Selection of the conservation program components is also guided by the *2005 Cascade Water Alliance Conservation Potential Assessment (CPA)*. The CPA analyzed conservation opportunities and estimated water savings and costs associated with various conservation measures. The analysis was performed for each individual Cascade member, as well as for Cascade collectively. For Bellevue’s portion of the CPA, the single family sector has the largest savings potential (approximately 65% of Bellevue’s total savings), followed by multifamily (approximately 25%) and then by commercial (approximately 10%). The CPA also indicates that the outdoor portion of Bellevue’s single family sector has strong savings potential, with approximately 25% of Bellevue’s total savings potential coming from this component. Therefore, Bellevue’s strong focus on the single family sector and landscape management measures is consistent with the CPA analysis.

Details of the 2006-2011 conservation program are provided in Table 5-6. The table is structured to show that the new program continues to meet or exceed DOH requirements, as well as to allow for comparisons between new and historical programs. A summary

**Table 5-6
Conservation Program for 2006-2011**

Category	Measure	Summary	Lead Entity
N/A	Full Time Conservation Coordinator	Continue staffing.	Bellevue
Public Education	School Outreach	Continue 4 th grade Shared Waters curriculum and conservation kit, 6th grade Powerful Choices for the Environment program, Cedar River watershed tours, assembly programs, and teacher workshops.	Bellevue, PSE
	Speakers Bureau	Continue providing speakers for groups.	Bellevue
	Program Promotion	Continue general program promotion through brochures, media releases, city newsletter, website, displays, demonstration projects, and more.	Bellevue, Cascade
	Theme Shows & Fairs	Continue providing display materials and staff to local and regional theme shows and events.	Bellevue
Technical Assistance	General Customer Service	Continue water use assessments and strategies to reduce water use.	Bellevue
	Customer Assistance: Residential Audits	Continue water usage audits and materials for high summer water users.	Cascade
	Customer Assistance: Commercial Audits	Continue water usage audits for large commercial customers.	Cascade
	Technical Studies	Evaluate participating in technical studies as appropriate.	Cascade
	Bill Showing Consumption History	Continue providing consumption history on bills.	Bellevue
System Measures	Source Meters	Continue metering, as well as meter testing and repair.	Bellevue, SPU
	Service Meters	Continue metering, as well as meter testing and repair.	Bellevue
	Leak Detection	Continue leak control programs.	Bellevue
Incentives /Other Measures	Single Family / Multifamily Kits	Continue providing showerheads and faucet aerators to multifamily customers.	Bellevue, Cascade
	Landscape Mgmt: Water Efficient Landscape & Irrigation Requirements	Continue landscaping-oriented conservation requirements for commercial properties, street projects, and parks.	Bellevue
	Landscape Mgmt: Waterwise Demo Garden & Classes	Continue landscaping-oriented conservation education, signage, and classes.	Bellevue
	Landscape Mgmt: Water Efficient Irrigation Program	Continue landscaping-oriented water usage audits, technical assistance, and financial incentives for large commercial customers.	Cascade
	Landscape Mgmt: Summer Lawn Care (Watering) Campaign	Continue landscaping-oriented conservation through Northwest Natural Yard Days.	Multiple Partners
	Conservation Pricing	Continue inverted block rate structure for residential, seasonal rate structure for commercial, and premium pricing for irrigation meters.	Bellevue
	Utility Financed Retrofits: Residential Toilet Rebates	Continue toilet rebates for residential customers.	Cascade
	Utility Financed Retrofits: Residential Clotheswasher Rebates	Continue clotheswasher rebates for residential customers.	Cascade
	Utility Financed Retrofits: Commercial Rebates	Continue rebates up to 50% of installed cost for most equipment.	Cascade
	Seasonal Demand Management	Continue conservation pricing and landscape management measures listed above.	Bellevue, Multiple Partners
	Recycling and Reuse	Continue promoting the use of reclaimed water as appropriate.	Bellevue/Cascade

statement about each measure is included in the table and more detailed measure descriptions are available in the Conservation Savings section of this chapter. For measures where the lead entity is not the City of Bellevue, continuation of the measure is contingent on continued participation by the lead entity.

Cascade serves as Bellevue's regional partner for a range of conservation services. As a Cascade member, Bellevue actively participates in planning these regional services. In 2006 Bellevue will be working with Cascade in formulating Cascade's Long-Range Conservation Plan. The items listed in Table 5-6 are based on Cascade's transition conservation program, which is currently in effect, and could change as Cascade develops its long range plan.. Bellevue anticipates that regional conservation services performed by Cascade will be at least equivalent to the transition program elements.

Bellevue finances its conservation program through customer rates. Bellevue pays directly for measures where it is the lead entity. Bellevue's share of Elements where Cascade is lead entity are included as part of wholesale water payments to Cascade.

WATER SHORTAGE CONTINGENCY PLAN

The City of Bellevue maintains a specific *Water Shortage Contingency Plan* as Appendix D to the *Bellevue Utilities Department Emergency Response Book* (Red Book) referenced in the Emergency Procedures section of Chapter 9. The *Water Shortage Contingency Plan* provides a systematic response, should the need arise, for Bellevue to reduce customer water demands in response to a water supply emergency or a drought event. The Water Shortage Contingency Plan is designed to be used in highly unusual and infrequent events, and to be coordinated with Cascade's *Regional Water Shortage Contingency Plan*. The Plan identifies:

- The Water Shortage Response Team (both local and regional) responsible for coordinating and implementing Bellevue's response in the event of a water shortage;
- Actions to be implemented by Bellevue during each stage of a water shortage response;
- Bellevue staff, and City Council members who should be notified and routinely briefed on the status of a water shortage, and;
- Public notification procedures and messages that should be implemented during each stage of a water shortage response.

The *Water Shortage Contingency Plan* is divided into four stages which allow Bellevue to either progressively implement more severe demand reduction activities as conditions warrant (as in the case of a regional drought), or to immediately invoke severe restrictions (as in the case of a local or regional supply emergency or failure). In general, the four stages are:

- **Advisory Stage:** Customers are notified as early as meaningful data are available that weather conditions may result in a less than normal available supply of water.

- Voluntary Stage: Voluntary support and cooperation of customers is relied upon to meet target consumption goals in response to a water shortage.
- Mandatory Stage: If voluntary support and cooperation by customers does not reduce demand enough to meet target consumption goals, or if supply conditions continue to deteriorate, mandated restrictions are placed on discretionary water uses in order to meet consumption goals.
- Rationing Stage: Water rationing is implemented only when a critical water supply situation exists which threatens availability of water for public health and safety.

The Water Shortage Response Team includes staff from the Engineering and Operations & Maintenance Divisions, from the Utilities Department Director's Office, and the Utility's Public Information Officer. Water conservation staff are responsible for maintaining the *Water Shortage Contingency Plan* and response team composition. The complete response team roster is contained in the Plan, along with the names, titles, work and home phone numbers of the staff (in ranked order) responsible for assembling and directing the Water Shortage Response Team, and the Utility's response in the event of a water shortage.