Water Conservation Report

January 2002

The Strategic Plan for Water Supply

The City of San Diego's Strategic Plan (Plan) for Water Supply, which was approved by the Public Advisory Group (PAG) on April 30, 1997, and accepted by the San Diego City Council by Resolution R-289102, outlines a preferred alternative to meet existing and ongoing demand for water from 1997 through 2015. Water conservation, or demand-side management, is integrated into this Plan for supplying water to meet future needs.

Water conservation programs reduce water demand through promoting or providing incentives for the installation of hardware that provides permanent water savings. This savings makes water available to meet growing demands, and it can be viewed as a source of local supply. The Plan called for an increase in water conservation from then current levels of 13,000 acre feet (AF) per year to 26,000 AF per year by FY2005. The Plan specified the following programs: turf management - targeted conservation for large landscaped commercial accounts; rain sensor rebates (irrigation incentives); a horizontal-axis (H-axis) clothes washer incentive program; facility (infrastructure) repair and replacement; and an enhanced public education program.

In order to make this goal achievable, the PAG recommended that this goal be broken down into manageable chunks each fiscal year, as follows:

FY2000 additional annual savings	FY2001 additional annual savings	FY2002 additional annual savings	FY2003 additional annual savings	FY2004 additional annual savings	FY2005 additional annual savings	**Cumulative Total New Water Savings**
1,300 AF	1,300 AF	2,600 AF	2,600 AF	2,600 AF	2,600 AF	**13,000 AF**

Based on this time-line, the savings achieved in FY1999 (refer to Table 1 attached) put the Water Conservation Section ahead of its goal for water savings.

Conservation Programs and Initiatives

This conservation plan will require the integration of existing programs and the development of new programs focused on achieving an additional 13,000 AFY of water saved by June of 2005. The following outlines key programs and initiatives.

Ultra-Low Flush Toilet (ULFT) Incentives

The City of San Diego's ULFT Incentives Programs have been in operation since 1991. The ULFT Incentive Program provides monetary incentives for replacing high-volume flush toilets with ULFTs that use 1.6 gallons per flush or less. Originally, a rebate style ULFT Incentive Program was administered regionally by the San Diego County Water Authority (CWA). In 1993, the City hired its own contractor to operate a rebate style program. More than 200,000 rebates have been issued to City water customers since 1991.

In a study conducted by the CWA, the projected potential of high-volume toilet retrofits (600,000 residential fixtures) in the City was enough to continue providing retrofit incentives through 2006. Likewise, continued interest in the program has been demonstrated by organizations like the San Diego Association of Realtors, and by water customers who continue to retrofit homes and apply for rebates in order to comply with SDMC 147.04, the City's "Retrofit Upon Resale" Ordinance.

Recently, the City chose to make an entrepreneurial shift to modify the program to achieve greater participation, and to provide customer friendly enhancements. The City chose to join the CWA's Voucher Incentive Program, which had been in operation for the past seven years. The CWA program provides point-of-purchase vouchers or instant discounts for ULFTs, low-flow urinals, residential and commercial high-efficiency washing machines, and cooling tower controllers. The City was already a participant in the CWA Voucher Incentive Program for all fixtures except ULFTs and urinals. Because the existing City ULFT Rebate Program's contract term was ending, the opportunity arose to have ULFTs and urinals included in the CWA Voucher Incentive Program and for the City to have just one type of program for all these water-saving devices.

The ULFT Incentive Program, which began in 1991, is responsible for over 7.5 million gallons per day (gpd) of cumulative water savings. The ULFT Incentive Program is the City's water savings workhorse.

The City Facilities ULFT Retrofit Program replaces existing high-volume City toilets with ULFTs. It serves as a model to encourage Commercial, Industrial and Institutional (CII) water customers to retrofit buildings using low water use plumbing fixtures. Qualcomm Stadium was previously retrofitted, replacing 365 toilets and 196 urinals. The City Facilities ULFT Retrofit Program accounts for water savings of 201,576 gpd.

Water Conserving Municipal Codes - Legislation

The concept of an ordinance that would require the retrofitting of properties upon change of property ownership or bathroom alteration was first discussed by the City Manager's Water Conservation Advisory Committee in the Spring of 1990. By March 14, 1991, San Diego had an

ordinance which required the installation of ULFTs in all new construction. In addition, the City Council requested that the City Manager develop a separate ordinance requiring the replacement of existing toilets with ULFTs when remodeling a bathroom or upon change of property ownership.

On March 28, 1991, U.S. District Court Judge Rudi Brewster issued a Memorandum of Decision that presented the City with the option of foregoing a $2.5 million fine resulting from a lawsuit involving sewer line breaks if the City used these funds for a conservation credits project involving three water conserving measures: 1) new construction permits requiring the installation of ULFTs; 2) an ordinance requiring that all properties resold or remodeled within the City of San Diego be retrofitted with 1.6 gallon per flush (gpf) toilets and 2.5 gallons per minute (gpm) showerheads and faucet aerators; 3) incentives for ULFTs to be made available to the public.

In FY2001, 11,052 Water Conservation Certificates of compliance with SDMC 147.04 were filed with the Department. The vast majority of these certificates came from the residential sector.

In FY2002, improving program participation will be the program's emphasis. Furthermore, property data from the County Recorder's Office will be compared to the Water Department's Consolidated Water Conservation (CWC) database to validate compliance efforts. Additionally, electronic forms will be provided via the City's website to provide assistance to the real estate community.

Residential High Efficiency Clothes Washing (HEW) Machine Vouchers

The High-Efficiency Clothes Washer (HEW) Voucher Program provides a point-of-purchase discount of $125 off the cost of a new qualifying HEW. These machines use 40% less water and 60% less energy per load than standard top-loading machines. HEWs are also credited with cleaning clothes more thoroughly, reducing detergent requirements, and reducing wear and tear of clothing.

In FY2001, the City of San Diego issued 835 residential HEW vouchers. Clothes washers account for approximately 12% of overall residential water use, and 28% of indoor residential water use. Each residential HEW washer saves approximately 5,100 gallons per year for 16 years. Water savings from this program accounted for cumulative water savings of 40,330 gpd in FY2001.

Commercial, Industrial, Institutional (CII) Customers - Incentives and Surveys

The CII Voucher Program offers vouchers to commercial, industrial and institutional customers. Managed by the CWA, point-of-purchase vouchers are offered for cooling tower conductivity controllers and coin-operated high efficiency washing (HEW) machines. Coin-operated HEWs vary in their water savings depending on the model and site usage, but in an average Laundromat, a HEW can be expected to save about 60 gpd. Surveys indicate that the average cooling tower conductivity controller will save about 492 gpd. In FY2001, 29 cooling tower controllers and 781 commercial coin-operated HEW vouchers were redeemed which saved 61,128 gpd, with cumulative water savings of 168,219 gpd since the program started in FY1999.

The CII survey program offers assistance to businesses, production plants, hospitals and other nonresidential facilities by analyzing water use patterns and recommending water conserving measures. The goal of the program is to offer cost-effective advice and strategies to reduce a facility's water consumption without affecting processes or production levels. It also offers the aforementioned vouchers for implementing certain retrofit recommendations. This program was enhanced through changes to the City's Municipal Code 67.3806(d)(11) which "guarantees water" for manufacturing and research and development firms that implement California Urban Water Conservation Council (CUWCC) Best Management Practices (BMPs) and also use reclaimed water if available. CII surveys result in average water savings of 876 gpd for each survey conducted. The CII survey program accounts for cumulative water savings of 524,700 gpd.

Residential Interior/Exterior Water Surveys

This program offers residential customers an interior and exterior water use survey of their home. The service consists of analyzing water usage and flow rates of fixtures, checking for leaks, installing water-saving devices, and recommending efficiency improvements to landscaping and irrigation. A typical household participating in this program can reduce daily water consumption by 13%. This program is extremely popular, because surveyors can often identify hard-to-find water leaks that contribute to higher water and sewer bills. The Residential Survey Program accounts for water savings of 40 gpd for each survey. Water savings through FY2001 account for a total of 1,032,713 gpd.

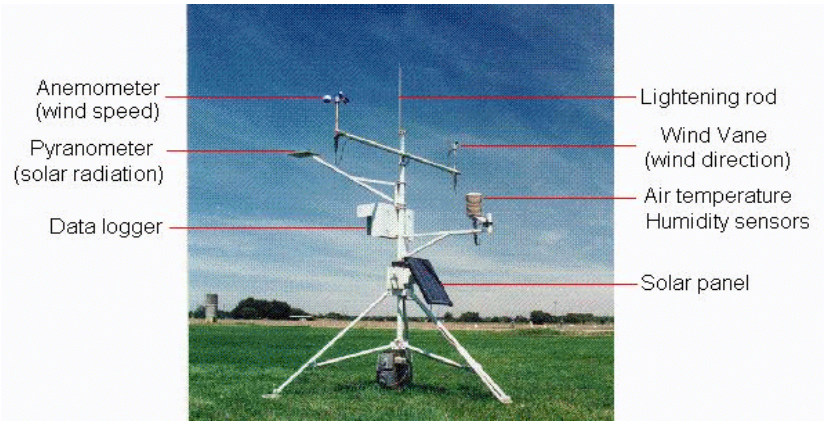
Water Conservation Demonstration Gardens - Education

The Water Conservation Program has actively promoted water efficient landscaping practices by sponsoring and designing demonstration gardens that showcase xeriscape practices.

Water Department staff originally designed landscapes for the Environmental Services Department's Ridgehaven structure and designated Fire Department facilities to reduce maintenance needs, create opportunities for educational displays highlighting water conservation efforts and implement xeriscape principles which include: planning and design; practical use of turf; efficient irrigation; soil analysis; appropriate plants; and ongoing maintenance. In FY2002, the Water Department plans to participate in the regional Cuyamaca College Water Conservation Garden, located at 12122 Cuyamaca College Drive West, El Cajon, California, as part of a county-wide effort to promote water conservation.

CIMIS (California Irrigation Management Information System) Stations

One of the keys to effectively managing irrigation for agricultural customers and commercial nurseries is accurate weather information. Weather patterns (solar radiation, wind, rain, relative humidity) have a direct impact on the watering needs for turf, trees, shrubs and other plants.



The City of San Diego partners with the California Department of Water Resources (DWR) to locate, calibrate and maintain CIMIS weather stations. CIMIS stations are passive data loggers that gather accurate weather data to create and track evapotranspiration (ET) values. ET provides information on when and how much to water plants. This real-time weather data is one of the keys to water savings with central irrigation control systems and conventional controllers. The advantage of CIMIS is that it is a recognized standard and the equipment calibration is performed regularly. City staff, working in conjunction with the DWR, provide local support for the four CIMIS stations located in the maritime, coastal, central and inland weather bands of San Diego.

The data from these stations is used to develop water budgets. Data from the University of California, Berkley, shows water reduction of 13% when CIMIS data is used, which equals 30,502 gpd for the City's agricultural customers and commercial nurseries.

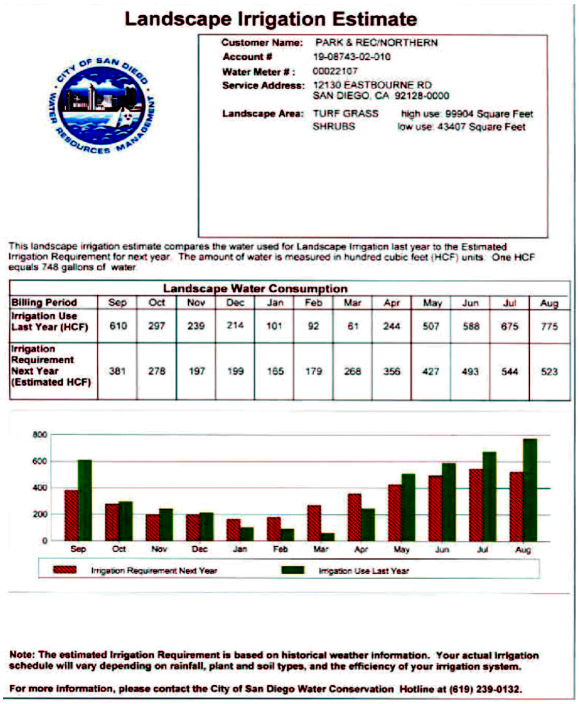
Professional Assistance for Landscape Managers (PALM)

The PALM Program provides an audit of both the irrigation system and landscape at sites with one or more acres of irrigated landscape. Using methodology developed by the Irrigation Training and Research Center at California Polytechnic State University at San Luis Obispo, contracted staff perform sprinkler tests, make numerous soil and plant observations and calculate an evapotranspiration based irrigation schedule. A comprehensive report is then provided with specific recommendations to implement effective landscape water management techniques. This service is free to customers in the service areas of the participating CWA agencies like the City of San Diego. The City and CWA pay a private contracted vendor to perform this service.

In FY2002, the Water Department will explore the possibility of performing this type of survey by Water Department staff in conjunction with the WRLD Program (see below), with potential reimbursement provided by the CWA and Metropolitan Water District of Southern California (MWD). By performing this function "in house," the City could reduce the unit cost of water saved. This program accounted for cumulative water savings of 1,028,044 gpd in FY2001.

Landscape Water Management

The Landscape Water Management Program concentrates on providing customers with a specific water-use budget for their property. This will indicate exactly how much water to use and when to water, making for optimal irrigation. This program, and the computer application (Water Resources Landscape Database or WRLD) that supports it, is by far the most complex of the new programs under development and could contribute significant water savings once the computer application is completed (June 2002). The City's Park & Recreation Department has agreed to pilot test WRLD and water budgets to help manage irrigation use and save money.



Landscape Irrigation Estimate

Customer Name: PARK & REC/NORTHERN
Account # 19-08743-02-010
Water Meter # : 00022107
Service Address: 12130 EASTBOURNE RD
SAN DIEGO, CA 92128-0000
Landscape Area: TURF GRASS high use: 99904 Square Feet
SHRUBS low use: 43407 Square Feet

This landscape irrigation estimate compares the water used for Landscape Irrigation last year to the Estimated Irrigation Requirement for next year. The amount of water is measured in hundred cubic feet (HCF) units. One HCF equals 748 gallons of water.

Landscape Water Consumption

Billing Period	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Irrigation Use Last Year (HCF)	610	297	239	214	101	92	61	244	507	588	675	775
Irrigation Requirement Next Year (Estimated HCF)	381	278	197	199	165	179	268	356	427	493	544	523

800
600
400
200
0
Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug
Irrigation Requirement Next Year
Irrigation Use Last Year

Note: The estimated Irrigation Requirement is based on historical weather information. Your actual irrigation schedule will vary depending on rainfall, plant and soil types, and the efficiency of your irrigation system.

For more information, please contact the City of San Diego Water Conservation Hotline at (619) 239-0132.

This effort was defined in the Strategic Plan and also seeks to satisfy California Urban Water Conservation Council (CUWCC) Best Management Practice 5 (BMP 5) "Large Landscape Conservation Programs and Incentives."

Park and Recreation Department Support

The Water Department partners with the Park and Recreation Department to fund the replacement and upgrade of irrigation fixtures as well as a Horticulturist position for the Park and Recreation Department. Proper management, maintenance and repair of irrigation fixtures reduces water consumption and waste. It also sets a good example for residents to see the City using water wisely. As part of this effort, the Water Department and Park and Recreation Department jointly received a California Municipal Utilities Association Award for this program, which accounts for cumulative water savings of 1,350,000 gpd.

Landscape Watering Calculator

The Water Conservation Program's (Internet site) Landscape Watering Calculator is an easy-to-use tool that helps customers estimate the right amount of water to give a landscape or garden. The calculator was designed to give a weekly schedule for the maximum amount of water which plants may need each month of the year. Because each landscape is different, the calculator has been simplified by using average numbers for weather, plants, and soils in San Diego. The Landscape Watering Calculator has had 4,692 water schedules produced which accounts for water savings of 281,520 gpd. The location of the Internet site is: http://interapp.sannet.gov/landcalc/Landscape

Graywater Incentives

Graywater is untreated household wastewater which has not come into contact with food or toilet waste. It is used water from showers and baths, bathroom sinks and washing machines. It can be reused for irrigation without undergoing a treatment process. It does not include water from toilets, kitchen sinks, dishwashers or laundry water from soiled diapers due to potential health issues. Graywater can be used to irrigate most plants at a household residence, except for vegetable gardens.

Graywater is a form of recycling and therefore reduces potable water consumption. About half of a household's indoor water can be reused as graywater, providing a constant source of recycled water for irrigation. A system must be installed at the home to collect and redirect the graywater to landscaping areas. The system must be designed and installed according to State regulatory guidelines and be inspected locally by the San Diego County Department of Environmental Health. Graywater can be considered a new source of local water. It is estimated that there is the potential to capture between 32 and 40 gallons of graywater per person per day from a local single family residence.

The Water Department is interested in conducting a long-term (3 to 5 year) scientific study to investigate the health and safety, behavioral, agronomic, customer satisfaction, water savings, sewer flow reduction, and cost consequences of graywater usage over time. Department staff have applied for grants from: the EPA; CALFED (grant administered by DWR); Proposition 13 (grant also administered by DWR); and the MWD. Unfortunately, these grant applications, requesting financial incentives for graywater system installation and funding for the research study, were denied.

While continuing to research potential grant applications, the City is participating in a unique opportunity to pilot the installation of graywater systems within the City of San Diego. The Water Department has allocated up to $80,000.00 to a new home developer, Stowe-Passco, to install 20 graywater systems within the Remington Hills development. The Water Department allocated up to $4,000.00 per system, which reflects the Water Department's commitment to actively encourage the exploration of alternative water supply options which may help meet the region's future overall water demand.

By requiring the installation of separate meters to measure graywater consumption, the 20 homes can be compared to other homes in the area that do not have graywater systems. Should the graywater systems result in significant water and sewer savings, these can be documented and used in applying for additional grant funding or loans to expand the program to achieve aggregate savings that would benefit the City.

Other Irrigation Incentives

The Water Conservation Section is working with the Metropolitan Water District of Southern California (MWD) to develop a menu of irrigation equipment incentives including:

Dedicated landscape irrigation meters: CUWCC BMP 4 requires the City to conduct a feasibility study to assess the merits of a program to provide incentives to switch mixed use accounts (accounts with one meter that serves both internal usage and exterior irrigation) to dedicated landscape meters. This type of program would also serve to assist the Landscape Water Management Program and its WRLD database in providing the best information about exterior water usage. This will have to be coordinated with the CWA to ensure additional capacity charges for the second meter does not nullify interest in this idea.

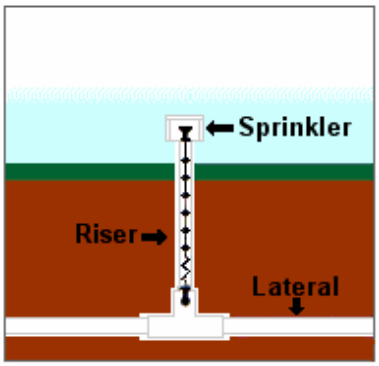
Clock Timers: Incentives for customers to purchase and install timer clocks for their in-ground irrigation systems.

Moisture Sensors: Monitors soil moisture levels and overrides controllers to prevent unnecessary irrigation.

Rain Sensors: Similar to moisture sensors, rain sensors override irrigation controllers on rainy days.

Flow Interruption Devices: These low-cost devices installed directly into existing sprinklers to reduce water use when breakage or theft occur.

Flow Interruption Sensors: A device that actively measures water flow through an irrigation or piping system to compare actual flow with expected flow. A common response to a high-flow condition (sprinkler head broken) is to shut off the flow and to alert the site manager. Other piping systems on the site with normal flows continue to operate and irrigate the site.



Typical Riser installation
(Typical Sprinkler Flow Rate - 6 gpm)

Soil Probes: A low-tech yet effective landscape water conservation device is the soil probe. A soil probe is a hollow metal tube used to extract a sample of soil and the roots of grass. Soil probes help monitor soil moisture where it counts, below the surface. Studies show that soil probe users have lowered their water consumption from 14 to 24 percent.

Public Education

Central to the overall water conservation goal is an enhanced public education program. Public education promotes new plans as well as the existing foundation of conservation programs. The public can't cooperate without being informed, but they also must be convinced. The campaign is structured to reach schoolchildren as well as adults. Elementary students design posters promoting water conservation. Top entries receive prizes as well as extensive public recognition.

Water Conservation staff members actively participate in community fairs, providing informational brochures on the various programs and promoting both simple and highly technical conservation measures. Additional components of this program include: updating and maintaining the Department's and Water Conservation web-site, providing more and better quality brochures and fact sheets that have a centralized theme for water conservation, advertising, working with local television and radio news stations, and coordinating with the CWA, MWD and other local agencies on regional water conservation efforts.

In FY2000, the Water Conservation Program unveiled its interactive educational display at the Reuben H. Fleet Science Center in Balboa Park. The exhibit, entitled *"San Diego's Water, from Source to Tap,"* details the long journey our water makes to reach our faucets and the technology involved in providing water to the City. This exhibit, which received a California State Assembly Certificate of Recognition for leadership in technology will be on display at the science center for three years and is expected to reach an audience of 2.1 million residents and tourists. The project was created in partnership with the CWA and was made possible through a grant from the Hans and Margaret Doe Charitable Trust. It is estimated that the overall public education effort contributes water savings of 100,000 gpd.

Facility Repair and Replacement/Leak Detection

The replacement of the City's cast iron mains through Capital Improvement Projects along with the Operation Division's Leak Detection Crews, decrease the amount of main breaks and associated water loss. Updated information shows that 4% of the water produced at the treatment plants is lost through leaks, main breaks, theft and fire suppression. The national average for unaccounted water loss is 8%. An estimated 90,000 gpd of water savings was achieved through these efforts for FY2001.

Water Waste Investigations

Water Conservation Program staff respond to water waste complaints generated by citizens throughout the Department's service area. Staff contact the property owner or manager and work to resolve all kinds of water waste concerns and their associated hazards. Water waste complaints can range drastically, yet a typical example would be a broken sprinkler head which is wasting 10 to 15 gallons per minute and flooding adjacent properties. In FY2001, over 979 water waste complaints were resolved. This translates to water savings of 26,822 gpd.

More than "Just Saving Water"

Water conservation contributes more than just local water savings. Proper water conservation techniques assist the City's Storm Water Pollution Prevention Program. When excess irrigation water flows out of yards, it flows directly into storm drains. Everything that flows down into a storm drain goes untreated directly into canyons, creeks, bays, lagoons and ultimately the ocean.

Irrigation runoff water can consist of pesticides, fertilizers, pet waste and silt. The Clean Water Act prohibits disposal of wastes and pollutants into creeks, bays, lakes and oceans. Such pollutants have harmful effects on recreational areas, waterways and wildlife. Proper irrigation scheduling either through the Section's various survey programs or the Department's website landscape watering calculator prevent storm water pollution.

The Water-Energy Link

The California Energy Commission notes that "moving water around the state takes up to 40 percent of the total energy supply." By helping our customers conserve water locally, the Water Department is helping the entire State of California deal with its current energy crisis. Before it reaches arid San Diego, water is pumped hundreds of miles from either the Sacramento-San Joaquin Bay Delta in northern California or from the Colorado River. It takes energy to move and treat water.

Drought Preparedness

With the new water conservation programs that are being developed, along with the established programs that have provided long term water savings over the years, the City of San Diego is better prepared than ever to face any upcoming drought. An enhanced public education campaign, scheduled for the Spring of 2002, will increase overall awareness and interest in water conservation and would prove timely, should this Winter not replenish state-wide reservoirs and snow-pack.

Annual Reevaluations

Planning to double water conservation efforts is an ongoing process. The attached spreadsheet and chart outline actual and future estimated water savings, and how each program contributes toward the overall goal. The programs outlined here undergo periodic reevaluation to ensure the realization of forecasted savings. Additionally, changes in water conservation technologies may require reassessment of long-range plans. Water recycling for x-ray machines, water brooms and recirculating water heaters are some of the emerging technologies available. Because of these changes, this document is reviewed and revised at the end of each fiscal year to provide an ongoing assessment and status update, redirecting efforts as necessary.