



West Basin
Water Recycling Project

.....
Dedicated October 13, 1994

a message from the general manager

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Samuel Johnson, 18th century English author and critic, said "what we ever hope to do with ease, we must learn first to do with diligence." Providing a reliable supply of water in Southern California is a difficult challenge. In 1990, the West Basin Municipal Water District Board of Directors adopted a plan to respond to persistent droughts.

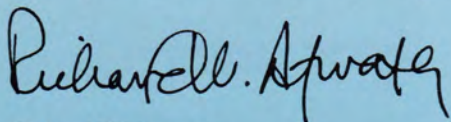
In four years, the West Basin Board of Directors and staff have constructed a landmark \$200 million water recycling project which will drought-proof South Bay communities, assist in cleaning up the Santa Monica Bay, and reduce our reliance on water from Northern California.

Developing and financing the West Basin Water Recycling Project was a lesson in reinventing government through the use of creative partnerships. Numerous public and private partnerships made the project possible. The United States Bureau of Reclamation helped with \$50 million in authorized grants for project construction; the California State Water Resources Control Board approved a \$5 million low-interest loan; and the Metropolitan Water District of Southern California will contribute \$200 million over the next 25 years toward the project's operating costs.

Partnerships also helped in the construction of the treatment facility and pipelines. For example, in El Segundo, pipeline construction required the excavation of a 25-foot deep trench along Grand Avenue, a major traffic thoroughfare. The City of El Segundo and local businesses became partners in keeping the construction on schedule, while West Basin facilitated customer access to local businesses, and implemented noise and dust mitigation measures.

Marketing recycled water also required new partnerships. Local water utilities have established discounted water rates to make the use of recycled water competitive against imported water and groundwater. Chevron and Mobil oil refineries have committed to using recycled water. The State of California and the County of Los Angeles are allowing West Basin to be a one-stop center for the health and safety permits which are required to use recycled water.

At West Basin Municipal Water District, the result of our partnerships is the successful completion of Phase I of the West Basin Water Recycling Project. All of our partners in this project are congratulated for "making government work," creating jobs for our communities, and protecting our natural environment.



Richard W. Atwater
General Manager

project background

The West Basin Municipal Water District has initiated a water recycling program which will ultimately recycle 100,000 acre-feet per year (AFY) of wastewater from the City of Los Angeles' Hyperion Treatment Plant. The recycled water produced by this program will be distributed locally for a wide range of beneficial non-potable uses. When fully implemented, this program will be the largest water recycling project in California, and probably the United States.

Southern California is experiencing an ever-increasing shortage of dependable water supplies. Approximately two-thirds of the region's water supplies are imported from Northern California, the Colorado River, and the eastern slopes of the Sierra Nevada mountains. All three of these sources have become increasingly less dependable. Owens Valley and Mono Basin supplies have recently been restricted by court, regulatory decisions and agreements. The Metropolitan Water District's (MWD) imported water supplies from the Colorado River and Northern California are inadequate to meet the current and projected needs for the region.

Decreasing dependable supplies of imported water, combined with the recent drought in Southern California, have heightened public awareness of the need to conserve existing water supplies and develop new local sources. Water recycling will become an

increasingly important part of the region's water supply. Water recycling utilizes existing and proven technologies to treat domestic wastewater to a level acceptable and safe for many applications. Because much of our local wastewater is currently discharged into the Pacific Ocean, water recycling provides an excellent opportunity to conserve and reuse a scarce natural resource, while protecting the environment. Water recycling has proven to be not only acceptable to the general public, but also strongly encouraged by the State of California and the Federal Government.

The concept of using recycled water for beneficial purposes is not new. As early as the 1930s, the reuse of wastewater in the South Bay was contemplated. Studies in the 1960s demonstrated the technical feasibility. In January 1990, the MWD and West Basin initiated the planning studies for the water recycling project.

In February 1992, a Planning/Feasibility study was completed which described in detail the water conveyance and treatment facilities identified in a May 1990 concept report. The study also evaluated project costs and benefits, and described a project implementation plan which included a schedule to complete Phase I of the project by the end of 1994. The Environmental Impact Report was certified in May 1991.

The MWD's Board of Directors agreed to fund the West Basin Water Recycling Project in July 1991.

continued on next page

project background

In July 1991, the City of Los Angeles agreed to be a partner in the project by providing Hyperion wastewater in return for 25,000 AFY supply of recycled water.



Following the Planning/Feasibility study, the project's preliminary design was completed in April 1992. The preliminary design identified pipeline alignments and treatment plant design concepts. During preliminary design, additional information on potential water users was gathered. Based on this information, the size of the project features were increased to meet a demand of up to 100,000 AFY. The Phase I facilities will produce about 20,000 AFY.

Investigations during preliminary design of the treatment plant site on the Chevron Refinery identified potential construction problems. As a result, an alternative treatment plant site was selected at Sepulveda Boulevard and Hughes Way in El Segundo. The property was purchased in January 1992. Final design of the treatment plant was completed in December 1992. Final design of the pipeline distribution system was completed in July 1993.

The project was divided into 17 contracts for construction. Construction on the first contract began in December 1992, the treatment plant construction contract was awarded in February 1993, and the

remaining pipeline contracts were awarded between August 1993 and May 1994. Construction was scheduled so all of the facilities would be available to treat and deliver recycled water by December 1994.

Phase II

In July 1993, West Basin began preparation of a master plan investigating potential recycled water demands southeast of the Phase I service area. The Phase II master plan identified potential users in Carson, Torrance, Lomita, Palos Verdes, and the Los Angeles harbor area. More than 50,000 AFY of recycled water demand was identified, primarily at the oil refineries.

The final design of portions of Phase II began in December 1993 and was completed in August 1994. This part of Phase II, which will deliver water to the ARCO refinery, will be constructed in 1995.

Phase III

Under contract with the Los Angeles Department of Water and Power, West Basin is designing and will manage the construction of the recycled water pipeline delivery system serving Los Angeles International Airport and the nearby Los Angeles communities of Westchester and Playa Vista. Ultimately, the recycled water pipelines will be expanded to serve Santa Monica, West Los Angeles (UCLA), and Culver City areas.

*"The West Basin
Water Recycling Project is a
model for our new federal water
priorities... it creates jobs, conserves
water and reduces pollution levels in
Santa Monica Bay."*

- United States Bureau of Reclamation
Commissioner Daniel P. Beard

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he West Basin Water Recycling Project dramatically benefits the economy and the environment.

Reduce Dependence

Use of recycled water in the South Bay will reduce by 50 percent the South Bay's dependence on water from environmentally-sensitive watersheds in Northern California and the Colorado River.

Drought-Proof the South Bay

In the event of future drought, the West Basin Water Recycling Project will prevent water rationing and loss of jobs by providing an alternative dependable water source.

**Stop Salt Water Intrusion into the West Coast
Basin Barrier**

The West Basin Water Recycling Treatment Plant will purify water for injection into the West Coast Basin Barrier, preventing further salt water contamination of our fresh underground water supply.

**Reduce Treated Wastewater Discharged into the
Santa Monica Bay by 25 Percent**

In partnership with the City of Los Angeles, the West Basin Water Recycling Project will divert effluent which is currently discharged into the Santa Monica Bay, thus improving coastal water quality.

breaking ground



Secretary for Resources Douglas P. Wheeler of the California State Resources Agency delivers an address at the West Basin Water Recycling Project groundbreaking ceremony on March 12, 1993.

March 12, 1993 marked the beginning of actual construction of the West Basin Water Recycling Project. Local and state dignitaries, community leaders, business people, and environmentalists joined in celebrating the start of the landmark project.

Pictured at top are just a few of the dignitaries who attended the groundbreaking ceremony: West Basin Director Charles L. Stuart, State Senator Teresa Hughes, Congresswoman Jane Harman, Secretary for Resources Douglas P. Wheeler of the California State Resources Agency, El Segundo Mayor Carl Jacobson, West Basin Director Edward C. Little and Assistant General Manager Virginia Grebbien, Lawndale Mayor Harold Hofmann, West Basin Directors Richard C. Heath and Lawrence P. Gallagher, Hyman representatives Pete Sarwin, Kevin McCarthy and Richard Murphy, Assemblywoman Juanita M. McDonald, Assemblywoman Betty Karnette, and Los Angeles City Councilwoman Ruth Galanter. Kneeling in front: West Basin General Manager Richard W. Atwater and Director Michael W. Sweeney, and Hyman Construction Senior Vice President Richard M. Heim.

project funding



On October 21, 1993, the West Basin Board of Directors was presented a \$5 million check for the West Basin Water Recycling Project by Daniel P. Beard, Commissioner of the United States Bureau of Reclamation.



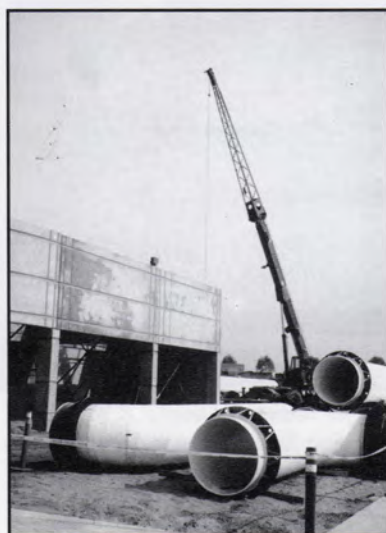
One of numerous environmental organizations in favor of the project, Martha Davis, Executive Director of the Mono Lake Committee, endorses the project for promoting water conservation and water recycling.



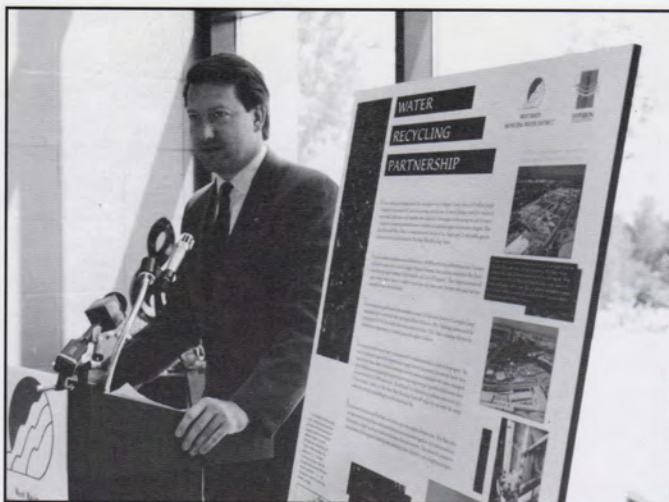
Representing the 39th District, Assemblyman Richard Katz praises the project for helping to drought-proof the South Bay and aiding the economic recovery of the region.

The \$200 million construction project is funded through a wide variety of financial means: a per parcel standby charge, revenue bonds, the Metropolitan Water District local projects rebate program, recycled water sales, federal grants, and low-interest state loans.

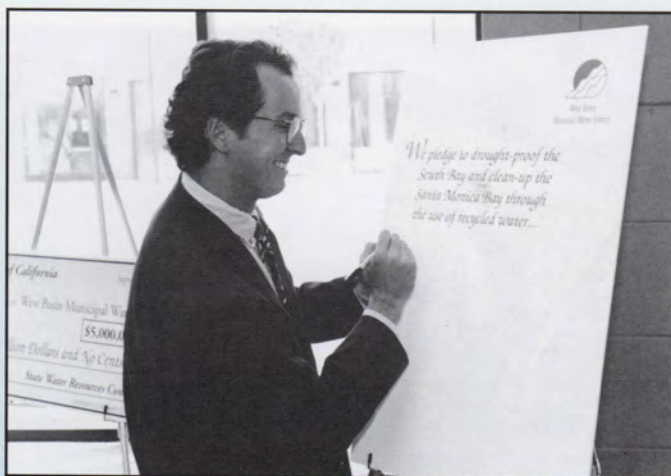
A \$50 million grant from the United States Bureau of Reclamation and a \$5 million low-interest loan from the California State Water Resources Control Board provided key financial assistance.



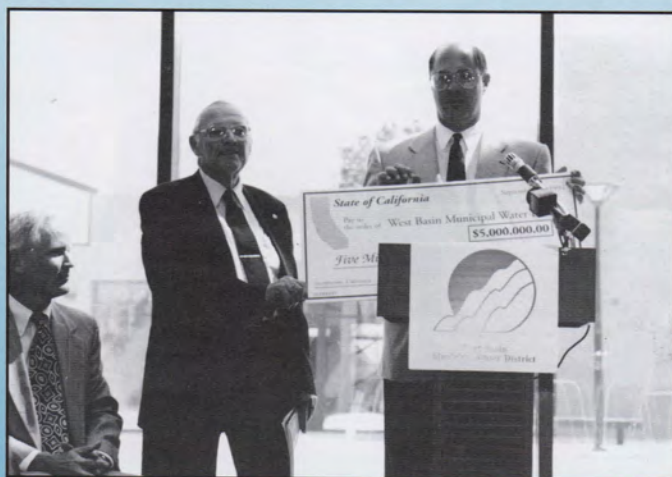
October 1993, construction completion continued to progress at a rapid pace.



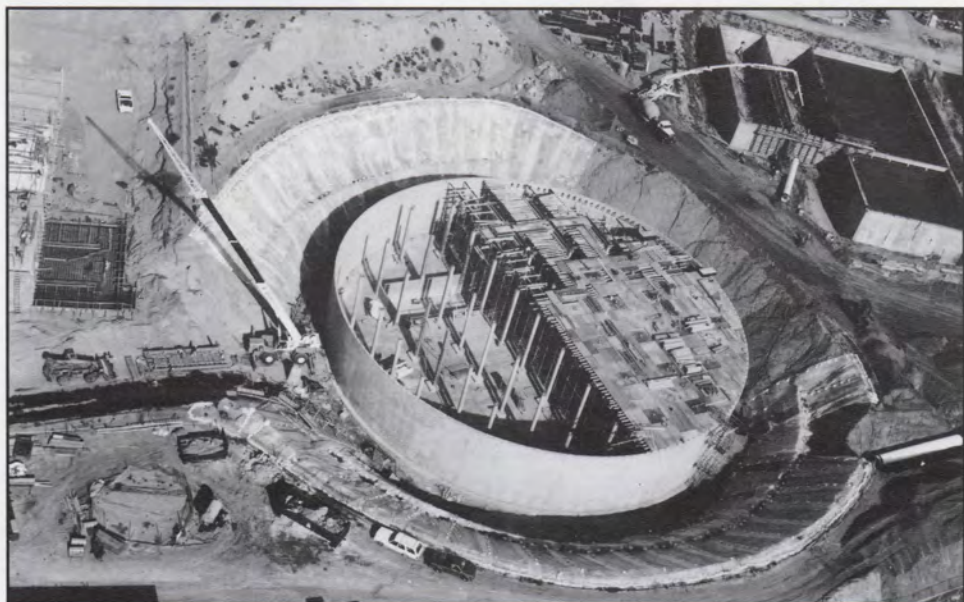
During a September 13, 1994 news conference in the City of Torrance, California Environmental Protection Agency Secretary James Strock made a statement of support for the West Basin Water Recycling Project.

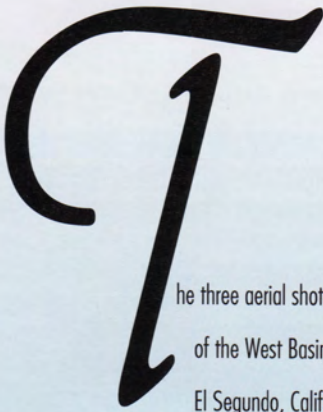


A highlight of the September 13, 1994 news conference was the signing of a pledge to drought-proof the South Bay and cleanup the Santa Monica Bay through the use of recycled water by California Environmental Protection Agency Secretary James Strock, State Water Resources Control Board Member Marc Del Piero, Mobil Oil Corporation spokesperson Barry Engelberg, and Torrance Mayor Dee Hardison. Pictured signing the pledge is Roger Gorke, Policy and Science Analyst for Heal the Bay.



The State Water Resources Control Board, on September 13, 1994, joined the ranks of West Basin Water Recycling Project funding partners, as State Water Resources Control Board Member Marc Del Piero presented the District with a \$5 million check.





he three aerial shots on the opposite page illustrate construction progress at the site of the West Basin Water Recycling Project, located on Hughes Way in El Segundo, California.

June 1993 – The top photo shows the treatment plant at approximately 7 percent completion. At this stage, rough site grading is complete and treatment facilities are in the initial stages of concrete work.

December 1993 – The Title 22 storage tank, as shown in the middle photo, is approximately 50 percent complete. The subsurface concrete storage tank, when operational, will have the capacity to store 5 million gallons of recycled water.

August 1994 – The bottom photo shows that all major concrete work is finished. Project construction is at 85 percent completion and final site grading is in progress.







construction & the community

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... excerpts from

The Daily Breeze

August 25, 1994

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Construction for the plant, at Sepulveda Boulevard and Hughes Way, began in March 1993.

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It's expected to recycle about 100 million gallons of effluent water per day, protect the South Bay from future droughts and reduce treated sewage discharged into Santa Monica Bay.

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"We've tried to take a proactive approach in informing the public ...," said Tom Love, a water district engineer. "We've held town meetings so they know why."

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The district helped businesses and residents by putting in sound barriers, buying cordless phones so employees could conduct business away from the noise, and adding air conditioning units when ventilation was affected.

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Sarah Reilly, owner of El Segundo preschool on Grand Avenue, said, "...they were as helpful as they could be. They put a blanket up over our fence and checked with me. I couldn't really complain... They were so nice, it made it easier to handle."

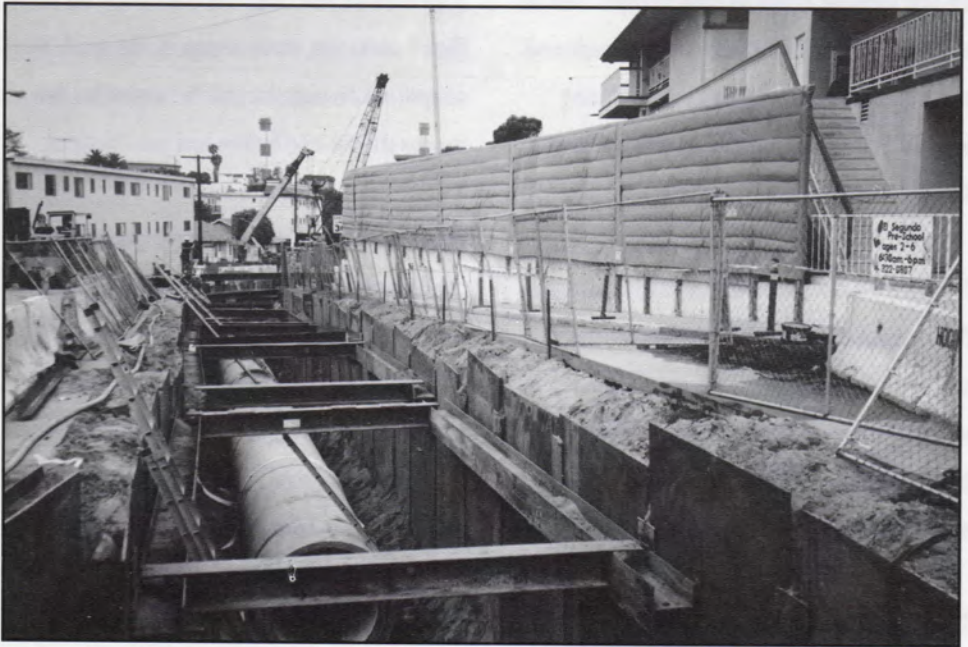
Throughout the construction of the West Basin Water Recycling Project, West Basin took a proactive approach in alleviating the impacts of the construction on residents and business owners. Frequent neighborhood meetings were held along the construction route, with residents and business owners. At these meetings residents and business owners voiced their concerns and discussed solutions with District staff.

In turn, the District fine-tuned traffic detours, scheduled construction hours, and made allowances for safety factors from information that residents and merchants shared. This unique partnership helped residents and business owners by installing sound barriers, providing cordless phones so employees could conduct business in a less noisy environment, providing portable air conditioning and fan units when ventilation was affected, and promoting local businesses in community newspapers.

construction & the community



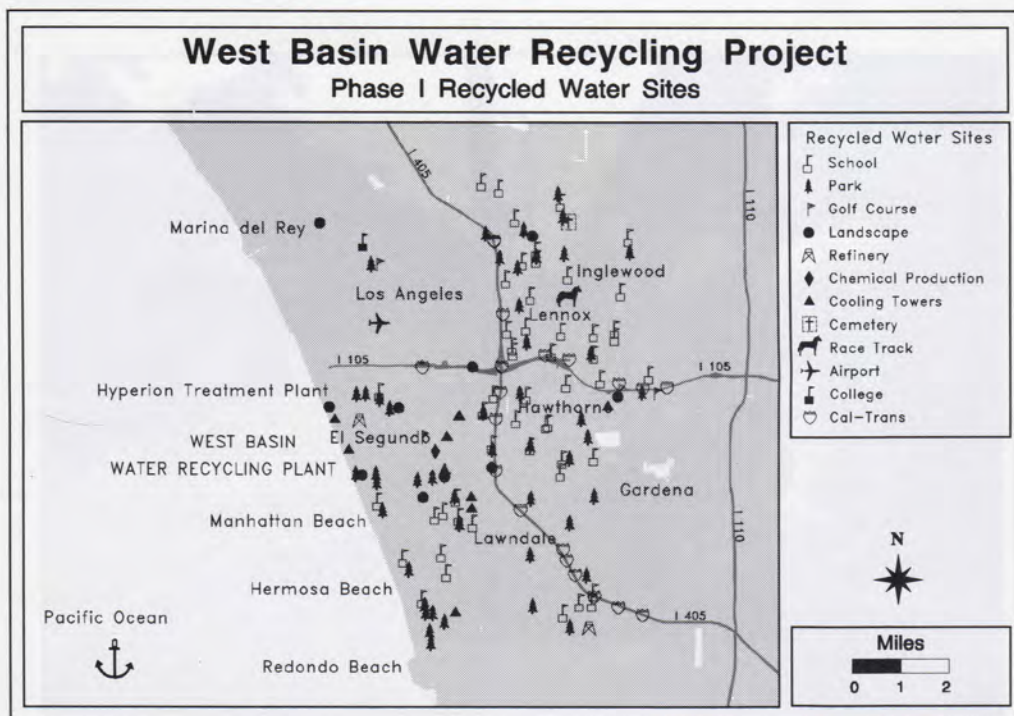
As project construction made its way throughout portions of the South Bay, young and old were equally curious. Pictured are children watching the construction as it progressed down El Segundo Boulevard.



Proactively solving a construction impact -- noise -- the District installed a sound barrier in front of the El Segundo Pre-School.



recycled water users • phase 1



The District's partnerships extend to the end user of water. The customers of the recycling project are among the most vulnerable to potential water shortages. Their use of recycled water not only provides a secure, drought-proof supply, but also ensures adequate supplies of drinking water will be available to meet the remaining demands in the District's service area.

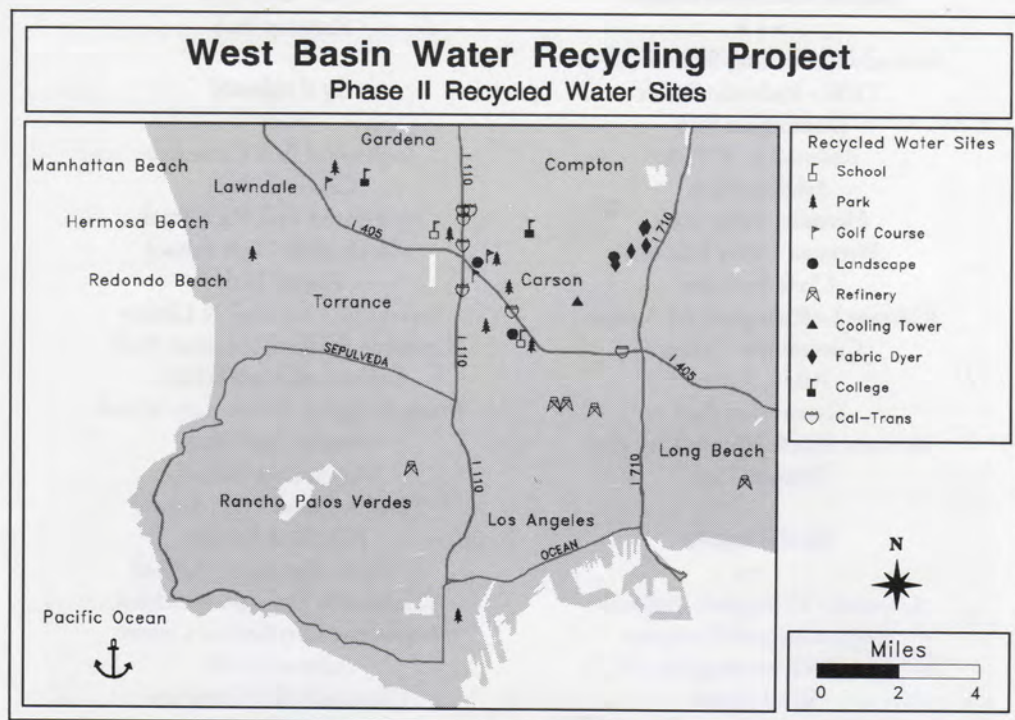
The map above describes the users of recycled water in the Phase I service area. Large turf areas, including school sites, city parks, and public and private golf courses, represent the more traditional uses of recycled water. Industries, which are dependent on a secure water supply, are becoming innovators in the use of recycled water.

The District has employed a team of technical experts and adopted a philosophy of customer service. Even before the initial phase of the recycling project is complete, customers

have committed to use recycled water. This commitment will fully utilize the initial recycled water capacity provided at the treatment plant. Expansion of the project into the Phase II service area, shown on page 15, has already been designed and this expansion could be complete less than one year after the initial facilities have been completed.

The largest individual users on the recycling system are the oil refineries which operate in the South Bay. Conversion of just one of these facilities to recycled water frees up enough drinking water to meet the needs of a typical city. In the Phase I service area, both the Chevron Refinery in El Segundo and the Mobil Refinery in the City of Torrance have committed to utilize recycled water. Similar commitments by ARCO, Unocal and Texaco Refineries will ensure the financing of projects into expansion areas.

recycled water users • phase 2



The District offers a wide variety of services to existing and potential customers for use of recycled water. The District obtains all permits for recycled water, enforces Health Department regulations, provides technical support and offers creative financing to customers, all in an effort to make sure that conversions are completed timely, in a manner that protects public health, and does not pose a burden on the customers themselves.

Providing an adequate water supply is a public function and the development of recycled water is a governmental service. Nonetheless, the District has endeavored to avoid the creation of a large bureaucracy by looking to existing municipal water suppliers and to the private sector to operate and maintain the recycled water system.

The treatment plant is initially being staffed by JMM Operational Services, Inc., and the distribution system is being maintained by the private and public water suppliers, who already maintain water systems in these areas. The structure of these relationships enables the District to take advantage of existing expertise practicing the most current maintenance management and operational business systems developed in the private sector, while at the same time ensuring that the publicly-elected Board of Directors maintains and controls policy direction.

The District's small, permanent staff is made up of innovators who effectively manage a much larger team of professional consultants and contract construction and operation forces.

recycled water users

California Water Service Company

• • •

Redondo Generating Station (SCE)
TRW - Redondo Beach
Dominguez Park
Railroad R/W Park
Aviation Park
Hermosa Valley Park
Hermosa Valley School
Clark Stadium
Caltrans I-405/Inglewood Avenue
Community Center
Public School
Greenwood Park
Hermosa Beach Library/City Hall
Prospect Park

City of El Segundo

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Chevron - El Segundo Refinery
Hughes Aircraft Company
El Segundo Generating Sta. (SCE)
Allied Signal
Rockwell International Corporation
Continental Park
L.A. Air Force Base
Recreation Park
El Segundo Golf Course
Center Elementary School
Raiders Headquarters
Richmond Park
El Segundo High School
El Segundo Library Park
Caltrans Sepulveda/Imperial Hwy.
Hilltop Park

City of Hawthorne

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Northrop Corporation
Hawthorne High School
Bodger County Park
Thorpe Park
Hawthorne Memorial Park
Eucalyptus Avenue School
Hawthorne Municipal Airport
Holly Park
Eucalyptus Park
York Avenue School
Hawthorne Junior High School
Ramona Avenue School
Washington Avenue School
Caltrans I-105/Van Ness
Jefferson School
Caltrans I-105/Prairie

Holly Glen Park
Ramona Park

City of Inglewood

• • •

Inglewood Park Cemetery
Centinela Park
Hollywood Park Race Track
Morningside High School
Rogers Park
Inglewood City Hall & Library
Coleman Stadium (Sentinel Park)
Inglewood High School
Frank D. Parent Elementary School
Grevillea Mall Park
Warren Lane School
Monroe Junior High School
Highland School
La Tijera Elementary School
Woodworth Elementary School
Inglewood City Service Center
Ashwood Park
Caltrans I-105/Crenshaw
Centinela Adobe
North Park
Tony Siminski Park
Park Circle
Oak Street Elementary School
Beulah Payne Elementary School
Kelso School
Queen Park
Bennett-Kew Elementary School

City of Manhattan Beach

• • •

TRW - Manhattan Beach
Radisson Golf Course
Polliwog Park
Valley/Ardmore Greenbelt
Manhattan Village Mall
Mira Costa High School
Sand Dune Park
La Marina Field
Marine Avenue Park
The Strand
Street Medians - Rosecrans Avenue
Street Medians - Marine Avenue
Live Oak Park
Center School
Manhattan Village Park
Meadows School
Begg School
Pennecamp School
Radisson Hotel

recycled water users

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Robinson School
Block 35 Reservoir
Pacific School
Public Services Facility
City Hall/Joslyn Center
Grandview School
Manhattan Heights Park

City of Torrance

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Mobil Oil Corporation
Columbia Regional Park
El Camino College
El Nido Park
North Torrance High School
McMaster Park
Caltrans I-405/Crenshaw Blvd.
Caltrans I-405/Van Ness
Caltrans I-405/Artesia Blvd.
Magruder School
Yukon School
Edison School
Caltrans I-405/Yukon

Dominguez Water Corporation

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ARCO Products Company
Victoria Golf Course
Pacific Continental Textile
Cal. State Univ., Dominguez Hills
Western Dye & Finishing
E&J Dye House
Sungdo International
Rohne-Poulenc
Dominguez Golf Course
Roosevelt Memorial Park
Marriot Textile Service
Victoria Park
Goodyear Airship Field
Toyoshima Dyeing and Finishing
Caltrans 91 Hwy/I-110
Caltrans I-110/I-405
Caltrans I-405
Gardena High School
Carson Park
Calas Park
Anderson Park

Los Angeles Department of Water and Power

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Scattergood Generating Station
L.A. Department of Airports
Westchester Golf Course
Playa Vista Development
Hyperion WWTP
Westchester Park
Continental Development
Continental City
Loyola Marymount University
Hughes Corporation

Southern California Water Company

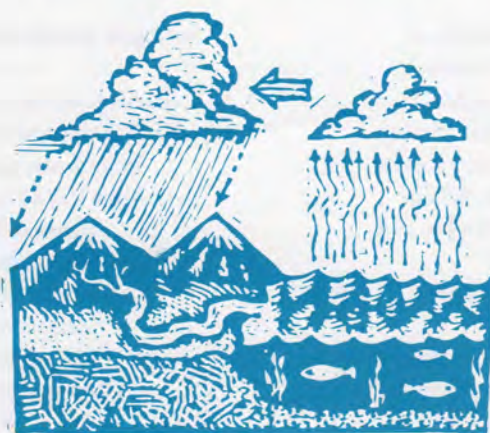
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Alondra County Golf Course
Chester Washington Golf Course
Alondra Regional County Park
Dan-Burnett Playground
Caltrans I-105/Hawthorne Blvd.
Lennox High School
Caltrans I-405/Imperial Hwy.
Lawndale High School
Rogers-Anderson Park
Cabrillo School
Felton School
Anza School
Caltrans I-405/135th Street
Caltrans I-405/El Segundo Blvd.
Caltrans I-405/La Cienega Blvd.
Lennox County Park
Sepulveda School (Cyn. Verde Ctr.)
Caltrans I-405/117th Street
Cimarron Avenue School
Leuzinger High School
Del Aire County Park
Caltrans I-105/La Cienega Blvd.
William Green Park
Caltrans I-105/Western Avenue
Caltrans I-405/120th Street
Glasgow Right of Way
Jane Addams Park
Railroad R/W Park
Moffett Elementary School
Moneta Recreation Center
Caltrans I-405/Redondo Beach Blvd.
Buford School
Caltrans I-405/166th Street
Caltrans I-405/Century Blvd.
Jefferson School
Center Park
Yukon Junior High School

a history of water recycling

Despite recent technical advances, construction of facilities and press coverage, the principle of water recycling is as old as life itself. Since the advent of the first bacteria and blue-green algae some 3 billion years ago, nature has been using, cleaning and reusing water countless times. All the water we have is all the water there ever was, and ever will be. The water molecules which come out of the tap are the same ones dinosaurs drank. Water neither wears out nor breaks, it only gets dirty. The idea behind modern water recycling is to collect used water, treat it in a manner similar to nature, only faster, and reuse it in place of our scarce drinking water supplies.

The earliest known wastewater collection systems began about 5,000 years ago in the Assyrian Empire, located in present-day Iraq. Relics of sewers constructed during the Roman Empire are still in existence today. However, during the Dark Ages, the concept of proper sanitation was lost, leading to widespread epidemics. Three hundred years ago, the British reinvented water



closets and sewer systems, eliminating a wide variety of water-borne diseases.

Unplanned reuse occurs whenever one city's treated wastewater effluent is discharged into a river, which becomes the water supply for the next city downstream. It is estimated that by the time the Mississippi River reaches New Orleans, every drop of water has been used by seven other people. Closer to home, water imported into the Southern California area from the Colorado River and the State Water Project contains a certain amount of "previously owned" water from the cities of Las Vegas and Sacramento, respectively.

Planned reuse of wastewater occurred as early as the 1880s in Pasadena, when raw wastewater was used to irrigate orchard crops. However, this practice was

soon discontinued. In 1904, primary-treated wastewater was used on farmland in the Pomona Valley. This was followed by the construction of the first Tri-Cities (Claremont,

Pomona, and La Verne) plant which produced secondary-treated effluent for reuse.

In the early 1920s, wastewater from the visitor center on the north rim of the Grand Canyon was treated and used for landscape irrigation. Perhaps the most famous of the water recycling projects is Golden Gate Park in San Francisco, which was irrigated with primary-treated effluent from the McQueen Plant from the early 1930s to 1981. The City of San Francisco is currently planning to return more highly-treated recycled water to Golden Gate Park in the near future.

The current generation of water recycling projects began with construction of the prototype Whittier Narrows Reclamation Plant in 1962 by the Sanitation Districts of Los Angeles County. The effectiveness and aesthetic qualities of

continued on next page

a history of water recycling

these facilities prompted the construction of four more Sanitation Districts' water recycling plants in the early 1970s. Additional water recycling plants in the county were built by Los Angeles, Glendale and Burbank, and by the Las Virgenes Municipal Water District.

Groundwater recharge with recycled water began 40 years ago in Orange County, which began capturing treated effluent in the Santa Ana River. In Los Angeles County, nearly 900,000 acre-feet of recycled water has been used to replenish the Central Basin groundwater supply.

Landscape and agricultural irrigation with recycled water has skyrocketed in recent years due to the limitations of imported water supplies, the growing population and climatic droughts. Literally hundreds of parks, golf courses, schoolyards, cemeteries, nurseries, roadways, and other greenbelt areas are receiving recycled water throughout the state. Because of the dependability and reliable supply of recycled water, even during drought conditions, public areas continue to remain green, enhancing the quality of life for area residents.

One of the first examples of industrial use of recycled water began in 1967, when treated effluent from the City of Burbank was used for cooling tower supply at its municipal power plant.

In 1979, a newsprint recycling mill in Pomona began using recycled water. In 1993, a carpet dyeing mill and a concrete mixing

company in Santa Fe Springs extended the applications of recycled water for industrial processes. With a less expensive water supply that is unaffected by drought, these and other industries have a more secure business environment in which to successfully compete in the marketplace.

In the 1980s, the Irvine Ranch Water District began requiring new high-rise construction be equipped with a dual-distribution system so that all toilets, urinals and floor drain traps are supplied with recycled water. More than 90 percent water savings could be realized with the use of recycled water for these buildings' cooling systems and landscape irrigation.

The evolution of water recycling systems continues even today. The first users were those located adjacent to the treatment plants. Later, city-wide systems were constructed to serve multiple users. And with the recent completion of the West Basin Water Recycling Project, serving numerous cities and water companies, the third generation has matured. Water recycling is becoming even more cost effective when compared to traditional domestic water supplies. Regional

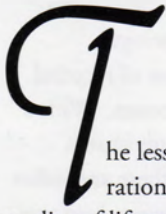
distribution systems are evolving into the fourth generation, as they interconnect with one another and are supplied by several treatment plants. By the turn of the century, recycled water distribution facilities, with their

distinctive purple coloration, will be as ubiquitous and commonplace as drinking water pipes.



the vision

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he lesson of the West Basin Water Recycling Project is that drought rationing and the result of business slowdowns, job losses, and lower quality of life overall are unacceptable.

Directors of West Basin Municipal Water District are considered leaders statewide for the unprecedented speed in building a \$200 million public works project. It took only four years for the vision of a "drought-proof" South Bay to become a reality, with construction of the nation's leading water recycling project and its 70 miles of initial pipelines.

Staff of West Basin Municipal Water District proudly salute our leaders for their vision, tenacity, and contagious dedication.

West Basin Municipal Water District

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West Basin Municipal Water District

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Rolling Hills, Rolling Hills Estates

Division II

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Division III

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Manhattan Beach, Redondo Beach

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