



Water Replenishment District

OUR ROAD TO WATER INDEPENDENCE



WRD MISSION

“To provide, protect and preserve high-quality groundwater through innovative, cost-effective and environmentally sensitive basin management practices for the benefit of residents and businesses of the Central and West Coast Basins.”



WRD main office circa early 1990's

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City of Los Angeles Bureau of Sanitation Terminal Island Advanced Water Purification Facility

West Basin Municipal Water District Edward C. Little Water Recycling Facility

INTRODUCTION

The Water Replenishment District of Southern California (WRD) manages and protects groundwater resources for a 420-square mile service area covering 43 cities, including a portion of the City of Los Angeles. Four million people, more than 10% of the state's population, live within WRD's boundaries. Groundwater accounts for about half of the region's water supply.

When WRD was formed in 1959, the Central and West Coast groundwater basins underlying WRD's service area were in danger of catastrophic collapse. Over-pumping of groundwater resulted in massive seawater intrusion, contaminating water wells from El Segundo to Long Beach and threatened the continued existence of an underground resource that met most of the water needs of the thousands of businesses and 2.5 million residents living in the area in 1959.

The drought cycle that had persisted since 1941 coincided with the most explosive population growth any region of the country had ever seen. A region that for most of the century had been the agricultural capital of California was rapidly becoming its urban heart. The urbanization that triggered increased water demand also decreased natural recharge, as did the concrete lining of the Los Angeles River for flood control purposes beginning in the 1930s.

As the natural supply for groundwater recharge declined, groundwater pumping to meet increasing demand accelerated. By 1959, pumpers were taking out of the ground two times more water than Mother Nature could replace through the percolation of rainfall and captured storm water. The once-robust groundwater flow from the Central Basin across the Newport-Inglewood Uplift, the principal replenishment source for the West Coast Basin, was reduced to a relative trickle.



WRD's main office in Lakewood, CA

In 1959, WRD's mission was straightforward and urgent:

- Restore and maintain the depleted groundwater basins
- Halt seawater intrusion
- Curtail over-pumping

By 1965, court judgments were in place establishing who could pump how much annually from each basin.

Maintaining healthy basins and preventing the intrusion of seawater have been continuing duties of WRD since its formation. Early in its history, WRD relied mainly on imported water --- and lots of it --- to carry out these duties. Imported water was used to percolate into the spreading grounds in Central Basin and was

injected into the expanding barrier system along the coast to stop seawater intrusion and replenish both the Central and West Coast Basins.

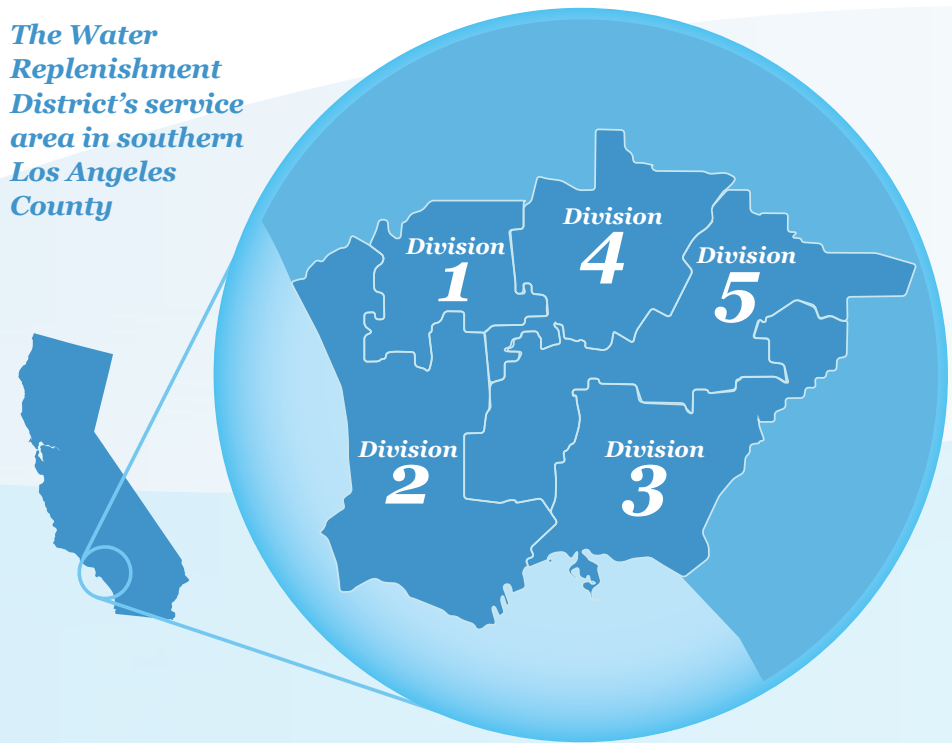
Almost from the time of its formation in 1959, WRD had expressed interest in reducing its total dependence on imported water for artificial replenishment by increasing local supply. Indeed, WRD, the Los Angeles County Flood Control District, and the Sanitation Districts of Los Angeles County pioneered the use of recycled water for replenishment in 1962.

It was assumed in 1959 and until relatively recently, however, that imported water would always be a significant and reliable source of supply to meet the District's replenishment needs. That did not turn out to be the case for many reasons, not the least of which was the increasingly uncertain availability of imported water for replenishment by virtue of persistent drought and regulatory constraints on imported sources of supply. Over time, WRD on its own and through partnerships with other entities sought and secured a sustainable local supply as the alternative to water imported from hundreds of miles away.

In 2004, WRD embraced Water Independence Now or WIN, a suite of programs and projects intended to make WRD fully independent from imported water to meet its groundwater replenishment needs. WIN was a dramatic departure from the conventional thinking that had governed water planning in Southern California since water from the Colorado River Aqueduct was first delivered to the Los Angeles region in 1941. In the past year, we have extended the WIN concept to advance regional independence from imported water as a policy goal.

The completion of the Albert Robles Center for Water Recycling and Environmental Learning (ARC) is the final step in WRD's journey towards independence from imported water to maintain the groundwater basins for beneficial use and to repel the intrusion of seawater into aquifers along the coast.

The Water Replenishment District's service area in southern Los Angeles County



This is the story of WRD's road to independence.

*WRD Ad Hoc History Committee
Rob Katherman, Chair
John D. S. Allen, Member
August 2019*

THE PAST



THIRTY DEAD IN SOUTHLAND FLOODS

WHERE MOTHER AND BOY MET DEATH IN WRECKAGE OF HOME

Fog and Rain Balk Lost Plane Search

Ship Carrying Nine Believed Down in Lake Area North of Fresno

Grey rains, fog shrouded the scene and gales which wild swarms for men on land as well as in the air which night crippled a desperate search for an air liner missing with nine persons aboard somewhere in the lower Sierra Nevada near Huntington Lake. Fifty miles northwest of Fresno.

Bound for Alhambra, N. M., from San Francisco at 8:30 p.m. Tuesday, the Transcontinental and Western Airway Douglas biplane and the wilderness after making its most extensive voyage in 7 1/2 p.m.

RESCUE BEGINS HERE

Reports of sighting a large aircraft northeast of the morning the mighty floods of the region covered in the surrounding lake area where waterfalls were seen in the Huntington Lake.

By midnight the business of a searching party had been organized for the dangerous and



Record Storm Spreads Ruin

Deluge Drives Thousands From Homes; Floods Sweep Away Bridges and Houses; Peak Passed but More Rain Due Today

Southland skies opened up in death and destruction over a California's heaviest rainstorm tory entered its 6th day.

The storm's death toll, which during the day, leaped to a peak where bridges in Long Beach and other towns in the area were piled into the torrent, carrying children into the maelstrom.

San Bernardino that three men were drowned in the deluge.

DAMAGE RUNS INTO MILLIONS

Property damage ran into millions, highways sank, homes houses swam and gardens in the United States West night that the peak of the light rains, followed by the heavy rains past. Fossilized living anxiety that a deluge sweep the valley.



Images of the LA River Flood of 1938. Images courtesy of Los Angeles Public Library

IN THE 'TIMES' TODAY
THURSDAY, MARCH 3, 1938

GROUNDWATER CONDITIONS IN THE FIRST DECADES OF THE 20TH CENTURY

Falling groundwater levels in the basin were detected in the early 1900s. In a report published by the United States Geological Survey in 1905, Walter Mendenhall measured heightened salt water levels in groundwater adjacent to the coast extending in certain areas more than a mile inland.

In 1912, Southern California Edison was forced to abandon a well at its power plant in Redondo Beach because of salt water contamination. Salt water contamination also forced the abandonment of wells in Hermosa Beach in 1915 and El Segundo in 1921.

Even so, groundwater availability was more than sufficient to meet the needs of the large farms and modest population of 50,000 or so at the time. Indeed, Mendenhall characterized 94 square miles of what is now WRD's service area as "artesian," with water at or near the surface, often resulting in natural springs. The cities of Artesia and Santa Fe Springs derive their names from the artesian conditions existing in those areas in the early part of the century.



Artesian Wells in the early 1900's



Windmill used to pump groundwater

Image courtesy of Dominguez Rancho Adobe Museum

1938

• Rio Hondo Coastal Spreading Grounds completed by LACFCD

1939

• San Gabriel Spreading Grounds completed by LACFCD

GROUNDWATER CONDITIONS IN THE FIRST DECADES OF THE 20TH CENTURY

The widespread introduction of the electric pump to replace windmills and steam generators made it possible to pump water more quickly and from deeper sources as demand for groundwater continued to grow. The area saw spectacular population growth in the first decades of the 20th century, first propelled by the influx of people from the East and Midwest responding to the lure of “health, wealth, and sunshine” promoted by the railroads and real estate speculators and then by Dust Bowl migrants looking for work in the burgeoning factories in the region and on the hundreds of farms and dairies that still dominated the landscape.

Groundwater extractions also increased by virtue of the new industrial demand that resulted from oil drilling in the Signal Hill, Santa Fe Springs and Long Beach areas in the 1920s and the Wilmington oil fields in the 1930s.

Water demand accelerated exponentially during World War II. Huge manufacturing facilities in what is now WRD’s service area contributed thousands of aircraft, tanks and ships to the war effort.

Tens of thousands of military personnel from throughout the country who were deployed to the Pacific Theater from California ports, including Long Beach, returned to the area to make permanent homes. The population in what is now the WRD service area grew from 590,000 in 1930



Oil Wells in Signal Hill, circa 1923

Image courtesy of City of Signal Hill & Signal Hill Historical Society

to 1,017,000 in 1940 to nearly 2,000,000 by 1950. Throughout this period, groundwater was the only source of water supply for the majority of residents and businesses.

As demand increased, natural conduits for replenishment were paved over by homes, factories, roads and streets. The resulting runoff made its way to the ocean rather than into groundwater aquifers. The “50-year flood” of 1938, which killed 144 people, knocked out dozens of bridges, and destroyed 6,000 homes along its path from Los Angeles to Long Beach, led to the concrete channelization of the Los Angeles River beginning in 1939. Formerly a significant source of water for groundwater recharge, the river became a flood control channel necessary to protect life and property from catastrophic storm events.



By July 1941, Vultee Aircraft in Downey was producing 15% of all military aircraft in the nation. The Valiant Basic Trainer and the B-24 Liberator were produced here. Image courtesy of Downey Historical Society.

1941 • Colorado River Aqueduct begins water deliveries to the region

ORGANIZING FOR WATER SUPPLY

In 1945, as a first step to correct a groundwater overdraft that was “truly alarming,” the Water Conservation Group recommended the creation of a non-profit corporation to legally assess its members for costs incurred in addressing common water problems. Thus the West Basin Water Association was formed in 1946.

But the 1945 Report also triggered a lawsuit filed by City of Torrance, California Water Service Co. and Palos Verdes Water Co. against the other 151 basin pumpers to limit pumping and control the basin overdraft.

The first objective of the Association was to sponsor creation of a municipal water district to provide imported water to areas of West Basin not already included in the Metropolitan Water District service area. Voters approved formation of the West Basin Municipal Water District in 1947.

The organization process was similar on the Central Basin side, but occurred much more quickly because the West Basin experience provided a template. The Central Basin Ground Water Conservation Group was formed in 1949. The Group promptly identified reduced natural replenishment originating from the Upper San Gabriel Valley and increased groundwater pumping in the Central Basin as major problems, as was the risk of seawater intrusion in the Long Beach area.



*Aerial view of West Basin looking west, in San Pedro circa 1939
Image courtesy of Los Angeles Public Library*

1946 • West Basin Water Association is formed

1947 • Voters approve formation of the West Basin Municipal Water District

ORGANIZING FOR WATER SUPPLY

In 1950 they recommended the formation of the Central Basin Water Association.

As in West Basin, the immediate objective of the Association was to sponsor creation of a municipal water district to provide imported water service to the Central Basin. The Central Basin Municipal Water District was approved by the voters in 1952. Pumpers in both basins soon realized that a supplementary supply of imported water would not be enough to salvage the basins. Some form of groundwater replenishment, and a way to pay for it, would have to be found.

What were the possible sources of supply for replenishment? Who should pay for the water and the related costs of replenishment? What kind of agency should be responsible for replenishment? These questions preoccupied the pumping community for the better part of the 1950s.

GOVERNANCE OPTIONS

Measures considered by the Legislature between 1951 and 1955 reflected the growing sense of urgency in preserving the basins and possible options for governing and financing groundwater replenishment.

Legislation adopted in 1951 empowered the Los Angeles County Board of Supervisors to create “Conservation Zones” to assess a property tax of

\$0.05 per \$100 assessed valuation to finance the purchase of imported water for spreading and barrier injection. The zones would provide financing for replenishment, but would exist on a temporary basis for purposes of triage only.

In 1953, the Metropolitan Water District (MWD) unsuccessfully sponsored legislation that would authorize Metropolitan member agencies to create “special replenishment districts”.

That same year, Orange County Water District, which opposed the Metropolitan legislation, successfully sponsored a bill to permit an assessment on groundwater pumping to purchase imported water to address the annual overdraft and a property tax to purchase imported water to address the accumulated overdraft. An effort by Central Basin pumpers to apply the legislation to their basin was unsuccessful.

Following the 1953 legislative session, pumpers in both basins were in a quandary. As their respective ground water conditions worsened, institutional options to permanently finance replenishment appeared bleak.

It was in this environment that the Water Conservation Association of Southern California convened a meeting in September 1954 with 45 different water agencies. A result of the meeting

was the formation of the “Committee of Twelve” to develop groundwater replenishment legislation.

After five months, the Committee of Twelve proposed legislation that in 1955 became the Water Replenishment District Act. Committee members Ben Haggott and Louis Alexander, representing the two Water Associations, were the principal architects of the legislation.



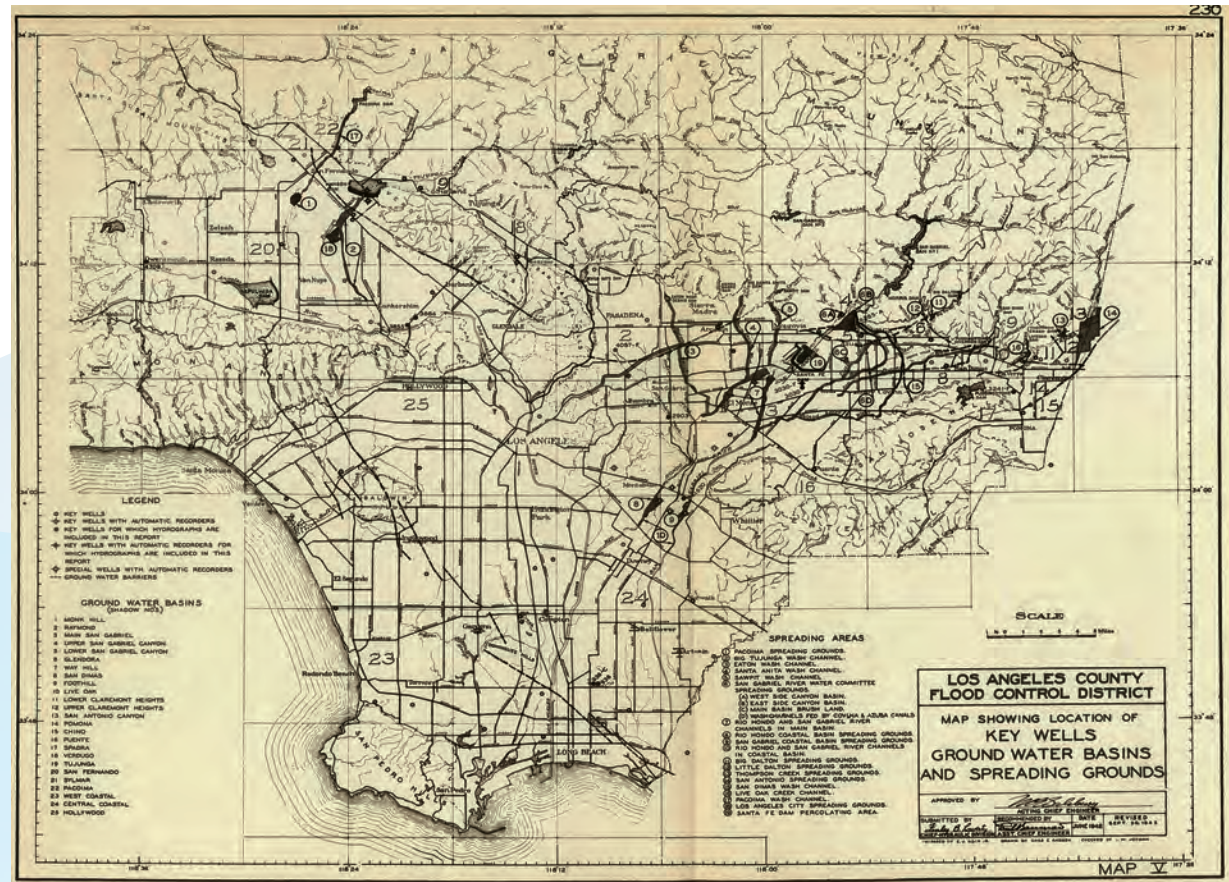
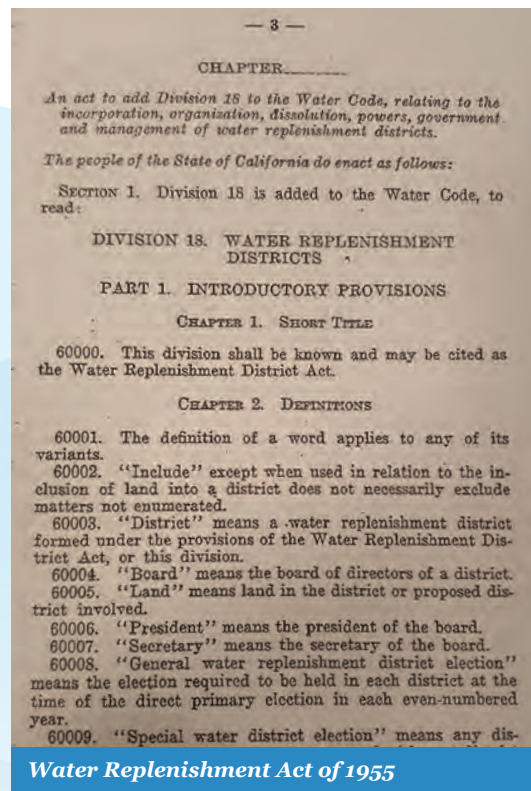
Ben Haggott



Louis Alexander

WATER REPLENISHMENT DISTRICT ACT OF 1955

The Water Replenishment Act did not create the Water Replenishment District. It created a procedure for forming a replenishment district and outlined the purposes and powers a district would have and the financing tools it could use to perform them.



The Act provided that a district can “manage and control water for the beneficial use of persons or property...” Most importantly, the legislation provided a way for a replenishment district to finance its operations. It could levy a uniform assessment on pumping, a tax on

property and a rate on water it sold. Many of these powers were tailored to the Central and West Coast Basins, whose pumpers wanted a replenishment district to have maximum legal and financial flexibility to deal with groundwater conditions.

1951

- LACFCD Conservation Zone legislation is adopted

- Legislature appropriates \$750,000 for experimental seawater barrier

WATER REPLENISHMENT DISTRICT FORMATION

Governor Goodwin Knight signed the Water Replenishment District Act in July 1955. For the next three years, the replenishment district committees of the two Associations discussed the district boundaries, sources of replenishment water a district or districts would buy and the options available to raise revenue to purchase water. Boundaries studied included separate replenishment districts for the Central and West Coast Basins and a single district encompassing those two basins and the Upper San Gabriel Valley.



*Governor Goodwin Knight and legislators confer on State Water Bill, 1956
Image courtesy of Los Angeles Public Library*

In August 1958, the Water Associations voted to form a single district encompassing the Central and West Coast Basins. It would take 15 months for a determination by the Department of Water Resources Director on the boundaries of the proposed Central and West Basin Water Replenishment District.

The next step was to prepare and obtain enough signatures on a petition calling for an election to put the question of district formation before the voters.



Ralph Helm



Carl Fossette

THE PETITION

The Executive Committees of the two Water Associations engaged Ralph Helm to prepare the Formation Petition and related legal documents. Helm was the attorney for the Central and West Basin Municipal Water Districts as well as the lead attorney in connection with the ongoing West Basin adjudication. Day-to-day operations would be handled by Carl Fossette, Executive Director of both Associations and General Manager of the Central and West Basin Municipal Water Districts.



Filing the Petition. From Left to Right: D.W Ferguson, W.C. Farquhar, Harry Chapman, Hal Levy, E.L. Lynn

The petition was at the same time a legal document and a campaign document. It contained the following Explanation of Purpose for the proposed new district:

“You are living in an area under which lie the great Central and West Basins or underground reservoirs which hold the water being pumped daily to keep you and your family alive.

This area which now contains about 2,500,000 people has grown by a million since World War II and will grow a million and a half more in the next ten years.

We are pumping out of these Basin reservoirs billions of gallons more than nature puts back. If the level gets much lower, salt water will creep in and fill our wells, as is now the case in some localities. We must immediately restore this underground supply of fresh water which is our ‘bank account’ on which to draw if earthquake or bombing destroyed the surface supply.

Public officials, water companies and industry leaders are sponsoring a Water Replenishment District which would obtain money for restoring water needed by taxing the pumps of water, not you, the average citizen. All it would cost you is about 25 cents a year to administer the District office.”

1952

- LACFCD for the first time buys imported water for the spreading grounds
- Voters approve formation of the Central Basin Municipal Water District

“Your Water Security Plan,” a pamphlet describing the problems of overdraft and seawater intrusion and the need to protect water supply from earthquake and enemy attack, were distributed by petition circulators. Press coverage in many of the 92 newspapers was extensive and editorials were uniformly positive.

The Long Beach Press-Telegram urged its readers to make signing the petition part of their New Year’s resolutions.

The campaign had 180 days to secure signatures from 91,951 registered voters. For three months, petition circulators, 1,482 of whom were volunteers, seemed to be everywhere, as was the persistent message of the campaign.

On June 2, 1959, the County Registrar declared that 116,275 of the signatures collected were valid, far exceeding the number required. The Board of Supervisors promptly scheduled the election for November 17, 1959.

THE ELECTION CAMPAIGN

The election campaign picked up where the petition campaign left off. “Your Water Security Plan” was mailed to 500,000 registered voters. Volunteer speakers appeared at dozens of service clubs, chambers of commerce and city councils to solicit support for District formation. They were armed with a prepared “15 Minute Replenishment Speech on a Plan for Water Security.”

The prepared speech characterized the basins as “these vast subterranean reservoirs --- where nature has been storing water for years --- that made possible the transformation of a desert country into farm lands, homes and factories.

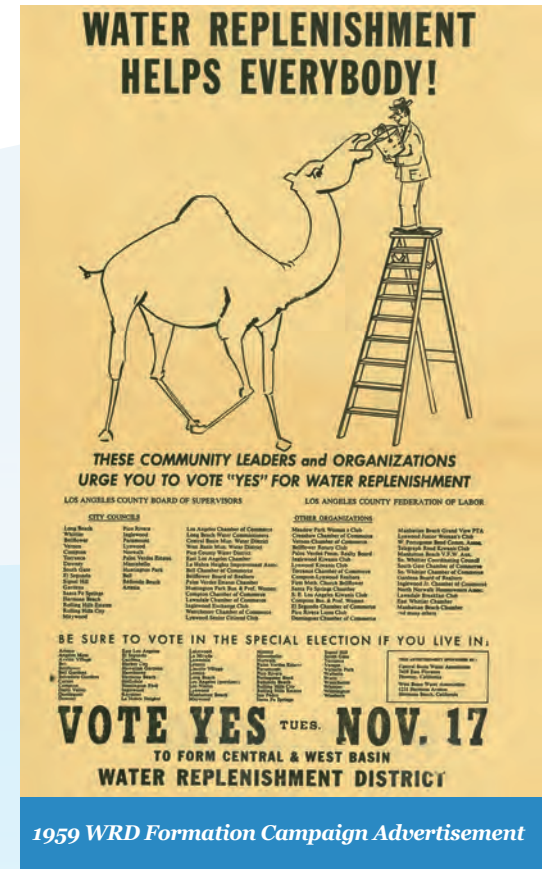
“Thousands and thousands of thirsty newcomers caused us to pump water from the underground faster than nature could put it back. The change-over from acres of cultivated land to miles of paved streets, walks and roof-tops left less surface for moisture to sink into the underground, with the result that millions of gallons of rainfall go scooting out into the ocean.”

“If we continue to lower the underground water level through excessive pumping, salt water from the ocean is going to move in. This contamination will render our priceless subterranean supply unfit for human consumption.”

“Storing water underground was the way to achieve water security and formation of the Central and West Basin Water Replenishment District was the way to store water underground.”

Mailers and newspaper advertisements carried similar messages. Fittingly, a camel became the symbol of the campaign.

There was no organized opposition. The question put before voters on November 17, 1959 was:



1959 WRD Formation Campaign Advertisement

“Shall the proposition to organize the Central and West Basin Water Replenishment District under the Water Replenishment District Act be adopted?”

The results...81,719 people voted yes while 20,860 voted no. A resounding victory.

WATER REPLENISHMENT DISTRICT FORMATION

WRD GETS UNDERWAY

In addition to approving formation of the Central and West Basin Water Replenishment District, voters selected the district's first directors from five divisions. The directors elected were:

Division 1 - William P. Malloy, an attorney from Los Angeles.

Division 2 - Charles D. Barker, an executive with Standard Oil of California and West Basin Water Association Director.

Division 3 - Lloyd Leedom, a realtor from Long Beach, member of the Long Beach Water Commission, member of the Metropolitan Water District Board since 1945, and Co-Chair of the District Formation Petition Committee.

Division 4 - Russell L. Hardy, a Councilman from South Gate and Real Estate Appraiser for the Los Angeles County Sanitation Districts.

Division 5 - D.W. Ferguson, President of Quaker City Savings & Loan in Whittier and a Co-Chair of the District Formation Petition Committee.

The organizational meeting of the newly-elected Board was on December 9, 1959. The first action of the Board was to elect Lloyd Leedom as Board President, a position he would hold for all but the



Left to right: Division 2, Charles D. Barker; Division 3, Lloyd Leedom; Division 4, Russell L. Hardy; Division 5, D.W. Ferguson. No picture available for former Division 1 Director William P. Malloy.

last six months of his 20-year tenure. Ferguson would serve for 31 years, Barker for 29, Hardy for 25. Malloy would serve only one two-year term and did not to run for reelection.

Carl Fossette was appointed General Manager and John G. Joham, Jr., an engineer in the State Watermaster's office, was appointed Assistant General Manager. Fossette would serve until May 31, 1974; Joham would succeed Fossette and serve until December 1989. WRD shared office space and a common staff with the Central and West Basin Municipal Water Districts until 1992 when, seeking its own identity, WRD relocated to its own headquarters in Cerritos.



Max Bookman

Max Bookman, who had recently retired from the Department of Water Resources, was hired as the District's first consulting engineer. He and his firm would prepare the annual Engineering Survey & Report until it was brought in-house in 1992.

1955 • Water Replenishment District Act is adopted

GROUNDWATER REPLENISHMENT BEFORE WRD



BUILT IN 1939 BY THE LOS ANGELES COUNTY FLOOD CONTROL DISTRICT, THE SAN GABRIEL COASTAL SPREADING GROUNDS INFILTRATES STORMWATER, IMPORTED WATER, AND RECYCLED WATER TO REPLENISH THE GROUNDWATER SUPPLY. THE RIO HONDO SPREADING GROUNDS WAS BUILT IN 1938. SINCE WRD FORMATION, 7.5 MILLION ACRE-FEET OF WATER HAS PERCOLATED THROUGH THESE TWO SPREADING GROUNDS.

San Gabriel Coastal Spreading Grounds in 1939, located in the City of Pico Rivera and owned and operated by the Los Angeles County Department of Public Works.

1939

GROUNDWATER REPLENISHMENT BEFORE WRD

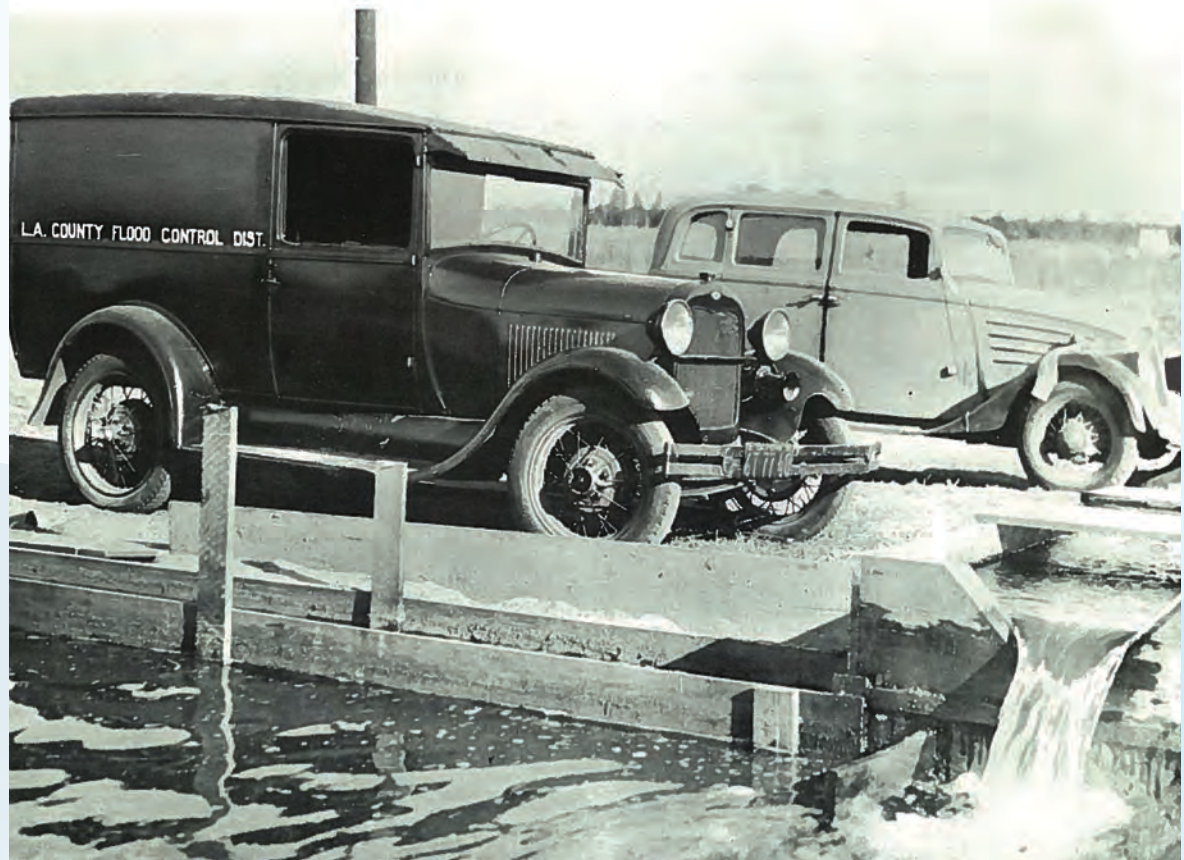
SPREADING GROUNDS

Prior to WRD formation, the Los Angeles County Flood Control District was the de facto replenishment agency for the Central and West Coast Basins. It completed the Rio Hondo Coastal Spreading Grounds in 1938 and the San Gabriel Spreading Grounds a year later. Together, these are referred to as the “Montebello Forebay Spreading Grounds”.

For the first 15 years or so of their operation, the Rio Hondo and San Gabriel facilities averaged a combined 3,600 acre-feet annually in spreading storm water, barely making a dent in the growing annual overdraft in the basins. That would change dramatically in 1952 when the Flood Control District secured a temporary source of funding to purchase imported water using the “Conservation Zone” Property tax funds.

ACRE-FEET:

An acre-foot is about 326,000 gallons, enough to cover a football field to a depth of one foot. Or enough to fill the balloon-like section of 7 Goodyear blimps. By virtue of water conservation practices, average per capita water use in WRD’s service area has decreased markedly in recent years to about 125 gallons per day, so an acre-foot meets the annual water needs of 9 people

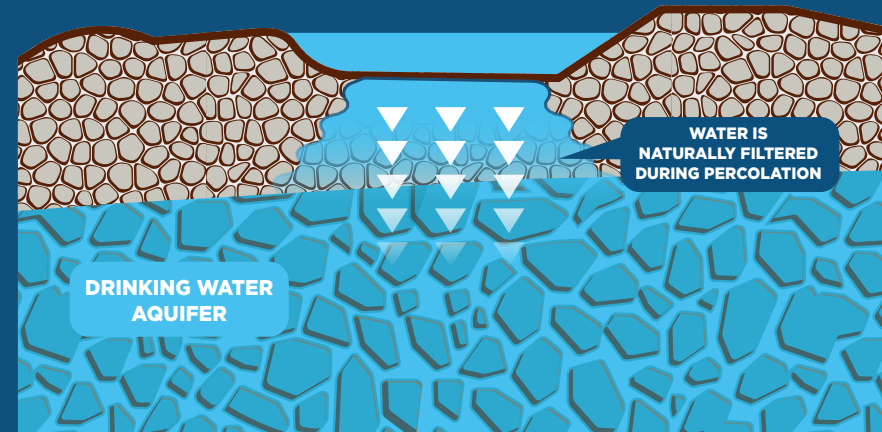


Spreading water in the Montebello Forebay spreading grounds, 1935

1959 • Voters approve formation of the Central and West Basin Water Replenishment District



Rio Hondo Coastal Spreading Grounds located in the City of Pico Rivera owned and operated by the Los Angeles County Department of Public Works



Simple diagram showing how groundwater replenishment through surface spreading works. Treated water is diverted to the spreading grounds to percolate to the aquifers as opposed to injection, where water is directly injected into the aquifer.

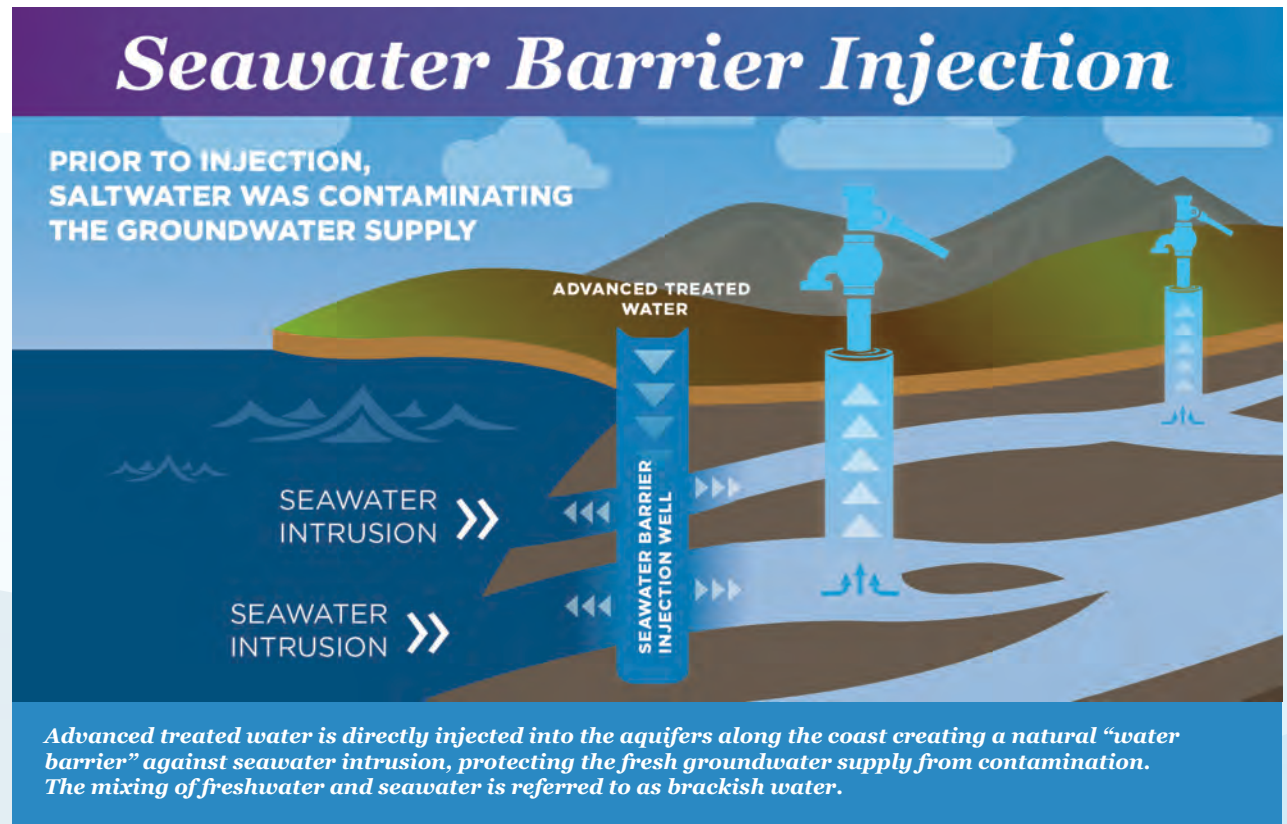
GROUNDWATER REPLENISHMENT BEFORE WRD

WEST COAST SEAWATER BARRIER

A 1932 Flood Control District study by J.H. Dockweiler noted the accelerated pace of seawater intrusion and recommended injecting water into a series of recharge wells adjacent to the coast, thereby creating fresh water barriers that would act as dams to hold seawater at bay. This was a novel approach to a seemingly intractable challenge.

Alarmed by the relentless migration of seawater inland and the promise of freshwater barrier technology, the West Basin Water Association sponsored legislation in 1951 to appropriate \$750,000 (\$7.5 million in 2019 dollars) to study seawater intrusion and implement methods to repel it. The State Department of Public Works allocated most of the money to a Flood Control District proposal for a West Coast Basin Barrier demonstration project. Initially, the project would consist of five injection wells and 30 monitoring wells in Manhattan Beach and the south area of Hermosa Beach.

Paul Baumann, the Assistant Chief Engineer for the Flood Control District between 1939 and 1959, designed and supervised construction of the project. The “West Coast Basin Experimental Project” began operations in February 1953. In January 1959, the District issued a final report on the project, finding that Dockweiler’s novel approach, made 27 years earlier, did, in fact, work.



Armed with these findings and sources of funding that would come, the Flood Control District over the next 12 years built a system of three seawater intrusion barriers with 300 injection wells and 800 observation wells extending over a length of 17 miles from LAX to the Orange County line (excluding the

Palos Verdes Peninsula). The West Coast Barrier was completed in 1969, the Alamitos Seawater Barrier in Long Beach was completed in 1965. The Dominguez Gap Barrier in Los Angeles was completed in 1971.

1962

• Whittier Narrows Water Reclamation Plant (WNWRP) begins operations

CONSERVATION ZONES – A TEMPORARY SOLUTION TO PURCHASING IMPORTED WATER

State money to purchase water for injection was exhausted a few months after West Coast Basin Experimental Barrier operations began. Continuing water purchases for the Barrier relied on voluntary contributions from West Basin pumpers. The County was not in a position to buy imported water for the spreading grounds.

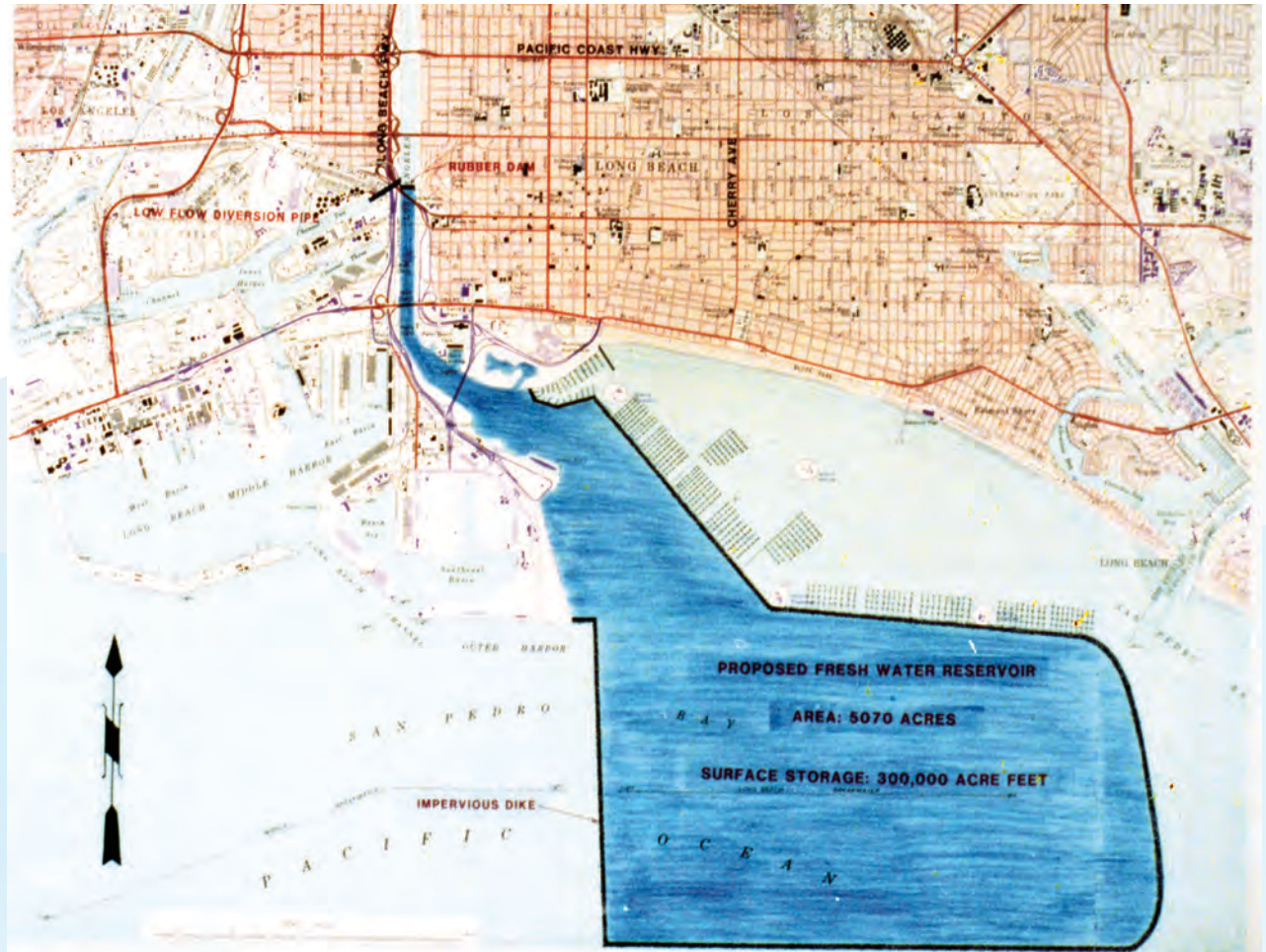
Using the 1951 legislation, the Board of Supervisors created temporary “conservation zones” to assess a property tax to finance the purchase of imported water for spreading and barrier injection.

Water Conservation Zone I, covering most of the Central Basin area, was established by the Board of Supervisors in 1952. Zone II, covering most of the West Basin area, was established in 1954.

Zone I funds were used to buy imported water for spreading and to fund construction of the Alamitos Seawater Barrier, which began operation in 1965.

Zone II funds were used to purchase imported water for injection into the West Coast Seawater Barrier, as well as its expansion in 1964 and 1969. Revenue from Zone II also funded most of the costs for the Dominguez Gap Seawater Barrier, which began operation in 1971.

Both Zones expired in 1971-72.



“Offshore Freshwater Reservoir” conceptual plan for proposed fresh water reservoir and stormwater capture

1964

• Alamitos Seawater Barrier begins operations

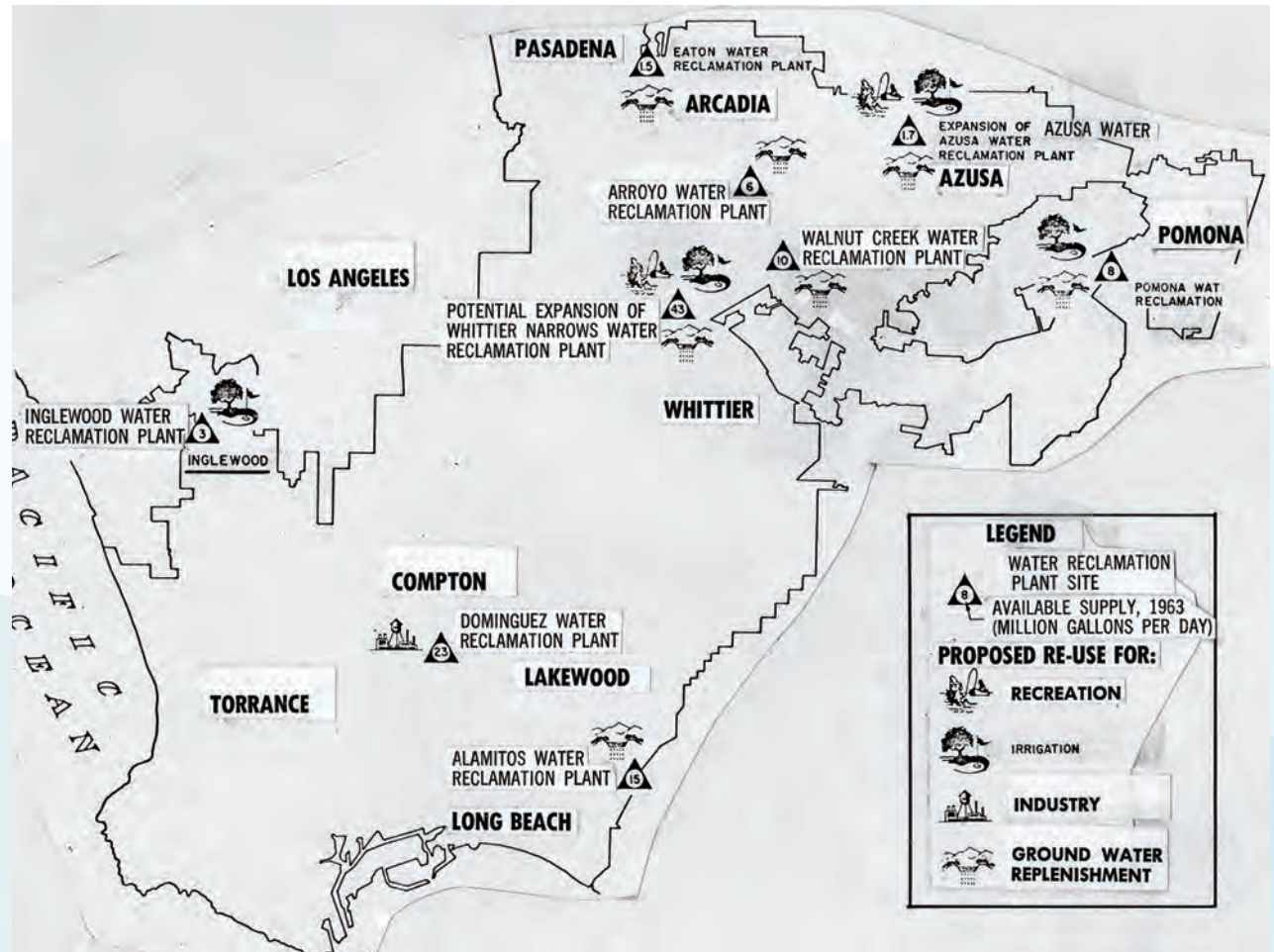
PIONEERING USE OF RECYCLED WATER AT THE SPREADING GROUNDS

The Sanitation Districts of Los Angeles County (Sanitation Districts) had been interested in the beneficial reuse of sewage effluent since the 1930s and saw groundwater replenishment potential in the reuse of treated effluent.

In 1949, A.M. Rawn and H.E. Hedger, along with County Engineer and Surveyor C.E. Arnold, coauthored “The Reclamation of Water from Sewage and Industrial Waste,” a landmark study documenting the field tests their agencies jointly conducted in Whittier in 1948 to test the large-scale feasibility of using treated wastewater as an artificial replenishment supply.

Results of those tests were the basis for the 1960 decision by the newly-formed Water Replenishment District to invest in what became the Whittier Narrows Water Reclamation Plant (WRP). Under a three-party Joint Powers Agreement, the Flood Control District built the plant, the Sanitation Districts supplied the effluent and operated the facility, and WRD financed the \$1.7 million capital cost (\$14.5 million in 2019 dollars).

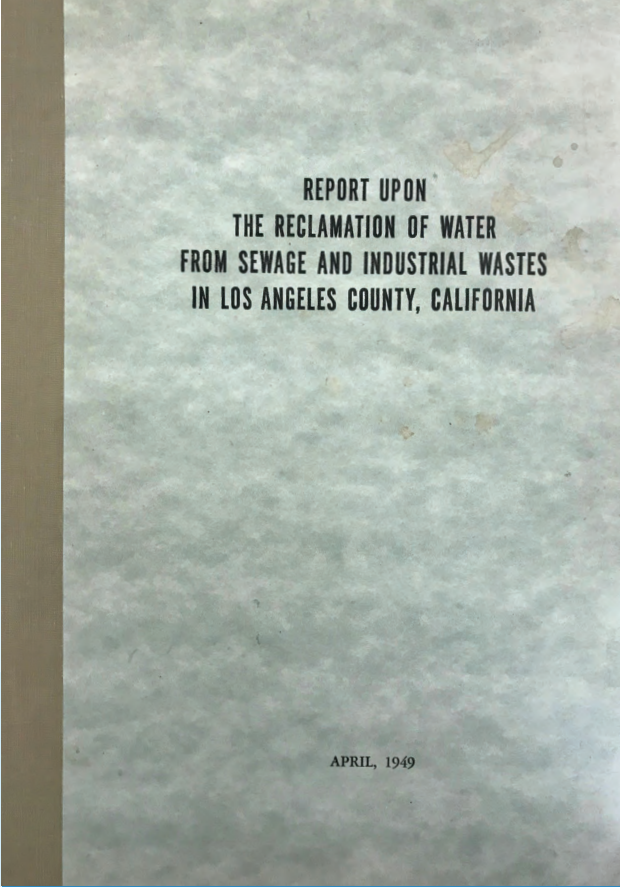
WRD borrowed the \$1.7 million from the County in 1961 and repaid the loan in full in 1975. Completed in 1962, the Whittier Narrows WRP was the first water reclamation plant in the world built for the specific purpose of producing recycled water for groundwater replenishment. Since it began operation, more than 630,000 acre-feet (over 200 billion gallons) of recycled water from that plant has been spread for groundwater replenishment.



Map of “Experimental” water reclamation plants in Los Angeles County, circa 1963
Image courtesy of Los Angeles Public Library

1970

- Dominguez Gap Seawater Barrier begins operations
- Spreading of recycled water from the LACSD Pomona WRP begins



REPORT UPON
THE RECLAMATION OF WATER
FROM SEWAGE AND INDUSTRIAL WASTES
IN LOS ANGELES COUNTY, CALIFORNIA

APRIL, 1949

Landmark Report on the Use of Reclaimed Water for Groundwater Replenishment

The use of recycled water at the spreading grounds has always been subject to stringent public health requirements. The original 1962 permit from the Regional Water Control Authority placed a limit of 11,200 acre-feet per year on the volume of water originating from the Whittier Narrows WRP. It also required that every acre-foot of recycled water be diluted by a like amount of imported water and/or storm water. Over time, permit limitations on the volume of recycled water were eliminated and the dilution requirements were eased, enabling the use of ever-increasing volumes of recycled water for spreading.

WRD began purchasing recycled water from the Sanitation Districts' Pomona WRP in 1970 and the San Jose Creek WRP in 1972. The combined spreading of reclaimed water from the three plants totaled more than 2 million acre-feet (650 billion gallons) by 2019.

WRD'S COMMITMENT TO RECYCLED WATER GROWS IN THE 1980S

WRD's replenishment supply portfolio for the spreading grounds changed dramatically in the 1980s. For the 10-year period of 1980-1989, the volume of recycled water applied in the spreading grounds (362,649 acre-feet) exceeded the volume of imported water (277,700 acre-feet). The Whittier, San Jose Creek and Pomona Water Reclamation Plants were steady sources of supply; the volume of recycled water supplied was limited only by the dilution requirements of the Regional Water Quality Control Board.

Four reasons accounted for WRD's increasing emphasis on recycled water as a source of supply:

1. The relatively high quality of the recycled water had been demonstrated by WRD and the Sanitation Districts since it was first introduced to the basin in 1962, giving WRD and health regulators confidence in its safety. Rapidly-advancing improvements in filtration technology added to that confidence.
2. The volume of water available from the three plants operated by the Sanitation Districts continued to increase.
3. The supply was more reliable than imported water. During the drought cycle between 1981 and 1984, MWD limited the sale of replenishment water to WRD to a total of 8,100 acre-feet, far below the 50,000 acre-feet or so it made available annually in the previous decade.
4. The cost of imported water relative to recycled water continued to rise precipitously. In 1981, WRD's cost for imported replenishment water was \$67.00 per acre-foot. Recycled water cost \$7.00 per acre-foot. Today the price for that same water is \$820 for untreated imported and \$65 for tertiary recycled water.

1972

- Spreading of recycled water from the LACSD San Jose Creek WRP begins
- State Water Project begins delivery to Southern California

WRD FROM THE 1990'S TO TODAY



WRD Engineering Team circa 1993/1994



WRD staff circa early 1990's



*Director Leo J. Vander Lans,
Governor Pete Wilson, and
Director Robert W. Goldsworthy
circa 1996*



*Congresswoman Grace Napolitano,
Director Albert Robles, and
Director M. Susan Carrillo*



*WRD Board of Directors back in 1991. From left to right,
Directors Robert Goldsworthy, Kenneth Orduna,
Daniel Glasglow, Tim Keleman, and Wesley Sanders Jr.*



In late 2003, Robb Whitaker was appointed as General Manager at WRD. He wanted to leverage past efforts by WRD and others to reduce dependence on imported water and devise a plan to make the District completely independent of imported water by greatly increasing development of locally sustainable replenishment sources for WRD. The District developed and identified projects that would be led by WRD or others to achieve this goal. WRD's communication consultant at the time, Adan Ortega, helped to package this plan in a readily understandable way so that WRD could develop support for funding and for the effort in general. Initiated in 2004, Water Independence Now, or WIN, was a guiding principle for WRD's approach to water supply for groundwater replenishment. In practice, it became a suite of projects that eliminated altogether WRD's need for imported water. The projects include three that enhance stormwater capture, three that produce advanced treated recycled water for injection into the seawater barriers, and one that produces advanced treated recycled water for delivery to the spreading grounds.

STORMWATER CAPTURE AT THE SPREADING GROUNDS



Rio Hondo and San Gabriel River Spreading Grounds

For the first 15 years of spreading grounds operation, stormwater was the only source of supply. Historically, captured stormwater has accounted for approximately one-third of the groundwater recharge at the spreading grounds.

In addition to its relatively good quality, the economic advantage of stormwater for replenishment is that it's free in perpetuity, once the investments to increase its capture have been made.

WATER INDEPENDENCE NOW

RUBBER DAMS



Rubber Dams in the San Gabriel River

WRD and Los Angeles County Department of Public Works (DPW) co-financed three rubber dams on the San Gabriel River. Installation of the dams was completed in 2005, enabling controlled releases of storm-water that would otherwise be lost to the ocean, these dams have increased natural replenishment by an average 3,600 acre-feet annually.

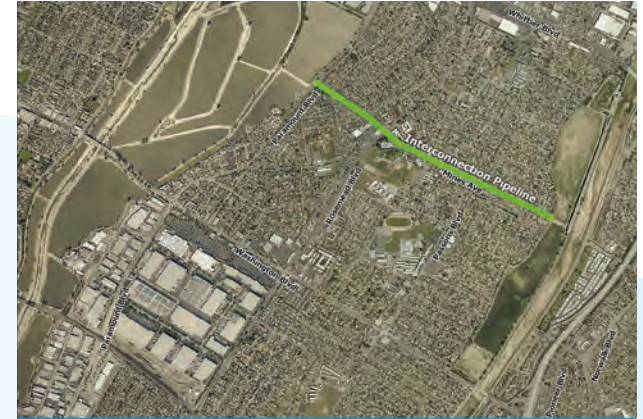
WHITTIER NARROWS CONSERVATION POOL



Whittier Narrows Conservation Pool

Completed in 1957, the Whittier Narrows Dam, in addition to its principal flood control purpose, has been a reliable means of capturing stormwater flows in the conservation pool behind the dam that can be released to the Montebello Forebay Spreading grounds for replenishment purposes. Until 2003, the capacity of the conservation pool was limited by the activities of five oil companies. In 2003, the County and WRD sued the companies to halt their oil production activities with a settlement reached in 2004. The increased capacity of the conservation pool increases the capture of stormwater for recharge by 3,000 acre-feet per year.

INTERCONNECTION PIPELINE



Pipeline connecting both spreading grounds to maximize stormwater capture and spreading operations

In a funding partnership with the DPW, WRD in 2012 completed construction of a pipeline connecting the Rio Hondo and San Gabriel Spreading grounds, greatly enhancing the operation and effectiveness of both. The pipeline enables the capture of an additional 1,300 acre-feet of stormwater annually as well as the storage of an additional 5,700 acre-feet of recycled water.

These collaborative efforts and joint funding by the County Department of Public Works and WRD result in nearly 8,000 acre-feet (2.6 billion gallons) of additional stormwater capture annually for groundwater replenishment.

1991

- The Central and West Basin Water Replenishment District changes its name to Water Replenishment District of Southern California

RECYCLED WATER AT THE SEAWATER BARRIERS



*West Basin Municipal Water District's Ed C. Little Water Recycling Facility in the City of El Segundo
Image courtesy of West Basin Municipal Water District*

WEST COAST SEAWATER BARRIER

The Flood Control District conducted pioneering tests from early 1955 through 1958 to study the potential of using treated reclaimed water from the Los Angeles Hyperion Water Reclamation Plant for barrier injection. While pleased with the results, the District concluded that “a third stage of treatment would be needed eventually” before injection into a seawater barrier.

Taking up where the Flood Control District left off in 1958, the Los Angeles Department of Water and Power (LADWP) built a Water Injection Pilot Plant next to Hyperion to further test the feasibility of using reclaimed water for the West Coast Seawater Barrier. The promising results prompted the Department to propose a 5 million gallon per day demonstration treatment plant just north of the Barrier, with LADWP and WRD sharing the construction costs and operational risks and rewards.

1995

- WBMWD Edward C. Little Water Recycling Facility begins delivery of advanced treated recycled water for injection into the West Coast Basin Seawater Barrier

WATER INDEPENDENCE NOW

Negotiations between WRD and LADWP began in 1969 and continued through 1974. Agreement appeared imminent on several occasions. On LADWP's recommendation, WRD filed a permit application for use of the water with the Regional Water Quality Control Board in December 1972. In 1973, however, the California Department of Health released a "position paper" expressing reservations about the direct injection of treated wastewater.

The additional filtration that would be required to satisfy the Department of Health drove the estimated unit cost for the treated water from \$56 per acre-foot in 1972 to \$153 per acre-foot in 1974. By comparison, in 1974, MWD water cost less than \$38 per acre-foot. The next year WRD formally withdrew from the proposed project.

By 1992, 18 years later, advances in technology along with regulatory and cost certainty made it possible for the West Basin Municipal Water District (WBMWD) to pick up where LADWP and WRD left off. It built what is now called the Edward C. Little Water Recycling Facility to treat Hyperion water and in 1995, the facility started producing advanced treated recycled water that WRD purchases for injection into the West Coast Seawater Barrier. Originally producing 7,500 acre-feet annually, the facility was expanded several times and now produces up to 17,000 acre-feet for barrier injection.

ALAMITOS SEAWATER BARRIER



WRD's Leo J. Vander Lans Advanced Water Treatment Facility in the City of Long Beach

In 1998, after having completed feasibility and engineering and environmental studies as well as land acquisition, the WRD Board made the decision to proceed with construction of the Alamitos Barrier Advanced Treated Recycled Water Project, subsequently renamed the Leo J. Vander Lans Advanced Water Treatment Plant.

A prominent attorney and resident of Long Beach, Leo J. Vander Lans served on the WRD Board from 1995 to 2002. The project was completed in 2005 with a capacity of 3,000 acre-feet annually. The capacity was expanded to 9,000 acre-feet per year in 2015.

1998 • WRD Board approves construction of Alamitos Barrier Advanced Treated Recycled Water Project

DOMINGUEZ GAP SEAWATER BARRIER



*Los Angeles Terminal Island Advanced Water Purification Facility
Image courtesy of City of Los Angeles*

In 1992, WRD undertook the first study of recycled water use at the Dominguez Gap Seawater Barrier. This would become a joint study with the Los Angeles Bureau of Sanitation a year later.

The study would lead to construction by the Bureau of Sanitation of the Terminal Island Advanced Water Purification Facility to provide recycled water that WRD purchases for injection into the Barrier.

Water service began in 2006 at an original capacity of 5,000 acre-feet per year. The plant was expanded to 8,000 acre-feet per year in 2017.

REGIONAL WATER BOARD PERMITS RECYCLED WATER USE INCREASES AT THE BARRIERS

The first permit for the injection of advanced treated recycled water at any barrier was issued by the Regional Water Quality Control Board to the WBMWD in 1995. The permit applied to the West Coast Seawater Barrier and authorized the use of up to 50% advanced treated recycled water in any given year, matched by a like amount of imported water. In 2006, the permitted recycled water portion was increased to 75%, and in 2015, rose to a full 100%.

In 2005, WRD's permit for the injection of advanced treated recycled water into the Alamitos Seawater Barrier had a 50% recycled / 50% imported blending requirement. The City of Los Angeles permit issued the same year for the injection of advanced treated recycled water into the Dominguez Gap Seawater Barrier had the same blending requirement. In 2015, the Regional Board increased WRD's permitted use of recycled water for injection at the Alamitos Barrier to 100%. In 2016, the City of Los Angeles permit for the Dominguez Gap was also increased to 100%.



*“Water Wars Move Underground,”
Los Angeles Times May 17, 2005*

More than 60 years after the Flood Control District conducted pioneering tests to assess the potential use of treated reclaimed water from the Los Angeles Hyperion WRP for barrier injection, three treatment plants have the capacity and the permits to produce advanced treated recycled water to meet 100% of the water required for injection into the three seawater barriers.

2003

- WRD helps fund two LA County DPW rubber dams on the San Gabriel River
- Capacity of WBMWD's Edward C. Little facility is expanded

THE FINAL STEP FOR WATER INDEPENDENCE

ADVANCED TREATED RECYCLED WATER AT THE SPREADING GROUNDS



Architectural rendering of the Albert Robles Center for Water Recycling and Environmental Learning

In 1991, the WRD Board instructed staff to seek a consultant to “study the use of reverse osmosis treatment to increase the spreading of reclaimed water in the Montebello Forebay.” The resulting study and subsequent pilot testing of treatment alternatives were the first step on the path toward WRD’s Groundwater Reliability Improvement Program (GRIP), which was the final step toward achieving the Water Independence Now objective.

25 years after the original study, the WRD Board moved forward with construction of GRIP, which was re-named the Albert Robles Center for Water Recycling and Environmental Learning (ARC).

Commencing in 2012, the WRD Board proceeded methodically and relatively quickly to bring project planning to project execution. Preliminary design and engineering, environmental documentation, land acquisition, a long-term water purchase agreement with the Sanitation Districts, and extensive community outreach preceded award of the final architectural design contract in 2015. A final design-build-operate contract was awarded in June 2016. To pay much of its costs, WRD received \$34 million in state and federal grants and a \$80 million 1% loan from the state’s Water Recycling Funding Program.



From left: Director Albert Robles, Director John Allen, Sanjay Robles, Sonjia Robles, and Director Rob Katherman at the Albert Robles Center naming ceremony on May 24, 2018

Formally opened in August 2019, the Albert Robles Center will produce 10,000 acre-feet per year of advanced treated water for percolation in the Montebello Forebay spreading grounds.

The plant is named for former WRD Director Albert Robles, who served on the Board from 1993 to 2018. Robles was a relentless project proponent and chaired the WRD committees that brought it from concept to fruition.

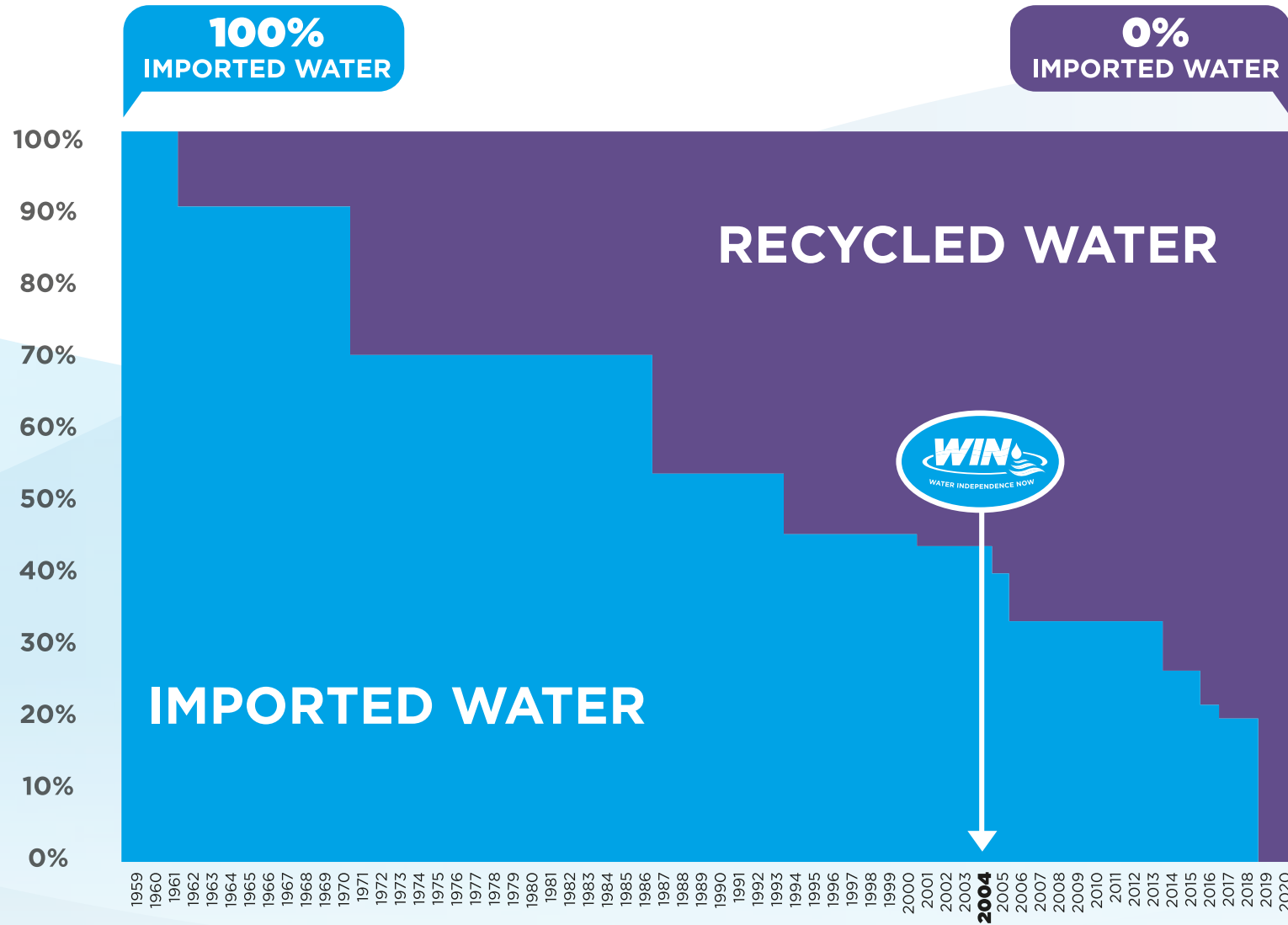
2004

• Whittier Narrows Conservation Pool expanded by virtue of a legal settlement of litigation filed by LA County DPW and WRD to halt oil drilling behind the dam

• WRD embraces Water Independence Now (WIN) as strategic goal

WRD'S REPLENISHMENT SOURCE WATER PORTFOLIO FROM 1959-2020

HISTORIC DEVELOPMENT OF RECYCLED WATER FOR GROUNDWATER REPLENISHMENT



2005

- WRD's Leo J. Vander Lans Advanced Water Treatment Facility begins producing water for injection into the Alamitos Seawater Barrier

WHAT'S NEXT...

WIN 4 ALL

THE 2040 PLAN FOR REGIONAL WATER INDEPENDENCE

In 2019, the WRD Board updated its Strategic Plan and 5-Year Capital Improvement Plan and for the first time, formally introduced the goal of “WIN for All,” an expansion of WRD’s WIN objectives to further offset the region’s imported water use. WRD’s WIN 4 ALL program will aim to increase resiliency in our replenishment operations and expand extraction capacity in the basins to ensure that the pumping community sees the full benefit of existing pumping rights. In addition, WIN 4 ALL will aim to take advantage of available local recycled water and stormwater resources to recharge available groundwater basin storage space and provide another avenue for increased regional reliance on local water supplies.



2006

- LASAN Terminal Island Advanced Water Purification Facility begins producing water for injection into the Dominguez Gap Seawater Barrier

The following projects are currently being completed by WRD or its partners to plan for and develop new local recycled water and stormwater sources, identify new replenishment and groundwater storage opportunities, expand groundwater extraction opportunities, and increase innovation and efficiency across all efforts within our region's water portfolio.

GROUNDWATER BASIN MASTER PLAN

As early as 2010, the WRD Board had made regional self-reliance a District objective, at least in concept, when it approved the preparation of a Groundwater Basin Master Plan.

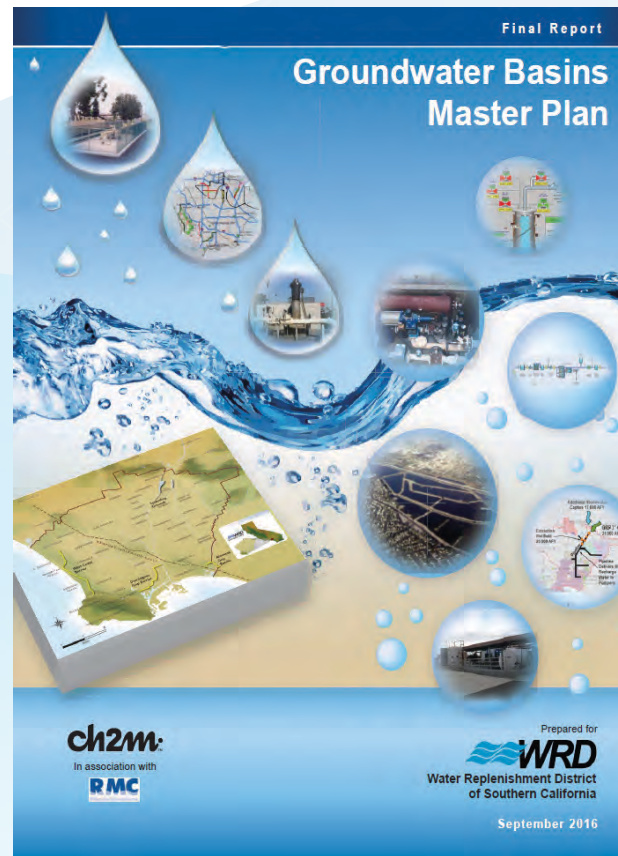
Following a six-year, extensive stakeholder engagement process accompanied by detailed modeling of basin utilization concepts, scenarios, and alternatives, WRD in 2016 adopted the Master Plan and a related Programmatic Environmental Impact Report.

The intent of the Master Plan is to provide a single reference document for parties operating in the Central and West Coast groundwater basins. It complements the efforts of WRD's WIN program by identifying projects and programs to enhance basin replenishment, increase reliability of groundwater resources, improve and protect groundwater quality, and ensure that the groundwater supplies are suitable for beneficial uses

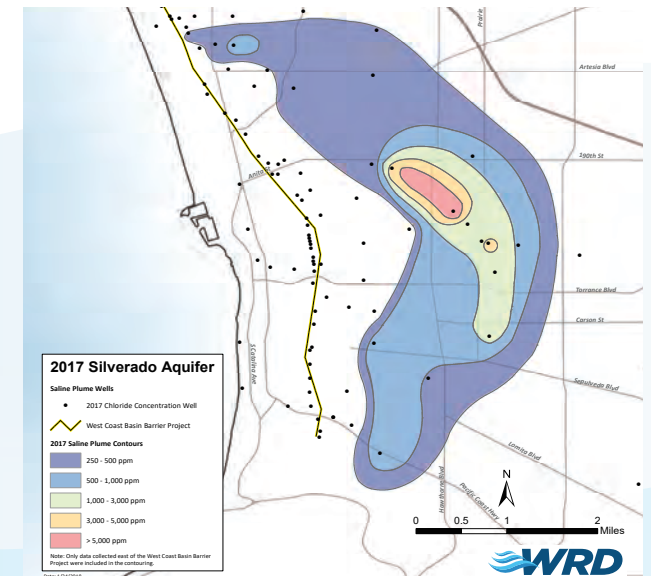
The Master Plan is a blueprint for regional independence from imported water. Under one of the concepts explored, the Master Plan identified

projects to increase supply to enable 320,617 acre-feet of groundwater production in the Central Basin, 103,250 above current pumping limits in the Central Basin Judgment, and 30,000 acre-feet above current pumping limits in the West Basin Judgment.

The total volume of additional groundwater supply under this concept is 220,250 acre-feet.



REGIONAL BRACKISH WATER RECLAMATION PROGRAM



Brackish water plume trapped in the Silverado Aquifer in the West Coast Groundwater Basin.

Within the West Coast Basin a significant plume (Approx. 600,000 acre-feet) of brackish groundwater containing high Total Dissolved Solids (TDS) has been trapped due to seawater intrusion and the implementation of the West Coast Seawater Intrusion Barrier. WRD began the Regional Brackish Water Reclamation Program to evaluate the feasibility of remediating the high TDS plume, working with six additional stakeholders who pump and wholesale potable water within the basin. WRD is currently completing a Feasibility Study to evaluate siting options and available treatment technologies for brackish water reclamation facilities.

WHAT'S NEXT...

LOS ANGELES BASIN JOINT MASTER PLAN



*Hyperion Water Reclamation Plant
Image courtesy of the City of Los Angeles*

WRD and the Los Angeles Department of Water and Power (LADWP) are working collaboratively to investigate potential future opportunities for sustainable replenishment and extraction of groundwater from the West Coast and Central groundwater basins, utilizing new local water sources. LADWP has access to flows from the Hyperion Water Reclamation Plant (WRP) as a potential source of replenishment water (supply equaling ~200 million gallons per day) and shares WRD's goal of increased local sustainability and water resiliency. The two agencies are currently working together to complete a Joint Los Angeles Basin Replenishment and Extraction Master Plan that will develop possible project alternatives that would utilize local water supplies and provide replenishment and drinking water resiliency for the region.

REGIONAL RECYCLED WATER ADVANCED PURIFICATION CENTER



*MWD's Demonstration Facility for the Regional Recycled Water Advanced Purification Center
Image courtesy of Metropolitan Water District of Southern California*

The Metropolitan Water District of Southern California and the Sanitation Districts of Los Angeles County are currently completing a demonstration plant at the Sanitation Districts' wastewater treatment facility in Carson to produce 500,000 gallons per day, or 560 acre-feet per year, of advanced treated recycled water. The Regional Recycled Water Advanced Purification Center will generate information needed for future design and construction of a full-scale advanced water treatment plant producing as much as 150 million gallons per day, or 168,000 acre-feet per year. Since 2016, WRD and Metropolitan have worked collaboratively

to evaluate potential groundwater recharge and storage opportunities that will take advantage of this new source of recycled water. Metropolitan's project concepts currently include conveyance of water from Carson to the Montebello Forebay for injection or spreading, to the West Coast Basin as a potential replenishment source for extraction associated with WRD's Regional Brackish Water Reclamation Program, to the Long Beach area for injection and storage, to other groundwater basins, to oil refineries, or possibly to water treatment facilities as a new raw water augmentation source.

2013

• WRD agreement with LACSD assures 71,000 acre-feet of future tertiary supply

LOS ANGELES COUNTY SAFE, CLEAN WATER PROGRAM



Los Angeles River

Los Angeles County voters in November 2018 approved the “Safe, Clean Water” ballot measure to impose a 2.5-cent tax on each square foot of impermeable surface on the roughly 2.2 million privately-owned parcels in the Los Angeles County Flood Control District’s service area. The tax will generate approximately \$300 million per year. 50% of the money would fund “regional projects.” Not counting the City of Los Angeles, which will receive approximately \$38 million per year under the program, cities in WRD’s service area will receive approximately \$32 million per year to fund projects that will help them comply with stormwater and urban runoff prohibitions and requirements adopted by the Regional Board pursuant to the Federal Water Pollution Control Act.

The measure creates nine Watershed Area Steering Committees with responsibility for establishing Storm Water Management Targets, reviewing proposed projects, and identifying possible partners for projects that are proposed. WRD is a designated member of the Steering Committees for the Lower Los Angeles River, the Lower San Gabriel River, and the South Santa Monica Bay.

In promoting passage of the measure, proponents argued that projects undertaken would capture for beneficial use a good portion of the 2 billion gallons of storm water lost annually to the ocean.

JOINT OUTFALL REPLENISHMENT FUND

Historically, recycled water connection fees WRD has paid to the Sanitation Districts is revenue that is not dedicated to particular projects or programs. The connection fees can be quite high--\$15 million in the case of ARC, for example. In a series of meetings, WRD General Manager Robb Whitaker proposed to the Sanitation Districts’ General Manager Grace Hyde that the mutual interests of their respective agencies would be served by the creation of a Replenishment Fund to provide a dedicated stream of funding for recycled water projects that necessarily involve Sanitation Districts’ facilities. Grace Hyde agreed and proposed to make changes to their ordinance related to the connection fee. In September of 2018, the Sanitation Districts’ Board formally approved a Joint Outfall Replenishment Fund for that purpose, providing significant benefits to the region.

WELL CONSTRUCTION AND REHABILITATION LOAN PROGRAM



Production Well

The Well Construction and Rehabilitation Loan Program is designed to allow pumpers to utilize their unused pumping rights through a loan program for new well construction or existing well rehab. The program stipulates that pumpers must increase their 5-year extraction average by 10% to receive funding. WRD released the first program application in the summer of 2018 and received four (4) applications totaling over \$10 million in requests. WRD plans to expand this program to provide additional loans and ensure the pumping community is able to see the full benefit of their pumping rights.

WHAT'S NEXT...

LEO J. VANDER LANS ADVANCED WATER TREATMENT FACILITY SUPPLEMENTAL SOURCE WATER PROJECT



Leo J. Vander Lans Advanced Water Treatment Facility

WRD has a currently unused allocation of 10,000 acre-feet per year at the Los Coyotes Water Reclamation Plant (LCWRP). Connecting the Leo J. Vander Lans AWTF to the LCWRP through either a direct connection or interconnection will allow WRD to utilize the unused allocation as an alternative source of water for the AWTF, providing operational flexibility to the District. WRD has initiated planning studies to determine the preferred alternative for this connection.

SAFE DRINKING WATER PROGRAM & DISADVANTAGED COMMUNITIES OUTREACH ASSISTANCE PROGRAM



Maywood Mutual No. 2 Groundbreaking Event

WRD's Safe Drinking Water Program (SDWP) promotes the cleanup of groundwater resources through the installation of wellhead treatment facilities at existing production wells, working in collaboration with well owners. The facilities remove contaminants from the underground supply and delivers the extracted water for potable purposes. A total of 16 facilities have been completed and are online and one facility has successfully completed removal of the contamination and no longer needs to treat. The Safe Drinking Water Program also includes the Disadvantage Communities (DAC) Outreach Assistance Program, which will provide assistance to water systems in Disadvantaged areas with applying for State funding. There are currently

11 participants in the DAC Outreach Assistance Program. There are several projects in various stages of implementation and new candidates for participation are under evaluation, with four projects currently under construction.

CONTAMINATED SITES INVESTIGATIONS & PERCHLORATE REMEDIATION PROJECT



Wellhead treatment system in the City of Paramount

Many potential groundwater contamination sources exist within the District boundaries due to a large and diverse industrial and commercial presence. WRD established its Groundwater Contamination Prevention Program to minimize or eliminate threats to drinking water aquifers. One project within this program is the Perchlorate Remediation Project in the City of Vernon which recently received funding from the State Water Resources Control Board and is currently underway.

2017 • Capacity of the LASAN Terminal Island facility is expanded

REPLENISHMENT FACILITIES RESILIENCY & OPERATIONS OPTIMIZATION PARTNERSHIP



San Gabriel Coastal Spreading Grounds

WRD works in partnership with regional water and wastewater agencies to ensure supplemental water delivery to the Montebello Forebay Spreading Grounds and coastal seawater barriers that are owned and operated by Los Angeles County Public Works. Moving forward, WRD, Los Angeles County, and other partners will work to expand replenishment facilities planning & operations coordination efforts, developing a collaborative partnership that will ensure replenishment source water and recharge facilities increase in both efficiency and resiliency.

ENERGY MANAGEMENT PLAN



Energy recovery devices are installed at pumps at the Goldsworthy Desalter in Torrance.

WRD has taken the initiative to develop a strategic approach to identifying and minimizing the District's Green House Gas (GHG) footprint. This effort will involve identifying all of WRD's existing electrical demands and potential optimization efforts.

OUTREACH AND EDUCATION/ WATER CONSERVATION ECO-GARDNER PROGRAMS



Students participating in WRD Water Education program

Groundwater provides nearly half of the drinking water supply to the 4.3 million residents within the WRD service area. Unfortunately, due to the "unseen" nature of the resource, many of these residents do not know about the occurrence of groundwater, the source of other drinking water supplies, or the need for local conservation. WRD's outreach and education programs are multi-faceted and focused toward groundwater resource education for all knowledge levels including elected officials, industry professionals, regulators, teachers and students. The program involves regular presentations and tours by District staff and has won several awards from various water industry associations.

2019

• Albert Robles Center for Recycling and Environmental Learning (ARC) begins producing advanced treated recycled water for delivery to the spreading grounds



WRD's Vision Statement

Utilizing groundwater aquifers to create a locally sustainable water supply for the Los Angeles Basin region



WRD DIRECTORS

DIVISION ONE

William P. Malloy	1959 – 1962
Iris A. Crochet	1963 – 1978
Louis J. Kenney	1979 – 1982
Emmet E. Brown	1983 – 1990
Kenneth Orduna	1990 – 1998
Willard H. Murray, Jr.	1999 –

DIVISION TWO

Charles D. Barker	1959 – 1988
Robert Goldsworthy	1989 – 2004
Rob Katherman	2005 –

DIVISION THREE

Lloyd C. Leedom	1959 – 1979
Clyde N. Moore	1979
Warren P. Harwood	1979 – 1982
Daniel R. Glasgow	1983 – 1994
Leo J. Vander Lans	1995 – 2002
Norm Ryan	2003 – 2006
Lillian Kawasaki	2007 – 2013
Lynn Dymally	2013 – 2014
John D. S. Allen	2015 –

DIVISION FOUR

Russell L. Hardy	1959 – 1984
John P. Kearney	1984 – 1986
Wesley Sanders, Jr.	1987 – 1992
Clarence Wong	1992 – 1994
M. Susan Carrillo	1995 – 2002
Patricia Acosta	2002 – 2006
Sergio Calderon	2007 –

DIVISION FIVE

D.W. Ferguson	1959 – 1990
Tim Keleman	1990 – 1992
Albert Robles	1993 – 2018
Vera Robles DeWitt	2018 –

PRESIDENTS OF THE BOARD

Lloyd Leedom	1959 – 1978
Russell Hardy	1979 – 1982
D.W. Ferguson	1983 – 1986
Daniel R. Glasgow	1987 – 1993
Kenneth Orduna	1994 – 1996
Robert W. Goldsworthy	1997 – 1999
M. Susan Carrillo	2000 – 2001
Leo J. Vander Lans	2001 – 2002
Willard H. Murray, Jr.	2003 – 2006
Albert Robles	2007
Rob Katherman	2008
Albert Robles	2009 – 2010
Sergio Calderon	2011
Albert Robles	2012 – 2013
Rob Katherman	2013 – 2014
Sergio Calderon	2014 – 2015
Willard H. Murray, Jr.	2016
Rob Katherman	2017
John D. S. Allen	2018 –

WRD GENERAL MANAGERS

Carl Fossette	1960 – 1974
John G. Joham, Jr.	1974 – 1989
John Norman	1990 – 1994
Fred Cardenas	1995 – 1998
Robert Campbell	1998 – 2000
Bruce Mowry	2001 – 2003
Robb Whitaker	2003 –



Early WRD Reports

WRD SERVICE AREA MAP



WRD SERVICE AREA MAP





**WILLARD
H. MURRAY**
DIVISION 1

Representing

Hawthorne
Inglewood
City of Los Angeles (partial)
Los Angeles County (partial)



**ROBERT
KATHERMAN**
DIVISION 2

Representing

El Segundo
Gardena
Hermosa Beach
Lawndale
Lomita
Manhattan Beach
Palos Verdes Estates
Rancho Palos Verdes
Redondo Beach
Rolling Hills
Rolling Hills Estates
Torrance
Los Angeles (partial),
including San Pedro
and Wilmington.



**JOHN
D. S. ALLEN**
DIVISION 3

Representing

Artesia
Cerritos
Hawaiian Gardens
La Mirada
Lakewood
Long Beach
Signal Hill



**SERGIO
CALDERON**
DIVISION 4

Representing

Bell
Bell Gardens
Commerce
Cudahy
Downey
Huntington Park
Lynwood
Maywood
Montebello
Monterey Park
South Gate
Vernon



**VERA
ROBLES DEWITT**
DIVISION 5


Representing

Bellflower
Carson
Compton
Downey
La Habra Heights
Norwalk
Paramount
Pico Rivera
Santa Fe Springs
Whittier



**ROBB
WHITAKER**
GENERAL MANAGER

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