



San Gabriel River Watershed

UPPER AREA

WATER SUPPLY SOLUTIONS TOUR



Upper
District

Where Solutions **f**low

Upper District



OUR MISSION

- *Provide a reliable supply of high quality drinking water at the lowest possible cost.*
- *Provide a drought-proof and economical supply of recycled water for industrial and irrigation uses.*
- *Provide and complete projects that aggressively advance water use efficiency throughout the San Gabriel Valley.*

It is our goal to pursue this mission in a manner that is transparent,

Board of Directors



Anthony R. Fellow, Ph.D.
Division 1



Charles M. Treviño
Division 2



Ed Chavez
Division 3



Alfonso "Al" Contreras
Division 4



Bryan Urias
Division 5

Upper District Service Area



District Management



Shane Chapman
General Manager



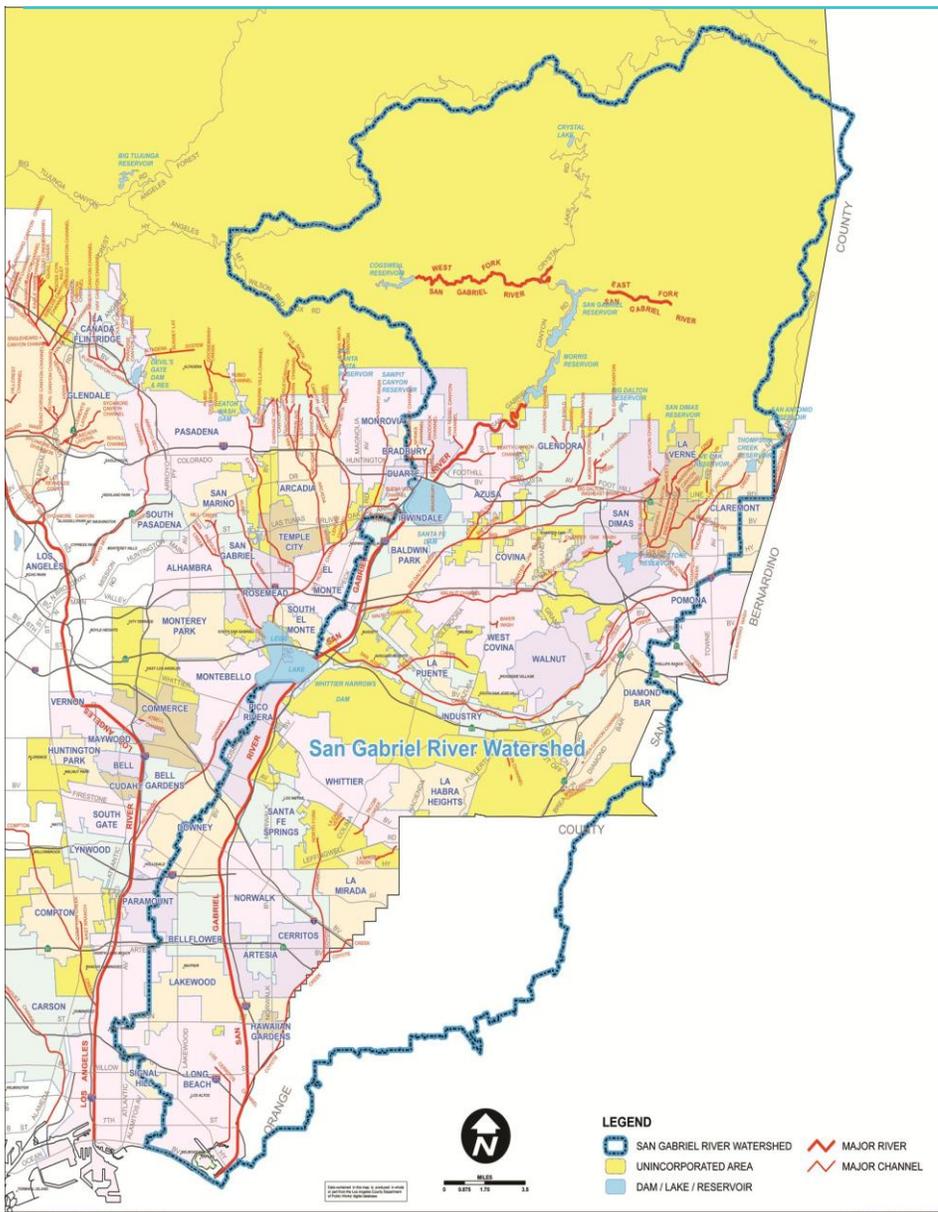
Overview

San Gabriel River Watershed

UPPER AREA

WATER SUPPLY SOLUTIONS Tour

The educational tour and enclosed materials are a cooperative effort by numerous water-related agencies in the San Gabriel Valley. Our goal is to provide interested stakeholders with an overview of the San Gabriel River Watershed's unique water supply challenges and opportunities and to encourage stakeholder involvement in the development of long-term water supply solutions.



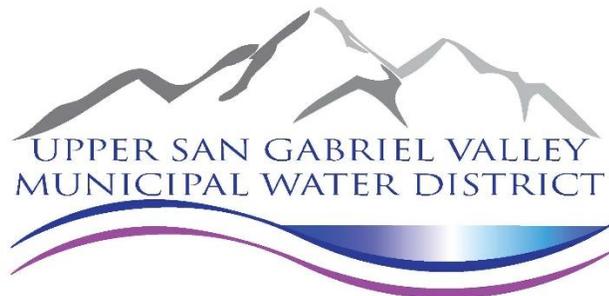
- A. Introduction to Upper Area of the San Gabriel River Watershed
 - Site 1 | Upper District Headquarters
- B. Historical Development of Water Infrastructure and Supply
 - Site 2 | Morris Dam
 - Site 3 | San Gabriel Dam
- C. Imported Water
 - Site 4 | Weymouth Treatment Plant and Research Laboratory
- D. Recycled Water
- E. Groundwater Replenishment and Stormwater Capture
 - Site 5 | Spreading Grounds upstream of the Santa Fe Dam at the intersection of the 210 and 605 Freeways
 - Site 6 | Santa Fe Dam
 - Site 7 | San Gabriel Drop Structure
- F. Water Quality
 - Site 8 | Baldwin Park Operable Unit
- G. Conclusion and Feedback



2017

Information

Resource Guide

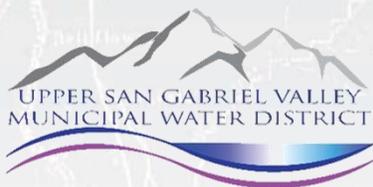


Overview

The Upper San Gabriel Valley Municipal Water District (Upper District) welcomes you to this informational and educational tour of the San Gabriel River Watershed. Our tour is designed to enable you to see and learn firsthand what has been accomplished in the past to provide the San Gabriel Valley with a reliable water supply, to visit key locations and infrastructure related to our water supply system and to discuss what needs to be done now and in the future.

The San Gabriel River Watershed is a large geographic area featuring the San Gabriel River (including West and East Forks), San Gabriel Mountains, the Puente-Chino Hills, and local creeks and streams. Ultimately, the Watershed "empties" into the Pacific Ocean, though Upper District and other water agencies work with Los Angeles County Flood Control District to retain as much water as possible within the Watershed.

Mountain runoff, precipitation, imported water (from State Water Project and Colorado River Aqueduct) and recycled water (treated waste water) flow into the San Gabriel Valley naturally and through a network of dams, pipelines and spreading grounds, replenishing streams, lakes, reservoirs and underground aquifers.



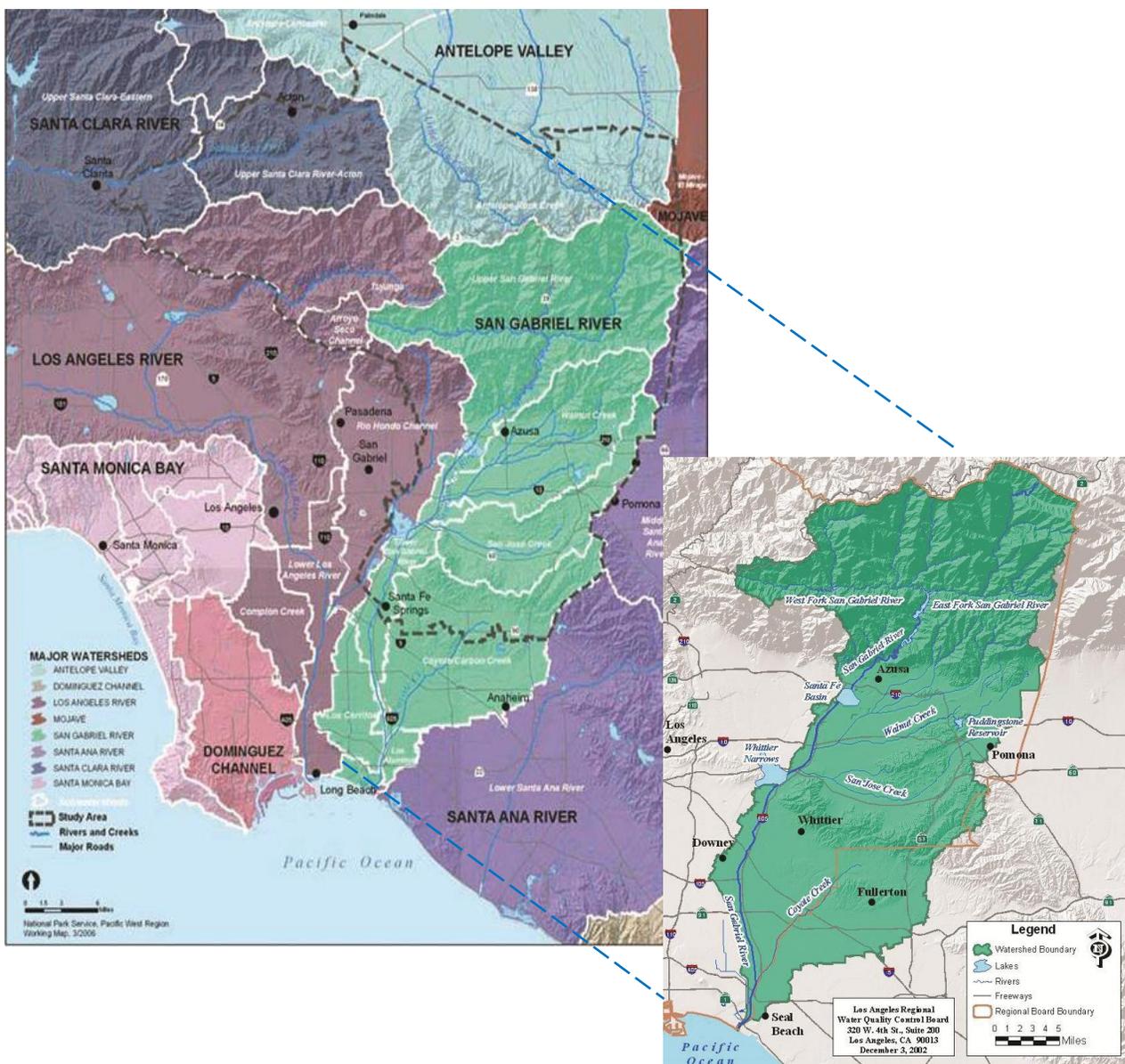
Where Solutions **flow**



Southern California Watersheds

The Los Angeles Basin is bounded by the Pacific Ocean and a variety of mountain ranges, with topography akin to a “bowl.” Within that bowl there are a number of mountain ranges, hills, rivers and streams which create a variety of watersheds (shown by the different color areas on the map). The San Gabriel River Watershed (green area) is the large geographic area featuring the San Gabriel River (including West and East Forks), the San Gabriel Mountains, the Puente-Chino Hills and local creeks and streams.

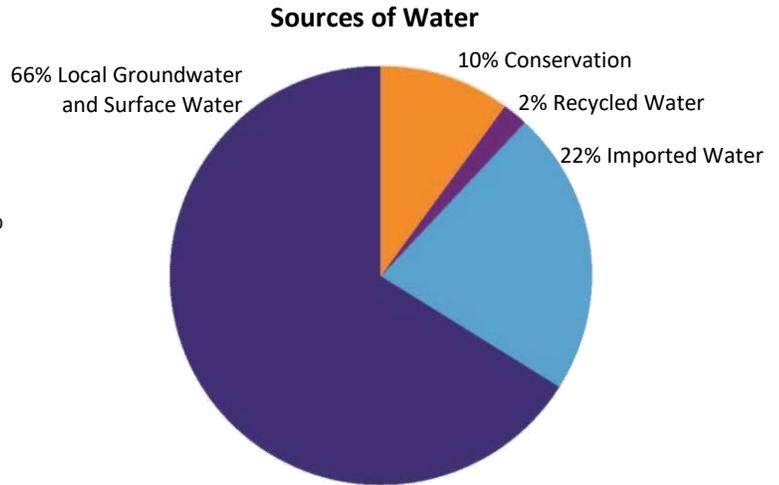
Maps of the San Gabriel River Watershed



San Gabriel River Watershed

How Does Water Flow to our Valley?

Mountain run off, precipitation, imported water (from State Water Project and Colorado River Aqueduct) and recycled water flow into the San Gabriel Valley naturally and through a network of dams, pipelines and spreading grounds, replenishing streams, lakes, reservoirs and underground aquifers.



Organizations Involved with the San Gabriel River Watershed

Federal Government	Roles and Responsibilities
Army Corps of Engineers	Flood risk management; flood control
Environmental Protection Agency	Protect and restore water resources
U.S. Fish and Wildlife Service	Conserve, protect and enhance fish, wildlife, plants and their habitats
U.S. Forest Service	Sustain the health, diversity, and productivity of the Nation's forests and grasslands
U.S. Bureau of Reclamation	Manage, develop, protect water and related resources in an environmentally manner.
State of California	
Department of Water Resources	Improve and sustain California's water resources, imported water supply, California Aqueduct, flood management and water use efficiency
State Water Resources Control Board	Preserve, enhance and restore the quality of California's water resources and ensure their proper allocation and efficient use for the future
LA Regional Water Quality Control Board	Preserve and enhance water quality in the Los Angeles region
State Resources Agency	San Gabriel River, Rivers and Mountains Conservancy
County of Los Angeles	
Department of Public Works/Flood Control District	Water conservation, flood control and stormwater capture
LA County Sanitation Districts	Wastewater treatment and recycled water
Main San Gabriel Basin Watermaster*	Manage and protect groundwater resources within Main San Gabriel Groundwater Basin
Special Districts	
Upper District	Increase local water supply reliability, recycled water and water use efficiency
San Gabriel Basin Water Quality Authority	Coordinate and accelerate groundwater cleanup programs in the San Gabriel Basin
San Gabriel Valley Municipal Water District	Increase local water supply reliability and cost-effectiveness, water quality and water use efficiency
Three Valleys Municipal Water District	Supplement and enhance local water supplies
Metropolitan Water District of Southern California	Provide adequate and reliable supplies of high quality water to its service area
Non-governmental / Non-profit organizations	Council for Watershed Water Environment Federation

Note: in addition to the above government organizations, a variety of quasi-and non-governmental organizations such as the Council for Watershed Health, Amigos De Los Rios, San Gabriel and Lower Los Angeles Rivers and Mountains Conservancy, San Gabriel Mountains Regional Conservancy, Watershed Conservation Authority, and Sierra Club provide valuable input toward the effective management of the Watershed.



Reaching Out to Increase Water Conservation and Water Awareness

Water use efficiency (conservation) is one of the least expensive ways to ensure a reliable water supply. We have a history of partnering with water, environmental and educational agencies to provide stakeholders with information and practical experience related to water conservation and water issues. Through rebate and retrofit programs beginning in 1992, Upper District has helped conserve 42,046 acre-feet (over 13.7 billion gallons) of water! The snapshots below show the extent of our outreach in 2010-2011.



Youngsters "Learn by Doing" at Watershed Restoration Events

Watershed Restoration Program – The Program is a cooperative partnership between the Upper District and the U.S. Forest Service that incorporates volunteers into efforts to protect and maintain the local watershed. The program seeks to improve areas negatively impacted by fire, heavy rains and flooding, plant disease, insects, non-native vegetation and heavy recreational use. Several hundred volunteers help collect native seeds and plant saplings that retain precious precipitation, allowing more water to percolate down into the groundwater as well as reduce runoff and erosion. Since the program began in 1991, more than 130,000 saplings and thousands of acres of chaparral have been planted and over 20 tons of trash have been removed.

Water Efficient Landscape Classes – A series of "smart gardening" workshops, offered in both English and Spanish, were offered free to teach residents about water wise irrigation equipment and water efficient vegetation. Since the program began in 1992, approximately 1,000 people have participated in such classes.



New website and Water Education Materials - The new website provides users with information to assist market agencies, cities, utility and service area residents and businesses. The website has many state-of-the-art features to enhance our dialogue with the public. Upon request and also via download from the website, educational posters are available in English, Spanish and Chinese. Ed Chavez, Director of the Upper San Gabriel Valley Municipal Water District, recycled water, watershed water pollution and water saving tips. An array of conservation brochures and activity booklets are also available free of charge to the public.



www.usgvmwd.org

Educational Videos – A variety of educational videos are viewable on the website and have been provided to local cities and cable access channels.



Outreach Presentation to City of Industry City Council, Upper District Board Members and management made numerous presentations to City Councils, Chambers of Commerce, service and community organizations. The presentations provided stakeholders with information about the history of the Upper District, local water issues and challenges, recycled water projects, water-related legislation and water conservation programs.



WaterFest 2016 was Popular with Families and Children

WaterFest 2016 – WaterFest 2016– was an outdoor educational event attended by several thousand residents, families and children. Held in spacious, tree-shaded Arcadia County Park, the event featured dozens of interactive educational booths, environmental displays, informative presentations, free water-saving materials, guest speakers, raffles and prize drawings, games, food and refreshments.

think about how important water is to all life. The program has four grade level categories: K-2, 3-5, 6-8 and 9-12. Approximately 2,500 students have participated in the art contest. The art is displayed on our website.



Community Partnering Program

– This program is offered through MWD and provides sponsorships to non-profit community organizations, educational institutions, public agencies and professional

associations for short-term water-related projects, events and activities, especially those with a water conservation focus. Examples include events for community leaders, public officials and stakeholder organizations such as Earth Day, water festivals, informational conferences and workshops. Since the program began in 2002, 29 applicants have received a total of \$194,950 from MWD and \$119,500 from Upper District.

Water Education Grant Program – Upper District sponsors a grant program that offers teachers and/or schools within the Upper District's boundaries up to \$1,000 to fund water-related educational projects. Since the program began in 2004, 36 applicants have been awarded a total of \$33,154.



Solar Cup – Together with the Metropolitan Water District of Southern California, Upper District sponsors teams of local high school students who prepare for months to build and race solar-powered boats at Lake Skinner near Temecula. The students learn about natural resources, alternative and solar energy, water quality and teamwork. The program began in 2003 and Upper District has sponsored 27 teams over the years. Above, a Solar Cup team gets ready to race their boat.

'Water is Life' Art Contest – We partner with local schools to conduct an annual water awareness art contest, inspiring students to

Residential Water Efficiency Rebate Program – The Program assists residents who retrofit certain high water use fixtures/equipment with water efficient devices. Rebate items include: high efficiency clothes washers,



and irrigation controllers, rotating sprinkler nozzles and turf removal. Since 2008, rebates distributed through this program provide a lifetime water savings estimate of more than 1,549 acre-feet (more than 50 million gallons)!

Turf Removal Program – This program offers financial assistance to commercial, industrial and institutional sites for removing turf from large landscape areas. The program began in 2005 and, thus far, participating sites provide a lifetime water savings estimate of more than 712 acre-feet (nearly 232 million gallons)!

Commercial, Industrial and Institutional Rebate Program – This rebate program offers commercial, industrial and institutional facilities rebates for retrofitting a variety of high water-use fixtures/equipment with water efficient devices. Rebate items include: high efficiency toilets, ultra low water urinals, zero water urinals, cooling tower conductivity controllers, cooling tower PH controllers, water brooms, steam

sterilizers, dry vacuum pumps, connectionless food steamers, rotating nozzles for pop-up spray heads, large rotary nozzles, weather-based irrigation controllers, central computer irrigation controllers and ice-making machines. Since 2000, rebates provided through this program produce a lifetime water savings estimate of over 10,083 acre-feet (nearly 3.3 billion gallons)!

Residential High Efficiency Toilet Programs – High Efficiency Toilets are provided for free to qualifying residents. Each HET unit helps save an average of 38 gallons of water per day. Over the years, Upper District has distributed water-saving toilets that conserve close to 22,646 acre-feet (over 7.3 billion gallons)!

Overview

As the San Gabriel Valley transitioned from its agricultural roots following World War II, growth in population and business increased the need for water management systems and infrastructure related to flood control, water supply and water conservation. The timeline on the following page traces the history of water supply management along the San Gabriel River and in the San Gabriel Valley.

At this point of the Tour, we will travel into Angeles National Forest and the San Gabriel Mountains. We will visit the two dams constructed in the 1930s: Morris Dam was built by the City of Pasadena and San Gabriel Dam was built by the Los Angeles County Flood Control District. Both dams are owned and operated by the Los Angeles County Flood Control District. In addition, we will see USG-3, the outlet for water imported from Northern California and the Colorado River by Upper District to supplement our water supplies in the San Gabriel Valley.





Main San Gabriel Basin Watermaster

Main San Gabriel Basin Watermaster is the agency charged with administering adjudicated water rights and managing groundwater resources within the watershed and groundwater basin known as the Main San Gabriel Basin.

Mission Statement

"The Main San Gabriel Basin Watermaster, a nine-person board appointed by the Los Angeles County Superior Court, administers and enforces the provisions of the Judgment which established water rights and the responsibility for efficient management of the quantity and quality of the Basin's ground water."

History

Watermaster was created in 1973 by the California Superior Court of Los Angeles County to administer the Basin's adjudicated water rights and to provide a basin-wide governing body for management of water resources.

Background

Beginning in the 1940s, the San Gabriel Valley experienced a period of rapid urbanization, which led to an increased demand for water drawn from the Main San Gabriel Basin. The ensuing rise in water consumption—along with an extended period of drought—had by the 1950s put the Basin into a state of overdraft, where water production from the Basin exceeded the amount that could be replaced.

As a result of the decrease in available water supply, parties downstream of the Basin became especially concerned. These downstream water users rely on the Main San Gabriel Basin for a large portion of their natural water supply, as much of it comes from the Basin by way of outflow through Whittier Narrows. Legal action was initiated on behalf of the downstream users, resulting in a court decision which requires the Upper Area (Main San Gabriel Basin) users to guarantee a source of water to the Lower Area or downstream users.

For several years the Upper San Gabriel Valley Municipal Water District (Upper District) administered and took responsibility for the Upper Area's obligations to the Lower Area. The Upper District could not, however, assert control over all producers in the Basin because the district boundaries do not encompass the entire Basin. In 1968, at the request of producers, the Upper District filed a complaint that would adjudicate water rights in the Basin and would bring all Basin producers under control of one governing body. The final result was the entry of the Main San Gabriel Basin Judgment in 1973.

Service Area

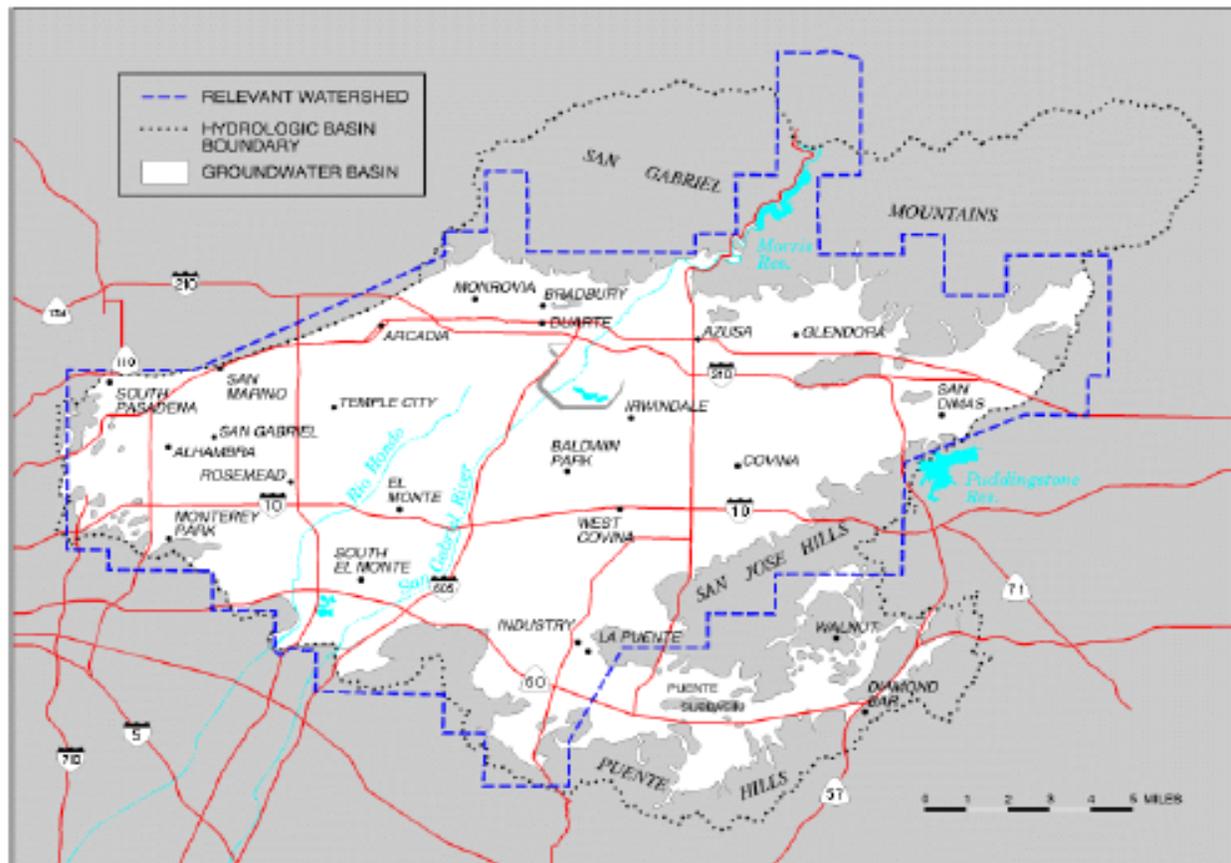
The Main San Gabriel Basin lies in eastern Los Angeles County, California. The hydrologic basin or watershed coincides with a portion of the upper San Gabriel River watershed, and the aquifer or groundwater basin underlies most of the San Gabriel Valley.

The groundwater basin is bounded by the San Gabriel Mountains to the north, San Jose Hills to the east, Puente Hills to the south, and by a series of hills and the Raymond Fault to the west. The watershed is drained by the San Gabriel River and Rio Hondo, a tributary of the Los Angeles River.

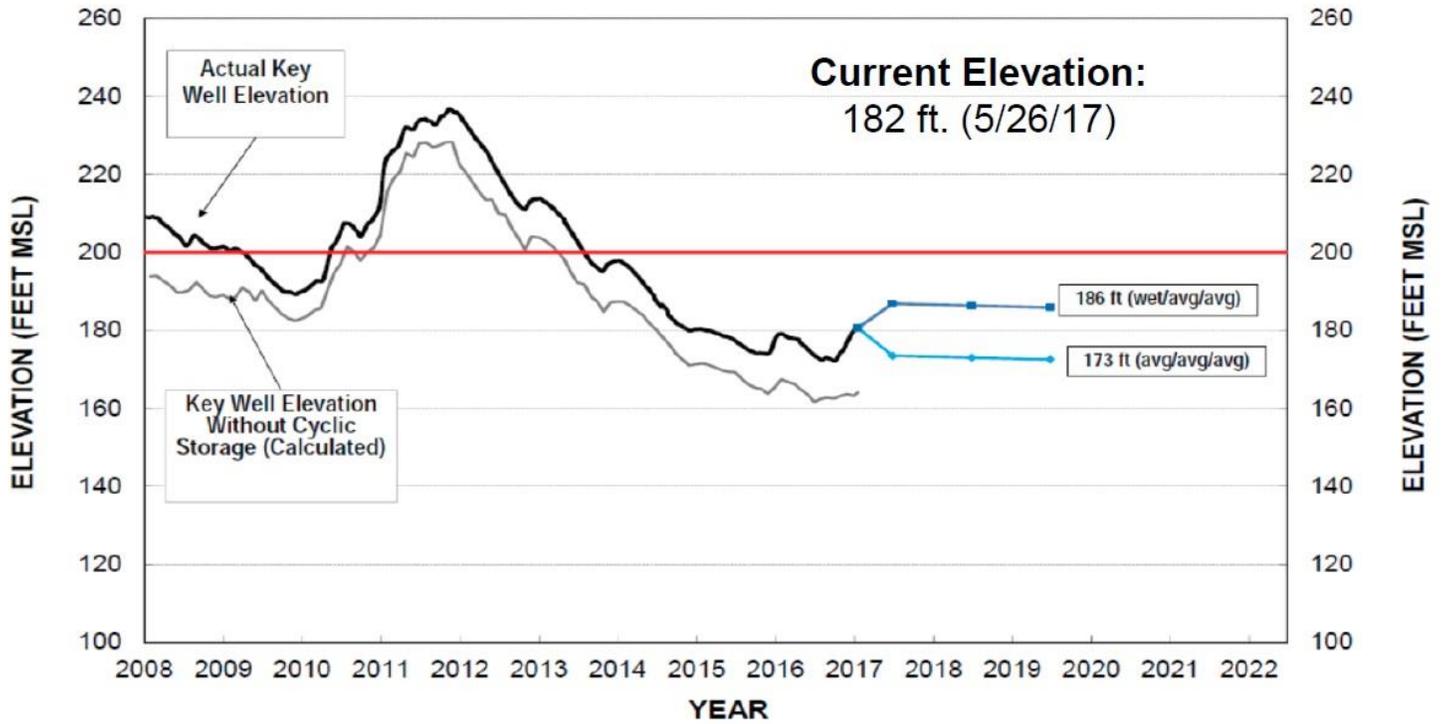
Principal water-bearing formations of the basin are unconsolidated and semi-consolidated sediments which range in size from coarse gravel to fine-grained sands. The major sources of natural recharge are infiltration of rainfall on the valley floor and percolation of runoff from the adjacent mountains. The basin also receives imported water and return flow from applied water.

Surface area of the groundwater basin is approximately 167 square miles. The fresh water storage capacity of the basin is estimated to be about 8.6 million acre-feet.

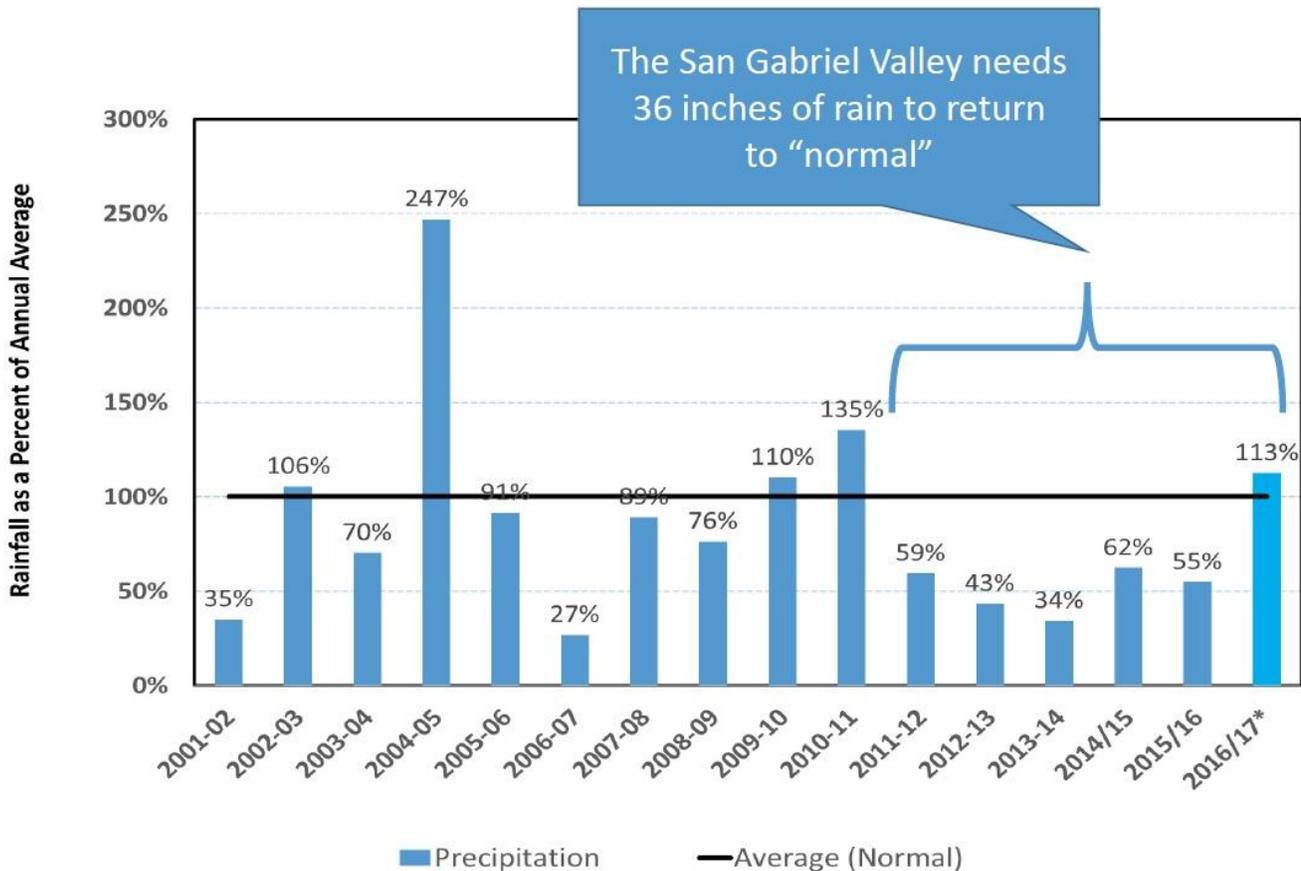
The physical groundwater basin is divided into two main parts, the Main Basin and the Puente Subbasin. The Puente Subbasin, lying in the southeast portion of the map above, is tributary to the Main Basin and hydraulically connected to it, with no barriers to groundwater movement. It is, however, not within the legal jurisdiction of Main San Gabriel Basin Watermaster, and is thus considered a separate entity for management purposes.



FORECASTED BALDWIN PARK KEY WELL ELEVATION (THROUGH JUNE 30, 2019)



Note: Assumes production of 190,000 AF for next three years.





MORRIS DAM

Morris Dam was built in 1934 by the City of Pasadena. Morris Dam is a concrete gravity dam that crosses the San Gabriel River. The dam was built as a water supply facility for the city of Pasadena, but is now mostly utilized for flood control and flow regulation for groundwater recharge. Morris Dam is owned and operated by the Los Angeles County Flood Control District.

The dam impounds the 417-acre Morris Reservoir in the Angeles National Forest, a few miles northeast of Azusa. It is roughly 37 miles upstream of the San Gabriel River's mouth on the Pacific Ocean and 6 miles downstream of the river's beginning at the confluence of its East and West Forks.

Morris Dam's crest is at an elevation of 1,175 feet. The slightly arched Art Deco-style gravity dam is 245 feet high and 800 feet long. Its spillway, located slightly north of the main structure, is a concrete-lined chute controlled by three steel drum gates. The dam was capable of storing 39,300 acre feet of water when first put to use.



Morris Dam was originally slated to be called Pine Canyon Dam, but was renamed for the Chief Engineer of Construction, Samuel Brooks Morris, of the Pasadena Water Department. With the dam envisioned as a private structure for Pasadena, groundbreaking was in April 1932 and construction was completed in May 1934, four months behind schedule. Upon completion, the dam was dedicated by United States President Herbert Hoover.

In 1935, contrary to its original purpose, Morris Dam was sold to the Metropolitan Water District of Southern California (Metropolitan), which owned it through most of the 20th century. The dam was unexpectedly completed in time for the catastrophic Los Angeles Flood of 1938, the most severe flood recorded in Southern California since the Great Flood of 1862. Along with San Gabriel Dam (then still under construction) and Cogswell Dam upstream, Morris Dam greatly reduced the flood peak on the San Gabriel River, saving downstream cities millions of dollars' worth of damages.

Beginning in World War II, Morris Reservoir was used as a naval weapons test facility for the U.S. Navy in conjunction with the California Institute of Technology. A wide variety of weapons, including torpedoes and ballistic missiles, had their trial runs here. Testing continued until the 1990s, when most of the structures at the associated military compound were demolished. However, the concrete foundations remain and are easily seen from State Route 39, which runs past the dam and reservoir. In 1995, Metropolitan sold the dam to the Los Angeles County Flood Control District which continues to own and operate it today.

San Gabriel Dam is an earth fill dam on the San Gabriel River in the San Gabriel Mountains in Los Angeles County, California, within the Angeles National Forest. San Gabriel Dam is owned and operated by the Los Angeles County Flood Control District.

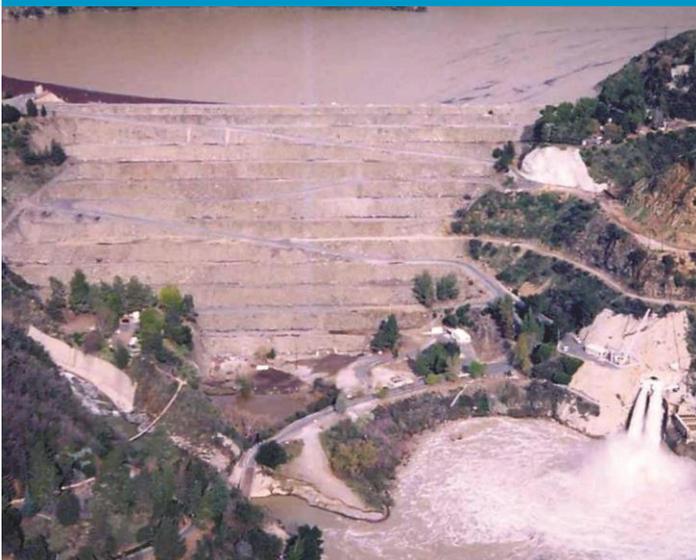
The dam is situated on the main stem of the San Gabriel River about two and a half miles downstream from where the river's East and West forks join together. Its lake, known as the San Gabriel Reservoir, stretches nearly 3 miles upstream at maximum pool, extending up a bit of each fork during floods.

The San Gabriel Reservoir stores 53,344 acre feet of water. The reservoir is long and narrow because of its situation in a steep gorge.

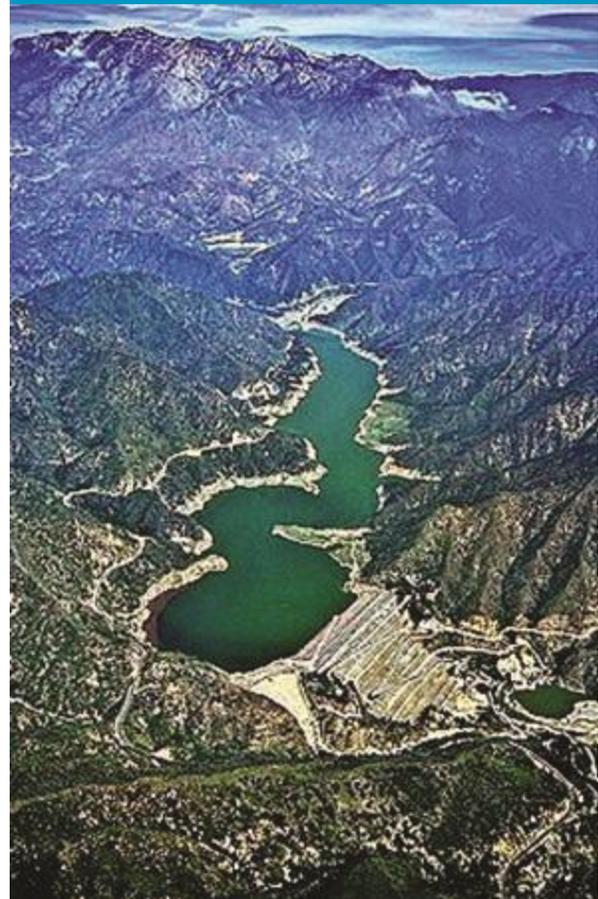
Construction of the 291-foot dam was begun in 1932 and finished in 1939. The dam was built to serve primarily for flood control and thus its reservoir only fills to capacity during wet winters; however, it also supports a 4,975 kilowatt hydroelectric plant. The San Gabriel Dam is operated in conjunction with Morris Dam, which is downstream, and Cogswell Dam, which is located on the West Fork. The San Gabriel Dam is 1,500 feet long and receives water from an area of 202.7 square miles. It is a water supply source in addition to serving flood control, water conservation and hydroelectric power plant functions.

The San Gabriel Dam played an important role in reducing the flood crest of the San Gabriel River in the Los Angeles Flood of 1938, even though it had not yet been completed at the time.

San Gabriel Dam



San Gabriel Reservoir



Overview

Simply stated, Southern California, and the San Gabriel Valley, use more water than Mother Nature provides. Because the demand exceeds the natural supply, Upper District has to look beyond the San Gabriel Valley and beyond current technology and infrastructure for its water supply solutions.

One such solution is water imported from Northern California and/or the Colorado River. Upper District is a member of, and purchases water from, the Metropolitan Water District of Southern California (Metropolitan). Metropolitan imports water from the State Water Project and the Colorado River Aqueduct.

For its 26 member public agencies, Metropolitan provides almost half of the water used by more than 19 million people in Los Angeles, Orange, San Diego, Riverside, San Bernardino and Ventura counties.

Imported water supplies face a number of challenges. First, the recent drought led to limits being placed on the amount of water available through the State Water Project, and growth of neighboring states creates added demand and competition for Colorado River water supplies.

The second challenge involves legal, regulatory and environmental constraints. Protection of the Sacramento Delta Ecosystem and endangered fish species have led to limits on the amount of water available for export.

The third challenge is financial. Imported water is relatively costly compared to other current and emerging water supply solutions due to the cost of transporting water great distances through systems of pipelines, canals/aqueducts and pumps. Extraordinary amounts of electricity are required to convey water from region to region through valleys and over mountain ranges.

At this point in the Tour, we will visit Metropolitan Weymouth Filtration Plant in La Verne, California.

In this section of the Tour Booklet, you will find:

- Information about Metropolitan's Water District of Southern California
- Photos of the Colorado River Aqueduct and Hoover Dam
- Photo of State Water Project/California Aqueduct
- Photo of USG-3
- Photos and information about Weymouth Filtration Plant.



Where Solutions **f low**



Facts About Metropolitan Water District of Southern California (Metropolitan)

Organization

- Authority: Act of California Legislature 1927
- Mission: To provide Metropolitan's service area with adequate and reliable supplies of high-quality water to meet present and future needs in an environmentally and economically responsible way
- Water Sources: Colorado River and Northern California
- Service Area: About 5,200 square miles in Los Angeles, Orange, San Diego, Riverside, San Bernardino and Ventura counties
- Population Served: Approximately 19 million
- Member Agencies: 26

Governance

- Board of Directors: 37. Each member agency is entitled to at least one director; additional directors are based on the agency's assessed valuation.

Facilities

- Colorado River Aqueduct: 242 miles from Lake Havasu to Lake Mathews, Riverside

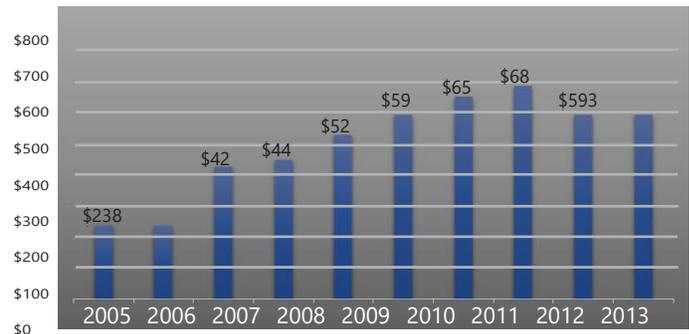
Supply, Deliveries and Sales

- Average Daily Delivery: 6,023 AF
- Diamond Valley Lake: 810,000 acre feet (AF) of storage
- Unit Price: Full-service rates are \$942 per AF for treated water and \$594 per AF for untreated water

Finance and Administration

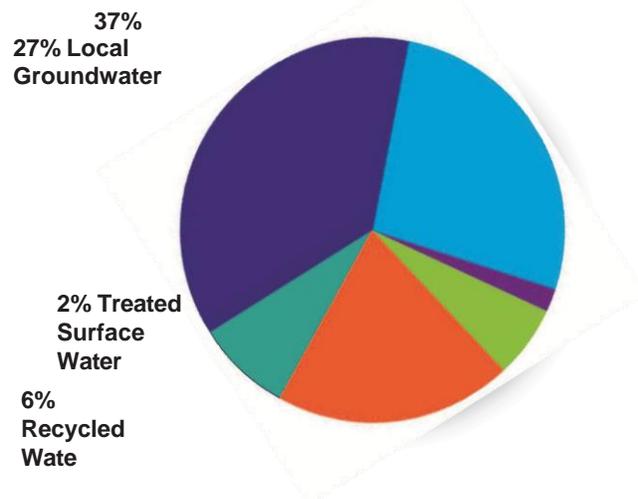
- Budget: July 1, 2010 – June 30, 2011: \$1.64 billion
- Capital Projects: \$259.9 million
- Employees: 1,899 budgeted regular employees
- Fund Sources: Water Sales – Imported, 64%, Capacity Charge Revenue, 1%; Upper District Surcharge, 10%; Upper District Standby Charge, 5%; MWD Gross Standby Charge, 6%; Grant Funding, 3%; Interest and Others, 2%; Reserves, 4%.
- Uses of Funds: Purchased Water Cost-Imported, 70%; Purchased Water Cost – Recycled, 1%; Water O&M Cost Recycled, 1%; Debt Service, 2%; Outside Services, 11%; Labor & Benefits, 7%; WUE Education & Outreach, 3%; Facility and Office Expenses, 2%; Other, 2%

Marginal Cost of Imported MWD Water for Groundwater Replenishment (dollars per acre foot)

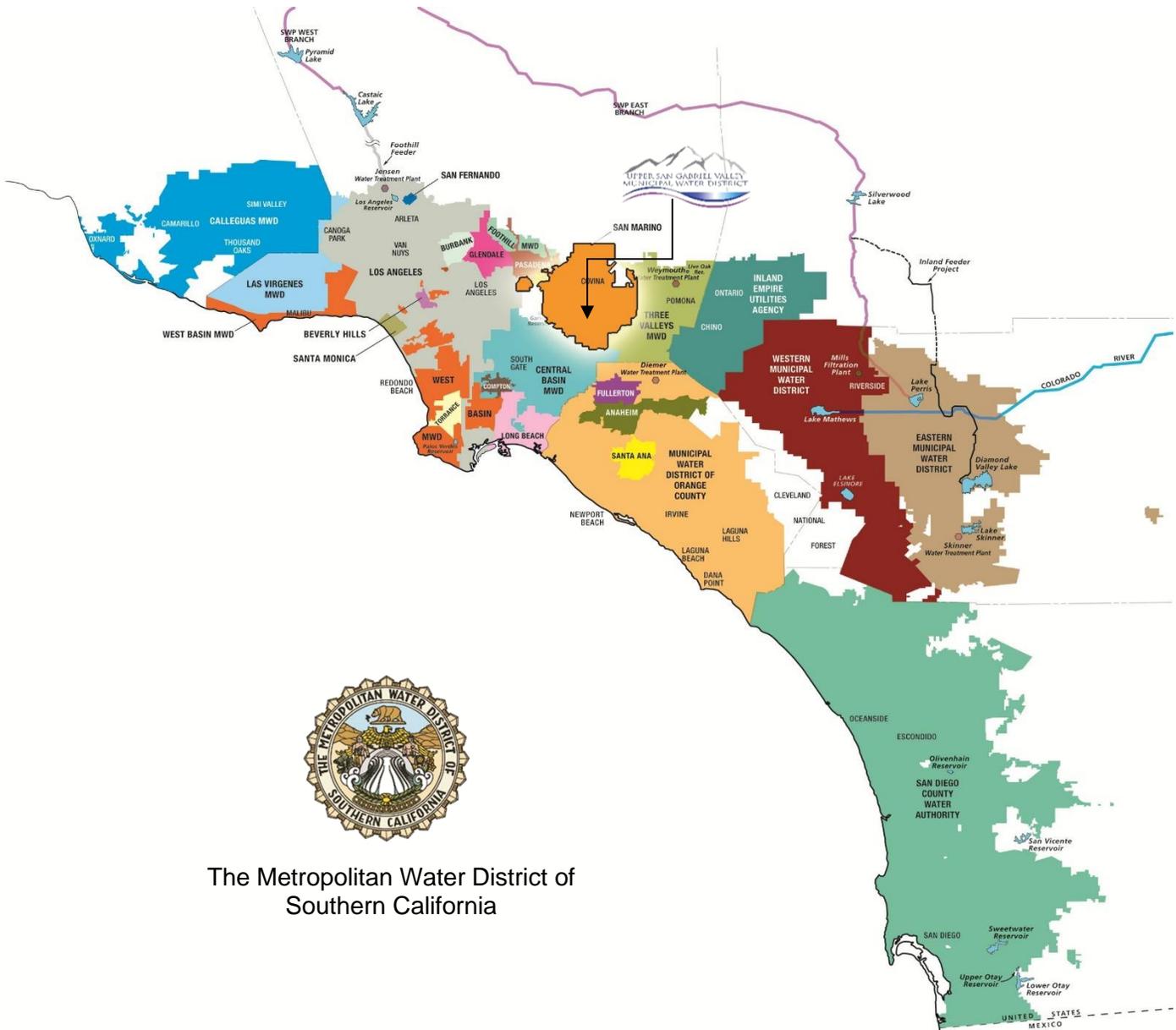


The chart shows the rapid rise in the cost of imported water supplies: 111% increase in Metropolitan's average water rate for Upper District; 211% increase in Upper District's average water rate; and 117% increase in the total average cost of imported water to the Main San Gabriel Basin. The increasing costs were driven by the recent drought and regulatory restrictions that reduced replenishment supplies, rising cost of Metropolitan's services and drought allocation, and Upper District's investments in recycling and conservation programs.

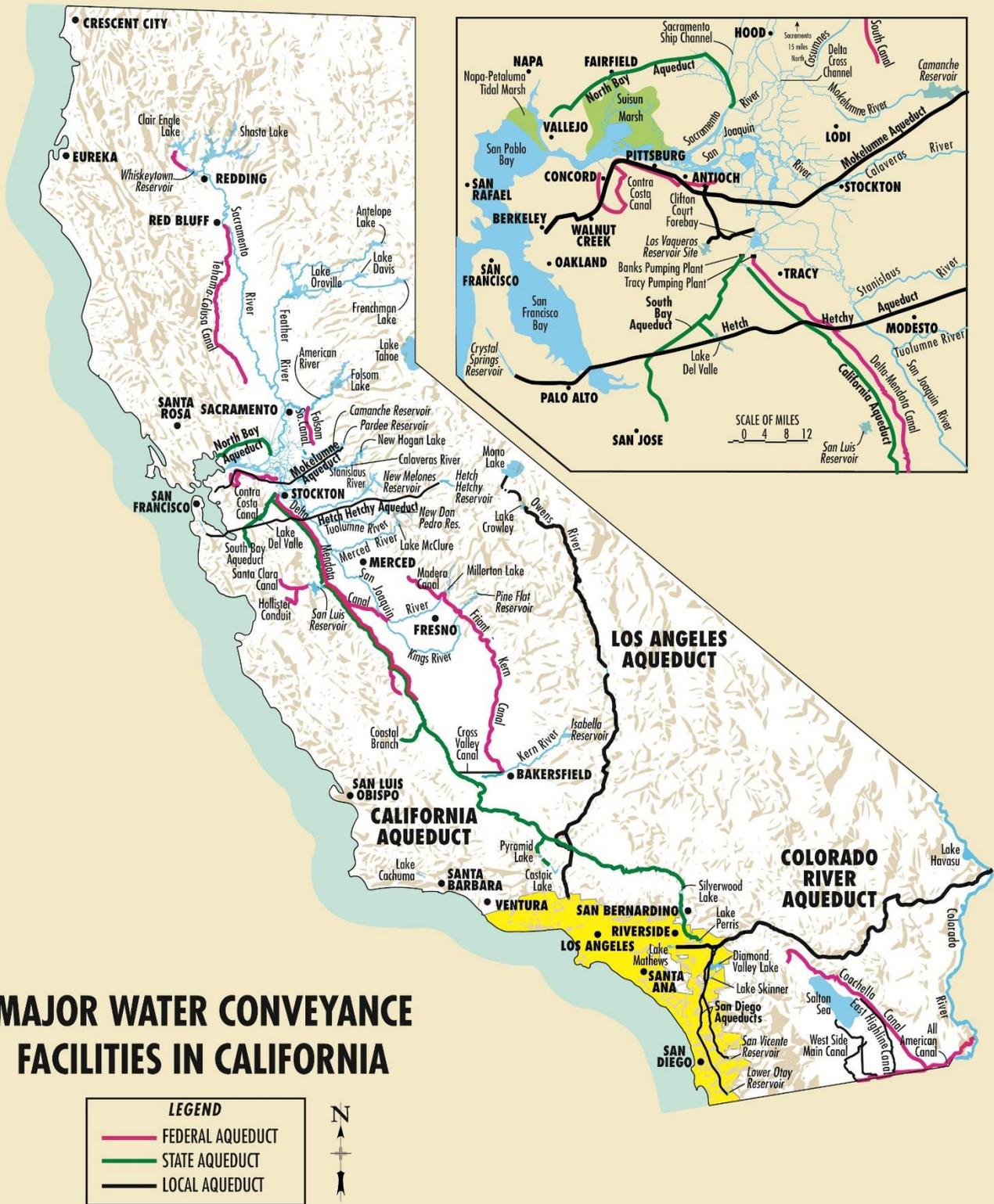
Sources of Water for Southern California (2009)



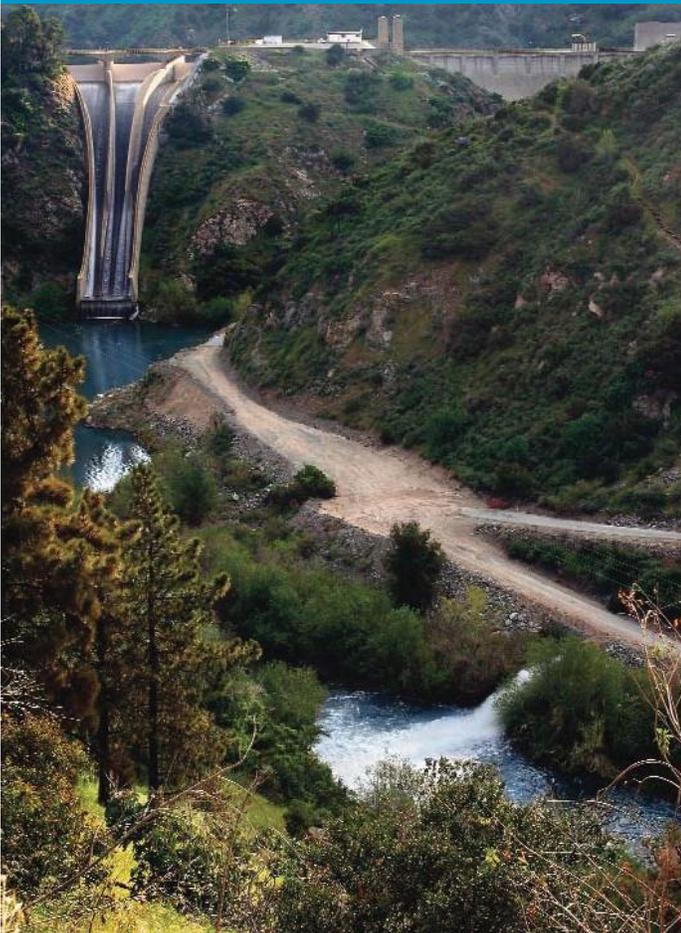
Metropolitan Water District of Southern California Service Area Map



The Metropolitan Water District of Southern California



MORRIS DAM AND USG-
3 OUTLET
(Lower Right of Photo)



Hoover Dam



State Water Project
California Aqueduct



USG-3 is one of Upper District's main connections to the imported water system. Water from Northern California is used to replenish groundwater supplies in the San Gabriel Valley.



Weymouth Treatment Plant



The Weymouth Treatment Plant is one of five filtration plants within the Metropolitan Water District of Southern California's (Metropolitan) system. Weymouth was the first filtration plant built by Metropolitan, and today, largely serves Los Angeles and Orange counties. Completed in 1940, it is noted for its Mission Revival style architecture and features a blue-tiled bell tower, graceful arches, a vivid district seal mosaic and colorful tiles cast with the Native American zigzag sign for water.

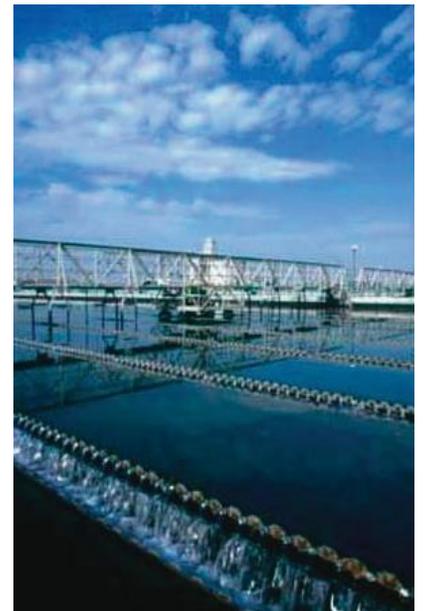
Most of the water filtered through this plant originates in the mountain ranges of seven western states, travels down the Colorado River and flows through Metropolitan's 242-mile Colorado River Aqueduct. To a lesser degree, water supplied to the plant also comes from Northern California rivers and streams that feed the State Water Project's 444-mile California Aqueduct.

One of the largest filtration plants in the United States, Weymouth delivers up to 520 million gallons per day. This means the plant cleans enough water to fill the Rose Bowl every 45 minutes. Though plant operators must adjust large strategically placed valves, automated systems are designed to regulate water levels and pressures. In addition, these systems offer precise monitoring and surveillance capabilities to anticipate demands and respond rapidly to emergency water situations, if necessary.

Conventional filtration is surprisingly simple and effective. The process uses items similar to those found in any home, garden or garage. Upstream grates and screens catch large debris and plants. At the treatment plant, coal and sand are used as filter media to remove any particles left in the water. Then, chlorine and ammonia are used to disinfect the water.

The conventional filtration process includes coagulation. Here, aluminum sulfate and other chemical additives cling to particles in the water. These particles stick together and form large particles called floc. The water and floc particles flow into large sedimentation basins that allow the particles to settle to the bottom.

From the basins, water flows through the coal and sand for filtration. Finally, disinfection kills remaining microorganism to keep the water safe as it travels to the public. Metropolitan water meets or surpasses all state and federal water quality standards.



Overview

Upper District is a leader in developing recycled water projects. Recycled water is abundantly available, cost-effective, safe and not affected by regional water supply shortages or drought conditions. Recycled water is being used extensively throughout California to irrigate golf courses, parks, freeway landscaping and crops. It is also being used to replenish groundwater basins, to serve as a barrier to seawater intrusion and by industry for cooling processes and other purposes.

Recycled water preserves more expensive drinking water, saves money, creates jobs, helps the local economy, protects the ecosystems of the Sacramento Delta and Colorado River, conserves electricity and reduces air pollution.

The Upper District acquires safe, recycled water from the Los Angeles County Sanitation Districts. In addition to the County Sanitation Districts, our partners include the United States Bureau of Reclamation, State Water Resources Control Board and Metropolitan Water District of Southern California (Metropolitan).

The LA County Sanitation Districts' San Jose Creek Water Reclamation Facility, located in North Whittier, treats 100 million gallons of wastewater per day. Approximately 35 million gallons per day of purified water is reused at 17 different reuse sites including groundwater recharge as well as irrigation of parks, schools and greenbelts, with the remainder discharged to the San Gabriel River where it is managed by Los Angeles County Flood Control District for spreading at their spreading grounds.

In this section of the Tour Booklet, you will find descriptions of various projects which currently comprise the Upper District's recycled water program as well as potential future projects.



Where Solutions **f**low



Existing Recycled Water Projects

What Projects
Comprise Upper
District's Recycled
Water Program?

What is Upper District Doing to Increase Local Water Supplies?

In addition to ongoing purchases of imported water and aggressive water conservation efforts, Upper District is a leader in developing recycled water projects. Upper District was named the 2010 "Water Recycling Agency of the Year" by the WaterReuse Foundation.

Recycled water is abundantly available, cost-effective, safe and not affected by regional water supply shortages or drought conditions. It is used extensively throughout California to irrigate golf courses, parks, freeway landscaping and crops. It is also used to replenish groundwater basins, to serve as a barrier to seawater intrusion and to assist various industrial processes.

Recycled water preserves more expensive drinking water, saves money, creates jobs, helps the local economy, protects the ecosystems of the Sacramento Delta and Colorado River, conserves electricity and reduces air pollution.

The Upper District acquires safe, recycled water from the Los Angeles County Sanitation Districts. In addition to the County Sanitation Districts, our partners include the United States Bureau of Reclamation, State Water Resources Control Board and the Metropolitan Water District of Southern California (Metropolitan).

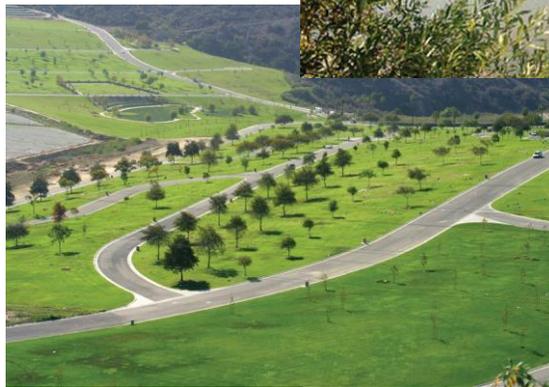


Where Solutions **f**low



Whittier Narrows

Supplies the 2,500 acre Whittier Narrows Recreation Area with over 2 billion gallons of recycled water each year for irrigation at a large Los Angeles County park which includes soccer, baseball and softball fields and Whittier Narrows Golf Course.



Rose Hills Memorial Park

Recycled water is used for irrigation purposes, saving enough drinking water to supply about 2,000 households per year or about 325 million gallons of water. As part of this project, Rio Hondo College, Mill Elementary School and Gateway Pointe Industrial Park are provided with recycled water.



Rosemead Extension

This project consists of recycled water pipelines extending north and west from the Whittier Narrows Recreation Area to supply water for irrigation purposes to several elementary schools, a middle school, Southern California Edison corporate headquarters, Panda Express corporate headquarters and several other facilities in the City of Rosemead.



City of Industry

This project will provide 2.4 billion gallons of recycled water per year for irrigation purposes by extending an existing recycled water pipeline from the City of Industry through Hacienda Heights to West Covina.



South El Monte High School

Recycled water used to irrigate campus green areas and athletic fields will conserve nearly 40 million gallons of drinking water each year, enough to supply about 270 households per year.

Recycled Water Projects During Construction Phase (Direct Use)

Installation of Recycled Water Pipeline



Construction of 2 Million Gallon Storage Tank for photo in upper right.





Future Recycled Water Projects in Upper District Service Area

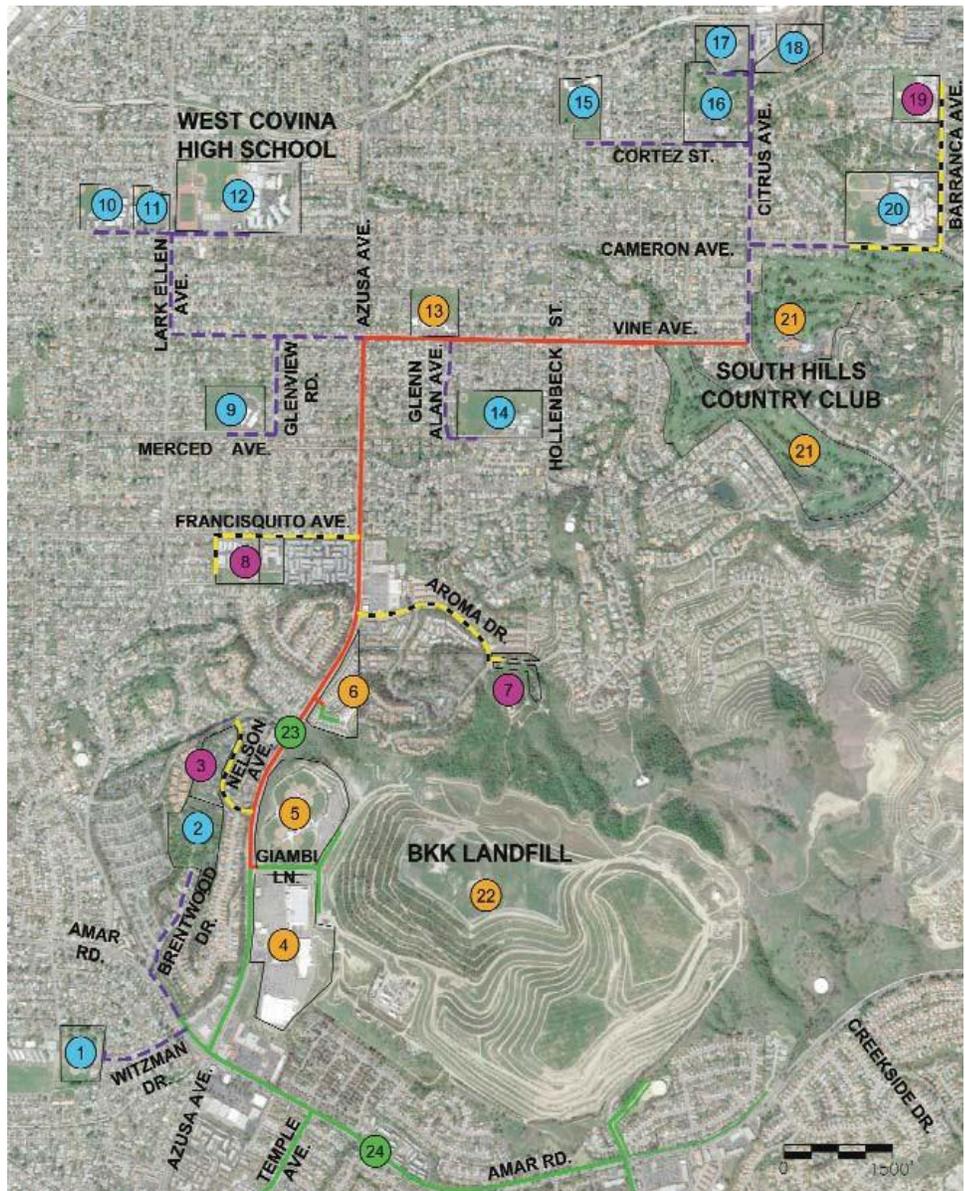
Package 3 and Package 4 Pipeline Extensions for Recycled Water Customers

Package 3

Package 3 consists of approximately 25,000 linear feet (LF) of PVC pipeline. This project consists of expanding the recycled water system in the northern part of the City of West Covina, conveying new pipes ranging from 4 to 12 inches in diameter. The major customers in this expansion will include parks and a number of schools from multiple school districts. Design is currently underway for this package, with construction to begin early 2012. Completion of the project is scheduled mid to late 2012.

Potential Recycled Water Customers

1. Rimgrove Park
2. Woodgrove Park
3. Ridgewood HOA
4. Heights Shopping Center
5. Big League Dreams
6. CP West HOA
7. Galster Park
8. South Hills Academy
9. Merced Elementary
10. Cameron Elementary
11. Cameron Park
12. West Covina High School
13. Vine Elementary
14. Hollencrest Middle School
15. Cortez School
16. Cortez Park
17. Christ Lutheran Pre-School
18. Maverick Field
19. Mesa Elementary
20. South Hills High School
21. South Hills Country Club
22. BKK Landfill
23. Azusa Medians
24. Amar Medians



- EXISTING PIPELINE
- - - PACKAGE 3 PIPELINE
- POTENTIAL FUTURE PIPELINE EXTENSIONS
- PACKAGE 2 CUSTOMER (CONNECTED)
- PACKAGE 2 CUSTOMER (FALL 2011)
- PACKAGE 3 CUSTOMER (SUMMER 2012)
- POTENTIAL FUTURE CUSTOMERS

Recycled Water

Package 4

Package 4 is part of the Direct Use Projects and will provide water to landscape irrigation applications in the Cities of Walnut and West Covina. Package 4 consists of approximately 24,000 (LF) of PVC pipeline ranging from 4 to 12 inches in diameter. The customers identified for this part of the project include schools, greenbelts and parks. Design is currently underway with construction to begin early

2012. Completion of the project is scheduled mid to late 2012.

Potential Recycled Water Customers

- | | |
|------------------------------|---------------------------|
| 1. Creekside Park | 6. Nogales High School |
| 2. Stanley G. Oswald Academy | 7. Giano Intermediate |
| 3. Shadow Oak Park | 8. Villa Corte Elementary |
| 4. Friendship Park | 9. Geingrich Park |
| 5. Hollingworth Elementary | |

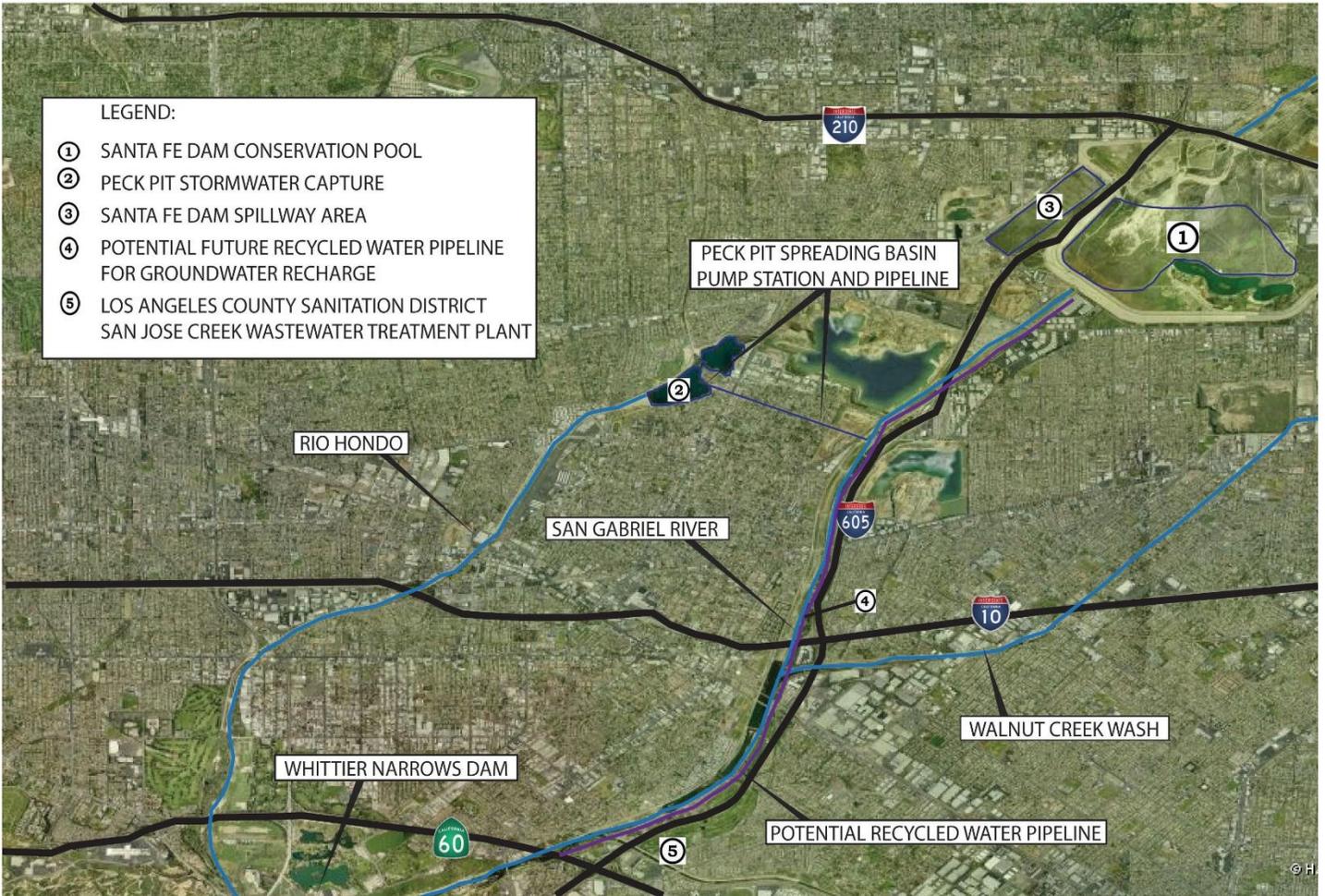
*Customer Already Part of Rowland Water District RW System



- EXISTING USGVMWD PIPELINE
- - - PACKAGE 4 PIPELINE
- EXISTING IRRIGATION METER
- POTENTIAL RW CUSTOMERS
- POTENTIAL RW LANDSCAPING AREAS
- REQUIRED IRRIGATION PUMP (730FT --> 900FT PRESSURE ZONE)



Potential Future Water Supply Projects



Overview

Groundwater Replenishment

Groundwater replenishment involves the replacement of, or addition to, groundwater by a variety of methods. Groundwater replenishment (known as recharge or deep drainage or deep percolation) is a hydrologic process during which water moves downward from surface water to groundwater.

This process usually occurs in the vadose zone below plant roots and is often expressed as a flux to the water table surface. Recharge occurs both naturally (through the water cycle) and anthropologically (i.e., "artificial groundwater recharge"), where rainwater and/or recycled water is routed to the subsurface.

Groundwater is recharged naturally by rain and snow melt and, to a smaller extent, by surface water (rivers and lakes). Recharge may be impeded somewhat by human activities including paving, development, or logging. These activities can result in enhanced surface runoff and reduction in recharge. Use of groundwater, especially for irrigation, may also lower the water table. Groundwater recharge is an important process for sustainable groundwater management.

Artificial groundwater recharge is becoming increasingly important in many countries and regions where over-pumping of groundwater by farmers has led to the depletion of underground water resources.

Recharge can also help move excess salts that accumulate in the root zone to deeper soil layers or into the groundwater system.

Groundwater recharge varies from location to location depending on the infiltration capacity of the surface and the permeability of adjacent geologic material shielding the aquifer.

Stormwater Capture

Decades ago when flood control systems were designed for our Watershed, they were engineered with the dual goals of controlling flooding and conserving water through capture of stormwater. Historically, our Watershed has been able to retain nearly all of its stormwater north of Whittier Narrows Recreation area. Only during large storm events has stormwater flowed through the system to the Pacific Ocean.

Thanks to the efforts of the Los Angeles County Flood Control District, over 95% of the surface runoff in the San Gabriel River Watershed is captured and conserved for use by the San Gabriel Valley.

There is increasing understanding that management of groundwater and surface water as an integrated resource can improve water quality and increase local water supplies. These benefits can be realized through effective stormwater management and Regional Board is working to promote integrated water resource and effective stormwater management projects through planning, permitting and watershed coordination activities. The stormwater discharge permit provide cities the opportunity to work with the Flood Control District and local water districts to implement multi-benefit projects.



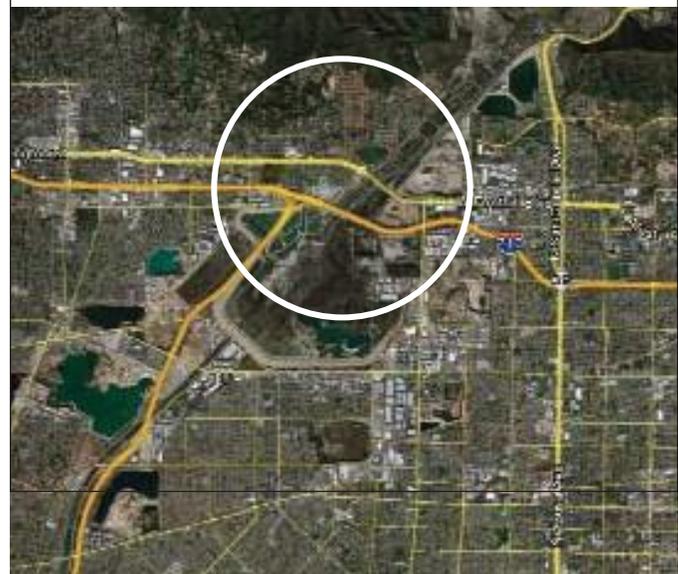


Spreading Grounds Near 210-605 FREEWAY INTERCHANGE



The Santa Fe Spreading Grounds are operated and maintained by the Los Angeles County Flood Control District.

Santa Fe Dam (Within Highlighted Area of Photo)

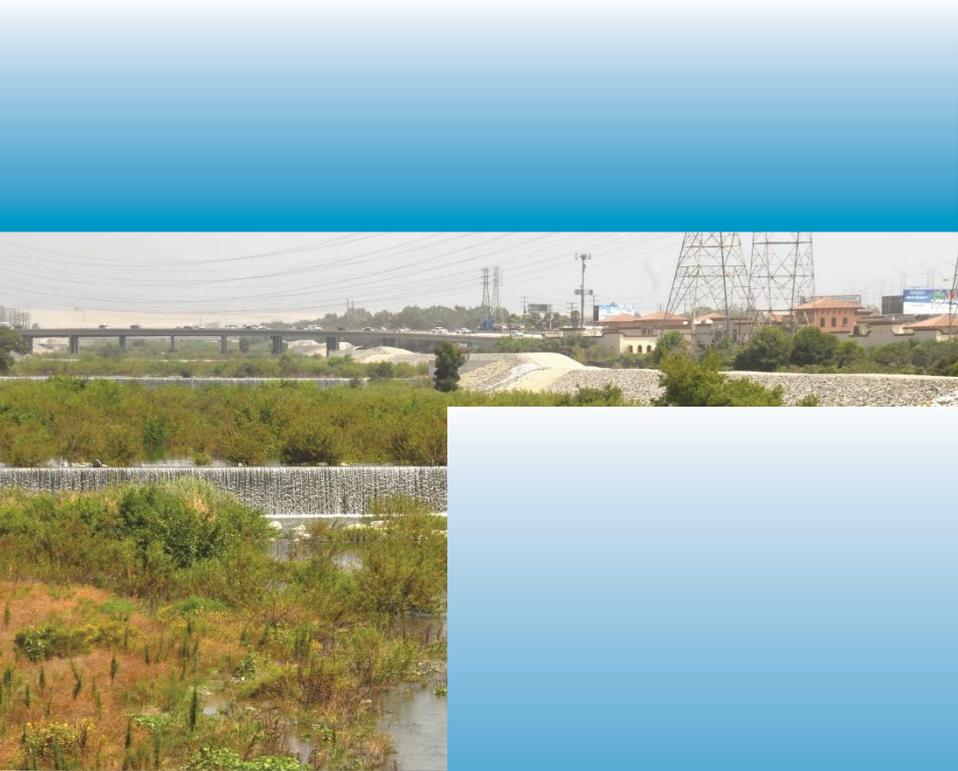


United States Army Corps of Engineers

®

Decades ago when flood control systems were designed for our Watershed, they were engineered with the dual goals of controlling flooding and conserving water through capture of stormwater. Historically, our Watershed has been able to retain nearly all of its stormwater north of Whittier Narrows Recreation area. Only during large storm events has stormwater flowed through the system to the Pacific Ocean. Thanks to the efforts of the Los Angeles County Flood Control District, about 90% of the surface runoff in the San Gabriel River Watershed is captured and conserved for use by the San Gabriel Valley.

While both the Los Angeles River system and the San Gabriel River system are designed for flood protection, the Upper Area of the San Gabriel River was also designed to capture large amounts of stormwater.



(b) Los Angeles Storm Channel



Overview

Water quality is an important public health and water supply issue in the San Gabriel Valley. Not only does water pollution and contamination threaten water supplies, but remediation and clean up is a costly matter for Southern California and the San Gabriel Basin.

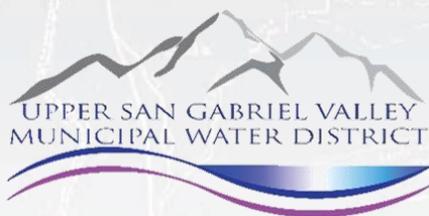
Upper District is a member of the San Gabriel Basin Water Quality Authority which was established by the State Legislature (SB1679) on February 11, 1993 to develop, finance and implement groundwater treatment programs in the San Gabriel Basin.

The seriousness of the groundwater contamination problem became evident when high concentrations of volatile organic compounds ("VOCs") were discovered in Azusa in 1979 near a major industrial complex. Over the next four years, further investigation revealed widespread VOC contamination significantly impacting the San Gabriel Basin.

This discovery led the United States Environmental Protection Agency ("USEPA") to place four portions of the Basin on the National Priorities List under authority of Comprehensive Environmental Response, Compensation, and the Liability Act of 1980 ("CERCLA"), also known as the Superfund program.

Unfortunately in 1997, newly detected contaminants, perchlorate and N-Nitrosodimethylamine ("NDMA") liquid/solid rocket fuel, complicated and delayed progress of cleanup activities.

Since the formation of the WQA, over 30 groundwater treatment facilities have been constructed that operate full-time to remove contaminants from the groundwater supply and to ensure that the highest quality of water is available within the San Gabriel Valley. Over 100,000 pounds of contaminants have been removed so far. The total cost to construct and operate these facilities is estimated to be \$1.2 billion.



Where Solutions **flow**



Typical Contaminated Water Treatment Process at an Operable Unit

First, the contaminated groundwater is pumped out of the water table by means of an **Extraction Well**. Second, the water is sent to the first treatment technology, **Air Stripping** (or **Liquid Phase Granular Activated Carbon**), to remove volatile organic compounds (VOCs) from the water. Third, the water is sent to **Ion Exchange Treatment** process to remove perchlorate. Next, the water is moved on to destroy 1,4-Dioxane and N-Nitrosodimethylamine (NDMA) by means of **Advanced Oxidation Process (AOP)** whereby hydrogen peroxide is injected into the water stream. The final treatment technology is achieved by an **Ultra Violet Light Reactor**.

The water is now ready to be delivered to customers for potable use.

1) Extraction Well



2) Air Stripping





Water Quality Authority



San Gabriel Valley Water Association



Main San Gabriel Basin
WATERMASTER

3) Ion Exchange Treatment



4) Advanced Oxidation Process and Ultra-Violet Light Reactor



Acknowledgments

Upper District appreciates greatly the assistance and photo images provided in the development of this Tour Book by the following organizations:



Main San Gabriel Basin Watermaster



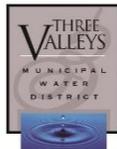
San Gabriel Valley Water Association



San Gabriel Valley Municipal Water District



Three Valleys Municipal Water District



Main San Gabriel Basin Water Quality Authority



Los Angeles County Department of Public Works



Los Angeles County Flood Control District



Los Angeles County Sanitation Department



Metropolitan Water District of Southern California



United States Bureau of Reclamation

United States Army Corps of Engineers

California Department of Water Resources



State Water Resources Control Board



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