

Initial phase of groundwater replenishment system begins operations in Southern California

The state-of-the-art water purification facility in Orange County Water District in Southern California, USA, paves the way for future projects that protect groundwater from saline intrusion, provide drought-proof water supply, and solves wastewater discharge problems.

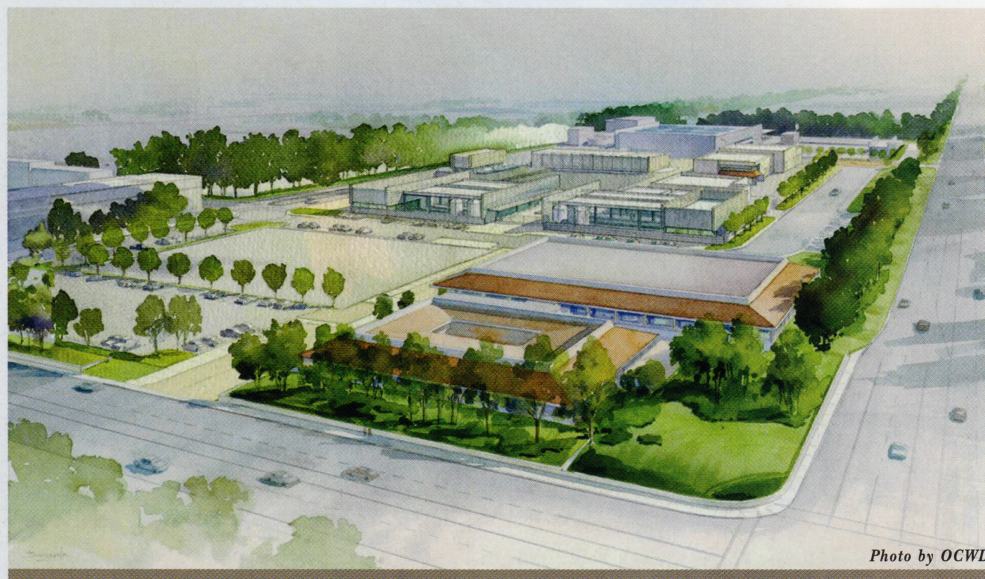


Photo by OCWD

The new Phase One Groundwater Replenishment (GWR) System in California's Orange County Water District (OCWD) now sends five million gallons per day of purified water to the seawater intrusion barrier that keeps the Pacific Ocean out of drinking water supplies in Southern California's Orange County.

The Phase One facility is a smaller-scale version of the Groundwater Replenishment (GWR) System's Advanced Water Purification Facility (AWPF) that is currently under construction and scheduled to begin producing 70 million gallons of water per day in 2007.

Both facilities receive highly treated sewer water that is currently released into the ocean and purify it to better-than-bottled water purity using a redundant state-of-the-art water purification system that includes microfiltration, reverse osmosis and ultraviolet light with hydrogen peroxide. This purified water surpasses state and federal drinking water requirements and is the highest quality available.

"This project is significant to water

Aerial rendering of the Orange County Water District (OCWD) site when the Groundwater Replenishment (GWR) System is complete in 2007

management professionals throughout the world," said Denis Bilodeau, president of the Orange County Water District. "The GWR System is the first water purification system of its kind to deploy a membrane-based technology with this combination of processes, and it represents a valuable model for regions across the globe facing similar combinations of population and climate pressures as California."

will provide a reliable, drought-proof source of water for Orange County, and serve as an alternative to discharging wastewater to the ocean, solving several community problems with one project.

Orange County is located in an arid region, and is currently in the midst of a prolonged drought affecting the entire western United States. Future water supplies are being challenged because of limited water supplies and other environmental and political factors. The GWR System provides a new, locally controlled, high-quality supply of water to recharge the groundwater basin and reduce the severity of drought impacts on Orange County.

The project will represent a major contribution to satisfying the demands on agency water resources, expected to grow from the current 505,000 acre-feet per year to 605,000 acre-feet per year by 2020. More than half of the area's water supply for 23 northern and central Orange County communities is drawn from groundwater aquifers, with the remainder imported from the Colorado River and California's State Water Project.

Half of the water from the GWR System will be injected into Orange

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Denis Bilodeau, Orange County Water District

The GWR System, a joint project of OCWD and Orange County Sanitation District (OCS), will serve three key functions when fully operational. It will produce purified water that will be injected into a seawater barrier to prevent ocean water from contaminating Orange County's groundwater basin. In addition, the GWR System

County's seawater barrier through 36 injection wells when the system is completed and operational. The remaining water will be piped to spreading basins in Anaheim, California, where the water will take the natural path of rainwater as it filters through clay, sand and rock to the groundwater aquifer. This new source

for groundwater recharge is estimated to meet the needs of 140,000 families.

The GWR System will help meet the long-range water supply plan developed by Metropolitan Water District of Southern California, the water import agency for Southern California, to maintain and improve regional water supplies.

"It's safe to label the Groundwater Replenishment System a win-win project for the water and wastewater industries," OCSD General Manager Blake Anderson said. "It's environmentally beneficial because it improves water quality and drought mitigation, saves energy over importing water from Northern California, and because it reduces the need for imported water from Northern California, it lessens the strain on the ecosystem of the San Francisco-San Joaquin Bay Delta. In addition, without this project, OCSD would have to build another ocean outfall to handle increased flows to the ocean," he added.

This project continues a legacy of successful partnership between the OCWD and OCSD on a major water project. For more than 25 years, the agencies have reclaimed clean, pure drinking water from highly treated wastewater at Water Factory 21, a water purification facility built to provide a barrier against seawater intrusion into Orange County's vast groundwater basin.

Until this year, Water Factory 21, one

of the nation's pioneer water purification facilities, produced water for the seawater barrier. Foreign dignitaries from many countries visited the facility to learn about the advanced water purification technology. Now, with the Phase One producing water for the seawater barrier, Water Factory 21 was demolished this summer to make room for the new GWR System.

The shut down of Water Factory 21 has been one of many milestones OCWD and OCSD have reached during development of the US\$ 486.9 million GWR System. A decade of research, comprehensive testing and evaluation at Water Factory 21 by OCWD and OCSD engineers preceded the start of GWR System construction in early 2003.

of construction occurring across several cities that affect numerous communities. "Our communications team designed a proactive, bilingual outreach program including monthly progress reports to community leaders, letters to neighbourhoods affected by construction, and face-to-face talks with many groups," said Grebbien. "We've also held neighbourhood gatherings in the heart of the communities affected by our construction, and OCWD communications team members continually go door-to-door in the affected neighbourhoods to provide information on the project and answer any questions our neighbours may have...we want to inform our neighbours and build support for this visionary water project."

Informing neighbours about the need

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Blake Anderson, OCSD

In addition to the water purification facility, projects currently under construction include a 13-mile pipeline, and the injection and monitoring wells for the expansion of the existing seawater barrier. These projects – scheduled for completion in phases according to a master plan – are among several stages of the GWR System that collectively make up the complex project.

"We're not just building a new water purification plant, we're deploying technologies, like microfiltration, that require new skill sets from our engineers and staff," said OCWD General Manager Virginia Grebbien.

Adapting to the new combination of the technologies and the scale of the project employed in the GWR System and managing the construction of the state-of-the-art project has required significant effort on the part of OCWD.

"One significant challenge is managing, in essence, close to US\$ 350 million in construction contracts concurrently with up to six different general contractors that are working in six cities simultaneously as well as the OCWD and OCSD campus, which is bordered on three sides by residents," said Mike Markus, GWR System program manager. "We try our best to consider our neighbours when we build noise and dust mitigation measures into our contracts, as well as landscape beautification projects," said Markus.

Keeping the public informed as the project advances has become a vital piece of the plan given the huge amount

for the project and construction activities has helped build goodwill and acceptance of the potential inconveniences associated with a major construction project.

The two agencies have worked hard to reduce the cost of this project to ratepayers. Recently, the Metropolitan Water District of Southern California awarded the GWR System an US\$ 86 million subsidy, which will help reduce the cost of producing water. The financial incentives lower the cost of GWR System water to US\$ 476 per acre-foot, which is less than the expected cost of imported water in 2007.

Partial funding for the GWR System comes from US\$ 92.5 million in federal and state grants. Grants include a US\$ 30 million contribution from the California Department of Water Resources (DWR) from Proposition 13 funds, US\$ 37 million from the State Water Resources Control Board and US\$ 20 million from the federal government. The GWR System grant represented the single largest DWR award from Groundwater Storage Program funds available statewide. The GWR System has also received a US\$ 700,000 grant from the California Energy Commission because the cost to produce water locally requires half as much energy as importing to Orange County from Northern California.

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Author's Note

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Section of the 13-mile GWR System pipeline under construction between Fountain Valley and Anaheim, California



Photo credit to OCWD