



**F**uture water resources will be challenged by political and environmental limitations, continued growth, and the need to develop new water supplies. Water experts are encouraging more water reuse and more efficient use of the water currently available. Orange County's groundwater basin needs to be refilled and maintaining the groundwater basin water reserve is critical because it provides reliable supplies for the most developed portion of the county.

California's water supply from the Colorado River will be reduced by 2016. A five-year drought has negatively impacted the Santa Ana and Colorado Rivers. The future water picture is complicated by the fact that Orange County's population is expected to increase by 300,000 to 500,000 people by 2020, Southern California's by seven million and the state's by some 15 million.

After years of evaluating numerous options to solve several community problems related to water, Orange County Water District (OCWD) and Orange County Sanitation District (OCSD) chose to partner together and focus their efforts on an advanced water purification project known as the Groundwater Replenishment (GWR) System. When completed, the GWR System will provide a new reliable, high-quality water supply for north and central Orange County; eliminate any immediate need for another ocean outfall pipe for wastewater; diversify local water supplies; and over time, help lower the mineral content in our groundwater basin.

After both outside and internal evaluations, the agencies concluded that the GWR System, which will purify highly treated sewer water through one of the world's most advanced water purification systems, is the most cost-effective option to address all of these community challenges.

### **Project Financing for Construction**

To build the GWR System in a financially responsible manner, OCWD and OCSD are equally sharing the \$486.9 million cost of capital construction. Once the GWR System is operational, OCWD will assume the costs of operating and maintaining the project. Funding for construction will come from a variety of sources including low-interest state loans and grants.

Grants play a key role. To date, grants totaling \$92.5 million have been secured to help offset construction costs. They include \$37 million from the State Water Bond (Proposition 13) approved by California voters in 2000, \$30 million from the California Department of Water Resources, \$20 million from the Bureau of Reclamation, \$5 million from the State Water Resources Control Board and \$500,000 from the Environmental Protection Agency. The California Energy Commission has also provided grant funding during the project design phase and the Metropolitan Water District of Southern California (MWD) will provide funds to subsidize the operating cost when the GWR System begins producing water in 2007.

Following is a summary of the capital construction costs.

### Estimated Capital Costs

Construction Contracts	Estimated Project Costs (in millions)
Advanced Water Purification Facilities – microfiltration, reverse osmosis, ultraviolet light and hydrogen peroxide disinfection	\$305.3
13-mile pipeline running from Fountain Valley to Anaheim	\$64.2
Barrier Facilities	\$17.1
GWR System Phase One facility	\$20.6
Integrated information system, wells, workshops, insurance	\$16.9
Design	\$30.9
Construction management	\$13.8
Administration	\$15.6
Program contingency	\$2.5
<b>Total</b>	<b>\$486.9 million</b>

### 23-Year Grant for Operations and Maintenance

Once the GWR System starts producing purified water in 2007, OCWD will assume financial responsibility for the ongoing operation and maintenance of the system. The annual operating and maintenance costs are estimated at \$26.7 million.

To help offset operation and maintenance costs, in April 2004, the Metropolitan Water District of Southern California awarded OCWD financial incentives of up to \$3.8 million per year for the GWR System over a period of 23 years. The annual payments will begin when the GWR System starts producing purified water in 2007.

### Annual Operations and Maintenance Estimate Summary

Item	Costs Estimated for 2007 (in millions)
Power (estimate of \$0.10 per kilowatt hour)	\$11.5
Contract maintenance	\$0.4
Chemicals	\$5.4
Plant refurbishment	\$1.2
Membrane replacement	\$2.8
Ultraviolet lamp replacement	\$0.3
Compliance monitoring	\$1.5
Labor	\$3.6
<b>Subtotal</b>	<b>\$26.7 million</b>
MWD Local Resources Program Subsidy	\$3.8
<b>Total</b>	<b>\$22.9 million per year</b>

The MWD funding will significantly lower the future cost of water for ratepayers over the 23-year period. MWD chose to award the financial incentives to the GWR System because it will create a new source of water, enough for 144,000 families annually, and help ensure future regional water supply reliability.

## **Comparing Cost of GWR System**

From the start of the project, both agencies recognized that the cost of GWR System water must be competitive with other water alternatives including imported water and desalination to make the project feasible.

The GWR System will produce high-quality water by purifying wastewater for approximately \$476 an acre-foot. The cost of GWR System water is less than the cost of treated imported water and will be the highest quality, drought-proof and reliable source of water available. Imported water supplies, especially untreated or raw water supplies, can be interruptible and available for purchase only when a surplus exists.

Desalinated water costs range from \$800 to \$2,000 an acre-foot to produce depending on where it is produced around the world. Still, desalination will need to be considered in our future water mix, especially in locations where there are no groundwater basins. The desalinated water could act as a reliable backup source. In south Orange County and other California areas, several ocean desalting projects are planned.

The GWR System and desalination efforts ideally will complement each other. The reality is that Orange County's water future is not in the hands of one project or one technology. It will require a combination of many local and regional projects, with efforts by all water agencies in Orange County and Southern California to meet future water needs as the demand for water continues to grow.

## **Cost-Benefit Analysis**

A cost-benefit analysis of the GWR System, conducted by the Public Resources Advisory Group, examined the financial impacts and benefits of moving forward with the GWR System. It also looked at the cost of alternatives to meet growing water demands if the GWR System were not implemented. Alternatives included building a new ocean outfall pipe and increasing purchases of imported water, or repairing and expanding Water Factory 21, the aging water purification plant that had been producing water to maintain the seawater barrier for more than 25 years.

Most notably, the study found that the GWR System produced greater benefits for its cost than the alternatives. In addition, the GWR System will produce high-quality water using 50 percent less energy than importing water from Northern California does, resulting in additional cost and energy savings.

The benefits of the GWR System also extend to the sanitation district. OCSD benefits by investing \$198 million in the purification of water, rather than building a second ocean outfall pipe to dispose of wastewater. Moreover, a new ocean outfall pipe would take many years to plan, design and build and could have difficulty gaining environmental acceptance.

## Conclusion

Research commissioned by OCWD shows that Orange County residents desire, and are willing to pay more for, a safe, reliable high-quality source of water. All sources of water (local and imported) will cost more in the future. However, the GWR System will provide less expensive water than imported water, and will provide Orange County with a drought-proof, reliable, and locally controlled supply of water.

The boards of directors for both districts have committed to building the GWR System because it is the most cost-effective new source of water to meet future water challenges.

### How the System Works

The Groundwater Replenishment System, a joint project of Orange County Water District and Orange County Sanitation District, will use state-of-the-art technologies to produce water of near-distilled quality that meets or exceeds all state and federal drinking water standards.

The GWR System takes highly treated sewer water and purifies it using a state-of-the-art, three-step process – the same technology used to purify baby food, fruit juices, medicines, and bottled water.

Once purified by the three-step process – microfiltration, reverse osmosis, and ultraviolet light and hydrogen peroxide – roughly half of the water from the GWR System will be injected into Orange County's seawater barrier. The seawater barrier is an underground pressure ridge of water formed by injection wells along the coast of Orange County.

The remaining water will be piped to recharge lakes in Anaheim, California, where the water will take the natural path of rainwater as it filters through clay, sand and rock to the deep aquifers of the groundwater basin.

Once in the basin, the purified water will blend with other sources of groundwater from the Santa Ana River, Northern California and the Colorado River.