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## This Reclaimed Wastewater Lake is the Center of a Community

By Doug Day | Sustainable Operations | April 2017 | Appeared in print as "That Extra Measure"

**Treated reclaimed water fills popular man-made recreation lake and protects the drinking water supply in drought-stricken California.**

People around Lake Mission Viejo in California now fish, swim and water ski in treated reclaimed wastewater. It comes from the Advanced Purified Water Project, a \$5.4 million facility built to end the use of scarce drinking water to fill the 124-acre man-made lake.

The 0.6 mgd plant opened in October 2016 and will replace about 500,000 gallons lost daily to evaporation from the lake, whose only natural water source is rain. When not needed for the lake, the purified water will be added to the Santa Margarita Water District's reclaimed water system.

### **Saving potable water**

The privately owned reservoir serves more than 35,000 members of the Lake Association homeowners group that encompasses the city of Mission Viejo. Members pay an annual fee for access to the lake, built in the mid-1970s.

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"The lake was the centerpiece of this master-planned community," says Don Bunts, water district deputy general manager. "A major drought was occurring then, and Gov. Jerry Brown was adamant that no potable water would be used to fill the lake." It was eventually filled from a variety of sources, and after the drought lifted, drinking water was used to keep it full.

"Gov. Brown is now in office for a second time and we're in a drought," says Bunts. "The governor has again identified specifically that this was not a good use of a very valuable and limited resource."

### **Comprehensive treatment**

The purification plant draws reclaimed water from the district's three wastewater treatment plants and first puts it through a microfiltration system (Wigen Water Technologies) to remove suspended solids, bacteria and most viruses. A reverse osmosis system (Wigen) removes minerals,

dissolved chemicals, viruses and other impurities. The water is then UV disinfected.

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"There's a variety of chemical additions we're making," says Bunts. "That's basically to balance out the pH after the RO process so it's not such an aggressive water. We add ferric chloride at the front end to take out some of the phosphorus and nitrogen. We're also going to add ion exchange for nitrate removal. If we have excursions from what the Lake Association feels are acceptable values, we can divert the flow through ion exchange so we're not creating a nutrient-rich environment for algae blooms."

District engineers designed the plant to provide up to 600 acre-feet per year, but it's only needed when the lake level diminishes from evaporation. When not used to replenish the lake, the purified water goes back to the district's growing reclaimed water system, which provides nearly 100 million gallons a year for local irrigation.

“If and when some other users want that higher-quality water, we would make it available,” says Bunts. “It doesn’t now make sense to build 2 miles of pipe. It isn’t cost-effective at this juncture.”

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## Pushing innovation

Unlike reclaimed water that is distributed in purple pipes and includes warning labels, the lake has only advisory signs. “To err on the conservative side, be transparent, and make sure everyone’s aware of it, we have posted signs so that people know that we are using advanced purified water to fill the lake,” says Bunts.

The plant was built by W.M Lyles Construction and completed in only eight months after project approval. Bunts credits the district board for its progressive approach. “All along, even before this project, they are always open and even pushing the staff to develop innovative ways to address our water-supply issues,” Bunts says.

“Outside of recycled water, we are 100 percent dependent on imported water. They understand the significance of securing additional supplies, because of drought and, more important, the potential for an earthquake or some other calamity that could sever our supply from northern California or the Colorado River. By developing local sources, we build reliability for our customers.”

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## Strong support

Knowing that people have some reticence about reclaimed or recycled water, the homeowners association educated its members about the plans and the process to be used. The vote of the plan was unanimous with 91 percent of the eligible members participating. “It’s a testament that people are becoming more comfortable with the idea of recycled water and understand the technology and realities of the water situation here,” says Bunts.

The next question was paying for it. “The district serves a much greater area than just the city of Mission Viejo and the lake,” Bunts says. “We didn’t feel it was appropriate for the rest of our ratepayers to pay for this project. The Lake Association opted to guarantee payment of all of the capital costs over 25 years and pay any additional costs for the treatment.”

The city also provided a grant of \$1 million along with a \$3 million low-interest loan to be paid off over 20 years at 2.5 percent interest. In exchange, the city will receive enough recycled water to irrigate about 80 percent of its parks and medians for 25 years at a discounted price.

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The purified water is more expensive than drinking water from the State Water Project and the Colorado River Aqueduct — about \$1,600 per acre-foot versus \$950. “Once we pay off the capital cost, it will be less expensive,” notes Bunts. “And we can control the variables we can’t control with our wholesale drinking water retailer, so we feel long-term that we’ll be able to keep the costs lower than for potable water.”

## Sign of things to come

Because of the drought and general scarcity of drinking water, California is a leader in reuse and recycling. The Mission Viejo project is an example of the possibilities. “Every use may not need the same level of treatment or the same process, but providing boutique or designer water is the future. It increases the ability to use recycled water in other applications,” Bunts says.

He cites examples that include wider use in cooling towers. Reclaimed water is already popular with golf courses, but some may want further treatment. “In one location here, they’re looking at putting in a small plant just to water the greens,” Bunts says. “You can use the better-quality water on the more delicate grass.”

California is also looking at pilot projects to test other processes for direct and indirect potable reuse to help preserve its drinking water supplies.

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