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Reclaiming Water

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The reclaimed water plant at Martin Way.

Reclaiming Water

Washington reclamation program preserves and conserves water resources.

By Karla Fowler, LOTT Wastewater Alliance, and Matt Kuzma, Siemens Water Technologies

While growing in popularity, water reclamation is still relatively new in the Pacific Northwest. But more area communities are now using reclaimed water for irrigation, commercial processes, decorative fountains or ponds, pressure washing, dust control, toilet flushing, groundwater recharge, or stream flow and wetland enhancement.

As the landlocked Budd Inlet Treatment Plant in downtown Olympia, Wash., neared capacity and faced marine discharge restrictions, four government partners started pondering alternatives for meeting future wastewater treatment needs. The LOTT Alliance, which is governed by a board of elected officials representing each of the partner jurisdictions – the cities of Lacey, Olympia and Tumwater, and Thurston County – developed a long-range plan with reclaimed water at its core. Strong public opinion influenced the alliance's decision to start treating wastewater to a high enough quality that it could be put to beneficial use. The plan envisioned a system of three small satellite reclaimed water plants.

Martin Way

Construction on the first satellite, the 2-MGD Martin Way Reclaimed Water Plant, began in 2004, with the plant coming online in summer 2006.

The facility generates reclaimed wastewater that meets Class A reclaimed water standards approved by the Washington State Departments of Health and Ecology. To limit operations and equipment requirements at the reclamation plant, solids are returned to the sewer system for treatment at the main

Budd Inlet Treatment Plant.

Located on a major thoroughfare in Lacey, the facility had to fit into a small footprint, visually blend into the commercial and light industrial neighborhood, and not generate odors.

MBR technology

The facility used a core membrane bioreactor (MBR) from Siemens Water Technologies. According to Eric Hielema, the alliance's project manager for the Martin Way project, his group considered several membrane manufacturers during the design process.

In the MBR process, wastewater is screened before entering the tank where the biological treatment process takes place. Aeration within the aerobic reactor zone provides oxygen for the biological respiration and maintains solids in suspension. To retain the active biomass in the process, the MBR relies on submerged membranes rather than clarifiers, eliminating sludge settleability issues. This allows the biological process to operate at long sludge ages (typically 12 to 30 days) and increased mixed liquor suspended solids (MLSS) concentrations (typically 8,000-10,000 mg/l).

> **Area communities are now using reclaimed water for irrigation, commercial processes, decorative fountains or ponds, pressure washing, dust control, toilet flushing, groundwater recharge, or stream flow and wetland enhancement.**

High MLSS concentrations were beneficial to the process, fostering stable operation, complete nitrification, and reduced biosolids production, reducing biological volume requirements (and associated footprint) to only 20 to 30 percent of conventional biological processes. Further, the membrane tanks provided space-efficient solids separation and did not require a clarifier in the system.

The submerged microfiltration membranes were located in a separated membrane tank and consisted of polymeric hollow fibers. These hollow fibers were bound together in modules, using a unique dual-potting system. By applying a low vacuum to the inside of the hollow fibers, the fully oxidized and nitrified water could be filtered through the membranes. Meanwhile, mixed liquor and air would be pumped continuously into each membrane module fiber bundle. The resulting cross-flow continuously would scour the membrane surface, preventing solids buildup.

Reclaimed water can be used for tasks such as washing the steps of the Capitol Building.

Shown above are the membrane modules installed in the treatment tank.

Reuse applications

From the Martin Way facility, the reclaimed water travels through a 3.5-mile pipeline to the alliance's Hawks Prairie Ponds/Recharge Basins, a series of wetland ponds and groundwater recharge basins designed into an attractive, park-like setting.

Water from the constructed wetland ponds flows to the rectangular groundwater recharge

basins. From there, the water percolates through the soil to a shallow underground aquifer. Some of the 1-acre recharge cells will be rested and rehabilitated while others are in operation. No more than half the cells will be in use at any one time.

Water utilities in Lacey and Olympia plan to purvey the alliance's reclaimed water to end-users. The cities will be able to tap into the alliance's main pipeline to get water for their own or customer uses.

"By using reclaimed water for these purposes, our citizens can help save hundreds of millions of gallons of drinking-quality water each year," said Hielema. "The jurisdictions in Thurston County face many challenges supplying drinking water to their growing communities. These issues are the result of a lack of legal availability of water due to competing needs for regional water resources. The use of reclaimed water will ease some of the pressures on local water utilities."

The membrane modules allow the water to be reclaimed for additional uses.

Future expansion

The Martin Way plant is part of the alliance's 20-year wastewater resource management plan that includes expanding reuse capacity by an additional two sites for similar satellite plants to produce local reuse water. As with Martin Way, each satellite will be built to treat at least 1 MGD, with a future expansion capacity.

Constructing the satellites in small increments should allow for timely construction to meet the region's future wastewater treatment capacity needs. Building satellite plants throughout the service area will minimize major construction requirements for reclaimed water distribution, and also reduce treatment capacity pressures at the area's main treatment facility. **PE**

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