By Shane Keaney

Demand for **Sustainability**

Decentralized membranes for water reuse

Many municipal wastewater treatment systems are large, centralized works that often waste the water resource rather than reuse it and consume significant amounts of energy to move wastewater from the source to the treatment plant. This has led to a growing recognition that infrastructure investment should be on the principle of sustainable, decentralized water reuse technologies where water is captured, treated and reused locally.

ARTICLE SUMMARY

Challenge: Laurel Cove Golf & Country Club required a simple, decentralized treatment system with strong water conservation technology.

Solution: Bord na Móna was awarded a contract for the design and supply of a PuraM MBR system, which provided effluent that could be reused for irrigation.

Conclusion: The PuraM MBR proved to be effective and simple to manage; the technology is also being tested in North Carolina for a sewer mining operation.

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Related search terms from www.waterinfolink.com: MBR, wastewater, sewer mining, reuse

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There has been a historic concern about the robustness, cost and operational effectiveness of residential and decentralized wastewater systems, creating the need for treatment solutions that deliver reduced complexity, have a small footprint and are easily constructed within buildings to minimize aesthetics and odor concerns when located within existing neighborhoods. There is also a responsibility on regulators to ensure higher operation and maintenance standards while providing affordability for the customer.

A new generation of innovative technologies is being developed to meet these demands. Membrane treatment is leading the way where water reuse or high-nitrogen performance standards are specified.

Some of the challenges for designers and manufacturers of decentralized membrane systems include:

- Reducing the complexity of the plant by eliminating the need for permeate pumps, chemical dosing and backpulse pumps and valves;
- Reducing the frequency of recovery cleans;
- Improving health and safety through removing the need for onsite chemicals;
- Considering phasing of flows and periods of no flow; and
- Having pre-engineered solutions that match the required flow rate.

Flat-plate systems exhibit many of these characteristics, and a new generation of membranes designed specifically for the decentralized market is becoming available. These membranes are designed to improve air-scouring efficiency; eliminate the need for chemical dosing and backpulsing equipment; and allow for periods between recovery cleans in excess of 12 months. Because the greatest portion of operating costs for decentralized systems is often associated with the provision of manpower, unattended operation through simplicity in design and introduction of remote monitoring technology will be critical to making these systems affordable.

Laurel Cove WWTP

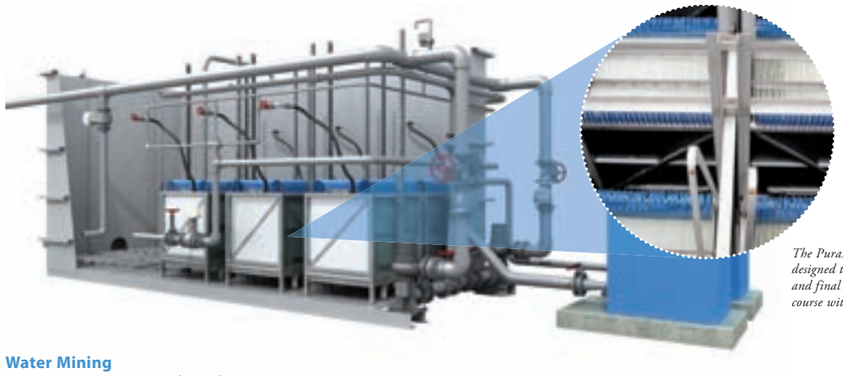
The 1,000-acre Laurel Cove Golf & Country Club is being developed into the foremost golf club and 800-lot-plus residential community in middle Tennessee. The decision makers wanted to incorporate the best available technology to allow for water conservation. They awarded Bord na Móna a contract in October 2007 for the design and supply of a PuraM membrane bioreactor (MBR) wastewater treatment plant (WWTP). A tight schedule was required because local regulation required the WWTP to be constructed prior to homes construction. The installation was completed on schedule in April 2008.

The Laurel Cove system includes 18 flat-plate PuraM membrane cassettes designed to treat a Phase I flow of 250,000 gal per day (gpd) and achieve a final effluent quality of 10 mg/L biochemical oxygen demand; 20 mg/L total suspended solids; and 10 mg/L total nitrogen. The design allows the final effluent to be used as a supply for irrigation water on the development's Greg Norman-designed golf course.

The wastewater plant is comprised of two treatment streams, each designed to handle up to 125,000 gpd. Each stream has an anoxic/equalization tank and an MBR tank. Consideration was made in the design to allow for future upgrades for flows up to 1 million gpd.

The PuraM MBR was chosen because its design is particularly suitable for the decentralized market, with an emphasis on reduced operational input, ease of maintenance and less complexity than comparable systems.

The flat-plate ultrafiltration membrane technology is assembled into stainless steel membrane cassettes that consist of a unique, integral dedicated air-diffuser assembly that eliminates the need for backpulsing or frequent chemical cleaning. The system does not require permeate pumps or site-installed chemical dosing systems, and a typical time between recovery cleans is approximately 12 months.



The PuraM MBR WWTP at Laurel Cove is designed to treat a Phase I flow of 250,000 gpd, and final effluent will be used to irrigate a golf course within the new development.

Water Mining

Water mining is another form of decentralized water conservation that is being implemented. There are different ways a decentralized system can "mine" wastewater from an existing municipal sewer line. For instance, a decentralized system can connect to a sewer line anywhere along its path to the centralized sewer plant, draw off wastewater, treat it and utilize the reuse water locally. The sludge taken from the wastewater can be put back into the sewer main to be sent to the central plant. Other decentralized systems can intercept some of the effluent, which has already been treated at the central plant, and treat it again to a higher standard for reuse.

Using smaller, decentralized systems to draw off wastewater from existing, centralized sewer systems is proving to offer a wide range of benefits. Sewer mining relieves pressure on existing, centralized infrastructure by intercepting a portion of their volume, while at the same time conserving potable water supplies by providing an additional water resource that is especially beneficial to drought-stricken areas. This can benefit taxpayers because their public utilities do not have to expand existing water and wastewater infrastructure to accommodate new development, often leading to a much lower cost for each gallon of water.

Bord na Móna's PuraM technology is being used as a trial system in North Carolina at the TZ Osborne WWTP. A 28,000-gpd system has been installed, taking water from the works influent. Third-party testing is being undertaken by North Carolina State University to verify performance. These high-quality, pre-engineered package membrane plants come in standardized flow ranges in increments of 14,000 gpd. They can treat up to 125,000 gpd as a single unit that can be delivered on the back of a truck, allowing for a cost-effective solution.

Looking Ahead

Initiatives such as U.S. Green Building Council Leadership in Energy and Environmental Design certification and the National Association of Homebuilders' National Green Building Standard are being promoted to rate buildings on their water conservation credentials. With the support of these and other regulatory initiatives, the future of water reuse systems is predicted to expand significantly, driven by the concern over water supply, the increasing cost of energy and the growing demand for sustainability. WWD

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