

BRINGING SOPHISTICATION AND LARGE CAPACITY TO

# DECENTRALIZED WASTEWATER TREATMENT

By Grant Beamish



**MBR Wastewater System is Housed in 27 High Cube Shipping Containers Comprised of Distinct 3-Container Treatment Trains.**

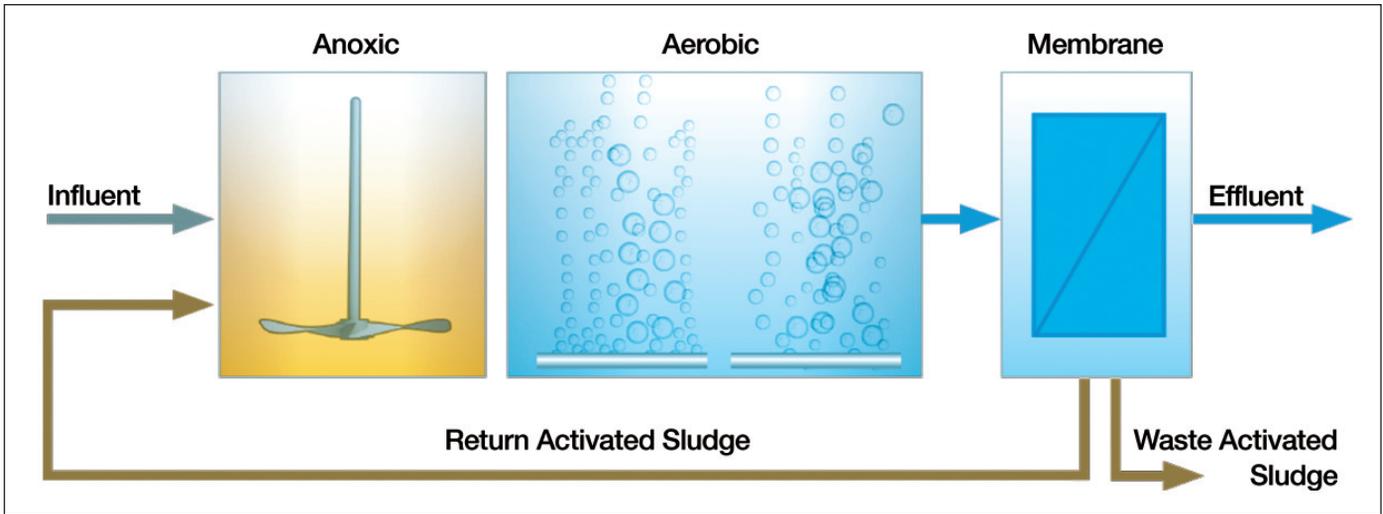
newterra helped a global mining company expand its operations at an African mine site cost-effectively by engineering and building a large, modular sewage treatment system. The pre-built, pre-tested system required minimal site work at the remote location and is scalable for future growth. The high quality treated effluent is suitable for reuse applications.

Decentralization is an approach to wastewater treatment that offers tremendous advantages by bringing treatment right to the source. That translates into less collection infrastructure, reduced pumping requirements and lower operating costs. The use of advanced technologies, such as membrane bioreactors (MBRs), allows systems that are very compact – about one

The high concentration of biomass inventory in the MBR process provides resilience to changes in influent quality.

#### Fast Facts

- ▶ Location: Zambia, Africa
- ▶ Project Assigned by: Mining Company
- ▶ Plant Operation Started in: 2013



Membrane Bioreactor Treatment Eliminates Need for Primary and Secondary Clarification.

quarter of the size of conventional activated sludge treatment. MBR technology also brings the benefit of high quality treated effluent that's suitable for direct discharge or reuse in a wide range of applications. [www.newterra.com](http://www.newterra.com)

For resource companies with operations in remote locations, modular, decentralized wastewater treatment is a necessity. The advent of “packaged treatment plants” has facilitated an environmentally responsible solution for these locations. The sophistication of modular treatment systems for mining and oil and gas operations has spawned the adoption of this same approach by municipalities and private developers – with the same inherent advantages.

newterra is a Canadian-based, global manufacturer of water, wastewater and groundwater treatment solutions. The company has been a pioneer of modular systems for the resource and private development markets. In

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**Robert Kennedy**  
Chief Technology Officer, newterra

response to the increasingly size of resource projects, where thousands of workers are located in remote sites, newterra has developed self-contained systems capable of serving sizeable populations. These modular systems are rapidly deployed to these locations and can be fully assembled and undergoing commissioning within days of arrival. They also offer the advantages of scalability to accommodate changes in population, and can be redeployed at the conclusion of a project, with minimal site remediation required.

Modularity was a key factor in the selection of a newterra MBR wastewater treatment solution by a global mining company to address their needs at a large operation in Zambia, Africa.

The copper mine was undergoing an expansion that included the addition of a new conveyor to transport ore to a nearby crusher. The result would be additional mine tailings at the site. With the current tailings pond approaching capacity, and the existing Rotating Biological Contractor (RBC) wastewater treatment plant directly in the expansion zone, the mine operator sought a large scale treatment system to address the mine's growth and the 8,000-person community supporting the project. Timing was also a key factor. The RBC was not operating to specifications and there was growing potential for non-compliance.

Upon consideration of various options, the global mining company selected newterra's modular

Membrane Bioreactor (MBR) system for the site. MBR technology is a simple, yet effective combination of an activated sludge biological treatment process with membrane filtration. The use of ultrafiltration (UF) membranes provides a physical barrier against the passage of all particulate solids, contrary to gravity settlement of mixed liquor in a conventional activated sludge process. As a result, MBRs can operate at a much higher mixed liquor suspended solids (MLSS) concentration (typically 8,000 to 18,000 mg/L vs. 2,000 to 4,000 mg/L in conventional activated sludge system). The result is a robust, versatile wastewater treatment system. In addition, the high concentration of biomass inventory in the MBR process provides resilience to changes in influent quality.

### Membrane Bioreactor (MBR) Treatment Process

The pre-engineered, pre-assembled and fully tested offering by newterra held numerous advantages over competing proposals – even ones that utilized MBR technology, according to Robert Kennedy, newterra's Chief Technology Officer. “Our systems are designed and factory-built for very quick assembly at their end location using our service team. In this case, we delivered a 1,500 m<sup>3</sup>/day (396,000 GPD) self-contained wastewater treatment plant that was fully assembled and undergoing commissioning within three weeks of the equipment's arrival. Our modular approach not only expedited delivery of the system, it significantly reduced site work. The

only thing required was a concrete pad and three external surface-mounted tanks.”

Other proposals for the project were based on erecting a building to house the treatment equipment – an approach that would have involved extensive on-site construction, as well as attracting skilled construction workers and housing them at the remote site for an extended period of time. Further complicating these alternatives was the need to endure the complications and delays of building through the rainy season.

“When the costs of onsite construction, not to mention inevitable weather-related challenges were factored in, newterra’s self-contained wastewater plant was the clear choice from an economic and timing standpoint,” says Kennedy.

newterra’s solution for the project was a 27-container membrane bioreactor wastewater treatment plant. The system was deployed in eight, three-container treatment trains – with each container in the trains housing equipment for a distinct process function – anoxic treatment, biological treatment and membrane filtration.

This design not only facilitated rapid deployment, it allows additional trains to be added if the mining community grows. They can be removed later if capacity requirements decrease. The entire treatment plant can also be removed and relocated elsewhere in the future without leaving assets in the ground. Three additional containers housed screening, sludge management and the control system for the plant.

Making the mine a more sustainable operation was part of the criteria for the project. The use of newterra’s innovative MicroClear® UF



**Large Capacity System Features Integrated Sludge Thickening and Dewatering Equipment.**



**1,500 M<sup>3</sup>/Day (396,000 GPD) System is Comprised of 27 Interconnected Containers to Allow Easy Movement within Modular Treatment Plant.**

membranes was central to meeting that objective. The patented, ultrafiltration membranes have a porosity of 0.04 microns and treat sewage to the high standards established by the World Health Organization (WHO) for irrigation, dust control and other applications – or direct discharge to the local river. The MicroClear membrane cassettes are configured in framed modules that feature newterra’s roll-out access system for simplified routine maintenance.

Further ensuring high quality permeates was the incorporation of ultraviolet (UV) disinfection. Two units, running in parallel, provided tertiary treatment to eliminate potential discharge of harmful pathogens such as Cryptosporidium and Giardia. The UV units are capable of disinfecting flow rates of 60 GPM.

Integrated sludge thickening and dewatering equipment allows on-site management. With composting, the dry filter cakes may ultimately be used as fertilizer for local agriculture. The sophisticated system also incorporates newterra’s advanced telemetry for monitoring, control and trouble-shooting half way around the world.

“Our ability to monitor and control our systems remotely using SiteLink™ telemetry means we can provide technical support in real time to our clients, and be proactive in scheduling maintenance procedures,” comments newterra’s Kennedy. “For systems running in remote regions, like our plant in Zambia, it provides tremendous peace of mind.”

The plant has been operational since its installation in 2013.

About the Author  
**Grant Beamish** is Marketing Communications Director at newterra.

**newterra** is opening up new possibilities for decentralized water treatment with redeployable systems. Our modular “plug & play” solutions can be located virtually anywhere and be SCALED up and down in parallel with capacity requirements. For subdivisions, for resorts, for remote work camps – wherever a decentralized solution is required.

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