



Domestic Wastewater Treatment



Case Study

Whitehouse Terrace

Industry: Land Development (Hotel, Condominiums, Detached Homes)

Location: Brockville, Ontario, Canada

Capacity: 8,835 GPD (33.45 m³/day)

Installed: 2009

Newterra designed and built a complete, modular Membrane Bioreactor (MBR) system that replaced an existing, 40-year old wastewater treatment facility – and met the stringent regulatory requirements for direct discharge into the St. Lawrence River.

Project Background

In 2007, the Members of the Condominium Corporation Seven (LCC7) Board of Whitehouse Terrace made a decision to replace their existing, 40-year old wastewater treatment plant because it was no longer meeting water quality discharge requirements. Whitehouse Terrace consists of a hotel, twenty (20) two-bedroom condominium townhouse units and two (2) three-bedroom, detached, single-family homes in a prime location along the banks of the St. Lawrence River. The properties have a combined sewage flow rate of 33.45 m³/day or 8,835 GPD.

Domestic wastewater from the Whitehouse Terrace properties had to be treated to a very high standard to facilitate direct discharge into the river. Other considerations were the minimal land available to accommodate a new system, and its close proximity to the hotel and residences. Thus, a compact footprint was essential, as was technology that would operate quietly – and with minimal odor.

Newterra Solution

After a thorough review of a number of technologies and systems, the Board of Whitehouse Terrace selected Newterra to engineer and build a modular MBR wastewater treatment plant. Based on design objectives, the Application for Approval of Municipal and Private Sewage Works required by the Ontario Water Resources Act (R.S.O. 1990, Section 53) was submitted in January 2008. The project proposal was reviewed by the Environmental Assessment & Approvals Branch of the Ontario Ministry of the Environment (MOE), and a Certificate of Approval was issued in 2008.

To minimize the system footprint, the design featured in-ground tanks for equalization and aeration. Control systems and the UF membrane tank were configured in a pre-built, pre-tested modular housing that sits above grade, on top of the tanks. This approach facilitated would help facilitate fast installation, commissioning and start-up of the system.

A key element of the system’s ability to produce very high quality, final treated was the use of Newterra’s patented MicroClear® ultrafiltration (UF) membranes. These innovative, flat sheet membrane cassettes provide a physical barrier to particulate, bacteria, viruses and protozoa. They are submerged directly in the mixed liquor and permeate is drawn through the membrane under a slight negative pressure.

Treatment Process

The MicroClear® MBR technology utilized in the Whitehouse Terrace project combines a conventional activated sludge process with membrane filtration. The main treatment stages are:

- Primary sedimentation
- Equalization
- Activated sludge biological treatment
- Membrane filtration

The main treatment process occurs in the aeration tank or *biological reactor*. Here, bacteria and other beneficial microorganisms consume organic pollutions (BOD5, bCOD, ammoniacal nitrogen, etc.) as food and convert them into carbon dioxide, water, and nitrates. To survive and flourish, these microorganisms require the presence of oxygen. The system includes an air blower system equipped with a low pressure alarm switch that delivers air to a diffuser installed within the aeration tank. Metal salt is also dosed into the aeration tank, causing phosphorus to precipitate as metal phosphate to reach the MOE discharge limits.

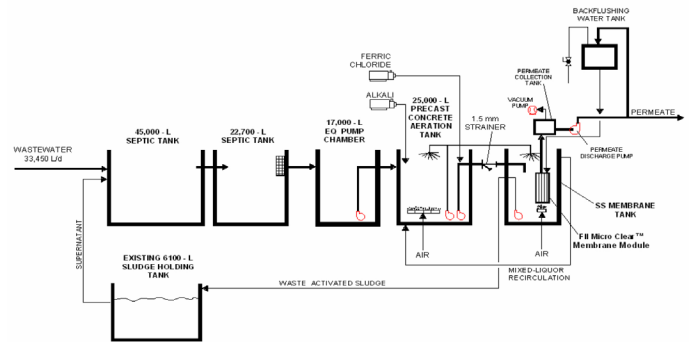
Alkalinity levels are monitored by an online meter. In the event that they become to low, alkali is added to maintain the pH within the desired range.

Treated water from the aeration tank flows into two parallel membrane tanks where physical filtration occurs, ensuring the retention of any bacteria, parasites, and viruses (99.99+% removals). Turbidity levels are also reduced to below 1 N.T.U. at this stage.

Effluent Parameters	Units	Effluent Objectives	Effluent Limits	Treated Effluent
cBOD5	mg/L	15	25	<3
TSS	mg/L	15	25	<4
TP	mg/L	0.9	1	<1
E.Coli	counts/100ml	100	150	nil

and from chemical precipitation for phosphorus removal. This sludge is pumped to the existing sludge storage tank on a periodic basis.

Newterra MBRs are operated by an automated control system to ensure efficient operation and guaranteed effluent levels are reached. The MBR system can be easily monitored and controlled from a distance by using proven, reliable, and user-friendly remote telemetry systems that reduce operator attendance.



The Control system includes a PLC control panel that receives input signals, processes that information, and controls outputs that operate the equipment. Telemetry module facilitates monitoring and control of the system from a remote computer. The operator can start/stop motors and pumps, view level switch status, monitor dissolved oxygen (DO), pH, and turbidity levels, and monitor permeate flow rate. Process variations and other programmed events trigger system alarms and automatic email alerts.

Production of the Whitehouse Terrace WWTP began in September 2008, with on-site construction and shipping of the equipment taking place between January and February 2009. Start-up and commissioning were completed that spring and the system was operating in May 2009. Since that time, the system has been in continuous operation, providing quiet, trouble-free, odor-free treatment that meets regulatory requirements.

Excess sludge is generated as a result of biological oxidation.

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