

Zero Drainfield

An innovative onsite system for a truck stop and restaurant in Ontario relies heavily on water recycling to suit site conditions

By **Scottie Dayton**

Plans for Cedar Creek Fuel Centre, being developed for 401 Multiplex Inc., included two existing buildings and a truck stop with a 42-seat restaurant and six showers, truck wash with two bays, and five-unit industrial mall, all on 14.7 acres in Ayr, Ont.

The area had no municipal sewer or water, but nitrogen levels of 80 mg/L from long-term corn farming concerned the provincial Ministry of Environment (MoE). Besides restricting nitrogen discharge, the ministry limited the amount of water onsite systems

could discharge and how much water the complex could draw from its two wells.

Martin Sommer, project and general manager, went a step beyond and designed a system that enabled the truck stop to meet any environmental objectives in the next decade. "The largest factors were the showers putting out 3,900 gallons per day, and the high-strength waste from the restaurant," he says. "I worked with Christopher Jowett of [Waterloo Biofilter Systems](#) to plan the tanking and flow."

Their innovative solution eliminated drainfields and contains more than 2,000 feet of 2-inch force main connecting 11 tanks, six trickle filters, disinfection, a commercial irrigation system, custom-built water reuse system, and stormwater maintenance pond. Contrary to what outside engineers predicted, the system works brilliantly.

Soil conditions

The property is part of the Cedar Creek subwatershed and is located in the low point of an open field. Soils are glacial till (sandy and gravelly loam) with percolation rates of less than one minute per inch. Cedar Creek, a Provincially Significant Wetlands, is one of the best coldwater fisheries in the area.

System components

Sommer sized the system to handle 7,925 gpd. Its major components are:

- 1,200-gallon concrete holding tank. Large tanks made by Wilkinson Heavy Precast, Dundas, Ont., and smaller tanks by Unit Precast, Breslau, Ont.
- 6,000-gallon grease trap.
- 3,000-gallon pump tank.
- Two 800-gallon pump tanks.
- Two GP200 grinder pumps on alternating duplex demand control from Monarch Industries, Winnipeg, Man.
- Two 12,000-gallon, two-com-

All pipes with less than four feet of cover were insulated against frost.



System Profile

Location:	Ayr, Ont.
Facility served:	Cedar Creek Fuel Centre
Designer:	Martin Sommer, Cedar Creek Fuel Centre, and Christopher Jowett, Waterloo Biofilter Systems Inc.
Installers:	Rob-Hart Mechanical Inc., Kitchener, Ont.; D.W. Cooper Contracting Ltd., Brantford, Ont.; Core Earthworks Ltd., Cambridge, Ont.
Site conditions:	Glacial till with percolation at less than one minute per inch
Type of system:	Absorbent trickle filters with disinfection, Waterloo Biofilter Systems Inc., Rockwood, Ont.; irrigation, stormwater maintenance pond, and water recovery system
Hydraulic capacity:	7,925 gpd

- partment septic tanks in series.
- PL-525 effluent filter (1/16-inch filtration) from Polylok Inc., Wallingford, Conn.
- 3,000-gallon balance tank.
- Two Monarch WS100HM 1-hp, single-phase effluent pumps on alternating duplex timer control.
- Six biofilters in polyethylene tanks from Waterloo Biofilter Systems Inc., Rockwood, Ont.
- 3,000-gallon disposal tank.
- Two Monarch MSS30, 2-hp, 4-inch, high-head well pumps on alternating duplex demand control.
- CATEC water recovery system from Custom Applied Technology Corp., Sarasota, Fla.



John Van Neiuwenhuizen (left) and Dave Mc Cready from D.W. Cooper Contracting install a rainwater infiltration gallery.

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— Martin Sommer

- Custom-built control panel from IDT Systems Inc., Cambridge, Ont.

System operation

A special labeled disposal sink in the kitchen separates coffee grounds and soups from the remaining wastes, which flow through the grease trap into the pump tank. A disposal sink in the janitor’s room separates harsh chemicals from restroom wastewater. The sewage combines with the grease trap discharge in the pump tank. The mixture is pumped into Septic Tank 1, then flows into Septic Tank 2. Sewage from an existing building and the truck wash flows into Septic Tank 1.

“The concept of disposal sinks connected to a separate holding tank is unique,” says Sommer. “It eliminates compensating for environmentally unfriendly products in the treatment process.” The holding tank is pumped every three months.

From Septic Tank 2, effluent flows into the balance tank, then is pumped up 20 feet to the biofilters in a heated building. Helical spray nozzles pressurized at 10 psi or more spray effluent evenly over foam cubes. Timer settings dose the units evenly throughout 24 hours at 1.5 gallons per cubic yard. A vent on the roof of each biofilter connects to a fan that draws air out of the tanks.

Microbes treat the wastewater as it trickles through the media. Liquid gravity-drains to the disposal tank, where pumps return 50 percent to Septic Tank 1. The remaining half flows to the disposal tank, passing through three Big Bubba filter cartridges (50, 20, and 5 microns) and two Hallett 30

A crew places the last of five 13,200-gallon water reservoir tanks for fire-fighting in the north end of the property.



The crew from Unit Precast places (background to foreground) the kitchen holding tank, grease interceptor, and one pump tank.

1.5-inch disinfection units in parallel, then to the distribution network.

Effluent dispersal

Distributing the tertiary-treated effluent was challenging. One goal was to reuse it in the truck wash, replacing the 45 gallons lost with each tractor-trailer washed and livestock or food truck disinfected. “By making up the water, it doesn’t show on our records as water taken in or disposed of,” says Sommer.

Because the effluent contains nitrogen and phosphorus, another goal was to use it for irrigation. In winter, the water surface-discharges into a 250- by 50- by 15-foot-deep stormwater management pond.

Two-thirds of the disposal tank’s capacity is dedicated to the

irrigation system. One-quarter of the rest is reserved for the truck wash. What remains prevents the pumps from running dry. To give water a chance to soak into the ground, the custom-built programmable irrigation system cycles twice in 24 hours, pumping 40 gpm at 100 psi. It takes 50 minutes to pump down the disposal tank.

The third goal was to recover the water used in the truck wash. The CATEC water recovery system targets soap and specific chemicals in the water. The lengthy treatment train has three baffled, 1,500-gallon balance tanks and an 1,800-gallon pump tank. Water in the pump tank returns to the truck wash for reuse. The pump tank has an emergency overflow pipe that drains into a 4,700-gallon graywater holding tank with high water alarm. Every part of the onsite system is fully redundant.

System installation

“The project was three months behind, and that’s all the time we were given to complete everything,” Sommer says. Contractors leveled the hills on a next-door property, trucking in more than 460,000 cubic yards of sand to raise the ground level 6.5 feet. The site also supplied all the B-grade gravel.

The two precast companies set their own tanks. Wilkinson used a 100-ton crane with outriggers to handle the 40,000-pound, 24- by 10-foot-square tanks. Some excavations were 14 feet deep, giving Sommer the five feet he needed to run piping overhead or maintain the required slope.

Because of site constraints, they backfilled as work was completed. “The installation was pretty straightforward,” says Sommer. “We worked long hours and met our deadline.” The system also satisfied the MoE’s nitrogen concerns, achieving 20 mg/L.

Maintenance

Startup was shaky. Stones rising in an incorrectly assembled water softener jammed open the rapid flush, releasing 24,000 gallons over a weekend. That flushed out the onsite system, killing the organisms in the biofilters. Sommer sent a vacuum truck to a nearby fuel center to pump up 3,000 gallons of sewage and kick-start the system.

Although the onsite system has operated for a year, Sommer hasn’t started the CATEC recovery system for fear of biologically contaminating the vehicles being washed. “We wanted to make sure the sewage system operates correctly, which it

does,” he says. “We also don’t know how the remaining nitrates in the water will react with the soap in the truck wash. Recovering water from a truck wash is extremely difficult, because water has a high affinity for dirt and doesn’t want to release it.”

Sommer does the maintenance. Monthly, he inspects the biofilters, sends effluent samples to ALS Laboratories, inspects the spray nozzles and control panel, tests the pumps, and inspects the float switches and septic tanks. ■

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