



A model for a residential greywater reuse system.

# Life in Greyscale

Water reuse at many levels.

BY KERRY FREEK

IN A RECENT CONVERSATION with a colleague, I learned that she was building a new home. Keen to incorporate elements of sustainable design, she and her husband were looking into residential greywater reuse (see page 16). Their meetings with contractors were growing frustrating, however—nobody seemed to have any experience with this kind of project. As demands for sustainable design gains popularity and the public becomes more educated about conservation, requests for reuse are increasing and so is the need for experienced consultants. Here's a look at three different applications of reuse.

## A workspace

The Rideau Valley Conservation Authority building was built on a low-lying field that floods almost every spring. It also sits next to wetlands, as well as a major tributary of the Ottawa River. When choosing the exact location of this new office, Christopher Simmonds Architects (CSA) had to consider these site issues, finding the sweet spot on the property that would avoid contamination. But site drainage and water retention remained the big problems. CSA's Don Peterman says all other challenges were minor in comparison.

"Because we had to retain stormwater on our own site, we decided to use it. It became a water feature. Our whole design philosophy came from that issue," says Peterman.

As a result of this thought shift, the design has the building shedding water into a watercourse and on-site pond (see cover image). Greywater and rainwater are collected, treated and reused in the building's toilets, which flow to a highly-efficient demonstration septic system. As Eastern Ontario's first LEED-Gold building, the \$5.6-million Rideau Valley Conservation Centre (RVCC) won points for these systems, and has reduced water consumption by 80 per cent.

When they started to go down the path of reuse, Peterman explains, there were very few experienced contractors and material suppliers. CSA's contractor, Ottawa-based M.P. Lundy Construction, was tasked with the responsibility of sourcing the right plumbers, suppliers of underground tanks, and filtration system.

There's nothing technically special about building a greywater system, says Gina Courtland, Lundy's vice president and project manager for the RVCC building. In fact, she says, it's one of the easier components of sustainable design to incorporate. Having been through the RVCC build (and six or seven since), Courtland says the challenge lies in asking the right questions. Contractors and suppliers are learning and becoming more experienced as building owners request reuse for new builds. "At the end of the day, it's a very simple solution for water conservation," says Courtland.

## A city

It's only been a difference of a few years between projects, but the City of Guelph, Ontario has been luckier finding experienced and motivated contractors. With assistance from the Federation of Canadian Municipalities' Green Municipal Fund, Guelph is conducting a feasibility study for using greywater for toilet flushing in residential settings. Installing reuse systems into a mix of 30 new home construction and home retrofit scenarios, the City will gather information on the costs, benefits, barriers, opportunities and requirements. The installations include monitoring equipment to measure the amount of greywater produced and used within the home.

"We were fortunate to have a knowledge base around the [contracting] community at the starting point," says Wayne Galliher, water conservation project manager. "Similarly, our building officials are forward-thinking. They endorse the practices and would like to see them move ahead."

It's not all roses. One of Guelph's key challenges is the low cost of water. "In the residential sector, a lot of people are looking to greening their home in terms of energy, while water takes a backseat," says Galliher. "Energy initiatives are much more attractive due to the return on investment."

Another challenge is maintenance, says Galliher. Part of the pilot is an education process for homeowners to see what the

system can do, its benefits, and what their roles will be in terms of upkeep. "With home retrofits, we're seeing homeowners that are more aware of their responsibilities," says Galliher. "But we're also seeing homeowners that have selected the [reuse] package [for new homes] without perhaps understanding their full responsibilities for maintaining the system," he says.

If the required maintenance isn't completed, there are emergency measures. The key function of homeowner is to clean the system's filter on a monthly basis, and inspect the state of the chlorine puck. If the homeowner fails to complete the inspection, says Galliher, the filter will be the first to go—it would become saturated with particulate matter. Depending on the number of people per household, the filter could stop working in more or less than a month. When the filter goes, the system that Guelph has chosen will call for potable water from the original system.

Galliher figures these barriers will continue to be addressed as the pilot progresses. The field test is expected to

lead to the implementation of a residential greywater reuse rebate program for residents. The goal would be to install 200 residential systems by 2019, reducing each household's water use by approximately 32,850 litres per year and utility costs by about \$73 per year. At this point, says Galliher, the savings might not be so appealing, but water prices are rising throughout Ontario, and he thinks that residents will be more willing to sign on for greywater reuse as a result.

**A home**

"I'm using water, but intelligently," says architect Richard Carbonnier. Located in Nunavut in Mittimatalik, Baffin Island, Inuksuk is Carbonnier's "habitat"—a living space designed and built in symbiosis with nature and the environment.

Part of Carbonnier's home-planning challenges included incorporating greywater recycling. "Water in the Arctic is an expansive commodity and Inuit people traditionally managed this resource carefully by having camps along

streams," he says. "Rationalizing water also means managing habitat effluents. Symbiosis is about working in harmony with the land and its capacity to give and take. Applying southern ways of living in the Arctic impacts the environment and adds considerable cost to living in a remote environment."

Carbonnier's system is simple. As seen in his initial schematic drawing, the plumbing drain and water supply is in parallel and can be used in alternate ways—if needed, greywater can be used in the kitchen sink or laundry. The 500-litre greywater tank is kept free of grease effluents, and it's divided into three equal communicating vases, first decanting, second oxygenation, and third relaxing (possibly with a UV light, but not if water is to be consumed). Overflow is taken to a pumping basin where chlorine is added sporadically to prevent algae growth—he doesn't chlorinate the compartments in order to maintain organic enzymes. To treat the water, Carbonnier uses a simple aquarium pump and soapstone to help the aerobic cycle. Previously, he used ozone, but stopped due to concerns about potential risks involved its application. The greywater cycle takes about seven days before it can be reused.

Carbonnier prevents drinking water cross-contamination at the kitchen sink with a separate faucet and water source (from an iceberg or the river). "Drinking 2,000-year-old water makes you younger," muses Carbonnier. "And stream water is practically free of pathogens, although an active carbon filter is preferred."

Since introducing recycling into his home, Carbonnier has gone from using 3,500 litres (or eight water truck deliveries) to 800 litres, or 26 litres per day per person. His sewage tank is emptied every three weeks (or 500 litres). "The saving is considerable, since we pay per consumption, and weekly deliveries are no longer required," he says. "Multiply this by a community and the math explains it all, not only because the system helps conserve water, but because the way of life and consumption is respectful of the land." WC

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