

Graywater challenge for a green home

• Couple building a new home in Bend face many regulatory hurdles in reusing household water

By Rachael Rees / *The Bulletin*

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Editor's note: Tom Elliott and Barbara Scott invited The Bulletin to follow their efforts to build the ultimate green home in Bend and document the project from start to finish. The exterior is now complete. Inside, the concrete floors and wiring for the LED light system are in place. This installment focuses on wastewater requirements outlined in the Living Building Challenge, the standards being followed by Elliott, Scott and the builders.

In their quest to build the most environmentally friendly home in Bend, Tom Elliott and Barbara Scott have pushed the regulatory envelope for handling wastewater.

About a year ago, the city of Bend rejected the couple's plan to reuse graywater — wastewater from sinks, showers and laundry — and treat blackwater — water carrying human waste and wastewater from dishwashers. However, Elliott and Scott received approval for the rest of the design so they could begin building Desert Rain, their name for the project. As the home nears completion, they have returned to the wastewater issue, revising and resubmitting plans to the city and state. But they are still awaiting approval from state and city officials.

The couple and their contractors want Desert Rain to meet requirements of the Living Building Challenge, green building standards designed to be the most advanced possible.

According to the challenge, the property must capture and process rain and snow melt on-site for drinking and other household needs. The used water must return back to the site, through, for example, an irrigation system.

But those standards don't always align with state and local regulations.



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David Manning, a subcontractor for Central Oregon Construction Contractors Inc., finishes the concrete cover on the reclaimed-water tank, which will hold water for irrigation and supply a water feature on the Desert Rain property.

While the city of Bend requires a home to discharge wastewater into the municipal sewer system, the Living Building Challenge is clear that if water is discharged into the system, the home will not meet the standards, said Morgan Brown, president of Whole Water Systems, of Seattle.

“We recognize that the Living Building Challenge pushes us outside of our comfort level,” Brown said.

“Some of this has been incredibly frustrating because of these struggles. There have been things that have caused delays and extra expense. But the clients have committed to doing state-of-the-art environmental design and meeting the Living Building Challenge standards.”

The latest plans call for a 600-square-foot constructed wetland to purify the graywater for irrigation use and a composting system for blackwater, Elliott said. There is disagreement on whether the city or Oregon Department of Environmental Quality has the final say, Elliott said.

In April, the DEQ implemented new statewide regulations allowing the reuse of graywater to encourage residents to minimize their water waste. Under the new program, people can use initially treated graywater for irrigation, said Ron Doughten, water reuse program coordinator for the DEQ.

Elliott and Scott believe that gives the DEQ jurisdiction over their system. However, Elliott said, the city of Bend wants an inspection from an Oregon professional Engineer.

The total cost of the wastewater systems are estimated at \$162,000, Elliott said. The couple doesn’t think the additional certification is necessary and would cost them an additional \$5,000.

“We want to keep it as affordable as possible ... ,” Elliott said. “We don’t want to set a precedent that will make it more difficult for people to install a graywater system in the future.”

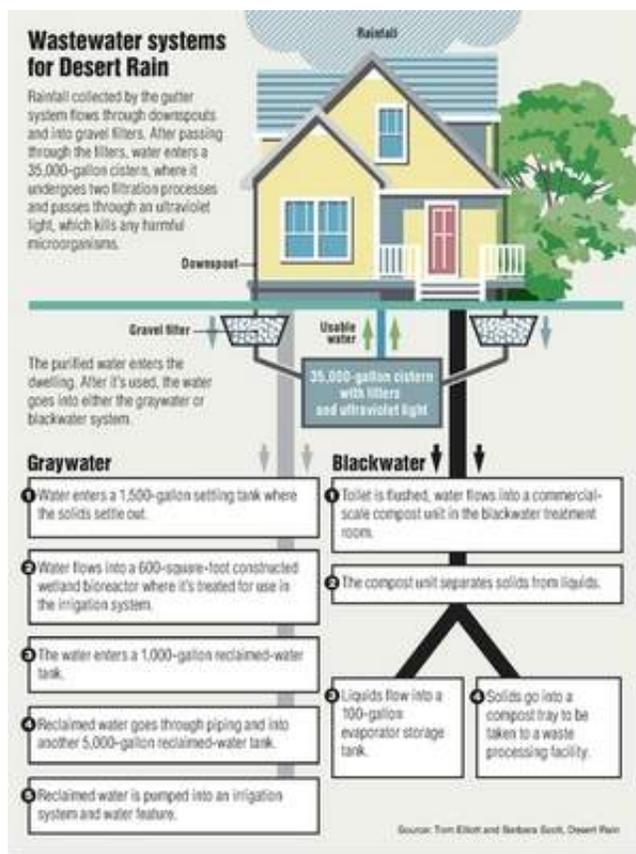
Melanie Paule, supervisor for the city of Bend’s Building Safety Division, said the city is reviewing the proposed system and was not interested in commenting for this story while the project is still going through plan review.

Throughout the project, said Brown of Whole Water Systems, there have been various issues with code interpretation, regulatory



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issues and permitting.

"The resistance isn't surprising because we are dealing with new code, and we are trying to do things that people haven't tried to do before," he said.

The DEQ's Doughten agreed, calling Desert Rain's proposal to use initially treated graywater, known as type 2, unique.

"DEQ hasn't dealt with anything like this before on a residential scale," he said. "This is the first type 2 graywater permit anyone has applied for in Oregon."

Despite the challenges with the graywater system, Elliott said the blackwater system has been less controversial.

To remove human waste, one-gallon-per-flush toilets will send it to a central composting unit, where solids and liquids will be separated, Elliott said.

The liquid waste coming from the toilets and dishwasher will flow into an evaporator storage tank and be evaporated by a solar-powered hot-air panel. Solid waste will enter a tray, where it will be composted over about six months.

Elliott said he's estimating the compost will be removed about once a year. Depending on regulations, he said the compost will either be taken to a waste processing facility, or used as fertilizer. Currently, compost derived from human waste may not be used as fertilizer, but he said he hopes the rules will change.

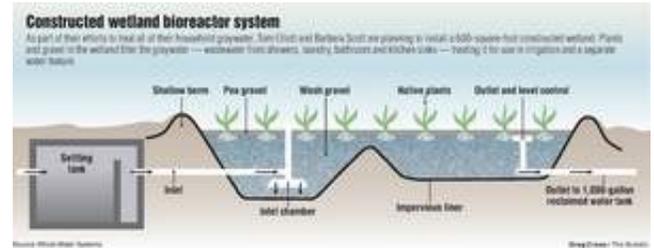
Scott said the issues associated with the wastewater system have made it one of the project's toughest hurdles.

"I expected it to be one of the biggest ... challenges," Scott said. "But, I don't think anyone anticipated the complexity behind what we're doing, how we've had to change our system to meet the local and state guidelines and the Living Building Challenge requirements, within the city."

If Desert Rain had been constructed in Deschutes County, she said, there would have been fewer barriers because there are fewer limitations. However, she said the purpose of the project is to be a demonstration project that will inspire others.

"The goal is to take this challenge and implement it at the scale of a whole development," she said.

Technologies like the constructed wetland are expensive at the individual level, but become more cost effective at a larger scale,



Defining wastewater

Graywater is wastewater such as water from the shower, bath, laundry, bathroom and kitchen sink. The Oregon Department of Environmental Quality classifies it by type:

Type 1 has not been treated or filtered to remove solids, fats, oils and grease. It may not be stored for more than 24 hours, and it can only be used for subsurface irrigation of landscape plants and compost.

Type 2 has passed through some type of chemical or biological process, such as a wetland, to further reduce solids and organic matter. It must be tested at least once per year. It can be stored for longer periods of time and used in landscape ponds as well as for drip irrigation.

Blackwater is wastewater carrying human wastes and wastewater from dishwashers.

Source: Oregon Department of Environmental Quality

The Living Building Challenge

Like the Leadership in Energy and Environmental Design standards, the Living Building Challenge provides guidelines and requirements for constructing an environmentally friendly building.

The challenge, created by the International Living Future Institute, "defines the most advanced measure of sustainability in the built environment possible today," according to the institute's website. It rests on seven areas, or petals: site, water, energy, health, materials, equity and beauty.

For more information, visit <https://ilbi.org/>

Elliott said.

"If we can demonstrate the effectiveness at a smaller scale, the hope is the city will be more comfortable with the technologies involved, and other property owners and developers will see this as an opportunity at a larger scale."

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