

The challenge of wastewater

Because of city restrictions, a Bend couple's planned ultra-green home might not meet the strict green standards they've set out to achieve

By Kate Ramsayer / *The Bulletin*

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Editor's note: Tom Elliott and Barbara Scott invited The Bulletin to follow their building project — to build the greenest home possible — from start to finish, to share their goals, decisions, costs, concerns, problems and achievements, and to be an open book on what it takes to build such a home. The Bulletin will follow the couple's project through periodic stories. This installment examines their plans for wastewater treatment, and efforts to get the designs and building materials ready for September's start date.

A Bend couple designing a highly efficient, environmentally friendly home has received a preliminary OK for a system to treat wastewater from sinks, washing machines and toilets on their site, but they've had to make some compromises with the city.

Tom Elliott and Barbara Scott have hoped their home, south of downtown, would capture rainwater to supply all the water for household use. After the water is run through appliances and faucets, they plan to treat it and put it back to work flushing toilets. The final step would be to treat effluent from the toilets in a 600-square-foot, man-made wetland in the yard.

The city initially turned down the plan, Elliott said. But after several discussions, city engineers have said they would approve most of the treatment plan as long as the wastewater is ultimately pumped into the sewer.

And while Elliott and Scott won't be able to reuse water for irrigation, as they had originally hoped to do, they plan to install extra pipes and valves so they can start watering vegetation with treated wastewater if the rules change in the future.

"We can treat (wastewater), but we have to treat it in a closed-loop system so that the treated water goes into the sewer," Elliott said. "Our thinking is that it won't be too much longer before the



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From left, Barbara Scott and Tom Elliott talk with Paul Schmitz, owner of Boxcar Productions in Bend, about reclaimed building materials they may use in the construction of their new home in northwest Bend. Elliott and Scott are designing their home to be as green as possible, including features such as nontoxic and recycled building materials.



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regulatory climate here in Oregon allows us to use that water for beneficial use.”

Almost a year after crews started demolishing two houses on adjoining lots, Elliott and Scott and their team of designers and builders are working on final engineering plans, looking for environmentally friendly building materials and planning for a September groundbreaking.

“Right now, we just have to wait,” Scott said, noting that things are taking longer than she had hoped.

Elliott and Scott are excited that the city approved the water system, even if they still have to send the treated water to the sewer.

It’s an unusual design within Bend, said Jeff England, private development engineer with the city.

“This is probably the first permit that we’ve seen that effectively was requesting that they not connect to city water and sewer,” he said.

Since the 1970s, Bend has been investing millions of dollars in the sewer system and centralized sewage treatment plant, England said. The city has moved away from on-site septic systems that can be prone to leaks, possibly contaminating groundwater with the effluent.

“Systems often fail; it gets real ugly,” he said.

Currently, city engineers don’t want to set a precedent of allowing people to choose not to connect to the municipal water and sewer system, he said, but water conservation is a good practice.

So England talked with Morgan Brown of Whole Water Systems, who is designing Elliott and Scott’s water system, and came up with a compromise.

The homeowners could install two different systems for treating graywater from sinks, the washing machine, dishwasher and showers, as well as a second, contained system to treat blackwater from toilets.

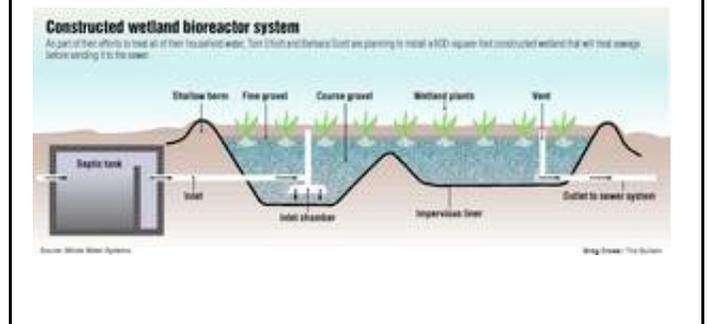
In the graywater system, Brown said, the water is treated right in the house. Some of it is recycled to flush toilets, which the Oregon Department of Environmental Quality allows.

Oregon has also approved the use of treated graywater for irrigation, but still is working on the regulations that specify how it can be used.

So until those regulations are set, Elliot and Scott will have to put the excess treated graywater back into the sewer.

The couple is also planning to treat sewage, or blackwater, in a constructed wetland that mimics how nature purifies water, Morgan said. The treated effluent will have to go to the sewer system along with the treated graywater.

From left, Barbara Scott and Tom Elliott talk with Paul Schmitz, owner of Boxcar Productions in Bend, about reclaimed building materials they may use in the construction of their new home in northwest Bend. Elliott and Scott are designing their home to be as green as possible, including features such as nontoxic and recycled building materials.



The constructed wetland is simply a lined hole in the ground, filled with gravel and topped with plants. Effluent is pumped to a septic tank, then to the wetland where bacteria on the gravel and roots eat away at the nutrients, pathogens and other contaminants in the wastewater.

“The combination of the gravel and the plants and the various aerobic and anaerobic materials will process and purify all of that liquid, so that when it comes out at the other end, it’s the same quality or better than what comes out of the Bend sewer system,” Elliott said.

But no matter how efficiently those systems treat the wastewater, the city has said it has to go back into the sewer system, England said.

“If they decide to pretreat on-site, and before disposing ultimately to the city sewer system, that seems OK to us,” he said. “I know their ultimate goal would be to reuse that water on-site in some fashion, or discharge it into the ground. But we’re not there yet.”

And because of that, Elliott and Scott’s new house might not meet the water requirements of the Living Building Challenge, which sets strict rules for certifying a green house, including a rule that the water can’t be discharged into the sewer.

“It’s disappointing,” Elliott said. “But we’re still going to move forward because we think it’s the right thing to do, and it’s consistent with all the other designs we’re doing in the house.”

Hopes for wind, green materials

Other aspects of the energy-efficient home are moving forward as well.

The couple is talking to neighbors about their plans for two vertical wind turbines they hope to install on the property, generating as much as 20 percent of the power for the home, Elliott said.

They plan to apply for a conditional use permit for the wind power devices in August, he said, which will require a neighborhood meeting.

“Our hope is that we talk to all our neighbors and get them to sign off on it,” he said. “Every indication is the city will approve it if the neighbors don’t object.”

The design team is also working on pulling together a list of building materials made with environmentally friendly materials within a certain distance of the house. It has not been an easy task, Elliott said.

They found some stone for the floor that they like, but couldn’t use it because it came from 450 miles away, and the Living Building Challenge requires the heavy material to be from within 250 miles.

“Beautiful stone, but we can’t use it because of the carbon footprint,” he said. “You have to start making some trade-offs.”

Eventually they found a source of local stone, but only after asking multiple suppliers.

While the team has found many building materials, from a recycled clay wall material to wood floors recycled from an orchard, they are still looking for many more items, including roofing material that is both environmentally friendly and approved for a rainwater collection system.

So far, Elliott estimates they've paid contractors \$15,000 just to track down different green materials.

"We've made a lot of progress, but it has been at an expense," he said.

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