Plumbing the American Dream

by Monica Allard Cox

FOR SALE: Style: other, 2-3 bedrooms, 2 baths, exciting kitchen, Florida room, private sewer.

Initiated house hunters are familiar with the mysterious literary genre of real estate listings. The uncertainty of a third bedroom, the otherness of a style, the capacity of a kitchen to excite, all these have meaning for the veteran Sunday open house-er.

A private sewer, however, is often a contradiction in terms. Even savvy house hunters, who know that a private sewer is frequently not a sewer at all, can't know from the listing whether they are looking at an antiquated cesspool or a traditional septic system. And while fixing a failing system is one of the nightmares of homeownership, it is compounded when the homeowner isn't quite sure where in the backyard the system actually is (even if Erma Bombeck was right about the grass always being greener over the septic tank).

Homebuyers can blame the 1970s for electric heat, orange shag rugs, and avocado appliances, but the era may also be responsible for replacement of backyard septic systems with sewer pipes. According to Lorraine Joubert, program director of URI Cooperative Extension's (CE) Nonpoint Education for Municipal Officials program, in the '70s, "there was a drive to clean up major point sources of pollution, which weren't adequately controlled at that time. Sewers were part of that effort." The federal government provided funding to municipalities to replace septic systems, which were considered temporary treatment devices, with sewers.

David Burnham, R.I. Independent Contractors and Associates president, installs piping for an alternative septic system at a demonstration site on Block Island. *Photo by Monica Allard Cox.*

Three decades later, federal funding for sewers has dried up—along with some groundwater sources. Sewering has reduced groundwater recharge because sewers divert wastewater directly to the ocean, rather than allowing it to replenish groundwater supplies, Joubert says. This reduction in water flow also harms wildlife habitat. And sewers encourage municipal growth by removing one of the limitations of development—wastewater disposal.

The twin concerns of directing development to already-sewered areas while maintaining groundwater quality prompted the town of New Shoreham on Block Island, R.I., to partner with Charlestown, South Kingstown, and CE to obtain a grant from the U.S. Environmental Protection Agency (EPA) that would help them achieve both those objectives. Thus, the cumbersomely titled "Block Island and Green Hill Pond Onsite

Wastewater Demonstration Project" was born. For EPA, this project will serve as a model for other communities in "decentralizing" wastewater management (that is, beginning to manage all wastewater systems, including individual septic systems, rather than just sewered areas and municipal wastewater treatment facilities) while protecting or improving water quality. For some Block Island residents, the project means being able to take a shower every day.

For six years, Molly O'Neill and her family had been alternating shower days and sending their laundry off-island to be washed in an attempt to keep their circa 1880s cesspool from flooding their back yard. Still, if they left a toilet running during the day, they would come home to find their back yard "soupy." When O'Neill attended town meetings regarding a proposed ordinance whereby failing septic systems would have to be replaced, she learned about the wastewater demonstration project. Through the project, funding is available to homeowners who submit an application and are selected to have an advanced onsite wastewater system installed as a "demonstration" on their property. If their site is selected, the grant funding covers up to $7,500 of the costs of installation, which is roughly half the price. While that still leaves a significant sum to be paid by the homeowners, inspection of the system for two years following installation will be done by CE for free. The homeowners, in turn, agree to allow CE or the town to bring groups of homeowners, system designers, or installers to their site to see how it works. O'Neill, whose home was selected for a demonstration system that was installed last December, is unfazed by this caveat. "That was part of the agreement and that's OK with us," she says. O'Neill, who was bringing cookies to the workers as they were installing a system at another property in June, says, "The system is much, much better." In fact, the only problem she reports is that after all those years of tight conservation, she and her family aren't using enough water to keep the system recirculating. With their newfound freedom, the family is purchasing a washing machine that should alleviate matters.

"People have asked us, 'Why not a conventional system?' We figured, with the grant money, and it was better for our location—the Sands Pond wellhead protection area—I've never even looked into conventional systems," O'Neill says. In part inspired by O'Neill's success with the system, their next-door neighbors also applied for a demonstration site, and planned to have a system installed over the summer.

A Good, Clean Scrub

So what is an advanced wastewater treatment system, and what does installation entail? Unlike conventional systems, in which wastewater receives no extra treatment before it goes to the drainfield, advanced systems offer numerous treatment and drainfield options that can treat for one or both of two sewage components that impair water quality—nitrogen and pathogens. For this project, sites selected are usually places where installation is difficult. This is so that other homeowners, whose properties may not be so challenging, can feel more comfortable about installing such a system, says George Loomis, program director of the URI Onsite Wastewater Training Center, who is overseeing the

installations on Block Island. And, “The guys like a challenge,” Loomis says of David Dow, training center program manager; David Burnham, R.I. Independent Contractors and Associates president; and the other installers who were working on a particularly tricky site one June morning. The house is set on a narrow, terraced lot, with a dozen stone steps leading up to the property. There is no access across neighboring properties, so the first challenge was bringing miniature equipment, such as a mini-backhoe, onto the property to do the digging for the two filters, septic tank, connecting pipes, and electricity that the system requires. An old foundation from a previous building had to be broken up and removed from the back yard, and debris had to be cleared away. After the system was in place, the installers planned to regrade the yard.

The physical difficulties of installing the system are only part of the puzzle that the alternative system installation team must solve. Systems are designed with the amount of usage, or “flow,” in mind. Different environmental factors also play a role in the type of system installed. Because this particular site is in an environmentally sensitive area on the island, the wastewater requires a high level of treatment. At this site, both nitrogen and pathogens will be removed from the wastewater before it is allowed to drain back into the ground.

Here, wastewater travels from the house to a tank where the solids settle. The wastewater is pumped from there up the backyard to a textile filter for the first step in ultimately removing nitrogen—nitrification. The textile filter is a 4-foot-by-8-foot, 30-inch-deep watertight fiberglass box with felt-type sheets hanging vertically from racks like towels on a line. The wastewater is sprayed over the sheets, and after it has been treated in this filter, Loomis says, the wastewater is clear, with no odor: “I think you’d be hard-pressed to tell which was wastewater and which was tap water.” Next, the water is pumped back to the other tanks for more treatment (denitrification), and then to a peat filter for its final dispersal. After this process, much of the nitrogen and pathogens have been removed from the wastewater.

While this system needs to be pumped far less frequently than a cesspool—once every four to seven years, depending on the system and usage for an advanced system, compared to once every one to two years for a cesspool—the advanced system requires an annual maintenance visit lasting an hour and a half, according to Loomis. He compares the maintenance of an advanced system and a traditional system with that of a high-performance sports car and “an old Volkswagen.” The high-performance car needs more frequent oil changes and adjustments, just as the advanced system needs its pumps and filters regularly checked—“not complicated, but essential,” says Loomis.

Weighty Considerations

Despite the multiple components and regular maintenance, at this particular site, the advanced system was probably more cost-effective than a traditional system would have been, with its reliance on gravity, says Loomis. And with all materials having to be obtained off-island and brought over on the ferry, and in this case, carted up a steep hill, the transportation of the components required by a traditional system would have been quite costly. The smaller filters used by the

advanced systems are also easier to transport, and produce highly treated wastewater, which enables the use of a smaller sized drainfield.

Block Island's wastewater management ordinance requires that systems be regularly inspected and maintained. If a system fails the inspection, it must be replaced with a system that includes features that will prevent groundwater contamination, such as watertight tanks, and features that improve access and maintenance, such as access risers. If the system is in an environmentally sensitive area in a coastal pond watershed or near a drinking water supply, the regulations additionally require coliform or nitrogen removal (an advanced system). Even if a system is working, some retrofitting may be required. Homeowners whose systems fail inspection and who are not among the lucky few to have their properties chosen as demonstration sites can apply to the town for financial assistance or obtain information, developed by the town and URI, for technical and financial support. The town has also created materials for real estate agents to help them inform new homeowners and renters of requirements and ways to keep their systems functioning.

Despite the potential expense of upgrading or replacing a septic system, Claire McElderry, Block Island wastewater management inspector, reports that the response from residents has been mostly positive. "When it comes to people possibly having to spend money, they're not always too happy about it, but a lot of people have been supportive. They know it's for the protection of their own well water," McElderry says. She adds that in the first year of inspections—April 2001 to March 2002—94 percent of systems passed inspection, 4 percent needed only cleaning or repairs, and only 2 percent failed inspection.

Growing Somewhere?

"The decentralized approach steps back from sewered versus unsewered being good versus bad," Joubert says. "Sewers are still a good choice in urban areas. The key is to plan where sewers are needed to accommodate more intense growth and to set sewer boundaries that help support town land-use goals." Both Block Island and Green Hill have established core village centers with public water and sewers. Infill development in these areas may strengthen the towns' economies while minimizing environmental impacts. "In this case, the town is using the public utilities to achieve its land-use goals, not letting gradual sewer extension beyond the growth district gradually drive land-use changes," Joubert says.

Green Hill

The situation in the Green Hill Pond area is quite different from that of Block Island. Green Hill Pond, a salt pond located in South Kingstown, on the border of Charlestown, R.I., has a densely populated residential shoreline. And the populations of both towns have increased significantly in the last 10 years—Charlestown grew by 21 percent to nearly 8,000 residents, and South Kingstown grew by 13 percent to nearly 28,000 residents. In South Kingstown, 300 million gallons of wastewater are discharged into the ground each year from septic systems or cesspools, according to an article in the *Providence Journal*. Fecal

coliform bacterial contamination from human sewage has closed all of Green Hill Pond to shellfishing.

Kerry Mahoney, onsite wastewater specialist for South Kingstown and Charlestown, says that while replacing failing systems isn't inexpensive, the advantages of the project to Green Hill area residents include dramatically reducing the levels of fecal coliform bacteria infecting the pond. Also, "property values will increase, and raw sewage isn't being dumped out into coastal areas." Charlestown, which is split into three districts, is in the first year of notifying homeowners that they must have their septic systems inspected.

Sewage discharges from residential development have contaminated Green Hill Pond. *Photo by Monica Allard Cox.*

Inspectors apply to the program, and if approved, are added to a list that homeowners receive with their notices. South Kingstown is ready to start sending notices; the town has seven districts, and one per year will receive the notices. The next step for South Kingstown and Charles-town is to create an ordinance dealing with systems found to be failing, according to Brenda Dillmann, demonstration project manager for New Shoreham, South Kingstown, and Charlestown. (South Kingstown already requires that, within a year of the sale of a home with a cesspool, the cesspool be upgraded to a modern system.) How soon can the towns expect to see improvement in water quality in the pond? "It's going to take two years to get all the inspections done in Green Hill Pond watershed, and another six to eight months to replace failing systems, and then another season to see results in water testing," Dillmann says.

While the decentralized approach fits well with the New England tradition of strong local government, the state has an interest in the outcome and a role to play as well. Jim Riordan, R.I. Department of Environmental Management (RIDEM) Nonpoint Source Management Program coordinator, admits that, "The most cost-effective way to manage innovative systems is at the local level. Each community group wants a specific market basket of goods as to what they want in a system"—including land-use and environmental issues. "It's not effective to take all those things into account at the state and federal level."

Municipalities, however, are not always ideally equipped to handle a major wastewater management undertaking, involving the planning and implementation of regulations, inspections, and follow-up. "You can hardly blame them. They have to deal with everything from the school budget to the cranky old lady down the street with 100 cats at her house. They don't need one more headache," Riordan says.

The state, however, can offer municipalities assistance in managing decentralized wastewater treatment. Riordan says that it is easier for the state to

obtain funding for certain initiatives than for towns because issuing municipal bonds to pay for some of these projects “drives up their taxes and eventually they (residents) vote it down. It’s easier to pass large bonds at the state level” and then use the money for low-interest loans or grants. The grant money RIDEM is providing to municipalities to create wastewater management plans and the low-interest loans they are providing to homeowners to repair or replace their septic systems comes from a nonpoint source bond fund passed in the early 1990s. “Twenty-one communities have taken up our offer of grants, with $10,000 to $37,500 granted to each community over the past four to five years, with competitive grant solicitation once a year. We think it’s a win for everyone—financial assistance to homeowners, environmental protection, and it takes the burden off the community.”

Pipe Dreams

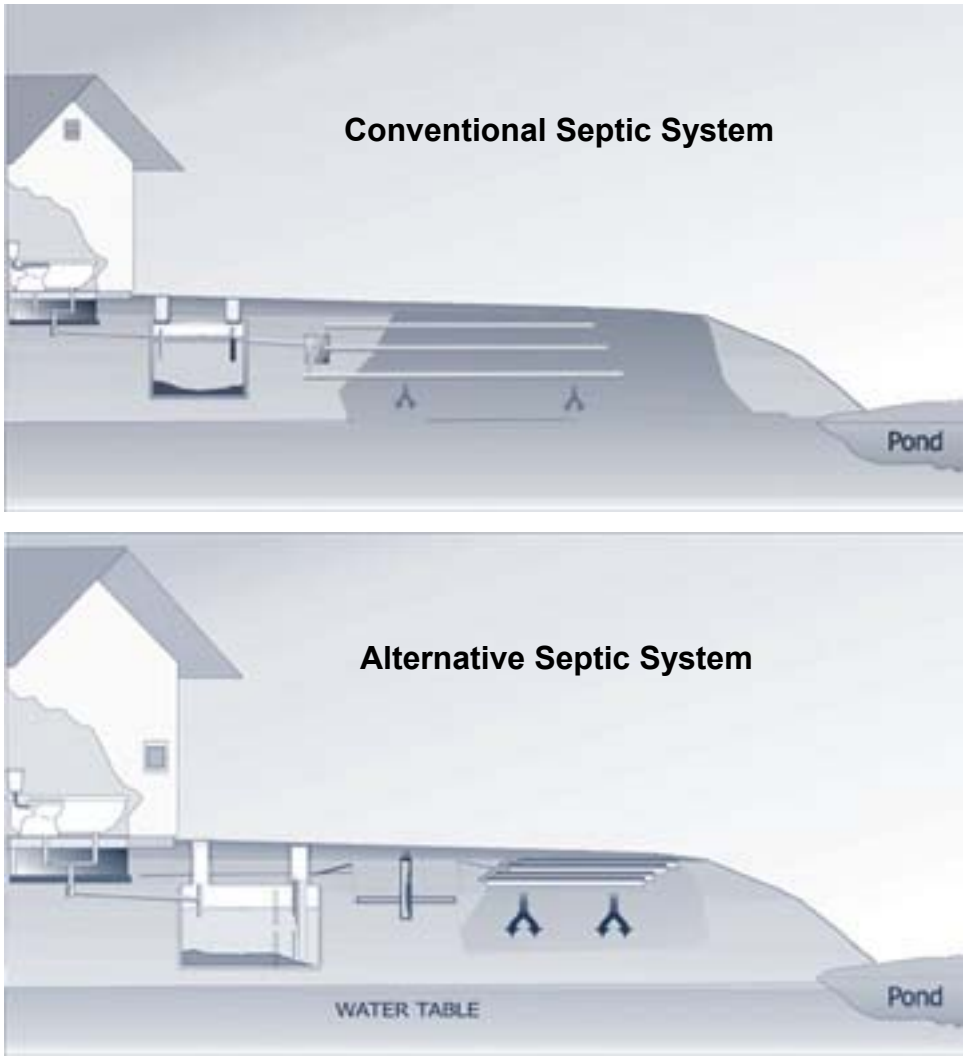
Dillmann predicts that after recent failed attempts, the General Assembly will pass statewide cesspool phase-out legislation in the next few years. Riordan predicts that the future of wastewater management will include more and more alternative systems. “The American way of life is a house in the suburbs with 2.5 kids. To maintain that lifestyle, the least you need is a good source of drinking water and wastewater disposal. Sewering costs five to 10 times more in moderate-density areas than good on-site wastewater management, and the costs to sewer are going up every day.” With innovative systems, in addition to the expense, homeowners have to give up “a little bit of liberty” in allowing inspectors onto the property, Riordan says, but, “we’ll figure out ways to make it more palatable and we’ll figure out better ways to manage them. We’ll see more of these alternative systems.”

Happy Days?

People live with the choices of their predecessors a lot longer than they intend to—the squash-colored stove that just won’t quit, the faux wood paneling they’ve been meaning to paper over—in part because making changes costs time and money. In the case of septic systems, these towns have decided that, painful though it may be, now is the time to remedy the legacy of neglect and failure of these systems to protect water quality—without encouraging even more development that could result in further stress to precious resources. Future generations, in turn, will live with the consequences of these management decisions.

The decisions being made today in wastewater management are informed by history, discovery, and invention. “It is only fairly recently that we better understand the associated impacts of sewers. The key difference is, now we have choices,” Joubert says. Where sewers may not be appropriate, “conventional systems may still be the best choice, but now, using alternative technologies, there are solutions for problem areas such as densely developed shorelines.” Joubert envisions more of a partnership among professionals, municipalities, and homeowners: “Helping homeowners understand the connection between water supply, wastewater recycling, and replenishing

groundwater recharge is more likely to encourage more sustainable water use. With comprehensive wastewater management programs, homeowners will have much more help—reminder notices for maintenance, technical support, and financial assistance in taking care of onsite systems."



With conventional systems, primary treatment occurs in the septic tank, where solids settle. Relatively clear wastewater then leaves the septic tank and moves through the distribution box to the drainfield, where wastewater moves down through the soil. Alternative systems can provide additional removal of contaminants. In this illustration, wastewater passes through a filter before dispersal in a drainfield. Also, many of these systems incorporate a shallow, narrow drainfield that usesexisting upper-level soil to provide additional treatment. *Illustration courtesy of CE.*

For more information:

■ "Block Island and Green Hill Pond Onsite Wastewater Demonstration Project" Fact Sheet. Available from CE, (401) 874-4518.

■ CE Water Quality Program Web Site: http://www.uri.edu/ce/wq

■ "Block Island Safewater" Fact Sheet. This fact sheet, designed for real estate agents to provide to renters of homes with septic systems, offers reasons and ways to conserve water and tips to help keep the septic system functioning properly. Available from Claire McElderry, Block Island Wastewater Management Inspector, (401) 466-8924.

■ Town officials defend septic system plan. *Providence Journal.* October 16, 2001, News: C-1.

■ "Septic System Information for Rhode Islanders" Fact Sheets:

- ♦ What's in your backyard?
- ♦ Maintaining your septic system
- ♦ Frequently asked questions about septic system operation and maintenance
- ♦ How to hire a contractor for septic system installation or repair
- ♦ What you should know about septic system installations
- ♦ How to order and buy a septic tank
- ♦ How to order and buy a distribution box
- ♦ Access risers and effluent filters
- ♦ Septic system additives

— All fact sheets are available at: http://www.uri.edu/ce/wq/has/html/has_resources.html or contact CE, (401) 874-4518.

—Monica Allard Cox is a Communicator for Rhode Island Sea Grant.