

“It is a question of discipline,” the little prince said to me later on.
“When you’ve finished your own toilet in the morning, then it is time to
attend to the toilet of your planet, just so, with the greatest care.”

ANTOINE DE SAINT EXUPÉRY, *THE LITTLE PRINCE*

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Are Septic Systems Up to Speed?

SEPTIC SYSTEMS

For more than 6,000 years, humankind has sought—in fits and starts—to improve the art and science of sanitation. The removal of human wastes from indoor areas has advanced rather well. The ultimate treatment and disposal of these wastes to reduce threats to public health and the environment has also progressed, but some serious challenges persist, particularly with regard to decentralized wastewater treatment systems—on-site systems (i.e., individual sewage disposal systems) or cluster systems (i.e., serving one or more dwelling units or businesses).



Decentralized systems collect, treat, and release about four billion gallons of effluent per day from an estimated 26 million facilities nationwide. More than half of these systems are more than 30 years old, installed when septic system rules were nonexistent, substandard, or poorly enforced. On-site systems serve about 25 percent of the nation’s households and account for about 33 percent of new construction. In the more rural New England states of Vermont, Maine, and New Hampshire, on-site systems serve closer to 50 percent of all households. On-site systems at converted seasonal camps and auto repair/service businesses that use engine fluids, fuels, and cleaning solvents are of particular concern.

While many municipalities have made important strides in establishing effective on-site sewage disposal regulatory programs, most have not adopted comprehensive management approaches that oversee the full range of issues—planning, siting, design, installation, operation, monitoring, and maintenance. Most do not require homeowner accountability for system performance. Improving the management and performance of decentralized wastewater treatment systems should be an essential component of your community’s source water protection program if your Source Water Assessment report has identified threats of nitrate, nutrients, and microbial contamination.

Plan for the Long Haul

Today, many on-site systems perform well, but many don’t. When they don’t, they present a serious threat to public health, drinking water resources, and aquatic life. Septic systems are among many known contributors of pathogens and nutrients to surface and groundwater. They have contributed significantly to the eutrophication of ponds, lakes, and coastal estuaries—not to mention the degradation of property values.

On-site Wastewater Treatment System



A passive or active method for treating and disposing of wastewater into the soil.



Decentralized Wastewater System Management

A comprehensive, life-cycle series of elements and activities that address public education and participation, planning, performance, site evaluation, design, construction, operation and maintenance, residuals management, training and certification/licensing, inspections/monitoring, corrective actions, recordkeeping/inventorying/reporting, and financial assistance and funding.

The *National Water Quality Inventory 1996 Report to Congress* states that “improperly constructed and poorly maintained septic systems are believed to cause substantial and widespread nutrient and microbial contamination to groundwater.” For many years, these systems were regarded as temporary installations to be replaced eventually by centralized wastewater treatment facilities. This mindset has been eclipsed by the reality that on-site systems are, for the most part, permanent approaches to treating wastewater for release and reuse in the environment.

The good news is that properly managed septic systems are a viable long-term solution for wastewater disposal. Communities that depend on septic systems need to recognize this and, if need be, take steps to adopt and implement creative, disciplined, and comprehensive management programs designed to achieve long-term sustainability.

While state and local health officials and state and federal water pollution control agencies recognize that on-site systems must be sited, constructed, and managed for the long haul, the regulation of these systems is often fragmented among state, county, and local jurisdictions. Most communities do not routinely oversee septic system operation and maintenance or detect and respond to changes in wastewater loads that can overwhelm a system. The decentralized nature of septic systems also makes it difficult to link on-site system planning and siting to larger groundwater and watershed protection efforts.

The New Approach to Wastewater Management

A conventional gravity-based on-site treatment system, which consists of a pipe from the home, a septic tank, a drainfield, and the soil, is essentially the responsibility of untrained and often uninformed system owners. As a result, system performance is monitored primarily by complaints or failures. Failures are typically caused by unpumped and sludge-filled septic tanks, which lead to clogged absorption fields and hydraulic overloading.

But decentralized wastewater management systems can be a fine solution if they are managed so that they perform effectively. In fact, many community development strategies are leaning toward the use of decentralized management approaches rather than traditional centralized infrastructures that often give rise to sprawling development, traffic congestion, environmental degradation, and diminished quality of life.

Decentralized management can deliver communities significant up-front and long-term financial savings and provide benefits in the form of preserved and restored waterways and more open space.

The new wastewater management paradigm involves a cooperative, coordinated, integrative approach to protecting public health and water resources. It includes the use of performance-based management approaches rather than traditional prescriptive code requirements for system siting, design, and operation.

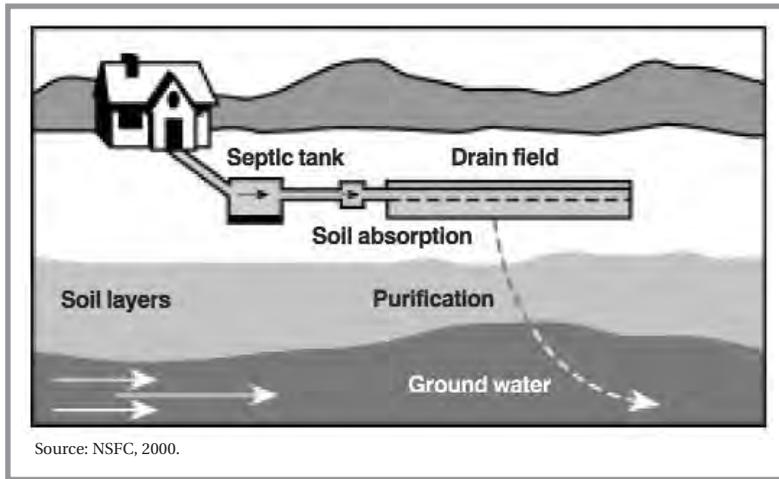


NEW IDEA

A Creative Decentralized Approach

The 120-home village of Warren, Vermont has charted an innovative path to cleaner water. It recently received a \$1.5 million grant from U.S. EPA to demonstrate a decentralized approach to planning and engineering the village wastewater system, maximizing the use of on-site systems to save money and improve community support. The new system combines management of on-site systems with a small, conventional central system, and the approach has garnered strong community support.

Already, some communities are experimenting with performance-based approaches, while retaining prescriptive requirements for technologies that have proven to be effective under a wide range of site conditions. Newer or “alternative” on-site treatment technologies are more complex than conventional systems and incorporate pumps, recirculation piping, aeration, and other features that require ongoing or periodic monitoring and maintenance.



Take a Closer Look

It is important for municipalities to take a closer look at their septic system management programs and address the following issues:

- how to be sure that septic systems are not impacting drinking water sources
- how to make sure existing septic systems will not impact source water in the future
- how to address future development so that decentralized wastewater treatment system siting, design, operation, and maintenance are optimized
- how to take into account the cumulative impacts of on-site systems on the water supply region or watershed
- how to change public and political attitudes toward the value of and need for an effective decentralized sewage management program
- how to fund an effective decentralized wastewater management program

Let's look at some of the Strategies for Action municipalities can take to minimize threats to their water supply sources from on-site wastewater treatment systems. *As a general rule, always check your state requirements and statutes.*

Strategies for Action

✓ **Consider establishing a comprehensive decentralized wastewater system management program to prevent the contamination of present and future drinking water from septic systems.**

If your water system's Source Water Assessment report has highlighted a potential source water pollution threat from septic systems, top priority should be given to this potential source of contamination. Ask some key questions:

- Have we reviewed the status of existing septic systems and projections for future development?
- Do we know the frequency of septic system failures in the community?
- Do we have an on-site system inspection program?
- Do we have septic tank pump-out requirements?
- Are we addressing wastewater management adequately to protect drinking water sources?

Responsibility for on-site wastewater treatment oversight rests with local boards of health, health directors, or sanitarians. If you don't have the expertise on board to evaluate this issue, consider hiring a consultant to work with the community on developing a comprehensive on-site management program.

✓ **Take advantage of readily available GIS map resources to inventory all septic systems in your source water protection area.**

Does your Source Water Assessment report accurately depict the septic system population in your source water area? Does your municipality have up-to-date locational information for septic systems on GIS? Has the information on your Source Water Assessment map been verified by your town sanitarian or health director? Make it a point to keep this information updated, so that your map can be a useful wastewater management planning tool.

✓ **Develop a municipal regulatory/best management program to address potential threats from on-site wastewater treatment systems and cesspools in your source water protection area.**



Cesspool

A buried, usually cylindrical, vault that acts as both a septic tank and leaching system. It is bottomless and/or has holes in the side to allow the wastewater to go into the ground. Cesspools do not provide proper primary treatment prior to discharge and are prohibited in New England states.

Take the following steps:

- evaluate existing conditions and problem areas
- evaluate future wastewater needs
- identify septage (pump-out material) disposal areas
- evaluate future growth to determine how treatment needs will be met
- identify funding sources
- propose a long-term strategy for meeting treatment needs

Such a program could include a public education strategy, a voluntary compliance program in low-risk areas, a mandatory septic system inspection and maintenance program for high-risk systems (e.g.,

advanced treatment systems, large-flow systems) and high-risk locations (e.g., drinking water supply watersheds, aquifer recharge areas, nitrogen-sensitive coastal waters), and installation specifications or guidelines.

Local governments have various options for controlling potential water supply threats. Here are a few examples:

- A **septic system maintenance ordinance** helps ensure that septic systems are inspected and pumped periodically to prevent malfunction. This type of ordinance could require that system owners:
 - hire a certified inspector to inspect their system
 - send inspection results to the town
 - use trained, certified/licensed system installers
 - have systems inspected during installation
 - close out cesspools
- A **septic system tracking program** is the computer software system a town uses to keep track of inspection reports and results, monitor compliance, and send reminders and other notices to system owners. New Web-based programs help minimize the local staff effort needed to manage the program, enabling staff to concentrate on monitoring results. Town staff may conduct spot checks to ensure local inspectors are conducting inspections properly.
- A **municipal septic system maintenance program** has the municipality assume responsibility for the maintenance and repair of septic systems. Homeowners are charged an annual fee and the municipality ensures that a pumping and maintenance schedule is followed. Or, short of the municipality taking responsibility, offer a municipally sponsored pump-out program, where the town organizes a reduced-rate pump-out program, and participation is voluntary.
- **Standards for installing and siting new septic systems** ensure that siting and design is such that potential threats to source water are minimized. Some states have very strict standards. At a minimum, these standards should include siting systems away from unsuitable areas (e.g., close to surface waters, floodplains, shallow water tables, public supply wells, poorly or excessively drained soil, areas where effluent can't be sufficiently treated before it reaches a water body).

CASE STUDY



Rhode Island Communities Take On On-site Wastewater Management

Several Rhode Island communities have adopted comprehensive ordinances for on-site wastewater management, most for the express purpose of groundwater protection. Block Island, South Kingstown, Charlestown, and Jamestown all mandate regular inspections by certified inspectors—frequency of inspection and maintenance is scheduled, as needed, based on the size, type of system, and water use.

The Block Island ordinance includes treatment standards requiring advanced treatment in drinking water supply areas, based on site conditions. Jamestown also has requirements for advanced treatment in selected areas with small lots of record and wells, and it also integrates wetlands buffer limits and stormwater controls requiring no more than 15 percent impervious cover and no net increase in runoff. Block Island, South Kingstown, and Charlestown have rules phasing out cesspools by a certain deadline.

Many elements are in place at the state Department of Environmental Management and University of Rhode Island (URI) Cooperative Extension to support town wastewater management planning and regulation, including training and certification programs for wastewater system designers, installers, and maintenance providers. URI has installed more than 50 working alternative demonstration systems on private property as repairs on difficult sites in the state. These are monitored for performance and used in training.

For more information on creative approaches to on-site wastewater approaches, see URI's Creative Community Design and Wastewater Management Manual on the Web at: www.ndwr-cdp.org/publications.cfm.

Explore new approaches for siting and managing decentralized wastewater systems.

On-site wastewater treatment authorities should routinely reevaluate and improve their standards to ensure that public health and environmental concerns are being addressed. The protection of source water protection areas may well require the application of more advanced wastewater technologies and innovative solutions.

The new direction for on-site systems involves more creative approaches to systems siting and the use of alternative systems to support more compact development on smaller lots to reduce site disturbance, minimize runoff, and preserve open space. Regulators must be attuned to current research technologies and practices, evaluate this information, and incorporate appropriate technologies into their program.

U.S. EPA's new *Voluntary National Guidelines for Management of On-site and Clustered (Decentralized) Wastewater Treatment Systems* provide a risk-based conceptual approach to on-site wastewater management. They outline a series of five management tiers in the form of model programs. Areas of a community with few problems and relatively low risk to water resources may choose to opt for a simpler, less comprehensive approach, while those with higher system densities and greater threat to source water may adopt a more protective program. These guidelines can be used to help states and communities meet water quality and public health goals, and they provide a range of cost-effective options.

Coordinate on-site system management with watershed protection efforts.

Coordinating your on-site wastewater management activities with programs and projects conducted under a watershed approach greatly enhances overall land use planning and development processes. These watershed partnerships provide mutual benefits for the participants, operating efficiencies, and public education opportunities.

Educate homeowners, businesses, and local officials about the importance of proper wastewater management and provide them with guidance on proper operation and maintenance.

Are your homeowners and businesses with septic systems fully informed about what they need to do to properly operate and maintain their systems? Are local officials in your community aware of the seriousness of protecting source water supplies and the importance of managing the widespread threat of on-site systems?

Public involvement and education are critical to successful on-site wastewater management. Engaging the public helps build support for funding, regulatory initiatives, and other elements of a comprehensive program. Educational activities directed at increasing general awareness and knowledge of on-site management procedures can improve the probability that simple, routine operation and maintenance tasks are carried out by system owners.

Sadly, the value of effective on-site wastewater management is often dismissed out of hand because it is perceived to lack political viability. This



CASE STUDY

The Massachusetts Community Septic Management Program

In 1995, the Massachusetts Department of Environmental Protection (DEP) with the help of key stakeholders revised Title 5 of the State Environmental Code to protect public health and the state's natural resources. These revisions reflect a new understanding of the impact of septic systems on the groundwaters and surface waters. Title 5 requires inspection of private on-site sewage disposal systems before properties are sold, expanded, or undergo a change in use.

To help people comply with the rules, DEP established a Community Septic Management Program to provide funding of up to \$200,000 in the form of low-cost loans to allow communities to devise a Community Inspection Plan or a Local Septic Management Plan. Both plans must always include the provision of financial assistance to homeowners using **betterment agreements**.

Community Inspection Plan

Under this plan, a community devises a plan to protect environmentally sensitive areas from contamination from on-site systems (conventional septic systems, innovative/ alternative (I/A), or cesspools). Inspections must be performed every seven years.

Community Inspection Plans must include:

- the scope and basis for the plan
- prioritization of areas to be inspected
- a proposed schedule for system inspections
- interim maintenance measures
- legal and jurisdictional bases for establishment and enforcement of the plan
- a system for monitoring inspections
- a proposed source of funding for administration and identification of revenue sources
- a proposed budget for administration and inspection
- a staffing plan
- an outreach and education strategy
- an annual status report
- an evaluation report to DEP after completing first time inspections

Local Septic Management Plan

This plan identifies, monitors, and addresses the proper operation, maintenance, and upgrade of on-site systems in a comprehensive manner. It does not require periodic inspection, neither does it relieve the obligation to have the system inspected at the time of property transfer.

Local Septic Management Plans must include:

- identification and prioritization of areas containing systems that warrant more regular monitoring and maintenance and/or upgrade
- development of a DEP-approved database system for tracking the inspection of septic systems; this database must also track whether failed systems are being upgraded in accordance with timelines outlined in Title 5
- development of requirements and a schedule for periodic pumping and other routine maintenance of systems covered by the program

Community activities suggested under the Management Plan include:

- create administrative structure to manage program
- prioritize environmentally sensitive or threatened areas
- notify the public
- prepare a priority list
- determine selection criteria for loans
- develop betterment agreements
- administer the repair of septic systems
- administer loan repayment

Betterment Loans to Homeowners

After a community has adopted an inspection or management plan of its own and has been awarded the loan amount, it is now ready to provide financial assistance to homeowners within the community. A Betterment Agreement between the community and a homeowner may be used for all costs necessary to repair or replace a failed on-site system including:

- renovating the existing system
- hooking up to existing sewer lines
- replacing traditional septic systems with an approved Title 5 innovative/alternative system

To apply for a betterment loan, the homeowner must submit an application and petition the local Board of Health. The systems that need work and that will be funded by a loan will be selected according to the priority list of that community. In addition, the municipality has the right to inspect the project, and the owner agrees not to sue the municipality for any damage to or loss of property. For a more detailed description of this program, visit the DEP Web site at:

www.mass.gov/dep/brp/www/localoff/files/cmspimpl.htm.

short-term thinking often only changes as the result of a crisis, but it can also change due to an aggressive community education effort.

Every owner of an on-site wastewater treatment system should have the facts on operation and maintenance on hand. U.S. EPA, the National Small Flows Clearinghouse, and New England state health and environmental agencies have prepared various fact sheets for septic system owners. Communities can use this material or adapt it and then make sure it is distributed appropriately. Septage haulers are usually willing partners in the education and distribution process. Local papers can be encouraged to cover the topic periodically.

Key benefits to a comprehensive (or at least adequate) on-site wastewater management program that should be emphasized include:

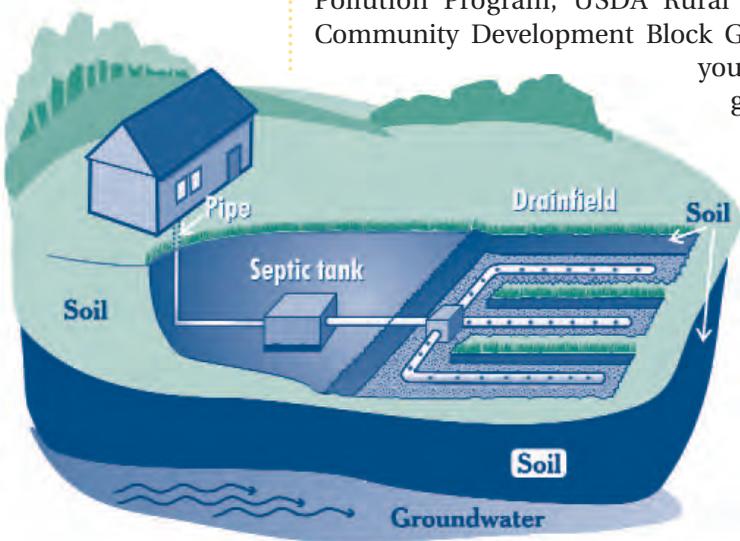
- protection of water quality and public health
- protection of the owner's investment in home and business
- increased life of the on-site service system and cost savings if a system does not need to be replaced
- avoidance of transferring water away from the source by conserving groundwater
- avoidance of the need to use a community's tax base to finance a centralized sewer system



Explore financing options.

Financing the installation and management of onsite systems can present a significant barrier for homeowners and small communities. While centralized wastewater treatment options are very expensive for communities, properly functioning decentralized management programs also come at some cost. U.S. EPA and other federal and state agencies have developed loan, cost-share, and other programs to help homeowners pay for new systems, repairs, or upgrades.

Some major federal initiatives include the Clean Water State Revolving Fund (CWSRF), the Hardship Grant Program, the Nonpoint Source Pollution Program, USDA Rural Development programs, and the Community Development Block Grant (CDBG) program. Check with your state source water protection program to learn about other funding sources. (See Chapter 9.)



Source: *A Homeowner's Guide to Septic Systems*, U.S. EPA