

## Onsite wastewater treatment systems

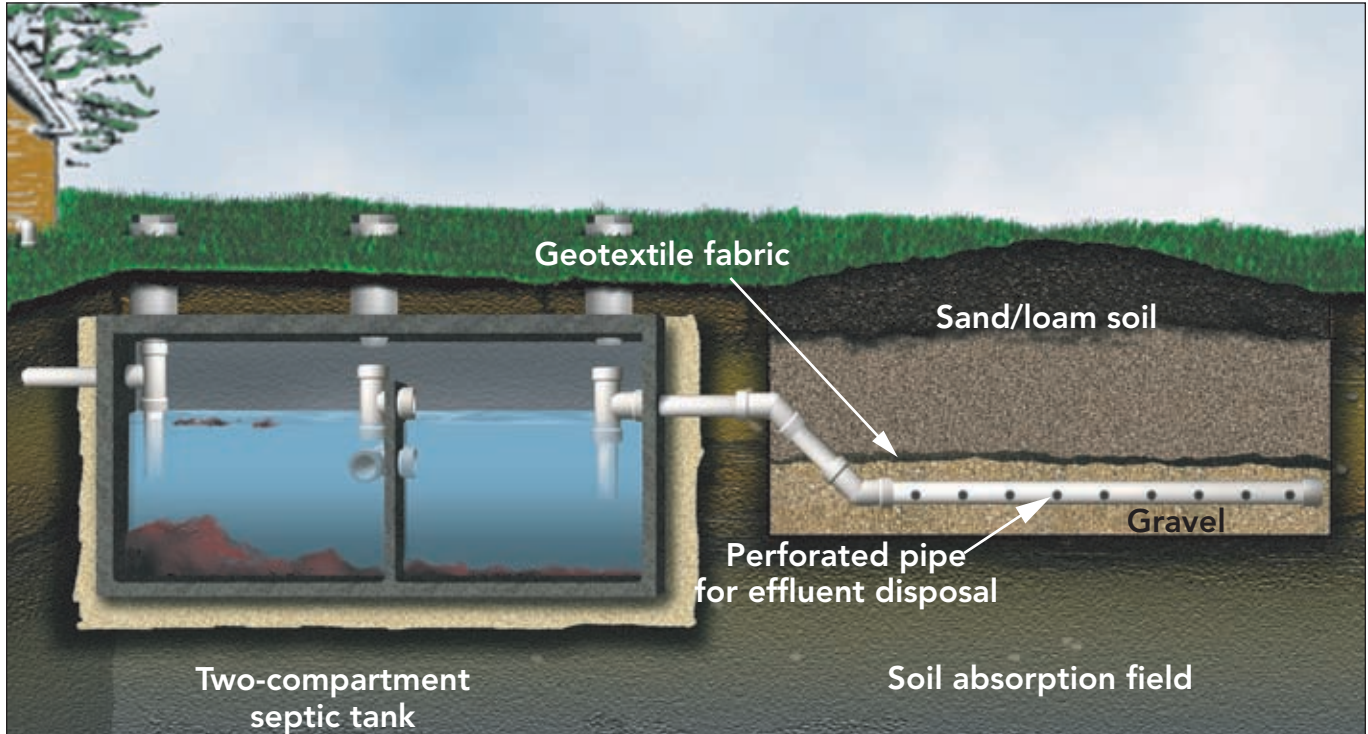


Figure 1: A septic tank and soil absorption field system.

# Operation and maintenance

**Bruce Lesikar**

Professor and Extension Agricultural Engineer  
 The Texas A&M System

If your home or business uses an onsite wastewater treatment system, commonly known as a septic system, you need to know how to operate and maintain the system properly to prevent pollution and sewage backups.

For many years, people in the United States viewed onsite wastewater treatment systems as a temporary way to manage wastewater for homes until they were connected to a centralized sewer system. In the past, about 25 percent of the U.S. homes used septic systems. Now, about 37 percent of the homes being built have onsite wastewater treatment systems. Onsite wastewater treatment systems are now considered a permanent solution for treating wastewater.

Consequently, it is vital that residents maintain them regularly so that they do not pollute the environment and pose health hazards to people.

To understand how to operate and maintain onsite wastewater treatment systems, it helps to know how they work and what factors affect them. You may wish to obtain other fact sheets in this series for specifics on a system or consult manufacturers' literature.

A conventional septic system—the most common onsite wastewater treatment system—consists of a septic tank and a soil absorption field. Wastewater from a home or business first goes to the septic tank, an enclosed watertight container where solids are separated from liquid wastes. Microorganisms in the septic tank begin consuming the organic matter, solids, and nutrients in the wastewater.

The wastewater then moves to a soil treatment area, also called a soil absorption field or drain field. There, it travels through perforated pipes to a bed of gravel or other similar material, and then into the soil, where

microorganisms consume more of the contaminants.

The water then moves through the soil and evaporates, is used by plants, or moves to groundwater.

Onsite wastewater treatment systems come in many types and sizes. Each one's operation and maintenance requirements depend on:

- ✓ The treatment method used to remove contaminants from the wastewater.
- ✓ The amount, or volume, of wastewater the system must handle.
- ✓ The strength of the wastewater, or the amount of contaminants it contains. Wastewater contains organic matter, solids, nutrients, and pathogens (disease-causing microorganisms). A residence typically has an average strength of wastewater, while businesses such as restaurants and convenience stores may have high-strength wastewater.

When a house is being built, the size of its onsite wastewater treatment system is determined by the number of bedrooms in the house (square footage) and whether water-conserving fixtures will be used. The system chosen is one that will handle the average volume and strength of wastewater for that size of house.

Onsite wastewater treatment systems differ from the centralized sewer systems used in cities and utility districts. Centralized systems collect wastewater from many houses and businesses, averaging together the amounts and strengths of the wastewater flows. The amount of wastewater from houses that use much water is offset by those that use little. Sewage from homes and businesses are mixed to produce an average strength.

In contrast, an onsite wastewater treatment system and the soil where it is located must be able to treat the amount and strength of the wastewater from that house. Your water-use habits affect how well your onsite wastewater treatment system works.

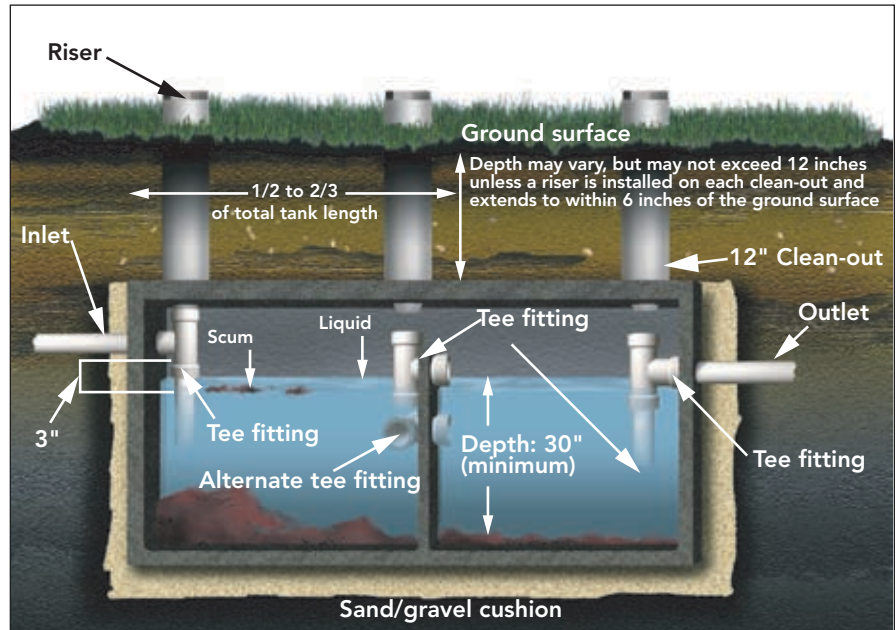


Figure 2: A two-compartment septic tank is an enclosed, watertight container where solids are separated from liquid waste.

If you use more water than average for the size of your house, your system can be overloaded with water, and malfunction. If you want to be able to use more water than average, you may need to install an oversized system.

Your wastewater will be stronger than average if you use a garbage disposal or operate a bakery or day-care facility at home. The wastewater may need additional treatment, such as with an aerobic treatment unit, sand filter or trickling filter, to bring it back to an average strength or remove most of the contaminants.

The site itself is also a factor. An onsite wastewater treatment system is a no-discharge system, which means that the wastewater must stay on the property where it is generated. All contaminants must be removed from the wastewater before it moves through the soil to groundwater.

If your soil does not treat the wastewater enough, as in problem soils such as fractured rock, Karst limestone, or gravelly sand, your onsite wastewater treatment system may need to provide additional treatment before it applies the wastewater to the soil. If the wastewater is not treated adequately before it reaches ground-

water, your water well can become contaminated.

There is one exception to the rule that all the wastewater must be treated on and applied to the property where it is generated. A cluster system legally ties several properties together for treatment and dispersal of their wastewater. A cluster system is used only when lot size, lot location, and soils make other onsite wastewater treatment system alternatives unacceptable.

## Maintenance and management

Different types of onsite wastewater treatment systems require different maintenance procedures. However, all systems need maintenance: Yours will malfunction if you do not maintain it. Follow the maintenance instructions provided for the equipment installed for your system.

These general tips can also help you keep your onsite wastewater treatment system operating:

- ✓ Do not treat an onsite wastewater treatment system as if it were a normal centralized sewer system. Items flushed down the toilet do not disappear. They must be

treated by the onsite wastewater treatment system.

- ✓ Do not use in-sink garbage grinders excessively or discard too much grease. Garbage grinders can cause sludge or scum to build up rapidly, making it necessary to clean the septic system more frequently and possibly causing it to malfunction because the wastewater is too strong for the system to handle.
- ✓ Do not use the toilet as a trash can. Do not dispose of cleaning tissues, cigarette butts, diapers, or other trash in the toilet. This wastes water and loads too many solids on the treatment system.
- ✓ Have the septic tank cleaned before sludge accumulates almost to the bottom of the tank's outlet device. If sludge or scum accumulates to this point, solids will leave the tank with the liquid and possibly clog the soil in the drain field. Sewage will then surface or back up into the house through the plumbing fixtures.
- ✓ Because it is impractical for an average homeowner to inspect a septic tank to see if it needs to be cleaned, establish a regular schedule of cleaning the septic tank every 2 to 3 years. Septic tank pumpers are equipped to clean septic tanks. Only people registered with the Texas Commission on Environmental Quality may pump and transport septic tank sludge.
- ✓ Do not build driveways, storage buildings, or other structures over the treatment works or its soil treatment area. These solid surfaces prevent access to the system for maintenance, reduce the ability of water to evaporate from the soil, and restrict air movement into the soil.
- ✓ Do not drive heavy equipment over the components of a wastewater treatment system. The equipment can crush them. The components are designed to support the soil over the top of the

system, not equipment driving over it.

- ✓ Natural bacteria are present in the wastewater to decompose the waste. Chemical additives are not necessary for a septic tank to operate. Some additives may even harm the tank's operation. Remember: The septic tank is supposed to collect solids. If you flush solids out of the tank and into the drain field by adding chemicals, the solids will plug the drain field, and you'll have to replace it.
- ✓ Soaps, detergents, bleaches, drain cleaners, and other household cleaning materials very seldom affect the operation of the system. However, use these materials in moderation. Excessive use of cleaning materials or using continuous disinfectants in the toilet bowl or disinfecting soaps and detergents may harm the microbes living in the onsite wastewater treatment system.
- ✓ If you have a water softener, do not send the back-flush water into the pretreatment component of your onsite wastewater treatment system.
- ✓ Do not come into contact with the liquid from the onsite wastewater treatment system. Nondisinfected wastewater may contain pathogens that could make you sick.
- ✓ Do not allow electrical service to be interrupted to an onsite wastewater treatment system that has mechanical components or alarms.
- ✓ Maintain a grass cover over the drain field. Plant warm-season grasses that use much water and overseed with cool-season grasses during the winter. Grasses remove a significant portion of the water, and the grass cover must be maintained. Trees also remove water and can be planted around the drain field.
- ✓ Divert away from the soil treatment area any rainwater com-

ing off driveways, other hard surfaces, and the roof. The soil treatment area is designed to manage a specific amount of water. Rainwater could fill the system, leaving no room for wastewater. Design landscaping to carry runoff water away from the soil treatment area.

- ✓ Excessive wastewater flows can overload the onsite wastewater treatment system. If you wash all your clothes on one day, you could overload the soil treatment area, causing water to pond on the ground surface. You also could flush water through the system, which can carry solids through the treatment device.
- ✓ Do not plumb the condensate drain from an air conditioning unit or commercial ice maker into the onsite wastewater treatment system. This extra water can overload the system.

## Conserve water

You can greatly reduce the amount of water entering your onsite wastewater treatment system by adopting water conservation practices:

- ✓ Because showers usually use less water, take showers instead of baths. Install a water-saving shower head that uses less than 2.5 gallons of water per minute. This practice saves both water and the energy required for the extra hot water.
- ✓ If you take a bath, don't fill the tub as high as usual. A whirlpool bathtub requires much more water. If your home has a whirlpool tub, make sure your septic system can accept the additional wastewater.
- ✓ Repair leaky faucets and faulty toilet-filling mechanisms as quickly as possible.
- ✓ Check toilets for leaks that may not be apparent. To determine if there is a leak, add a few drops of food coloring or a leak detection tablet to the tank. Do not



flush. If color appears in the bowl within a few minutes, the toilet fill or ball-cock valve needs to be adjusted to prevent water from overflowing the stand pipe, or the flapper at the bottom of the toilet tank needs to be replaced.

- ✓ Reduce the amount of water used for flushing the toilet by installing a new toilet (1.6-gallon) or a toilet tank dam. Or you could fill plastic bottles with water, cap them and lower them into the tank of the existing 3.5 gallon or larger toilet. Do not use bricks, because they can crumble and damage the fixture. Make sure the toilet dam does not contact the moving parts in the toilet tank, because this may allow too much water to flow down the drain.
- ✓ Whenever possible, operate the dishwasher with a full load.

- ✓ Do not leave the water running continuously when brushing your teeth, washing your hands, rinsing kitchen utensils, or cleaning vegetables.
- ✓ Use faucet aerators that restrict the water flow to no more than 2.2 gallons per minute.
- ✓ Keep a container of drinking water in the refrigerator instead of running the faucet until the water turns cool.
- ✓ Insulate all hot-water pipes to avoid long delays of wasted water while waiting for heated water.
- ✓ Ask your city, county, or local government about their programs to conserve water and how they can help you save water.

### Summary

Onsite wastewater treatment systems are a permanent solution to

our wastewater management needs. However, you cannot treat these systems as if you are connected to a centralized sewer because you do not have the averaging effect of being connected to a system with your neighbors.

- ✓ To achieve an average flow, change your personal habits that send too much water continually or on a single day.
- ✓ Or, install a system that can manage more wastewater.
- ✓ Remember that an onsite wastewater treatment system is designed to handle a specific volume of organic matter. Placing additional solids into the system can cause it to malfunction. Items flushed down the drain do not just disappear. The onsite wastewater treatment system must treat these items and distribute the water into the soil.

---

The Onsite Wastewater Treatment Systems series of publications is a result of collaborative efforts of various agencies, organizations and funding sources. We would like to acknowledge the following collaborators:

Texas State Soil and Water Conservation Board	USEPA 319(h) Program
Texas On-Site Wastewater Treatment Research Council	Texas AgriLife Extension Service
Texas Commission on Environmental Quality	Texas AgriLife Research
Consortium of Institutes for Decentralized Wastewater Treatment	USDA Natural Resources Conservation Service

---

### Texas A&M AgriLife Extension Service

*AgriLifeExtension.tamu.edu*

More Extension publications can be found at *AgriLifeBookstore.org*

Educational programs of the Texas A&M AgriLife Extension Service are open to all people without regard to race, color, sex, disability, religion, age, or national origin.

---

The Texas A&M University System, U.S. Department of Agriculture, and the County Commissioners Courts of Texas Cooperating.

Produced by Texas A&M AgriLife Communications

---