

Septic Systems and Their Maintenance

Why Use a Septic System?

Septic systems are used when sewage treatment plants are not accessible. They safely treat and dispose of wastewaters produced in the bathroom, kitchen, and laundry. These wastewaters may contain disease-causing germs and pollutants that must be treated to protect human health and the environment. Although septic systems are usually a permanent solution to wastewater treatment and disposal, they sometimes serve as a temporary solution until sewer lines are installed.

What Is a Septic System?

There are a number of different septic systems, each with its own design. Two conventional septic systems installed in the North Georgia Health District are gravel and high capacity chambered systems ([Figure 1](#)). *Each type of typical system consists of three main parts: the septic tank, the drainfield, and the soil beneath the drainfield.*

The septic tank is a watertight concrete box about 9 feet long and 5 feet tall. It is buried in the ground just outside the home. The tank is usually pre-cast from reinforced concrete and can be purchased from concrete manufacturers. While typically designed with a 1,000-gallon liquid capacity, the size of the tank is legally determined by the number of bedrooms in the home and whether or not a garbage disposal is planned for the home. The tank temporarily holds household wastes and allows a small amount of pretreatment to take place ([Figure 2](#)).

The tank is connected to the drainfield by a solid pipe. A typical drainfield consists of several trenches excavated into the subsoil. In many systems, a distribution box or a flow divider helps move wastewater to each trench. In most conventional septic systems, the trenches are 3 feet wide, 2 to 3 feet deep, and 8 feet apart. In each trench, a 1-foot thick layer of washed gravel placed around a 4-inch-diameter perforated distribution pipe. After the trenches are covered with soil, the area must be landscaped to keep surface waters from ponding over the drainfield.

The drainfield and the soil beneath it are often called the nitrification field or the soil absorption field. This field purifies the wastewater by removing the germs and chemicals before they reach the groundwater or any adjacent surface waters such as rivers, lakes, and estuaries.

Figure 1. A conventional septic system.

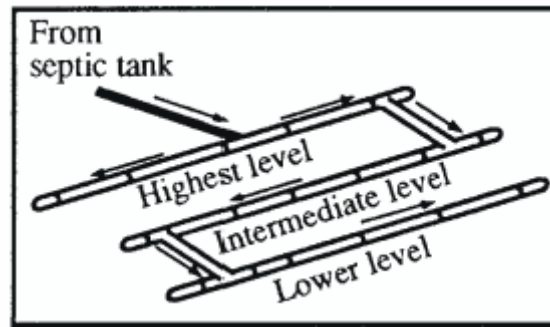
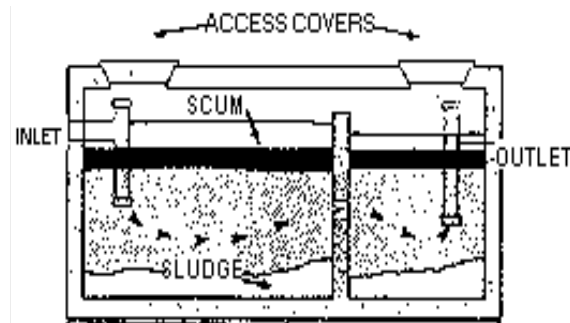


Figure 2. A two-compartment septic system.



What Takes Place in the Tank?

All of the wastewaters from the home should flow into the septic tank. Even waters from the shower, bathtub, and washing machine can contain disease-causing germs or environmental pollutants. As wastewater flows into the tank, the heavier solid materials settle to the bottom (forming a sludge layer), the lighter greases and fats float to the top (forming a scum layer), and the liquid (sewage effluent) flows out of the tank. An outlet baffle (or a sanitary tee at the outlet end) prevents solids from flowing out with the liquids. The tank's primary purpose is to retain the solids while releasing sewage effluent to the drainfield.

What Happens in the Drainfield and the Soil?

The real treatment of the wastewater occurs in the soil beneath the drainfield. Sewage effluent flows out of the tank as a cloudy liquid that still contains many disease-causing germs and environmental pollutants. When the effluent flows into the perforated pipe in the trenches, it passes through the holes in the pipe, and then trickles down through the gravel to the soil. As effluent enters and flows through the gravel and soil, many of the bacteria that can cause

diseases are filtered out. Some of the smaller germs, such as viruses, are adsorbed by the soil until they are destroyed. The soil can also retain certain chemicals, including phosphorus and some forms of nitrogen.

Where Can a Septic System Be Used?

Unlike a sewer system, which discharges treated wastewater into a body of water, the septic system depends on the soil around the home to treat and dispose of sewage effluent (Figure 3). For this reason, a septic system can be used only on soils that will adequately absorb and purify the effluent. If a septic system is installed in soil that cannot do so, the effluent will seep out onto the soil surface overlying the drainfield. In addition to causing an unpleasant smell, this untreated effluent can pose health problems.

In some cases where the soils do not adequately absorb the wastewater, the toilets and sinks might not drain freely. If the soil can absorb the effluent but not treat it, the sewage may contaminate the groundwater.

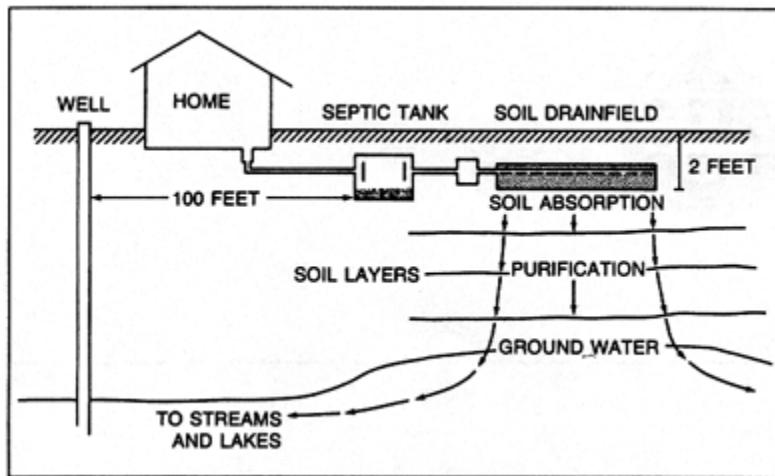


Figure 3. Wastewater treatment and disposal in the soil.
(Adapted from Tyler *et al.*, 1977)

How Do I Know If My Site Is Suitable for a Septic System?

There are more than 100 kinds of soils found in the North Georgia Health District, more than one of which is often found within a 1/2-acre lot. Because many of these soils are unsuitable for septic systems, you should always have a level 3 soils study performed on the property. If you are considering purchasing a piece of land for a home site, you can obtain additional information from your county Environmental Health office about soil evaluations.

How Large Is a Typical Drainfield?

Usually, the drainfield can fit within the front yard or the backyard of a typical 1-acre home site. The precise area requirements will depend upon the kinds of soils at the home site, the size of the house (the number of bedrooms), and the topography of the lot. A site with clayey, slowly permeable soils needs a larger drainfield to absorb the sewage effluent than does a site with sandy, permeable soils. Adequate land area must be available to isolate the entire septic system from any nearby wells, springs, streams, lakes, or other bodies of water. There also must be enough area to install a replacement system in case it is ever needed. This replacement area must meet the same soil and site requirements as the original system.

What Legal Requirements Regulate Septic Systems?

Your county along with State Regulations *Chapter 290-5-26* requires that soils be evaluated by a certified soil classifier and that an on-site sewage management (septic) permit be issued before any grading or clearing of a lot occurs. Also, the installation must be approved by your county Environmental Health Department before the septic system can be covered and put into use.

What Maintenance Is Needed?

Both the septic tank and the drainfield must be properly maintained. With conscientious maintenance, the system should work correctly for many years. Such maintenance begins with water use and waste disposal habits. Since your family will determine which materials enter the system, you should establish rules for proper use and maintenance.

The suggestions outlined below will save you anguish and money when applied to most conventional systems. More sophisticated systems require additional maintenance, possibly at much greater cost. Also, recent rule changes now require owners of some alternative septic systems and community septic systems to hire a certified operator to maintain their systems. For more information about these requirements, contact your local health department.

Tips for Maintaining Your Septic System

- Do not put too much water into the septic system; typical water use is about 50 gallons per day for each person in the family.
- Do not add materials (chemicals, sanitary napkins, applicators, and so on) other than domestic wastewater.
- If your septic tank is properly sized for a garbage disposal, restrict the use of your garbage disposal.
- Do not pour grease or cooking oils down the sink drain.
- Acquire a diagram from your county Environmental Health Department showing the location of your tank drainfield and repair area.
- Periodically have the solids pumped out of the septic tank.
- Maintain adequate vegetative cover over the drainfield.
- Keep surface waters away from the tank and drainfield.
- Keep automobiles and heavy equipment off the system.
- Do not plan any building additions, pools, driveways, or other construction work near the septic system or the repair area.

Will I Need to Pump the Tank?

After a few years, the solids that accumulate in the septic tank should be pumped out and disposed of at an approved location. If not removed, these solids will eventually overflow, accumulate in the drainfield, and clog the pores (openings) in the soil.

This blockage severely damages the drainfield. While some clogging of soil pores slowly occurs even in a properly functioning system, excess solids from a poorly maintained tank can completely close all soil pores so that no wastewater can flow into the soil. The sewage effluent will then either back up into the house or flow across the ground surface over the drainfield. If this happens, you may need to construct a new drainfield on a different part of your lot. Pumping the septic tank after the soil drainfield has become completely clogged will not rejuvenate the system. It will provide only a few days reprieve until the tank fills up again.

How Will I Know When to Pump the Tank?

The frequency with which you will need to pump depends on three variables: the size of your tank, the volume of your wastewater, and the solids content of your wastewater. If you are unsure about when to have the tank pumped, observe the yearly rate of solids accumulation. The tank should be pumped if the sludge layer has built up to within 25 to 33 percent of the liquid capacity of the tank. Therefore, a typical 1,000 gallon tank with a 4-foot liquid capacity should be pumped when the solids are 1-foot thick in the bottom of the tank. If the tank is not easily accessible, you may wish to inspect and pump it according to the frequency guidelines in [Table 1](#). Your county Environmental Health Department should be able to tell you the size of your tank. When inspecting the tank, check the sanitary tee or the outlet baffle to be sure that it has not broken off and dropped into the tank. Also, if you have a compartmented tank, be sure to have both compartments of the tank pumped.

Tank Size (gallons)	Number of People Using the System				
	1	2	4	6	8
900	11	5	2	1	<1
1,000	12	6	3	2	1
1,250	16	8	3	2	1
1,500	19	9	4	3	2

Source: Adapted from "Estimated Septic Tank Pumping Frequency," by Karen Mancl, 1984. *Journal of Environmental Engineering*. Volume 110.

If the septic system is not used very often (as in an infrequently used vacation home with a correctly sized tank), it will probably not need to be pumped as frequently as indicated in the table. If you use a garbage disposal, the tank may need to be pumped more frequently. After a few inspections, you should be able to adjust the schedule according to the rate at which solids accumulate.

What Should Not Be Put into the Septic System?

Make sure you are aware of the types and amounts of extra waste materials that are poured down the drain. Limiting the use of your garbage disposal will minimize the flow of excess solids to your tank. Garbage disposals usually double the amount of solids added to the tank.

Do not pour cooking greases, oils, and fats down the drain. Grease hardens in the septic tank and accumulates until it clogs the inlet or outlet. Grease poured down the drain with hot water may flow through the septic tank and clog soil pores completely.

Pesticides, paints, paint thinners, solvents, disinfectants, poisons, and other household chemicals should not be dumped down the drain into a septic system because they may kill soil microorganisms that help purify the sewage. Also, some organic chemicals will flow untreated through the septic tank and the soil, thus contaminating the underlying groundwater.

Are Septic-Tank Cleaners Necessary?

No. These products include biologically based materials (bacteria, enzymes, and yeast), inorganic chemicals (acids and bases), or organic chemicals (including solvents). They do not reduce the need for regular pumping of the septic tank. Some of these products contain organic chemicals and may even damage the drainfield or contaminate the groundwater and nearby wells.

Is Special Care Needed for the Drainfield?

Yes. The drainfield does not have an unlimited capacity. The more water your family uses, the greater the likelihood of problems with the septic system.

Water conservation practices can help reduce the amount of wastewater generated in the home. Periodically check your plumbing for leaky faucets and toilets. Uncorrected leaks can more than double the amount of water you use. Many soils that can absorb the 200 to 250 gallons of sewage usually produced each day by a family of four would become waterlogged if an extra 250 gallons were added.

Be sure that foundation drains, roof waters, gutter waters, and surface waters from driveways and other paved areas do not flow over the septic tank or the drainfield. Careful landscaping can help direct excess surface waters away from the system.

What about Alternatives to the Conventional System?

Other types of septic systems are sometimes used on sites where the soil is not suited to a conventional system. Where soils are too wet or too shallow for the conventional system, the drainfield might be placed very close to the ground surface in the upper layers of the soil. In some wet soils, artificial drainage around the septic system lowers the level of the shallow water table.

On some soils that are not deep enough to provide adequate treatment of the sewage effluent, it may be possible to use an aerobic treatment unit (ATU) to supplement the soil's treatment capacity.

Summary

The septic system is an efficient, inexpensive, and convenient method for treating and disposing of household wastewater. Because not all soils are suited for conventional systems, a comprehensive soil and site investigation must be performed before you purchase any land.

Septic systems will adequately absorb and purify wastewater if they are properly maintained. A few precautions can save you anguish and money. Reducing water use, avoiding grease, pumping the tank periodically, and properly landscaping the yard to keep surface water away from the tank and drainfield are inexpensive precautions that can help assure your system a long life. When properly located and maintained, your system should provide years of trouble-free, low-cost service.

Reference

Tyler, E. T., R. Laak, E. McCoy, and S. S. Sandhu. 1977. "The Soil as a Treatment System." in *Home Sewage Treatment*. ASAE publication 5-77.