

News Your Customer Can Use

by

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How Septic Systems Work

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What is a Septic System:

Households that are not served by public sewers usually depend on septic systems to treat and dispose of wastewater. There are many different types of septic systems that fit a wide range of soil and site conditions. In our area the most common type of system is a gravity fed system. If your drain field happens to be up hill you may need a "pump assist" system.



A Typical Septic System has Three Main Parts:

The Septic Tank — A septic tank's purpose is to separate solids from the wastewater, store and partially decompose as much solid material as possible, while allowing the liquid (or effluent) to go to the drainfield. A typical home will have a 1000 gallon tank.

The Drainfield — After solids settle in the septic tank and as decomposition continues, the liquid wastewater (or effluent) is discharged to the drainfield, also known as an absorption or leach field.

The Soil — The soil below the drainfield provides the final treatment and disposal of the septic tank effluent. After the wastewater has passed into the soil, organisms in the soil treat the effluent before it percolates downward and outward, eventually entering ground or surface water. The type of soil also impacts the effectiveness of the drainfield; for instance, clay soils may be too tight to allow much wastewater to pass through and gravelly soil may be too coarse to provide much treatment.



Why Septic Systems Fail:

A failing system can become a source of pollution and public health concern, causing property damage, ground (well water) and surface water pollution and disease. Once your septic system fails to operate effectively, you may need to replace it, costing you thousands of dollars. Therefore, it makes good sense to understand and care for your septic system.

Your daily habits can greatly affect your septic systems performance. Using more water than the system was designed to handle can cause a failure. Disposal of chemical or excess organic matter, such as that from a garbage disposal, can destroy a septic system. Cloths soaps, softeners and bleaches can

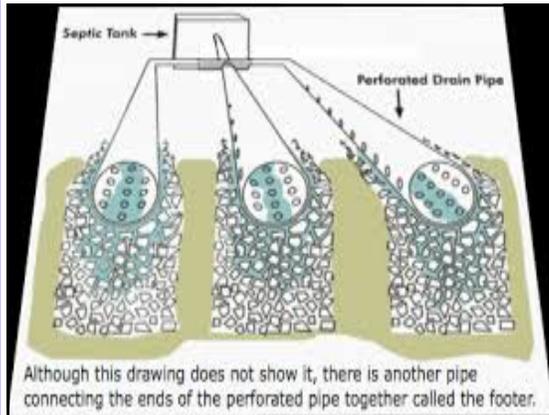
kill the bacteria which contribute the biological actions which cause proper decomposition. Lint from cloths do not settle in septic tanks and over time can clog the leach field. Modern materials such as polyesters do not decompose as cottons and wools do.

If the liquid effluent cannot soak into the soil surrounding the leach field, sewage may back up into the system and overflow into the house or puddle on the surface of the ground. There are several possible causes for this problem.

1. Poor Soil Conditions and Septic System; Faulty Design or Installation of Septic Systems. A leaching system placed in unsuitable soil, a system that is too small for the house it serves, or an improperly constructed system may lead to early failure.

2. Soil Clogging and Septic System; If sludge or scum is allowed to escape into the distribution box and from there into the leach field, the soil will quickly become clogged. If this happens, the liquid will no longer soak, or percolate, into the soil. This condition can be caused by broken baffles in the septic tank that allow sludge or scum to escape. Failure to have the tank pumped can also lead to a situation where the sludge and scum overwhelm the baffles.

3. High Water Table and Septic System; During abnormally wet seasons groundwater may rise into the leach field and force sewage upward to the ground surface. This condition may mean the system has to be re-installed at a higher level. It may also be possible to intercept the high groundwater with a series of drains around the system called "curtain drains".



Maintaining Your System

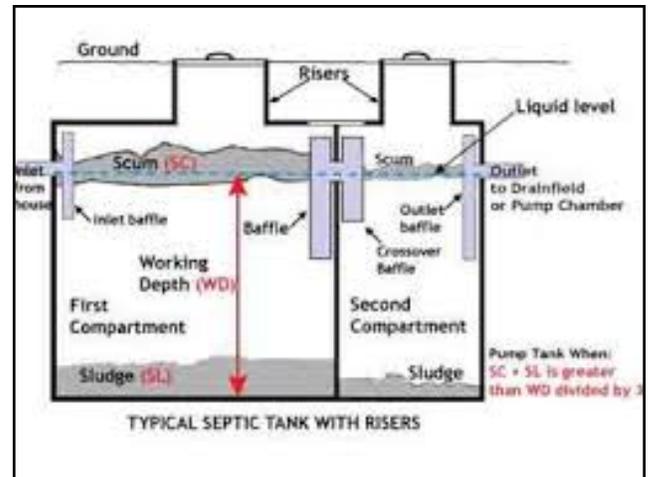
The following maintenance tips can help your system provide long-term, effective treatment of household waste.

1. Inspect and Pump Frequently; The most important step to maintaining your septic tank is to remove sludge and scum build-up before it washes into the drainfield. How often your tank needs pumping depends on the size of the tank, the number of people in your household, the volume of water used, and amount of solids (from humans, garbage disposals, and any other wastes) entering the system. Generally, tanks should be pumped every 3 to 5 years.

2. Use Water Efficiently; Excessive water is a major cause of system failure. The soil under the septic system must absorb all of the water used in the home. Too much water from laundry, dishwasher, toilets, baths, and showers may not allow enough time for sludge and scum to separate. The less water used, the less water entering the septic system, resulting in less risk of system failure.

3. Minimize Solid Waste Disposal; What goes down the drain can have a major impact on your septic system. Many materials do not decompose and consequently, build up in your septic tank. If you can dispose of it in some other way, do so, rather than putting it into your system.

4. Keep Chemicals Out of Your System; Keep household chemicals out of your septic system, such as caustic drain openers, paints, pesticides, photographic chemicals, brake fluid, gasoline, and motor oil. Improper disposal of toxic chemicals down the drain is harmful to the environment, as well as the bacteria needed to break down wastes in the septic system.



4. Roots and Clogging of Septic System; The roots of trees and bushes planted too close to the system can sometimes enter and block the pipes of the system. Removal of the plants and clearing the pipes of the roots is usually required.

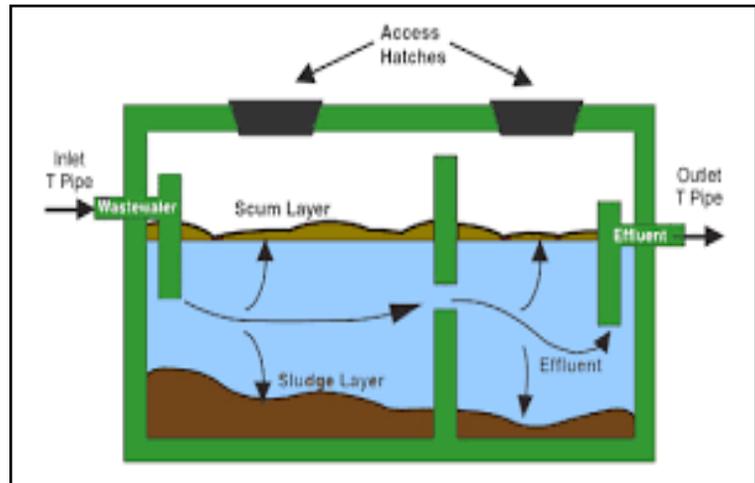
5. Physical Damage to Septic System; Trucks or heavy equipment passing over the system can damage pipes and joints to the point of rendering the system inoperable. You should be aware of the location of the system and direct traffic to avoid such damage.

5. Septic System Additives; Adding a stimulator or an enhancer to a septic tank to help it function or "to restore bacterial balance" is not necessary. The naturally occurring bacteria needed for the septic system to work are already present in human feces.

Signs of Failure

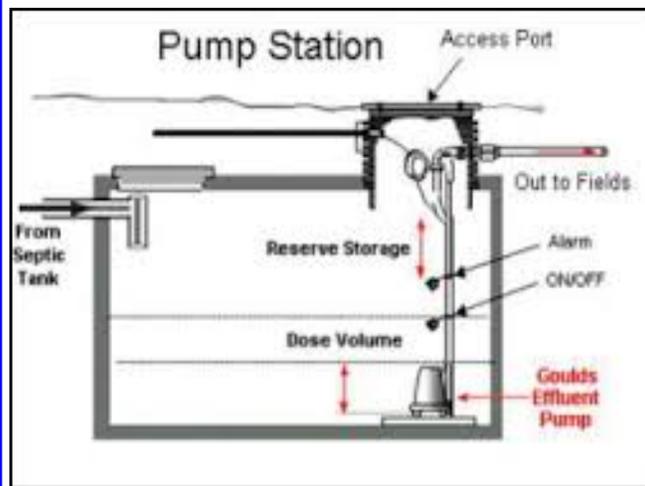
Septic systems are designed to provide long-term, effective treatment of household waste when operated and maintained properly. However, most systems that fail prematurely are due to improper maintenance. Following are signs that your system need attention.

1. Odors, surfacing sewage, wet spots, or lush vegetation growth in the drainfield area.
2. Plumbing or septic tank backups (often a black liquid with a disagreeable odor).
3. Slow draining fixtures.
4. Gurgling sounds in the plumbing system.
5. If you have a well and tests show the presence of coliform (bacteria) or nitrates, your drainfield may be failing.
6. Lush green grass over the drainfield, even during dry weather.



What About Pump Stations?

If your leach field is uphill from your home or if you have a pressurized sewer system you will have a Pump Tank. If you have a pump tank that is part of your septic system, understand that this is the only



way the wastewater gets to the drainfield. As long as your septic system is properly maintained, your drainfield should last a long time. Improper maintenance (not pumping the septic tank) will allow the sludge to collect in the pump tank affecting the pumps operation, and sooner or later the sludge will end up being pumped into the drainfield. This pump will soon fail because it was not made to pump sludge.

Spend a little more money and have your pump tank cleaned out when you pump your septic tank. If your pump tank does not have a ground level access port like our illustration shows, you may want to consider having one installed for service and occasional inspections.

Fore more information check:

Septic System Basics:

http://www.co.thurston.wa.us/health/ehoss/septic_basics.html

Maintaining your Septic System:

http://www.nesc.wvu.edu/pdf/ww/septic/pl_fall04.pdf

Environmental Protection Agency:

<https://www.epa.gov/septic>

The Septic Tank

The typical septic tank is a large buried rectangular or cylindrical container made of concrete, fiberglass, or polyethylene. A septic tank's purpose is to separate solids from the wastewater, store and partially decompose as much solid material as possible, while allowing the liquid (or effluent) to go to the drainfield. Wastewater from your toilet, bath, kitchen, and laundry flows into the tank and remains there for up to 24 hours (known as the retention time) before it passes to the drainfield. This helps prevent clogging of the drainfield, which can lead to failure and costly repairs.

Give It Time to Sink and Float

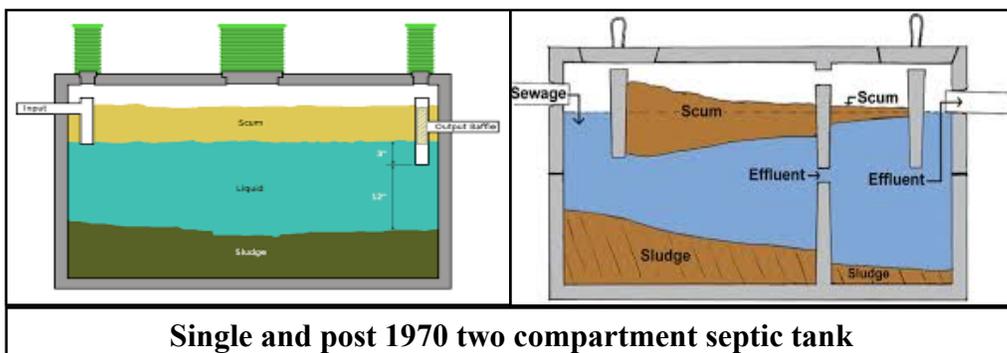
The retention time is necessary to allow the solids to properly separate from the liquids—heavy solids settle to the bottom as sludge and the lighter particles rise to the top, forming a scum layer. Although bacterial action partially decomposes some of the solids, up to 50 percent remain in the tank.



Until the mid-1970's, septic tanks had one compartment; however, current regulations require two chambers, which do a better job of settling solids. In residential systems, the tank size is determined by the number of bedrooms and should be enough to handle approximately three years worth of sludge and scum. In commercial establishments, the tank size is determined by the amount of daily flow.

As wastewater flows into the tank, a tee (or baffle) at the tank's inlet pipe slows the incoming wastes and reduces the disturbance of the settled sludge. The outlet tee keeps the solids or scum in the tank. In tanks installed since 1995, an effluent filter is attached to the outlet baffle (going to the drainfield) to keep solids in the tank instead of entering the drainfield. Effluent filters are an excellent addition to an older tank, and can be installed by a pumper or other septic system professional.

As the volume of sludge and scum builds up, there is less space and time for the solids to separate before the wastewater leaves the tank, which causes the system to be less effective.



Single and post 1970 two compartment septic tank

With not enough time for solids to settle, they can pass into the drainfield with the wastewater (or clog the effluent filter, if there is one). This causes the drainfield to gradually plug and eventually fail, causing sewage to back up into the house or effluent to surface outside. Also, the closer the thickening scum and sludge layers come to the outlet tees, the greater the risk that they can plug the tank inlet or pass into the drainfield.

Consequently, it is important that solids be removed by periodic pumping, so they do not overflow into the drainfield. Most septic tanks need to be pumped every 3 to 5 years, depending on the tank size and the amount and type of solids entering the tank.

All tanks should have accessible covers for checking the condition of the tees and for pumping both

Average Wastewater Volume per Day (in Gallons)	Minimum Capacity Required (in Gallons)
0 – 500	900
601 – 700	1200
801 – 900	1500
1001 – 1240	1900
2001 – 2500	3200
4501 – 5000	5800

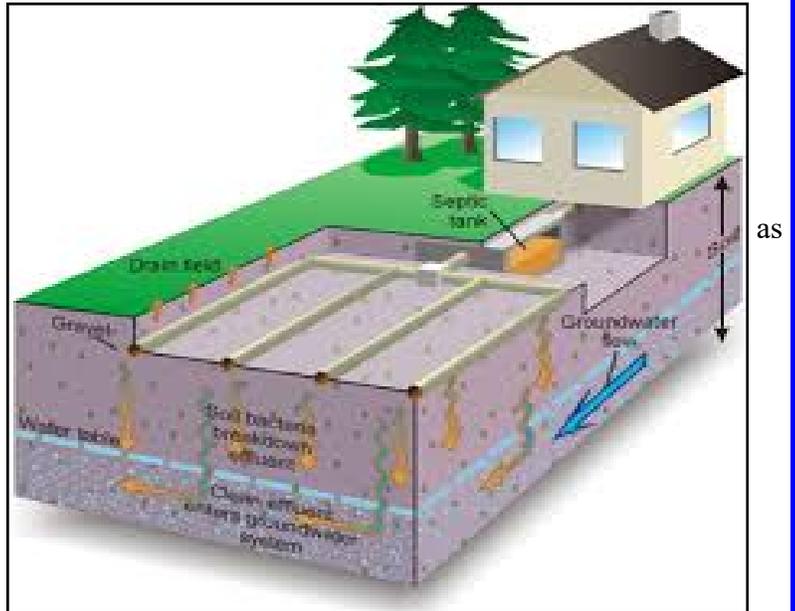
compartments. To eliminate the time and nuisance of digging down to the access covers, risers can be installed. The riser(s) should be secure to prevent accidental entry into the tank, and should also be watertight to prevent groundwater from entering the riser cavity, which may cause the tank to flood.

The Drain Field

The drainfield is a network of perforated pipes (or "laterals") laid in gravel-filled trenches or beds. After solids settle in the septic tank, the liquid wastewater (or effluent) is discharged, either by gravity or pressure, to an absorption field, also known as a drainfield or leachfield. In most gravity systems the wastewater first flows into a distribution box (d-box) or tee, which then disburses the effluent equally among the trenches in the drainfield, which is where the final treatment takes place.

Effluent trickles out of the pipes, through the gravel layer, and into the soil where further treatment occurs. The soil filters the wastewater it passes (or "percolates") through the pore spaces and the soil microbes treat it before it eventually enters the groundwater.

The drainfield is generally located in a stretch of lawn in the back or side yard of a property. The size and type of drainfield depends on the estimated daily wastewater flow and local soil conditions.



The Soil

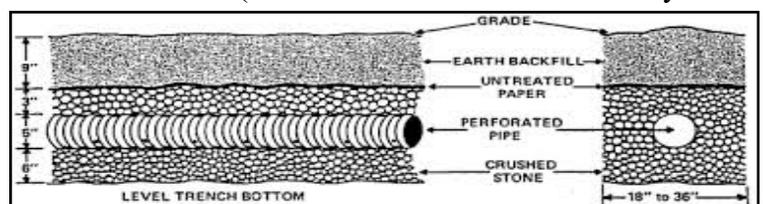
The soil below the drainfield provides the final treatment and disposal of the septic tank effluent. After the wastewater has passed into the soil, organisms in the soil treat the effluent before it percolates downward and outward, eventually entering ground or surface water. These processes work best where the soil is somewhat dry, permeable, and contains plenty of oxygen for several feet below the drainfield. The type of soil also impacts the effectiveness of the drainfield; for instance, clay soils may be too tight to allow much wastewater to pass through and gravelly soil may be too coarse to provide much treatment.



Protecting your Drainfield

Once a septic system has failed, it is too late to solve the problem by pumping your tank. A new drainfield will have to be installed at a different location. To ensure maximum life of your drain field;

- 1. Keep heavy equipment off** your drainfield. Cars and heavy equipment should not park or drive over the drainfield; doing so can crack pipes. Create a barrier if accessible to cars, livestock, or heavy equipment.
- 2. Keep water usage to a minimum.** Drainfields do not have an unlimited capacity. When there is more water than it can absorb, the system is unable to drain and filter effluent before it reaches groundwater.
- 3. Divert water away** from the drainfield. Water runoff from roofs and drainage ditches can saturate the soil. Drainfields are most efficient when the soil beneath the drainfield is not saturated.
- 4. Keep trees and shrubs at least 30 feet** away from the drainfield. (NOTE: Some soil conditions may require that plantings be kept an even greater distance from the drainfield.) Trees and shrubs generally have extensive root systems that seek out and grow into wet areas, such as drainfields. This can lead to clogged and damaged drain lines.



5. Plant only grass or shallow-rooted plants over the drainfield.

This will prevent soil erosion.

6. Protect your replacement area. It may be the only area with acceptable soil conditions in case you need to replace, repair, or add on to the drainfield. All of the above suggestions apply to the replacement area as well.

7. Don't build over your drainfield. This includes patios, carports, and other structures. You may damage the drainfield.

8. Don't pave over the drainfield. Drainfields need air to function properly. Oxygen is needed by bacteria to break down and treat sewage.

9. Don't dig in your drainfield. Damage to the pipes can occur.

10. Keep large animals and livestock off the drainfield. Soil compaction prevents oxygen from getting into the soil and prevents water from flowing away from the drainfield.

11. Don't use landscaping plastic over the drainfield. Air is necessary for the drainfield to function efficiently.

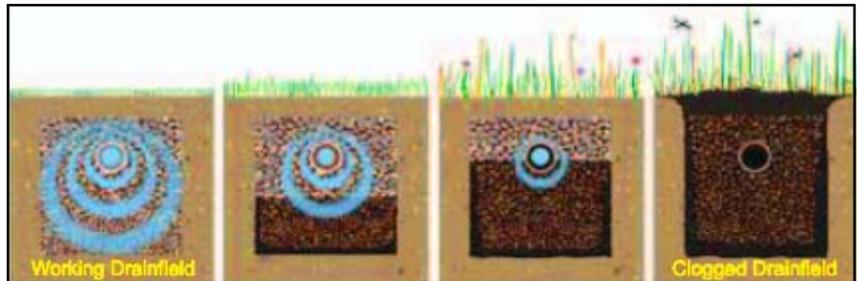
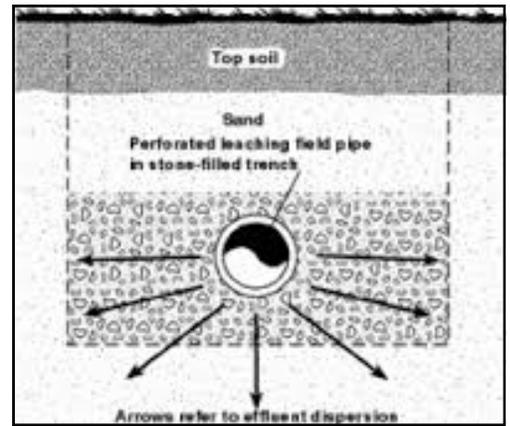
12. Don't plant a vegetable garden over a drainfield. You risk the possibility of food contamination.

13. Don't install an irrigation system in the drainfield. Neither should the irrigation system drain toward the drainfield.

Signs of Failure

If you notice any of the following signs of a potential failure or if you suspect your septic system may be having problems, contact a [qualified septic professional](#) for further diagnostics.

1. Odors, surfacing sewage, or wet spots in the drainfield area.
2. Plumbing or septic tank backups (often a black liquid with a disagreeable odor).
3. Slow draining fixtures.
4. Gurgling sounds in the plumbing system.
5. If you have a well and tests show the presence of coliform (bacteria) or nitrates, your drainfield may be failing.
6. Standing liquid over the drainfield, even during dry weather. This may indicate an excessive amount of effluent is moving up through the soil, instead of downward.



Excess grass growing on a improperly draining system



Clogged Drainfield Line

