

Water Pollution Solutions



Septic Systems

People who live in a home served by a sanitary sewer system place their trust in professionals whose jobs are to design, monitor and maintain the sewer systems. But for others who must utilize an on-lot individual sewage system, commonly called a septic system, the proper use and maintenance of the system is the responsibility of each homeowner. This publication is intended to help you understand, operate and maintain your septic system.

Septic systems originally were used to serve individual homes in rural areas where population densities were too low to economically justify sanitary sewers. Septic systems also have been used to serve more densely settled areas where, at least originally, occupancy was seasonal.

A functioning septic system, one that is of correct design for its site, will remove disease-causing organisms and some nutrients and chemicals from wastewater. However, it is not designed to remove or treat many liquid pollutants such as solvents, automotive and lubricating oils, drain cleaners and other non-cleaning household chemicals. Proper location, design, construction, operation and maintenance of septic systems is critical to protecting water quality throughout a watershed. This is especially true when systems are located close to lakes and streams or in areas having shallow groundwater zones.

Septic systems that are not functioning properly can pose health threats. Bacterial contamination, for example, is a concern if a lake or stream is used as a source of drinking water or for recreational activities involving body contact such as swimming.

In addition to threatening human health, malfunctioning systems can also harm natural systems. Sewage is high in nutrients, nitrogen and phosphorus, which help plants grow. Untreated effluent that makes its way to lakes or tributary streams, either through surface flow or groundwater seepage, can contribute to increases in algae or aquatic plant growth. This over-enriched system, called eutrophic, can significantly impact a waterbody's health over a period of time.

Algae overgrowth, for instance, create blooms that cover surfaces, cloud water, block sunlight and deplete oxygen supplies needed by aquatic plants and animals. In extreme cases, oxygen depletion associated with untreated sewage has created massive fish kills. Some nutrients and other pollutants generally are very slow to leave a lake system. Thus, untreated sewage discharges can have lingering effects long after a malfunction has been repaired.

Signs of a problem

- Slow draining toilets, showers, or sinks.
- Sewage backing up in the basement or drains.
- Ponded water or wet areas over the absorption field in your lawn.
- Bright green grass over the absorption field may indicate that effluent is coming to the surface.
- A dense stand of aquatic plants or algae growing only along your shoreline.
- Sewage odors.
- Bacteria or nitrates show up in tests of a nearby drinking water well.

Septic systems are safe and effective if selected, designed, located and constructed correctly. However, homeowners must actively monitor and maintain their systems. Because nutrients and other pollutants are generally very slow to leave a waterbody, a malfunctioning septic system can have a long term impact on water quality. The most common type of septic system consists of two primary components: 1) a septic tank for collecting waste and settling out solids; and 2) a soil absorption field for filtering the liquid waste. Where soil composition or depth is not suitable for a conventional septic tank/absorption field, other systems, such as elevated sand mounds, may be used.

Older methods of sewage disposal may use drywells instead of an absorption field or use a cesspool. These methods are allowed to be used, by law, if they were installed prior to the initiation of state regulations, but only until they are found to create a malfunction or be the source of a potential or actual health nuisance. These methods do not provide any certainty of adequate treatment and disposal of sewage.

The Septic Tank

The septic tank serves three functions: storage, settling and digestion. The tank must be able to store waste from high flow periods (e.g., the morning round of showers) until it can pass through the absorption field. Hence, the size of the septic tank is determined by the size of the household it is intended to serve. The formula accounts for the number of bedrooms in the house. The minimum size and the location of a septic tank and its absorption field must comply with state regulations.

Sewage flow coming from the house is separated into three fractions after it enters the tank. Grease, oils and other light materials accumulate at the top of the tank in a layer of scum. The heavier solids settle into a sludge layer at the bottom of the tank. The intermediate layer is wastewater. Wastewater passes on to the absorption field. The scum and sludge are held in the tank by a set of baffles. Since the settling process requires time, tanks are designed so that liquids are retained for about 24 hours, under normal flow conditions, before discharging to the absorption field.

Even though it has no moving parts, the septic tank requires regular maintenance. Annual inspections of

the baffles are recommended to ensure that scum is not leaving the tank and entering the absorption field. Similarly, accumulated sludge must be removed on a regular basis. Otherwise, the tank capacity will be reduced so that solids are not able to settle out before the wastewater effluent leaves the tank.

The minimum frequency of sludge removal ("pumping") varies with the amount of use your system receives and may be regulated, in Pennsylvania, by local sewage management program ordinances. For the average family of four, a septic tank in normal use needs to be pumped out every three years. If you place heavier demands on a system, such as a large family or a garbage disposal, the tank may need to be pumped every year.

Due to several considerations, including personal safety measure requirements to protect the person making a thorough inspection of the tank, a professional contractor should do septic tank pumping and inspections. **Warning: *Never enter the tank unless equipped with self-contained breathing equipment or actively operating high volume forced ventilation to force outside air to ALL areas in the tank. Do not breathe the air inside an unventilated septic tank. It may contain LITTLE or NO OXYGEN. The lack of oxygen can cause unconsciousness without warning. Death can occur in this type of situation!***

The Soil Filter

When the wastewater leaves the septic tank it flows to the absorption field. The absorption field consists of a network of perforated pipes (often plastic) laid out in a bed of trenches lined with gravel. The pipes are connected to the septic tank through a small chamber known as a distribution box. The distribution box is designed to distribute liquids equally among the absorption field pipes. Wastewater then flows through the gravel and into the surrounding soil. Microorganisms in the soil decompose many of the remaining contaminants. However, the soil cannot remove dissolved solvents, automotive and lubricating oils, drain cleaners, and other household chemicals that can easily percolate into groundwater.

If the absorption field is properly located, designed and installed it will accept septic tank effluent for a



very long time. Design life is normally a minimum of 20–25 years. The design presumes that in operation: 1) the field does not become overloaded with liquid, and 2) the septic tank is properly maintained and does not allow sludge or scum to escape and clog the field. Minimizing household water usage and waste output will extend the life of the absorption field and help keep it in good operating condition.

The size and placement of the absorption field is determined by the type and depth of soils on the site, as well as the sewage load it is expected to handle. Some soils are better than others for placement of an absorption field. In sandy soils, for example, water may pass through too quickly to be treated efficiently, while heavy clay soils may not allow enough flow. In addition, there must be sufficient soil above the water table or bedrock for complete treatment (generally about six feet).

Some homes have septic systems that do not have sufficient capacity for the type of use they receive, are located too close to the water table, and/or are in poor soils. Your county conservation district can help you estimate the type, depth, and location of the various soils on your property. A final determination of their suitability for septic systems will be made by your local sewage enforcement officer.

The absorption field ceases to function when the soils surrounding it become saturated. This can happen when the system is overloaded or when the water table rises to the level of the absorption field. When the absorption field becomes saturated, septic effluent can rise to the field surface, enter groundwater, or travel underground and resurface at another water source—quite possibly a lake or a stream tributary. As you can see, whenever the absorption field becomes saturated, the sewage you flush flows essentially untreated into the surrounding environment.

Septic System Water Pollution Solutions

The following list of tips can help extend the life of your septic system and protect water quality:

- ◆ Limit the amount of water entering your septic tank. Give your system time to absorb exceptionally heavy loads. (It would be best not to immediately do five loads of laundry after hosting a party for twenty or so guests.) Use water-saving fixtures. Repair leaking toilets and dripping faucets.
- ◆ Do not connect foundation sump pumps or other “clean water” discharges to your septic system.
- ◆ Inspect your tank every year. Measure the level of sludge build-up and inspect the baffles for scum. Pump your septic tank at least every 3 years (or sooner as indicated by your annual inspection of the tank). Save money—organize neighborhood tank pumping!
- ◆ Get complete design and maintenance records from the previous owner when you buy a house with a septic system. Know the location of the system’s components. Make a sketch showing locations and distances and keep the drawing in a safe place.
- ◆ Driveways, patios, aboveground pools and other structures should never be built over the absorption field. As much as one third of the water in septic effluent evaporates up through the ground over the absorption field.
- ◆ Avoid using a garbage disposal. Garbage disposals add tremendously to the amount of solids entering your septic tank.
- ◆ Discard grease in the garbage instead of the drain. Grease can clog the septic tank or the soils surrounding the absorption field. Also, use of liquid fabric softeners can contribute to excessive scum in the septic tank.
- ◆ Use toilet paper that decomposes easily. Purchase brands labeled “safe” for septic systems.
- ◆ Install a lint trap on your washing machine. Lint can clog the pipes in the absorption field.

- ◆ Read product labels! Use low phosphorus detergents and cleaning products whenever possible. Phosphorus is the nutrient most likely to cause damage to a waterway after leaving your septic system.
- ◆ Perform (at least) annual routine maintenance on any lift or distribution pumps associated with your system. Systems that utilize pumps will quickly back-up if a pump fails.
- ◆ Do not pour strong cleaning agents, chemicals, or old medicines down the drain. These can kill beneficial bacteria that break down waste in your septic system.
- ◆ Keep all non-biodegradable items such as sanitary napkins, disposable diapers, paper towels, and plastic out of your septic tank. They can block the tank's outlet and necessitate expensive repairs.
- ◆ Do not drive or park vehicles on your absorption field. Vehicles can compact soils and break pipes.
- ◆ Keep trees and shrubs at least 35 feet away from your field to prevent roots from plugging or breaking pipes.
- ◆ Avoid all so-called 'septic tank treatment' additives. No additive can alleviate the need to regularly pump your septic tank; some, potentially, may actually promote clogging of your absorption field or contaminate groundwater.
- ◆ Route surface water drainage away from your absorption field. Snowmelt, rain and

other surface runoff can temporarily inundate your field.

- ◆ Do not inhale gas emitted from an open septic tank. The atmosphere produced in your septic tank may suffocate you.
- ◆ Locate your absorption field as far away as possible from surface water to reduce its potential of becoming a source of contamination.

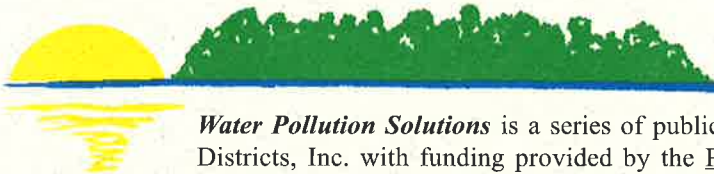
For additional information, visit the Pennsylvania Department of Environmental Protection's website at www.dep.state.pa.us. Go to: Wastewater (Keyword) where you will find numerous resources. You may also e-mail your inquiries to: ra-epaskdep@state.pa.us

Organizations to Contact for Further Assistance

Pennsylvania Department of Environmental Protection Office of Water Management
P.O. Box 2063
Harrisburg, PA 17105-2063
717-787-4693
www.dep.state.pa.us

Pennsylvania Lake Management Society
P.O. Box 425
Lansdale, PA 19446
info@palakes.org

North American Lake Management Society
P.O. Box 5443
4513 Vernon Blvd., Suite 100
Madison, WI 53705-0443
608-233-2836
www.nalms.org



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