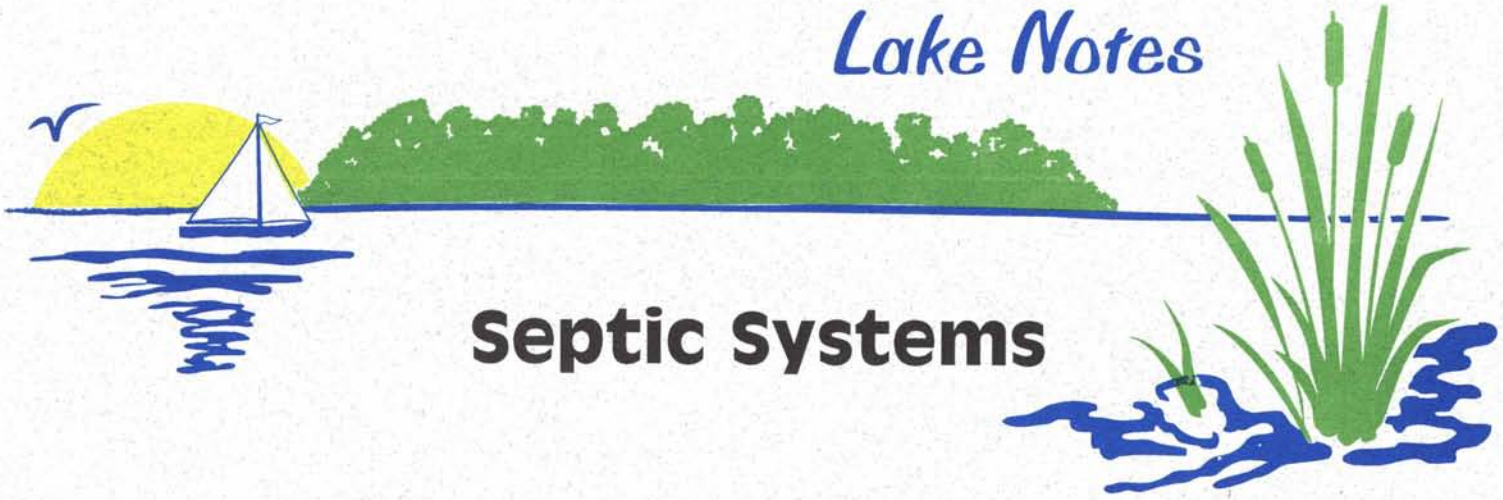
Lake Notes



Septic Systems

Those living in a home served by a sanitary sewer system may seldom ponder the fate of waste once it goes down the drain—they trust that the sewer system is well-designed and that the professionals monitoring and maintaining it are doing their jobs. But for those who must utilize an on-site wastewater treatment system, commonly called a septic system, the proper use and maintenance of the system is the responsibility of each homeowner.

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 properly-functioning septic system will remove most disease-causing organisms and some nutrients and chemicals from wastewater. However, it will not remove or treat many water-soluble pollutants such as solvents, drain cleaners, and many household chemicals. Consequently, the proper location, design, construction, operation, and maintenance of septic systems are critical in areas close to lakes and streams as well as in shallow groundwater zones. Lake community homeowners have a special responsibility to ensure that their septic systems are not polluting the lake. Septic systems can be safe and effective so long as installers design, locate, and construct systems correctly, ***and*** homeowners actively monitor and maintain them. This publication is intended to help you understand, operate, and maintain your septic system.

Septic systems that are not functioning properly can pose a health threat by allowing sewage to contaminate drinking water. The ecology of nearby lakes can be harmed as well. Sewage is high in phosphorus, which usually is the nutrient limiting algae and rooted aquatic plant growth in Illinois lakes.

Discharge of septic tank effluent to a lake or tributary stream, either through overland flow or groundwater seepage, can contribute to localized increases in algae or aquatic plant growth. In extreme cases, the oxygen depletion associated with untreated sewage can even kill fish. Widespread discharge to a lake over a period of time can significantly accelerate the lake's eutrophication ("aging") rate. Because phosphorus is very slow to leave a lake system, sewage inputs often have lingering effects long after they have been discontinued. Bacterial contamination can be a concern if the lake is used as a source of drinking water or for body contact recreation such as swimming.

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 along only your shoreline.
- Sewage odors.
- Bacteria or nitrates show up in tests of a nearby drinking water well.
- Biodegradable dye flushed through your system is detectable in the lake.

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. Older—and much less efficient—septic systems often utilize drywells instead of an absorption field or combine the functions of both the septic tank and absorption field into a cesspool.

Where soil composition or depth is not suitable for a conventional septic tank/absorption field, alternative systems may be used. Mound systems create a suitable area for an absorption field by piling up "good" soils to an approved depth and placing the absorption field within the resulting mound. Often this requires pumping the liquid waste up to the elevation of the new field, adding additional mechanical complexities. Other more intricate and expensive designs can be used if conditions dictate. These include aerobic treatment units, sand filters, lagoons, electro-osmosis systems, leeching chambers, and holding tank/truck collection systems.

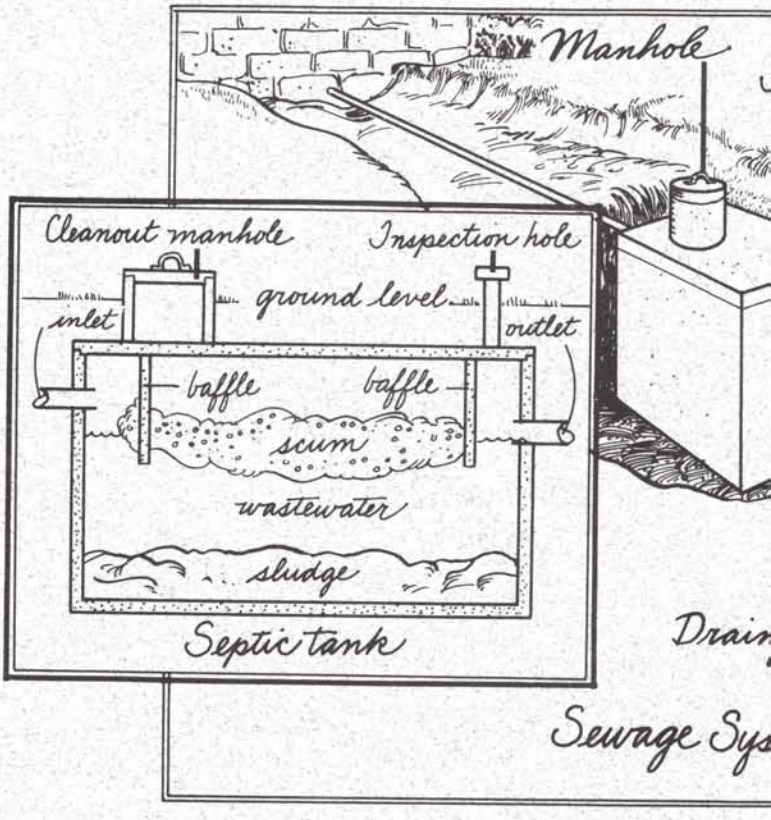
The Septic Tank

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, and it incorporates a formula that accounts for the number of bedrooms and bathrooms in the house. The size and location of a septic tank and its absorption field are regulated by your county health department, with minimum standards set by the State.

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 the wastewater—primarily liquids with some suspended solids. It is this wastewater that is passed on to the absorption field. The scum and sludge are held in the tank by a set of baffles. This settling process requires time, so tanks are designed to hold the liquid for 24 hours under normal flow conditions before discharging to the absorption field. A community of anaerobic bacteria in the bottom sludge layer digests the organic sludge portion, slowly transforming part of it into a form that can later be passed to the absorption field.

The septic tank requires regular maintenance to operate efficiently. Annual inspections of the baffles are necessary to ensure that scum is not leaving the tank and entering the absorption field. Similarly, accumulated sludge must be removed on a regular basis to prevent it from backing up into the absorption field or reducing the tank capacity to the point that solids are not able to settle out before the sewage slurry leaves the tank.

The frequency of sludge removal ("pumping") varies with the amount of use your system receives. For an average family of four, a septic tank needs to be pumped out every two to three years. If you are only using the system on a seasonal basis (e.g., summer cottages), the tank may need to be pumped less often. If you are placing heavy demands on the system, such as a large family or a garbage disposal, the tank may need to be pumped every year. Tank pumping must be done by a licensed contractor, but sludge level determinations and tank inspections can be done by you. Contact your County Extension Service office for further guidance. *Never enter the tank or breathe the gases inside the tank. The gases produced in a septic tank are dangerous and can kill!*

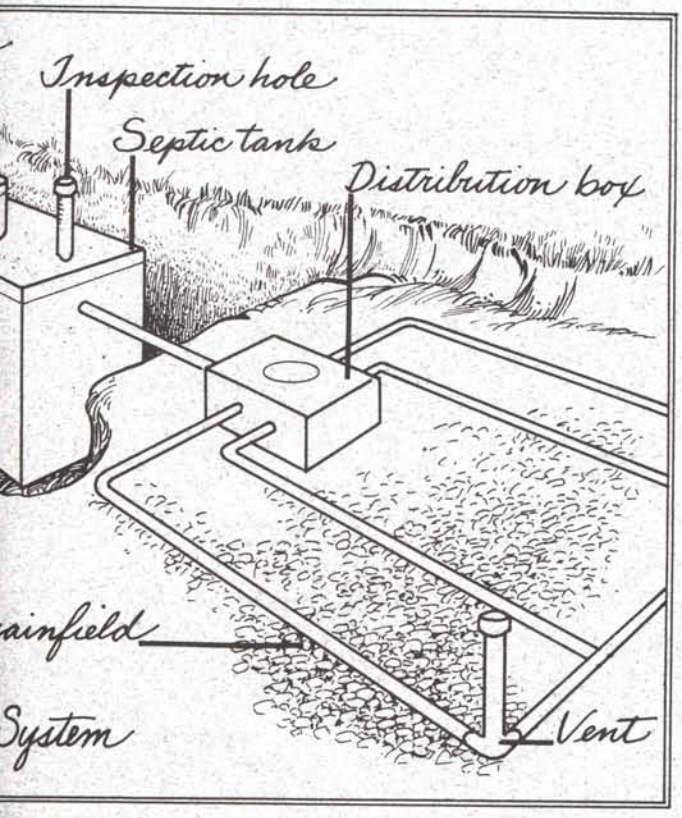


The Soil Filter

When the liquid fraction of the sewage leaves the septic tank it flows on 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. Septic liquid then flows through the gravel and into the surrounding soil.

Together, the gravel and soil act as a filter and remove any solids still found in the liquid. Microorganisms in the soil decompose many of the remaining contaminants. However, the soil cannot remove dissolved solvents, drain cleaners, and other household chemicals that can easily percolate into groundwater.

If the absorption field is properly designed and installed it will accept septic tank discharge for 20–25 years with no maintenance, provided that: 1) the field is not 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. For example, sandy soils allow water to pass through too quickly to be treated efficiently, while heavy clay soils do not allow enough flow. In addition, there must be sufficient soil above the water table or bedrock for complete treatment (generally about six feet).

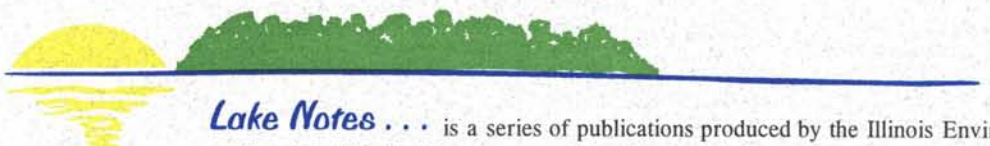
Many lake homes have septic systems that do not have sufficient capacity for the type of use they receive, are located too close to the water table, and/or are in poor soils. Your county Soil and Water Conservation District can help you determine the type, depth, and location of the various soils on your property and their suitability for septic systems.

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 soil surrounding the field is saturated, septic effluent flows untreated into the saturated soils and may rise to the surface over the field or seep to the surface down gradient from the field. This untreated septic effluent may also migrate below ground with the prevailing groundwater flow and towards the nearest surface water—quite possibly your lake or a stream tributary to your lake! Whenever your absorption field becomes saturated, the sewage you flush flows essentially untreated into the surrounding environment.

Septic System Tips

The following list of tips will help keep your septic system operating properly while reducing adverse impacts to the environment.

- Limit the water entering your septic tank, and give your system time to rest after heavy use. Use water-saving fixtures; repair leaky 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 when necessary (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 it 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 will clog the pipes in the absorption field.
- Keep water softener discharges out of your septic system. Sodium in water softener water reacts with soil and reduce's the absorption field's efficiency.
- Read product labels! Use low phosphorus detergents and cleaning products whenever possible. Phosphorus is the nutrient most likely to cause damage to a lake after leaving your septic system.
- Perform 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 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 chemical additives. No additive can alleviate the need to regularly pump your septic tank; some 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. Gas produced in your septic tank is toxic.
- Locate your absorption field as far away as possible from surface water to reduce its potential of becoming a source of contamination.



Lake Notes . . . is a series of publications produced by the Illinois Environmental Protection Agency about issues confronting Illinois' lake resources. The objective of these publications is to provide lake and watershed residents with a greater understanding of environmental cause-and-effect relationships, and actions we all can take to protect our lakes.

Appreciation is extended to the Univ. of Wisconsin-Extension and the Wisconsin Dept. of Natural Resources for permission to excerpt and adapt information and illustrations from "Life on the Edge—Owning Waterfront Property" and "Maintaining Your Septic System."

This *Lake Notes* publication was prepared by Michael Murphy, Holly Hudson, and Bob Kirschner of the Northeastern Illinois Planning Commission, Chicago, Illinois.

For more information about other publications in this series and to request copies, please contact: Illinois Environmental Protection Agency, DWPC-Lake and Watershed Unit, P.O. Box 19276, Springfield, Illinois, 62794-9276; 217/782-3362.