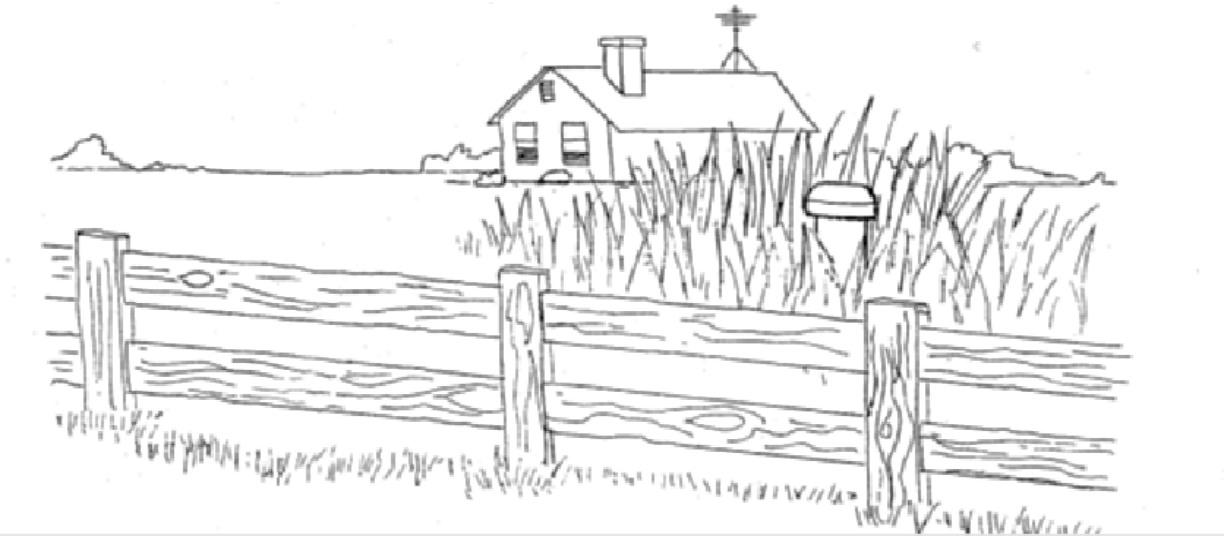
Is the Grass Greener over your Septic System?



Approximately 750,000 homes in Wisconsin dispose of their wastewater using private onsite wastewater treatment systems (POWTS). These systems provide on-site treatment and dispersal of household wastewater where municipal sewer service is unavailable. Household wastewaters may contain many undesirable substances such as disease-causing bacteria, infectious viruses, household chemicals, and excess nutrients such as nitrogen and phosphorus. Onsite treatment of the wastewater is necessary to protect public health and to prevent groundwater pollution

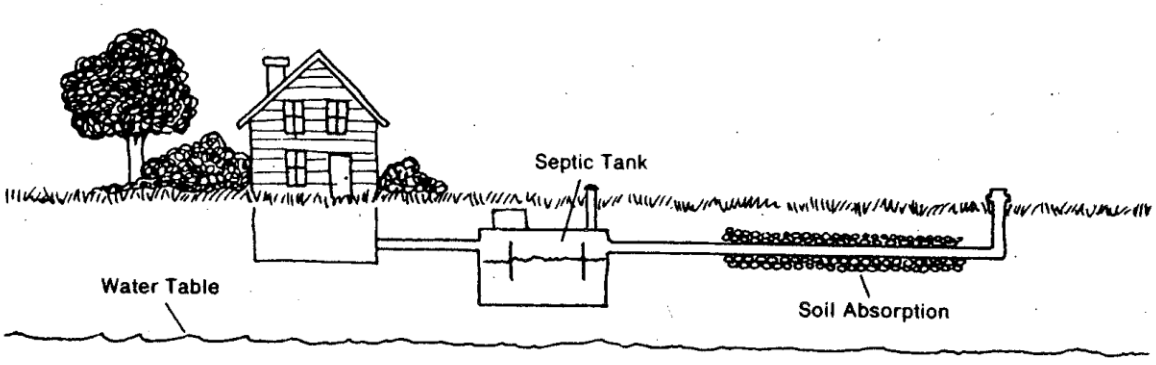
Below Grade Systems

For most homeowners, a below grade can be used to dispose of household wastes. A conventional private sewage system consists of a septic tank or aerobic treatment unit and a soil absorption system (SAS). A septic tank is a watertight tank that is placed underground. Household wastes are discharged from the house into the tank through the tank's inlet opening. Most solids, called sludge, fall to the bottom of the tank where they are partially digested by anaerobic bacteria. Greases, oils, and other buoyant particles float to the surface to form a scum layer within the tank. Baffles and outlet filters are placed in the tank to keep the scum from backing up into the inlet and outlet

openings, and also to prevent rapid flow of wastewater through the tank. Outlet filters can do an excellent job of keeping even the smallest particles from entering the SAS.

The liquid waste, called effluent, flows from the septic or aerobic treatment tank to the soil absorption system (SAS). The SAS is aggregate or aggregate substitute cell in which gravity fed four-inch diameter perforated piping is laid to distribute effluent throughout the absorption system. These systems may usually be used where there is approximately 48 inches of suitable soil. Effluent discharging by gravity into a SAS is not necessarily distributed equally to the entire absorption area. After entering the SAS the effluent flows into the soil, and is treated further as it moves through the soil and finally mixes with groundwater.

Another type of below grade system, the in-ground pressure system, spreads effluent evenly over the entire absorption area using small diameter perforated piping and a pump or siphon to provide pressure dosing. In-ground pressure distribution systems can be used where approximately 45 inches of suitable soil is available, and may be required where very coarse textured soils are present.



Site and Soil Suitability to Treat Effluent

Soil treats wastewater effluent by acting as a filter, trapping viruses and bacteria in the spaces between soil particles (called pores), or on the soil particles themselves. Some chemicals and nutrients may be adsorbed by the soil to be used by plants. Many processes acting on the effluent, as it moves through the soil, make the wastewater clean enough to enter the groundwater system without contaminating it.

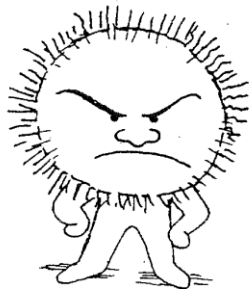
Only certain types of soil can purify sewage effluent, however. If the soil has large pores, the effluent can move through the soil very quickly, not being held in the soil long enough to be completely treated. The effluent will also not be completely treated if the soil is not deep enough such as with a shallow depth to bedrock or groundwater below the ground surface. Groundwater contamination can then occur because of the partially-treated effluent.

On the other hand, if the soil has mostly small pores, the effluent moves through the soil too slowly and can seep to the surface or back into your home if the soil absorption system cannot handle it. Lakes and streams can be contaminated as the unpurified effluent runs into them, or health hazards can arise if you have contact with the effluent.

Therefore, to protect public health and to prevent pollution, specific site and soil conditions are required for private onsite wastewater treatment systems (POWTS). Chapter SPS 383, Wisconsin Administrative Code, defines what is needed for a soil and site to be suitable for a POWTS.

These site characteristics include:

1. A three foot separation between the bottom of the soil absorption system and seasonal high groundwater, groundwater, or bedrock.
2. Suitable soil permeability. Some soil conditions are not well suited for treatment and dispersal of wastewater because they allow effluent to percolate either too slowly, or in some cases, too rapidly.
3. The soil absorption field should not be located in low areas. After rain storms or spring snow melt, water will accumulate in the low area and adversely affect the system.
4. Steep slopes (greater than 25 percent) are not well suited for sewage disposal systems because of the difficulties of installation on these slopes.



Bacteria and Virus Movement through the Septic System

Bacteria and viruses from the human intestines go down the toilet and into the septic system. The many bacteria and viruses are retained in the septic tank because of association with larger solids.

Some viruses and many bacteria get free from the solids, and proceed out the effluent pipe to the soil absorption system.

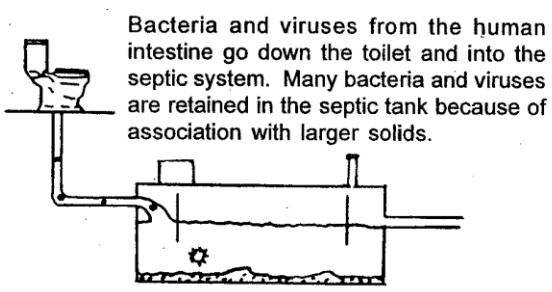
The soil can only stop these biologic contaminates if the soil layer is deep enough, and if the effluent passes through the soil slowly enough.

Bacteria and virus removal in soil

Soil can remove most biologic contaminates from septic tank effluent if the soil layer is deep enough and if the fluid passes slowly enough through it. HOWEVER, if the there is too little soil or time:

1. With slowly permeable soil, biologically contaminated liquids may be forced to the ground surface.
2. High groundwater may carry contaminates to streams or wells.
3. Shallow permeable soil may allow reaching creviced bedrock, passing into the aquifer, possibly to someone's well.

Bacteria and virus movement through the septic system



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New Construction

Over half of the soils in Wisconsin are unsuitable for below grade private onsite wastewater treatment systems. Therefore, if you want to build a home where municipal sewers are unavailable, it is wise to be sure a possible site is suitable for a treatment and dispersal system before purchasing the property. Make it a condition of purchase.

To determine if the site you may be interested in has suitable soils, contact a certified soil tester (CST) who will conduct a soil and site evaluation, including soil borings. Soil evaluation by a CST is required by Wisconsin regulations for all POWTS. A county zoning administrator or county sanitarian can give you the names of CSTs in your area. The cost of the testing is a better investment than purchasing land on which you cannot build.

You can also find out about soils and a site you are interested in from the soil survey report of your county. Soil maps are available from the county zoning administrator, sanitarian, or the federal National Resource Conservation Service. These maps can give information on soil wetness, flooding hazard, depth to bedrock, and the high groundwater table.

However, soil maps must be used with caution, and only as a guide to identify soil areas. Even if the information from the map appears positive, an evaluation by a CST is

still needed before a system plan will be accepted by the county or state representatives. The evaluation is also needed before an application for a sanitary permit will be considered.

If your site appears suitable for a POWTS, the next step is to contact a private sewage system designer. Only registered plumbing designers, appropriately credentialed plumbers, registered architects, designer of engineered systems or professional engineers may design the system.

The plans for a private sewage system must be approved at either the county or state level. The approving agency will depend on the type of private sewage system and the county in which the site is located. Presently, all counties in Wisconsin can approve plans for gravity below grade POWTS for one- and two-family residences. In addition, some counties can also approve plans for systems for certain public buildings, mounds at-grades, in-ground pressure and holding tanks. All other types of POWTS must be approved by the state Division of Industry Services. Contact your county to determine the approving agency for your specific plans.

A sanitary permit can only be issued after plans for the POWTS have been approved. A sanitary permit is required before a building permit can be issued. Sanitary permits are issued by the county. Only master plumbers or master plumbers - restricted service may sign the application for the sanitary permit. The person signing the application is responsible for the proper installation of the system.

How does soil under proper conditions remove bacteria and viruses from septic tank effluent?

Bacteria and viruses passing downward through soil may be stopped if:

1. They are associated with something that gets stuck between soil particles. If this happens, it is usually temporary.
2. Soil bacteria and fungus attack and destroy effluent-born pathogenic bacteria and viruses. This factor is of uncertain importance.
3. They adhere to soil particle surfaces in slime produced by bacteria. This is probably the principal mode of biologic retention if the effluent passes very slowly through the soil.
4. Bacteria and viruses that are not destroyed by desiccation or soil microorganisms, but remain stuck in the soil, eventually lose their ability to infect as a result of “old age” deactivation

Above Grade Systems

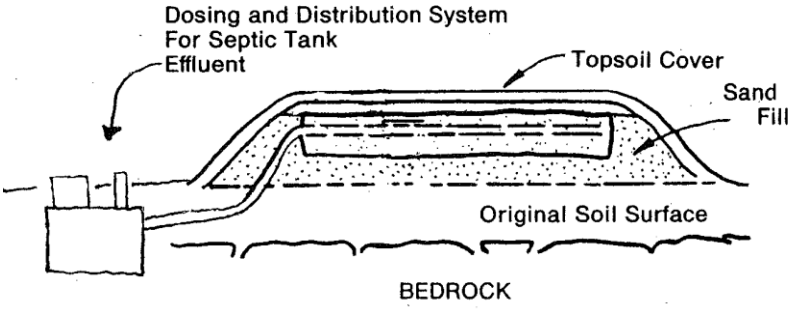
If soils or sites are not suited for a below grade SAS, there are alternatives available. Most alternatives are more expensive than below grade systems. As with below grade systems, a perspective land purchaser needs to be sure what alternatives are possible, and the cost of installation, before basing a land or home purchase on use of such a

system. Above grade systems used in Wisconsin include both At-grade and Mound systems.

At-Grade Systems

If there is at least 36 inches of unsaturated soil over bedrock, an at-grade type of soil absorption system may be installed. As the name implies, this system is literally installed on the existing surface grade. At-grade systems have been in use in Wisconsin since the mid-1980.

At-grade systems are installed along the land surface contour, and consist of the plowed topsoil upon which aggregate and piping are placed. The entire structure is covered with topsoil and seeded. With the infiltrative surface basically at ground level, sewage effluent passes through 36 inches of the most biologically active zone of soil which provides adequate treatment of wastewater effluent.



In an existing mound, careful dosing and distribution are essential to proper purification of the septic tank effluent. Air spaces are also important.

Mound Systems

If there's not enough soil depth (with adequate permeability), a mound of sand covered with topsoil can be built on the existing land surface. An aggregate or aggregate substitution absorption area is constructed on top of a cell of specified sand (ASTM C33). The sand adds a level of purification before the wastewater contacts the original soil for final treatment.

A mound system may be used where the soil is slowly permeable, and has at least six inches of suitable soil over bedrock or high groundwater.

Aerobic Treatment

In some cases, owners choose to use aerobic treatment instead of, or in conjunction with, a septic tank. Aerobic treatment units process wastewater, using processes similar to those in municipal treatment plants. By injecting air into the wastewater, aerobic treatment units quickly break down the organic components of the waste and oxidize certain nutrients, such as ammonium nitrogen to nitrate nitrogen. Aerobic

treatment units also have a baffle or filter system that prevents solids discharge to the SAS.

Other Alternatives

Most system types have alternatives products that can be used in place of or in conjunction with traditional components. Some products are approved for downsizing the SAS. Systems in fill and other designs can be utilized.

Holding tanks

An alternative to a soil absorption system is a holding tank. A holding tank collects and stores household wastewater at sites unsuitable for onsite treatment and dispersal. Holding tanks are sized to have a minimum five day holding capacity. When filled, the tank must be pumped and the wastes hauled to an approved disposal field or municipal treatment plant.

Any local government can prohibit the use of holding tanks for new homes. In areas without prohibitions, holding tanks may be used for new homes. Semi-annual pumping reports must be submitted to the local government and the county. An annual pumping report, including a summary of the previous year, must be submitted to the Department of Safety and Professional Services by the local or county government. In addition, owners must enter into contract with a licensed hauler who is responsible for servicing the system.

Because of the frequency of pumping and the high pumping cost, the use of holding tanks is very expensive. Although the initial costs of installing holding tanks may be comparably low, the high maintenance cost may be prohibitive.

Buying a Home with an Existing Private Sewage System

Private sewage systems serving some older homes may not meet today's POWTS design standards. The systems may not be working properly, or may be reaching the end of their useful life (failing). The cost of replacing a system may be an added expense that has to be considered when purchasing a particular property. Therefore, anyone considering buying a house with an existing POWTS should take precautions.

1. First, make sure the septic tank is accessible so it can be pumped and maintained. Ask whether a maintenance record has been kept. If not, when was the tank last pumped, and by whom.
2. Next, locate the soil absorption system, determine its type and check the ground for seeping effluent. If any section of the lawn is greener than another, this could indicate excessive effluent ponding within the SAS. If a vent pipe can be located, check for the depth of effluent. Excessive ponding levels may indicate problems with the SAS.

Your county health or zoning office can tell you if the property has been cited for violations of the state plumbing code. You can also check the files for permits, inspection reports, soil evaluation reports, and other documents relating to the property.

Become familiar with private onsite wastewater treatment systems, so you can ask appropriate questions about existing systems.

Finally, you may wish to contact a credentialed plumber or certified soil tester to evaluate the system and the soil conditions under the system.

Maintenance

The **most** important thing a homeowner can do to keep their private sewage system working properly is to understand how the system works, and then to maintain it properly.

Each county in Wisconsin has to establish its own maintenance program. Check with your county to see what requirements exist.

Guidelines for Maintenance

Absolutely never go into a septic tank. This could be very dangerous because of toxic gases. Qualified people with the proper equipment can be hired to enter tanks, if it is necessary.

Inspect your septic tank once a year to find out the level of scum and sludge that has built up. The tank should be pumped when the sludge and scum occupy one-third of the tank's liquid capacity. This may vary from one to three years. This is also a good time to clean the effluent filter.

The manhole of the tank should be used for pumping to reduce the risk of harm to the inlet and outlet baffles. The inlet and outlet structures, and key joints, should be inspected for damage after each tank pump out. Properly secure the manhole covers after inspection or pumping events. Septic tank pumpers must have a license issued by the state Department of Natural Resources. County personnel usually have lists of qualified septage haulers.

Leaving solids in the septic tank to "restart" the breakdown process after pumping is not necessary. When pumped, the septic tank must not be disinfected, washed, or scrubbed. Special chemicals are not needed to restart activity in the tank.

There are no known chemicals, yeast, bacteria preparations, enzymes, or additives for septic tanks that will eliminate the need for periodic pumping. Such additives are not necessary for the proper functioning of a septic tank. Ordinary amounts of bleaches, lye, caustics, soaps, detergents, and drain cleaners do not harm a properly functioning private sewage system.

Never flush materials into a septic tank that do not break down easily (coffee grounds, bones, disposable diapers, sanitary napkins, cigarette butts, etc.). Some items will not degrade in a tank, and can clog inlets, outlets, and absorption fields.

Avoid pouring grease down a drain. It can clog inlets, build up in a tank, clog outlets, and congest the absorption field.

Conserve water. The more water you use, the more your system is forced to work. Water-saving fixtures are an inexpensive and efficient way to use less water. Repair all leaky fixtures. Don't let foundation drains or runoff water into the septic tank.

Failure of a Septic System Due to Old Age

Whenever effluent is continuously applied to soil, as in a gravity-fed conventional system, a clogging mat will form at the bottom of the soil absorption field. This is a crust that forms through biological action due to continuous ponding of the effluent at the surface of the absorption field. The clogging mat gradually develops to a point the effluent cannot move fast enough into the soil. When this occurs, the system fails. Effluent can back up into the house and seep to the surface. This is old age failure.

When Private Sewage Disposal Systems Fail

Private sewage systems occasionally fail and must either be replaced or restored. The Wisconsin Administrative Code defines a failing system as one in which wastewater backs up into a building, seeps to the soil surface, enters surface or ground water,

bedrock, or moves into the saturated zone of a soil. This poses a threat to public health and water quality.

Many factors can cause a system to fail. Poor construction practices are a cause of early system failure. Constructing a system in wet soils leads to increased smearing of pudding of the soil. Driving equipment over a system area, even when the soil is dry, can lead to compacting. Compacted soils do not absorb wastewater as rapidly.

Improper siting or poor design can also cause a system to fail early. These problems can be prevented by following the process of having a CST evaluate the site, and a credentialed designer/installer preparing the plans and installing the system.

On occasion, failure of a private sewage system may be due to overloading, poor maintenance, or poor siting.

Excessive water use or leaking fixtures are common sources of system overloading. Preventative maintenance on existing fixtures, installation of water-reducing devices or water-conserving fixtures will aid in correcting the problems. Foundation drainage or surface runoff should be kept out of private sewage systems.

Poor system maintenance can lead to both either occasional or continuous failure. If the septic tank is not completely pumped when it needs it, sewage may back up into your house or clog the absorption field.

Allowing excessive kitchen waste into a system, particularly grease or ground-up waste, can also result in clogging.

If a system has continuous failure, several steps should be taken. Check all plumbing for proper repair. Have the septic tank pumped. Reduce water usage. If the system still is failing, the absorption field may be clogged, and may need replacing.

If your private sewage system must be replaced, don't destroy the old one. In some cases, the capacity of the soil to absorb effluent may be restored by allowing the system to rest. The ponded effluent will eventually drain; the clogging mat will dry out, and will break up in natural physical or chemical processes. Provision could then be made to alternate between the new and the old systems. This will prolong the life of both systems.

Funding Available for Failing Systems

There is financial help available for homeowners to replace failing private sewage disposal systems. Most counties in Wisconsin participate in the Wisconsin Fund Grant Program. The program is designed to help defray the cost of repairing or replacing failing systems. Participating counties must set up maintenance requirements. Contact the county zoning administrator or sanitarian to find out more about the Wisconsin Fund.

Water-Conserving Fixtures

Remember that all the water you use in your home must be absorbed and disposed of by your private sewage system. You can extend a system's life by lowering the amount of water you use. Federal law requires new toilets, faucets, and other fixtures to be water-conserving fixtures. Thus, replacing old fixtures can significantly reduce water use.

There are some fixtures that conserve more water than others. Toilets are available that use as little as two quarts of water per flush versus the four gallons per flush that many older toilets use. A plumbing contractor can help explain these water-conserving devices.

Water-conserving fixtures can save hundreds of dollars each year if a building uses a holding tank.

Is the Grass Greener over your Privately Owned Wastewater Treatment System?

Periodic maintenance of your private sewage system and proper use of water in your home can provide you with a reliable private sewage disposal system for years to come.

If the grass is usually greener over your soil absorption system, it's time to call a credentialed plumber to check out your system. Failing systems threaten health and water quality.

The grass usually isn't greener over the tank, but it may be the first area of bright green in your yard in the spring. This is not due to effluent from the tank, but due to the warmth radiating from the tanks contents causing the soil to warmth up quicker in the surrounding areas.

If you have question, contact a county zoning administrator or sanitarian. You may also contact a representative of the state Department of Safety and Professional Services.

DEPARTMENT OF SAFETY AND PROFESSIONAL SERVICES

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For a map of the state detailing the district assignments, click on the following link or copy and paste the link into your web browser: http://dsps.wi.gov/Documents/Industry%20Services/Maps/Wastewater%20Map.pdf

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