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BOUT YOUR HOUSE

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YOUR SEPTIC SYSTEM

Where Does the Water Go?

Do you know where the water goes when you empty a sink or flush a toilet? If your home is in a city, the wastewater goes into a municipal sewer system and to a sewage treatment plant. If your home is in a rural area or a small community, chances are there is no municipal water and sewage service available and your wastewater goes to your own private septic system. A septic system treats and disposes of your sewage right in your own yard.

There's Sewage in My Yard?

The septic system, when performing properly, safely treats and disposes of your sewage without creating any danger to your health or to the environment. Normally you don't have to worry about sewage in your yard. However, if the septic system

is not functioning properly, there can be health concerns. Therefore, it is a good idea to understand how a septic system works and what you can do to make sure it continues to work properly.

But I've Never Even Seen My Septic System!

Most people have never seen their septic system, and if the system is properly maintained, most may never need to see it. A septic system is generally composed of two main parts: a watertight septic tank and a network of perforated pipes, called a tile bed or leaching bed. All these parts are buried under your lawn so you may not even be aware of them. Yet, your septic system receives all the wastewater from your house, including toilets, showers, sinks, dishwasher, washing machine, etc. and purifies that water so it is safe to re-enter the ground water system.

How Does My Septic System Work?

The purpose of the septic tank is to separate the solids from the liquids in the wastewater stream and to begin the process of breaking down contaminants. The septic tank can be constructed of concrete, steel, fibreglass or polyethylene and can range in size from about 2,300 litres to 5,000 litres. To give you an idea of how large this is, consider that up to 200 litres of water fit in a standard bathtub and ordinary toilets use up to 20 litres per flush. So, depending on the size of your household, it doesn't take too long to fill the septic tank. But that's okay, because that's how the septic system is designed to work.

The septic tank typically has two interior chambers. The wastewater from your house, called "influent", enters the first chamber and its velocity slows so that the heavier



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solids can settle out of the water into the bottom of the chamber; and lighter materials can float to the surface. The accumulation of settled solids at the bottom of the tank is called "sludge" and the lighter solids (greases and fats) which form a mass on the surface of the liquid in the septic tank is called "scum". In between the sludge and the scum is liquid waste. Micro-organisms, like bacteria, and other natural processes act to decompose the waste materials in the liquid waste. Sludge and scum are also digested and compacted into a smaller volume. This is the first step in the process of purifying your household wastewater.

When the first chamber of the tank becomes filled, the liquid waste begins to fill the second chamber. The chambers of the septic tank are designed to prevent the movement of sludge and scum to the second chamber, allowing only the movement of liquid. Once the second chamber is filled, as more influent enters the first chamber, an equal amount of the partly-treated liquid waste flows into the second chamber, while an equal amount flows out of the second chamber into the leaching bed. The water flowing out into the leaching bed is called "effluent".

The purpose of the leaching bed is to further treat the wastewater. A gridwork of perforated pipes or clay tiles in the leaching bed area evenly distributes the effluent over the natural soil or imported fill. Sometimes a distribution tank is used at the head of the pipes to more evenly distribute the effluent to the pipes. The perforations in the pipe allow the effluent to escape to the soil. As the effluent filters through the soil, micro-organisms in the soil digest and remove the remaining impurities (such as suspended solids, organic chemicals and viruses and/or bacteria). Eventually, the purified water reaches the groundwater.

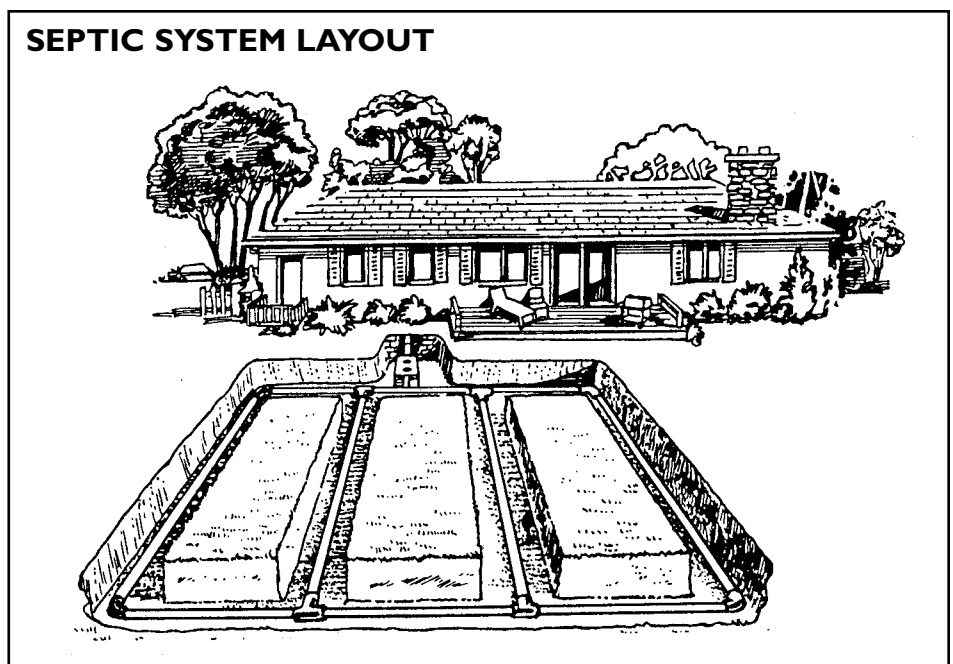
As you can see, the operation of your septic system is fairly automatic and can work quite well by itself with very little maintenance required by the homeowner. Note the key words though, "little maintenance", not "no maintenance".

What Do I Need to Do to Keep My Septic System Working?

Over time, the sludge will build up in the bottom of the septic tank. The rate of the build-up will depend on the size of your tank (bigger is better), the volume of wastewater entering the tank, and the volume of solids in the wastewater stream. If the sludge is allowed to accumulate to the height of the outlet pipe, it could flow into the next chamber and then out into the tile bed. The pipes in the tile bed can become rapidly clogged by sludge. When the pipe is all blocked and the wastewater can no longer leach into the soil, it will seep to the surface of the ground, or worse yet, back up into your house. Not only can a clogged septic system be hazardous to the environment and to your family's health, it also represents a very expensive repair bill. Once the

pipes become clogged, there is no quick fix; the entire system must be dug up and replaced.

To prevent the clogging of the system, every two to five years (depending on the tank size and use of the system), a licensed sewage disposal contractor should be hired to pump out the tank to remove the build-up of sludge. Pumping should be more frequent for a smaller tank, where more people are living in the house, and for houses with garbage disposals. Not only will this increase the capacity of the system by creating more room for the wastewater, but it will also prevent the sludge from entering the tile bed area. The best time to clean out the tank is summer to early fall. At these times, the ground will not be frozen, allowing easier access to the tank, and the biological activity in the tank can re-establish itself before it gets too cold (micro-organisms like it warm). In the spring, a high water table caused by melted snow can sometimes create sufficient pressure on the underside of an empty tank to push it up out of the ground. This is more of a concern with lighter tanks made of polyethylene, fiberglass or steel.



Never inspect or pump out a septic tank yourself. There is no oxygen in the tank for you to breathe and the tank contains deadly gases which can kill you in only a few seconds - that's one of the reasons why the tanks are kept sealed. When it is time to clean or inspect your tank, call only a firm that specializes in this type of work.

Because septic systems rely on microscopic organisms to break down the waste material, it is important that you don't "poison" these organisms. Even small amounts of paints, solvents, thinners, nail polish remover and other common household compounds flushed or poured down the drain can kill the organisms that break down organic material. Laundry bleaches, toilet bowl cleaners and caustic drain openers can also slow the treatment process, allowing sewage to pass through to the leaching bed without proper treatment. However, moderate use of these materials should not interfere with the operation of the septic system.

Some manufacturers promote the use of septic tank "cleaners", "starters" or "enhancers" to aid in the digestion of the waste. These products are typically of little value, and in some instances may actually kill essential bacteria, so they are not recommended.

You should avoid putting anything into the septic system that doesn't break down naturally or anything that takes a long time to break down. Materials such as oils, grease, and fat, disposable diapers, tampons and their holders, condoms, paper towels, facial tissues, cat box litter, plastics, cigarette filters, coffee grounds, egg shells, and other kitchen wastes, should never be put into the septic system. You should also avoid the use of in-sink garbage disposal units ("Garburators").

You can also prolong the life of the septic system by controlling the amount and timing of wastewater you put into the system.

Reduce the use of phosphate-based detergents, soaps and cleaners. The phosphorus in detergents doesn't break down in a septic system. When the phosphorus leaches into the ground and into nearby bodies of water, it can promote algae growth and can impair water quality and fish habitat.

I Need to Control My Water Usage?

Every time you put water into the septic tank, that same amount of water moves into the leaching bed. So, the faster you put the water into the tank, the faster it moves into the leaching bed. However, it takes time for the solids to settle out of the liquid waste and for the micro-organisms to digest the solids. The longer the "retention time", - the time that the wastewater is allowed to remain in the septic tank, the more purification that occurs. If you cause the water to move too quickly through the system, less purification occurs before the water reaches the leaching bed and the effluent may be discharged to the soil while still containing dangerous pollutants in unacceptable concentrations.

Therefore, whenever possible, you should try to regulate the amount of water entering the septic system. For example, rather than doing all the laundry on a Saturday, spread the work over the week by doing only one load a day. You can also reduce water usage by installing water saving features in plumbing fixtures and by only running the washer or dishwasher when it is full. Try taking shorter

showers rather than full baths. And fix leaky faucets! A tap leaking just one drop per second wastes about 10,000 litres of water per year. A silently leaking toilet can waste up to 20 times that amount. Lastly, ensure that foundation drainage, surface water from roofs, yards, garage floors and other sources of oily wastes, furnace condensate, and water softener backwash is excluded from the septic tank and the disposal field.

Sludge build-up can also reduce retention time, which is another good reason to regularly pump out the tank.

The last thing you need to be concerned with is the condition of the leaching bed.

How Do I Look After the Leaching Bed?

Looking after the leaching bed is easy. There's nothing you have to do, but there are a few things you shouldn't do.

The area over the leaching bed should have a good cover of grass. Good ventilation and adequate sunlight should also be maintained to promote evaporation. This means that you should avoid constructing parking areas, patios, tennis courts or decks in the area of, or over, the leaching bed. The weight of such constructions could crush the pipe in the leaching bed preventing it from working properly. Covering the leaching bed could also prevent oxygen from getting into the soil. The micro-organisms responsible for digesting the waste material need oxygen to survive and function.

You should not drive vehicles or machinery over the bed, as the weight could crush the pipe. Also, if the soil over the pipes becomes compacted,

it will be less able to absorb the wastewater. In winter, you should also keep snowmobiles off the leaching bed. The compaction of the snow will reduce its natural insulating effect, increasing the chances of the pipes freezing.

Don't plant trees or shrubs near the leaching bed. The roots of some trees, especially willows and poplars, will travel significant distances to reach water. The roots can plug and damage the tile.

Lastly, don't water the grass over the leaching bed. The additional water may interfere with the ability of the soil to absorb liquids and break down waste.

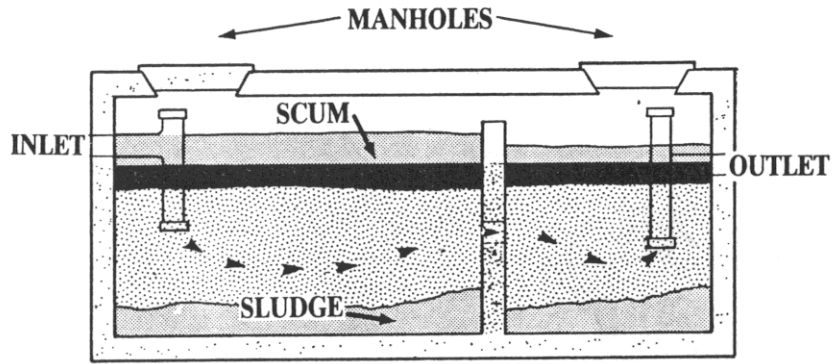
Looking after your septic system is easy, and if you follow all the suggestions for maintaining your septic system and prolonging its life, it should last twenty years or longer - and that's based on year-round use. Unfortunately, just like many building components, eventually all septic systems will need to be replaced.

How Will I Know if I Have a Problem with My Septic System?

Some of the warning signs that your septic system may be failing include the following:

- The grass over the leaching bed may be much greener and lusher than other areas of the lawn.
- The ground around the septic tank or over the leaching bed may be soggy or spongy to walk on.
- Toilets, showers and sinks may back up or may take longer than usual to drain.
- Occasional sewage odours may become noticeable, particularly after a rainfall.

TYPICAL SEPTIC TANK



- Gray or black liquids may be surfacing in your yard or backing up through fixtures into the house.
- You may notice significant algae growth in or around nearby lakes or water bodies.
- High levels of nitrates, bacteria or other contaminants may be found in nearby well water.

What If I Have to Repair My Septic System?

If you notice any of these problems, it is important that you take action immediately to protect your health and your environment. Contact a licensed contractor to advise you on how to proceed. Repairs can range from clearing a few lines, to replacing entire leaching beds and removing contaminated soil and costs can vary from a few hundred dollars to a few thousand dollars.

You are also required by law to report any problem to your Local Health Unit before proceeding with repairs. A final inspection will need to be carried out and a Use Permit granted before you can legally use a new or altered septic system.

Your contractor and/or your Public Health Unit can also help you determine the required size of your septic system. The size of the tank and the area of the leaching bed depend on a number of factors, including the size of your household (which is related to the expected water usage and load on the septic system), and the type of soil on your property. Some soils are better at absorbing liquid waste than others. The ideal location for a leaching bed is in well-drained sandy loam soil. If the soil is silt and/or clay, a larger leaching bed may be required. You may find that you need or want a larger system than you currently have. When it comes to septic systems, bigger is typically better. If you have a sloped site, you should contact your local Health Unit to discuss alternatives to the conventional system described here.

If you are repairing, replacing or installing a new septic system, you will also have to be aware of the legal limitations imposed on where your septic system can be located with respect to your house and your well, your neighbour's house and well, and nearby bodies of water. These distances are required to help ensure that wastewater from your septic system cannot reach and contaminate nearby water supplies.

What Are the Limitations Imposed on the Placement of My Septic System?

While the specifics may vary, depending on your jurisdiction, the following are some of the minimum distances required.

Septic tanks should not be closer than:

- 15 m to a well, lake, river, stream, watercourse, pond, spring or reservoir.
- 1.5 m to any building or structure (including a swimming pool).
- 3 m to any property boundary.

Distribution pipe in the leaching bed should not be closer than:

- 15 m to a well that has a watertight casing to at least 6 metres below ground.
- 30 m to a spring used as a source of potable water or a well (other than as above).
- 5 m to any building or structure.
- 3 m to any property boundary.
- 15 m to a lake, river, pond, stream or reservoir, or to a spring not used as a source of potable water.

If the surface of the leaching bed is raised above natural grade, the above clearances must typically be increased by 2 metres horizontally for each 1 metre raised.

In some cases, it may be impossible to meet these minimum distances and still construct a leaching bed big enough to meet your needs. Fortunately, there are some alternative technologies that may allow you to reduce the size of your system.

What Other Types of Systems are Available?

If it is impossible for you to install a leaching bed, perhaps due to the size of your lot, some jurisdictions will allow the installation of a holding tank in replacement situations. Holding tanks are not typically permitted as the only source of sewage treatment for a new house. The holding tank is designed simply to store wastewater, which is then pumped from the tank and trucked off-site for treatment. Typically you must have an on-going contract with a pumping service to ensure your holding tank is cleaned out on a regular basis. To ensure these systems never overflow, they are equipped with an alarm that will sound when the tank is nearly full.

There are also several mechanical alternatives to septic systems available. These systems, called Aerobic Systems, work by using a compressor to bubble air through the wastewater or by using rotating discs to expose the sewage to air. The introduction of air into the wastewater helps the micro-organisms break down the waste, providing a higher level of treatment than standard septic tanks. However, these systems employ mechanical

parts that require uninterrupted electrical connections and regular servicing, such as lubrication. Some Local Health Units have been hesitant to approve these designs, because of problems that have arisen from improperly maintained systems. As a result, aerobic systems often require the same size drainage field as a standard septic system.

Other types of pre-treatment units use different materials, such as special sands, peat or other filter materials. These systems are becoming increasingly popular because of the quality of the wastewater they produce and because they can reduce the overall size of the septic system, especially the leaching bed. The Waterloo Biofilter is an example of a technology that can be used in areas with little property, areas with surface bedrock or in northern locations where temperatures are prohibitive. Research into improved mechanical systems, better biological treatment media and systems using wetland or aquatic plants appears very promising. You should contact your Local Health Unit to find out what kinds of systems may be considered for approval in your area.

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or

Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa ON K1A 0P7

Phone: 1 800 668-2642

Fax: 1 800 245-9274

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