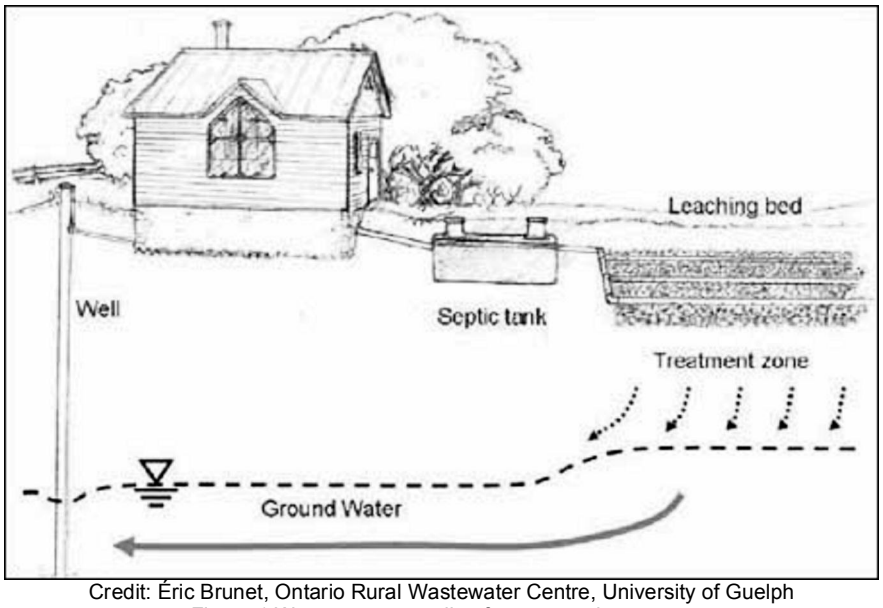
CANADA MORTGAGE AND HOUSING CORPORATION

Consumers

The following fact sheet is part of the About Your House — General Series

Your Septic System

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 likely goes into a municipal sanitary sewer system to a sewage treatment plant. If your home is located in a rural area or a small community, you are likely one of the 25 per cent of Canadians whose wastewater is treated by a septic system (also referred to as an onsite wastewater system). A septic system treats your sewage right in your own yard and releases the treated effluent back into the groundwater (see Figure 1).



Credit: Éric Brunet, Ontario Rural Wastewater Centre, University of Guelph
Figure 1:Wastewater recycling from an onsite system

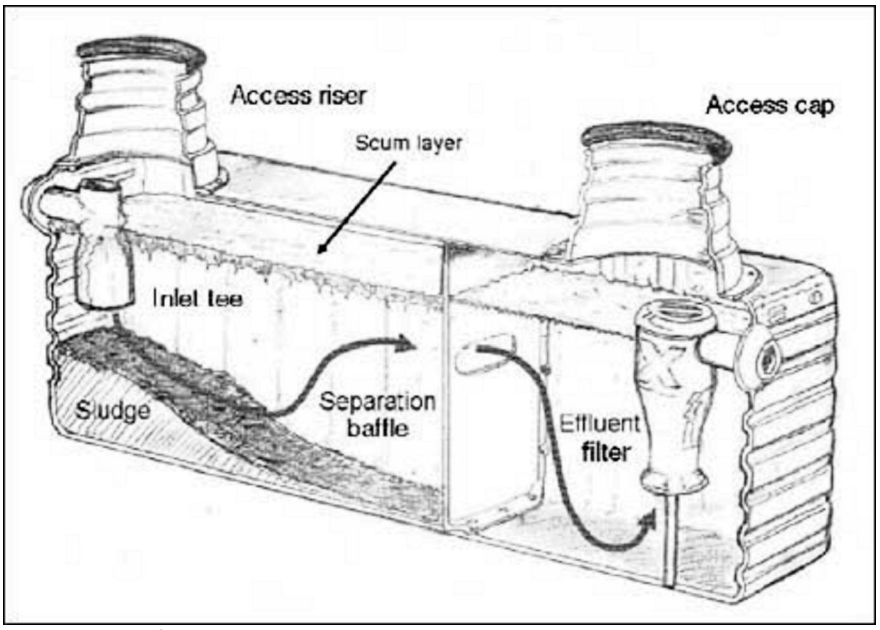
How Does My Septic System Work?

A properly functioning septic system receives all the wastewater created from household use (including toilets, showers, sinks, dishwasher, washing machine, and so on), treats the wastewater to a safe level, and returns the treated effluent to the groundwater system. A conventional septic system is composed of a septic tank and a soil filter called a leaching bed. A leaching bed may also be called a drain field, an absorption field or a tile field.

Septic Tank

he purpose of the septic tank is to separate liuids from solids and to provide some breakdown of organic matter in the wastewater. A septic tank is a buried, watertight container made from concrete, polyethylene or fiberglass. In the past, the tank was sometimes made of steel or wood. If you have a steel tank, it is likely rusted through and needs replacing. If you have a wooden one it is likely rotting and may need replacing. he sie of the septic tank will depend upon the sie of the house (number of bedrooms) and household water use, with minimum tank volumes ranging from 1, to , depending on the province or territory. Older tanks may be smaller than those installed today and tanks may have one or two compartments, depending upon when and where they were installed.

As wastewater from the house enters the septic tank, its velocity slows allowing heavier solids to settle to the bottom and lighter materials to float to the surface (see Figure 2). he accumulation of settled solids at the bottom of the tank is called sludge while the accumulation of lighter solids (greases and fats), which form a mass on the surface, is called scum . Anaerobic bacteria, which are always present in wastewater, digest some of the organic solids in the tank. Clarified wastewater in the middle of the tank flows by displacement into the leaching bed for further treatment in the soil layer.



Credit: Éric Brunet, Ontario Rural Wastewater Centre, University of Guelph
Figure 2: Common septic tank with access risers and effluent filter

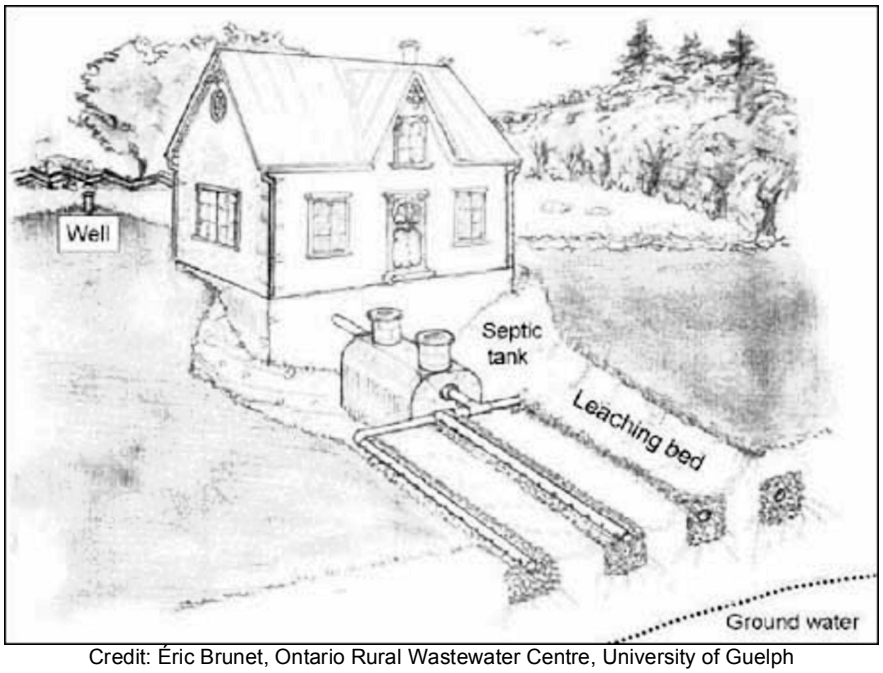
eaching ed

he partially treated wastewater from the septic tank flows into the leaching bed (see Figure). he leaching bed is typically a network of perforated plastic distribution pipes laid in gravel trenches over a layer of soil. In most provinces, the soil layer must be a minimum of . 1.2 m above the high ground water table or a restrictive layer

such as bedrock or clay and have a certain permeability (absorptive capacity). Older systems may have been constructed with clay tiles instead of plastic pipes, while new systems may use plastic chambers to replace the gravel trenches and perforated piping. he actual sie, design and layout of the leaching bed is defined in provincialterritorial code or regulation and is based upon the volume of sewage generated, the absorptive capacity of the underlying soils, and the depth to the high groundwater table or limitingrestrictive layer. Wastewater can flow by gravity from the septic tank to the distribution lines, or where reuired, can be collected in a pump chamber and pumped to a leaching bed at a higher elevation.

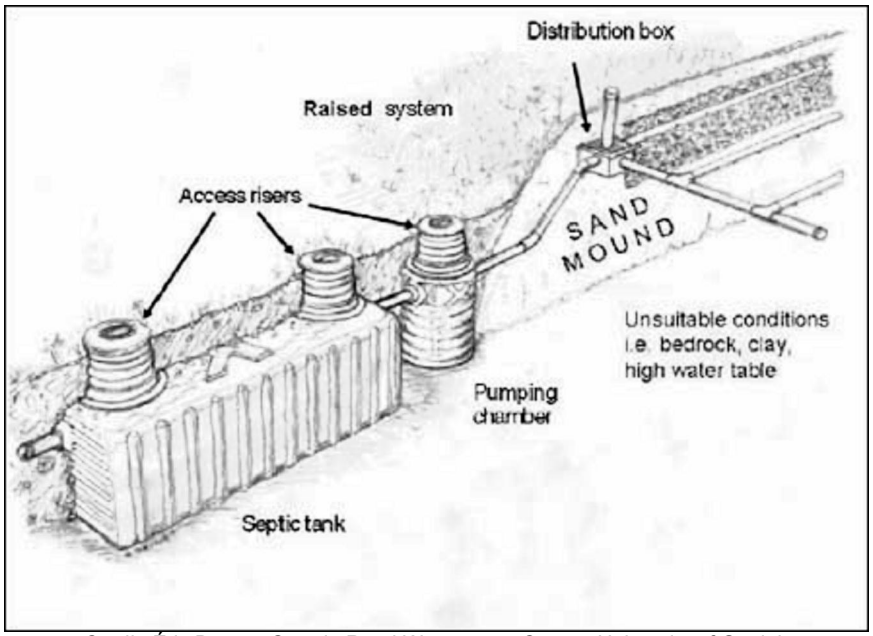
he leaching bed is a soil filter which uses natural processes to treat the wastewater from the septic tank. Contaminants in the wastewater include solid and dissolved organic matter (carbon compounds), nutrients (nitrogen and phosphorus) and harmful bacteria and viruses. A slime layer of bacteria, called a biomat layer, forms at the bottom and sidewalls of each distribution trench and it is in this layer where much of the treatment occurs. Bacteria in the biomat layer and surrounding soils consume the organic matter in the wastewater as well as transform ammonia nitrogen, which is toic to some auatic species, to the less toic form of nitrate nitrogen. armful bacteria and viruses present in the wastewater are largely removed in the leaching bed through filtration, predation (eaten by other microbes) and environmental eposure. ome leaching bed soils will contain iron, aluminium or calcium which can adsorb phosphorus from the wastewater. he soil bacteria which perform the treatment reuire oygen to function therefore the leaching bed must be installed in soils that are not saturated by surface water run off or a high groundwater table, and should not be paved or covered over with pavement, patios, sheds, and so on.

he leaching bed soil must be the right type to retain the wastewater long enough for treatment to occur, while at the same time allowing the wastewater to infiltrate into the ground (refer to your provincial or territorial regulations).



Credit: Éric Brunet, Ontario Rural Wastewater Centre, University of Guelph
Figure : Conventional septic system

In cases where there is a sufficient separation from either the high groundwater table or bedrock, the network of drainage piping is installed directly in the native soil or in imported sand if the permeability of the native soil is not suitable. his is called a **con□entional system** (see Figure). In cases where the high groundwater table or bedrock is close to the surface, the leaching bed must be raised so that there is sufficient unsaturated soil under the drainage piping. his is called a **raised □bed□system or a mound system** (see Figure).

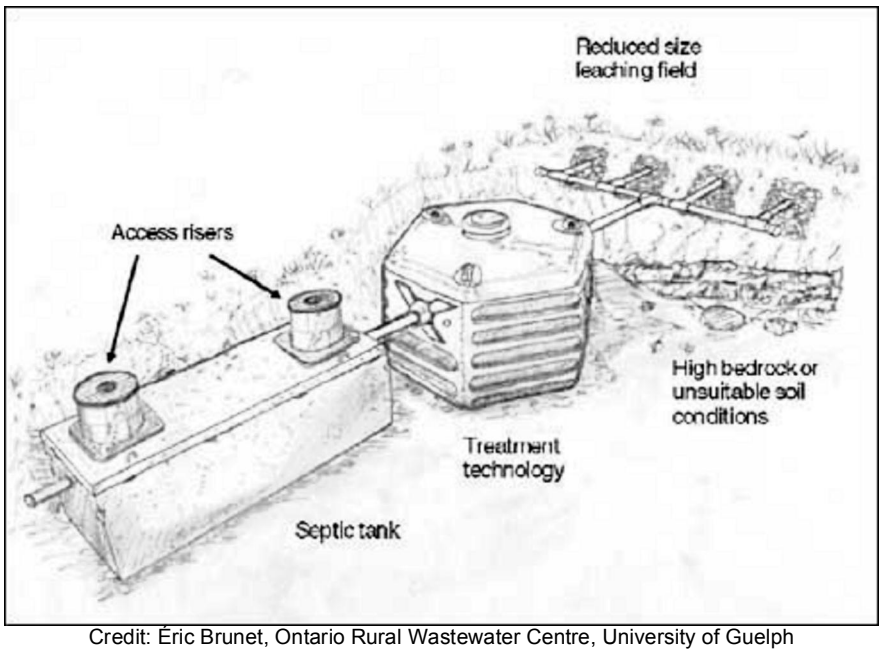


Credit: Éric Brunet, Ontario Rural Wastewater Centre, University of Guelph
Figure : Raised bed system

Aerobic Treatment Technologies

here are many site conditions where it is impractical to impossible to install a conventional septic system such as: high groundwater table, bedrock, poor soil conditions (i.e. clay, silt, till) or inability to meet the setback distances from surface water, wells or property boundary lines. In these cases, an aerobic treatment technology is often used. hese treatment technologies are proven technologies which have been on the market since the 1s with numerous installations across orth America. Aerobic technologies treat the wastewater to a higher level (secondary and tertiary) than a septic tank, permitting the treated effluent to be discharged into a much smaller area than is reuired for treatment by a conventional leaching bed. Each province and territory has its own regulations for aerobic treatment technologies and you should consult with your local regulatory authority to determine which technologies are approved in your locality.

Aerobic treatment technologies typically have three components: a settling tank (this may be smaller than a conventional septic tank), the aerobic treatment unit which removes much of organic matter from the wastewater, and a dispersal system, which is often a small leaching bed (see Figure 5).



Credit: Éric Brunet, Ontario Rural Wastewater Centre, University of Guelph
Figure 5: Alternative treatment technology

Aerobic treatment technologies all rely on aerobic micro organisms to break down the organic matter in the wastewater. In order to optimie treatment, the treatment unit vessels either include a material to support the growth of micro organisms (called attached growth media), or a continuous mier to keep micro organisms in suspension (called suspended growth). Many technologies utilie either an air pump or blower to provide oygen to the micro organisms, while some technologies are designed as trickling filters , where effluent is dosed onto an unsaturated media and the micro organisms use the oygen in the air which surrounds the media.

E. coli

		Environmental Protection
		Public Health Ac
		Environment Act
		Health Act
		Environmental Quality Act
		Environment Ac

		Public Health Act
		Safety Codes Act
		Health Act
		Public Health Act
		Public Health and Safety Act

Canada