

What is a Septic Tank System



And how do they work

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A Septic Tank System is an underground network of pipes carrying effluent from a household to designated treatment areas using tanks, chambers, pits, trenches or mulched areas to dispose of all wastewater from a household. Septic tank systems are used in areas where reticulated sewerage is not available.

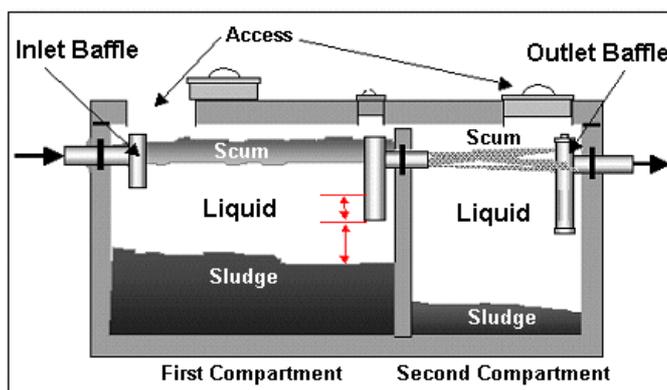
PRIMARY TREATMENT

WHAT IS A SEPTIC TANK?

A septic tank is usually a concrete, watertight chamber located outside the house. It is buried underground, and solid and liquid wastes from the household flow into it. Heavy solid wastes settle to the bottom of the septic tank (known as sludge), while lighter materials such as grease and oils collect on the top of the wastewater (known as scum). The liquid wastes are also held in the septic tank while bacteria break down many solids to a liquid in an anaerobic environment (no oxygen). This process is known as primary treatment. Some bacteria and viruses are adsorbed (chemically bound) onto solid particles and held in the sludge or scum layers, allowing for limited removal of disease causing organisms at this stage.

All purpose septic tanks are typically 3200 litres (700 gallons), with a capacity to hold 3000 litres of wastewater. They have a baffle, which effectively splits the tank into two compartments, allowing it to perform the dual role of grease trap and settling tank. The baffle slows down the flow of the liquid, allowing it to cool, which separates the grease / oil from the liquid. Smaller tanks (1800 litres / 400 gallon tanks) are generally only large enough to accept toilet wastes. These tanks do not have a

baffle, and are therefore not suitable for kitchen, laundry, shower or bath wastes that contain high levels of fats / grease / oil. They are also not large enough to accept and detain this volume of waste for an appropriate period of time before it flows out for secondary treatment. You should have your septic tank pumped out every 3 years, however it may be required sooner depending on the number of people living in the house and how much waste water enters the system.



WHY DO I NEED TO PUMP OUT MY TANK?

There are several reasons why a septic tank should be pumped out regularly. The scum and sludge layers build up over time, eventually limiting the amount of available liquid area in the tank. This does not allow the septic tank to perform one of its basic functions - to allow for settling of solids / some bacteria and viruses from the effluent. The waste liquid thus flows directly on to the next part of the system untreated. If this situation persists, parts of the scum and / or sludge can also flow through to the next part of the septic tank system, eventually causing blockages and malfunction - a messy, offensive and costly exercise to repair. The built up concentration of adsorbed pathogens (disease causing organisms) in the sludge and scum layers can also create potential public health issues and soil contamination. Soil contamination can degrade the groundwater quality, which eventually feeds into our rivers and streams.

Some forms of septic tank systems that include a treatment plant may not have a separate septic tank. These compact treatment plants have the septic tank and treatment plant together in the one large unit. The septic tank still requires pumping out every 3 years, but as these systems must be maintained every 3 months by the manufacturer or a suitably qualified person, septic tank monitoring and pumpout is generally part of the overall contract maintenance program. If you have one of these systems installed, you should confirm this with your contractor at the next maintenance visit.

To arrange for your septic tank or grease trap to be emptied you will need to look at the companies listed in the Yellow Pages under 'Septic Tank Cleaning Services'.

Never clean your septic tank out once it has been emptied. You will kill the bacteria that help break down and destroy the pollutants from your house. Once a septic tank has been pumped out, it can be

1/4 refilled with water to reduce odours on start up. Remember that your septic tank lid should be raised to ground level, and accessible at all times.

WHAT IS A GREASE TRAP?

A grease trap separates fatty wastes and oils from the liquid wastes. It works by slowing the flow of the hot liquid from the kitchen which allows the fat, grease and oil to separate from the liquid. Baffles allow the clear water to flow on to the second compartment of the grease trap, while the fat, grease and oil are detained in the first compartment.

Almost all properties with a toilet waste only septic tank will have a grease trap to remove the fats and oils from the kitchen wastes before they leave the property. The grease trap will have a concrete lid, and are located outside the house, within the vicinity of the kitchen sink. With these types of systems, it is very important that you inspect your grease trap regularly, and have it cleaned out as necessary (usually every 6-12 months in a domestic situation and ensure the 3 dividing baffles are fitted).



SECONDARY TREATMENT

Secondary treatment is what occurs after the sedimentation process (primary treatment), it removes nutrients and remaining solids through bacterial decomposition.

Types of secondary treatment include, sand filters, aerated wastewater treatment systems and reed beds.

WHAT IS A TREATMENT PLANT?

Treatment plants are underground concrete chambers containing a variety of mechanical parts. A treatment plant aerates and agitates the effluent as it enters the treatment plant from the septic tank, creating a turbulent, aerobic environment which helps to reduce the number of disease causing organisms. There is also a filter or clogging matt within the treatment plant that traps pathogens onto the filter / matt, performing the same function as the sand of a sand filter or the soil in effluent disposal trenches. These filters must be changed regularly, and this must be conducted by the manufacturer of the treatment plant, or a suitably qualified person.



Treatment plants require a constant supply of electricity to operate, and a warning light or alarm that must be visible from habitable rooms in the house. The mechanical parts of a treatment plant (e.g. pumps, agitators, aerators, filters) require regular servicing every three months. This is an EPA

condition for the use of all types of treatment plants. The maintenance of a treatment plant must be conducted by the manufacturer, or a suitably qualified person.

If your treatment plant discharges wastewater to the stormwater drain, or is / was installed after February 1999, you (as the owner) must arrange for the effluent discharged from the system to be tested regularly by a NATA (National Association of Testing Laboratories) approved laboratory.

Make sure you purchase the treatment plant that best suits your needs, and that you find out about the manufacturers ongoing maintenance conditions, and running costs of the treatment plant. Generally Council will only permit systems recommended on the Land Capability Assessment (LCA).

WHAT IS A SAND FILTER?

A sand filter, in basic terms, can be likened to a big sandpit under a grassed area, with concrete pits at either end that should be able to be seen at ground level. While the septic tank operates in anaerobic conditions (no oxygen), the sand filter operates in aerobic conditions (in the presence of oxygen).

Do not concrete over the sand filter or cover with additional earth, as this can stop air from entering. Bacteria present in the sand filter and disposal trenches require aerobic (oxygenated) conditions to digest effluent.

If your septic tank is not pumped out regularly, the sludge and scum (solids) in the tank can flow into the sand filter distribution box. Distribution into the slotted pipes on top of the filtered sand can block these pipes, and may result in the effluent backing up into the septic tank and potentially into the house.



Three of the pipes from the distribution box are slotted pipes that sit on top of 750mm of sand (but under some crushed rock, topsoil and grass). These pipes are almost level so that they can distribute the effluent from the septic tank evenly over the sandy area.



The effluent filters through the sand and is treated by organisms that grow on the sand particles. As the treated effluent reaches the bottom of the sand filter, it collects in a large slotted pipe located along the bottom of the sand filter. The bottom of the sand filter is in the shape of a 'V', so that treated effluent can be channeled towards the bottom pipe.

Once in the bottom slotted pipe, the treated effluent flows into the concrete pit at the far end of the sand filter, referred to as the chlorination or inspection pit. This pit is generally round in shape, and is very deep, as the depth of the pipe at the bottom of the sand filter is typically 1350mm below the ground, and the chlorination pit must collect the effluent from the bottom pipe.

The concrete pit at the start of the sand filter is generally square in shape, and is referred to as the distribution pit or box. If you lift the lid of this pit and look inside, you will see a round opening on each of the four walls of the pit. All of these round openings have pipes connected to them. One pipe comes from the septic tank into the distribution box, while the other three pipes flow out over the top of the sand filter from the distribution box.

When sand filters were first introduced, it was believed that effluent should be dosed with chlorine before being allowed to discharge from the property. However, it is now recognised that chlorine has potentially damaging effects on the local waterways and environment. Today, chlorine is not recommended, provided the sand filter is in good working order.



WHAT IS AN EFFLUENT DISPOSAL TRENCH?

Effluent trenches are also known as absorption trenches, agricultural trenches / lines ('aggy lines'), evaporation / transpiration trenches / lines and disposal fields. They are an underground system, consisting of a series of level trenches buried to a depth of approximately 380 - 400mm that follow the contour of the land. They have a slotted pipe along the bottom of each trench, with screenings (crushed rock) surrounding.

There is a concrete distribution pit or box at the start of the first trench (and sometimes at the start of each trench). Effluent is distributed evenly throughout a trench, which must fill to approximately 150mm below ground level before overflowing to the next trench, via a 'weir', or 'overflow'. Trenches are typically a minimum of 10m, and a maximum of 30 meters long.

Effluent disposal trenches work in three ways;

Absorption:

Bacteria build up over time in these trenches and form a 'clogging matt' in which bacteria compete with the effluent (disease causing organisms), diluting the mixture as it is absorbed into the soil. Some viruses and bacteria are trapped or adsorbed onto soil particles, while others pass through and are slowly diluted and / or destroyed by other organisms as they travel down towards the groundwater system.

Evaporation:

Through heating of the effluent disposal trenches from sunlight, or through strong or warm winds, evaporation of the wastes occurs through the soil and into the air.

Transpiration:

Where the roots of grasses and plants take up and utilise the liquid effluent, and release it to the atmosphere.



Effluent disposal trenches should be located:

- 15 meters away from any source of water supply or any cutting or escarpment (bank) at which effluent is likely to emerge
- 2 meters from any underground power line, water supply pipe, gas pipe, telephone cable or storm water drain
- 2 meters from a high property boundary
- 4 meters from a low boundary of any allotment or the high side of any building
- 6 meters upslope or 3 meters downslope from any swimming pool
- 60 meters from any surface waters

Trenches should not be located near areas subject to vehicular traffic

Depending on the fall of the land, pumps are sometimes required to get the effluent to the disposal trenches.

Surface waters must be prevented from entering the effluent disposal area by the use of a cut off drain, where necessary. Protect your effluent trenches by keeping them clear of vehicular traffic, livestock, and heavy machinery. These can compact the soils, and damage the pipes in a trench, which reduces their performance and lifespan. Do not concrete over the effluent disposal trenches or cover with additional earth. This creates anaerobic conditions which supports the growth of pathogens (disease causing organisms).

To avoid clogging the disposal system, the septic tank is required to be pumped out every 3 years. Do not build over any part of the septic tank system.

Secondary treatment removes high numbers of disease causing organisms from wastewater making it suitable for various forms of disposal on site such as:

Effluent disposal trenches:

These can be used for secondary treatment (as discussed earlier) or as a disposal field after secondary treatment has occurred via a sand filter or treatment plant. The Environment Protection Authority allows properties to halve the amount of trenches required if secondary treatment has occurred before disposal into the trenches



Surface (drip feed) irrigation:

With this option, treated effluent is pumped under pressure to a permanently designated area on the property that is rotary hoed, mulched, and suitable shrubs / plants are grown in the area to absorb the wastewater. The wastewater drips from raised sprinklers onto a permanently dedicated and mulched garden area. This system has several restrictive conditions for installation and use



Subsurface irrigation:

A combination of the two options above, where effluent is pumped through small flexible plastic piping under pressure in shallow trenches under the surface. Like traditional effluent disposal trenches, this form of wastewater disposal relies on transpiration principles rather than absorption.



Suitable plants for your septic disposal area

- Acacia Cyclops (Western Coastal Wattle)
- Acacia howittii (Sticky Wattle)
- Acacia Longifolia (Swallow Wattle)
- Acacia Retinoides (Wirilda)
- Callistemon citrinus (Crimson Bottlebrush)
- Callistemon viminalis (Weeping Bottlebrush)
- Callistemon lilacinus (Lilac Bottlebrush)
- Eucalyptus preissiana (Bell-fruit Mallee)
- Melaleuca ericfolia (Swamp Paperbark)
- Melaleuca halmaturorum (Salt Paperbark)
- Tamarix juniperina (Flowering Tamarisk)

Plants NOT suitable for your septic disposal area

- Eucalyptus camaldulensis (River Red Gum)
- Eucalyptus citriodora (Lemon Scented Gum)
- Fraxinus raywoodi (Claret Ash)
- Eucalyptus cladocalyx (Sugar Gum)
- Populus nigra (Poplar)
- Salix babylonica (Weeping Willow)

