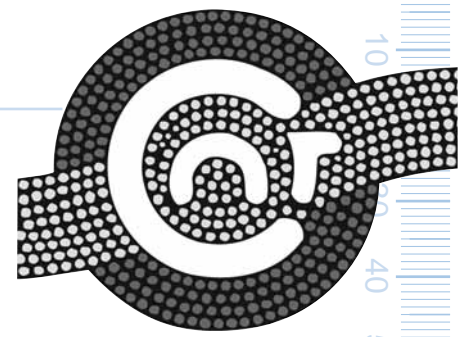


Septic tanks and absorption trenches



Septic tanks and absorption trenches (also called leach drains) are a very common method of wastewater disposal. They treat waste from flushing toilets, and also greywater waste from bathrooms, laundries and kitchens. About half of the small Indigenous communities in Australia use septic tanks. When they are working well, they are a safe and effective method of wastewater disposal. However, it is very common for septic tanks not to work well. Common problems include blocked pipes that can cause toilets to overflow, overflowing septic tanks, and overloaded trenches. All these problems result in untreated human waste being released into the home living environment. This is a serious health hazard, it pollutes the environment and it stinks!

For septic tanks systems to work well, they require:

- Quality design
- Quality construction
- On-going maintenance and management.

How does it work?

The main parts of a septic tank and absorption trench system (figure 1).

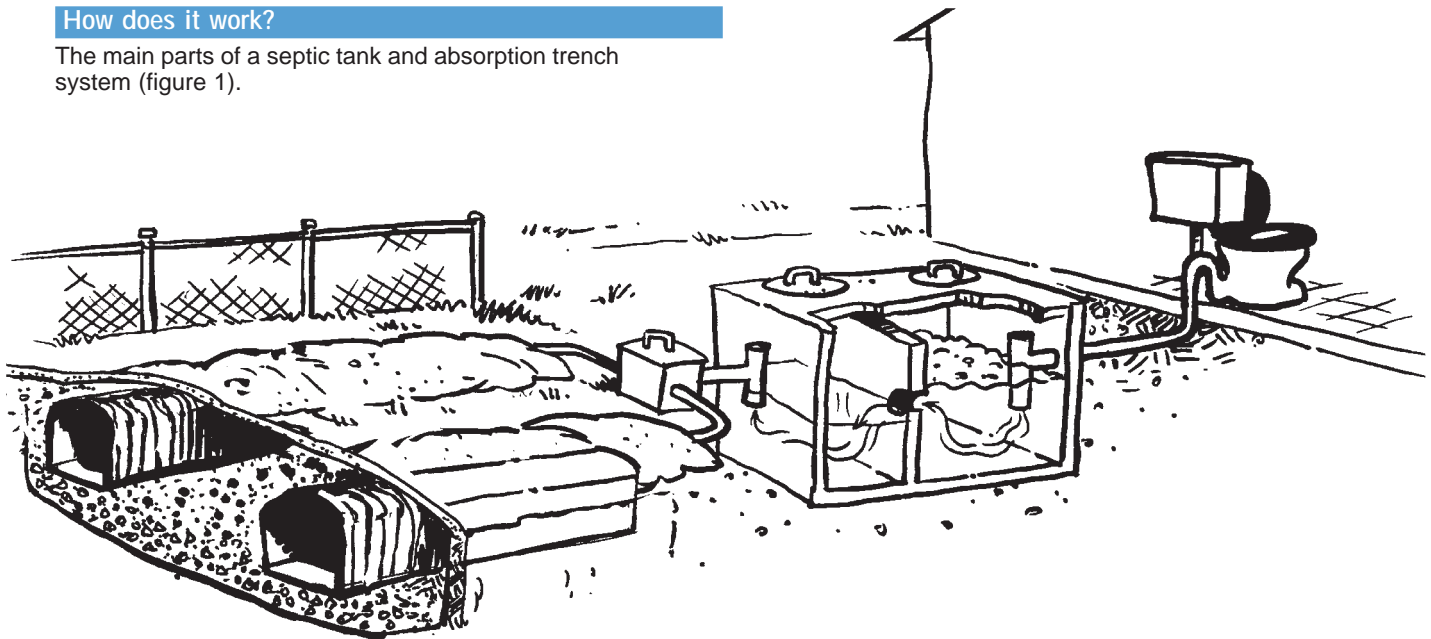


Figure 1: Cut-away view of a septic tank and absorption trench system.

The septic tank

A septic tank is a large, watertight tank, usually made of reinforced concrete or plastic, that is buried in the ground. Septic tanks are made in different sizes, to suit different size houses. Wastewater from the house flows in drainage pipes into the septic tank through the **inlet**. In the tank, light materials in the waste such as grease and oil float to the surface to form a **scum layer**. Heavier solid materials, including the solids in faeces (poo, shit), sink to the bottom of the tank. Microorganisms (bacteria, fungi and others) decompose some of the solid material, and form a **sludge layer** on the bottom of the tank. The partially-treated liquid in the waste flows out into the absorption trenches. This liquid still contains a high concentration of pathogens (disease-causing microorganisms), and also other pollutants including nutrients.

The trenches

An absorption trench (also called a leach drain) is made of a pipe with holes in it, surrounded by gravel, and buried in the ground. These days, plastic pipes and arch-shaped plastic tunnels are the most common type of absorption trench. Wastewater from the septic tank flows into the pipe, and then out into the gravel and the surrounding soil. As the water flows through the gravel and soil, pathogens and other pollutants are removed by filtering, and by decomposition by microorganisms in the soil. The rate at which wastewater drains out of the trench into the soil depends on what type of soil it is. Wastewater drains very slowly into clay soils, but very fast into sandy soils. That is why it is very important to look at what type of soil is on a site before designing a septic tank and absorption trench system.



Figure 2: A new absorption trench being installed.



Septic tanks and absorption trenches



Figure 3: The lid of a concrete septic tank.

In the past, it has been common practice to use one septic tank and absorption trench system to treat all the wastewater from a house. This is called an “all waste” system. These days, it is considered better to have separate systems for greywater and blackwater. In the Northern Territory, it is a legal requirement that all septic tank systems in Aboriginal communities must have separate tanks and trenches for greywater and blackwater.

Making it work well

For a septic tank to work well, it needs to be designed properly, and it needs to be maintained and managed. All States and Territories in Australia have rules about how septic tank and absorption trench systems must be designed. A specially trained person is needed to do this design.

The most important parts of the design are to make sure that the tank is large enough to handle the waste flows from the house, and to make sure that the absorption trench system is large enough so that all the wastewater drains away into the soil safely. Both these aspects of the design are especially critical in Indigenous communities, where there are often a lot of people living in a house, and lots of visitors.

Over the last ten years, as we have learnt more about how absorption trench systems work, it has become clear that trench systems should usually be much bigger than we think. For example, the current design rules say that for a large outstation house in an area with sandy soils, you should have more than 100 m of absorption trench. If the soil was more clayey you might need to up to 500 m of trench. The current design rules also suggest that you should have a reserve area of land available so that if after a few years your trenches are not working well any more, you have land available to dig new trenches. Setting aside enough land for your trenches can have a big impact on how you lay out your community.

To keep a septic tank system working well, it needs to be looked after. A system requires:

- The sludge layer from the bottom of the tank needs to be emptied out from time to time (usually once every two to five years, but possibly every year if the system is overloaded).
- Keeping an eye out for dripping taps or toilets cisterns, as they can quickly overload the septic tank.
- You can help prevent overloading of the septic tank by installing water-conserving plumbing fixtures in your houses such as low-flow shower roses and tap aerators.
- You can reduce the amount of grease and fat entering the septic tank by fitting a greasetrapp on the drain pipe from the kitchen.
- You need to look after the trenches by making sure that vehicles don't drive over them. It is a good idea to fence off the area where the trenches are. It is also a good idea to dig drains or bunds to divert rainwater away from the trench area.

When to use a septic tank and absorption trenches

The main things that will affect whether or not you can use a septic tank and absorption trench systems are the type of soil at your site, and whether the soil ever becomes flooded due to a high water table, or surface flooding. Your systems designer will look at these factors. The best soil for absorption trenches is loamy soil where water drains away well, but not too quickly. In very coarse sandy soils, the water drains away very quickly, but the pollution in the wastewater does not get removed very well. Pathogens and nutrients can travel a long way through sandy soil. In very clayey soils, the wastewater drains away very slowly. This can cause the trenches to overflow up to the soil surface. Most of the design rules say the absorption trenches should not be used if the water table is less than 1.2 m below the bottom of the trench.

If your soil is very sandy, or clayey, or if you have a high water table, or if your soil gets flooded in the wet season, you may still be able to use a septic tank system for your wastewater. There are other types of disposal methods that can be used with septic tanks such as evapotranspiration-absorption systems, and mound systems. Your systems designer will be able to tell you if one of these other systems can be used.

The rules

You need a permit to install a septic tank. In the Northern Territory, you need to apply to the Environmental Health Service of Territory Health. In other states, you need to apply to your local government (Shire Council or Community Council). A system design prepared by a qualified wastewater disposal system designer needs to be attached to the permit application. CAT staff in Alice Springs, Derby and Cairns can assist you to find a system designer and get a permit for a new septic tank.

Written by Michael Martin, CAT Cairns

Illustration by Tom Cosic