Looking after your household

Sewerage system

Helping care for the Ruapehu environment

Contents

1 Your On-Site Effluent Treatment and Disposal System

If you live in the country or in a small rural town, the wastewater from your toilet, shower and kitchen probably drains into an on-site treatment system and is then disposed of into the ground somewhere in your backyard.

Household wastewater (domestic effluent) can contain a mixture of human faeces, food particles, soaps and other cleaning chemicals. It must be treated and disposed of so that it does not pollute groundwater or streams, or put people's health at risk.

The standard on-site domestic effluent treatment and disposal system has two parts: Treatment and disposal. There are two main types of on-site treatment systems commonly used for domestic effluent: Septic tanks, and a group of treatment plants known as aerated wastewater treatment systems (AWTS).

There are many different types of disposal systems, each being designed to take into account the site conditions and soil types of your backyard.

The correct operation and continued maintenance of these systems are very important because if neglected, they can pollute the environment, put you and your neighbours' health at risk and be very expensive to fix.

Land occupiers and owners must ensure that their domestic wastewater treatment system is operating according to the rules and standards that apply.

Horizons Regional Council has rules that manage discharges to land such as those from sewerage systems to ensure that waterways and water bodies do not become polluted.
Ruapehu District Council has responsibilities for the control and management of domestic wastewater systems.

These are:

(a) The Local Government Act 2002, requiring district council's to provide water and sanitary services and the efficient and effective management of all types of waste within their districts.
(b) The Building Act 2004, where district council's ensure that building consent applications make proper provision for the disposal of wastewater.
(c) The Resource Management Act 1991, where district council's control the effects of land subdivision and development the environment through district plan rules and associated standards relating to wastewater treatment and site drainage.
(d) The Health Act 1956, where district councils are responsible for public health within their district. Environmental health officers inspect and take action on situations where conditions are likely to be injurious to health.

Local authorities want to ensure your household's residents know how to look after their on-site sewerage system to ensure it continues to operate in an environmentally friendly and safe way.

This information is based on a publication by the Taranaki Regional Council and is designed to help you by outlining how some of these systems work and what is required to keep them operating effectively.

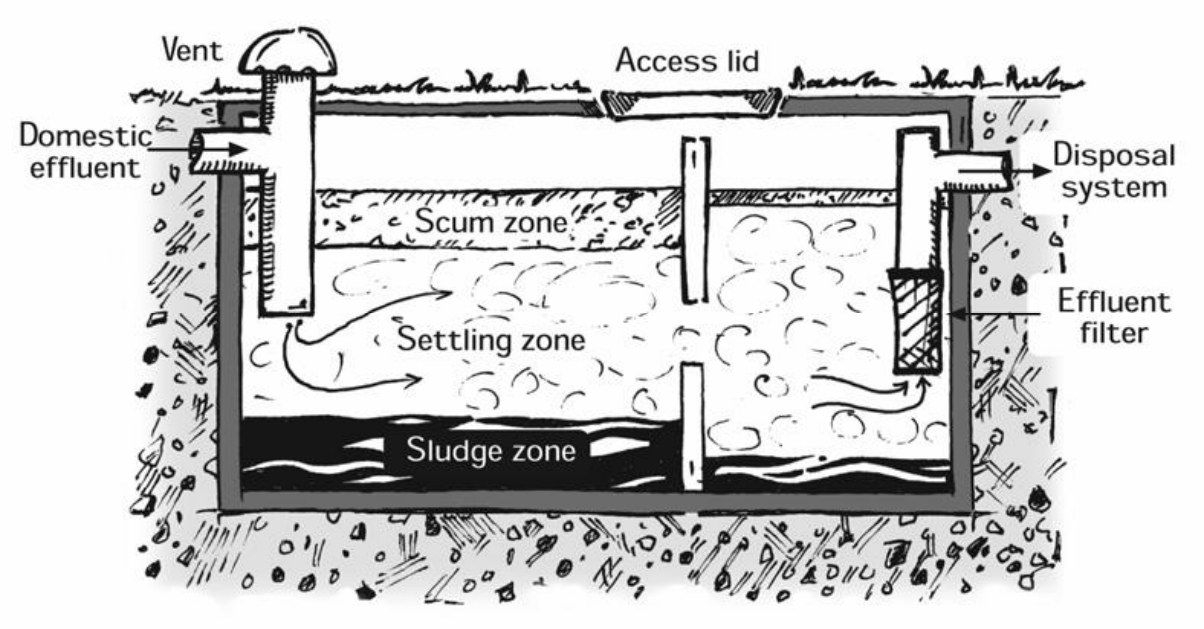
2 Septic Tanks

The main job of a septic tank is to prevent the suspended solids in domestic effluent entering the disposal system. When excessive amounts of solids escape from a septic tank, they may clog the disposal system and lead to its early failure.

Three main processes take place in the septic tank:

1. The heavier, solid particles settle to the bottom of the tank, forming a sludge layer.
2. Lighter materials such as fat and grease float to the surface, forming a scum layer.
3. Within the septic tank there is little or no oxygen, and anaerobic bacteria (bugs that can live without oxygen) break down some of the solids. This helps reduce the build-up of sludge in the tank.

The effluent that leaves a well-operating septic tank contains only the smaller particles that are less likely to rapidly clog the disposal system.



NOTE: This is a "standard" septic tank design. Different load conditions and/or sites with poor soakage or other disposal constraints may require a more sophisticated tank design. Design advice should be obtained from a qualified professional.

2.1 Effluent filters

The escape of larger suspended solid particles from a septic tank is the most common cause of early failure of the effluent disposal system. A relatively inexpensive method of reducing the likelihood of this happening is to install an effluent filter on your septic tank outlet, as these filters allow only the smaller solids to pass. Most modern septic tanks should have an effluent filter installed on their outlet. Effluent filters can also be installed on the outlets of existing septic tanks with very little modification.

2.2 Effluent disposal

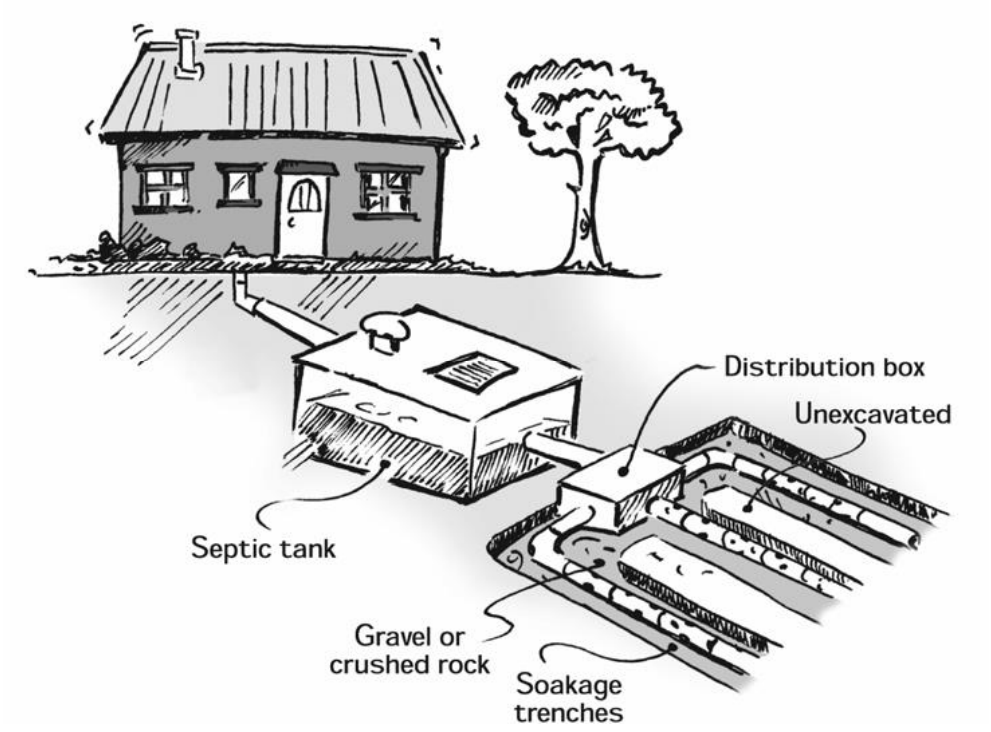
When the effluent leaves the septic tank, it is only partially treated. The natural processes occurring within the soils below the disposal system carry out the final treatment of the effluent.
The type and size of the disposal system used is normally determined by the site conditions, ground water level and soil type. The two following types of effluent disposal systems are most commonly used with septic tanks.

2.2.1 Soakage Trench and Bed Systems

These are the most common type of effluent disposal systems used in association with a septic tank.
Perforated pipes (or in older systems field tiles) are laid in shallow trenches filled with gravel. Effluent flows out of the holes in the pipe and soaks into the surrounding soil (see diagram below). The main difference between trenches and beds is that beds are wider and shallower than normal trenches.

Beds should be used only where it is not possible to use trenches.
Some soakage trench/bed systems may have a distribution box that allows the effluent to be manually diverted from one trench/bed to another. This gives the trench/bed that is not receiving any effluent time to rest (recover) while the other is in use.

The trenches/beds should be alternated at least every three to six months. In some areas where the soils are poor, it may be necessary to use all the trenches/beds during the winter months when the soil soakage is worst and then rest some of the trenches/beds during the summer months when the soil soakage is normally at its greatest.



2.2.2 Evapo-Transpiration Seepage (ETS) Systems

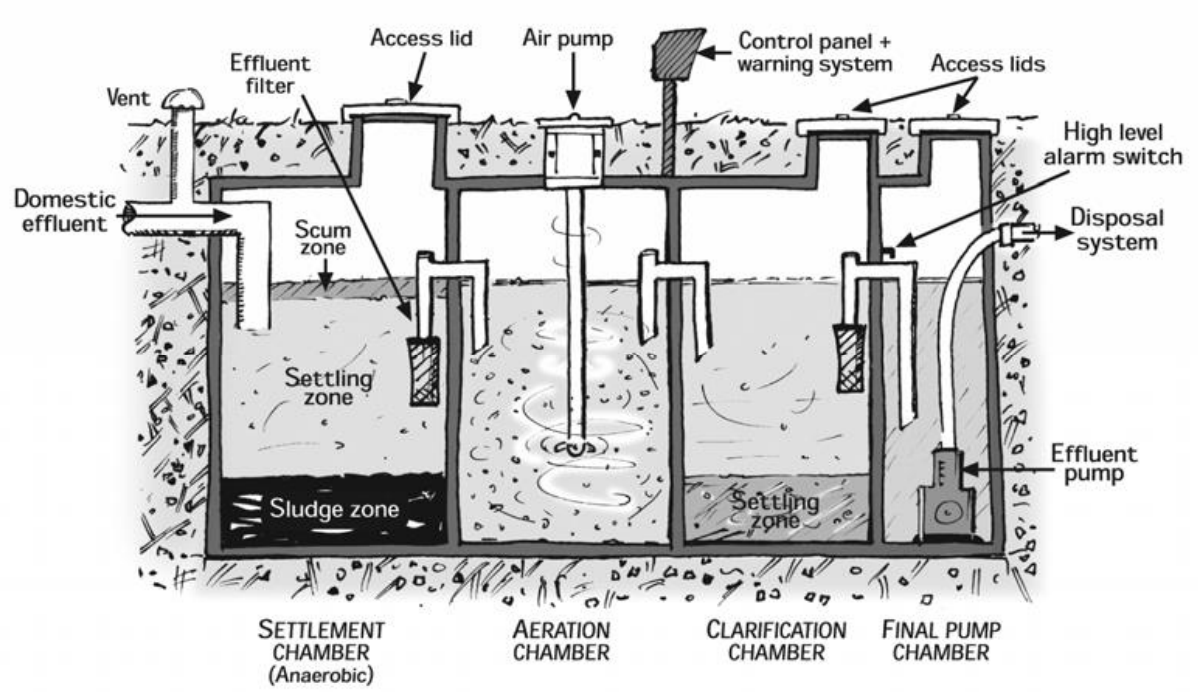
These systems are similar to soakage trench and bed systems but they use both the soil soakage and selected plants for the disposal of effluent. The area where the effluent is to be disposed of is specially planted with selected plants that like wet feet (see list of recommended plants in section 11 of this document). The plants absorb some of the effluent, using the nutrients to grow, and lose the liquid portion as water from the surface of their leaves through the natural process of evapo-transpiration. The remaining effluent within the disposal area is disposed of by soaking into the surrounding soils.

3 Aerated Wastewater Treatment Systems (AWTS)

The term AWTS covers a number of different brands of packaged on-site treatment systems that use similar treatment principles to provide additional treatment to septic tank effluent. In general, an AWTS has three parts to it, and these may be housed in a single unit or split into more than one unit.

The three main processes that take place in an AWTS are:
1. Settlement and anaerobic treatment: This takes place in a chamber or tank and the process is identical to that which occurs in a septic tank. Some of the solids within the effluent settle out and are broken down by anaerobic bacteria (bacteria that can live without oxygen).
2. Aerated treatment: The effluent is then pumped to a second chamber where aerobic bacteria (bacteria that require oxygen to live) break down the solids further and also reduce the number of harmful bugs within the effluent. This process is normally achieved by either passing the effluent over, or through, a material that contains aerobic bacteria, or by pumping air directly into the effluent. In some AWTS a combination of both methods may be used.
3. Final settlement (clarification): After the aerated treatment, the effluent is allowed to settle prior to being pumped to a disposal system.

Some of the systems have an option whereby the final effluent can be disinfected (e.g. by using ultraviolet light or chlorination). It is vital that such disinfection systems be maintained, to protect your health and the environment. For a UV system, follow the manufacturer's instructions on checking and replacement of the UV lights. They do lose their power over time. For a chlorination system, replace the disinfectant at the recommended intervals. No matter how advanced your system is, it will not perform if you maintain it only 'when I get around to it'. The mechanical pumps within an AWTS require maintenance and a continuous power supply. The actual amount of electricity used by an AWTS per day is similar to that used by a light bulb that has been left on all day.



NOTE: This is a generalised diagram of an AWTS. Designs may differ with different brands.

An AWTS removes a greater amount of solids from the effluent than a septic tank does and therefore problems within the disposal system caused by clogging are less likely. The additional treatment within the aerobic chamber should result in an effluent that has fewer harmful bugs and nutrients, so there is less likelihood of any adverse environmental effects occurring. The installation of an AWTS is particularly useful in areas where there is a high groundwater table that needs protection or there are poorly draining soils. If you are unsure whether your on-site effluent treatment system is an AWTS, you should first check if building or drainage records are held for your property. Enquiries may be made at the Ruapehu District Council, Ph. 8958188.

3.1 Effluent disposal

Effluent from an AWTS is commonly disposed of by means of dripper irrigation lines. This method uses a flexible pipe that usually has small pressure compensating drippers installed along its length. The drippers should be self flushing, which helps prevent them from becoming clogged. The irrigation line is placed either under the soil surface, or on the surface and covered with bark or a similar material. The irrigation lines can be laid around ornamental gardens to water plants, which is a useful means of recycling the effluent.

4 Holiday Homes

Most holiday homes are used infrequently during the majority of the year and then are heavily occupied for a few weeks during the summer holidays and other holiday periods. This type of use generates a sudden large volume of effluent that enters the on-site treatment system, a situation normally termed “shock loading”.

4.1 Septic tanks

If you have a septic tank system installed then shock loading is not usually a major problem as the septic tank should be of a sufficient size to retain the majority of solid material entering it. If your septic tank does not have an effluent filter fitted to the outlet, then installing one will help reduce the risk of larger solid particles entering the disposal system. Due to the long periods of non-use the soakage trenches or beds will have been rested and the soils below them should have good soakage.

4.2 Aerated wastewater treatment systems (AWTS)

The aerobic bacteria within an AWTS require a regular source of effluent to maintain their population numbers. As more effluent enters the system the aerobic bacteria will slowly increase their numbers to take advantage of the extra food source. When an AWTS is shock-loaded there will initially be insufficient aerobic bacteria available to effectively provide additional treatment to the effluent. This can potentially cause odour problems and may increase the risk of the disposal system, especially if it includes irrigation lines, becoming clogged. This period of reduced treatment will also adversely affect the environmental protection that these systems are designed to provide.

Some AWTS will have features, such as sludge recirculation, that help keep the aerobic bacteria alive during short periods of non-use. If you do have an AWTS installed in your holiday home, it is advisable that someone uses the house for a few days prior to everyone arriving. This person should ensure that the AWTS is still operational when they leave the house. This simple practice will help the AWTS to more effectively cope with the shock loading and reduce the potential for any major problems occurring.

If you are proposing to install an AWTS in a holiday home, you should check with the manufacturer or supplier of the system that it is appropriate for your particular situation. If you have any doubts, please discuss your concerns with your registered plumber or drain layer.

5 Other Treatment Systems

There is a variety of alternative on-site treatment systems that can also be used for domestic effluent. Two examples are outlined below:

5.1 Composting toilets

These systems generally produce very little or no liquid effluent and work by composting the solid material of the effluent. Some of these systems can require a greater amount of general maintenance than other treatment systems. The resulting composted product may be used as a fertiliser on an ornamental garden, but should not be used on vegetable gardens. Some composting toilets also have a flush component that needs to be disposed of on your property as well. If you have a composting toilet, grey water (water from showers, kitchens and washing machines, etc.) still needs to be treated and disposed of on your property.
The grey water treatment system should be similar in design to that for a normal domestic septic tank treatment system. This allows for the settlement and collection of solids from the grey water. If not contained, these solids can lead to premature

failure of your soakage system. Many of the recommendations in this information sheet regarding a septic tank treatment system also apply to a grey water treatment system.

5.2 Biolytic filtration

These treatment systems consist of a chamber where effluent is passed over a bed of accumulating organic matter. The effluent filters down through the bed, leaving the bulk of the solid material behind. Bacteria and earthworms break down this organic material. The earthworms also assist with the aeration of the organic waste, thus reducing the potential for odours. The residual effluent is collected and in some systems may receive further treatment in a sand filter before entering the disposal system. Maintenance of these systems should be as recommended by the manufacturer.

6 System Failure

If your effluent treatment and disposal system is used correctly and well maintained, it should give you years of trouble-free service. However neglect, damage, or even long years of use can cause your system to fail.

6.1 How can you tell your system is failing?

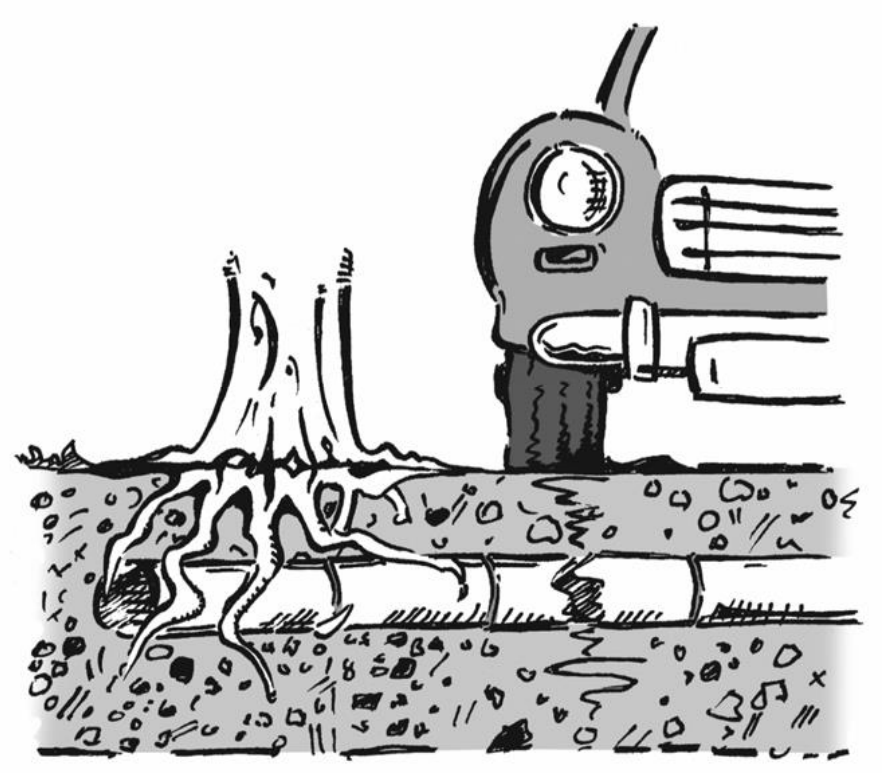
If you notice one or more of the following, your system is probably failing and you must take urgent action to get it working properly again:

(a) Sinks and toilets are slow to drain.
(b) You smell effluent near either the treatment or disposal systems.
(c) Black and slimy areas are forming on the ground where your disposal system is located.
(d) If you have an AWTS, a high effluent level warning system may be activated. This is usually an alarm bell or a flashing light.

6.2 Why do systems fail?

When an on-site effluent treatment and disposal system starts giving problems, it is usually because the disposal system has begun to fail. Failure of the disposal system can be caused by:

(a) **A build-up of sludge in the septic tank.** If the septic tank is not pumped out often enough (see section on regular maintenance), excessive solids and fats may escape into the disposal system, causing it to clog and reducing the amount of effluent that can soak into the surrounding soil.
(b) **Tree roots extending into the disposal system.** These can cause a blockage, preventing the effluent from getting all the way through the disposal system and overloading a small part of the system.
(c) **Heavy stock or vehicles fracturing the disposal system.** This will also prevent effluent getting all the way through the disposal system and overloading a small part of it.
(d) **Poor location of the disposal system in waterlogged areas.** Effluent cannot soak into soil that is already wet.
(e) **The 'good' bacteria in the treatment system being killed off.** This occurs when unsuitable materials are put down household drains.



7 Some other causes of system failure

7.1 Aerated wastewater treatment systems (AWTS)

a) If the power supply to an AWTS is disconnected then the effluent and air pumps will not operate. If the power supply to the house is disrupted, the occupants of the house should minimise the volume of effluent entering the AWTS until the power supply is restored. This should help to prevent effluent from the settlement chamber filling the other compartments of the AWTS – however if this does occur, then the AWTS may need to be pumped out (desludged) to remove the excess solids. If the settlement chamber of your AWTS is not completely sealed, i.e. the walls do not go up to the roof of the AWTS, then the risk of excessive solids entering the other chambers is greatly increased due to the effluent being able to flow over the settlement chamber walls. Depending on the duration of the power failure, the lack of oxygen within the aerobic chamber may also result in the death of all the aerobic bacteria.

b) If for some other reason an effluent pump fails, then effluent will begin to accumulate within the AWTS. Your AWTS should have a high effluent level alarm system installed that has both a visual and audio alarm. Since the AWTS will still have a power supply, once the effluent reaches a certain level then the high effluent level alarm system should alert you that something is wrong.

c) Failure to replace disinfectant at the recommended intervals.

If either of these events occurs then the supplier or maintenance contractor should be contacted immediately.

7.2 Effluent filters

If your septic tank has an effluent filter then a build-up of sludge may result in this filter becoming clogged. This could cause effluent to build up within the septic tank and either overflow through the mushroom vent or back up and overflow from the nearest drainage network opening (e.g. a gully trap).

Why is failure a problem?

(a) Effluent on the surface of the ground or within nearby streams, is a health hazard to your family, your pets, your neighbours and other users.
(b) Birds, rats and other animals may spread disease from the effluent.
(c) A mosquito and fly breeding ground may develop.
(d) Your own or other people's underground water supplies may be polluted.
(e) Streams, beaches and shellfish beds may be polluted.

8 The Do's and Don'ts of Operating Your On-Site Treatment and Disposal System

8.1 Keep the treatment system 'alive'

Household cleaners, strong detergents and toxic chemicals can kill the 'good' bacteria within treatment systems.

To keep these bacteria alive:
Do use biodegradable detergents and cleaners.
Don't pour acids, pesticides, medicines, paint, thinners or other materials which will kill the bacteria in your treatment system.
Do check your detergents and cleaners to see if they are suitable for use with an on-site treatment system.
Don't use septic tank "cleaning chemicals".
Do leave the power turned on to AWTS, as per the manufacturer's instructions.
Don't pour car engine oil, cooking oil or grease into your treatment system.
Do replace disinfectant chemicals within the recommended intervals.

8.2 Reduce the solid load

To reduce the sludge build-up in your treatment system:

Do scrape all your dishes to remove fats and food particles before washing.
Don't put sanitary pads, tampons, paper tissues, paper towels, disposable nappies, nappy liners, cigarettes or rags into the system.
Do shake sand and dirt from clothes before you wash them.
Don't use a kitchen waste disposal unit.
Don't put compostable vegetable matter into the treatment system unless it is specified by the manufacturer.

8.3 Reduce the liquid load

Small loads of effluent take up less space and don't pass through the treatment system so quickly. This gives the solids in the effluent more time to settle to the bottom, rather than escaping out of the tank. Less effluent going in means less effluent coming out. Therefore the soils beneath the disposal system don't get so wet and they can provide a better final treatment for the effluent.

To reduce the amount of effluent going into the tank:
Do install water-saving devices, e.g. dual flush toilets.
Don't wash clothes until you have a full load.
Do take showers instead of baths.
Don't do all the clothes washing on the same day. If you normally do more than two full loads of washing per week, try to spread it out over a few days.
Do fix leaking taps.
Don't empty large volumes of water into the treatment system from spa pools and the like.
Don't allow stormwater to enter the treatment system, either from the roof or the surrounding land.

8.4 Protect the disposal system

To protect the disposal system's structure:
Do restrict access to any areas of land that have been specially planted as part of the disposal system.
Don't allow vehicle or stock access to areas where a disposal system has been installed.
Don't allow stormwater to enter the disposal system, either from the roof or the surrounding land.
Don't grow deep-rooting trees or shrubs over the disposal system.

9 Regular maintenance

9.1 Septic tanks

The septic tank must be pumped out (desludged) regularly to remove excess sludge and scum. If the septic tank is not desludged often enough, the escape of excessive solids and fats may cause the clogging of your disposal system and its early failure. If your septic tank has an effluent filter, then it should also be cleaned when your septic tank is desludged.
Constructing a new disposal system because it has failed can cost more than 10 times as much as getting a septic tank desludged.
How often a septic tank needs to be desludged depends mainly on the number of people using it and the size of the septic tank. For households with two to four people, a standard-sized septic tank **may need to be desludged about every three to five years.**
If your septic tank has an effluent filter on the outlet then it may need to be desludged less often. It is advisable though to have the sludge levels in your septic tank checked approximately every three years to help determine when it will need to be desludged. For motels and camping grounds, or for larger communal tanks serving several houses, septic tanks may have to be desludged much more often.
The septic tank is desludged by putting a suction hose through the access lid of the septic tank, not down the "mushroom vent", so make sure the access lid is not covered by rock gardens, fences or the like.
Never wash out your tank after it has been desludged - the bacteria and solids left behind are required to restart biological activity.
If you need advice, contact your local septic tank cleaning contractor or your registered plumber or drain layer.

9.2 Aerated wastewater treatment systems (AWTS)

All AWTS require regular service and maintenance checks by a suitably qualified person to ensure the system continues to work properly. The manufacturer or supplier of the AWTS will have a service and maintenance contract (which normally requires an annual fee to be paid) that must be entered into when the system is installed.

This service and maintenance contract should also cover the disposal system, especially if it is a dripper irrigation line system. A well-maintained and operating AWTS will help reduce the build-up of slime within the irrigation lines and drippers, thereby reducing the risk of the drippers becoming clogged. Sludge will accumulate in the various parts of an AWTS and should be pumped out regularly in accordance with the recommendations of the manufacturer or supplier.

9.3 Evapo-transpiration areas

If you have an evapo-transpiration area, the plants should be maintained to ensure these areas operate at maximum efficiency. Maintenance should include replanting and pruning of plants to promote healthy growth.

9.4 Alternating soakage trenches or beds

If your disposal soakage trench or bed system has a distribution box that allows you to manually divert effluent from one trench/bed to another, then the trenches in use should be rested at least every three to six months. Alternatively, in some areas with poor soils it may be advisable to use all the trenches/beds during the winter months and then rest some trenches/beds during the summer months.

Alternating the trenches/beds in use is normally done by adjusting a baffle or valve in the distribution box. For ease of maintenance, distribution boxes must be accessible and not covered.

9.5 Surface water cut-off drains

If your disposal system is located on a slope, it is usually normal design practice to install a surface water cut-off drain above the effluent disposal system to prevent stormwater runoff from the slope entering the disposal area. Any surface water cut-off drains will need to be maintained to ensure they work properly.

This may include removing excess grass or plant growth from the drains and making sure that any flows within the drains are unrestricted. It is advised that before each winter, a quick visual check of all surface water cut-off drains is undertaken and any required maintenance is carried out as soon as possible. If a surface water cut-off drain is not functioning properly it may lead to excess water entering the disposal area, which may cause the disposal system to prematurely fail.

10 Do You Know Where Your On-Site Effluent Treatment and Disposal System Is?

Your on-site effluent treatment and disposal system is probably quite near to your house. It is important to know the location of your system so regular maintenance and repairs can be carried out.

10.1 Septic tanks

(a) First look for a mushroom vent sticking out of the ground. You may also see the access lid if it is not covered with grass. If you cannot see an access lid,

look for a mound or a dip in the ground by the mushroom vent, or a place where the grass is a bit thinner than elsewhere. Following the effluent pipe from your house will also help. If necessary, you can probe the soil with a metal rod.

(b) The disposal system will usually be downhill from the treatment system. It can be located by probing the soil with a metal rod, but it will often be apparent because the grass along the soakage lines is usually greener during the summer months.

(c) If you have no luck, telephone a drain layer or your district council's plumbing and drainage inspector. The district council may have a drainage plan for your property.

10.2 Aerated wastewater treatment systems (AWTS)

Your AWTS may have one or more of the following above ground level that are close to the treatment system and will allow you to locate its position:

(a) An electrical box.
(b) Part of the treatment system that allows easy access for maintenance.
(c) An air pump that supplies the aeration chamber.
(d) A high-effluent level warning system (either a light or alarm).

However the irrigation lines of the disposal system can be more difficult to trace. You may need to contact the installer of the disposal system as they should have plans of its location. When you locate your treatment and disposal system, draw a rough sketch map showing your house, the treatment system, the disposal system and any permanent features on your property. Keep the map with your other household documents. Keep a record of tank desludging and other required work.

a) Your Map

Measure the distance from the house to the vent on the system, and the distances from the vent to the edges of the disposal system. Do not worry whether or not your drawing is to scale.

b) Record of Tank Desludging and Other Required Work

Drain layer _____
Date installed _____

Date septic tank desludged	Date distribution box changed over

11 Suitable Plants for Evapo-Transpiration Systems

a) **Native shrubs and trees**
Coprosma *Coprosma propinqua*
Hebe *Hebe*
Manuka *Leptospermum Scoparium*
Weeping mapou *Myrsine Divaricata*
Flax (fast) *Phormium Tenax*
Pokaka (slow) *Elaeocarpus Hookerianus*
Cabbage tree (fast) *Cordyline Australias*
Rangiora (fast) *Brachyglottis Repanda*
Lacebark (fast) *Hoheria Populnea*
Ribbonwood (fast) *Plagianthus Regius*
Poataniwha *Melicope Simplex*
Heketara *Olearia Rani*
Poataniweta *Carpodetus Serratus*
Kohuhu (fast) *Pittosporum Tenufolium*

b) **Grasses**
Jointed twig sedge *Baumea Articulata*
Longwood tussock *Carex Comans*
Pukio *Carex Secta*
Toetoe (use native species
not invasive pampas grass) *Cortaderia Fulvida*
Umbrella sedge *Cyperus Ustulatus*
Oioi *Leptocarpus Similis*
Hooksedge *Uncinia Unciniata*

c) **Introduced species**
Canna lilies, taro, aralia, fuschia, philodendrons and begonias