Technical Guidelines:
Installing Trenches, Beds and Mounds

Wastewater generated in a home or office goes by pipes to a facility for further treatment before discharge. Where the home does not have a sewer, the captured wastewater is treated in a septic tank or aerated wastewater treatment system before discharge to the environment. All new septic tanks must be fitted with an outlet filter to retain gross particles in the tank.

The slimes which grow on the filter play a part in renovating the wastewater. The discharged effluent is further treated in the near surface soils of the land application area. Treating wastewater in soil where bacteria can grow and metabolise its components is an essential step in on-site wastewater treatment.

The land application area needs to be correctly designed so that effluent can be treated and the nutrients absorbed into the environment, and the area operates correctly over an extended time frame. These guidelines are intended to complement the New Zealand Standard AS/NZS 1547:2012 On-site domestic wastewater management. Apply the principle of "Keep Infiltration Systems Shallow" - KISS.

There are various methods of disposing of wastewater into soil, depending on the quality of the wastewater. These include trenches, beds, LPED and mounds. Effluent can be distributed more evenly in beds and trenches by using a dose loading system, rather than simply relying on gravity. This method must be used on category 1 and some weakly structured category 2 soils.

Stormwater needs to be directed away from the land application area. Surface water can be diverted by shallow trenches or swales so that the land application area is not inundated.

Trenches

To use trenches as the land application method, there must be at least a metre from surface to ground water winter maximum. The depth to the base of the trenches will be between 300 mm and 550 mm (refer figure 1). There must be at least 600 mm of unsaturated soil beneath the trench.

The trenches must be laid on a level contour. (refer figure 2) For a sloping site, this will result in the trenches curving around the slope. The trenches must not run into the slope, getting deeper with distance.

Trenches should be around 20 metres in length and should not exceed 25 metres. A distribution box, pump or flout valve could be used to ensure all the trenches are loaded equally. Where gravity flow or flout valves are used, the trench soil surface must be no higher than 100 mm above the outlet of the tank.

Effluent is distributed along the length of the trench by a pipe with holes or slots in it.

The distribution pipe will be surrounded by a drainage metal which has a size range of 20-40 mm and is free of fines. The aggregate is then covered with a geotextile fabric or filter cloth and the trench backfilled with topsoil.

A 100 percent reserve area is required.

Fig 1. Example of Soakage trenches

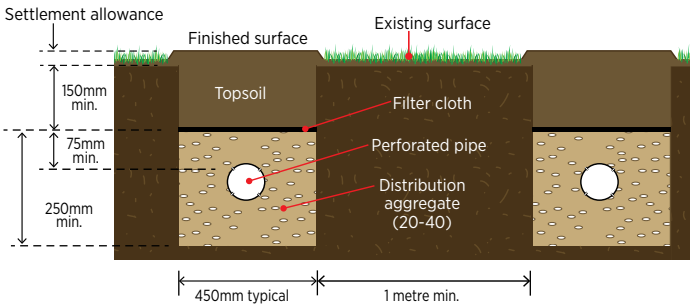
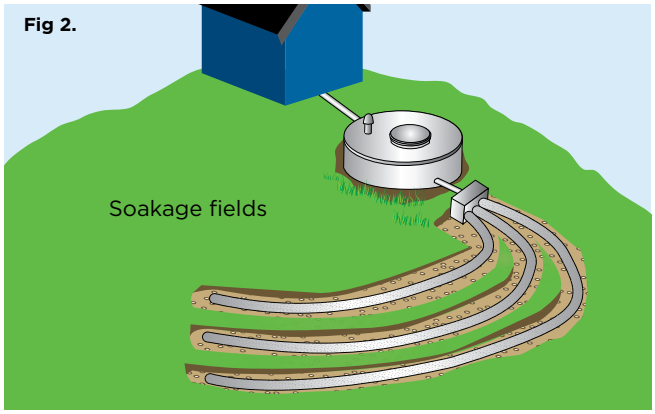


Fig 2.



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Beds

Beds can be used in situations where the land application area is of a shape or size that makes it unsuitable for trenches. They are suitable for sites which are relatively flat, such as less than 5 percent slope. There must be at least 600 mm of unsaturated soil beneath the bed. The beds will be between 400 mm and 750 mm deep. Where the bed is only a metre wide, only one distribution pipe is used. For wider beds, two distribution pies are used. Beds can be up to four metres wide.

The beds can be curved to suit the contour of the site. The bottom of the bed is filled to a depth of 300 to 600 mm with 20 – 40 mm drainage metal which is free of fines. The drainage metal is covered with filter cloth and then topsoil to a depth of 100 to 150 mm.

A 100 percent reserve is required.

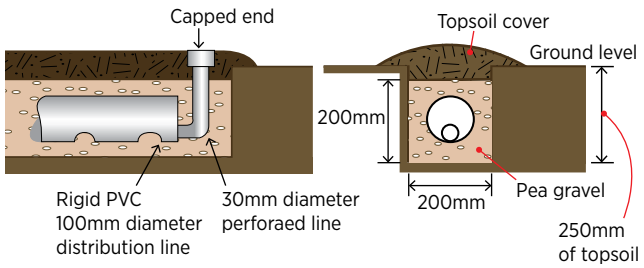
Low Pressure Efluent Distribution

Generally only secondary treated effluent can be irrigated

onto a land application area. LPED trenches allow primary treated effluent to be irrigated. The small trenches have a 25 or 32 mm pressure line inside a 100 mm distribution pipe, and the pressure line is drilled at regular intervals. The trenches are 200 mm deep and wide, and are filled with a clean pea metal or a clean 10 -15 mm drainage aggregate. Refer figure 3.

A 50 percent reserve area is required.

Fig 3.



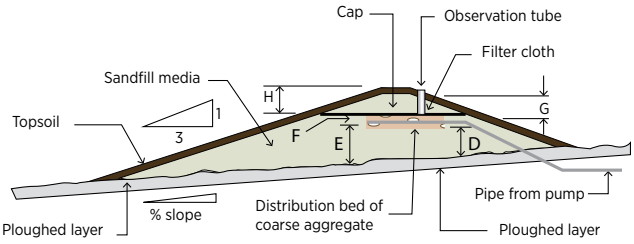
Mounds

Mounds can be used where the ground water is very high and where there are site size constraints. Renovation of the wastewater takes place in the mound before it reaches the groundwater. This provides the required separation of 600 mm between effluent and groundwater. The mound footprint is the smallest of all land application areas and so can fit in sites where other methods can't. Because the mound stands about a metre high, it is not always an acceptable solution for property owners. Refer figure 4.

The mound is built of washed and graded 5 mm sand. Refer figure 5. The distribution bed in the top of the mound is made of 20 – 60 mm drainage metal. The entire mound is covered with topsoil and planted with wet-tolerant species.

Effluent to be dosed into a mound must be treated to a standard higher than achieved by a septic tank. A large surface area filter should ensure the wastewater meets the required quality standards. The effluent is then dose loaded into the mound.

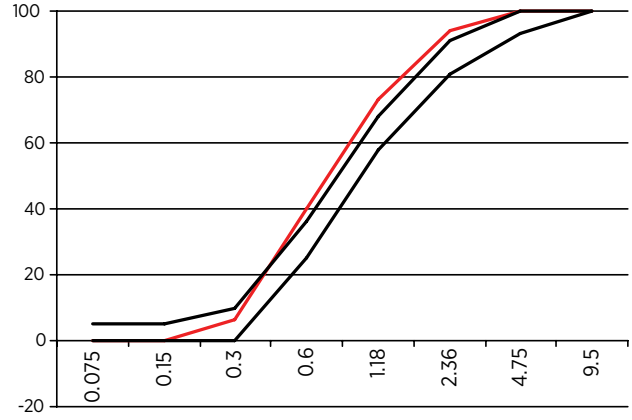
Fig 4. Cross section view of mound on sloping land



LEGEND: Typical dimensions:

A 1200 to 2000 mm
B 6 to 8 times A
D 600 mm
E 600 mm on flat ground, >600 mm on sloping ground
F 225 mm
G 300 mm
H 450mm
I Determined by fground slope and 1 in 3 mound face slope
J 2000 mm minimum on sloping ground (equals I on flat ground)
K Determined by height of finished mound and 1 in 3 mound face slope
L B + 2K

Fig 5.



For information on the installation of drippers, see our Technical Guidelines: Using Driplines for wastewater disposal.

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