



# Tri-cel Septic Tank Systems

## Builders & Homeowners Handbook.



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# Tri-cel Septic Tank Systems

## Conventional Septic tank systems.

A conventional septic tank system comprises a septic tank followed by a soil percolation area. The septic tank functions as a primary sedimentation tank, removing most of the suspended solids from the wastewater; this removal is accompanied by a limited amount of anaerobic digestion. It is in the percolation area that the wastewater undergoes secondary treatment and is purified. The wastewater from the septic tank is distributed to a suitable soil percolation area, which acts as a bio-filter. As the wastewater flows into and through the subsoil, it undergoes surface filtration, straining, physicochemical interactions and microbial breakdown. After flowing through a suitable percolation area, the wastewater is suitable for discharge.

<b>A Properly constructed septic tank will:</b>
Retain and remove 50% or more solids; outflow from tank contains about 80% mg/l solids
Allow some microbial decomposition.
Accept sullage (i.e. water from baths, wash hand basins etc).
Accept water containing detergents.
Reduce clogging in the percolation area.
Not: fully treat domestic wastewater.
Not: work properly if inadequately maintained.
Not: significantly remove microorganisms.
Not: remove more than 15 – 30 % of the BOD
Not: operate properly if pesticides, paints, thinners, solvents, disinfectants or household hazardous substances are discharged to it.
Not: accommodate sludge indefinitely.
Not: operate properly if surface waters (i.e. roofs etc) are discharged to it.

## Site Characterisation.

The object of site characterisation is to obtain sufficient information to determine if the site can be developed for an on-site system. Characterising the site involves a number of stages including,

- A desk study which collects any information that may be available on maps etc about the site.
- A visual assessment of the site, which defines the site in relation to surface features.
- A trial hole to evaluate the soil structure depth to rock and water table.
- Percolation tests.





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The responsibility here lies with the homeowner or builder. Once we receive a copy of the engineers report, with “T values” we have the facilities to do a Site Specific Assessment.

## Site assessment.

KMG is pleased to offer a full site-specific assessment to our customers. Once we have a qualified engineer’s report we can provide all of the necessary paperwork required in relation to septic tank systems.

## Locating the Septic Tank. (EPA guidelines 2000).

Minimum distances for locating the unit are set out below. These are minimum distances only; the unit should in fact be located as far away as is practically possible. However, when locating the unit, consideration should be given to allow adequate access for the vacuum tanker.

The unit should be located not nearer than 7 meters from any other dwelling as set out in EPA wastewater treatment manual. Guidelines of minimum distances for locating the TRI-CEL<sup>®</sup> system are set out in the table below.

	Any Dwelling	Watercourse /stream	Springs / Wells	Lake	Site Boundary	Road	Slope Breaks/ Cuts
Septic Tank System	7 m	10 m	10 m	50 m	3 m	4 m	4 m
Percolation System or Polishing Filter	10 m	10 m	30 m	50 m	3 m	4 m	4 m

*Minimum separation distances in meters.*

Liquid is introduced and discharged from the septic tank system unit under gravity. This may have a bearing on the location of the unit. Where site conditions do not allow gravity discharge, a pumped discharge option is available.

The Septic tank system is designed for pedestrian traffic only. Adequate protection should be given to avoid super- imposed loads. Vehicles must be restricted from the region surrounding the Septic tank system. Vehicles should maintain a distance equal to the depth of the excavation unless the necessary structural protection around the tank has been provided. The manufacturer will advise on the suitable protection. Suitable fencing to restrict farm animals should be erected.

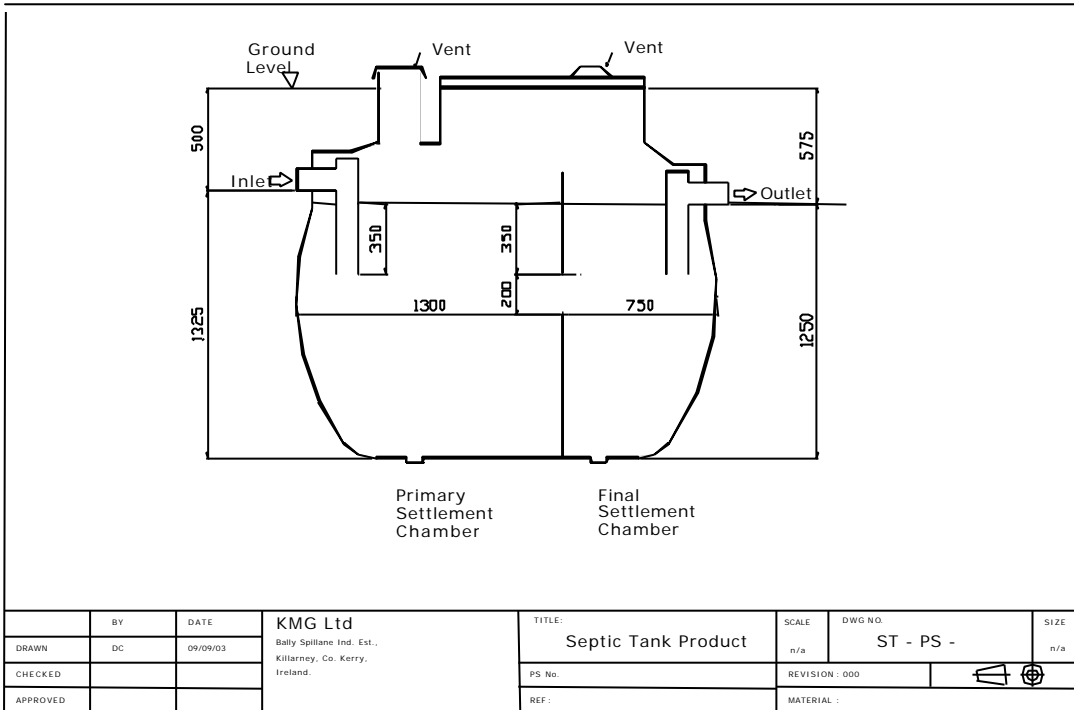




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## Drawings & Dimension:

Septic Tank Systems – Length x Width x height  
 Volume 3,500 litres–approx. Dim: 2700mm x 1700mm x 1850 mm





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## Installation of the Septic Tank System:

We recommend that when the system arrives on site that it be inspected for damage, from miss handling etc. If any damage is seen or suspected, please notify the manufacturer immediately, as problems cannot be rectified easily after installation. It is then the responsibility of the homeowner or builder to undertake the installing of the unit, as per manufacturer instructions. A suitably sized digger will be required to excavate the hole and lower the Septic tank system.

### **Note: water logged sites:**

The Septic tank system should not be placed into water logged sites. Please contact the manufacturer if there are difficulties on site due to adverse water logging.

Once a suitable site has been chosen and excavated the following steps must be followed:

### **Installation of the unit. Pea shingle Backfill.**

Pea shingle can be used to backfill on dry sites. A dry site is one where the water table never rises higher than the base of the unit

1. Dig a hole approx. 3.5 m x 2.5 m x 2.2m deep. Remove all loose debris and ensure the ground is flat. Ensure the base and sides of the excavation are free from any stones or other objects which may interfere with the tank.
2. Cast a slab of semi dry concrete minimum 150mm deep, in the base of the excavation. Level the concrete. This is to be 1.8m under ground level so that only the lid and de-sludging pipe appear above ground level.
3. Carefully lower the septic tank into the excavation using the lifting hooks. Note the inlet and outlet of the tank when placing the unit into the excavation.
4. Level the unit using a spirit level. The unit should be 100% level. The lip of the lid should sit flush with proposed finished level of the ground so just the lid will protrude above ground. Line up the inlet and outlet pipes with the house pipes and percolation pipes respectively.
5. Fill the septic tank unit with water to ballast the tank (keep it in position).
6. Although the system has been water tested for 24 hours, we recommend that the system is inspected at this stage for leaks due to damage from handling, transport etc. If any damage is seen or suspected, please notify the manufacturer immediately.
7. Pour another 150 mm of semi dry concrete around the base of the tank. Ensure the base of the unit is fully supported and any voids in the concrete have been removed.





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8. Backfill the excavation with pea shingle to just below the outlet pipe level. Pea shingle should be of no larger than 12mm rounded aggregate material.
9. Connect up the pipe work. The septic tank is plumbed for 110mm uPVC pipe. A short length of pipe with flexible joints should be used immediately before and after the tank to allow for movement between the tank and the pipe work.
10. Back filling can then recommence with pea shingle to 250mm above the top of inlet pipe. The rest of the excavation can be covered over with good topsoil.

### Installation of the unit: Concrete backfill.

A concrete backfill is required for wet sites. A Wet Site is one where the water table may rise higher than the base of the septic tank system. A concrete backfill can also be used in site where the septic tank may be prone to some superimposed load.

1. Dig a hole approximately 3.5 m x 2.5 m x 2.2 m deep. Remove all loose debris and ensure the ground is flat. Ensure the base and sides of the excavation are free from any stones or other objects which may interfere with the unit.
2. Cast a slab of lean mix concrete minimum 150mm deep, in the base of the excavation. Level the concrete. This is to be 1.8m under ground level so that only the lid and de-sludging pipe appear above ground level.
3. Carefully lower the septic tank unit into the excavation using the lifting hooks. Note carefully the inlet and outlet of the unit, when placing the unit into the excavation.
4. Level the unit using a spirit level. The unit should be 100% level. The lip of the lid should sit flush with proposed finished level of the ground so just the lid will protrude above ground. Line up the inlet and outlet pipes with the house pipes and percolation pipes respectively.
5. Fill the unit with water to ballast the tank (keep it in position).
6. Although the system has been water tested for 24 hours, we recommend that the system is inspected at this stage for leaks due to damage from miss-handling etc. If any damage is seen or suspected, please notify the manufacturer immediately.
7. Pour concrete around the base and sides of the unit, to about 3" over the flange at the center of the system. Ensure that the joint flange is covered. Ensure the base of the unit is fully supported and any voids in the concrete have been removed. Allow concrete to set.
8. Backfill the rest of the excavation with semi dry concrete up to the pipe work connections ensuring at least 250mm thick concrete surrounding the unit.





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9. Connect up the pipe work. The septic tank is plumbed for 110mm uPVC pipe. A short length of pipe with flexible joints should be used immediately before and after the unit to allow for movement between the tank and the pipe work.
10. Back filling can then recommence with concrete to 250 mm above the top of inlet pipe. The rest of the excavation can be covered over with good topsoil.

When installation is completed and the system is plumbed to the relevant sewers etc and the Septic tank system is filled with water, the electrical installation must be completed.

## Plumbing the system.

Do not plumb water / storm-water from roofs, drains, footpaths etc, into the septic tank system. Qualified ground-works site personnel or qualified builders, should connect the plumbing from the dwelling to the septic tank system.

## 1.7 Site Development.

Where a site is initially unsuitable for a septic tank system site development works may improve the site and make it suitable for the development of an on-site system. Killarney Plastics is pleased to offer a facility of site specific solutions for our customers.

## Disposal of treated water.

The septic tank discharges treated water to the required standards (BOD 20 : SS 30) or better. This water is now suitable for disposal. Disposal can be by any of the following means:

- Sub-surface irrigation
- Raised bed

The best disposal method can depend on a variety of site factors including percolation results, soil type, water table level and topography of the site. Please refer to the manufacturer for further details.





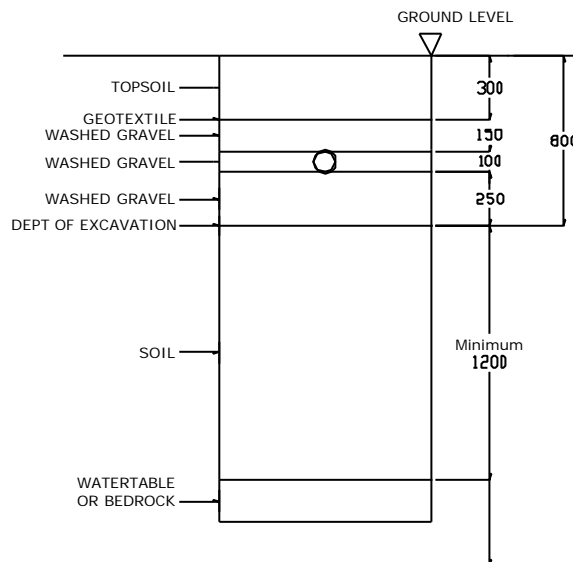
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## Sub-surface irrigation:

The main factor for sub-surface irrigation is the ‘T’ value as obtained for the percolation test. This will determine the length of pipe needed in the percolation area based on 450mm-meter wide trenches.

1. ‘T’ values <5 may indicate a percolation rate that is too fast. Consult the manufacturer for percolation area sizing.
2. ‘T’ values >60 may indicate a percolation rate that is slow. Consult the manufacturer for percolation area sizing.

Estimated number of people in the house based on number of bedrooms.	Required length of trench (m) for T/P values 21-50 (loading at 25 l/m <sup>2</sup> .d)	Required length of trench (m) for T/P values 1-20 (loading at 50 l/m <sup>2</sup> .d)
6	96	48



Section through Sub-Surface Irrigation System





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The treated water is discharged by gravity. A network of 110mm perforated pipes is laid in the percolation. The percolation area spreads the treated water evenly over a large area thus minimizing the risk of the ground getting over saturated.

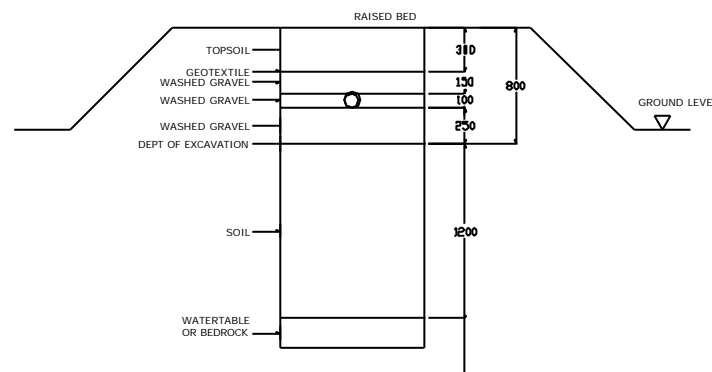
The length of percolation pipe recommended should be sub-divided into a number of equal lengths. No trench should be longer than 20 meters. There should be a minimum distance of 2 meters between any two trenches.

The trenches should be 450mm wide and 800 mm deep. The pipe should be laid on 250mm of clean 20mm stone. The pipe should be covered by another 150mm of stone. A layer of geo-textile soil barrier should be placed on top of the stone and the remaining 300mm should be back filled with topsoil. The pipes should be laid with a fall of not more than 1 in 200. There should be at least 1200mm of unsaturated soil from under the bottom of the trench to the bed rock / water table.

## Raised bed:

Where the existing pipes have to be above ground level or where there is a very thin layer of topsoil a raised bed percolation system is required. It is similar to the sub-surface percolation only it is man-made.

In this case a discharge pump must be used to elevate the treated water into the percolation system. Full details available upon request from the manufacturer.



Section through Raised Bed Irrigation System





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## Polishing Filters.

In some cases a polishing filter may be required where a very high quality discharge is required. This is simply passing the discharged water through a specially designed sand filter. A discharge pump will be required for this application. The guidelines set out by the EPA in their 'Waste Water Treatment Manuals' or the manufacturer should be consulted.

### Percolation Trench Characteristics.

- Length of distribution pipe, 20 meters maximum.
- Minimum separation distance between percolation trenches 2 meters (2.45 center to center).
- Diameter of pipe from system, 100mm.
- Slope of pipe from tank to distribution box. 1 in 40 for earthenware or concrete. 1 in 60 for uPVC.
- Slope of percolation trench from distribution box, 1 in 200.
- Distribution (percolation) pipes. 100mm bore, perforated (typically at 4, 6 and 8 o'clock) smooth wall PVC drainage pipes with perforations of 8mm diameter at about 75mm centers along the pipe or pipes with similar hydraulic properties.
- Width of percolation trench, 450mm.
- Depth of percolation trench is about 800 mm below ground surface depending on the site.
- Back-filling of percolation trench. 250 mm of 20 to 30 mm washed gravel or broken stone aggregate on invert; pipe laid at 1 in 200 slope surrounded by 20-30 mm clean washed gravel or broken stone aggregate and width 150 mm of similar aggregate over pipe: geotextile layer followed by topsoil to ground surface.





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## Distribution Box.

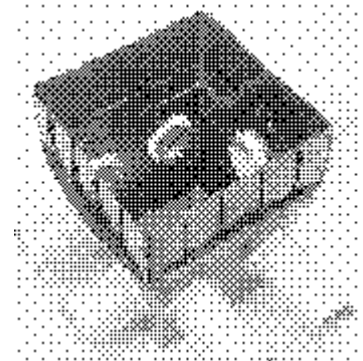
A proper Distribution Box (available from KMG) should be used to correctly construct the percolation trenches.



**Distribution Box.**



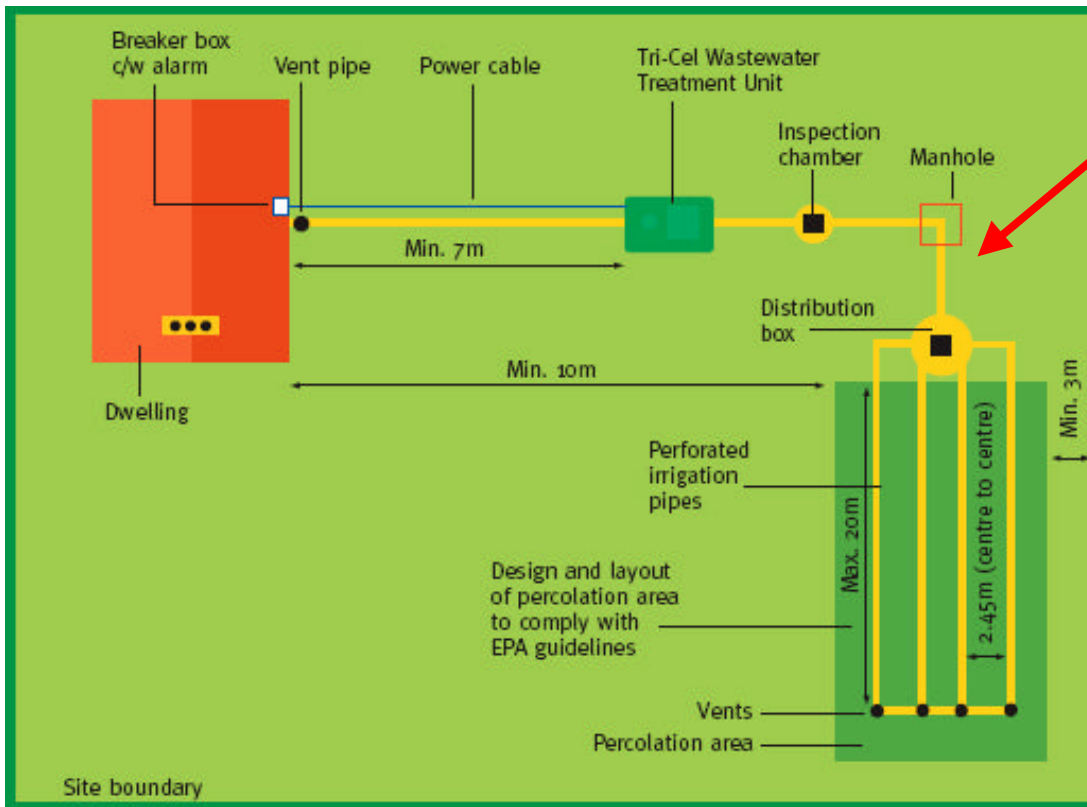
**150mm (6") Riser extension.**



**The 7 Hole Box.**



**Snap in pipe seals**



**Distribution Box, available from Killarney Plastics**

**Layout of House, septic tank, manhole, distribution Box and percolation area.**

## Homeowners Maintenance.

**“PLEASE REFER TO SAFETY SECTION OF THIS HANDBOOK”.**

To maintain efficiency, the septic tank may require de-sludging and maintenance. The de-sludging of the septic tank is the responsibility of the homeowner. De-sludging can be carried out with a vacuum tanker (we would recommend the use of a licensed company) or other suitable means. It is the homeowner’s responsibility to provide access for the vacuum tanker, to de-sludge the septic tank.

1. Remove the de-sludging access cover by undoing the M6 nuts and removing the safety bar. The de-sludging cover can now be removed
2. Empty the septic tank using the vacuum tanker. Care must be taken not to damage septic tank system with the hose of the vacuum tanker.
3. Replace the de-sludging access cover and safety bar.



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## Notes:

- The access cover should never be left off while the unit is unattended
- De-sludging should never be carried out alone
- The septic tank system should be clearly marked and vacuum tanker should never come closer than the dept of the excavation for the system unless the appropriate precautions have been taken. Contact the manufacturer for the correct precautions.

The continued performance of the septic tank will depend on regular maintenance and cleaning. It is the homeowner's responsibility to de-sludge the unit and keep the vents clear.

There are two vents on the septic tank. The inlet vent, built into the lid of the unit guarantees a fresh supply of air to the unit. The outlet vent under the de-sludging cover allows gas to escape and stops the tank from becoming pressurized.

## **EPA Guidelines (selected) from Wastewater Treatment Manuals Treatment Systems for Single Houses. © Environmental Protection Agency 2000.**

Regular maintenance of the unit and percolation area is very important for the satisfactory performance of the system. Units should be de-slugged a minimum of once per year,

The depth of sludge can be checked using the following technique,

- Use a 2-meter pole and wrap the bottom 1.2 meters with a white rag.
- Lower the pole to the bottom of the tank and hold for several minutes to allow the sludge layer to penetrate the rag.
- Remove the pole and note the sludge line, which will be darker than the coloration caused by the liquid waste.

The percolation area should be inspected regularly.

Note: Signs of ponding indicate blockage or insufficient permeability.





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**NSAI, National Standards Authority of Ireland. Standard recommendation, 1991, ref: S.R.6: 1991. © Eolas 1991.**

## **5.2.1 General.**

The inlet manhole should be inspected and any solid matter which may clog the inlet tee-pipe should be removed. The cause of any blockage should be investigated. Only qualified personnel should carry out this.

The inlet and outlet tee-pipes should be inspected and rodded that scum does not collect and that the vertical leg is not obstructed.

## **5.2.2 De-sludging.**

De-sludging should normally be carried out by a vacuum sludge tanker. When a sludge tanker is to be used and access is poor, the tank should be de-sludged before the onset of winter. Licensed tankers are available commercially and the service is also provided by some local authorities. This sludge should be disposed of in accordance with local authority instructions or in a manner which will not cause pollution. The sludge should not be removed completely, but approximately 75mm should be kept in the bottom of the tank to re-seed the new sludge, which will be formed when the tank is put into use again.

## **Safety Precautions.**

There a potential danger when de-sludging and therefore should never be done alone. Never enter a tank unless a safety line is attached to the person entering the tank and a second person is over ground to help if the entrant is overcome by gasses or foul air. Naked flames should not be used in the vicinity of the tank due to the danger of explosion. The manhole covers should never be left off an unattended tank. Disused or abandoned tanks should be demolished, filled in or sealed so that accidental entry is impossible.

As safety and security are of vital importance in small-scale sewage treatment systems, the following aspects are critical,

- Protective clothing / gloves should be worn at all times. Always remove contaminated clothing and protective equipment after working with sewage treatment systems.
- Wash hands and face prior to eating, drinking or smoking.
- Adequate first aid boxes should be present.
- When working with machinery / electrical equipment, proximity of water should be noted. Equipment should not be wet when working with it.





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- A second person should be present when carrying out non-routine maintenance.
- The distribution box should be designed (& constructed by the builder) to facilitate sampling and inspection without placing personnel at risk.
- Only qualified personnel should carry out electrical repairs.
- Great care should be taken when handling sludge.
- Always lock the cover of the system.

### 5.3.1. Maintenance of percolation area.

The percolation area should be inspected periodically and any signs of malfunctioning noted. This will show itself by obvious signs of blockage of the distribution box, or by ponding or smells or pollution in the surrounding area. In this event expert advice should be sought or use should be made of the reserve percolation area.





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