

Breckland Council

Sewage Treatment

a guide to cesspits, septic tanks and
sewage treatment plants



This leaflet about cesspits, septic tanks and sewage treatment plants has been prepared by Breckland Council and is aimed at providing information and guidance on foul water drainage systems, the problems that may occur and solutions available for the improvement of these systems.

Introduction

There are two types of sewage or foul water drainage systems within the Breckland Council area:

Firstly is the mains sewerage system which predominates in the towns and larger villages. Effluent from a large number of houses drains through a network of pipes to a sewage treatment works operated by Anglian Water Services Limited. (In a new development where a public main foul sewer is available within 30 metres (100 ft), there is a mandatory requirement for new properties to be connected to such a sewer.)

Secondly, cesspits, septic tanks and small sewage treatment plants which serve individual or small groups of properties in villages or rural settings. In some cases, a small sewage treatment plant, described below, may have been adopted for maintenance by Anglian Water, in which case, the household will be charged normal sewerage rates. This second type of drainage system takes the form of drainage pipes leading to a collection tank, which may in turn lead to either bacteriological treatment of the liquid effluent, as in the case of a sewage treatment plant, or effluent dispersal into the subsoil around the collection tank as with a septic tank.

A cesspool

A cesspool or cesspit is a sealed underground tank with an inlet pipe into which all the foul effluent from a building drains. The cesspool stores sewage and other wastewater until the time of disposal. Cesspools must be watertight to prevent the leakage of foul water or the ingress of groundwater. Older cesspools will be constructed from brick, while modern ones are made of fibreglass. Cesspools must be emptied frequently, to alleviate such problems as overflowing. The frequency of this is dependent on the tank size and obviously how much effluent is draining into it.

Remember:

- ⊙ Check the level in your cesspool regularly
- ⊙ Have your cesspool emptied at frequent intervals
- ⊙ Check for any leakage or ingress of groundwater

A septic tank

A septic tank is a mini sewage system in which effluent is treated naturally. The effectiveness of the septic tank system to drain foul effluent is very dependant on the ability of the subsoil surrounding it to absorb liquid effluent.

The tank will either be constructed from concrete/brick (older types) which is then rendered internally and externally to make it watertight in order to contain the effluent, or is a large plastic/ fibreglass watertight bottle tank which is sunk into the ground and surrounded by concrete.

Both the older brick and the newer fibreglass tanks work in exactly the same way.

The primary purpose of the tank is to separate solids from the liquids as wastewater flows through it, and to help to break down contaminants. There may be three layers in the tank:

- ⊙ a scum layer of floating solids
- ⊙ the liquid sewage from which solids are settled out
- ⊙ a bottom sludge layer which is 'digested' to some extent by naturally occurring bacteria

Foul water (sink, washing machine, bath, toilet) enters the tank via an inlet pipe. The tank retains sewage from a property for a sufficient amount of time to allow the solids from the sewage to bacteriologically breakdown, forming a crust on the top of the effluent and a sludge at the base of the tank. The remaining untreated liquid in the tank then drains from the tank by means of an outlet pipe to a soakaway or a series of land drains. Such a system of land drains will splay out across the ground in a 'herring bone' pattern in the top section subsoil which is well drained and will allow efficient dispersal of effluent.

The sludge in the tank needs to be removed only when necessary – usually once a year and the emptying of the tank should be carried out by a licensed contractor.

It is important not to let roof or surface water enter the tank, as this will affect the process within the tank, solid matter would not be effectively digested, and this could cause the drains to block. Septic tanks, like cesspools, should be watertight and adequately ventilated. The soakaway drains are usually located within 1 metre of the ground surface. You are advised to contact the Environment Agency prior to installing new or improving existing soakaways to ensure you are complying with their requirements.

Problems with septic tanks

The common indicators of a septic tank not working properly are:

- ⊙ The downstairs toilet failing to drain properly, i.e. the water in the bowl rises rather than falls when flushed
- ⊙ Dirty water or effluent overflows from outside foul water gullies or manholes
- ⊙ Effluent overflows from the top of the septic tank itself. This problem should not be confused with a correctly working septic tank which will have effluent at a level just below the top of the tank manhole

Drainage problems with septic tanks are generally as a result of the surrounding soil's inability to properly drain away/absorb the liquid effluent.

The main reason for this is due to land drains having been laid incorrectly, i.e. where they are either draining into the subsoil containing a high level of impervious clay (very typical in the Norfolk area) or within ground where the water table is very high. Subsoil water may even drain back down the land drains filling up the septic tank. Both of these problems will not allow the effluent to disperse. It is very rare to find that the septic tank itself is not working correctly.

In certain cases, effluent from septic tanks may cause smell or pollution problems in ditches or watercourses and in such situations legal action may be taken against the owners of these tanks by either this authority or the Environment Agency.

A few things to remember:

Do:

- ⊙ Do put all wastewater from your home into the system - any of these can contain environmental pollutants.
- ⊙ Do use bleaches and disinfectants sparingly as these could kill the useful bacteria that help to digest the waste in your septic tank. Some brands of domestic cleaner are 'septic tank friendly' and are preferred.
- ⊙ Do try to avoid excessive discharges from washing machines, use the 'halfload' setting. If possible use showers instead of baths.
- ⊙ Do inspect the system at least once a month.
- ⊙ Do empty the tank whenever necessary.
- ⊙ Do ensure that air vents are not blocked, and all covers are secured and are easily accessible.
- ⊙ Do act immediately if you find a blockage or any sign of pollution.

Do Not:

- ⊙ Do not use your toilet or kitchen sink as a bin.
- ⊙ Do not put disposable nappies, sanitary items, plastic or other large solids, which may cause blockages down the toilet or into manholes.
- ⊙ Do not empty chemical toilets into the drains of the septic tank, pour paints, solvents, oils, fats or heavy greases into the drains of the septic tank. These should be kept in their original containers and disposed of properly.
- ⊙ Do not allow roof or surface water into the septic tank. Excessive discharges into solids through before the tank will flush the waste before adequate digestion has taken place.

Methods of improving foul drainage systems

Options open to the owner of an inoperative septic tank to put their drainage back in working order may take the form of either simple improvement of the land drain system or entirely replacing the system with a package sewage treatment plant described below.

Sewage treatment plants

Sewage treatment plants are ideal for use in very wet land areas where the drainage of surface water is poor. Such a plant allows treated effluent to be discharged to a ditch system, which obviously takes this water away from the property, removing or reducing problems of ineffective septic tanks or flooding of land/gardens.

There are a number of package sewage treatment plants on the market which, subject to the correct siting requirements being provided, can be purchased and installed relatively easily either as a total replacement of the septic tank or as a filtration unit after the outlet of the septic tank, using the tank as a large primary settlement tank. This treatment plant will then treat the effluent to an acceptable quality which can then be discharged to a ditch or watercourse subject to Environment Agency approval. This approval will be in respect of the quality of the effluent only; this does not constitute an express permission to use a specific ditch for that purpose. Permission of the landowner on whose land the ditch lies must therefore be received before any treated effluent is discharged into it.

A sewage treatment plant firstly has a primary settlement tank which separates off the solid part of the waste (this tank may require emptying every six to twelve months). The liquid part of the effluent is then circulated over a bacterial filter medium which filters out a large proportion of the waste material until it is of an acceptable quality to be discharged to a ditch.

There are financial implications for such a system including the initial outlay of several thousands pounds, the need for a continual electrical power supply, yearly maintenance to ensure correct operation and obviously an available ditch or watercourse to discharge to. There may also be additional costs for Building Regulation/Planning approvals dependent upon the type of installation.

Improving land drain layouts

In general, the best section of soil for foul effluent drainage is the zone from ground level down to around 450mm (18 inches) deep. Below this level, soils, particularly those with a high clay content, tend to become waterlogged during the winter months or at times of excessive rainfall. The specific usable depth for drainage is obviously dependent on the results from the porosity tests as described in Appendix A.

* Before any land drainage works are started, it is advised that porosity tests are carried out so as to avoid using land containing a soil type which may be totally unsuitable for efficient drainage.

If the porosity test suggests that the soil has sufficient drainage capabilities, then a new set of land drains, constructed of porous or perforated pipe, can be laid within this 450mm zone either by relaying a new gravity fed system direct from the outlet of the septic tank or by pumping the effluent to a new system of drains in an area of your land which is well drained.

Gravity fed system

The effectiveness of such a system will be dependent on the depth of the septic tank outlet and the drainage capabilities of the soil in the immediate surroundings of the tank. Obviously, if the tank outlet is below the acceptable drainage depth of 450mm, the laying of land drains with even the smallest fall on the pipe would be unlikely to be effective.

With tank outlets that fall either above or within the top part of the drainage zone then the land drains should laid as follows:

1. Drainage fields should be designed and constructed to ensure aerobic contact between the liquid effluent and the subsoil. Drainage trenches should be from 300mm to 900mm wide, with areas of undisturbed ground 2m wide being maintained between parallel trenches.
2. Drainage fields should be constructed using 100mm perforated pipe, laid in trenches of a uniform gradient which should not be steeper than 1:200.
3. Pipes should be laid on a 300mm layer of clean shingle or broken stone graded between 20mm and 50mm.

4. Trenches should be filled to a level 50mm above the pipe and covered with a layer of geotextile to prevent the entry of silt. The remainder of the trench can be filled with soil; the distribution pipes should be laid at a minimum depth of 500mm below the surface.

Pump fed system

In this system, a set of land drains is constructed as described above for the gravity fed system but they can be positioned anywhere in the garden where the soil has a sufficient capability to drain the produced effluent as determined by the porosity tests. This method also gets around the problem where the septic tank was installed incorrectly with its outlet too low in the ground.

Two brick built manholes which are sealed internally with concrete render should be constructed each approximately to a depth of 450mm (dependent upon the depth of the septic tank outlet pipe) below ground level. The first should be constructed and joined to the outlet pipe of the septic tank to collect the discharging effluent and the second should be positioned at the start of the new set of land drains so that effluent contained within it will slowly discharge into the drainage pipes.

A submersible pump operated by a float switch can then be installed within the first manhole to pump the effluent to the second manhole via a 50mm diameter plastic pipe (generally of alkathene, UPVC or polyethylene). This pipe should be located at least 300mm below ground level in order to avoid freezing in winter and damage from digging in the soil above.

Septic tanks and sewage treatment plants

Breckland residents should be aware that there are new requirements to register the discharge from their septic tank drainage system with the Environment Agency.

We would advise that prior to any work on new installations or repairs to existing installations that you contact the Environment Agency for up-to-date advice.

Full details are available via the Environment Agency website: www.environment-agency.gov.uk or by following the direct link <http://www.environment-agency.gov.uk/homeandleisure/118753.aspx>. Alternatively the Environment Agency can be contacted by calling 08708 506506 or emailing enquiries@environment-agency.gov.uk.

APPENDIX A

Percolation testing

Before any work is carried out to construct or improve a septic tank system, particularly with the land drain system, it is necessary to carry out a series of percolation tests in order that the efficiency or capacity of a piece of land to absorb liquid effluent can be determined.

The following abbreviated percolation test method is taken from The Building Regulations 2000 Approved Document Drainage and Waste Disposal, where the full guidance can be found.

1. A hole 300mm square should be excavated to a depth 300mm below the proposed invert level of the effluent distribution pipe.
2. Fill the 300mm square section of the hole to a depth of at least 300mm with water and allow it to seep away overnight.
3. Next day, refill the test section with water to a depth of at least 300mm and observe the time, in seconds, for the water to seep away from 75% to 25% full level (i.e. a depth of 150mm). Divide this time by 150. The answer gives the average time in seconds required for the water to drop 1mm.
4. The test should be carried out at least three times with at least two trial holes. The average figure from the tests should be taken. The test should not be carried out during abnormal weather conditions such as heavy rain, severe frost or drought.
5. Drainage field disposal should only be used when the percolation tests have proven favourable otherwise effective treatment is unlikely to take place.

In a large proportion of areas within Norfolk, the soil conditions are very poor for land drainage and therefore the results obtained for the above porosity tests may well exceed the quoted drainage times. In these cases, specific guidance should be sought from the Environmental Health Department at Breckland Council.

For further advice please contact:

The Environmental Protection Team

Environmental Health

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