Field drains

Field drains should be:

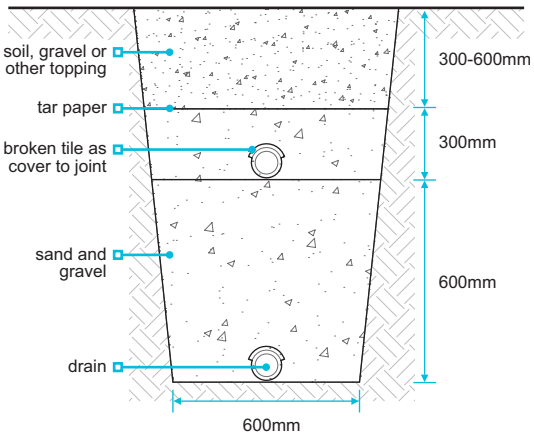
- sited according to topography, ensuring that water is drained away from the building
- formed with perforated pipe, laid at least 500mm below the surface
- laid in trenches with a uniform gradient less than 1:200 with undisturbed ground 2m wide between trenches and at least 8m from any building and 10m from any water course
- laid on a 150mm bed of clinker, clean gravel or broken stone (20mm–50mm grade) and trenches filled to a level 50mm above the pipe and covered with strips of plastic material to prevent entry of silt
- backfilled with as dug material.

Where the level of the water table is expected to rise in the winter months to within 1m of the field drain invert, it is not acceptable to use subsurface irrigation.

Underdrains

Where underdrains are necessary, drainage trenches should be constructed a minimum of 600mm deeper than the pipe level specified in the design.

The lower part of the drainage trenches should be filled with pea gravel. A second system of drainage pipes should be laid on the bottom of the trenches to convey surplus drainage to an outfall in a surface ditch or watercourse.



5.3.11 Surface water soakaways

Also see: BRE Digest 365

Soakaway drainage shall be sited and constructed to provide adequate short term storage for surface water and adequate percolation into the surrounding ground. Issues to be taken into account include:

a) soakaway location

b) soakaway design.

Soakaway location

Soakaways should be:

- built on land lower than, or sloping away from, buildings
- sited at least 5m from the foundations of a building
- sited to take account of topography, ensuring that water is drained away from the building
- in soil of low permeability, only be provided where no alternative system is available.

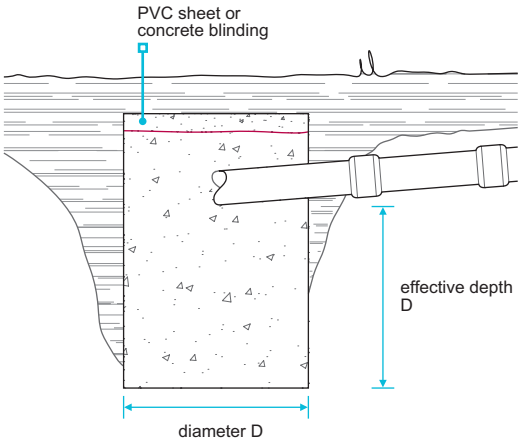
Soakaway design

NHBC will require a percolation test for a soakaway, especially where there is:

- doubt about the ground,
- a large quantity of run-off into the soakaway which may swamp the ground.

Where the ground is free draining and granular, a test may not be necessary.

In soil, chalk and fill material subject to modification or instability, the advice of a specialist geotechnologist should be sought regarding the siting and suitability of soakaways.



Small soakaways

Small soakaways are holes filled with granular material, eg broken brick, crushed rock or gravel, with particle size 10mm to 150mm.

PVC sheet or concrete blinding should be laid over the fill to prevent topsoil being washed down into the soakaway.

Large soakaways

Large soakaways consist of a pit lined with dry jointed or honeycomb brickwork.

Alternatively, precast perforated concrete rings or segments may be laid dry and surrounded with granular material.

Large soakaways should be designed in accordance with BRE Digest 365, and the volume calculated to ensure suitable capacity including checking appropriate time to emptying half the storage volume.

Percolation test procedure for small surface water soakaway

The rate at which water will disperse into the ground depends on the permeability of the ground, which varies with soil type. The percolation test provides an assessment of how the ground drains.

The following test procedure and design approach may be adopted where the soakaway is for a single dwelling development with a total drained area of less than 100m^2.

As the test hole can be used as part of a soakaway, it should be:

- dug in a place that could be used as a soakaway
- at least 5m from the foundations of a building
- to the same depth as the proposed drain.

Percolation test procedure for surface water soakaways

Step 1	Bore a hole 150mm in diameter with an auger, to a depth of one metre
Step 2	Fill with water to depth of 300mm. As an aid, mark a stick 300mm from one end, place in the hole and fill up to the mark. It takes approximately 5.5 litres to fill a volume of this size
Step 3	Observe the time taken in minutes for the water to soak away
Step 4	Where possible, the test should be repeated and the average time used
Step 5	A second group of tests are carried out after the hole has been bored out to a depth of two metres, still using a 300mm depth of water
Step 6	Where the soil appears to become more permeable with depth, it may be useful to deepen and retest the bore in one-metre stages

Design of soakaway

The relationship between the diameter or effective depth required for a soakaway, to suit a given collection area, eg roof or paved surface, and the average time (T) resulting from the test is shown in the graph below.

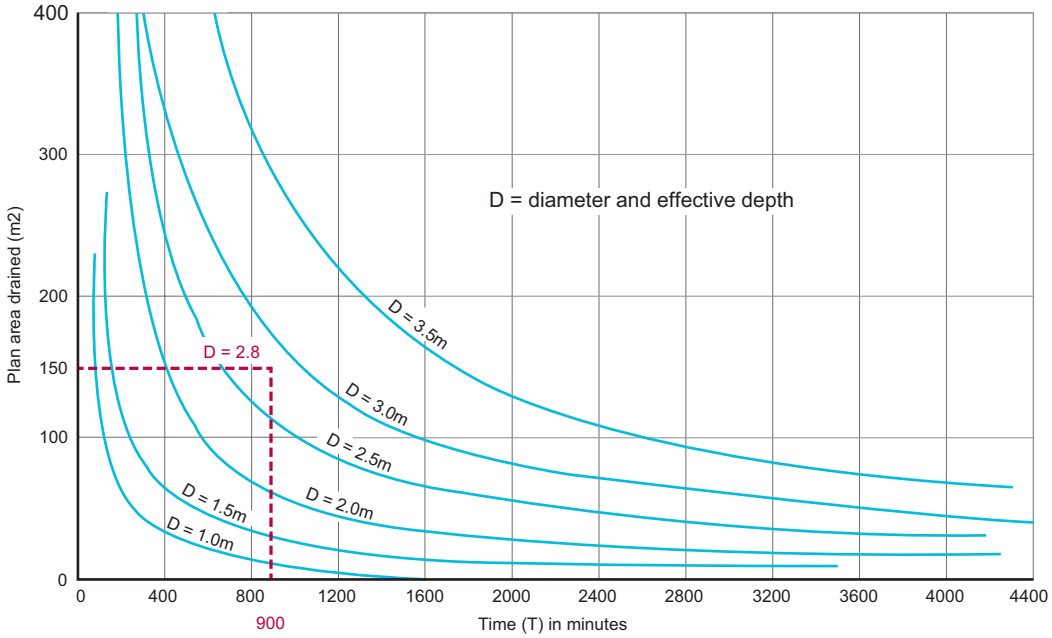
The diameter and effective depth below invert level are assumed to be the same dimension (D).

Example

Test time (T) = 900 minutes

Plan area to drain = 150m^2

From the graph below, the diameter and effective depth of the soakaway (D) are both 2.8m.



Where the ground is of low permeability; dig separate soakaways to drain smaller but distinct parts, for example:

- one side of a roof to one soakaway
- the other side to a second soakaway
- the driveway or yard to a third soakaway.

Where the permeability of the ground increases with depth; tests in the deepened trial holes will give shorter percolation times. It may be more cost effective to build a smaller soakaway at a greater depth below the surface.

5.3.12 Component requirements

Drainage systems shall be constructed with materials that ensure satisfactory service over the life of the system.

Components in accordance with the following standards will generally be acceptable:

BS 65	'Specification for vitrified clay pipes, fittings and ducts, also flexible mechanical joints for use solely with surface water pipes and fittings'
BS 437	'Specification for cast iron drain pipes, fittings and their joints for socketed and socketless systems'
BS 4660	'Thermoplastics ancillary fittings of nominal sizes 110 and 160 for below ground gravity drainage and sewerage'
BS 4962	'Specification for plastics pipes and fittings for use as subsoil field drains'
BS 5911	'Precast concrete pipes, fittings and ancillary products'
BS EN 124	'Gully tops and manhole tops for vehicular and pedestrian areas'
BS EN 295	'Vitrified clay pipe systems for drains and sewers'
BS EN 476	'General requirements for components used in drains and sewers'
BS EN 588	'Fibre cement pipes for sewers and drains'
BS EN 877	'Cast iron pipes and fittings, their joints and accessories for the evacuation of water from buildings. Requirements, test methods and quality assurance'
BS EN 1401-1	'Plastics piping systems for non-pressure underground drainage and sewerage – Unplasticised poly (vinyl chloride) (PVC-U)'
BS EN 1916	'Concrete pipes and fittings, unreinforced, steel fibre and reinforced'
BS EN 12566-1	'Small wastewater treatment systems for up to 50 PT. Part 1: Prefabricated septic tanks'
BS EN 13101	'Steps for underground man entry chambers. Requirements, marking, testing and evaluation of conformity'
BS EN 13476	'Plastic piping systems for non-pressure underground drainage and sewerage. Structured wall piping systems of unplasticized poly (vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE). Parts 1, 2 & 3.'
BS EN 13598-1	'Plastics piping systems for non-pressure underground drainage and sewerage. Unplasticized poly (vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE). Specifications for ancillary fittings including shallow inspection chambers'
BS EN 13598-2	'Plastics piping systems for non-pressure underground drainage and sewerage. Unplasticized poly (vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE). Part 2: Specifications for manholes and inspection chambers'