

## BELOW-GROUND DRAINAGE SYSTEMS

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This Good Building Guide gives recommendations for below-ground drainage systems serving sanitary appliances in low-rise and high-rise dwellings, office buildings and public buildings. It does not cover systems for more specialised equipment for buildings such as hospitals, laboratories and factories. Above-ground drainage (see Good Building Guide 76<sup>[1]</sup>) should be designed before below-ground drainage so that the wastewater loadings determined for the above-ground system can be used in the design of the below-ground systems. Similar design principles apply to suspended horizontal pipework, for example, in a basement.

Wherever possible, a drainage system should be designed to operate by gravity (see BS EN 752<sup>[2]</sup>). However, where this is not appropriate or is uneconomical, then alternatives include pumped discharges or vacuum or pressure systems. Situations where non-gravity systems will need to be considered include:

- high water tables
- contaminated land
- mountainous countryside
- settlements separated by rivers
- supermarkets
- buildings above tunnels
- sites where gravity systems would result in pipework with negligible or back (negative) falls.

The appropriate British Standards for alternative drainage systems include BS EN 121091<sup>[3]</sup>, BS EN 1671<sup>[4]</sup> and BS EN 12056-4<sup>[5]</sup>.

The Public Health Act 1936<sup>[6]</sup> defines a drain as a pipeline that serves only one property and a sewer as a pipeline that serves two or more properties. Also a drain will have intermittent wastewater flow whereas a sewer is more likely to be flowing continuously.



If water-conserving appliances are to be used in buildings there could be some impact on the drainage systems. BRE Information Paper IP 1/04<sup>[7]</sup> sets out the principles of designing drain and sewer systems for low-water-use dwellings.

### PERFORMANCE REQUIREMENTS

The basic requirement for an underground drainage system is to convey foul water and rainwater from the base of a drainage stack or drain gullies to an outfall (a foul or combined drain or sewer, a cesspool, septic tank or other type of individual wastewater treatment plant). Only gravity systems are discussed in this *Good Building Guide*. Box 1 lists the key performance requirements.