

FOUL AND SURFACE WATER DRAINAGE

Combined mains drainage systems: The first drains or sewers were built to combat diseases caused by poor sanitation by removing foul drainage and wastewater from residential areas. Most older towns and cities have combined sewerage systems which take both rainfall and wastewater to the sewage treatment works, and most buildings constructed before 1950 have a combined drainage system connected to the public sewers.

Separate mains drainage systems: As urban populations grew, the amount of wastewater could not be accommodated by the combined system, and separate sewers were developed with two drains: one for wastewater from toilets, sinks, industrial wastes, etc. (that go to the sewage works for treatment before being discharged into rivers); and one for clean surface water from roofs and roads that discharge directly into rivers. New buildings must have separate on-site drainage systems even if they are in a combined sewer area so that they are ready to connect to the separate public system if it is ever upgraded.

Inspection chambers: These provide access to drains for inspection and cleaning in the event of a blockage. They are installed whenever a branch pipe joins a main run, where a drain changes direction horizontally by more than 30°, or when there is a straight run of more than 22m. They usually have a preformed plastic base, with connecting channels, a plastic riser, concrete surround and a metal cover and frame.

Manholes: Often large, brickwork or concrete inspection chambers with metal steps built into the walls, enabling a person to climb down into the drainage system to carry out maintenance work.

Connections and fittings: Trapped waste pipes from toilets, basins, baths, etc., will usually be connected to an external soil and vent pipe that takes all waste to a foul drain and vents at high level to allow fumes and gases to escape. Ground floor toilets may be connected directly to drain, with other wastes connected via an external gully. Rainwater downpipes will discharge over gullies connected to separate storm water drains.

Building regulations: Approved document for part H of the regulations outlines requirements for the design of drainage systems, including the provision of access points, capacities, materials and falls or gradients.

SUSTAINABLE URBAN DRAINAGE SYSTEMS

Extensive development has resulted in high peak flows of storm water and serious flooding of urban areas.

Sustainable urban drainage systems (SUDS) are systems that deal with surface water run-off locally, through collection, storage and cleaning, before allowing it to be released slowly into the environment. SUDS details are likely to be required for approval as part of the planning process. SUDS techniques are described in the table:

Technique	Description
Soakaways	Circular, square or trench excavations filled with rubble and used to store storm water run-off from roofs or car parks, that allow for infiltration into the soil.
Swales	Grass-lined channels or ditches which act as temporary reservoirs, reducing peak flows and allowing absorption of water into the ground.
Drainage ponds and basins	Ground depressions that are normally dry and can store surface water before infiltration into the ground.
Reed beds	A shallow lined and planted trench. Storm water is slowed as it passes through the bacteria rich reeds, which remove harmful contaminants, before it is discharged to a watercourse.
Filter strips	Gently sloping, vegetated strips of land that slow runoff and provide an opportunity for infiltration. Often used between a hard-surfaced area and a receiving stream or drain.
Wetland areas	Vegetated and saturated areas that use sedimentation and filtration to provide treatment of surface water.
Rainwater harvesting	The process of collecting and storing rainwater from a roof or paved area for uses such as garden watering, that reduce demand on the mains supply and reduce peak flows of storm water.
Green roof technology	Roofs that are cultivated with vegetation produce a decrease in surface water runoff and a reduction in peak flows because part of the rainfall is retained by the vegetation.

Key terms

Term	Definition
Combined drainage systems	A system where each drain handles both foul water and surface water.
Separate drainage systems	A system where foul water and storm water are handled by different drains.
SUDS	Sustainable Urban Drainage Systems – systems for managing the drainage of surface water in urban areas, intended to avoid pollution and reduce flooding.