

Sustainable Drainage

Why is There a Problem?

Most land is naturally porous, allowing water to infiltrate soils and move into surface water features such as ponds, lakes, rivers and streams and underlying water storing rocks (aquifers). The movement of water through soils slows the translation of rainfall to river flow while filtering and breaking down pollutants. In non-urban areas rainfall fills up (recharges) the aquifers in winter. In summer much of the rainfall is lost through transpiration and evaporation, so recharge of aquifers is limited.

In urban catchments, water flow is altered by the materials we use to build our towns, cities, shopping centres and developments. Tarmac and concrete are impermeable and water collects on the surface. Throughout most of the 20th century the water that fell on these impermeable materials was seen as a problem and moved as quickly as possible into our rivers and watercourses through dedicated surface water sewers or combined foul and surface sewers.

The presence of impermeable cover prevents water from seeping into the ground while the drainage systems transmit rainfall rapidly to the nearest watercourse. This leads to a more "flashy" flow regime in urban catchments with lower flows in summer and higher peak flows during storms (see figure 1).

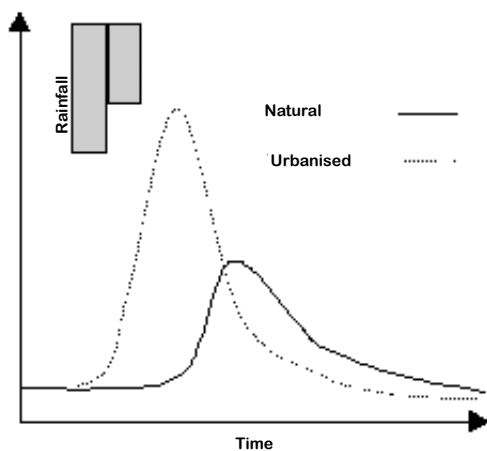


Figure 1

Urbanised and Natural Response to Rainfall



Photo: © The Wildlife Trusts' UK Office

Many traditional combined sewage and surface water drainage systems cannot cope with storm flows, overflowing untreated sewage and litter into watercourses.

What is The Problem?

The change in a river "hydrograph" may seem academic. However, in the UK, increased "flash flows" can affect our wildlife, our livelihoods and our homes. The surges of fast moving water from the hard surfaces of our towns and cities can scour and erode our rivers and is channelled quickly to sea. At no point in the system is this water allowed to slowly and naturally penetrate or recharge the aquifer. This reduces summer river flows and impacts our river wildlife including:

- dragonflies and other invertebrates
- water voles
- otters
- fish

During storms, water is sometimes unable to move into drainage channels and pipes quickly enough and local flooding occurs. In other areas the rapid movement of water from developed land to rivers can increase the size and frequency of flood flows, devastating downstream communities. The direct impacts of many existing drainage schemes are often compounded by the construction of flood defence schemes and by irresponsible building in our flood plains. Unsuitable development and impermeable catchments contributed to the flooding seen in winter 2000/2001 where water in streams and rivers met the high tides and caused massive devastation and flooding along the Ouse and the Medway river corridors in Sussex and Kent among others.

What is The Answer?

Sustainable Drainage Systems (SuDS) aim to reduce the impact of developments by mimicking natural processes of infiltration of water into the soil and underground rocks. As an added bonus SuDS methods can "filter" and degrade pollutants gathered by water as it moves across urban areas, reducing pollution in watercourses. So how do we mimic natural processes?

A range of techniques can be used to minimise water run-off including:

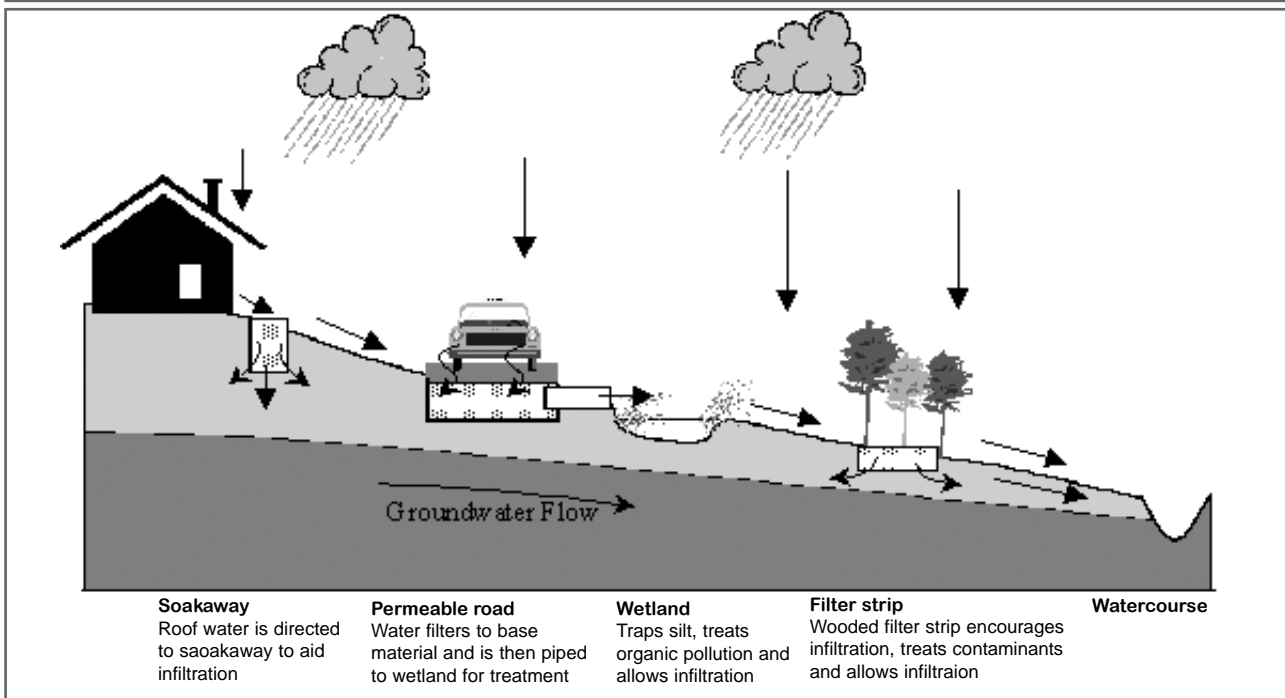
- soakaways to handle uncontaminated roof drainage
- permeable paving which allows water to soak into the ground
- filter strips which encourage infiltration and sediment removal
- water butts which collect water for later reuse

Where reducing run-off is not possible, techniques can be used to store and/or filter run-off including:

- vegetated channels (swales)
- french (filter) drains
- infiltration basins
- storage ponds or wetlands

These methods not only help to balance flows but can also offer efficient treatment for a wide range of contaminants and provide wetland habitats in an urban environment. Such habitats can give communities an educational resource and provide opportunities for recreation as well as contributing to the delivery of local biodiversity targets.

SuDS have not been widely accepted to date because of a lack of detailed technical and legal guidance, reluctance to take on "novel" techniques and uncertainty over the long-term implications for both management and maintenance. The Wildlife Trusts, with its experience in land management and habitat creation, is ideally placed to overcome some of these barriers to the benefit of people, wildlife and long-term sustainability.



Information & Advice

Further information on SuDS can be found in:
 "Sustainable Urban Drainage - An Introduction" SEPA and the Environment Agency
 "SuDS - Best Practice" CIRIA
 "SuDS - Design Manual" CIRIA (comes in separate editions for Scotland & Northern Ireland and England & Wales)



Severn Trent Water

For further information on the conservation of water and wetlands species and habitats please visit:

www.wildlifetrusts.org