# SuDS – a developing landscape

In this briefing Jonathan Glerum, CIRIA, outlines how SuDS can be integrated into urban landscape using best practice solutions

Sustainable drainage systems (SuDS) are an approach to managing rainfall that mirror natural systems. They provide developers, designers and landscape architects with the opportunity to manage local flood risk and improve water quality in local watercourses while creating exciting and interesting developments that can increase levels of biodiversity and amenity.

As Bob Bray, a landscape architect with many years' experience of designing SuDS schemes explains: *"SuDS require an understanding of how water behaves naturally and how engineered structures can be integrated into an attractive and useful landscape setting"*. SuDS can provide a creative way to manage rainfall in a way that can actually improve the quality of the built environment.

## SuDS and landscape design

SuDS that are based on existing features of a site are the most appropriate method of providing efficient drainage to new developments. However, the use of SuDS may only help to deliver better quality development and amenity improvements if they are designed correctly and fully incorporated into a master plan at the earliest stages. Good SuDS schemes should combine engineering principles with interesting landscape design, and this is most successfully achieved at the beginning of the design phase.

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## Creating good SuDS schemes

So how are good SuDS schemes created? The design should start by following the SuDS philosophy, which calls for the inclusion of:

1. **SuDS on the surface:** where possible, SuDS should be used on the surface as much as possible.
2. **A management train:** using several SuDS components in series.
3. **Source control:** managing runoff as close as possible to where it falls as rain.
4. **Sub-catchments:** characterising areas into land use and drainage type.

The SuDS management train is particularly important, as it can be used to explain the other features of the SuDS philosophy (see Figure 1).

The management train starts with prevention, i.e. good housekeeping and site design that reduces and manages runoff and pollution. Next is source control, managing runoff as close to its source as possible, and site control, where runoff is managed in a network across a site in sub-catchments. Finally, the last component of the SuDS management train is regional control, where runoff is managed for a whole site or series of sub-catchments. All sections of the management train can be designed to effectively suit the development, with SuDS placed on the surface and designed to improve the visual environment.

## SuDS component selection

There are many different SuDS components, and those used will often depend on the specific characteristics of the site where the SuDS are to be built and the effect the designer is trying to achieve. Not all SuDS components will be suitable for all sites, so it is important to understand the characteristics and likely use of the site as early in the design phase as possible. David Singleton, a landscape architect who has designed SuDS for

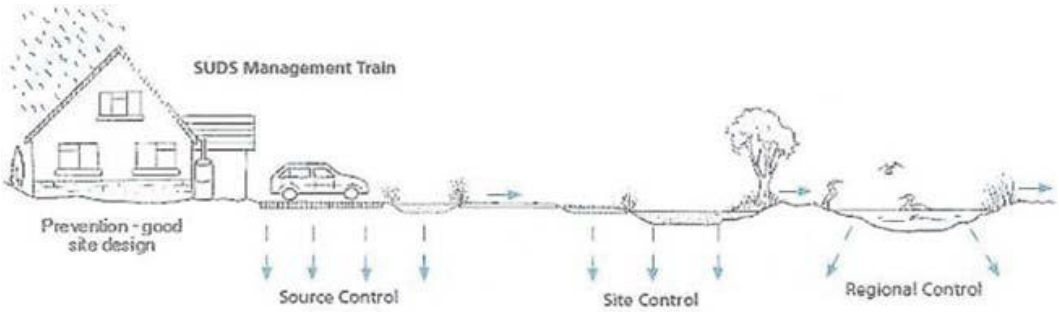


Figure 1 *The SuDS management train (courtesy Catherine Greene and Eithne Flanagan)*

schools, explains: *"SuDS not only provide an economical drainage solution specific to the site, but they also allow young children to learn about their environment in a safe, dynamic and meaningful way"*.

## Typical SuDS components

SuDS components can be split into seven separate groups that take up different levels of land and have different effects on the landscape.
These are:

1 **Source control:** includes green roofs, rainwater harvesting and permeable pavements, all that manage runoff as close to the point where it falls as rain as possible (see Figure 2).

2 **Filtration:** includes filter strips, filter drains or trenches that are often gravel filled and used next to roads, and surface and subsurface sand filters.

3 **Infiltration:** includes soakaways and trenches designed to allow water to seep slowly into the ground.

4 **Detention:** detention basins are often designed as a dry landscaped area that can be used to detain large volumes of stormwater when required, and also subsurface storage such as geocellular systems (see Figure 3).

5 **Retention:** includes retention ponds (similar to traditional ponds) that are designed with water treatment and runoff volumes in mind.

6 **Wetlands:** includes wetlands that are often designed to treat water and provide increased biodiversity. Due to the sensitivity of plants used in wetlands, often they need protecting with other SuDS further upstream, which may remove heavy pollutant loads (see Figure 4).

7 **Open channels:** includes swales (shallow grass channels), which convey water as well as provide some infiltration capacity, and other harder engineered open channels such as canals and rills.

## Adopting SuDS into urban areas

The SuDS components outlined are often considered to be easy to adopt on new build developments, but delivering SuDS into urban areas can be more difficult. Retrofitting SuDS to manage surface water issues has become an important issue. Local authorities in particular, and following the establishment of the Flood and Water Management Act, have a lead role in managing local flood risk.

Figure 2 *A small extensive green roof in Malmo, Sweden (courtesy Graham Fairhurst)*

However, retrofitting SuDS provides a significant opportunity to realise multiple benefits, presenting local authorities and other stakeholders with the potential to deliver "more for less". SuDS can improve the urban environment, help to manage flood risk, improve water quality, biodiversity and amenity. Figure 5 is an example of how a terraced street is transformed with the addition of street trees, traffic calming measures and window boxes, all of which help to manage surface water.

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Figure 3 *Detention basin forming part of the landscape in a low density housing estate*

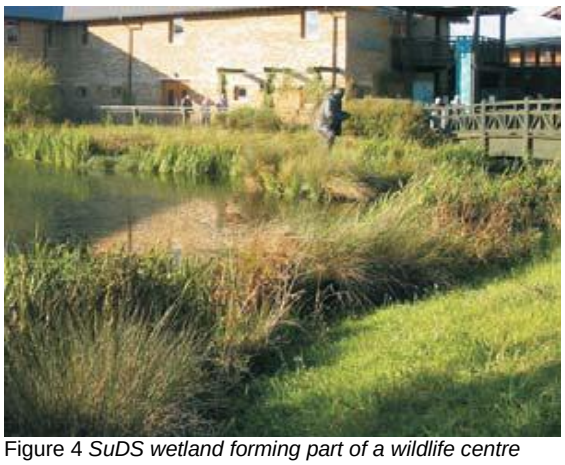

Figure 4 *SuDS wetland forming part of a wildlife centre*

## Further information

The SuDS Manual (Woods-Ballard *et al*, 2007) is a comprehensive guide to sustainable drainage. It provides the background, design and selection criteria, details of components and how they should be built, operated and maintained, for all SuDS.

New guidance by CIRIA on retrofitting for surface water management (CIRIA C713) is available. It provides stakeholders involved in retrofitting, and particularly local authorities, with the tools to challenge the way surface water is now managed and to quickly establish innovative retrofit solutions.

CIRIA also provide training courses, either in-house or externally on SuDS. For more information go to: www.ciria.org.uk/suds/forthcoming_events.htm

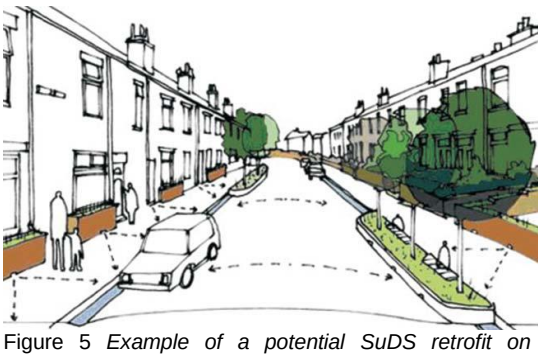

Figure 5 *Example of a potential SuDS retrofit on a terraced street*

If you would like to find out more, contact Jonathan Glerum, *CIRIA*, on email:

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or visit www.susdrain.org

## References


Flood and Water Management Act 2010 (c29)

Woods-Ballard *et al* (2007) *The SuDS Manual*, C697, CIRIA, London (ISBN: 978- 0-86017-697-8).

Go to: www.ciria.org