

Sustainable Drainage News



The bi-annual bulletin of news and development in sustainable drainage systems

Issue 11 – February 2008

This is the eleventh bi-annual newsletter on sustainable drainage systems (SUDS). The newsletters highlight innovations in SUDS practices and encourage their widespread implementation in developments.

Ding(s) Dong the SUDS are here !

UK Government's Sustainable Communities program aims to "co-ordinate the efforts of all levels of government and stakeholders in bringing about development that meets the economic, social and environmental need of the future".

Bristol City Council (BCC) managed the EU funded VIVALDI project (Visionary and Vibrant Actions through Local transport Demonstration Initiatives), to help them achieve four key urban policy goals: urban vitality and economic success, social inclusion, the health and well-being of citizens, and sustainability. Included in the projects implemented in Bristol was The Dings Home Zone.

Home Zones

The concept of the Home Zone development originated in Holland and Denmark. In Home Zones vehicles are viewed as "guests" in a street, and shared surfaced space is introduced enabling key community participation, higher levels of social interaction and sustainable transport modes (walking and cycling). Home Zones often eliminate the use of levelled carriageway, kerbs and footpaths and instead utilises one level paving. Different colours and textures of paving enhance the street, indicate specific areas and play different roles.

The Dings is situated in central Bristol in an area of high social deprivation. It consists of seven streets, 120 households and 12 small businesses, surrounded by light industry and brownfield land. A severe parking and traffic problem motivated residents and the council to look for an innovative solution, and a Home Zone was proposed.

Community involvement

An effective community involvement process, by dedicated staff from Sustrans and a wide range of engagement methods, fostered increased social inclusion, local skills development and greater understanding and respect between all stakeholders.

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The Dings Home Zone Bristol (Courtesy J Bewley/Sustrans)

Events were held in the streets in the evening or at weekends so that residents could informally discuss the issues they wanted to see addressed in their area such as parking, materials, and possible street layouts.

The following design principles were explored with residents and adopted in the final design of the Dings' streets:

- creating a shared surface (block paving) in many areas to eliminate traditional distinction between pedestrian and car space, encouraging interaction between all users to bring vehicle speeds to walking pace
- using attractive but durable and maintainable materials for road surface and other street furniture
- incorporating trees and other planting
- working with utilities and phone companies to bury many of the overhead cables to open up the street space further.

Permeable paving

The proposal to use SUDS was suggested by BCC engineers within the project design team which also consisted of members of the BCC Home Zone Team, and Sustrans.

SUDS was introduced at the Dings' Home Zone for several key reasons: The existing combined sewer system in the area was already working at capacity and the drainage authority did not want to increase flow into these sewers. Permeable paving allows rain to infiltrate through a permeable concrete block paved surface into a stone sub-base where it is cleaned by filtration and microbial action, before being released in a controlled manner into sewers or water courses, or infiltrated directly into the sub-grade.

Permeable paving was used in three of the streets which removed the need for traditional drainage channels, which can form a barrier to mobility-impaired people and are one of the ways that the traditional highway delineates between car and pedestrian space.



Playing football in The Dings, a Home Zone in Bristol (Courtesy J Bewley/Sustrans)

Adoption of permeable paving

The Dings' Home Zone was the first area of SUDS permeable paving to be laid as adopted highway in Bristol and is one of the largest areas in Britain to date.

The idea of using SUDS had to be investigated further and was "championed" by the design team to convince the Highway Authority Maintenance (HAM) engineers to take a leap of faith and be prepared to adopt a new concept for Bristol's roads. This was helped by HAM's suggestion to bring in a specialist consultant to advise on the suitability proposal and educate all on the use of SUDS.

The initial three phases of this project used a SUDS permeable paving system. But it was installed with traditional gullies relocated to the centre of the new surface and capped to provide peace of mind for the Highway Authority in the unlikely event of system failure. As a result, these phases of the scheme have a concave profile to the carriageway surface.

Unfortunately, this concave carriageway profile is believed to have

contributed to contamination of the system with detritus and mud from overfilled landscaping areas, gardens and adjacent development works as it provided a channel for the contaminants. This emphasised the need for the cleansing engineers, who manage the use of mechanical road sweepers, to be involved in the design process, along with the highways engineers. They had not been involved with BCC in the design, while the Highways Maintenance staff who deal with traditional drainage using gully sucking machines had. For future systems this will be taken into account. Many of the streets in the new build Home Zone development adjacent to the Dings are now being constructed with permeable paving SUDS by Barratt Homes.

The whole life-cycle of the project, from inception and stakeholder involvement to the multiple benefits achieved, are at the core of the Sustainable Communities program and demonstrate how projects designed for improvements in specific areas, such as transport in this case, can be utilised to achieve wider benefits to the community.

The Dings' home zone was a partnership between:

The residents of the Dings

Bristol City Council

Sustrans

Community at Heart (Bristol's New Deal for Communities)

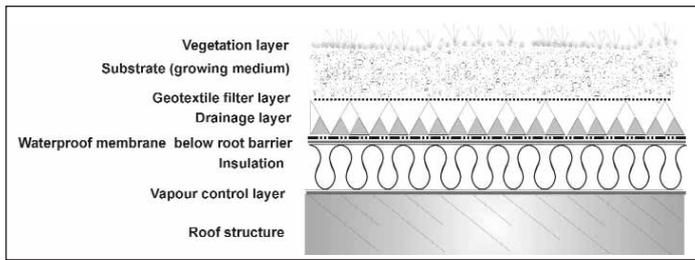
Green Roofs – Lifting the lid on guidance

In September 2007 CIRIA launched new guidance on the use of green roofs, green walls and complementary features on buildings. The document explains how these features can benefit the built environment by enhancing biodiversity, thermal efficiency and contributing towards sustainable drainage objectives.

The contribution that green roofs can make to stormwater management has been a major driver for their use in a wide range of projects, primarily in mainland Europe, but increasingly in the UK. This is particularly important in areas of dense urban development where space for ground-level SUDS components, such as ponds, is often limited.

In line with the SUDS philosophy, green roofs can contribute to the replication of natural drainage patterns when used as a source control technique within a well-designed sustainable drainage system. They do so in the following ways:

- retention of rainwater in substrate, drainage layers and on plants
- uptake of water and release by plants as vapour (evapotranspiration)
- uptake of water and biochemical incorporation by plants (photosynthesis)
- evaporation from substrate and foliage.



A typical green roof cross-section

Green roofs are effective at providing attenuation and runoff reduction for small events, with these benefits reduced but not lost for larger events. Green roofs can reduce the annual volume of runoff by between 50 and 85 per cent depending on their construction. The performance of a green roof in attenuating runoff will depend on a number of factors including:

- storage capacity of the substrate and drainage layer (most significant)
- type of vegetation
- degree of saturation of the substrate at any time
- climatic factors (temperature, wind, evaporation rate)
- intensity and duration of rainfall
- water requirements of plants.

A green roof is most effective for sustainable drainage perspective if it is combined with other SUDS components as part of a stormwater management train, as demonstrated by the Zurich railway station below.



Infiltration basin (above) and green roof (below) at Zurich railway station (Courtesy S Wilson)



Case Study: Norfolk Community Primary School, Sheffield



Roof (Courtesy (left) C Basilio (right) Sheffield City Council)

Because of sewage and stormwater overflow problems in the local catchment, one design requirement for the design of this new school in Sheffield was to minimise the site's rainwater runoff as part of a holistic water management strategy. The decision was taken to implement a sedum green roof to reduce runoff and relieve pressure on the overloaded drainage system. Excess water runoff from the roof was harvested and utilised to supply the school's toilets. The green roof also provided benefits in terms of reducing intrusive noise from rain and hail, improving thermal insulation and providing a habitat for insects and other wildlife.

For more information on the guidance and on upcoming events and training please visit the Building Greener website

www.ciria.org/buildinggreener

ODDS & SUDS

Want to talk odds and SUDS? Why not visit CIRIA's electronic SUDS forum at www.ciria.org/suds/eforum.htm

SUDS and the Water Framework Directive

Diffuse pollution arises from land-use activities (urban and rural) dispersed across a catchment and sub-catchment in contrast to point-source pollution from industrial effluent, municipal sewerage effluent, deep mine water or farm effluent.

Individually these sources of pollution have a minor impact but, collectively can damage water quality and ecology as well as habitats, aesthetic quality and the use of our water bodies for amenity.

The Water Framework Directive is an obligation for all EU member states to manage the quality of their surface waters. It seeks to prevent any deterioration in status of water bodies, and aims for all water bodies to reach "good status" (not yet defined) by 2015.

Because most "point-source" discharges are well controlled in the UK, this directive has thrown the spotlight on diffuse pollution. The Government, through the Department for the environment food and

rural affairs (Defra), is now investigating how best to tackle the problem. This is far from easy given the many small actions which contribute to the problem.

Defra held a number of consultation workshops to scope the priority areas where existing mitigation/reduction efforts can have the greatest impact. These have been identified as:

- industry
- transport
- abandoned mines
- sewerage
- sediment.

Although there are processes and legislation in place to deal with all of these sources, Defra's consultation suggests many of these cannot be effectively controlled with current legislation.

Some of the most recent legislative controls, such as the Building Regs and PPS23, identify SUDS as a central approach in dealing with urban diffuse pollution.

Urban diffuse pollution

By stemming the rapid flush of polluted water entering urban rivers following rain, SUDS can reduce pollution loads. Introducing these techniques to the urban environment can have a significant effect on reducing many kinds of diffuse pollution.

Numerous consultations have identified the main barriers hindering the widespread implementation of SUDS, notably the issue of the eventual adoption of the systems. Because the responsibility for drainage in urban areas lies with a variety of organisations, there is no holistic view of surface water drainage and sewerage systems. In addition, the right to connect to a public sewer; (Section 106 of the Water Industry Act (1991), means there is little incentive for developers to design or promote the use of SUDS.

Previous consultations on responsibilities for the long term adoption of SUDS have been inconclusive. However, as part of the Water Strategy, Defra has published a consultation document called *Improving surface water drainage* to develop a framework to finally help overcome this challenge. Defra would welcome your views on this document.

ODDS & SUDS

LANDFORM – The Local Authority Network on Drainage and Flood Risk Management held its inaugural event on 20th September. It looked at adoption of SUDS by Oxford County Council. A report of the event and presentations can be found by visiting www.ciria.org/landform/

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