

Sustainable Drainage News



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

Issue 7 - February 2005

This is the seventh bi-annual newsletter for sustainable drainage systems (SUDS). The newsletters aim to communicate the latest innovations in SUDS practices and encourage their widespread incorporation into developments.

SUDS – exploding common myths

Discussions over sustainable options for the drainage of a site are often overshadowed by common myths or misconceptions surrounding SUDS. This article exposes some of these and offers an alternative view.

The most common myths associated with SUDS are:

- they need infiltration to work
- they will not work on brownfield or contaminated sites
- they involve ponds and wetlands with a large land take

Infiltration

Although many SUDS techniques using infiltration are highly effective, there are many sites where infiltration is not possible, due to impermeable ground conditions or contamination. This does not prevent the use of the SUDS approach, but requires careful thought on how water can be treated to improve quality and attenuated to reduce peak flows. Rainwater harvesting, green roofs, permeable surfaces, swales, ponds and wetlands can all operate without infiltration. Permeable surfaces, used for car parks and drives are very effective, even where infiltration is not possible. The M40 motorway services at Wheatley is a good example of the use of SUDS where infiltration is not possible. At this site, infiltration was not used due to the risk of mobilising contamination in the underlying soil. Here, the car park uses permeable paving for the parking bays, offering treatment and attenuation of the run-off. Research at a site in Scotland has demonstrated that even where the soil is substantially impermeable, the discharge from a permeable car park is both reduced in volume and flow rate and improved in quality when compared with an adjacent traditional parking area.

In this issue

- SUDS – exploding common myths
- Hop Oast park and ride innovative SUDS design
- run-off control at Farnborough Airport
- SUDSnet, an overview.

Brownfield and contaminated sites

Conventional drainage on these sites often involves complex arrangements to ensure that drains are sealed, that material excavated from trenches is properly disposed of and that drainage trenches are filled with suitable materials. SUDS techniques can be used to keep the run-off at, or close to, the surface, for example using permeable surfaces, swales and wetlands, reducing or eliminating the need to disturb, remove or import materials to the site. Up to 40 per cent of sites developed using SUDS in Scotland have been brownfield sites. The Scottish SUDS working party has produced an advice note on the subject, which highlights the benefits of integrating the use of the SUDS approach at the earliest stage possible in the planning for the site and its remediation. For further details, visit www.sepa.org.uk/pdf/publications/leaflets/suds/brownfield.pdf



Integrating amenity – a bird-watching hide at Barnes Wetland Centre

Ponds, wetlands and land take

Constraints on space are often cited as a reason for not using the SUDS approach, as many developers believe that the use of SUDS will inevitably mean the use of ponds and similar surface features.

However, there are a wide range of SUDS techniques that can be used to attenuate and treat rainwater flows, starting at an individual property scale, even on the most constrained sites. It is also the case that green space provision is required in many developments and that open drainage features such as swales and ponds can be imaginatively integrated into these.

This article has addressed a few of the myths surrounding SUDS, but it is important to emphasise that the SUDS concept or philosophy is about a different approach to drainage, which seeks more sustainable solutions than our traditional, pipe-based system. SUDS are a way of thinking about drainage that encompasses a wide range of techniques which, if considered at the earliest stages of a development, can be applied to any situation.

Phil Chatfield, Environment Agency

Innovative engineered SUDS solution

SUDS components developed by Hydro International provide a hard engineered option for sustainable drainage. Hydro has been working with Horsham District Council to incorporate SUDS in recent infrastructure projects. A good example of the application of hard engineered SUDS solutions can be found at the new Hop Oast park and ride facility. Horsham District Council has installed a porous pavement to deliver controlled, unpolluted surface water discharge to the local watercourse, which compliments the council's policy of providing sustainable infrastructure and services.

The Hop Oast park and ride has space for 479 cars and is paved with a combination of standard asphalt pavement for the car and bus access ways and 10 mm gravel in the car bays. The car bays are designed with a slight gradient that drains inward to filter drains set down the center line between the car bays.

These filter drains feed surface water into the stormwater storage system, which retains the excess water and allows it to be discharged under control via a vortex separator and flow control device. These devices treat and regulate the flow of stormwater before it is discharged into a local watercourse.

The distribution pipework arrangement used with stormwater management system ensures any silt within the system is carried through to the separator. The vortex flow action then settles out sediment into the easily accessible sump whilst also separating hydrocarbon pollutants into a collection zone allowing for easy maintenance.

These novel and reliable design features ensure minimal maintenance requirements for the system and its low operational and installation costs provide an attractive alternative to conventional techniques.

In addition, as a result of the load bearing capacity of the honeycomb storage system, it could be sited directly under the car park without additional civil or structural support, greatly reducing land take.



Use of gravel in a porous pavement

The Hop Oast park and ride facilities were funded jointly by Horsham District Council and West Sussex County Council.

Alex Stephenson, Hydro International

ODDS & SUDS

Keep an eye out for further information on the third national conference on Sustainable Drainage, 20-21 June 2005.

Run-off control at the Farnborough airfield

In the early 1980s, it was decided that the south east corner of the Farnborough airfield should be released for private development. Site investigations indicated that as well as requiring new service connection from public supply mains, there was a severe limitation in the capacity of a nearby stream, Cove Brook.

The Farnborough site is a horseshoe-shaped hollow. Cove Brook rises within the airfield but is channelled beneath it in a series of pipes. On the local golf course where the stream is in the open, it is subject to very rapid changes in level due to fast run-off from the airfield. Flooding of local playing fields is a common event after heavy rainfall and some of the land has been reduced in level to create a flood park.



The lorry park site at Farnborough airfield

The part of the airfield site intended for development was used as a lorry park before the Farnborough air shows and then as a car park during the shows. As a result of the new development, the lorry park was to be relocated two km further north. Efficient drainage was needed to prevent overland flow reaching the touch down area on the main runway. However, the constraint on surface water drainage for the area meant that pipe surface water drainage was not an option.

It was suggested that precast concrete grass grid units for surfacing were used and this would be underlain with a crush stone sub-base. While the design was being finalised, it was discovered that the area would be used by vehicles with a combined weight of in excess of 44 tonnes and axle weights much in excess of 10 tonnes. There was a risk that these vehicles would break the castellations of the precast unit or even split the units completely. The precast approach was replaced by plastic grass grid formers that were infilled with concrete

and reinforcing mesh was laid between the grids. The top shells of the formers were burnt out and the pockets filled with blended topsoil and later seeded with grass. This lorry park has now been active for 15 years and despite several tonnes of vehicle movements per day it has continued to function well.

It was also necessary to relocate the car parking for the air show to an area of woodland on the southern boundary of the airfield. However, this site was adjacent to a field containing bee orchids – a protected species. These plants are vulnerable to changes in hydrology, and soil and water quality. Potential decreases in water quality excluded the use of fresh concrete products, as alkaline run-off would be harmful to the orchids. A carriage drainage system would increase the load on the already unpredictable Cove Brook and overland flow was not an option as this would spill into the area where the orchids were growing. It was decided that the site should be covered with crushed stone plastic geogrid reinforcement and pinned to the ground underneath. The area tended to be marshy so a system of perforated pipes were laid, the open ends terminating beyond the orchids.

Part of the site was to be used as an emergency heliport. As there might be a risk of stones being blown out by down draught from helicopters, this part of the site was drained faster and reinforced with rope matting without any stone cover. Now the site has been colonised by some self-sown vegetation and looks less stark than the first laid bare stone.

The need to maintain or reduce run-off from the new development and the difficulty in infiltration water meant that a storage solution had to be implemented. Open water was not an option as such areas may encourage waterfowl that could result in birdstrike. Surface water run-off from the new buildings in the business park is therefore passed through a covered attenuation tank that contains a system of weirs and orifices. Low rates of rainfall are now carried through the pipes that lead to the brook.

Mike Johnson, ODPM

ODDS & SUDS

If you have suggestions for interesting and brief articles to be included in this newsletter, please contact: suds@ciria.org

ODDS & SUDS

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

SUDSnet – the EPSRC-funded network for all those involved in SUDS applications and research

SUDSnet provides a UK-wide network for researchers, practitioners, agencies, developers and all those who are interested in sustainable drainage systems. SUDSnet is funded by an EPSRC network grant which is held jointly by Coventry University and the Urban Water Technology Centre at the University of Abertay Dundee.

SUDSnet has been created to address the current need for a coherent approach to SUDS. National emphasis on more sustainable urban water solutions, as supported by the EPSRC's Sustainable Urban Environment (SUE) initiative and the WaND consortium (Water Cycle Management for New Developments) dictate that a coherent and consistent approach to SUDS issues is required. The national SUDS Network also complements other initiatives of national importance including the EPSRC/DEFRA consortia on flood management, the EPSRC/UKCIP work on adapting to climate change and other projects such as those that CIRIA manage.

Local authorities and environmental regulators now require practitioners to incorporate quantity/quality/habitat aspects into their designs. SUDSnet can assist in this process by facilitating vital communication between groups of researchers and practitioners on subjects such as best practice, design code refinement and the development of design procedures.

This national network will ensure that research expertise is shared and that a coherent SUDS research agenda is developed on a UK-wide collaborative basis to assist and inform decision-making processes. SUDSnet will also enable high quality research proposals to be brought forward to the research councils in the UK and Europe. We want to see best practice being adopted and implemented at the practitioner level to promote more sustainable urban environments in-line with the sustainable cities programme. For more information go to: <http://sudsnet.abertay.ac.uk>

Dr. Rebecca Wade, SUDSNet



Ducks enjoying a SUDS pond

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