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# SUDS and Roads

## Introduction

The main driver for establishing the Sustainable Urban Drainage Scottish Working Party (SUDSWP) was to address road runoff and the problems that contamination generated from road traffic activity can generate in the water environment.

Since the inception of the working party in 1997 several milestones have been seen including production of the first of many CIRIA guidance documents (C521<sup>1</sup> – superseded 7 years later by *The SUDS Manual C697*) at the direct commission of SUDSWP and a dedicated Scottish Planning Advice Note on SUDS (PAN 61<sup>2</sup>). Perhaps the most significant milestone has been when the requirement for SUDS became law through the *Water Environment (Controlled Activities) (Scotland) Regulations*<sup>3</sup>, or CAR.

Another milestone, again with Scots Law, was when Scottish Water gained the duty to vest “public” SUDS through standards determined by the water authority; the first such occasion for any water authority in the UK.

Good, if steady, progress has been made over the last decade or so, but at a conference run by both SUDSWP and Transport Scotland it emerged that the reticence shown by the roads sector was due to a perceived lack of SUDS guidance for the roads engineer. This was particularly obvious from local authority engineers.

This saw a commission initiated by SUDSWP to produce a dedicated document which resulted in the recently released “*SUDS for Roads*<sup>4</sup>”. It is not the intention of this paper to provide detail of SUDS for Roads, but simply to give a fuller picture of SUDS and road drainage particularly with respect to SUDS and the options from a regulators perspective.

So in Scotland sustainable drainage can be vested by both the water or drainage authorities and thereby kept within controlled maintenance regimes in perpetuity.

## SUDS for Roads

The commission for “SUDS for Roads” by the SUDS Working Party sensibly became a collaborative effort with SCOTS (The Society of Chief Officers for Transportation in Scotland). This was seen as critical because to have a

roads product not only written by roads professionals but endorsed by roads engineers too would give more credence and hopefully gain acceptance by the roads sector as a whole.

A multi-stakeholder steering group comprising the following;

- An independent chair, with years of experience in both road construction and maintenance and SUDS generally
- SEPA, the Scottish Environment Protection Agency
- SCOTS
- Scottish Water
- University of Abertay
- Homes for Scotland
- Transport Scotland
- Scottish Enterprise
- City of Edinburgh Council
- Glasgow City Council
- Aberdeenshire Council
- Highland Council

N.B. 4 local authorities; 2 rural and 2 urban.

WSP Group consultants were commissioned after a stringent tendering process and the first public draft was released at a consultation launch event at the Scottish Government office in September 2009. The release of the final product was made available in early August 2010 after regarding all consultation responses which were also made available.

Local authority roads departments realise the duty to drain roads using SUDS, but of major concern as should be the case for any responsible authority, is maintenance of the drainage infrastructure that is an integral part of the road structure.

SUDS for Roads will assist the roads engineer optioneer to give sensible consideration both from the capital construction costs and maintenance costs.

What was not intended by the initial commission was to give comprehensive whole life costs for sustainable road drainage, however, after heeding *the* major concern made clear from the consultation - that of costs, in particular maintenance costs - a further commission will see another smaller piece of work that will provide dedicated whole life costs for SUDS for road drainage. This work has recently started and is expected to be completed during the first half of 2011.

### **Options for Roads**

So what can be done by the roads engineer where, as commonly, land take is limited and drainage infrastructure should be kept simple?

As is often the case new developments will require open space incorporated within the area as part of a planning condition. This can become the domain of the local authority after construction of the development is completed. A

realistic assessment should be made of proposals to consider the long term vesting of such SUDS. In Glasgow, where significant problems exist in the drainage system it is the intention of both the water and local authorities to share sustainable drainage arrangements.

This will probably be through a “Section 7 agreement” which is written into the *Sewerage (Scotland) Act*<sup>5</sup> and allows for the water authority and the drainage authority to share drainage responsibilities. An obvious route for this to occur is for the water authority to vest the permanently wet and hydraulic elements of the system (e.g. ponds, pipes, inlets, outlets and control structures) where the local authority may become responsible for the landscaping and road drainage elements (e.g. swales, filter strips, filter and infiltration trenches). Of more contention will be basins that have already been agreed by Scottish Water as part of their standards and permeable surfaces which will be the responsibility of either the roads authority or resident/occupier of the permeable surface.

### **Levels of Treatment**

According to the SUDS Manual<sup>4</sup> two SUDS levels of treatment are necessary for residential roads and other catchments. Industrial areas will generally require more.

2 options exist that SEPA consider to be deliver a twin level of treatment when designed and constructed robustly as follows;

1. Permeable paving constructed with a sub-base comprising washed, no-fines stone of a depth of construction of at least 0.5metres and with an area ratio of 2:1, impermeable to permeable surface. This means that 200 square metres of tarmac may drain into 100 square metres of proprietary permeable paving.
2. A wet, or under-drained, swale with a filter trench of at least 0.5m depth with an interface (between floor of swale and filter trench) of soil with suitable permeability - not too permeable that allows immediate infiltration and not too slow that disallows any useful permeability.

Such options allow for minimal landtake with 2 levels of treatment and can assist roads and drainage engineers deliver suitable SUDS for roads.

An additional and generally under-used component within the SUDS manual is that of bioretention (landscaped areas serving as a drainage function). Such systems may be included over parts of a large area, but more usefully smaller elements across a car park, for example, or as part of traffic calming measures. These smaller elements are called bioretention cells and can serve as much more subtle drainage arrangement that can also deliver good water quality performance.

### **Creative Drainage**

This leads us to a much less conventional drainage system with strong elements of source control where rainfall is managed on the surface it lands

on or adjacent to that surface. Conveyance is provided often using limited lengths of pipework substituted by swales and possibly linear wetlands, leading to other site/regional controls that may be a water authority asset that will deliver water quality polishing having had most of the treatment delivered by the upstream elements.

By keeping the drainage system visible allows several advantages. Failure of the system is easily identified and thereafter much more readily repaired – no digging up and disruption of underground assets to identify where and what the problem may be. Biodiversity is encouraged and habitat is created, which can in turn deliver significant water quality treatment and if done properly will be aesthetically pleasing. Also much larger volumes of flood water can be contained at less cost than oversized sewers; critical in these days of sustainability and climate change.

Overall such systems can be constructed cheaper than providing conventional drainage however maintenance cannot be ignored and must be considered before construction has begun. A developer may choose to construct the cheapest option available to them at the construction stage, which may not be the most sustainable over the life of the asset. A sensible compromise must be achieved to consider both construction and maintenance; developer and authority.

A project looking at 6 sites in Greater Glasgow aims to consider all the above to produce “concept plans” as a pre-master-planning stage. The main focus for each site is to consider “infrastructure first” and to take forward the green networks throughout and beyond each site. The *Green Network – Integrated Urban Infrastructure Project* will be completed by January 2011 and output reports will be available on the SEPA website.

## References

1. CIRIA Report C521 “Sustainable urban drainage systems. Design manual for Scotland and Northern Ireland”, London 2000.
2. Planning Advice Note 61 “Planning and Sustainable Urban Drainage Systems” Scottish Executive, Edinburgh, July 2001.
3. *Water Environment (Controlled Activities) (Scotland) Regulations*. Scottish Government, Edinburgh
4. “SUDS for Roads”, Society of Chief Officers for Transportation in Scotland website. Shortcut “Quicklink” at [www.SEPA.org.UK](http://www.SEPA.org.UK)
5. *Sewerage (Scotland) Act 1968*, The Scottish Government, Edinburgh