

Go with the flow

Can SUDs be a practical option for local authorities? Now that 3D software can unleash virtual storms and predict flood flow paths it is a step closer, as **Stuart Constable** reveals.

Controversy over the willingness of local authorities to adopt sustainable urban drainage techniques shows just how important the issue of source control has become.

Now, for a number of councils, new technology has made the use of SUDs as practical as conventional flood prevention techniques.

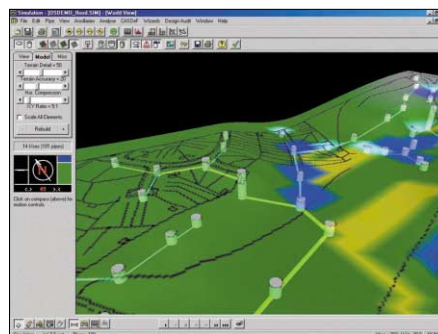
By using drainage systems such as porous paving, infiltration trenches and lined soakaways, engineers can dramatically reduce the rate at which water is delivered into a drainage system. In addition, the gradual absorption of the run-off provides a mechanical and biological filtering effect that improves the quality of the water entering the infrastructure.

One of the pioneers of this growing use of SUDs in the UK is Aidan Millerick, managing director of drainage software developers Micro Drainage. The introduction of a dedicated 'Source Control' module for the company's WinDes drainage design suite was a significant step forward for those championing sustainable techniques.

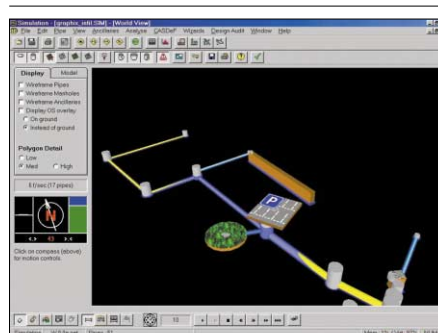
'It goes right back to the 1828 Charter of the Institute of Civil Engineers,' says Millerick. 'It refers to 'the art of directing the great sources of power in Nature'. Sustainable urban drainage systems adapt the natural absorption and filtration characteristics of the landscape to prevent flooding and pollution. They also require far less maintenance than artificially constructed forms of control.'

Before the launch of Source Control, engineers encountered a wide variety of obstacles to the application of SUDs. 'First, there is the engineering itself, which historically has been highly laborious and less precise than engineers would like,' explains Millerick.

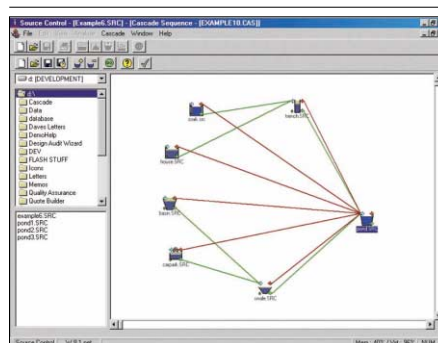
'Then there is the question of selling the principle and the solution as part of a design. Asking approving authorities to com-



WinDes can be used to model flood flow paths, in line with requirements of PPG25



3D graphics within WinDes provide a valuable visual aid to analysis and design



The WinDes Source Control modules allows infiltration systems to be designed and analysed alongside conventional storage

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mit to what they may perceive to be an unproven technique can make the difference between having a design accepted or rejected.

'Finally, there is the perennial problem of time. SUDS solutions have hitherto taken longer to design than many projects would allow. Too often, if a deadline is approaching it is easier to go with what you know and can demonstrate. Now technology has made it possible to work with SUDS as quickly and easily as conventional controls and to demonstrate the effectiveness of the solution,' he concludes.

With flooding high on the political agenda, the Environment Agency is urging the industry to make infiltration its standard drainage solution, rather than positive drainage. Prosper Paul, who co-ordinates the Agency's national campaign on sustainable systems, explains that the first objective is to prevent any worsening of the current situation.

'The infrastructure is already struggling to cope with the volumes delivered into it by our existing development,' he says. 'With 4M new houses about to be built, SUDS can help significantly in keeping volumes at their current levels. Moreover, where positive drainage can be replaced with infiltration, it can even contribute to the alleviation of the problems we are already experiencing.'

The momentum for the adoption of SUDS is growing. John Canton, senior engineer for land drainage at Epping Forest District Council, is an active advocate of the technique and his authority is willing to approve designs that employ source control.

'The authority I work for is certainly actively pursuing implementation of the Planning Policy Guidelines (PPG25),' he says, 'and, because of the growing awareness of flood risk assessments, I am sure others are doing the same.'

'In fact, in the catchments of flood sensitive locations, the land drainage bye laws in the district for which I work have been requiring developers to include SUDS in their storm drainage designs since as early as 1999.'

The integration of the Source Control module within the WinDes suite enables engineers to adopt a holistic approach to flood prevention. Source control is not always the best or most practicable solution and the software incorporates pre-design feasibility checks to help the engineer evaluate the options before commencing the full design process.

Using a highly graphic interface, all the controls can be cascaded together to model a solution that incorporates SUDS and conventional controls. Graphic representations in 3D show how the flow behaves at each node and the engineer can make fine adjustments along the length of the system to determine the optimum solution.

Canton's reference to the Government's latest planning policy guidelines also high-

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lights another critical issue facing engineers. The precautionary principle set out in PPG25 calls for designs to be tested for sensitivity to flooding and for engineers to be mindful of the possible effects of climate change. In addition, the fifth edition of Sewers for Adoption calls for flood flow paths to be considered, rather than simply flooding at a given node.

Newly introduced additions to the WinDes suite incorporate these requirements. The advanced productivity tools (APT) provide 'wizards' that enable rapid and simple batch processing of storms, including a sensitivity wizard that meets the requirements of PPG25.

APT also features the CASDeF analysis tool, which identifies problems within the system and can actually propose solutions. CASDeF can be set to add online or offline storage and other controls and presents an audit trail that allows the engineer to scrutinise and refine the solution if required.

'Speed is the real issue,' says Millerick. 'Governments and regulators want fast solutions and there is enormous pressure on the industry to deliver quick answers.'

'With a growing skills shortage and downward pressure on costs, automating some of the processes through technology is the only way to meet the demands without compromising the quality of the results.'

We have certainly not seen the last of the flooding, which will ensure that the question of SUDS remains a prime time, water-cooler topic. Now, however, technology has opened the way to organic techniques that will enable engineers to provide cost-effective, long-term solutions.

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Technology will enable engineers to provide cost-effective, long-term solutions to flooding