

The role of Water Sensitive Urban Design in the UK



In this briefing Paul Shaffer, CIRIA, explores the role of Water Sensitive Urban Design in delivering improved water cycle management in developments.

The challenges of delivering effective, efficient and reliable water and wastewater services are well understood. Urbanisation, climate change, environmental protection, expectations from the public and the quest for cost effective infrastructure delivery and operation are some of the potential dilemmas that trouble the UK water industry.

Water Sensitive Urban Design (WSUD), originally an Australian concept, recognises and attempts to overcome these challenges by integrating water into urban development and planning from the earliest stages to maximise the opportunities for sensitive water cycle management.

WSUD can be synonymous with sustainable urban water management and integrated water cycle management, which encourages “big picture” holistic thinking about the water cycle. This includes managing potable (drinking) water, surface water, wastewater (sewage and greywater), as well as natural watercourses. It is this integrated approach and the consideration of water supply and wastewater that differentiates WSUD from how sustainable drainage systems (SuDS) are defined in the UK.

WSUD is a seductively simple concept, but complex in delivery as it focuses on the relationship and synergies between urban design and development, liveability, ecosystems, landscape, and the urban water cycle. It challenges our traditional approach to water management by recognising that community values and sustainability should inform urban design decisions and water management practices.

They should be an integral part of urban planning processes, not simply “tagged-on” at the end.

The objectives of WSUD are to:

- Protect and enhance natural systems within urban environments
 - manage the effects of surface water on watercourses
 - control the generation and treatment of sewage
 - consider opportunities for daylighting culverts and urban channels
- Manage water resources and abstractions to maintain groundwater levels and surface water flows
- Promote and deliver water conservation
 - reduce the use of potable water
 - promote the harvesting of rainwater
 - promote the use of greywater and effluent recycling
- Integrate surface water management into developments
 - protect water quality
 - manage flood risk
 - improve biodiversity and urban design
- Protect public health by providing liveable, resilient and adaptable urban developments.

Why WSUD?

The urban water cycle is under increasing social, environmental and economic pressures. Recognising this there are numerous policy and regulatory drivers that relate to climate change, water quality, flood risk management, the natural environment, public health and general sustainability.

The challenges of managing the water cycle are demonstrated by the droughts experienced in parts of the UK in 2006, the flooding in some of the UK in 2007, and the drought conditions that

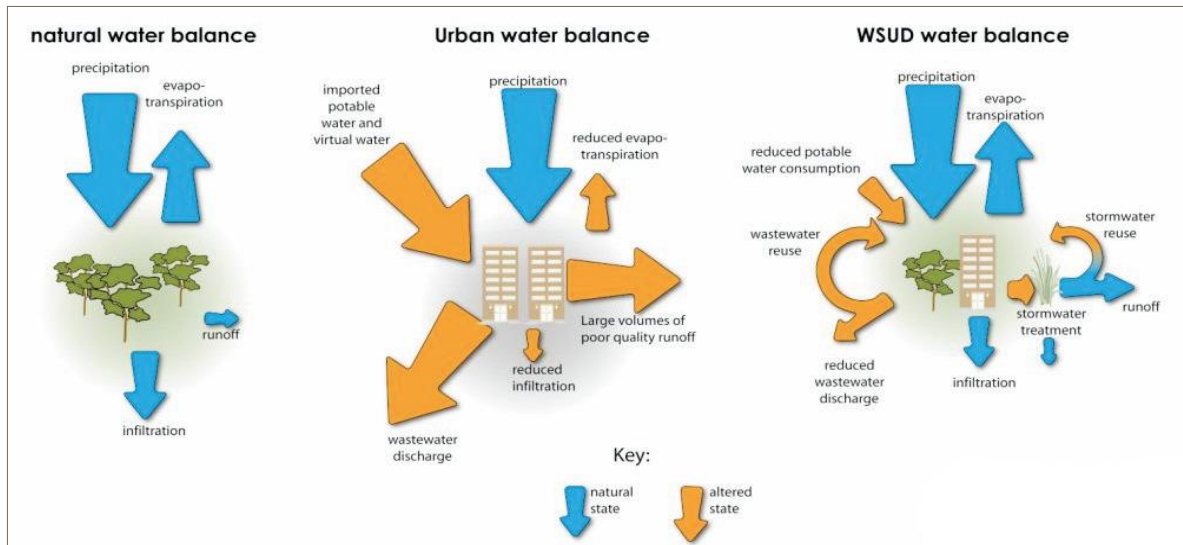


Figure 1 Urban water management cycle (from Hoban and Wong, 2006)

were recently experienced in many parts of south east England. WSUD can also help overcome some of the wider challenges being faced by the water industry that include:

- **climate change** - will alter the seasonal weather patterns. Summers will tend to be hotter and drier, while winters will become milder and wetter. It is also likely that there will be greater variability and extremes in the weather reducing carbon and embracing
- **innovation** – like other infrastructure providers the water industry is increasingly under pressure to innovate and reduce the amount of carbon and energy used during the delivery and operation of its infrastructure
- **environmental pressures** – the UK’s environmental regulatory framework is becoming more stringent, e.g. Water Framework Directive, Bathing Water Directive and Habitats Directive
- **population growth and distribution** – the UK’s population is projected to increase. Much of this population growth is likely to be in the water scarce south-east
- **effectively managing water networks and assets** – due to challenges like urbanisation, climate change and an ageing infrastructure the water industry has to improve its management and provision of capacity in its clean and dirty water networks and related assets
- **delivering multi-functional infrastructure** – with finances being constrained water management needs to be cost effective and deliver multiple benefits and broader ecosystem services
- **consumer expectations and welfare** – consumers are becoming more sophisticated with rising expectations of the services they pay for and increasingly extravagant lifestyles that the water infrastructure needs to maintain
- **societal and economic pressures** – there is increasing focus on local accountability and delivery of infrastructure (localism) within a more cost and resource efficient competitive framework. In England the Cave (2007) and Walker reviews (2009) will affect the future delivery of services in the forthcoming Water White Paper
- **aging infrastructure** – much of the UK’s infrastructure was built over 100 years ago and has reached its capacity. Ofwat considers some of the traditional approaches to water management as being no longer affordable and alternative approaches need to be explored as existing networks and assets are refurbished and replaced.

Traditionally these challenges have been managed with grey infrastructure (hard engineered sewers, treatment systems). However, in recent years it has been recognised that there are more sustainable approaches to respond to these environmental and regulatory pressures.



Figure 2 Urban water management (courtesy Alan Hoban)

The requirement for sustainable water management will increase in response to environmental and legislative plans. WSUD will become crucial in providing an inclusive approach to spatial planning, urban design and water management, helping to overcome the challenges of delivering more sustainable developments within a changing climate.

Progress in the UK

In the UK there is yet to be delivery of WSUD or integrated water management in housing developments. Building Regulations provide a baseline compliance for water efficiency and some developers are striving for better performance



Figure 3 Stamford and Lamb Drove (courtesy Roger Nowell)

For further information on CIRIA's work on sustainable water management and the proposal on Water Sensitive Urban Design please contact Paul Shaffer or Louise Clarke, CIRIA on: 020 7549 3300



Figure 4 SuDS at Lamb Drove

Water cycle studies may offer a chance to promote WSUD. Around 80 water cycle studies have been produced in partnership by local planning authorities to determine the timing, location and requirement of sustainable water infrastructure and integrate it within the local planning framework. A water cycle study will tend to flag the requirement for integrated water management, rather than provide guidance on delivery but combining these with development master plans provides a strong evidence base and framework. This combination is a pre-requisite for eco-towns, where the master plans set a vision to manage water more holistically. WSUD and its general approach to master planning, detailed design, delivery and management will be important for delivering sustainable drainage, water efficiency and water infrastructure to create fantastic places for people to live, work and play while reducing the impacts on the natural and built environment.

It is accepted by a growing number of disciplines that WSUD is appropriate and required in the UK. By working in partnership and using more imaginative and innovative thinking better water cycle management and water sensitive developments can be delivered in the UK.

Building on its guidance on sustainable water management, CIRIA has been developing ideas with support from Arup, Aecom and Pennine Water Group and others to explore the role of WSUD in the UK. CIRIA is fundraising for a scoping study and has obtained support from Defra, South West Water, Yorkshire Water, Micro Drainage, Halcrow, Richard Allitt Associates, Jeremy Benn Associates, Environmental Gain, ACO and Formpave. Interest has also been expressed from other water companies and consultancies. CIRIA is looking forward to working with these organisations and the industry to champion WSUD in the UK.

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Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC (the Bathing Water Directive)

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