



SUDS and Floods

SUDSnet National SUDS conference 2009



Aim

- To identify the pre requisites for the successful use of SUDS in urban flood risk management through an exploration of the flooding process.

Definition of SUDS

- A group of structural surface water management measures with limited capacity.
 - Used appropriately they can be termed as best management practices
 - Used inappropriately they will be less than best management practice

Workshop format

- Working in small groups, answer a series of simple questions

Thread one questions

What is flooding?

How are surface water drainage systems designed?

(Use the rational method as the basis for your answer)

What happens if the inlets within a compartment are blocked, or the capacity of the system is exceeded?

What happens then?

What happens then?

And then?

How can this be avoided?

Thread one questions and answers

What is flooding?	It's water in the wrong place
How are surface water drainage systems designed? (Use the rational method as the basis for your answer)	Identify what area drains to each element. Identify the design criteria Calculate what flow enters each element Calculate the flow in the element Calculate the size of the element This is known as design by compartmentalisation
What happens if the inlets within a compartment are blocked, or the capacity of the system is exceeded?	Water flows into another compartment
What happens then?	The capacity of the inlets or the system in the other compartment may become exceeded
What happens then?	Water passes to the next compartment
And then?	Eventually water may find its way to the wrong place and flooding occurs
How can this be avoided	By ensuring that the compartments assumed in the design are well and truly constructed in reality

Thread two questions

What are our urban drainage systems designed to drain?

Where does our urban greenspace drain to?

So what caused the summer 2007 floods?

How can that be avoided?

Thread two questions and answers

What are our urban drainage systems designed to drain?	Developed areas (Roofs and highways)
Where does our urban greenspace drain to?	It depends. If its by a river to the river. Perhaps to a culverted watercourse, but that watercourse may now be part of the sewer system, or maybe its been destroyed
So what caused the summer 2007 floods?	In the vast majority of cases the rainfall intensities were nowhere near great enough to trouble the sewer systems! Creep may have caused overloading through excessive impermeable areas Intra and peri urban greenspace was not adequately drained into the major system Watercourses had been lost, destroyed, blocked or diverted into sewers. It was a major system, not a minor system event
How can that be avoided?	Make sure that you pay as much attention to the drainage of green space (including green roofs) as the developed space!

Thread three questions

Just how sensitive to gravity is water?

Howe can you control the downhill flow of water

In an empty flat bottomed vertically sided undrained open reservoir what is the maximum depth of water if 100mm of rain falls on it?

If 10% of an undrained area is designated to store flood water in the form of an empty flat bottomed vertically sided reservoir, what is the maximum depth of water in the reservoir if 30mm of rain falls on it?

How can you construct large flat areas?

Thread three questions and answers

Just how sensitive to gravity is water?	Very sensitive
Howe can you control the downhill flow of water	By the creation of reservoirs
In an empty flat bottomed vertically sided undrained open reservoir what is the maximum depth of water if 100mm of rain falls on it?	100mm
If 10% of an undrained area is designated to store flood water in the form of an empty flat bottomed vertically sided reservoir, what is the maximum depth of water in the reservoir if 30mm of rain falls on it?	300mm
How can you construct large flat areas?	Terracing!

Conclusions (1)

- Design as you intend to build. Build as you design. That means build compartments.
- Design for runoff from the green space. Route flows from upstream of the site through or round the site maintaining continuity with the downstream pathways
- Remember, green roofs act in a similar way to greenspace so design for when their capacity is exceeded

Conclusions (2)

- If you want to control the water on a sloping site, then you will have to terrace the site to create compartments. The larger the area used to store water, then the shallower the depth of water
- This is known as landscaping, not drainage. The unit costs for the construction of earthworks are much less than those for the construction of drainage.

Conclusions (3)

- Once you have dealt with the exceedence flows through landscaping, then you can then design the most appropriate drainage system to handle the more frequent flows.
- Finally, remember that you are not just mimicking the natural processes. In order to deal with the development, future densification and climate change you will have to enhance them.