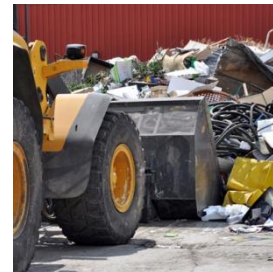
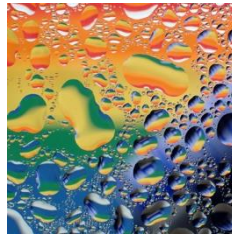
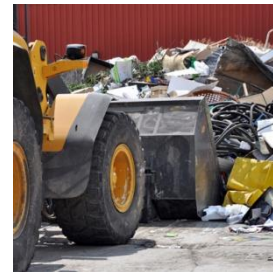
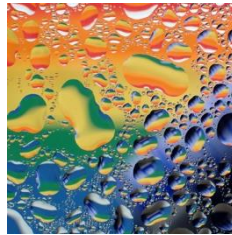




WRc plc

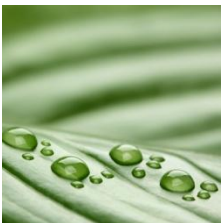


Sustainable Drainage





Meaning of SuDS



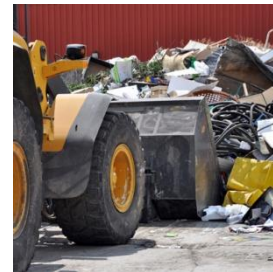
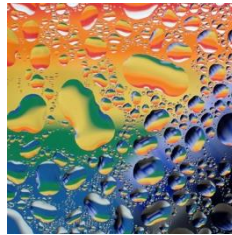
Sustainable
Urban
Drainage
(SuDS)

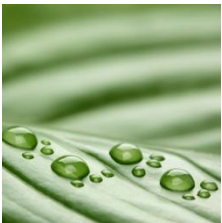
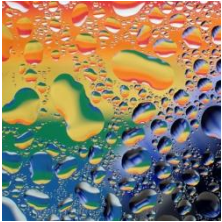


Sustainable
Drainage
(SuDS)

Urban & Rural

Why SuDS?





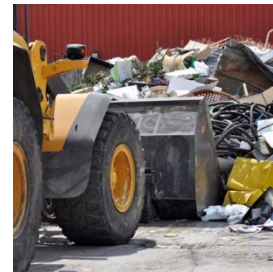
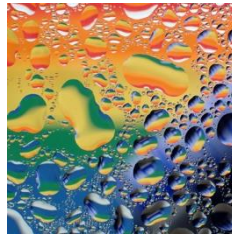
Water Quality

- Water Framework Directive 2000/60/EC

Flood Risk

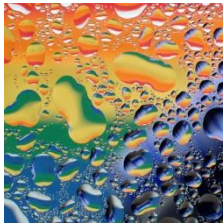
- Pitt Report 2007
- Flood and Water Management Act 2010

What does it do?





SuDS – Mimic natural processes



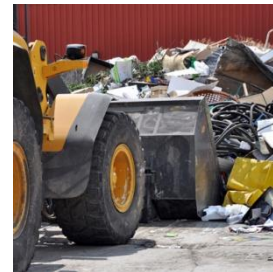
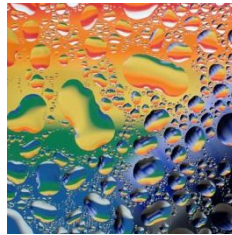
Pipe Drainage

- Fast runoff
- Sediment wash-off

SUDS

- Slow runoff
- Sediments retained

Legislation

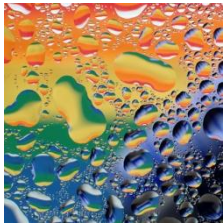




Water Framework Directive 2000



“Member States shall protect, enhance and restore all bodies of surface water... ..with the aim of achieving good surface water status at the latest 15 years after the date of entry into force of this Directive...”



“Member States shall implement the measures necessary to prevent or limit the input of pollutants into groundwater and to prevent the deterioration of the status of all bodies of groundwater”

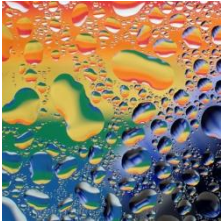




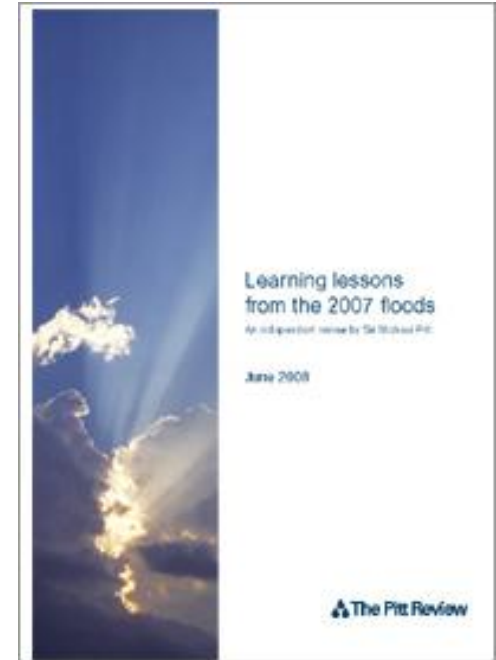
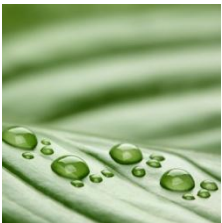
Pitt Report on 2007 Floods



- **RECOMMENDATION 10:** *The automatic right to connect surface water drainage of new developments to the sewerage system should be removed.*



- **RECOMMENDATION 20:** *The Government should resolve the issue of which organisations should be responsible for the ownership and maintenance of sustainable drainage systems.*

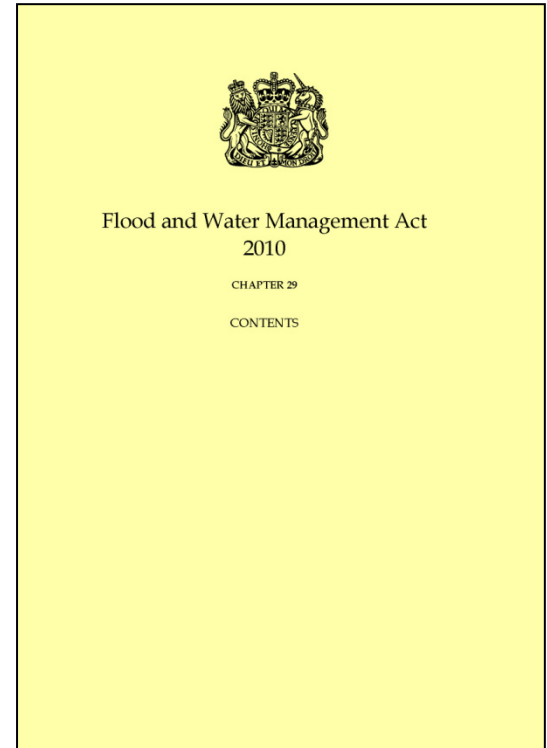
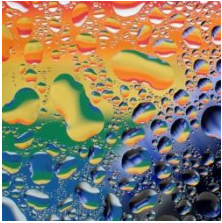




Surface Water Drainage in Flood and Water Management Act

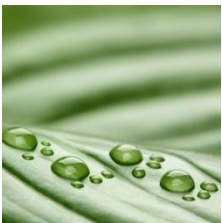
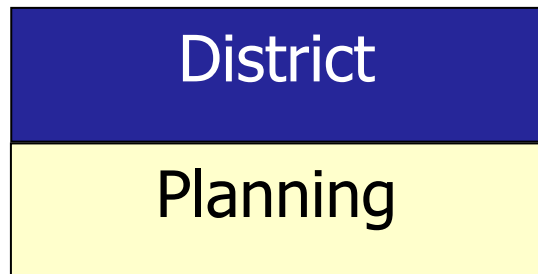
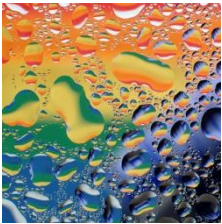
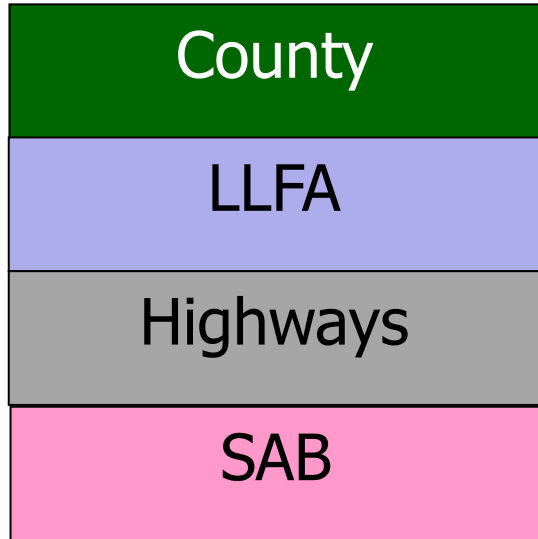


- Approving Body
- Connection to sewer
- The approval process
- New SuDS National Standards
- Adoption





Local Government Responsibilities

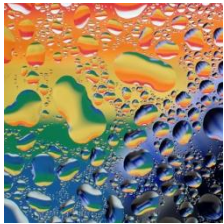




Skills needed



Engineering



Hydrology



Planning



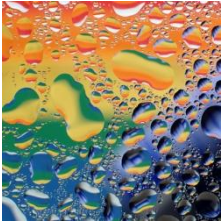
Landscape design



SuDS Approving Body (SAB)



Approves and adopts SuDS



Includes drainage from

- Buildings
- Car parks
- Local Highways



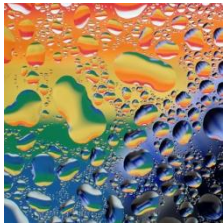


Right to connect Surface Water to Sewer



Now

- Right to connect SW or foul
- Can connect SW to foul if no SW sewer



After

- Right to connect foul
- Right to connect SW only if approved by SAB in accordance with standards





SUDS Process



Approval required before construction

Can be in parallel with planning



Approval is on basis of National Standards

Compliance = Approved

Non compliance = Rejected



Construction

Constructed to approved plans

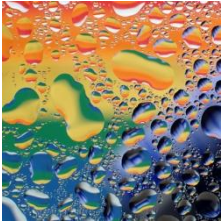
No evidence that does not work



Adopted by SAB

Excludes Highway SuDS

Excludes single property SuDS



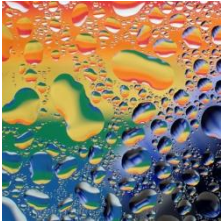


Adoption of SuDS



Approved SuDS must be adopted unless:

- Not constructed
- It serves only a single property
- It is part of a public highway



All SuDS on private land to be designated

- Designated as flood risk features FWMA Sch 1
- Permission required to alter, remove or replace



Voluntary Adoption possible

- Only applies to SuDS not requiring approval



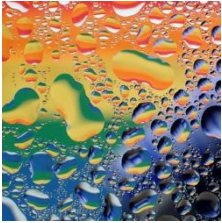


SuDS National Standards



Applicable to a wide range of developments

- Greenfield & previously developed
- Domestic & Commercial
- Pervious & impervious soils
- Dense city centres and less dense peripheral areas

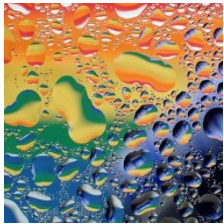


Must deliver most sustainable option in all cases

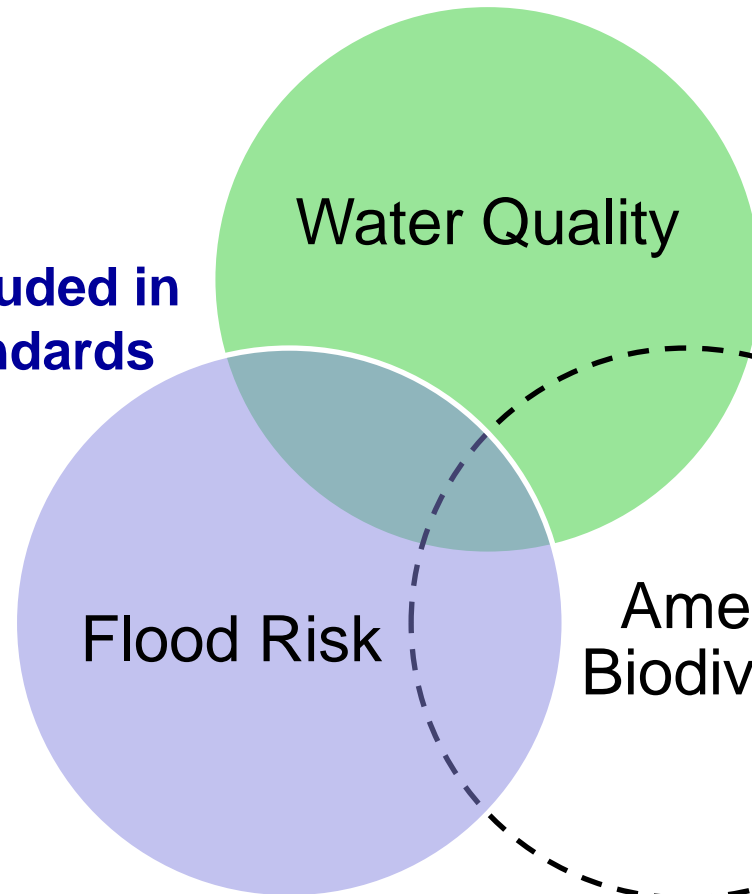




Scope of standards



Included in standards



Excluded from standards but still a matter for planning policy

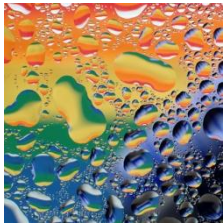


Draft SuDS National Standards



Design:

- Runoff destination
- Off-site flood risk
- On-site flood risk
- Water quality
- Structural integrity
- Economic sustainability



Construction

Affordability





Runoff Destination Hierarchy



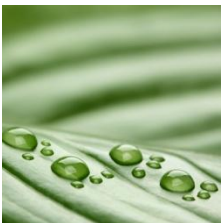
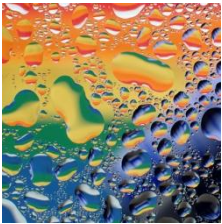
Groundwater

Surface Water Body

Surface Water Sewer

Combined Sewer

~~Four Sewer~~



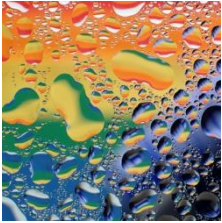


Off-site flood risk



Peak flow control

Peak Volume Control



1 in 1yr & 1 in 100 yr rainfall

where reasonably practicable control:
1 in 100 yr 6 hr event

Where not reasonably practicable



Greenfield sites – greenfield rate

Brownfield sites – pre-development rate

Greenfield sites – greenfield volume

Brownfield sites – pre-development volume

Additional volume must not affect flood risk



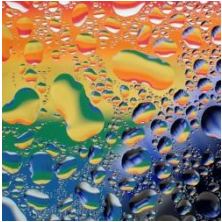


On-site flood risk



Up to 1 in 30 yr rainfall

- No site flooding
- Unless designated flood storage area



Up to 1 in 100 yr rainfall

- No building flooding (incl. basements)

Above 1 in 100 yr rainfall

- Exceedance flood routing
- Minimise risk to people or property



Take account of:

- climate change over design life
- likely changes in impermeable area

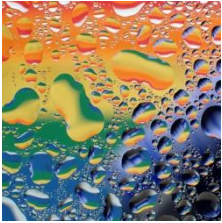




Water Quality



“not adversely impact the water quality of receiving water bodies”



Standards do not say how



Interception

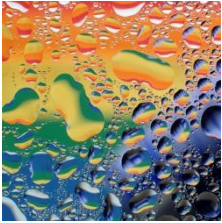
Soft
treatment
systems

Proprietary
treatment
systems





Sustainability



Buildable, operable & maintainable

- Accessible for operatives and plant

Economically proportionate maintenance

- Proper balance between construction and maintenance costs

Minimum pumping

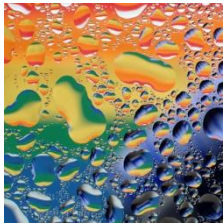
- Only used for parts of site where not reasonably practicable to drain by gravity
- Below ground drainage makes pumping more likely



Construction



Build to approved plans



Correct materials and good workmanship



No damage to SuDS from construction work

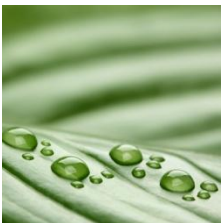
Sewer connection not be prejudicial to sewer



Assume it works unless proved otherwise



Affordability



If an applicant for approval demonstrates to the satisfaction of the approving authority that the construction of a drainage system in accordance with the Standards is more affordable than a drainage system compliant with current regulations, then the applicant may propose a drainage system; then the proposed sustainable drainage system to be approved must comply with these Standards to the greatest extent possible, without exceeding the construction costs of conventional drainage system compliant with current regulations.

**Wrecking amendment
or necessary control?**



What Costs?



Construction costs



Additional land costs



- but make multiple use of amenity space



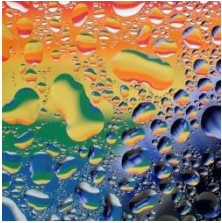


Two Challenges



To designers:

- be innovative to minimise costs



To SABs:

- have knowledge and confidence to challenge poor design

