

# Sustainable Drainage Systems

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## SUDS Guidance in Gloucester - a Story

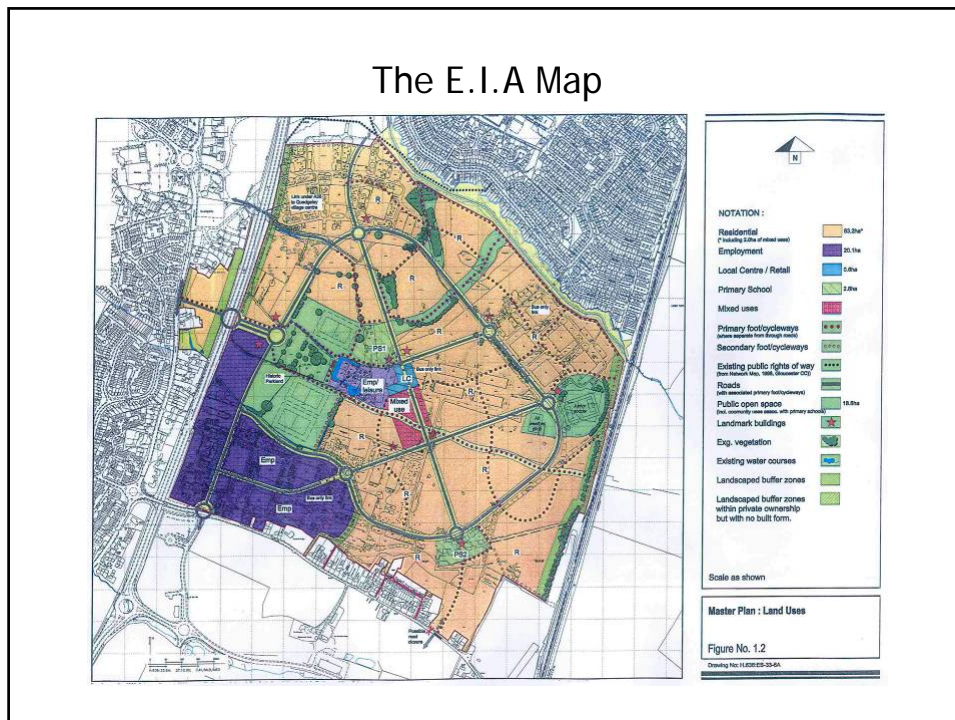
- RAF Quedgeley - the application
- The negotiations
- What actually happened on site?
- Design guide
- Where from here?

### The Site



### The E.I.A

- 'A surface water management plan will be prepared that incorporates a range of SUDS techniques and best management practices. This would provide the necessary mitigating measures that would reduce the proposed surface water run off from the site to acceptable levels. The use of mitigating measures such as infiltration trenches, swales and porous pavements would facilitate the filtration of pollutants .... to ensure receiving watercourses were protected.....With the use of mitigating measures and practical design, the surface water management plan would ensure that the existing ecology, aquatic regimes and natural habitat for the existing water courses, ponds and ditches would be protected and maintained'



### The Appeal and the Condition

- Applicants appealed against non-determination
- Appeal upheld with 68 conditions including Condition 55
- **Prior to the commencement of development...a comprehensive strategy for the provision of works for the disposal of foul sewage and surface water involving a Sustainable Drainage System shall be submitted to and approved in writing by the LPA. The approved scheme shall thereafter be fully implemented on a phased basis, to serve the development**

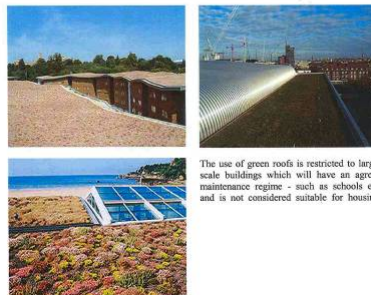
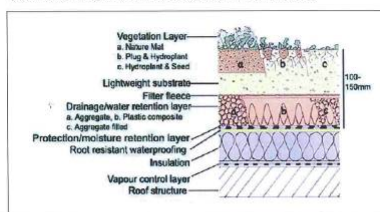
## The Negotiations

- Not pretty
- Involved QUVL, City Council Drainage Engineer, City Council Planners, City Council Highway Engineer, County Council Highway Engineer, Applicant’s Consulting Engineer, Landscape Architect
- Resulted in Chief Executive and Leader of the Council becoming involved
- Prompted policy change in that the City Council agreed to adopt SUDS features (swales, etc). Probably one of the first in England (A Herculean task in itself)
- Led to eventual discharge of condition 55 after significant number of houses had been built on Phase 1 with a conventional system
- Adopted highways were to be drained by conventional system. Porous paving only on private drives

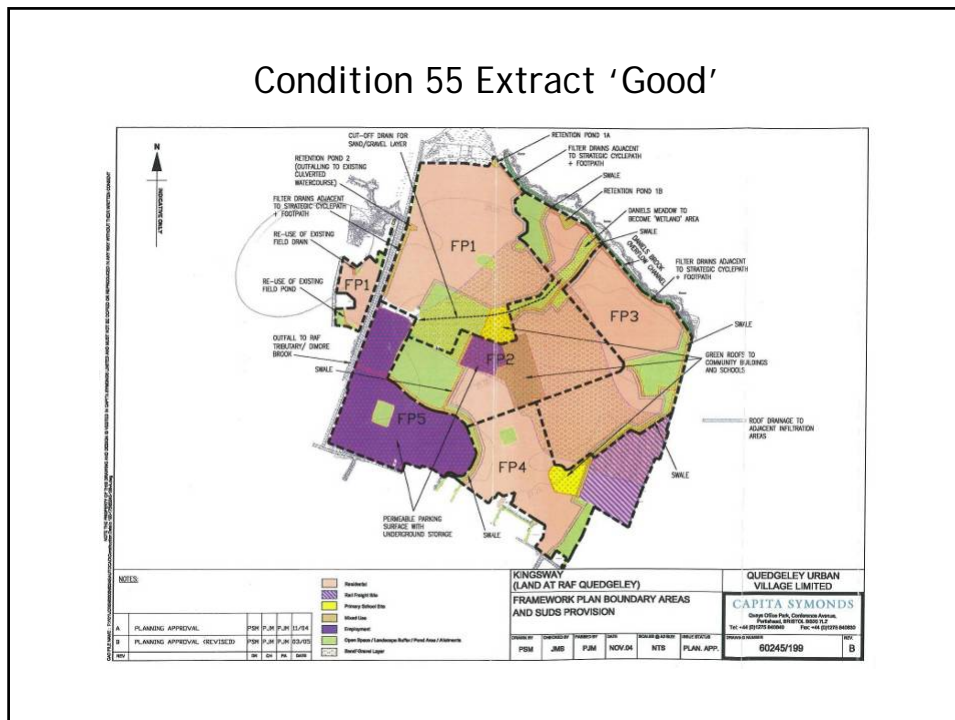
## Condition 55 Extract ‘Bad’

### Green roof

A roof with plants growing on its surface, which contributes to local biodiversity. The vegetated surface provides a degree of retention, attenuation and treatment of rainwater, and promotes evapotranspiration. Sometimes referred to as an ‘alternative roof’.



The use of green roofs is restricted to larger scale buildings which will have an agreed maintenance regime – such as schools etc. and is not considered suitable for housing.



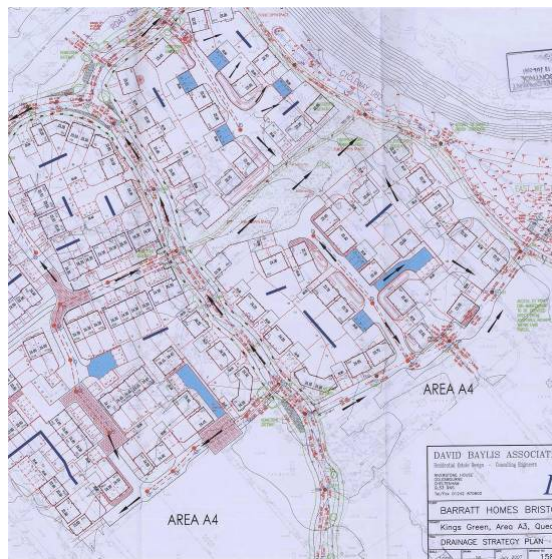
### The Result

- A two-tier system (County still not convinced)
- Problems with Infrastructure planning (QUVL) being separate from housing development
- Some porous paving
- Some token swales
- Some strategic swales
- Some filter drains
- Some wetland areas

### Example of Planning Application



### Example of Planning Application



### Problems Since

- Parks Department in meltdown, engineering lost
- New partnering arrangement led to loss of experience with no one left to adopt open space
- Balancing structures built without planning consent
- Problems with company charged with delivery
- 2007 floods

### Site Examples



Site Examples



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Site Examples



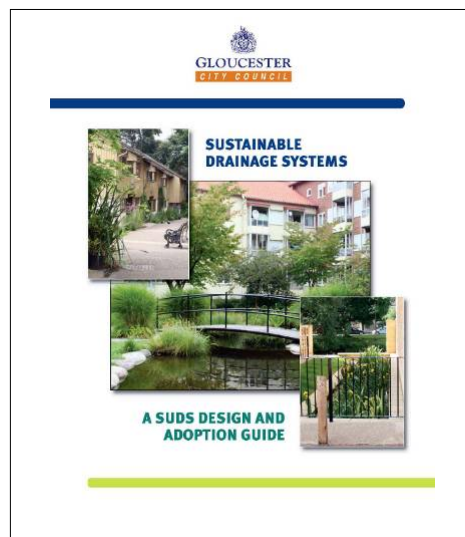
Site Examples

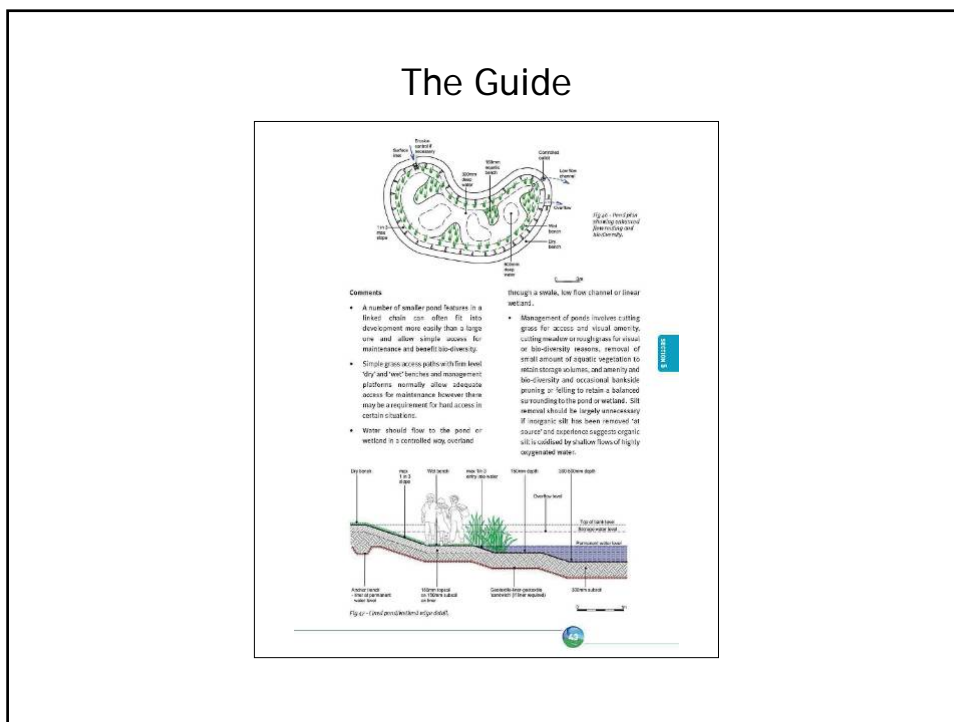
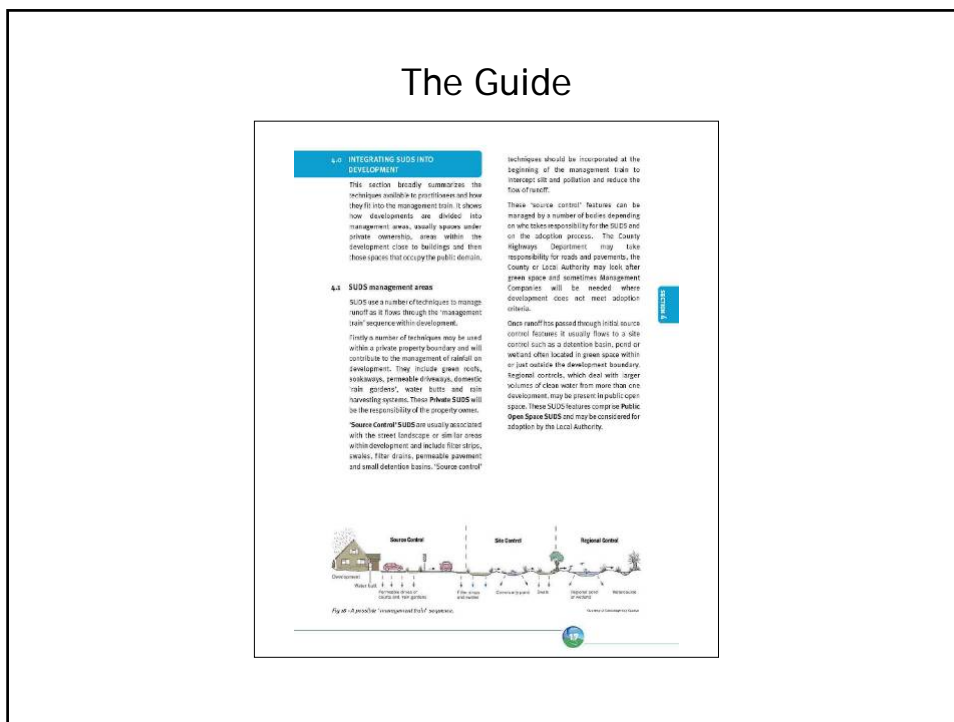


## A Way Forward

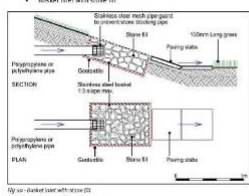
- Need for something more useful for DC and Parks (now Streetcare) staff
- Simple guide showing what to negotiate and what to adopt
- Something that would set out our stall from the beginning, showing developers what to expect and therefore what to build into purchase value

## The Guide





## The Guide



**6.3 Outlets from SuDS features**

Once water has passed through a SuDS component it may flow unimpeded, as in many water outlets, but more often it will be restricted through a flow control structure.

A necessity of flow control and storage is required in SuDS to meet attenuation

Requirements and the outlet design will depend on the location in a development.

The reduction in flow rate, as water travels through the SuDS, causes silt and debris to fall from suspension. Vegetated structures (low walls, basins, ponds) and weirbanks intercept silt and debris through filtration and settlement that reduce the risk of blockage.

Low flows leaving an open SuDS feature usually pass through an outlet structure before leaving through a control device that further reduces the risk of blockage at the outlet opening.

Low flows leaving a permeable pavement or other SuDS structure that flows runoff through roughed stones, will not be at risk from blockage.

Therefore the design of the outlet is generally to manage low flows effectively rather than deal with large volumes and velocities.

## The Guide

**WETLAND AND POND EDGE MIX**

Areas adjacent to unlined ponds where the soil remains permanently moist can become species rich wetland. Wet flowers mix composed of 20% wet flower seed and 80% grass seed.

%	Common Name	Species
2	Common Fringing	Pulicaria dysenterica
6	Flippwort	Cytisus europaeus
6	Greater bird's-foot trefoil	Lotus uliginosus
4	Hemp agrostis	Eragrostis canadensis
3	Marsh marigold	Galium palustre
9	Marsh woodwort	Stachys palustris
8	Meadow rue	Thalictrum flavum
15	Meadowweet	Polygonum orientale
5	Purple loosestrife	Lythrum salicaria
9	Flagged robin	Lychnis flus carcalli
7	Sheepsweet	Achillea ptarmica
6	Square stemmed	Hypochaeris glabra
3	St. John's wort	Scum male
18	Water swan	Iris pseudacorus
18	Yellow flag iris	Iris pseudacorus
100	Grasses: 80%	
5	Blowtop bentgrass	Agrostis castellana
6.5	Common sedge	Carex nigra
10	Crested dogtail	Cynosurus cristatus
10	Meadow foxtail	Aloneurus pratensis
6.5	Perennial sedge	Carex pendula
7	Rough meadow grass	Poa trivialis
18	Sheeps fescue	Festuca ovina
4	Sweet vernal grass	Anthriscum odoratum
15	Tufted hairgrass	Deschampsia cespitosa
100		

**ALIEN PLANTS TO AVOID AT ALL COSTS:**

There are a few exotic plants that cause problems in native planting by out-competing local species and in the worst case with *Carex hirsuta* the habitat is overwhelmed by the newcomer.

<b>Canadian pondweed</b> ( <i>Elodea canadensis</i> )	<b>Water fern</b> ( <i>Acrostichum filiculoides</i> )
<b>Nuttall's pondweed</b> ( <i>Elodea nuttallii</i> )	<b>New Zealand swamp-sedge</b> ( <i>Carex lasiocarpa</i> )
<b>Curly waterweed</b> ( <i>Lagarosiphon major</i> )	<b>Flowering pennywort</b> ( <i>Hydrocotyle ranunculoides</i> ) - this is often supplied as <b>Marsh pennywort</b> ( <i>Hydrocotyle vulgaris</i> )
<b>Parnass's-leather</b> ( <i>Hydrophilum aquaticum</i> )	

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### Joint Core Strategy S.P.D

- Will go JCS wide, i.e Tewkesbury, Cheltenham and Gloucester in the form of SPD
- Flood and Water Bill will throw up threats and opportunities
- Would like countywide guidance. Would prefer mini-agency (opportunity)
- Drainage like highways could lead to mono-specific solutions that are over-engineered and nominally cheap to maintain (threat)

### Over-engineered



## Conclusions

- Need firm policy base
- Clear guidance
- Get in early. Infrastructure planning cannot be done part way through process
- Attention to detail
- Parks, Landscape, Planning, Highways, Drainage, Engineering Professionals all signed up

## Not all bad news

