

# SUDS

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# Environment Agency Policy

- The Environment Agency will promote SUDS as a technique to manage surface and groundwater regimes sustainably.
- Sustainable drainage is the practice of controlling surface water runoff as close to its origin as possible, before it is discharged to a watercourse or to ground.
- **Good** SUDS achieve integrated surface water drainage design with the objectives of:
  - Reducing flood risk from developments within a catchment
  - Minimising diffuse pollution of surface and groundwaters
  - Minimising environmental damage such as erosion
  - Maintaining or restoring the natural flow regime of the river
  - Maintaining recharge to groundwater
  - Delivering improvement to wildlife habitats

# SUDS Devices

- Detention basins
- Grassed swales
- Porous pavements
- Soakaways
- Storage Tanks
- Vegetated waterways
- Wetlands and reedbeds
- Green roofs
- Oil Separators

# Example – A distribution hub

- A 2ha brownfield site being developed to contain warehousing, overnight truck parking and a prestigious office development.
- Distributing oils and paints.
- The development is high density, thus a high proportion of the site will be paved with limited space available for surface water drainage.
- The receiving stream is of good quality and requires appropriate protection.
- There are no particular flood risks to people or property downstream of the site, but land adjacent to the site is part of the floodplain.
- The site comprises soils of very low permeability. However, the groundwater that exists at depth forms part of an important local aquifer and is highly vulnerable to pollution.

■ *This example is taken from the CIRIA SUIDS manual 2007 C697 which can be*

# Planning and Design Criteria

- Early liaison with the Environment Agency, the sewerage undertaker and the Local Authority took place.
- This ensured that the proposed drainage system would meet all stakeholder criteria and that appropriate long-term maintenance agreements could be secured.
- The characteristics of SUDS components and site constraints were reviewed to ensure a complete understanding of hydraulic, water quality, amenity and ecological constraints and opportunities were developed.
- The pollution risks were high and a minimum of three levels of treatment were recommended with the capability for spillage containment in upstream components.

# SUDS treatment proposals for the site

Site area	Sources of Pollution	Level of Treatment Required
F1	Roof runoff Loading Area runoff	Limited pollution, attenuation only Loading area for oils and paints , high pollution risk, three levels required, with no infiltration at the first level.
F2	Roof Runoff Loading area runoff	Limited pollution, attenuation only Loading areas for dry goods plus heavy lorry traffic, 2/3 levels required, with no infiltration at the first level
F3	Roof runoff Car park runoff	Limited pollution, attenuation only Light vehicular traffic only, high frequency of movement, two levels required
F4	Truck parking	Heavy trafficking by large lorries, 2/3 levels required, with no infiltration at first level
	Site access road	Heavy trafficking by large lorries, 2/3 levels required, with no infiltration at first level

# SUDS constraints/opportunities

Characteristic	Constraint/Opportunity
Development Type	Permeable pavements are unsuitable for the warehousing a truck storage due to the risks of spills and heavy lorry trafficking
Soils	Soil is clay so minimal infiltration is possible
Groundwater	No infiltration due to pollution risk to groundwater; all systems should therefore be lined (clay or synthetic liner)
Space available	<p>There is room for a retention pond adjacent to the river floodplain; this would provide enhanced amenity and biodiversity benefits as well as a good final treatment of runoff</p> <p>Some open space is available directly adjacent to the offices and parking areas</p> <p>Large industrial buildings suited to the use of green roofs</p>
Site topography characteristics	<p>Receiving stream requires protection from pollution, but is less vulnerable to flooding</p> <p>Site gradients range from moderate to gentle and therefore do not limit</p>

# Continued

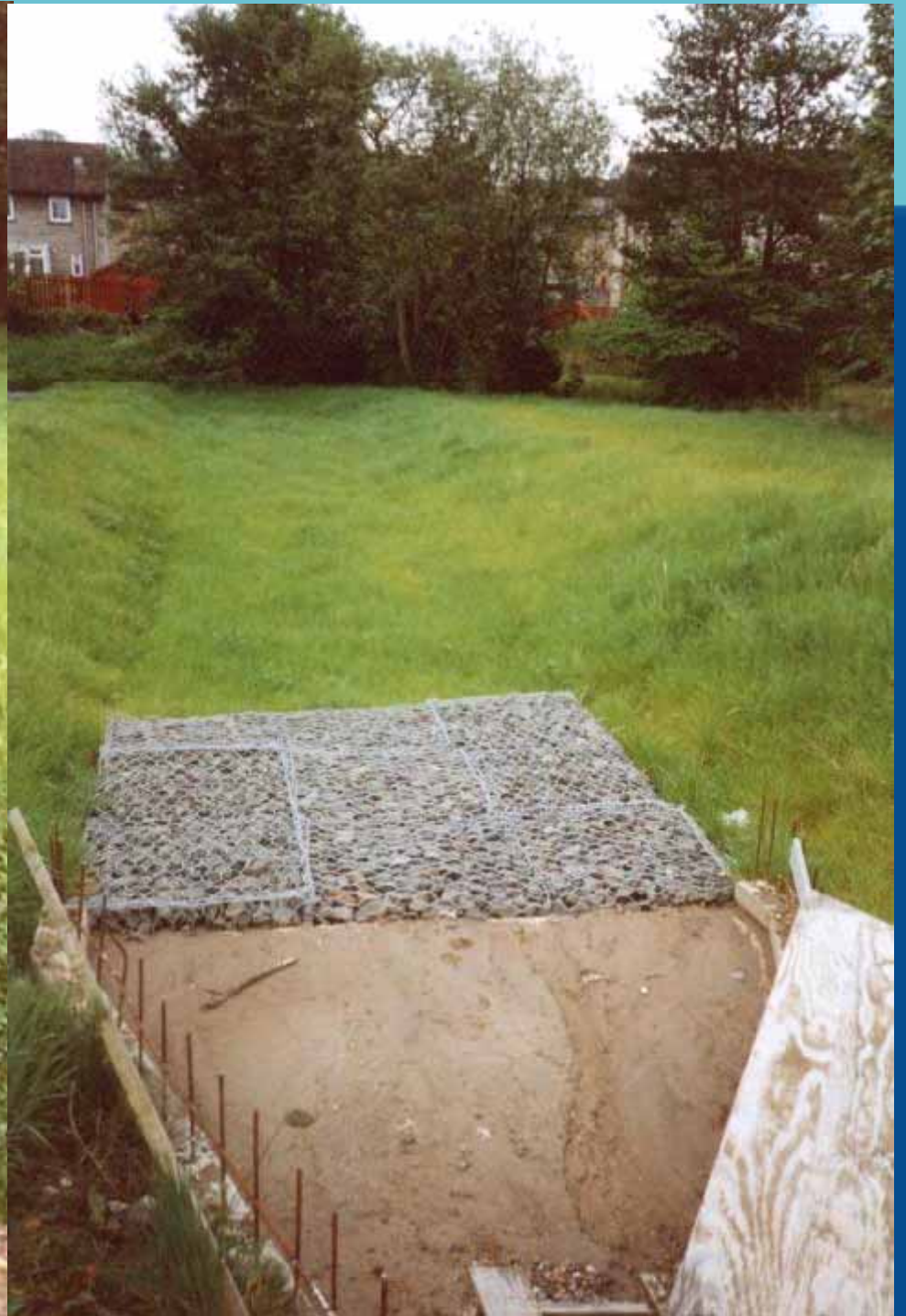
Characteristic	Constraint/Opportunity
Ownership/ Maintenance	<p>All subsurface pipework, to be adopted by the sewerage undertaker; swales, filter strips, retention pond, detention basins, and bioremediation systems to be maintained by private site management company</p> <p>Roadside swales should convey site drainage so that sources of pollution can be identified, facilitating prosecution if necessary</p> <p>Use of filter trenches was rejected due to the high density of lorry traffic and the risk of trench damage due to deterioration in performance due to lorries accidentally driving on the trench surfaces</p>
Community/ acceptability	<p>Aesthetically pleasing solutions are preferred</p>
Cost	<p>Architectural and planning constraints precluded the use of green roofs in this instance</p>
Public safety	<p>Ponds and detention basins are acceptable in public open space</p>

# The chosen SUDS devices

- Treatment swales with check dams to provide 1<sup>st</sup> level of treatment for pavement runoff from the warehouse areas and access road
- Detention basins – to attenuate roof and pavement runoff to the 1 in 10 yr event; this reduces the on-site attenuation storage volumes required. The basins also provide 2<sup>nd</sup> level treatment for the pavements of both warehouse areas
- Filter strip with a treatment swale – to provide 2 levels of treatment for the truck loading area
- Bio-retention area (and associated detention) – to provide vegetated open space for treatment and attenuation of flows from office roof and car park runoff; also provides amenity and biodiversity benefit
- Retention pond to provide tertiary treatment, and attenuation for the 1 in 100 year event
- Conventional pipework to convey flows from detention basins to the pond







# Summary

- There is rarely a right or wrong solution
- SUDS can be mixed with conventional drainage
- Don't accept bad SUDS – they are worse than conventional drainage
- They must be designed in accordance with published guidance so that they adequately protect the environment, improve habitats and minimise flood risk
- Don't be overwhelmed by the guidance – it's really quite simple – just needs common sense

# Good SUDS are marvellous

- They prevent pollution and reduce flood risk
- But as well as that, they;
  - Can create natural habitats and create a nice place to live and work
  - Attract animals and insects to the site
  - Incorporate walkways/cycleways to promote healthy living
  - Bring people together to improve community cohesion
  - Deliver urban cooling and Green & Blue urban infrastructure

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