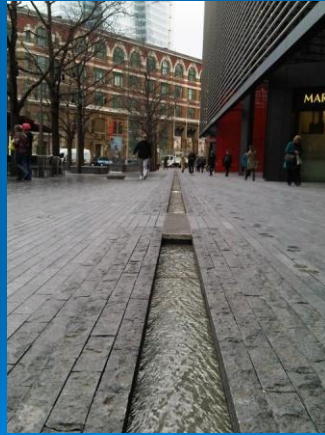


## SuDS for Highways



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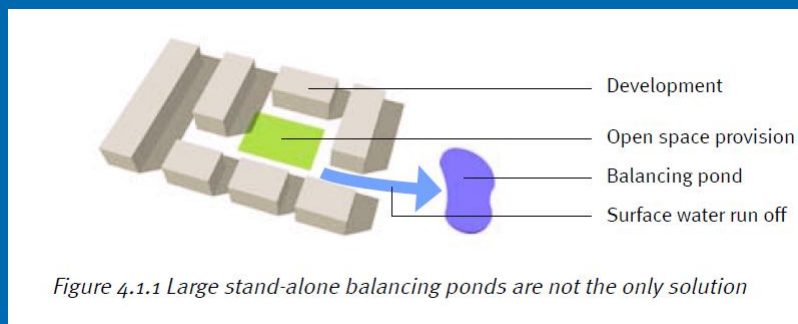
## Integration

- Hard or soft SuDS?
- The most appropriate solution for the site given the constraints
- Sometimes landscape features are best
- Sometimes hard engineered solutions are best
- Often a combination is the right solution
- Try and put either in the wrong place and it will not work

## Use of SuDS in highways

- Permeable pavements
  - Bioretention
  - Treatment channels and tree irrigation
  - Swales, basins, ponds, wetlands
  - Retrofitting
- We will hopefully dispel a few myths along the way

## This is not SuDS!



- Design like this -

## This is not SuDS!

- And you get this



*"Beauty is in the eye of the beholder"*



## End of pipe ponds/wetlands

- Are not SuDS
- Are a maintenance liability
- Have poor biodiversity
- Are not valued by the community



## A question

➤ Would you rather adopt this?



## Or this?



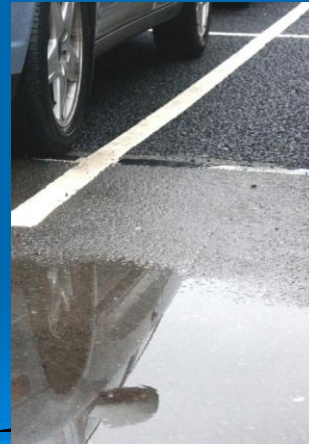
Permeable paving to  
canals – Brownfield  
site



After approx 50 to 60mm rainfall  
4 years old at time of photo – never  
been cleaned

## Permeable pavements

- Permeable pavements are an ideal SUDS solution for many sites
- Source control technique
- Can attenuate large rainfall events
- Reduce volume of runoff
- Prevent runoff for rainfall up to 5mm
- Good pollution removal capability
- Robust



## BUT!

- They are not appropriate on all parts of all sites
- They are not the solution to all flood problems
- They need to be designed and constructed correctly
- Just like any other road construction or drainage system
- They are different to normal road construction
- This is no reason not to use them
- We need to apply engineering skills





## Water flows downhill



## Durability

- If used in appropriate locations
- If designed and constructed correctly
- Permeable pavements are durable
- 11 year old permeable pavement on a landfill
- Still drains, structurally sound



# Permeable paving within 5m of buildings



## Guidance

January 2013 – Edition 6

Uniclass 1.534.1217

**permeable pavements**

GUIDE TO THE DESIGN, CONSTRUCTION AND MAINTENANCE OF CONCRETE BLOCK PERMEABLE PAVEMENTS

**Interpave**

THE PERMANENT CONCRETE PAVING AND REUSE ASSOCIATION

[www.paving.org.uk](http://www.paving.org.uk)

BS 7533-13:2009

**BSI British Standards**

**Pavements constructed with clay, natural stone or concrete pavers**

Part 13: Guide for the design of permeable pavements constructed with concrete paving blocks and flags, natural stone slabs and setts and clay pavers

raising standards worldwide™


**BSI**  
British Standards

Published Project Report  
PPR432

Creating the future of transport

**A pilot-scale trial of reservoir pavements for drainage attenuation**

B Chaddock and M Nunn



## Permeable pavements are good but!

- We do not want a world where the only SuDS is permeable pavement
- Where HGVs are turning regularly they are not so good
- Use surface green features where appropriate
- There are other solutions that are equally as good



## Bioretention - retrofit

- Ashford in Kent

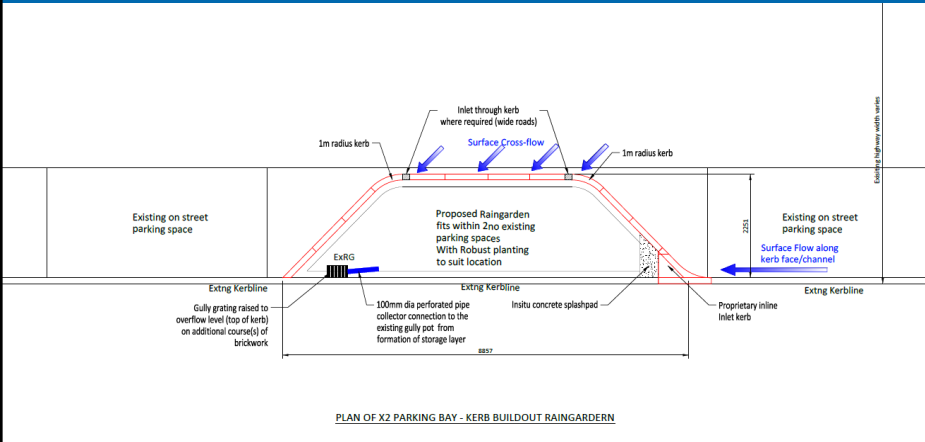




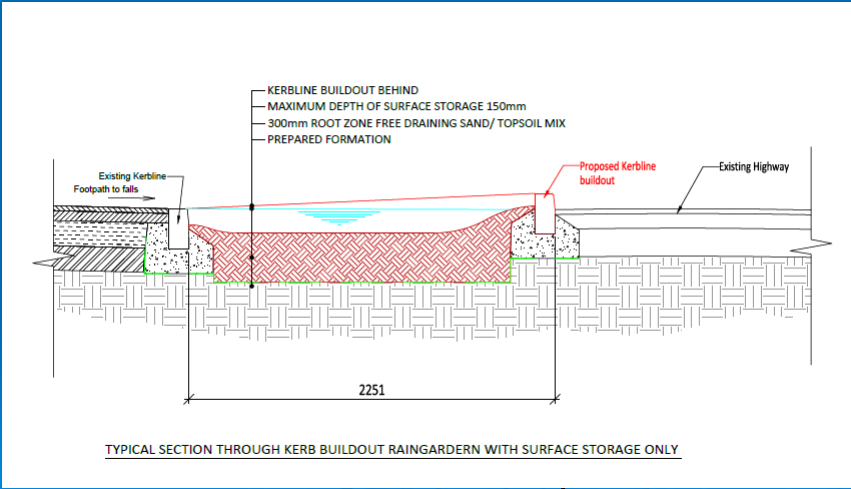
# Retrofit



# Retrofit bioretention - Lambeth



# Section



## Swales, basins, etc



J4 Services, M8, Scotland



Near Stanstead, A120



Factory, Northumberland



40mm porous and breathable resin bound gravel, tapered at interface with base of tree.

Arboslot tree grill

Flexible resin bound gravel, Refer to Drawing M4387/306, Laid in Arboslot galvanised steel trays.

Concrete footing to support Arboslot frame, to engineers detail

Permafilter Wicking hydrophilic geotextile and root barrier surround to pit

2142 x 2142 x 150mm thick Permafoam water retention system with 1416 x 1416mm formed opening at centre, Permafoam encapsulated in SEL Permafilter Wicking hydrophilic geotextile (storage capacity 0.152 cum) and to base and sides with Selflex waterproof membrane.

1416 x 1416mm opening to facilitate deeper roots if required (Permafoam units shown dotted outline)

Underground guying to BS4043

Tree pit backfilled with topsoil/compost mixture, Refer to Specification Q31 586

Tree to be planted so that the nursery mark is in line with top of bound gravel surface.

1500mm center/overflow pipe (beyond)

Root ball

Root ball

Proprietary seals to 1000 pipe

Permafoam Bio-Mat Floating Water Treatment System

SEL Permafoam storage and conveyance conduit 354 wide x 300mm deep encapsulated in Selflex membrane and Selfex R protection fleece

SEL Permafilter combined collection and silt/gravity separation system with 200mm thick grade ST3 concrete bed and 150mm thick haunch

Pavement to Engineer's specification

Varies

-- Falls

1200

1416

**TYPICAL TREE PIT IRRIGATION ARRANGEMENT ALONG SEASIDE WAY**

## Blackpool



## Treatment channels

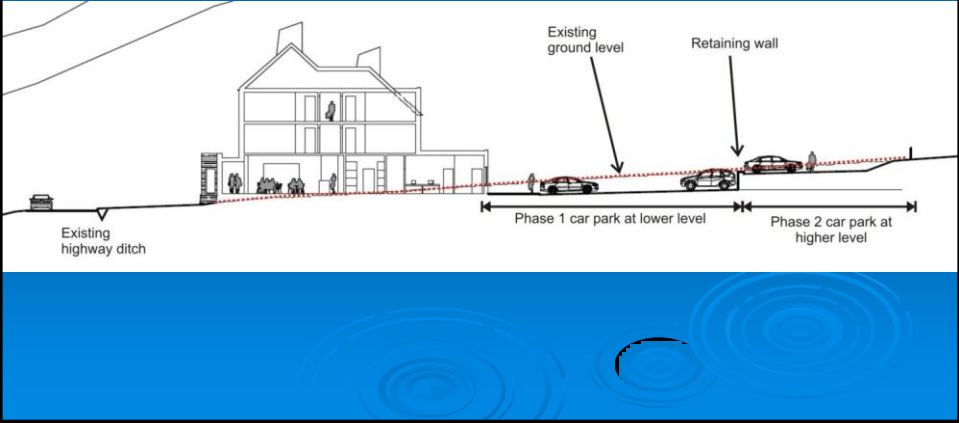
- There are source control methods that are not in the SuDS Manual
- Meet all the performance requirements especially ease of maintenance





# The most appropriate solution

➤ Will depend on site constraints



# Supervision



SURFACE WATER MANHOLE – S70  
DEPTH TO INVERT APPROX 2.95  
DESIGNED 1 X 240mm ORIFICE  
AS BUILT = 2 X 240mm ORIFICES

If you want safe and easy to maintain SuDS - avoid this



## A final thought

*“Those who say SuDS cannot be done should not interrupt the people who are doing it”*

By using an appropriate combination of solutions and careful design at the right stage SuDS can provide an affordable solution on any site

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