



Robert Bray
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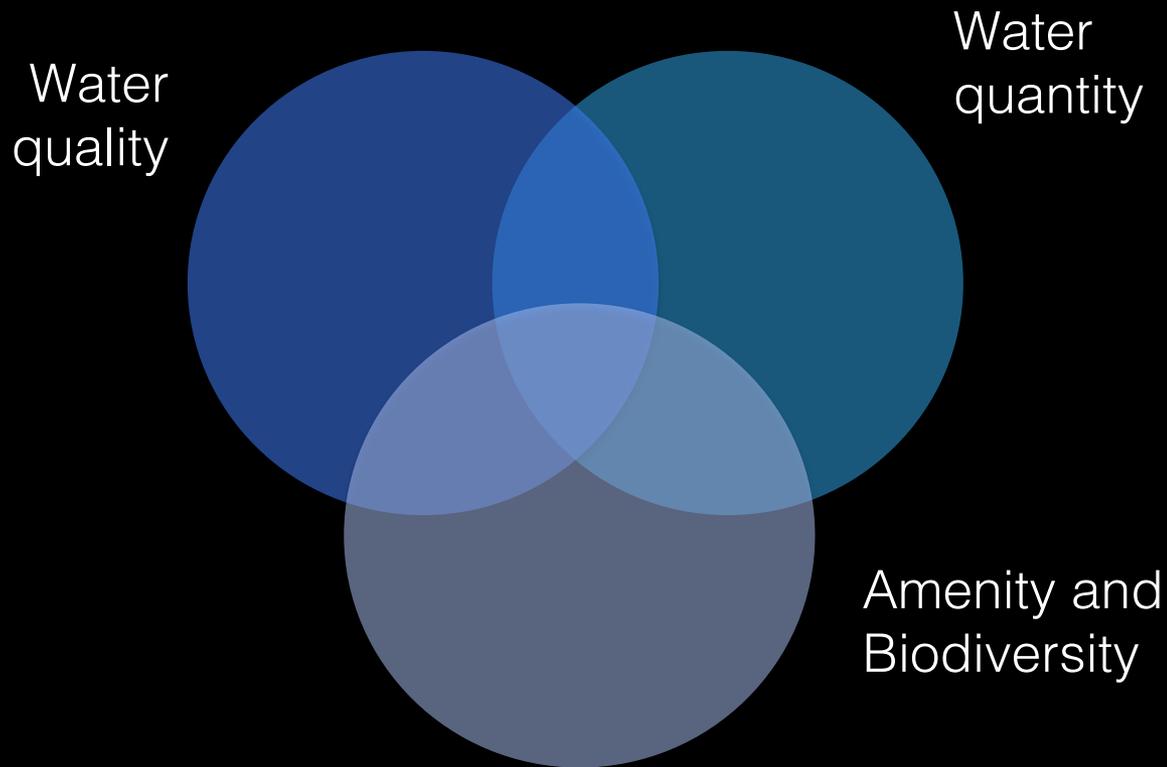
Sustainable Drainage Consultants
Landscape Architects

Engaging with SuDS for Arboricultural Benefits

Bob Bray

Robert Bray Associates

The nature of SuDS



A controlled flow of clean water to benefit society and the environment

Creating the SuDS Landscape



SuDS Features



Green Roofs

Roofs can be planted to form green roofs which soak up some rain and filter out pollutants. They can also be designed as 'brown roofs' which allow nature to colonise naturally or even 'blue roofs' which have valuable wetland habitat on them.



Permeable Pavement

Hard surfaces can be designed to allow water to pass through, rather than run off, the surface. This allows the water to be naturally treated to remove pollutants and stored in the stone beneath the paving.



Raingardens & Bioretention

These planted depressions can store water when it rains but look beautiful all year round. Bioretention features have additional gravel filtration layers to treat the extra pollutants from roads or car parks.



Filter Strips

Gently sloping grass next to a hard surface can filter out pollutants as water flows over the surface toward the next SuDS feature.



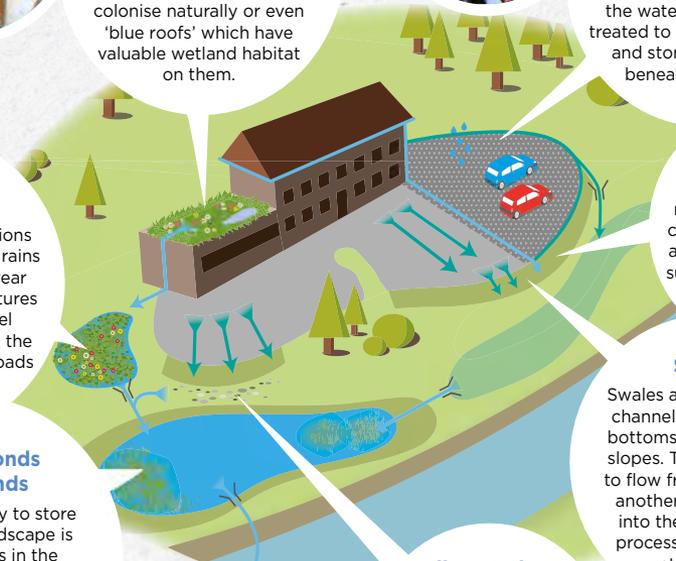
Swales

Swales are shallow grass channels with wide, flat bottoms and gentle side slopes. They allow water to flow from one place to another and let it soak into the ground in the process. They can also store water.



Basins, Ponds & Wetlands

The simplest way to store water in the landscape is to use features in the ground that mimic the natural temporary pools, ponds and wetlands that used to be so common in the English countryside.



Filter Drains

These gravel filled trenches filter out pollutants and allow the water to soak into the ground or move through the trench to the next part of the system.



Mimicking nature – highs and lows



Wet Woodland Pool



Absorbent Mosses



Seasonal Features

SuDS mimics the topographical variety found natural woodland as here in Pembrokeshire. This is unlike the featureless landscapes so common after development.

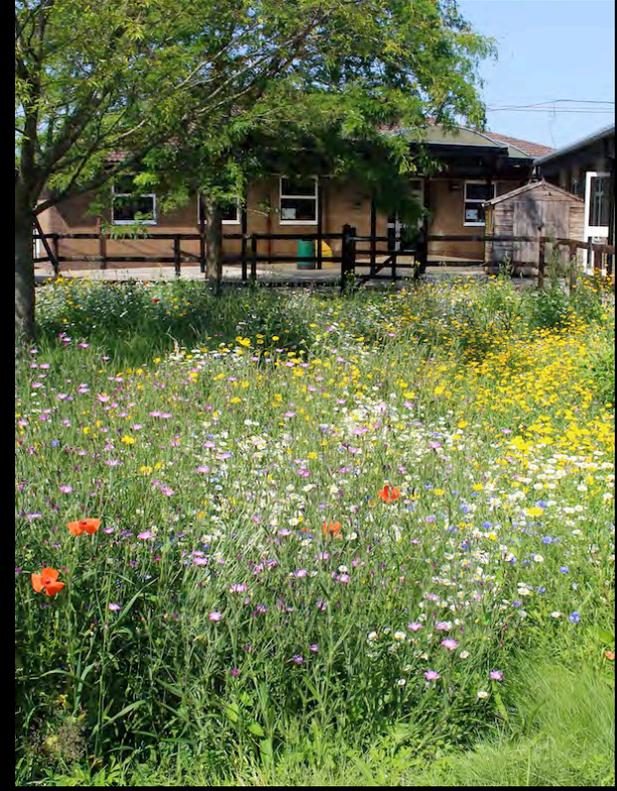
The SuDS Landscape – in development



Lamb Drove – Cambourne.
Play and Detention Basin



Red Hill Primary School –
Worcester. Swale Maze



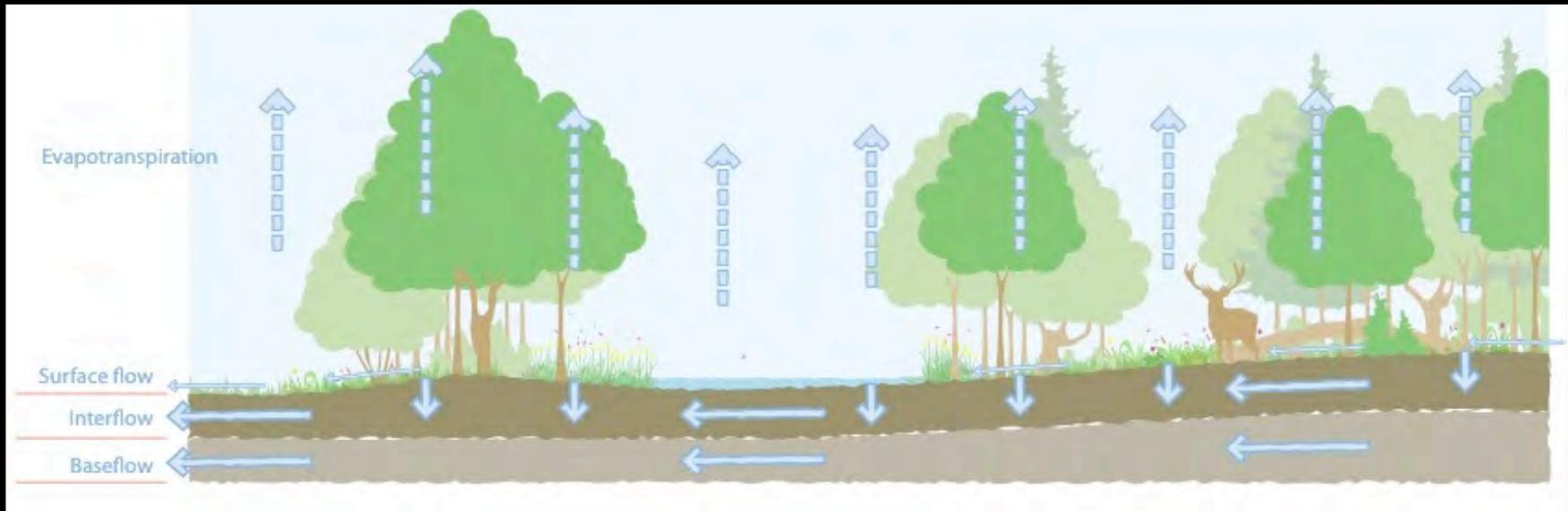
St Peters School – Gloucester
Biodiverse Raingarden

Interception Losses – the value of trees & vegetation in SuDS



Natural losses are a minimum of 5mm and everyday rainfall is 10 -15mm

- Evaporation – myriad surfaces
- Transpiration – stomata losses
- Infiltration – natural soil structure



Natural irrigation – the value of SuDS to trees



- Direct flow to trees in the SuDS landscape
- Create a natural hydrology in the catchment
- Reduce long term saturation via a ‘drain down’

Wet Woodland – a priority habitat



Hopwood M42 MSA – Construction

SuDS can have individually planted trees, or natural colonisation as here, with alders seeding along this wet low flow channel.



Low flow channel, Hopwood M42 MSA

Wet woodland corridors using SuDS and Integrated Constructed Wetlands (ICWs)



New wetland areas will bring more biodiversity.

Scrub clearance creates more attractive and biodiverse spaces.

Wetland plants will be chosen for attractiveness as well as function.

Wetland areas are attractive and bring wildlife.

A cleaner, clearer natural environment for all to enjoy.

Yellow Flag Iris is a beautiful native wetland plant.

Polluted Stream :
The stream is polluted with mis-connections and road run-off. This is evident in its smell, colour, the presence of Sewage Fungus and has been confirmed by our laboratory testing.

Natural Treatment :
Weirs will be used to divert the day to day low flow through new wetland areas which will 'treat' the water to remove pollutants using natural biological and filtration processes. The wetland areas will be planted with aquatic and marginal planting and species will be selected in order to bring the most wildlife and colourful flowers.

Woodland Management :
Some tree clearance and crown thinning will be required in order to allow enough daylight to reach the wetland plants, but nothing that wouldn't normally be expected as routine biodiverse woodland management. The additional sunlight will allow more plants and wildlife to flourish.

Maintenance Access :
Routes will be cleared through the woodland to allow routine maintenance such as de-silting, checking weirs, water quality testing and wetland inspection. These routes will also allow enjoyment of the new wetlands without the need for formal paths.

Thames21 SuDS projects

Boxer's Lake : SuDS Park Concept Proposals 1of2

- existing watercourse
- proposed weir diversion
- proposed low flow routes through wetland treatment areas
- proposed wetland treatment areas
- proposed maintenance access bridge
- proposed treatment channel
- road gully diversions

Display of information on how the stream is being cleaned up will be chosen with input from local residents. Signage boards or inscribed pavements are just two possible ideas

Scrub clearance and selective thinning improves woodland biodiversity and appearance

Cleared grass pathways for maintenance access

Final wetland treatment area to be protected from grazing water fowl

Boxer's Lake

Existing bridge

0 1 2 5 10 25m

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Glenbrook – Concept Proposals that show a scheme designed to clean a storm drain outfall at source

Forest and Glade Landscapes

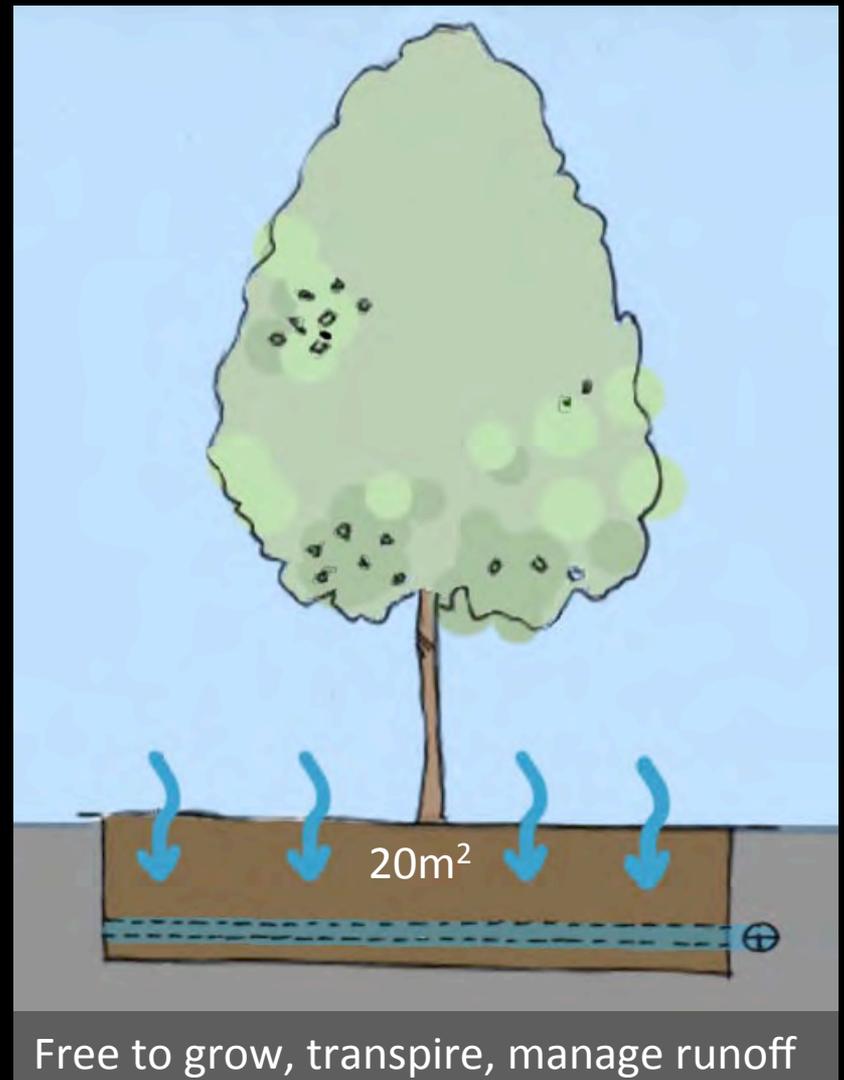
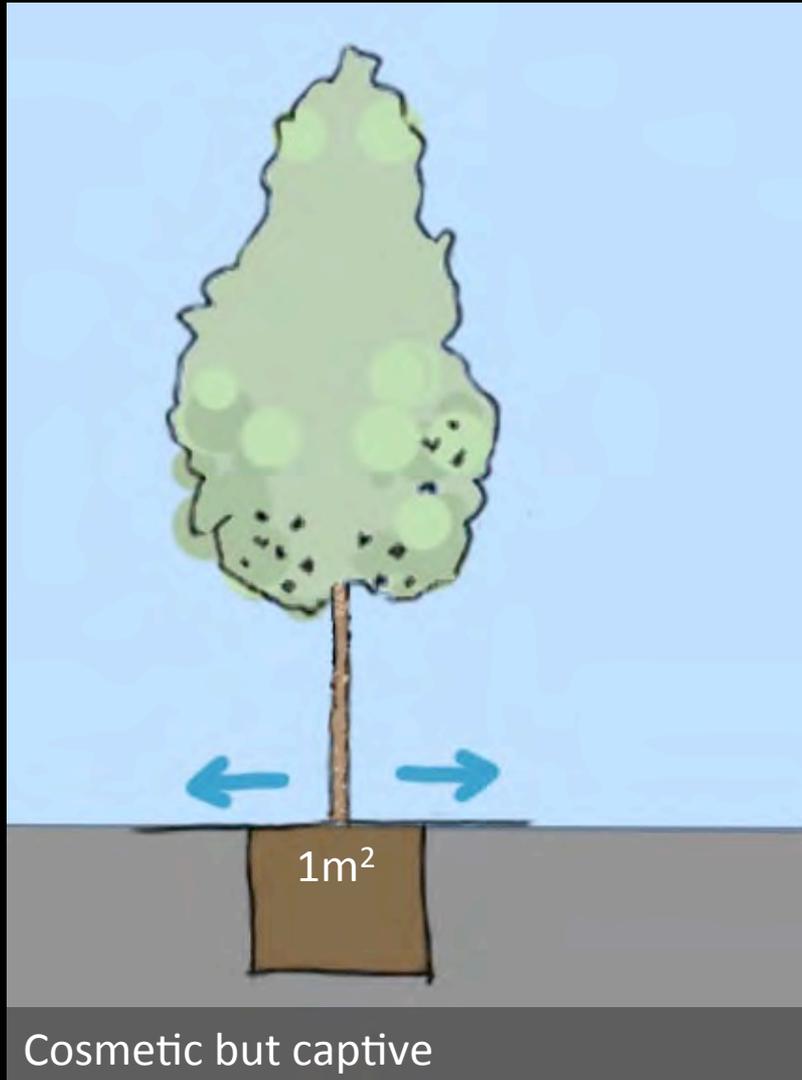


Wetland Pond, Glenbrook



Final Wetland Glade, Glenbrook

The Urban Tree and SuDS



The Urban Tree to Manage Rainfall



Goldhawk Road, Shepherds Bush

The Urban Tree – the SuDS element



Option 1
Kerb Gaps

Greenleaf 1800x1800mm Castle paved tree grille on frame secured to concrete foundations. Paving to match adjacent paving.

2no. 100mm wide breaks in kerb line with in-fill piece to match laid flush with road surface and with 20mm fall into tree pit.

Option 2
Steel Bridge Pieces

2no. 300mm wide breaks in kerb line with 316 grade stainless steel bridge piece to continue kerb line incorporating drainage into tree pit.

Option 3
Slotted Kerbs

2no. 800mm wide granite kerb units with 75x300mm slots cut through incorporating 20mm fall into tree pit. To be laid with aperture flush to road surface.

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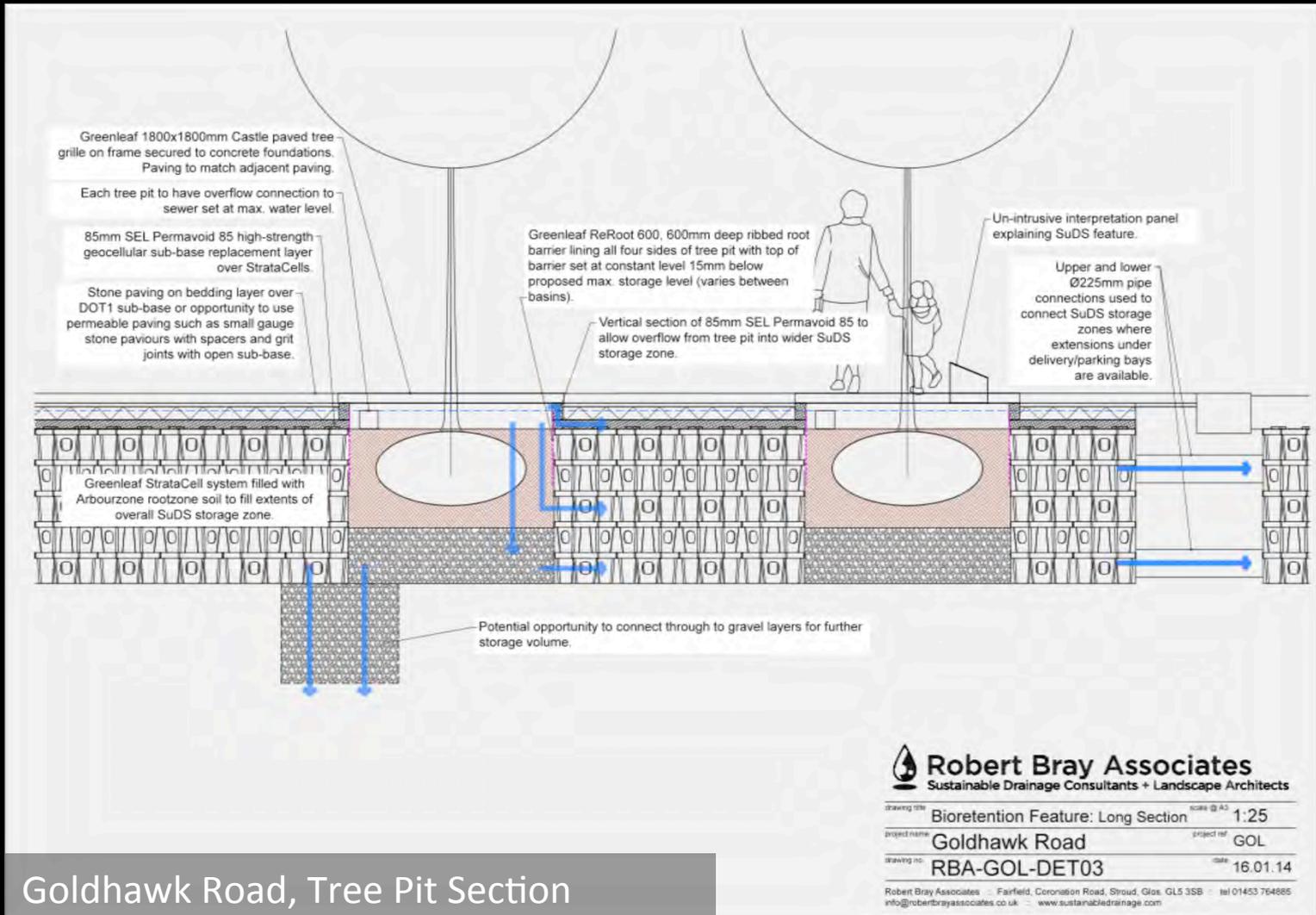
drawing title	Kerb Inlet Options	scale @ A3	1:20
project name	Goldhawk Road	project ref	GOL
drawing no	RBA-GOL-DET05	date	16.01.14

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- Effective entry of runoff
- Spreading the flow
- ‘Engineered’ topsoil
- Structural strength
- A drainage layer

Goldhawk Road, Inlet Options

The Urban Tree – the SuDS element



Goldhawk Road, Tree Pit Section

Tree selection for SuDS



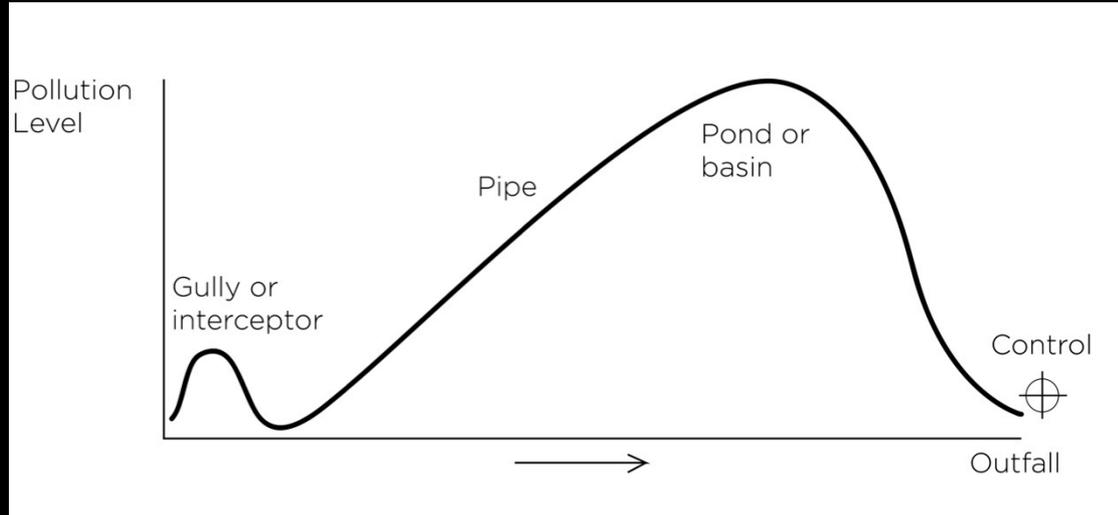
Issues

- Tree size
- Shade characteristics
- Rate of leaf decay
- Risk of blockage by leaves
- Maintenance issues

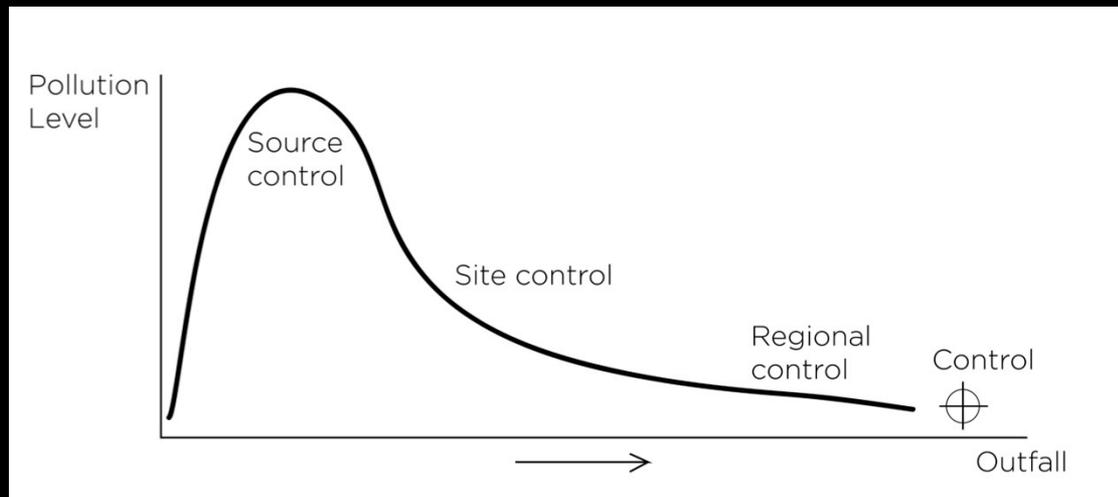
The pollution issue – source control and treatment



Conventional Pollution Control



SuDS Pollution Control



Pollution breakdown and impact



- Heavy metal accumulation
- Light oil treatment
- Heavy oil accumulation and treatment
- Herbicide and pesticide
- Nitrates and phosphate
- Spillages
- Litter

Green Streets, Portland, Oregon

Passive management – mimicking nature



- Habitat management
- Site maintenance - not SuDS maintenance
- Silt management
- Waste management
- Inlets, outlets and control structures

Birchen Coppice Swale

Case Study – Australia Road



View onto principal basin

Case Study – Australia Road



Corten steel supports

Case Study – Australia Road



Bridget Joyce Square

Australia Road, W12

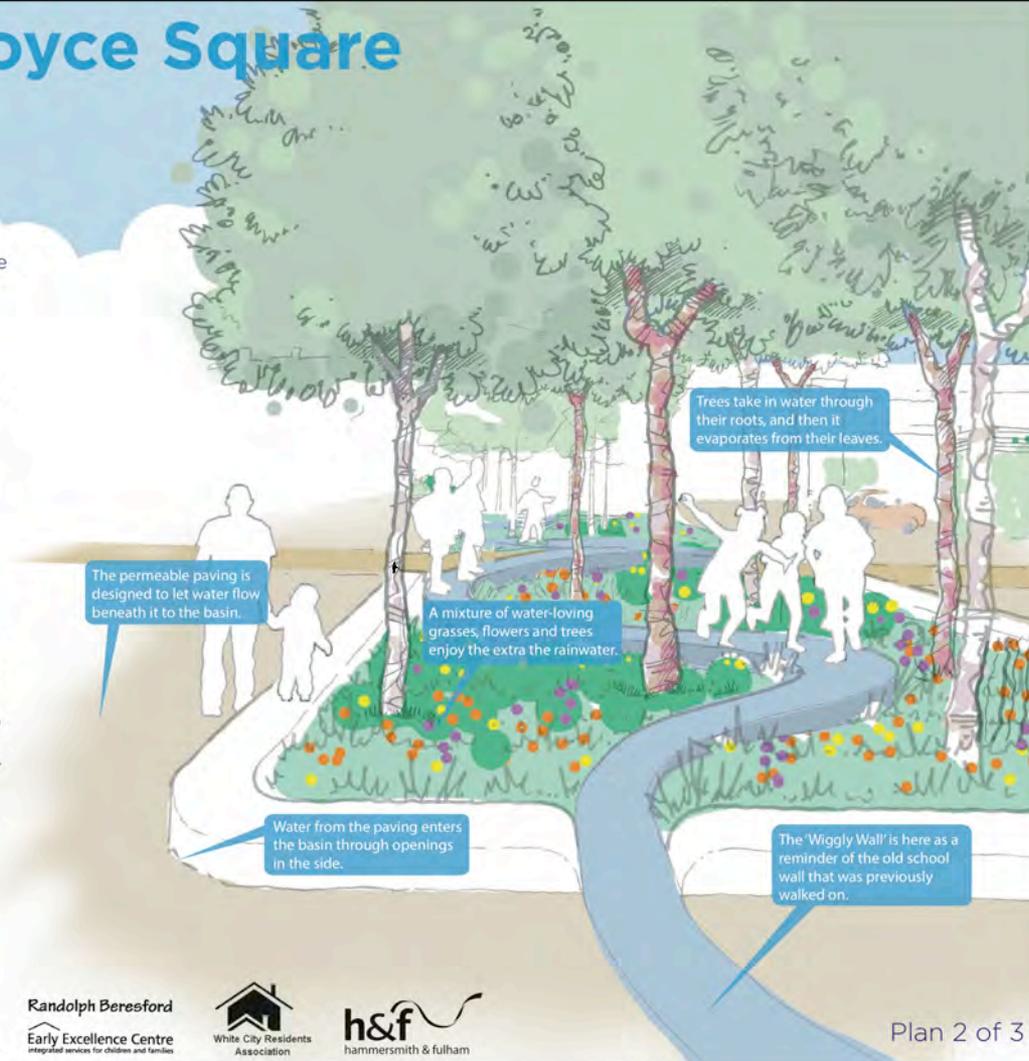
The Main Basin

Whenever it rains, rainwater runs into gaps in the permeable paving, from where it flows directly into the basin. Likewise, rainwater from the school roof can enter the basin by way of the downpipes and channels.

In the event of a big storm, a lot of rainwater will enter the basin, possibly filling it. The soil could become too wet to absorb any more rainwater, in which case the basin will empty within 48 hours, thanks to a slow-release pipe system.

Rainwater passing over our streets can pick up a lot of pollution. The same pollutants are removed from the water as it soaks into the soil, which can make a big difference to the water quality that eventually enters our rivers. Holding rainwater here will also help to prevent London's sewers from overflowing, and reduce local flooding.

The plants and trees will also get more water this way, to provide habitat value for birds and other wildlife.



SUPPORTED BY
MAYOR OF LONDON



Randolph Beresford
Early Excellence Centre
integrated services for children and families



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Plan 2 of 3



Thank you

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