

A stylized, light-colored illustration of a plant with several stems, leaves, and small round fruits, positioned on the left side of the slide.

Retrofitting SuDS

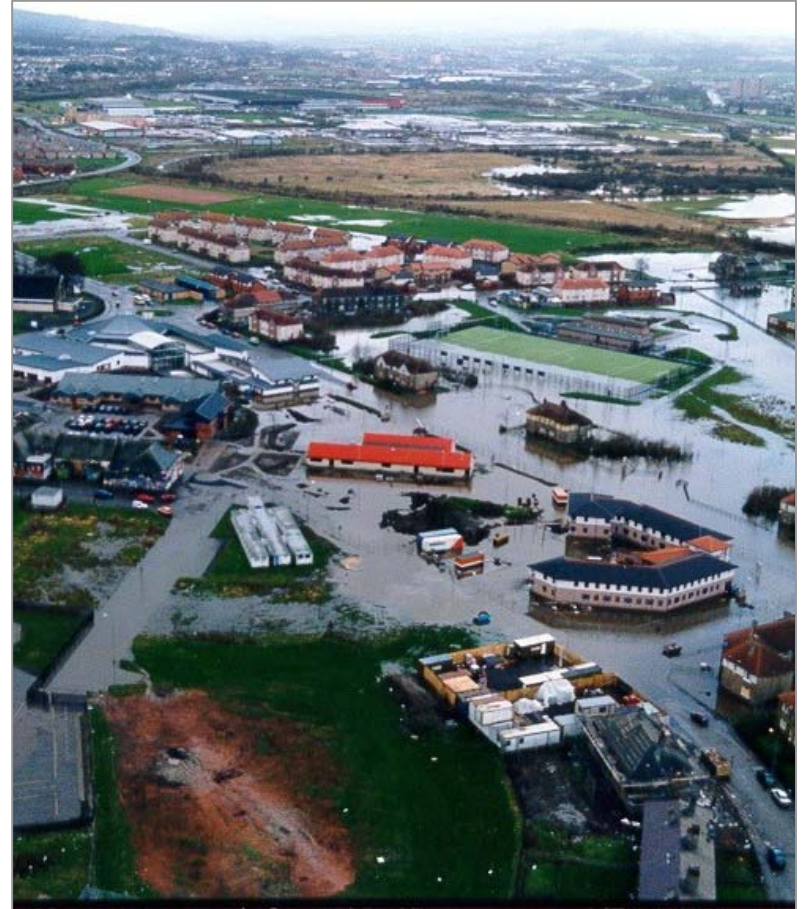
...building resilience in urban areas

CIRIA
November 2015

illmanYOUNG™

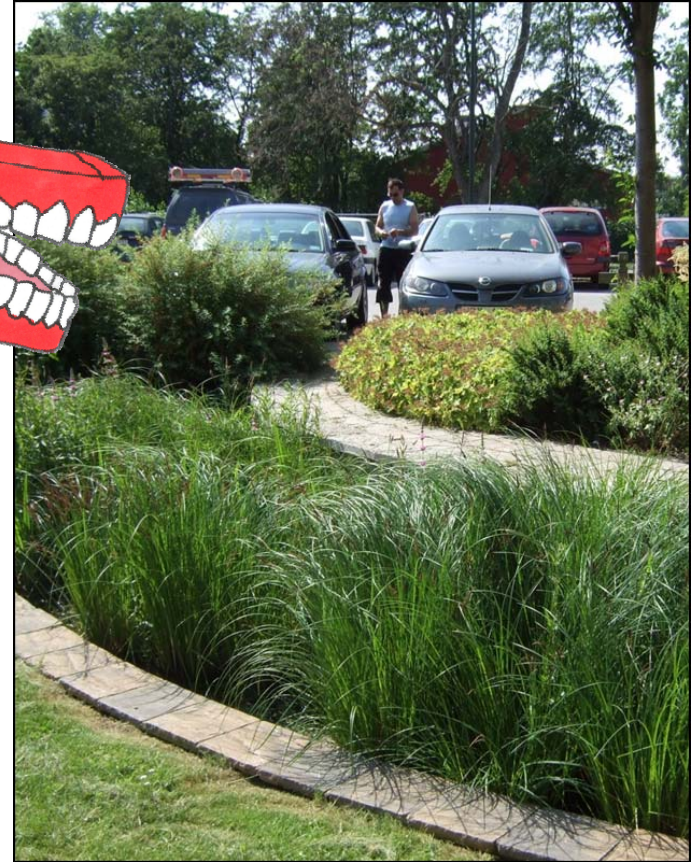
Why is it going to get worse?

- Climate change bringing more extreme rainfall events and storm surges
- Towns and cities historically located on rivers
- Urban creep and upstream development
- Combined sewers have limited capacity
- Large number of homes and businesses currently at risk
- Estimated cost flood damage - potentially £10's-100's millions per annum depending on level of protection provided
- **Requires a comprehensive, long-term approach**



How retrofitting can help

- Incremental but immediate effect
- Multiple interventions inherently build greater resilience
- Flexible application and value for money
- Develop a mindset that considers SuDS first
- Consider its application everywhere
- Integrate with other planned works
- Aligns with other objectives around public health, GI, biodiversity, water quality and place-making
- **NEED TO DO..... *all the time* everywhere!**



Portland – 56,000 downspouts

Philadelphia – 25 year ongoing plan

How's retrofitting different?

- Different approach to new build SuDS
- Different site constraints – services in particular
- Design criteria decided on site by site basis
- Brownfield site redevelopment
- Engineering (and bioengineering) likely to be a key aspect
- Requires individual approach – frequently linear
- **Be opportunistic**
- ***But – can be expensive***
 - so align with other outcomes



Work in partnership

- Seek partnership funding with all stakeholders
- Consider – local authorities, water companies, EA, LEPs, BIDs, local commercial organisations, third sector organisations, radio and TV
- Its not just cash!
- You need community champions
- Community engagement is time consumingexpensive, **but essential**
- Seek genuine partnerships... and be honest

Working in Partnership

Cheltenham Borough Homes
Putting our customers at the heart of what we do.

CHELTEMHAM
BOROUGH COUNCIL

Environment
Agency

Can your green spaces work better for you and the environment?
A chance to have your say

What is the problem?


There aren't many places for wildlife to live


Surface water flooding due to increase in tarmac and concrete drives


The fish and wildlife in Wymans brook and Pittville Lake suffer from silt and pollution

Things that could be done to help


Plant wildflowers, trees and gently recontour or landscape some areas


Install rain gardens which hold water back when it rains, and help reduce flood risk


Filter water through the ground, in shallow depressions (eg swales) to clean it up

Come along to the drop in session to find out more

What you can do and where

FLAT ROOFED BUILDING

- Consider when roofs need repair or renewal
- Green, blue or brown roofs
 - weight loading determines type of green roof



ANY BUILDING

- Rainwater harvesting for internal use
- Water butts or tanks for external re-use
 - overflows back into existing system
 - can be done at any time

What you can do and where

INDIVIDUAL HOUSES

- Repave drives with permeable paving
 - Disconnect downpipes
 - Create rain gardens
 - Green roofs on sheds
 - Water butts
- any loss of parking a key issue



FLATS AND APARTMENTS

- Disconnect downpipes and
- Redesign the communal space
- Green roofs to garages, cycle sheds or bin stores or disconnect their downpipes

What you can do and where

CAR PARKS

- Repave sections with permeable paving and potentially connect to rain gardens
- Reconfigure to introduce stormwater planters
- Collect rain water for recycling on site
 - any loss of parking a key issue



SCHOOL GROUNDS

- Redesign for creative play/use
- 'Spare' green space invariably available
- Soft SuDS especially align with the curriculum
 - be aware of BB98 requirements

What you can do and where

TRANSPORT AND HIGHWAYS

- Resurfacing works an ideal opportunity
- Road widening/narrowing schemes
- Traffic management schemes
- Tram routes or light rail
- Parking schemes
- Pedestrianisation
- New cycle routes
- Street tree planters

DOMESTIC STREETS

- Integrate with shared surface schemes
- Consider parking issues
- Tree pit planters very useful
- Create pocket parks in left-over space
 - beware the bin men!



What you can do and where

PARKS AND COUNCIL OWNED LAND

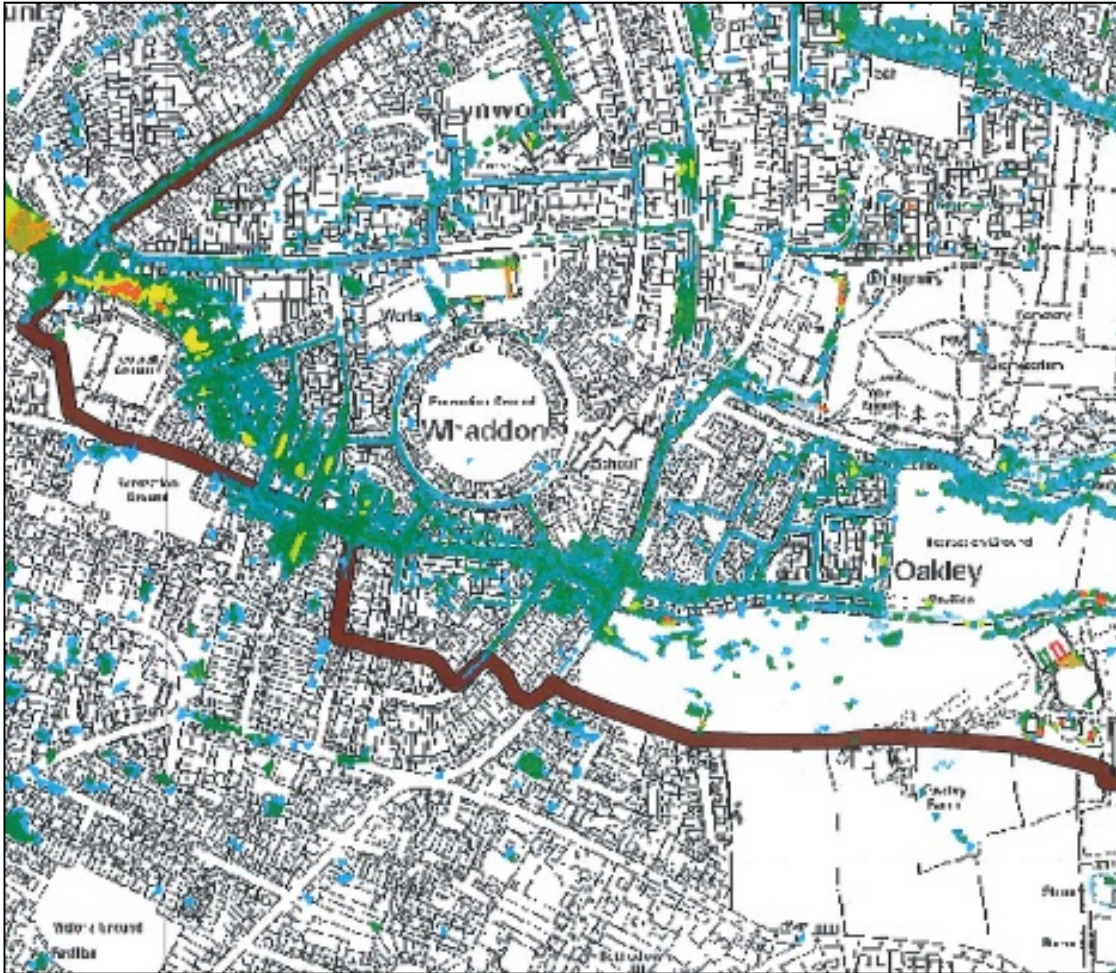
- Parks allow larger scale features
- Can be integrated with play or biodiversity
- Create pocket parks
- Enhance 'left over' green space
- Consider verges for shallow swales
- Roundabouts are a great opportunity!



URBAN DESIGN

- Town centre regeneration
- Pedestrianisation schemes
- Commercial projects
- Enhance 'left over' urban space
- 'Meanwhile' projects

Priors Farm, Oakley – the problem



- Hatherley Brook overflowing
- Overland flows from hill
- Flooding of roads and houses generally
- Surcharging sewers downstream



Priors Farm, Oakley

Where can we do it?

Landscape some green spaces – What do you think?

public open space near Somme Road?



public open space near Salamanca Road?

other shared green spaces?

private gardens?

Some areas can be mown less often and be planted with wildflowers



Gently reshape some areas



Some species are suited to the bottom of swales or basins



Rain garden

Planting Wildflowers

http://www.jonathanbuckley.com/Galleries/PORTFOLIO2011/2011GreatDiver/index_4.htm



Retrofitting SuDS in Cheltenham



Design issues

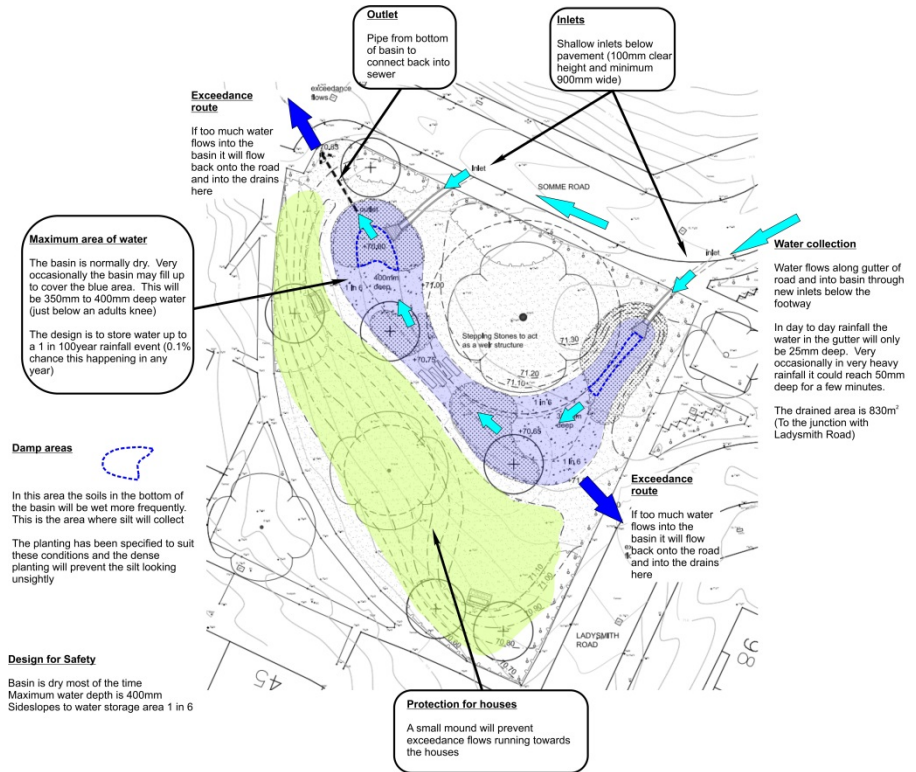
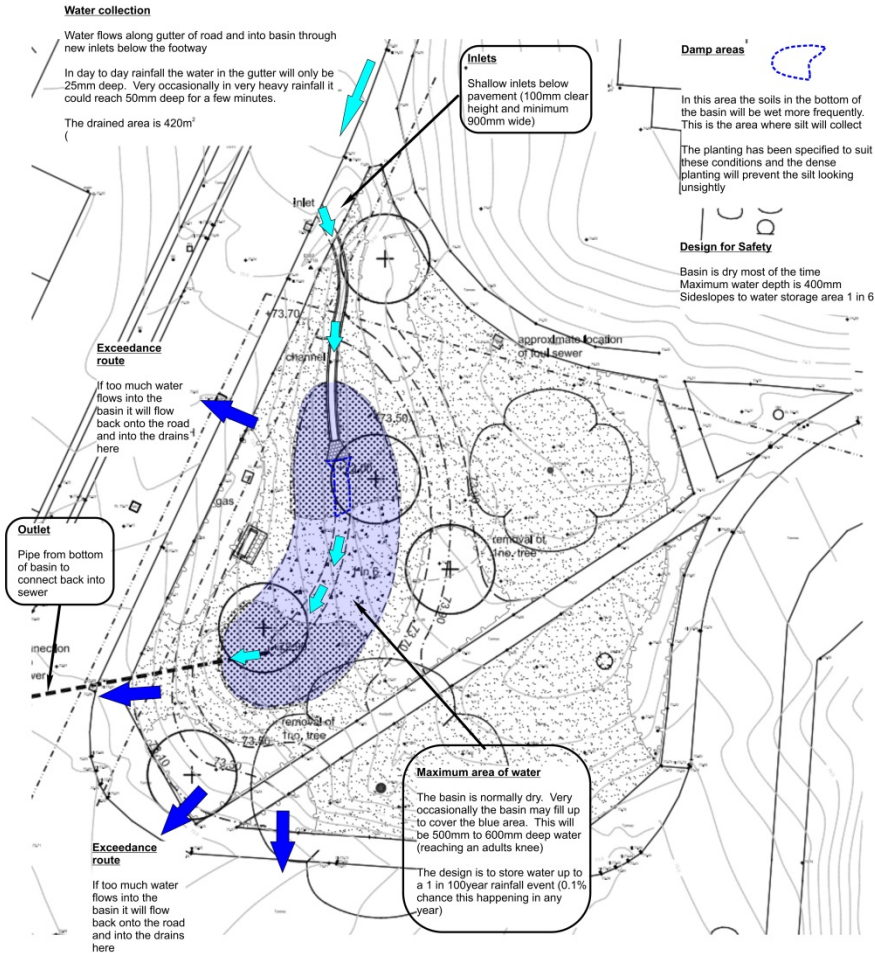
- **RAINGARDENS**

- Raingardens to take 1 in 100 storm event
- Limited infiltration as clay soils
- Stormwater diverted through raingarden with connection back to surface water system
- Overflow system
- Constructed soil
- Owners participated in design of rain garden and plant choices

- **ATTENUATION BASINS**

- Sized to take all road water to 1 in 100 storm event
- Gullies stopped up and inlet structures constructed
- Sett paving/rocks to break velocity
- Banks graded to 1 in 5 to allow gang mowing
- Simple flow control structure and reconnection back to surface water system
- Revitalised POS with planting and seating

Design with engineering



Raingardens



Rain Gardens for Oakley



Rain Gardens for your local area

- Existing pipes cannot cope with amount of water from roofs and tarmac
- Environment Agency would like to build rain gardens in your local area to improve the situation
- Your house is suitable for a rain garden because you have a down pipe and your front garden is either flat or slopes away from your house

What are Rain Gardens?

- Similar to regular garden beds
- Shallow depression in the ground or raised bed
- Designed to capture rain water from your roof
- Your downpipe would be connected into a shallow channel or directed straight into a rain garden
- Layers of sandy soil help to slow down water entering the drainage system

Rain garden will be attractively planted

- Planted with plants that don't mind getting their 'feet wet'
- Ornamental grasses like sedges, snowy woodrush and chinese silver grass
- Colourful herbaceous planting like Rudbeckia, Crocosmia and Aster
- Irises

Look at design options overleaf



Attractive garden features



Ornamental Grasses



Irises

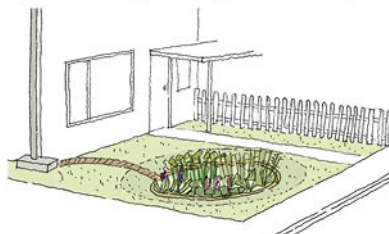


Rain Gardens for Oakley

What could they look like in my garden?

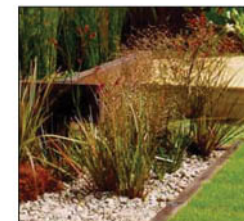
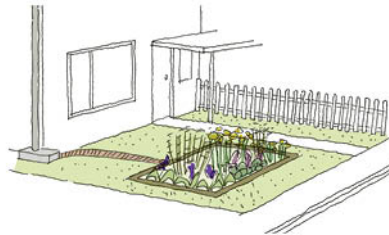
The type of rain garden suitable for you, depends on whether your garden is flat or sloping.

Option: Shallow planted depression for flat garden



Attractively planted shallow depression

Option: Sunken Timber Planter for flat garden



Sunken Timber Planter

Option: Raised Timber Planter for sloping garden



Raised Timber Planter

Raingardens



Planting for your Rain Garden

We have created three colour schemes for you to choose from and a variety of plant choices. Please follow the steps below to design the planting for your rain garden.

Step 1: Choose a colour scheme out of three options; red/yellow mix, blue mix or pastel coloured mix. Then go to the relevant mix.

Red/Yellow Planting Mix

Step 2: Choose one species of the following evergreen shrubs to be planted individually.



Spindle,
Eurokynus japonicus 'Oratus
'Aulus', evergreen, max.
height 1.5m



Japanese spirea
Spiraea japonica 'Anthony
Waters', evergreen, max height 1.5m



Cherry Blossom
Prunus laurocerasus 'Zabeliana'
evergreen, max height 1m

Step 3: Choose 2 species of the ornamental grasses and ferns to be planted in groups of 2-3.



Bowles' Golden Sedge
Carex elata 'Aurea'
max. height 1m



Great Woodrush
Luzula sylvatica,
max. 0.5m



Soft Shield Fern
Polystichum setiferum
evergreen, max. 1.2m

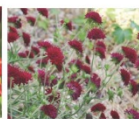
Step 4: Choose one species of the herbaceous plant to be planted in groups of 2-3.



Coneflower 'Goldsturm'
Rudbeckia fulgida var.
sulivanii 'Goldsturm'
max. height 1m



Sneezeweed
Helenium
'Moerheim Beauty', max. 1m



Knautia
Knautia macedonica
max. height 0.9m

Step 5: Add 2 species of ground cover planting to be planted in groups of 2-5 along the edges



Lenten Rose
Helleborus orientalis
evergreen, max. height 0.5m



Rock Crane's Bill
Geranium macrorrhizum
'White-ness', semi-evergreen,
max. height 0.3m



Lady's Mantle
Alchemilla mollis
evergreen, max. height 0.5m



Planting for your Rain Garden

Blue/Purple Planting Mix

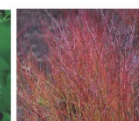
Step 2: Choose one species of the following evergreen shrubs to be planted individually.



Cherry Blossom
Prunus laurocerasus 'Zabeliana'
evergreen, max height 1m



Japanese Spirea
Spiraea japonica 'Little Princess'
evergreen, max height 0.8m



Kelseys Dwarf Dogwood
Cornus sericea 'Kelsey'
evergreen, max height 1.2m

Step 3: Choose 2 species of the ornamental grasses and ferns to be planted in groups of 2-3.



Tufted Hairgrass
Deschampsia caespitosa,
max. height 0.7m



Great Woodrush
Luzula sylvatica,
max. 0.5m



Soft Shield Fern
Polystichum setiferum
evergreen, max. 1.2m

Step 4: Choose one species of the herbaceous plant to be planted in groups of 2-3.



New England Aster
Aster novae-anglicae 'Violetta'
max. height 1.5m



Siberian Iris
Iris sibirica 'Shirley Pope'
max. height 0.85m



Globe Thistle
Echinops ritro
max. height 0.9m

Step 5: Add 2 species of ground cover planting to be planted in groups of 2-5 along the edges



Elephant's Ears
Begonia 'Bessingham White'
evergreen, max. height 0.45m

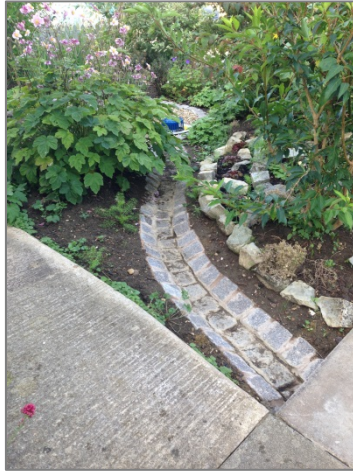


Geranium 'Johnson's Blue'
Geranium 'Johnson's Blue'
semi-evergreen, max. height
0.5m

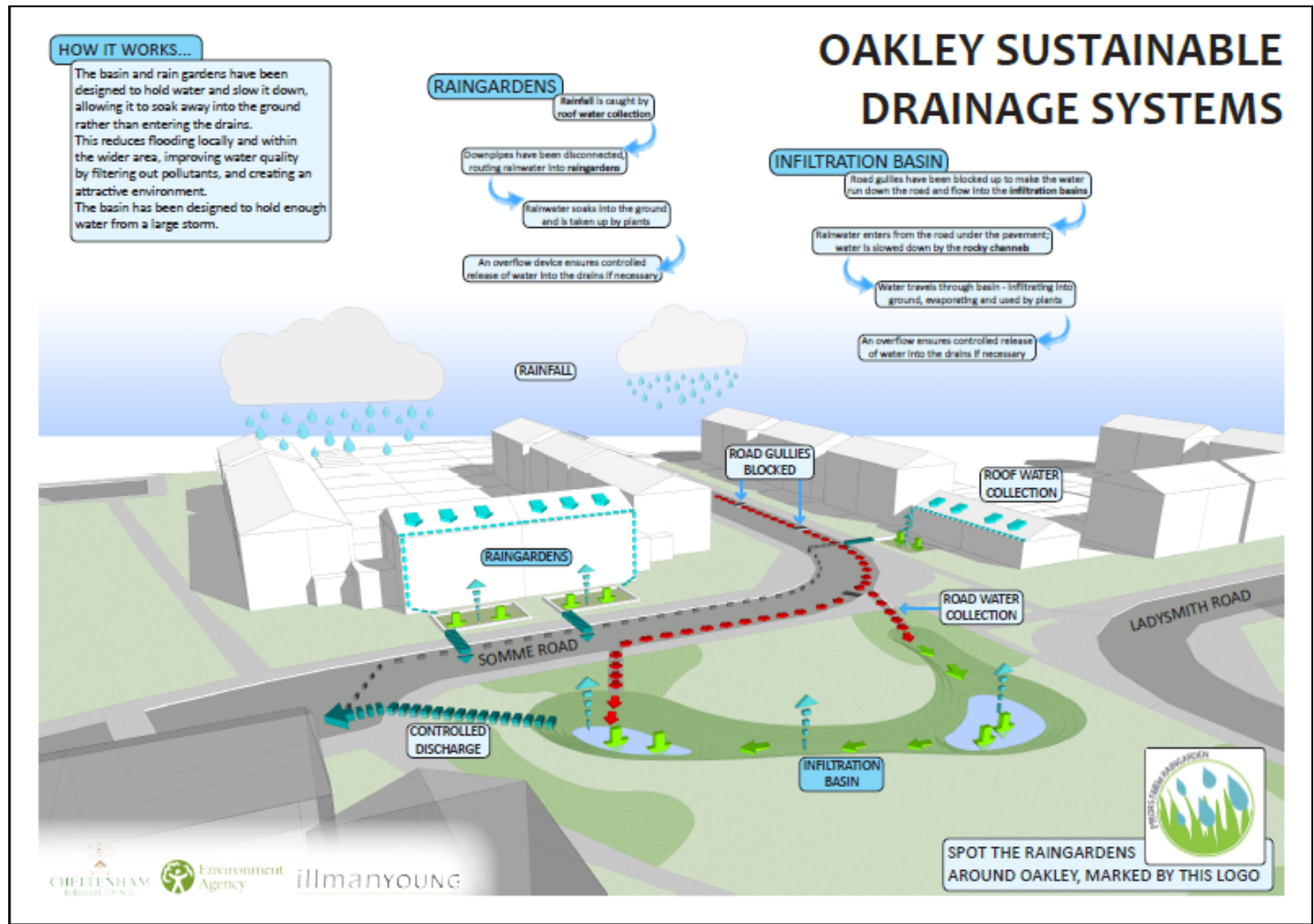


Heuchera 'Purple Palace'
Heuchera villosa 'Purple Palace'
evergreen, max. height 0.5m

Raingardens



Promoting understanding and SuDS awareness



Current schemes – original condition



Current schemes – one of proposals



Current schemes



Current schemes



Current schemes – Barbican



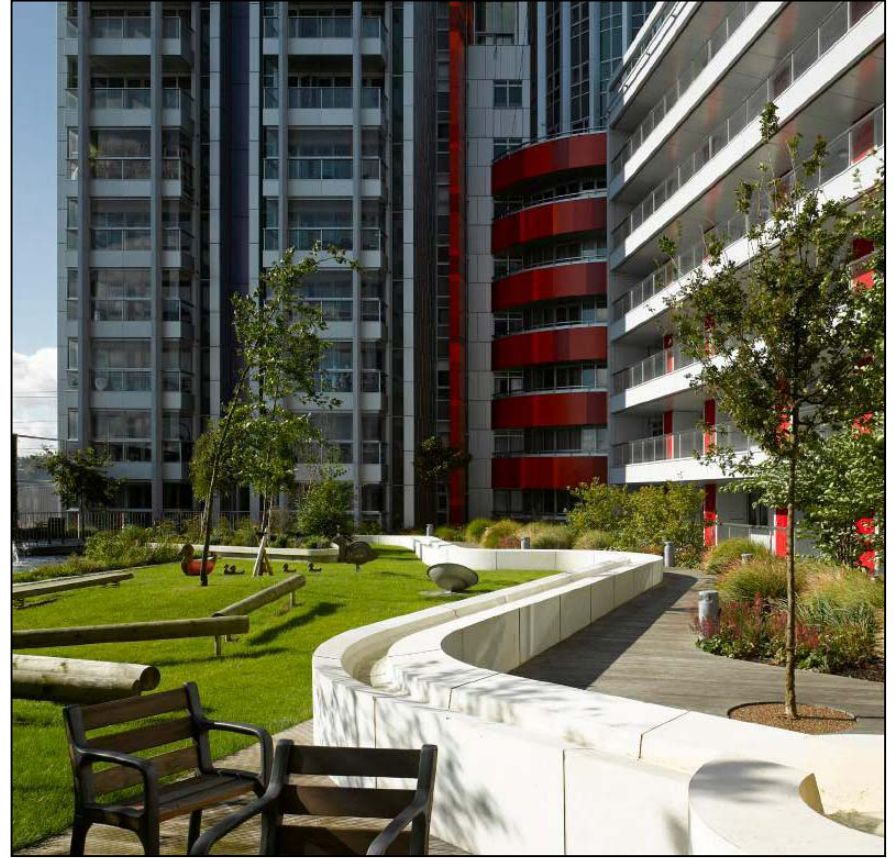
Current schemes – Barbican



Current schemes – Rathbone Market



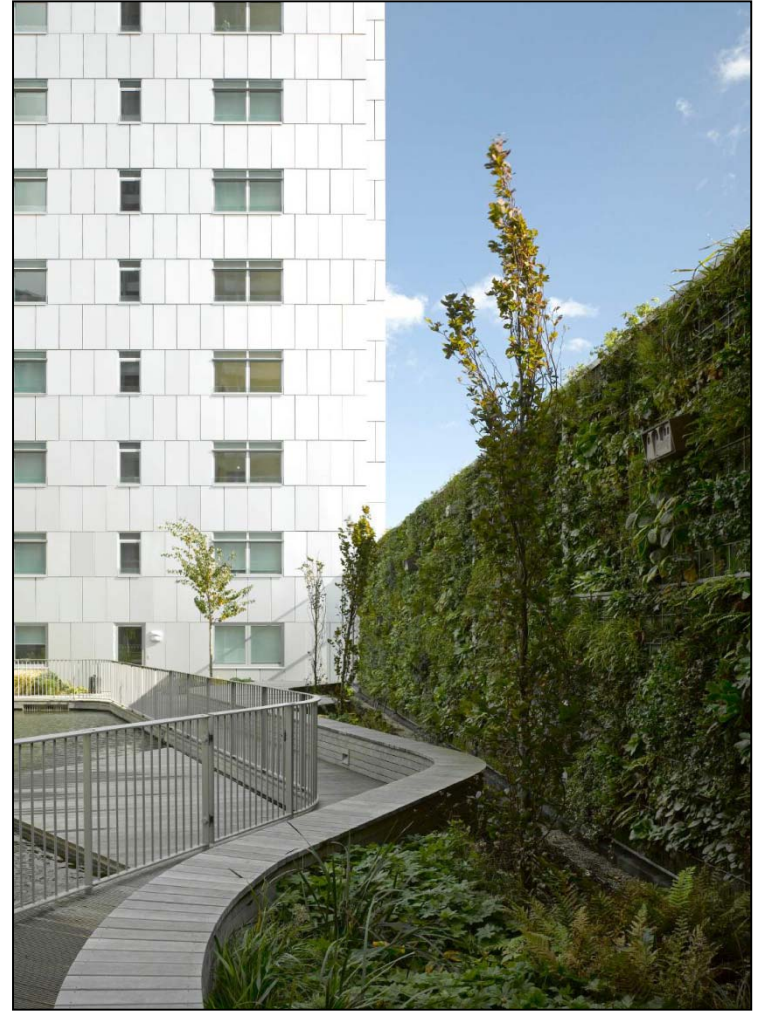
Current schemes – Rathbone Market



Current schemes – Rathbone Market



Current schemes – Rathbone Market



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Chris Churchman Associates



...and remember...

We need to nibble...



YouTube – ‘Let’s get Nibbling!’

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Any questions?



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