Retrofitting SuDS and…..

…Oakley – a case study

SGIF
September 2015

illmanYOUNG

Illman Young Landscape Design Ltd

- A landscape and environmental practice specialising in:
  - Masterplanning and site design
  - Landscape appraisals and environmental assessments
  - Project planning through to site inspection
- Our ambition:

  To create innovative, practical and sustainable landscapes

SuDS Research

- Illman Young in partnership with the University of Gloucestershire
- Completed 2 year research project
- Research into the design of SuDS that are functional, attractive and ecologically sound
- Investigation of existing schemes within the UK and abroad
- Development of Good Practice Guidelines and SuDS Training
- SuDS Pilot projects
- Ongoing relationship with university

The problem

- Increased development creates extensive hard surfaces
- Sealing of ground prevents rain water from percolating into the soil
- Up to 80% of total rainfall turns into runoff within developed sites
- Larger amounts of water travel faster over hard surfaces
- Localised flooding
- Runoff traditionally collected in pipes
- Directed as quickly as possible into the nearest watercourse
- Problems of flooding and pollution

Flooding in Scotland – July 2015

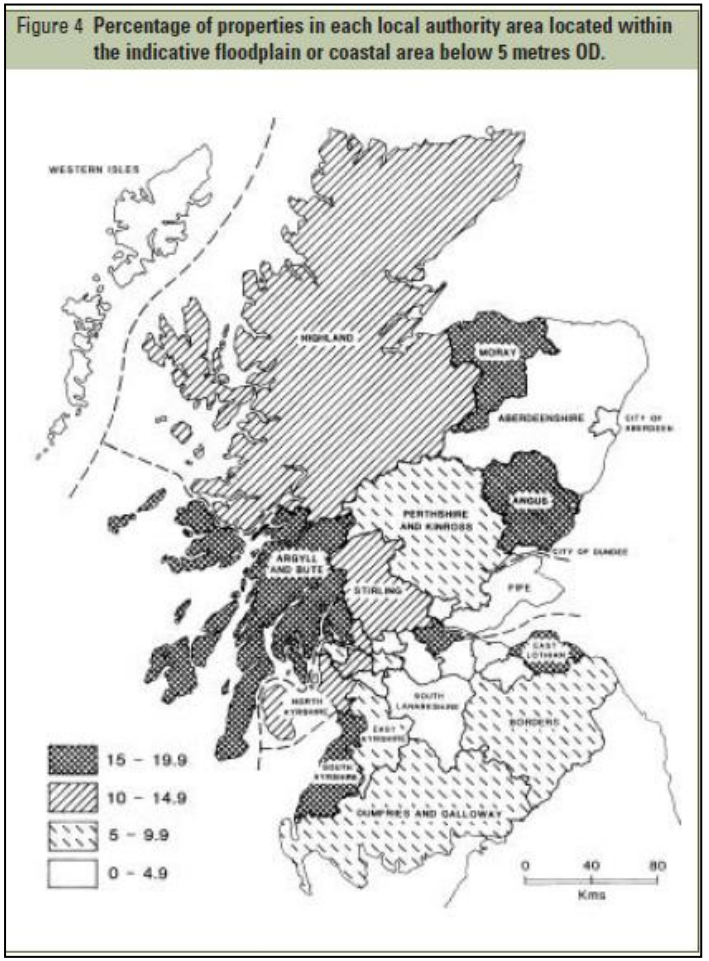
... plus the social cost

Why is it going to get worse?

- Climate change bringing more extreme rainfall events and storm surges
- Towns and cities historically located on rivers
- Large number of homes and businesses currently at risk
- Urban creep and upstream development
- Combined sewers have limited capacity
- 2007 – estimated 77,000 properties at risk of inland flooding – 12,000 in Glasgow
- Estimated cost flood damage -? But potentially £10's-100's millions per annum depending on level of protection provided
- Climate change bringing more extreme rainfall events and storm surges
- Requires comprehensive, long-term approach

Strategic approach - Scotland

- Water Environment and Water Services Act 2003
- Flood Risk Management Act
- Publication of Flood Risk Maps at community scale
- Collaborative approach
- Coordinated flood risk strategies and
- Local Management Plans
- Separate mapping of where natural defences could be used as prevention measure



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

What they are

What they are

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, SEPA, Scottish Enterprise, BIDs Scotland, local commercial organisations, third sector organisations, radio and TV
- Its not just cash!
- You need community champions
- Community engagement is time consuming ……expensive, **but essential**
- **Seek genuine partnerships… and be honest**

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

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

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

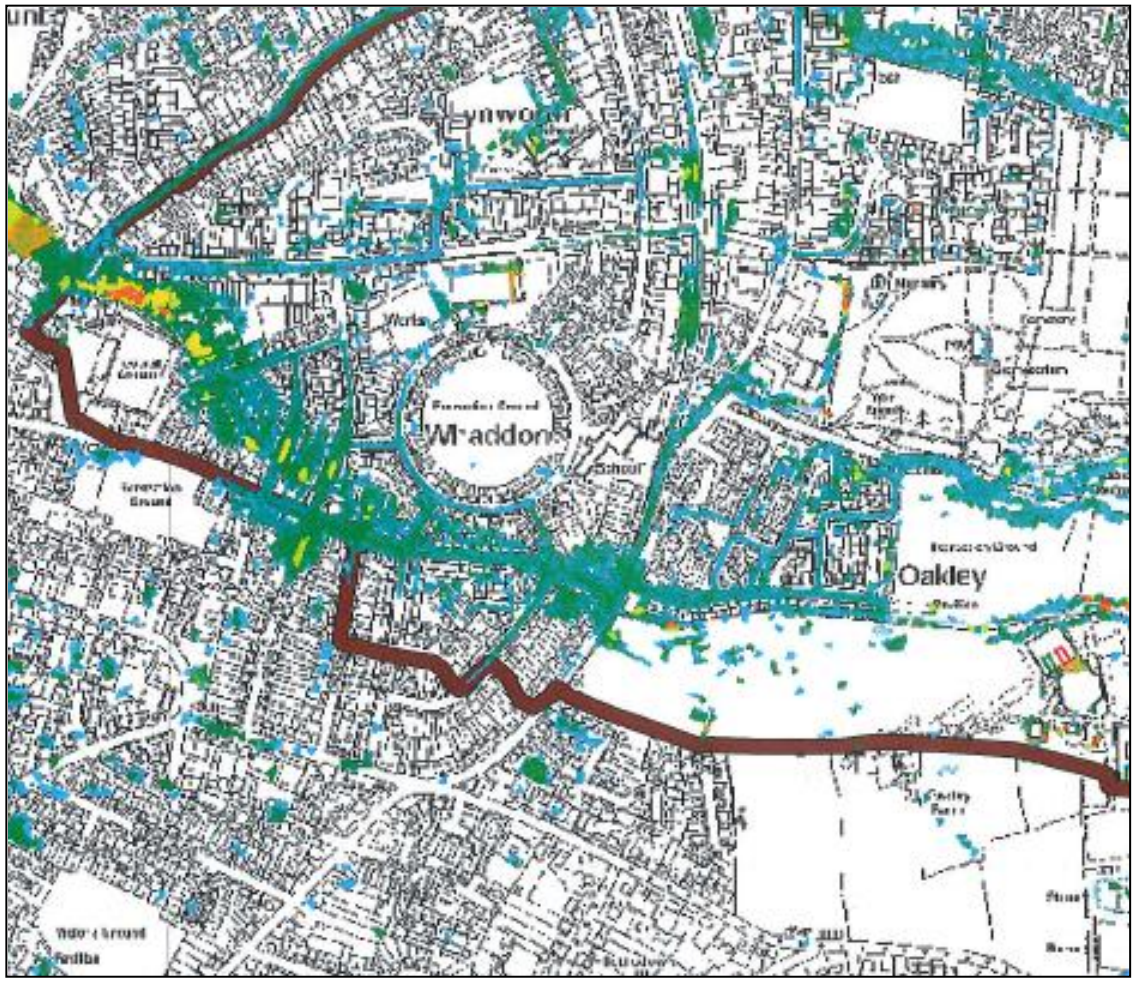
What you can do - use trees!

Use structured soils with stone base…

…as in dense urban environments trees have greater all-round acceptability

- Uptake of water
- Interception of water
- Water quality improvements
- Air quality improvements
- Urban heat island effect
- Increase in biodiversity and opportunities for wildlife
- Species migration and GI networks
- Visual quality in the environment
- Health and wellbeing – physical and mental

Priors Farm, Oakley – the problem



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

Priors Farm, Oakley

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

Raingardens

Environment Agency

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

Attractive garden features

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

Ornamental Grasses

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

Irises

Look at design options overleaf

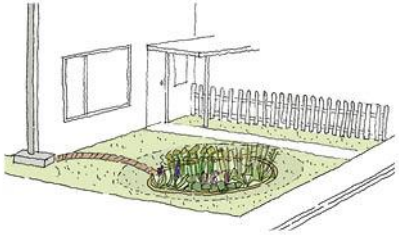
Environment Agency

Rain Gardens for Oakley

What could they look like in my garden?

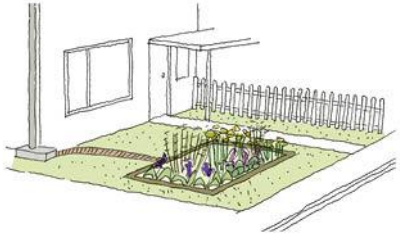
The type of rain garden suitable for you, depends on whether your garden is flat or sloping.

Option: Shallow planted depression for flat garden



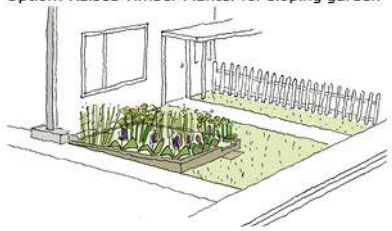
Attractively planted shallow depreassion

Option: Sunken Timber Planter for flat garden



Sunken Timber Planter

Option: Raised Timber Planter for sloping garden



Raised Timber Planter

Raingardens

Environment Agency

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 relevent mix.

Red/Yellow Planting Mix

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

Spindle,
Euonymus japonicus 'Oratus Aureus', evergreen, max. height 1.5m

Japanese spirea
Spirea japonica 'Anthony Waterer' 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 slyvatica, 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. sullivantii 'Goldsturm max. height 1m

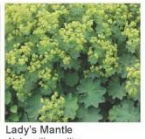
Sneezeweed
Helenium 'Moerheim Beauty', max. 1m

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

Environment Agency

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

Kelseys Dwarf Dogwood
Cornus sericea 'Kelseyi' 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 slyvatica, 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-angelica 'Violetta' max. height 1.5m

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

Globe Thistle
Echinops ritro max. height 0.9m

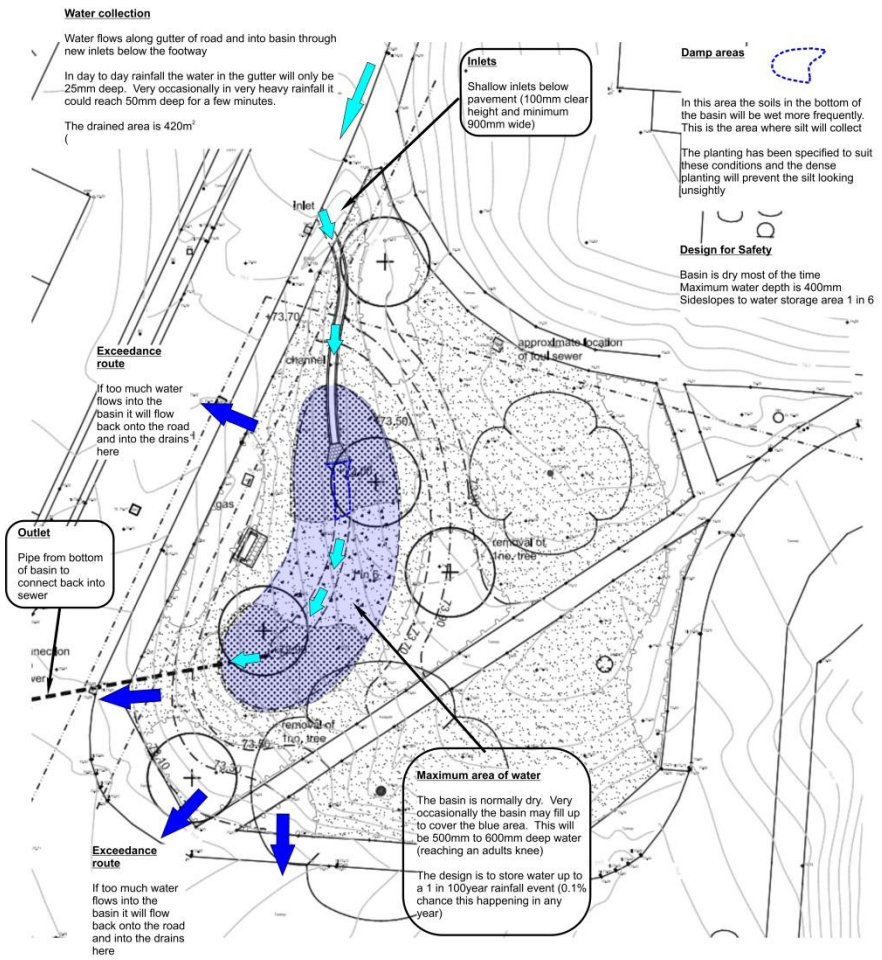
Step 5: Add 2 species of ground cover planting to be planted in groups of 2-5 along the edges

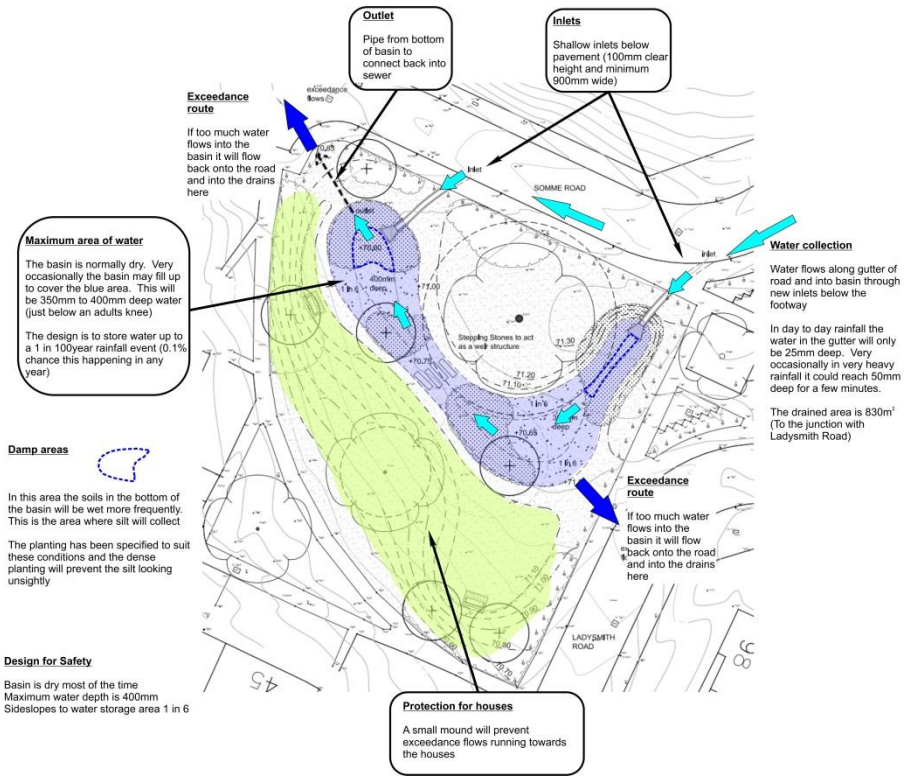
Elephant's Ears
Bergenia 'Bressingham White' evergreen, max. height 0.45m

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

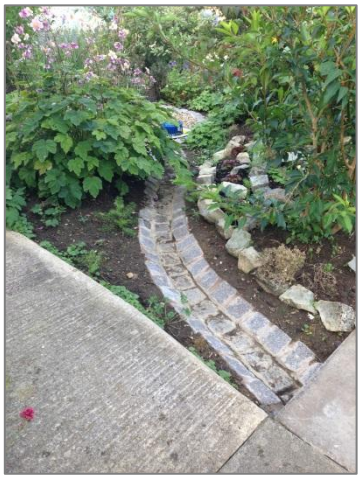
Heuchera 'Purple Palace'
Heuchera villosa 'Purple Palace' evergreen, max. height 0.5m

Design with engineering





Raingardens



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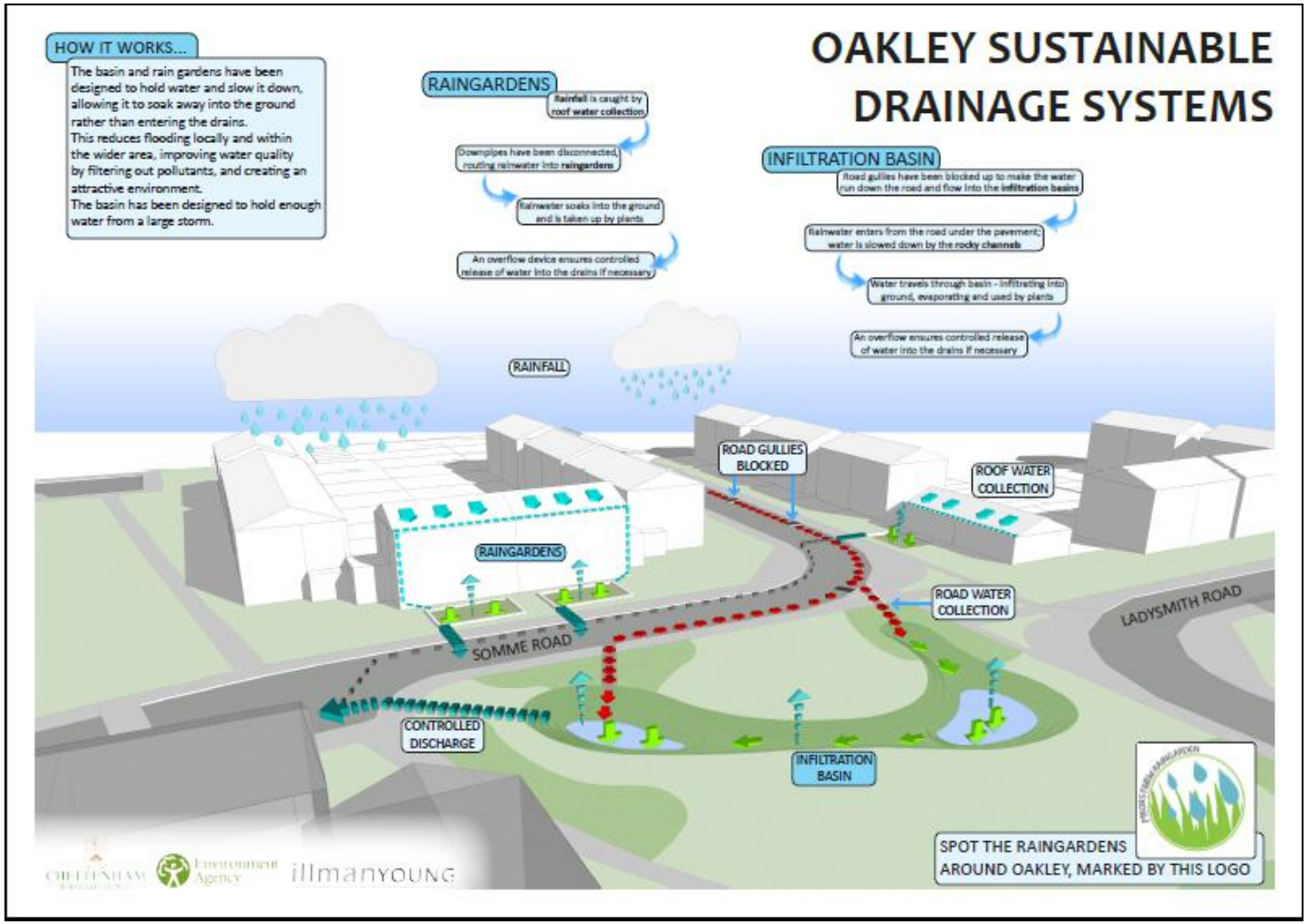
Fitting within existing gardens

Promoting understanding and SuDS awareness



PRIORS FARM RAINGARDEN

Information board and raingarden roundel

Lessons learned – the problems

- Lengthy public consultation process
- Unfamiliar engineering and techniques are expensive first time round
- There is a market for new hard SuDS products as we are currently lacking
- We need agreed standards for highways works – weight loading and appropriate engineering
- Some client expectation that it would solve all flooding problems overnight
- Sufficient robustness in the design
- Slow uptake by house-holders
- Getting maintenance regimes changed

Lessons learned – the positive

- Some of the public have become very positively engaged by the concept and the detail
- More house-holders coming forward now scheme in place
- Significant capacity can be achieved in relatively small spaces
- ‘Doubters’ converted by the end product and public response

….and remember…

YouTube – ‘Let’s get Nibbling!’

Any questions?