Ashby Grove Raingarden
SUDS Design Statement

1.0 Introduction

The use of SUDS in urban areas requires a more engineered approach than in less densely developed locations. Where SUDS are provided as a retrofit in urban areas every surface should be considered as a runoff collector. SUDS principles remain the same but the structures are more able to fit into the urban landscape. Urban green space offers a number of opportunities for retrofit SUDS, including Bioretention planters and Raingardens. Both techniques comprise a depression in green space that collects runoff either through an inlet or across a flush edge. However the raingarden uses existing topsoil over subsoil whereas bioretention has an engineered profile with free draining soil over a drainage layer to enhance performance.

2.0 ‘Raingardens’

Raingardens were developed in the US to reduce the impact of roofwater on local drainage systems and encourage rainfall to soak naturally into the ground to more closely mimic nature. The raingarden is simply an excavation in the ground that collects reasonably clean roofwater in a planted basin that is gardened using ordinary garden plants that can tolerate occasional inundation without damage. They usually have an overflow to the existing drainage system but this is often only required in the most severe storms. The raingarden can be sized to any storm event but often to accommodate the 1 in 1 year storm as a minimum. This is about 12mm for every sq M of hard surface. In the case of Ashby road a more extreme event can be dealt with as the roof area flowing to the basin is small. Management of the ‘raingarden’ is the same as any other garden space.

3.0 Benefits

‘Raingardens’ are an important technique for urban areas as they can be used anywhere that green space is available with many landscape, water management and social benefits. The construction of ‘raingardens’ can be the most cost effective way of providing temporary storage of rainfall. They intercept most short but high intensity runoff from roofs as well as the first heavy rainfall common to longer rainfall events thereby protecting the limited capacity of the urban sewer network.

- drainage is integrated into landscape areas
- quality of runoff is improved through silt interception and filtration
- storage is provided on the surface and in the surface soil layer
- clean water can soak directly into subsoil enhancing base flows and re-hydrating clays
- landscape is watered naturally, particularly in summer when water stress is greatest
- moist soils and vegetation improve air quality during hot weather
- visual amenity is enhanced for the community
- biodiversity opportunities are created
- cost is modest and construction simple

4.0 The Ashby Grove ‘Raingarden’

The proposed ‘raingarden’ at Ashby Grove is located in unused grass space in front of housing courts facing the road. The basin design was selected from 3 options as it retained some level grass for possible amenity use but accommodated a significant volume of roofwater. The open area on the corner of the building was also chosen as it gives maximum value from a number of viewpoints and is next to a rainwater downpipe.
A 300mm deep profile was used to give adequate storage and to allow the construction of a simple flow control device and overflow structure. The flow control ensures the basin drains down in a reasonably short period to allay concerns over open water near the building with an overflow to the sewer in very heavy rain. The flow control retains water for enough time to allow soakage into the ground in dry weather but drains the basin during prolonged wet weather.

Gentle grass slopes at 1 in 3 give safe access for viewing the garden and for regular maintenance with the level planted base providing an attractive feature in the landscape. Every short shower in summer waters the garden keeping plants in good condition. The simple construction and maintenance needed for the ‘raingarden’ together with significant rainfall control benefits offer a cost effective enhancement of urban space wherever space is available.

5.0 Planting the ‘raingarden’

The base of the ‘raingarden’ has 450mm of topsoil and a controlled flow outfall that drains the basin to sustain normal herbaceous garden plants. Most garden plants used in England can withstand short periods of inundation and do not need to come from wetland or marshy habitats. Herbaceous plants should be selected for robustness, long flowering or seasonal interest and ease of maintenance. This can comprise:

- Acanthus spinosus
- Alchemilla mollis
- Crocosmia Lucifer
- Geranium Rosanne
- Hemerocallis Golden Chimes
- Lysimachia punctata
- Miscanthus Silver Feather
- Thalictrum aquilegifolium
- With spring bulbs to include:
  - Allium Purple Sensation
  - Narcissus February Gold
- And edge cover:
  - Vinca minor Bowles Var
  - Autumn leaves can be left where they collect depending on leaf type to provide a mulch and weed suppressant during the winter. Stems should be cut down in February ready for new growth with a lift, split and replant every 3 years or as necessary. A simpler but less interesting ground cover plant type can be selected or even low growing shrubs can be used to reduce maintenance costs but they do not provide the ‘garden character’ associated with ‘raingardens’.

6.0 Storage and flow

The ‘raingarden’ receives roofwater from a relatively small area of 30sq M. This contributes a volume of 2.1 cu M for the 1 in 100 return period with a 30% allowance for climate change (30 X 0.07 or 70mm). This is the volume considered to give maximum reasonable protection to development. The volume of the 300mm deep ‘raingarden’ is 2.17 cu M which manages the whole volume. This reflects the small catchment area of roof flowing to the downpipe and would usually be somewhat less than this figure. However this example demonstrates the significant volumes that can be managed by simple planted basins in the landscape.

This volume assumes a ‘greenfield rate’ of runoff at about 5 L/sec/ha and a 1 in 100 year return period with 30% allowance for climate change but for such a small area the control cannot be provide for this flow rate. However the orifice control tube proposed can accommodate a 15 - 20mm hole that reduces the flow to a trickle from the basin. A larger catchment would allow a more reasonable flow analysis.

Evidence from Portland, Oregon in the US suggest that raingardens and bioretention features intercept about 75% of runoff form the contributing surfaces and reduce peak runoff rate dramatically to sewers. This benefits the natural environment but also reduces the risk of sewer surcharge, combined sewer overflows and provides a more even and easily managed flow for the Water Utility Companies.
NOTES:
Stainless steel baskets of 50mm square mesh of 5mm rod 900 x 600 x 300mm. Baskets are to be manufactured with hinged lids and fastened down with stainless steel clips at a minimum of 200mm centres on site. The top wires of the lid are to run across the width of the baskets. The stainless steel fabricator is to be De Havilland Fabrication and Welding Ltd. Tel 01453 828272 or agreed with RBA. A sample component demonstrating the standard of finish and workmanship is to be provided for approval. See separate detail for crimp clips.

NOTE:
SS oblique guard constructed using 50mm square mesh of 3mm stainless steel rod. The stainless steel fabricator is to be De Havilland Fabrication and Welding Ltd. Tel 01453 828272 or agreed with RBA.

Horizontal flow control: 100mm diameter 300mm long stainless steel flow control tube with 10mm (54% open area 12mm pitch) holes all round and orifice controls each end. (To be sourced by Robert Bray Associates.)
NOTE:
100 x 100 x 100 sett to be used at end of sett channel

Granite sett sample to be agreed

Channel 30mm deep

1:3 cement sand bedding and 10mm bucket handle joints (10-15mm max)
all mortar removed from setts

10 - 15 mm bucket handle joint

100x100x200mm granite setts in stretcher bond

Concrete foundations to be agreed with engineer

100x100x100mm sett to finish and start channel

Channel 30mm deep

NOTE
Granite sett selection to be agreed with Landscape Architect
**NOTES**

Stainless steel crimp clips are to be used to fasten down tops of all baskets.

Stainless steel crimp clips are fabricated from 40 x 35 mm rectangles of 1mm SS sheet.

The stainless steel fabrication is to be De Havilland Fabrication and Welding Ltd. Tel 01453 628272 or agreed with RBA. A sample component demonstrating the standard of finish and workmanship is to be provided for approval.

Bent over edges on inner surface of basket.

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A - Clip to be pushed over rods to be connected so they sit side by side in the bottom of the U shape. They are to be pushed on from the outer edge of the basket so that the bent over edges are protected within the basket.

B - Bend up bottom side of clip with pliers or gripes

C - Bend down top side of clip so no sharp edges are exposed

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**FOR CONSTRUCTION**

**BENGWORTH FIRST SCHOOL**

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scale: 2-1@A4
drawing no: BFS-D10
revision: -
Rain area
Say 30m²

100mm Ø downpipe

4 Storey building

Water butt comprising tipping bucket flow measurement.
(see detail)

1. Gravel base
2. Chamber with tipping bucket (see detail)

600x450mm cover
Overflow outlet

Rain gauge located nearby

Rain garden flow measurement
Rain Garden
Flow Measurement
Inlet.

Detail 1

- Inflow from roof
- Data logger
- Housing within butt
- Normal/constant level
- Tipping bucket mechanism
- Mounting brackets
- Seal
- Drain
- Outlet

Water enters butt from downpipe - stills - water level rises, enters tipping bucket inlet. Flow measured and discharged to outlet.
Rain Garden - Flow Measurement

Outlet.

- 600x450mm light duty cover
- 100mm Ø inlet
- 100mm Ø outlet to sewer
- Concrete surround if required
- Tipping bucket mechanism
- Overflow
- Logger

Adjust to suit with brick

Plastic or metal chamber build to suit.