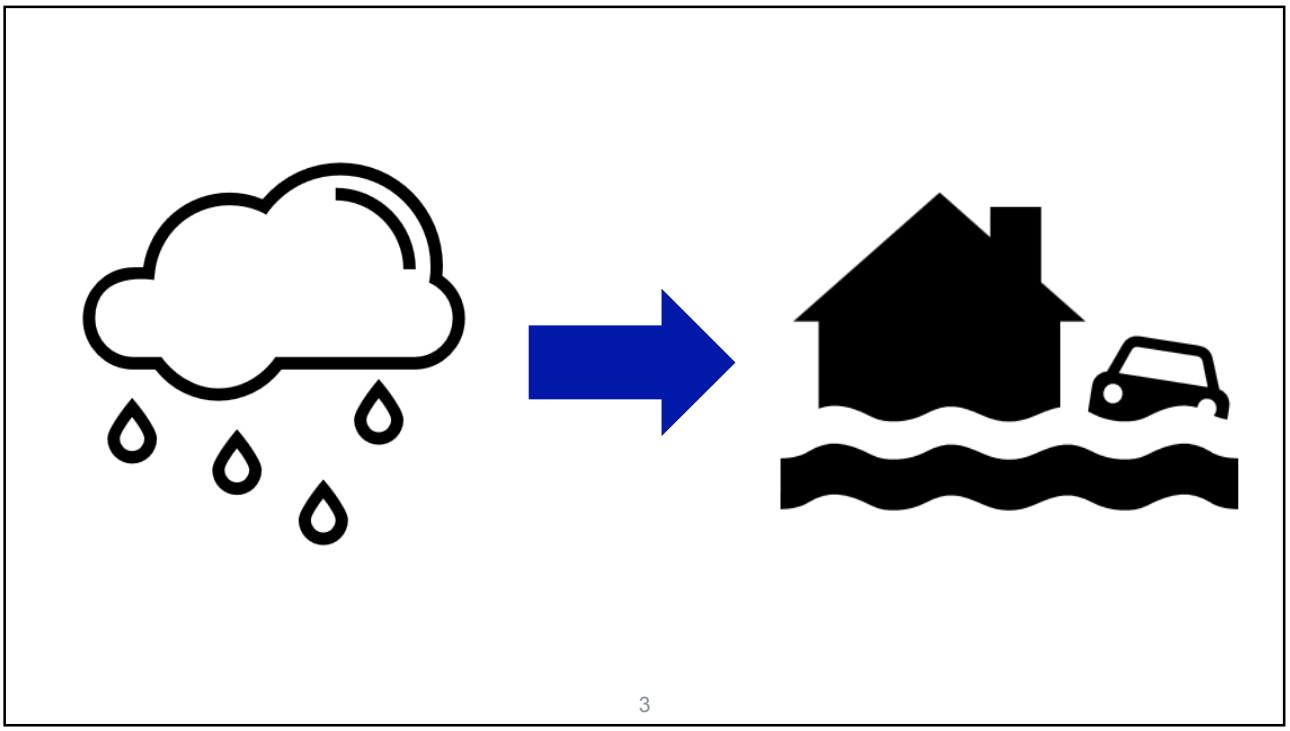
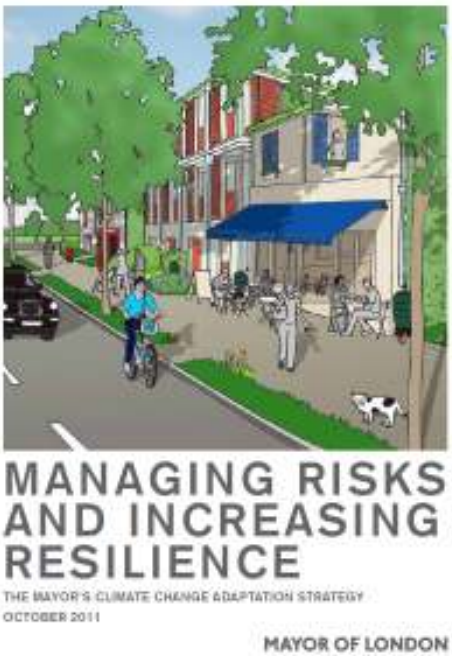
Introduction



Surface water flood risk

Greatest short term climate risk



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London Sustainable Drainage Action Plan

- Consultation: October 2015
- Aim: step-change in rainwater management in London
- Rainwater as an asset:
  - Capture ☑
  - Use ☑
  - Delay ☑
  - Absorb

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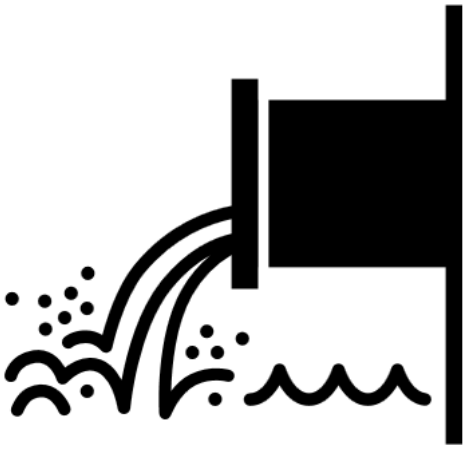
London Sustainable Drainage Action Plan



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London Sustainable Drainage Action Plan

LAUNCH DATE:
17 NOVEMBER

NEW LONDON ARCHITECTURE

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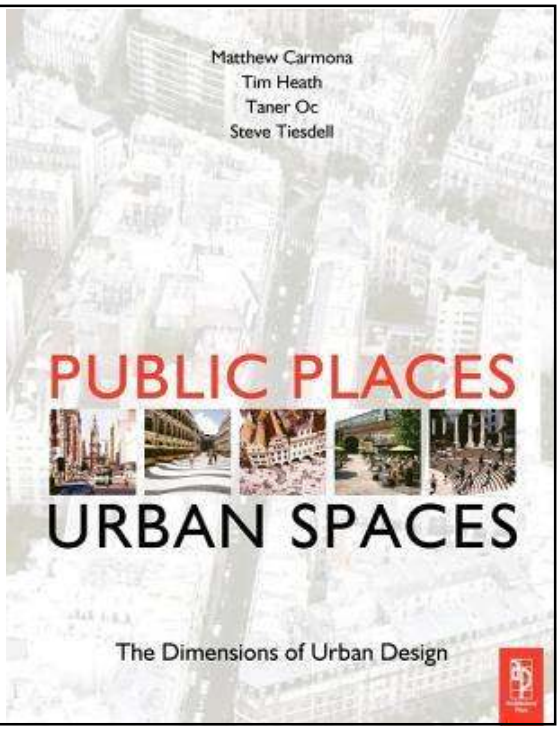
Why?

URBAN DESIGN

"The processes of making better places for people than would otherwise be produced".

Carmona, Heath, Oc and Tiesdell (2003)



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Public spaces in London

80%

Streets, roads, footways, paths

10

The guidance provides advice for all Highways Authorities and those responsible for:

- *Designing*
- *Building*
- *Operating*
- *Maintaining*

London's streets and public realm

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Who?

Steering Group

J & L GIBBONS

GREATER LONDON AUTHORITY

London Drainage Engineers Group

ROYAL borough of GREENWICH

h&f hammersmith & fulham

Environment Agency

Thames Water

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Consultation

- August – September 2016
- 450 recipients
- 24 sets of responses
- 368 individual comments

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Contents

Contents

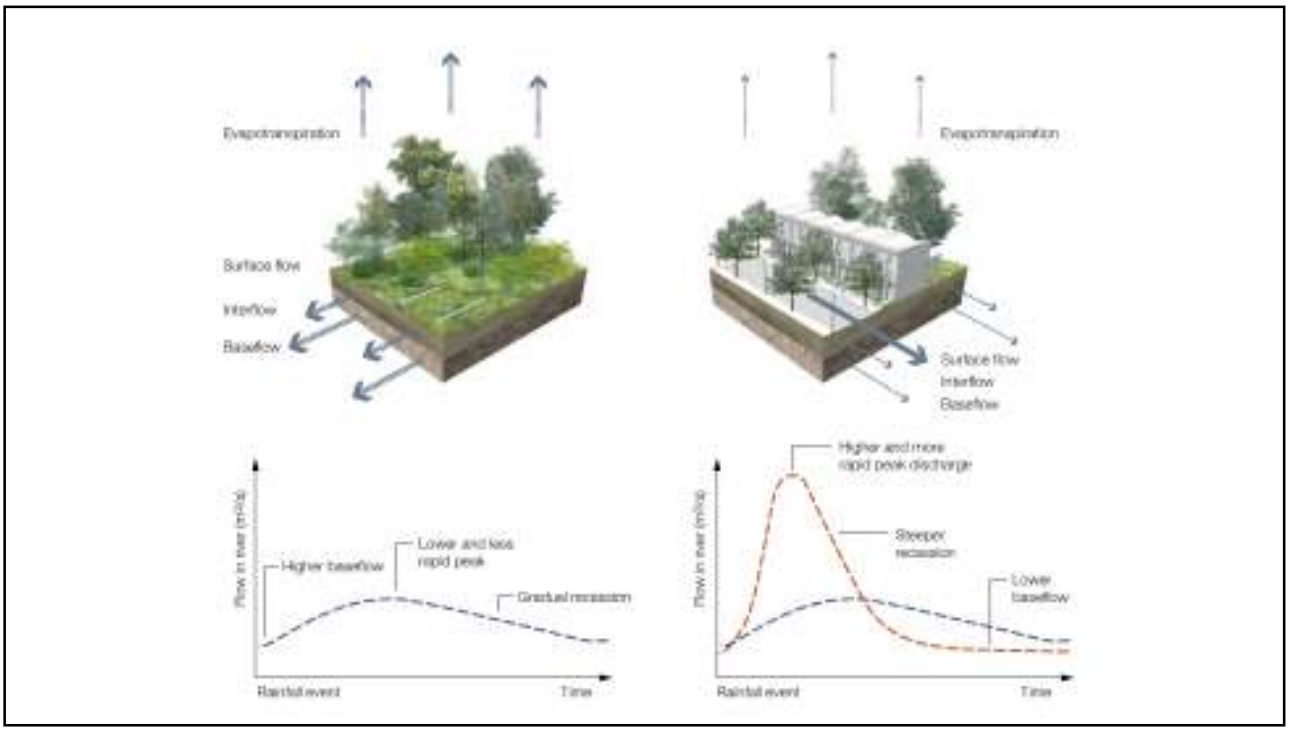
1. Introduction
2. Principles of SuDS
3. London Context
4. SuDS Components
5. SuDS in London's Streets
6. Case Studies
7. Implementation
8. Cost Benefits

Quantity: Permeable paving, grit jointing

Quality: Reed bed planting

Amenity: Community planting

Biodiversity: Reedbed habitat



The Thames basin

Anthropogenic
London soil

London clay

Regent Street: Street life on the strategic road network

St James's Park: Parks provide natural storage, attenuation, infiltration, interception

Plan

Bioretention swale

Swale - Case study 6

Location: Mill Pond Road
London Borough of
Wandsworth

Date: 2016

SuDS Components
Bioretention swales
Kerb inlets
Tree trench planting

Objectives
Mill Pond Road is a new road within a development at Nine Elms. It is constructed with a central planting bed acting as a swale to attenuate surface water.

Outcome
The surface water run off is be collected along bespoke broken kerb units and fed into the central planting zone where it filters through to an underground collection and holding tank before being released slowly into the mains sewer system. It is anticipated that there will not be standing water for more than one or two days following extreme rainfall events, the plants have been selected to be tolerant of these conditions.

Permeable paving - Case study 11

Location: Mendora Road
London Borough of
Hammersmith & Fulham

Date: 2016 (under construction)

SuDS Components
Permeable paving retrofit

Objectives
This Thames Water Utilities Limited (TWUL) project aims to trial the retrofit of SuDS within the highway with a focus on their flood risk benefits. Three streets were selected for the trial as part of the Counters Creek SuDS Retrofit Pilot Schemes

Outcome
Mendora Road involves the installation of permeable paving within the parking bays on each side of the road, with underground storage provided by geo-cellular structures on one side and aggregate on the other, with a flow control outlet to the existing sewer.

The scheme is lined to ensure monitoring data carried out by Thames Water gives an accurate representation of the scheme with no infiltration loses.

During construction

After

Timber planters as a trial solution for SuDS

The results: 1 year on

Traffic volumes dropped by 44%*

132 cars

72 cars

Traffic speeds have decreased with more cars travelling at 10-15mph*

What the parents think

86% of parents surveyed agree it is safer now

94% of parents surveyed would like the planters to be made permanent**

*between the hours of 7.30-9am in term time

**we surveyed 53 parents, 11% of the school roll

Bioretention - Case study 9

Location: Granton Road
London Borough of Lambeth

Date: 2015

SuDS Components
Rain planters

Objectives
Trial project: The local school needed to tackle illegal parking on the yellow zig-zags, traffic congestion and conflict as parents queued in their cars outside the school.

Outcome
A six-month trial saw the installation of timber planters. During term-time the planters were maintained by the school children, although this proved problematic over the longer summer break. Traffic was monitored before, during and after the trial.
A permanent solution will now seek to incorporate in-ground SuDS, that will address the seasonal issue and provide a learning facility for the school.

Results of trial

3.24 Green Roofs on Depots: Trial Project

After installation

Early green roof growth within 6 months

Location Ruislip Depot
Middlesex
Extent 125m²
Cost £30,000 (trial project)
Date 2012
Credits London Underground Limited
GLA
University of East London
GRC

SuDS Components
- Greenroofs

Summary
Retrofit green roof and monitoring of source control

Project Description
A small-scale trial to allow evaluation of the effectiveness of green roof, retrofitted for LUL depot environments. From the results it will be ascertained whether LUL could benefit from a broader application.

Objectives
- Experimenting in environmentally-friendly engineering solutions to address runoff from depot roof
- Achieve low maintenance
- Address Mayoral policy for SuDS by installing a green roof source control
- Ensure retrofitting on operational railway followed the rigorous assurance and safety procedures of London Underground, without any interruption of service

Actions and Results
- Biodiverse extensive green roofs types, each 18.5 metres x 3.3 metres, have been installed on a section of flat roof
- One section (south) has a drainage board with 65mm of extensive green roof substrate. The other section (north) uses recycled wool fibre instead of drainage board
- Both roofs are vegetated with sedum cuttings and seeded/planted with annual and perennial wildflowers
- The two trials are separated by an impermeable barrier to facilitate the measurement of run off. Total saturated loading is less than 100kg/m²
- With the assistance of the University of East London, monitoring devices have been installed in two downpipes of a green roof and two downpipes of a conventional control roof to measure water attenuation
- GLA support through Drain London. A small fund enables monitoring performance

5.1 Priory Common rain meadow

Priory Common after installation

Location Priory Common
London Borough of Haringey
Extent 85m²
Cost £48,000 (Construction only)
Date 2016
Credits London Borough of Haringey
Thames21
Robert Bray Associates

SuDS Components
- Filter strip
- Infiltration basin
- Channels

Summary
Green space enhancement and re-purposing for surface water interception and infiltration.

Project Description
Next to Priory Road is a linear green space with mature plane trees planted along the roadside. The verge is about 75 metres long and was highlighted as a site to deal with surface runoff from the road, via a sewer connection directly to the River Moselle. This project is part of a suite of SuDS schemes locally that will cumulatively improve water quality.

Objectives
- Intercept road runoff pollutants at source and use the existing landscape to allow 'interception loss' (ie, prevent water from reaching the ground) for everyday rainfall
- Clean and cool run-off during summer when the watercourse is most susceptible to the effects of pollution and water temperature increases (which inhibits the ability of water to carry dissolved oxygen)

Actions and results
- Runoff is diverted at the surface into a gully in Redston Road and collected in a five-sett channel that directs water onto the grass verge along Priory Road
- Verge re-profiling carries water for its full length until it reaches the sewer
- Early observations indicate that water flows quickly into the rain meadow but slows as it travels through the grass, soaking into the tree-lined verge before reaching the letterbox outfall to a road gully. Performance will improve as the meadow grows

5.28 Rue Garibaldi

Rill and de-paving

Location Lyon, France
Extent 15ha
Cost £19.3m (total scheme 1st phase)
Date 1st phase 2014
Credits Grand Lyon
Atelier des Paysages

SuDS Components
- Retention basins
- Swales
- Soakaways
- Depaving

Summary
Transformation of an urban motorway to a planted boulevard and high quality civic space

Project Description
Rue Garibaldi, east of the Rivie Rhône, is a north to south six-lane carriageway, constructed in the late 1960s. It is fronted with high storey buildings and features that are synonymous with an urban motorway. The environment for pedestrians and cyclists is hostile.

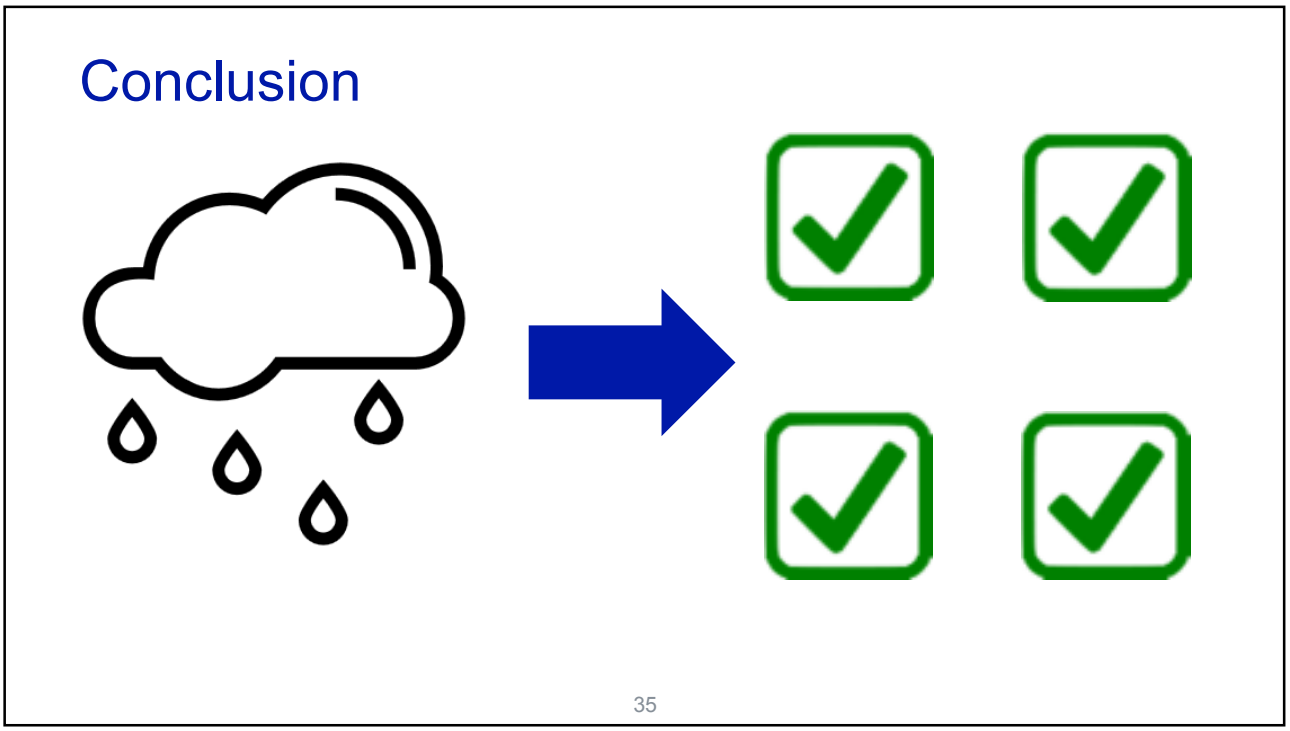
The configuration and high capacity of the streetscape meant the effects of urban heat island were exacerbated. Air (principally NOx and PM) and water quality was low (principally hydrocarbons and total suspended solids). Runoff into the combined sewer overflow was high, particularly during heavy or prolonged peak rainfall, considering the sub-catchment area of 65,000m².

These conditions, coupled with a carriageway reconfiguration proposal, presented the opportunity to reconsider hydrological management of the 2.6km stretch of highway.

Objectives
- Minimise runoff into the combined sewer overflow by installing a SuDS scheme
- Improve connection between districts bordering Rue Garibaldi by design and planning consideration, within the wider green space context of the area
- Reduce maintenance and utility costs by installing a water recycling system
- Reconfigure carriageway function by instating separate carriageways for public transport, pedestrians, cyclists and other vehicles
- Improve management of water quality and mitigate urban heat island effect by planting trees and installing a SuDS scheme

Ruskin Square at East Croyden under construction
SuDS an evolving art

Conclusion


Conclusion
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FOR LONDON
EVERY JOURNEY MATTERS