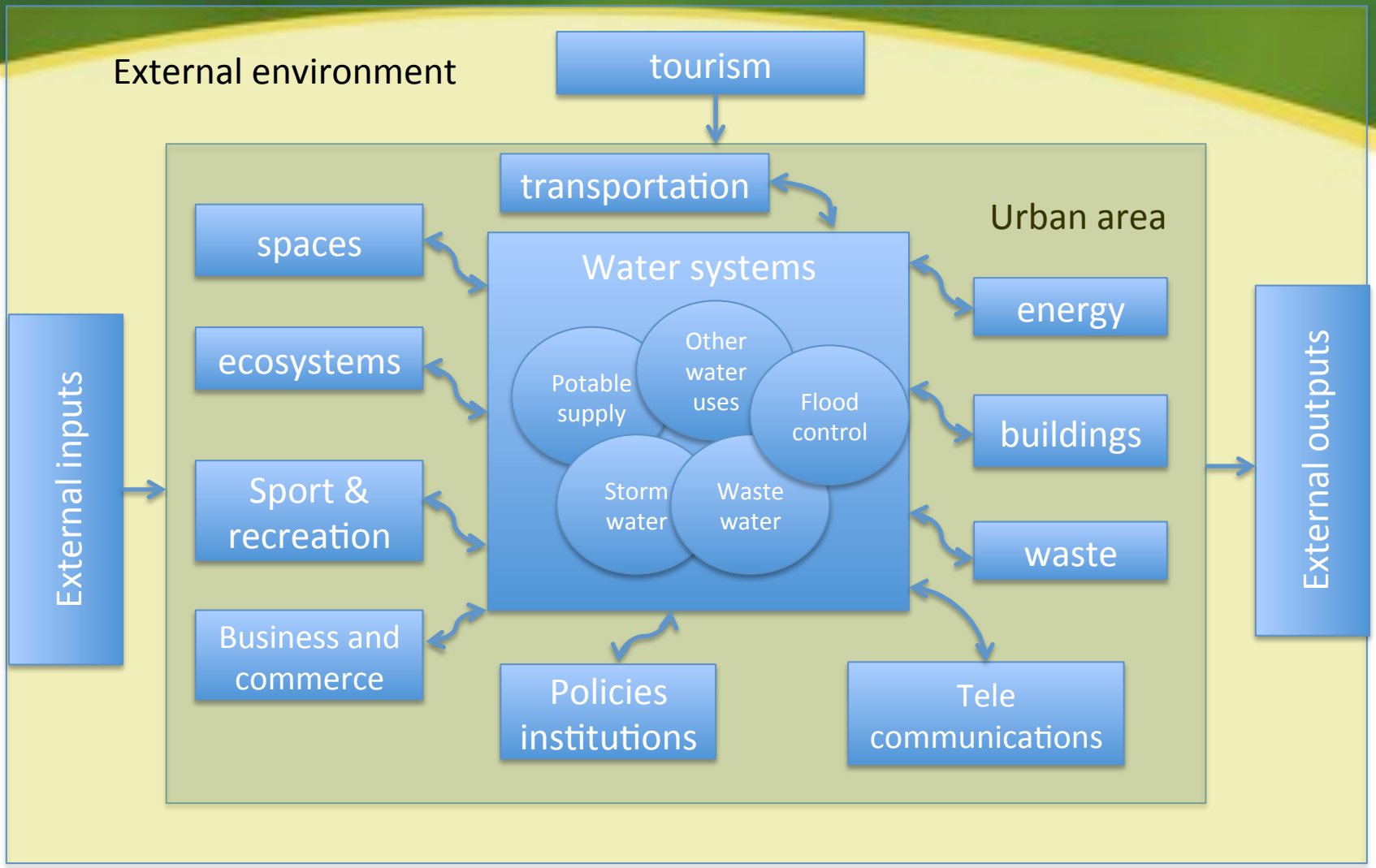
Managing water in an integrated way to maximise value

Richard Ashley EcoFutures Ltd.
Emeritus Professor of Urban Water University of Sheffield
Professor of Flood Resilience
UNESCO IHE Delft
Adjunct Professor
Urban Water Group, Lulea Technical University

Using evidence from working in projects with:

2 main issues



- Water is part of our systems of systems (technical)

We have (too) many players (governance, institutions, etc)

Regulators- Environmental (EP and FRM)
Regulators – Economic
Central Government
Local Authorities - Drainage engineers
Local Authorities - Spatial planners
Local Authorities - Landscape architects
Local Authorities - Urban designers

Local authorities – health welfare and quality of life maximise value for money

WE NEED TO UTILISE THE DRIVERS AND NEEDS OF THE KEY PLAYERS MAKE IT RELEVANT TO THEM

Local Authorities - Building control
Local Authorities - Emergency/contingency planners
Water company – water resources
Water company – water efficiency
Water company – developer services
Sewerage undertakers - Developer services
Sewe
Clien

Water service providers – deliver 'sustainable' services at affordable costs (make profits)

AND WORK TOGETHER ACROSS BOUNDARIES AND DISCIPLINES

Clients/developers - Commercial Developers
Clients/developers – Landowners
Consultants and practitioners - Drainage engineers
Consultants and practitioners - River engineers
Consultants and practitioners - Landscape architects
Consultants and practitioners - Urban designers
Consultants and practitioners – Hydrologist
Consultants and practitioners - Approved inspectors (BR)
Consultants and practitioners – ecologist
Consultants and practitioners – water efficiency
Consultants and practitioners - Other practitioner
Contractors - Construction companies
Contractors - Maintenance organisations
Other asset owners or operators - British Waterways
Other asset owners or operators - Riparian landowners
Other asset owners or operators - Internal drainage boards
Other asset owners or operators - Highways Agency

Regulatory agencies (reducing regulation?)

Property owners and dwellers – safety, security, affordability and an easy life

All Party Parliamentary Group for Excellence in the Built Environment Inquiry "Living with water" (March, 2015)

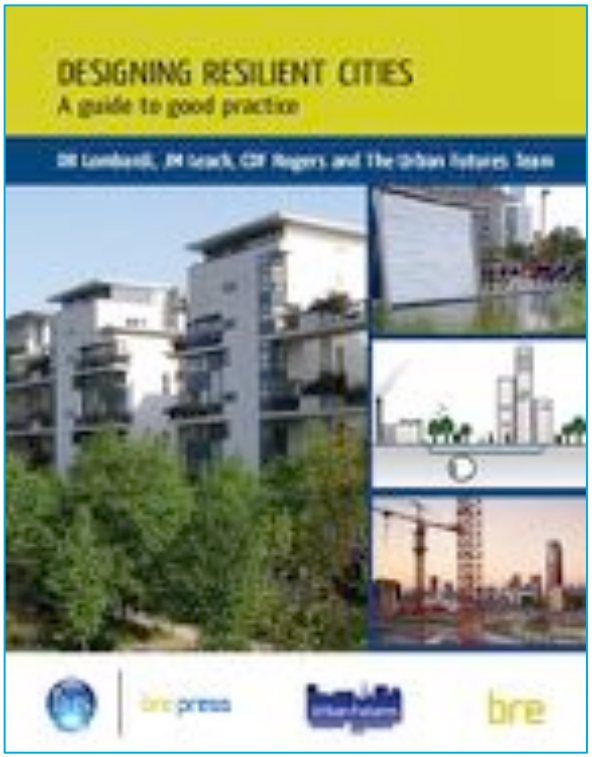
- "Despite the ever increasing challenges, flood resilience and water management still remains a Cinderella issue at the highest political level, though its importance is no less than that of transport and power infrastructure and needs to be given the same priority as High Speed 2.
- Failure to take the issue of comprehensive water management much more seriously will have severe economic impacts on UK plc. "

This applies to England ONLY

Nature as infrastructure

"ensure nobody in a city is further than 500m from an urban green space"… "CAP creates huge and perverse incentives"

[Dieter Helm, chair of natural capital committee 7-7-15]



There has never been a more propitious time to bring this together

It is being done around the world

- New 9.4-acre mixed-use neighborhood.
- Green roofs /solar panels mandatory.
- Each building collects rainwater.
- Below the development is a 120,000-gallon tank designed to store general runoff from streets, and the park includes a pond that can store up to 79,000 gallons of water.
- All water is used as a resource and runoff minimised.

In general our (English) Institutions (or policy makers) have not caught up with (some of) the leading ideas

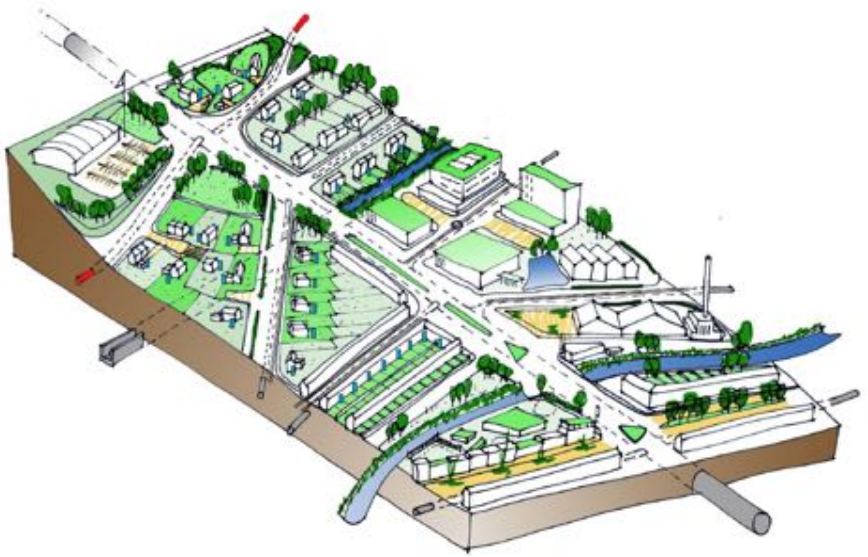
- 'water' is in compartments
- 'water' is not important; "it's the economy stupid"
- 'water' – well we've done that (Water Act, 2014; Flood & Water Management Act, 2010….) – *so just get on with it*
- Ofwat review(s)
- Charging and competition

The Beckton desalination plant provides water for 400,000 households by reverse osmosis membrane filtration

- Are the incentives wrong?
- What happened in the winter of 2013/14?

Water issues in London

- Pollution
- Flooding
- Resources
- Asset decay and replacement
- Affordability



Water needs to be considered as an opportunity - not a problem

As part of blue-green infrastructure it provides many added benefits

How can we respond?

New SuDS manual (2015):

- Sustainable Drainage Systems manage impacts from development on the quantity and quality of runoff, providing amenity and biodiversity as well as other potential benefits
- 'Surface water runoff should be managed for maximum benefit'

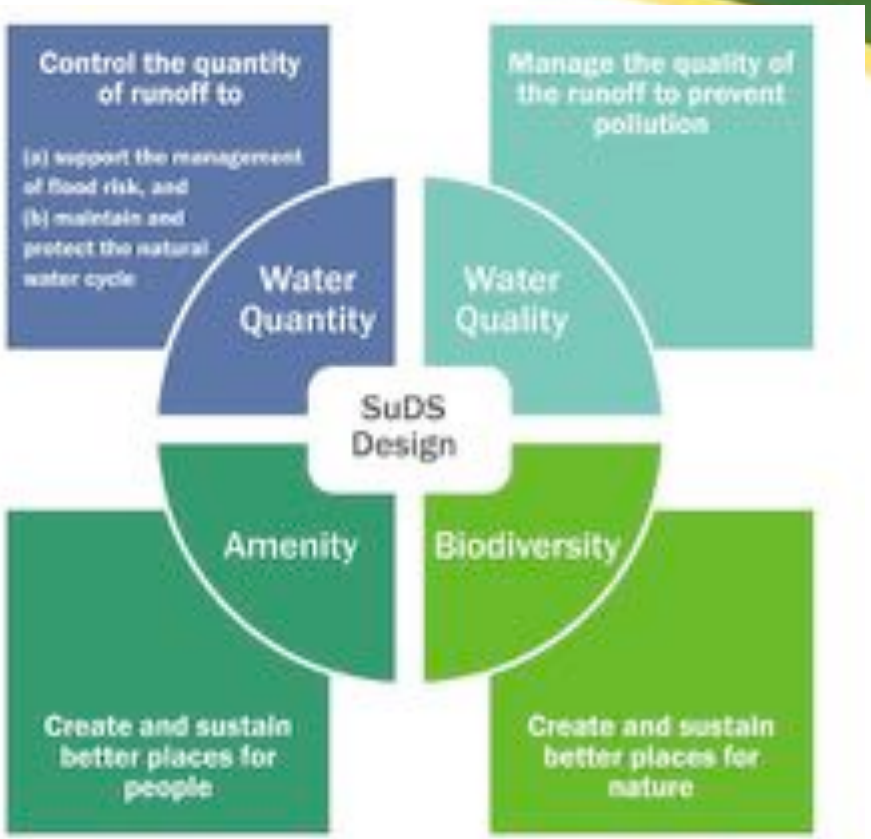


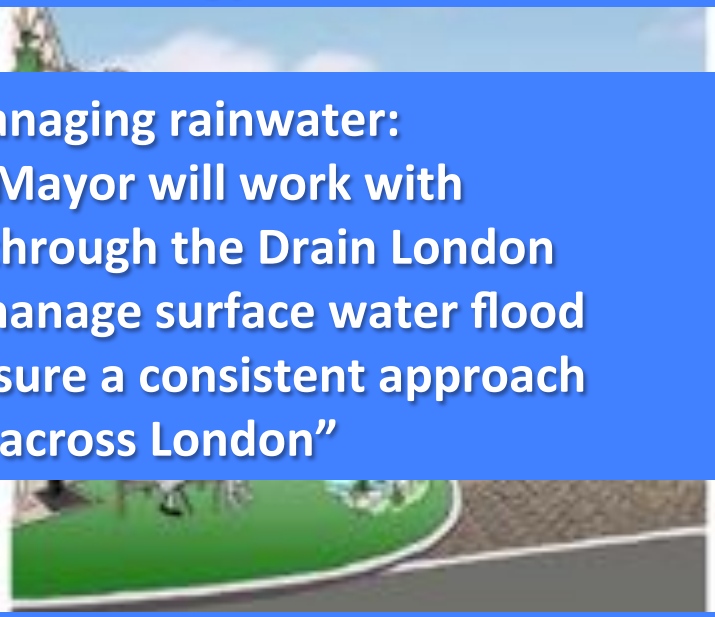
Figure 2.1 The four pillars of SuDS design

The Mayor's vision for water in

The Mayor applies the followi
for the drainage of rainwater in the London Plan:

1. Store rainwater for later u
2. Use infiltration techniques porous surfaces in non cla
3. Attenuate rainwater in po water features for gradual
4. Attenuate water by storing sealed water features for gradual release

"The integration of water management as a whole is central to the success of this Strategy"

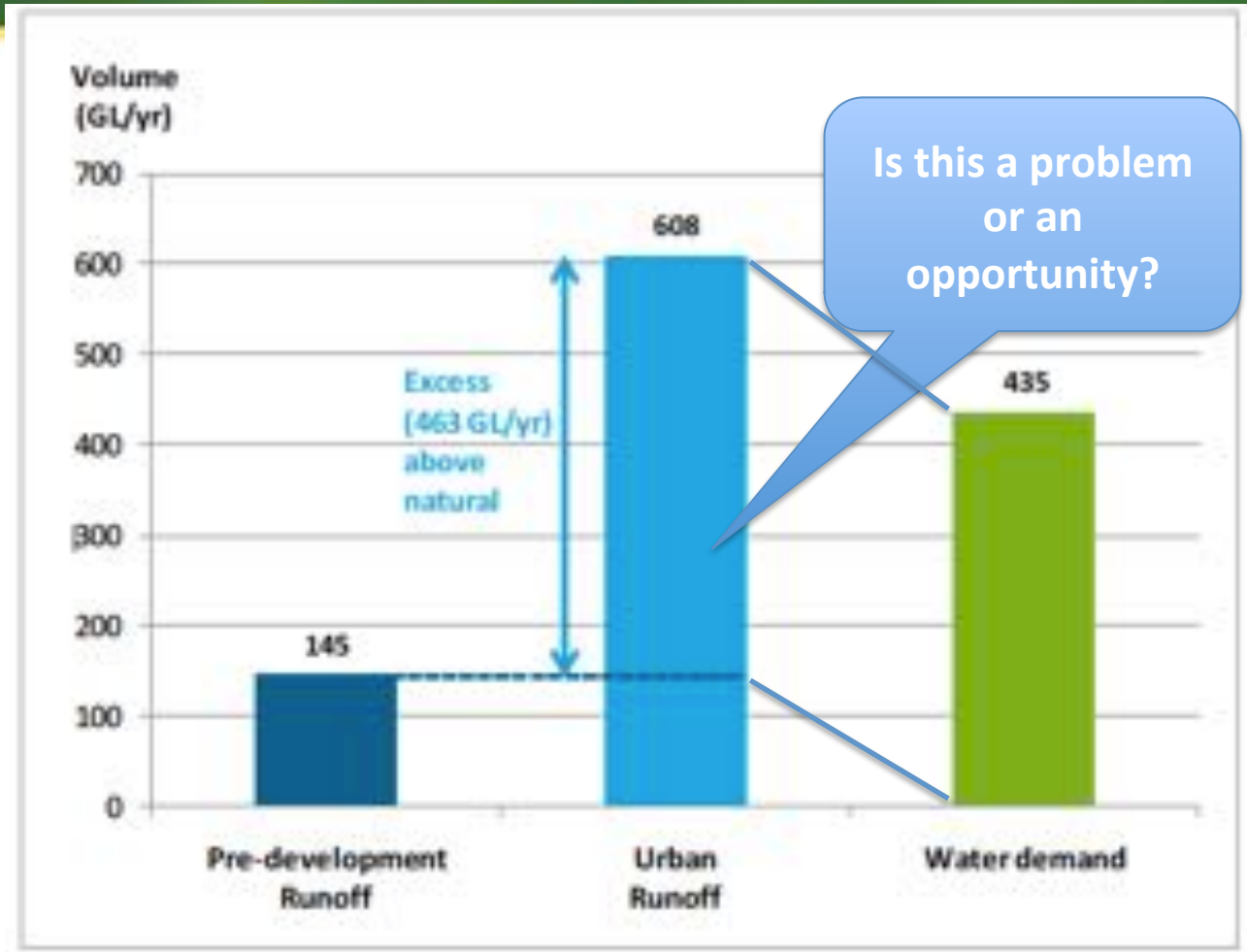


Managing rainwater:
"The Mayor will work with partners through the Drain London Forum to manage surface water flood risk and ensure a consistent approach across London"

Wastewater:
"The Mayor will work with Thames Water and other partners to support the construction of the Thames and Lee Tunnels…"

Who has forgotten the water cycle?

Water shortages?



Runoff from the Melbourne Metropolitan area prior to and after urbanisation

CRC for Water Sensitive Cities

(Other) big issues in London that BG addresses

Domain	BG infrastructure contribute?	How?
Housing	✔ ✖	Increases property values
Population	✖	May attract more people, but aids economic growth
Air pollution	✔	Improves air quality
Heat islands	✔	Reduces temperatures
Liveability and quality of life	✔	Brings nature, better environments and enhances mental health
Safety (resilience)	✔	Inherently more resilient, adaptable and flexible
Asset inertia and path lock-in	✔	Niche examples demonstrate effectiveness
Crime	✔	Nicer environments reduce crime
Recreation	✔	More opportunities
Carbon and energy	✔	Reduces these
Education	✔	More opportunities engaging in nature and using water wisely

Guessing the future

Getting it right:

Planned adaptation for future uncertainty

Don’t lock-in to single solutions leave pathways open to change tack

Water sensitive urban design

Hampton Park Wetland
(Melbourne Water)

Lynbrook Estate Wetland
(VicUrban)

All Nations Park Wetland
(City of Darebin)

NAB Building Forecourt
Wetland

Blacken Ridge Bioretention
Basin (Brisbane City Council)

Baltusrol Estate
(Australand)

Victoria Park
(Landcom)

Cremorne Street
(City of Yarra)

Victoria Harbour, Melbourne
Docklands
(Lend Lease)

Baltusrol Estate
(Australand)

Bourke Street Tree Planters
(Lend Lease)

Building Bioretention Planters
(Portland, Oregon, USA)

The water sensitive city and water sensitive urban design

CRC for Water Sensitive Cities

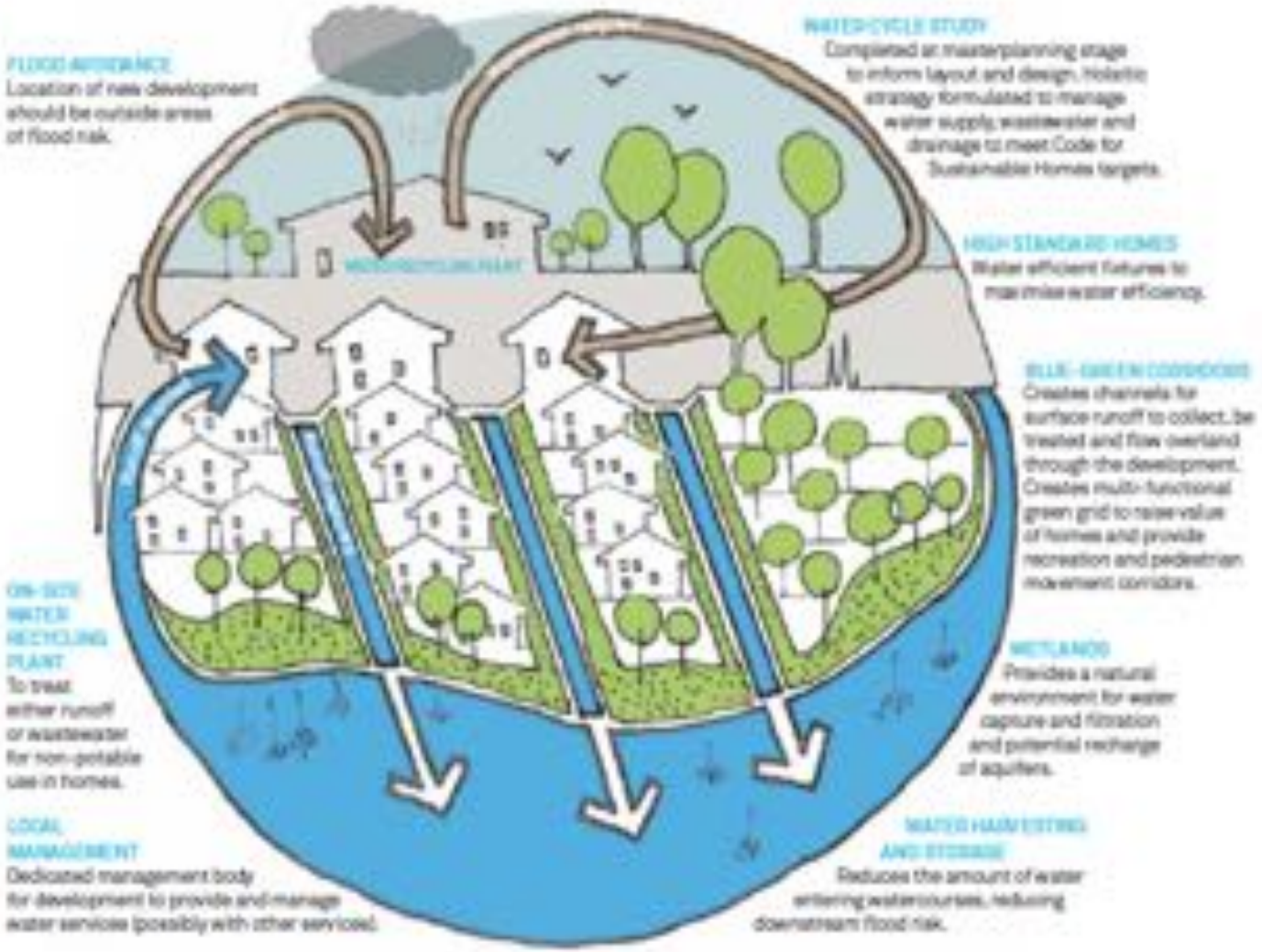
http://watersensitivecities.org.au/

http://www.susdrain.org/

Emerging UK guidance tailored to place-making agenda

(Morgan, 2012)

WHAT COULD A WATER SENSITIVE NEW DEVELOPMENT LOOK LIKE?



URBAN FORM:
New mixed use urban extension
3500 new homes
Code for Sustainable Homes level 5 target

WATER CONTEXT:
Driest area of the UK
Water infrastructure needs to be extended and upgraded
Downstream flooding issues

COMMUNITY CONTEXT:
Sustainable living desired
Mix between rural and urban living

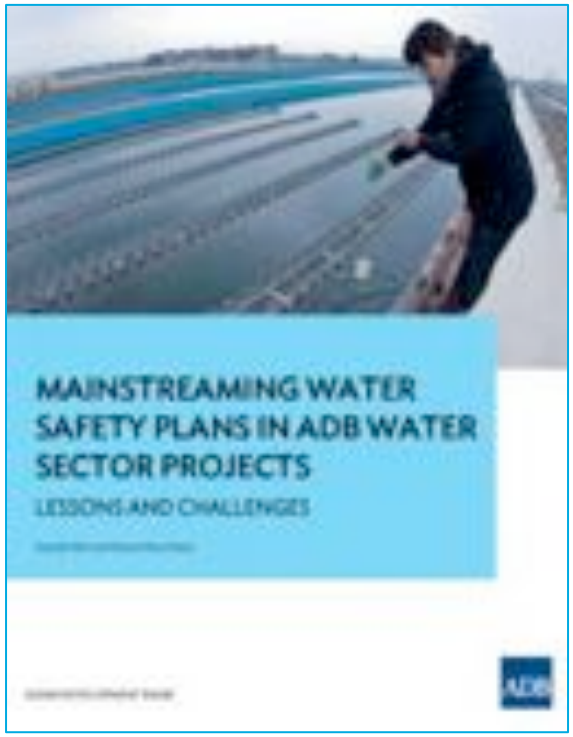
ciria

Working out the business case

- Main flood risk management benefits INCLUDE ecosystem services and soft values for Flood Defence Grant in Aid
- Unlike for SuDS: "….*expecting compliance with the technical standards is unlikely to be reasonably practicable if more expensive than complying with building regulations*" [Planning Practice Guidance].

Mainstreaming water sensitivity

- A term increasingly being used to describe how urban development can and should utilise the synergies between the various drivers, needs and responses
- Climate proofing has been successfully incorporated in the Netherlands into regeneration schemes



Mainstreaming (flood) resilience

Mainstreaming means that flood resilience strategies are being incorporated into urban development projects, or vice versa.

It can occur in various different ways:

- As a precondition to enable development (flood proofing Hafencity Hamburg)
- As a means to achieve a vision by systematically searching for opportunities (multi-layered safety in Dordrecht / city greening in Hoboken)
- As a by-product of autonomous development (city greening as a means for regeneration of ZoHo Rotterdam)

Many policy documents have picked up that mainstreaming can be beneficial for implementing adaptation strategies.

Systematic analysis of how opportunities from planned and ongoing projects can be used for both floods and droughts is under development as part of the CRC Water Sensitive Cities project.

Mainstreaming in Dordrecht

BeST: Benefits of SuDS Tool

- Collation of evidence (values)
- Structured assessment approach
- Considers confidence
- Support practitioners to qualify and quantify (monetise) benefits
- Compare drainage options
- Provision of detailed audit trail

Examples of multiple benefits estimation – using the BeST tool

Glasgow Surface Water Management Plan

MWH
BUILDING A BETTER WORLD

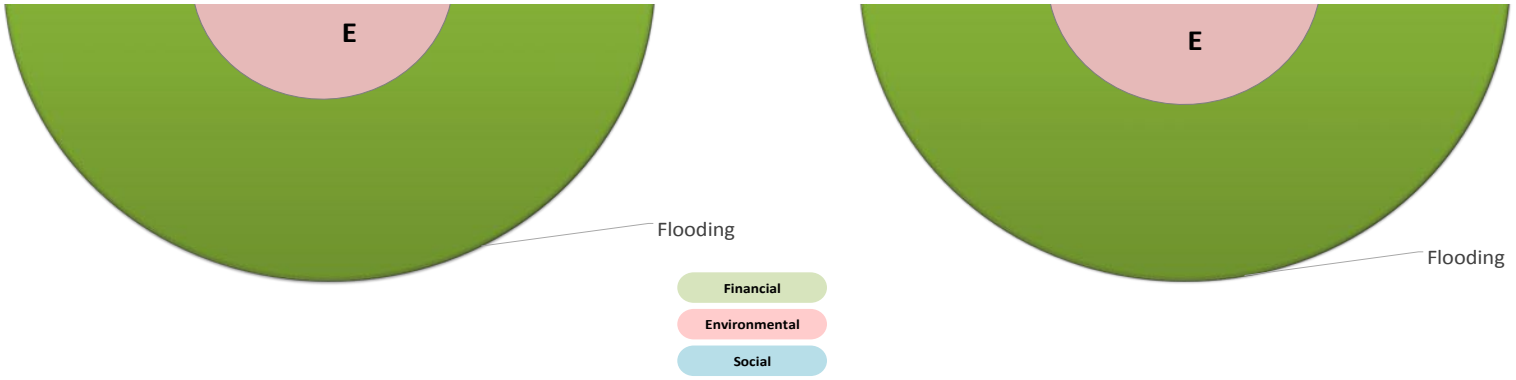
ciria

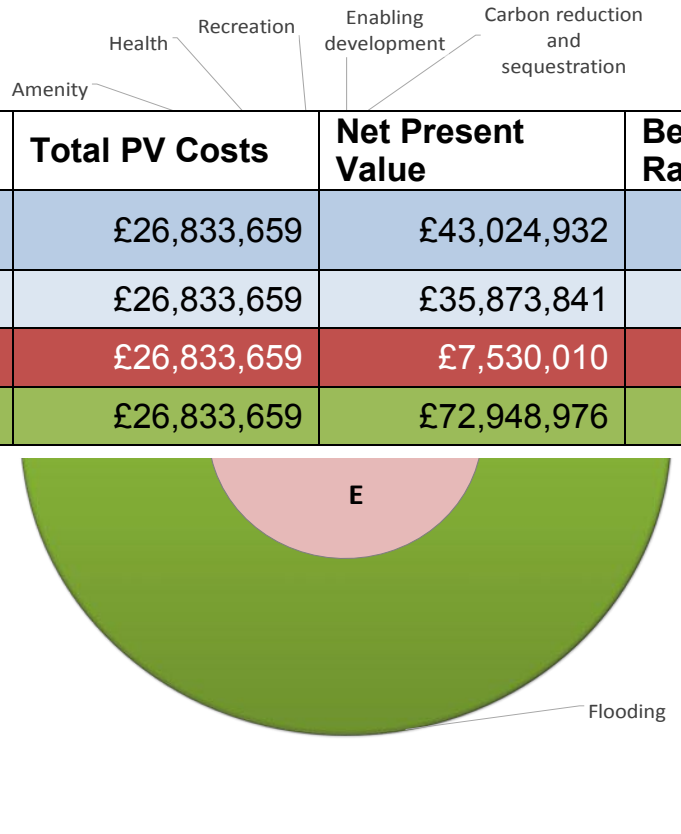
Applying BeST – Glasgow SWMP

Individual Benefits (Present Value) (Pre-Confidence)

Individual Benefits (Present Value) (Post-Confidence)

Present Value Assessment Stage	Total PV Benefits	Total PV Costs	Net Present Value	Benefit Cost Ratio
Present Value before confidence applied	£69,858,591	£26,833,659	£43,024,932	2.6
Present Value after confidence applied	£62,707,500	£26,833,659	£35,873,841	2.3
Present Value sensitivity - low	£34,363,669	£26,833,659	£7,530,010	1.3
Present Value sensitivity - high	£99,782,635	£26,833,659	£72,948,976	3.7





Examples of multiple benefits estimation – using the BeST tool

Combined sewer overflow – spill reduction with GI in Roundhay Park, Leeds, UK

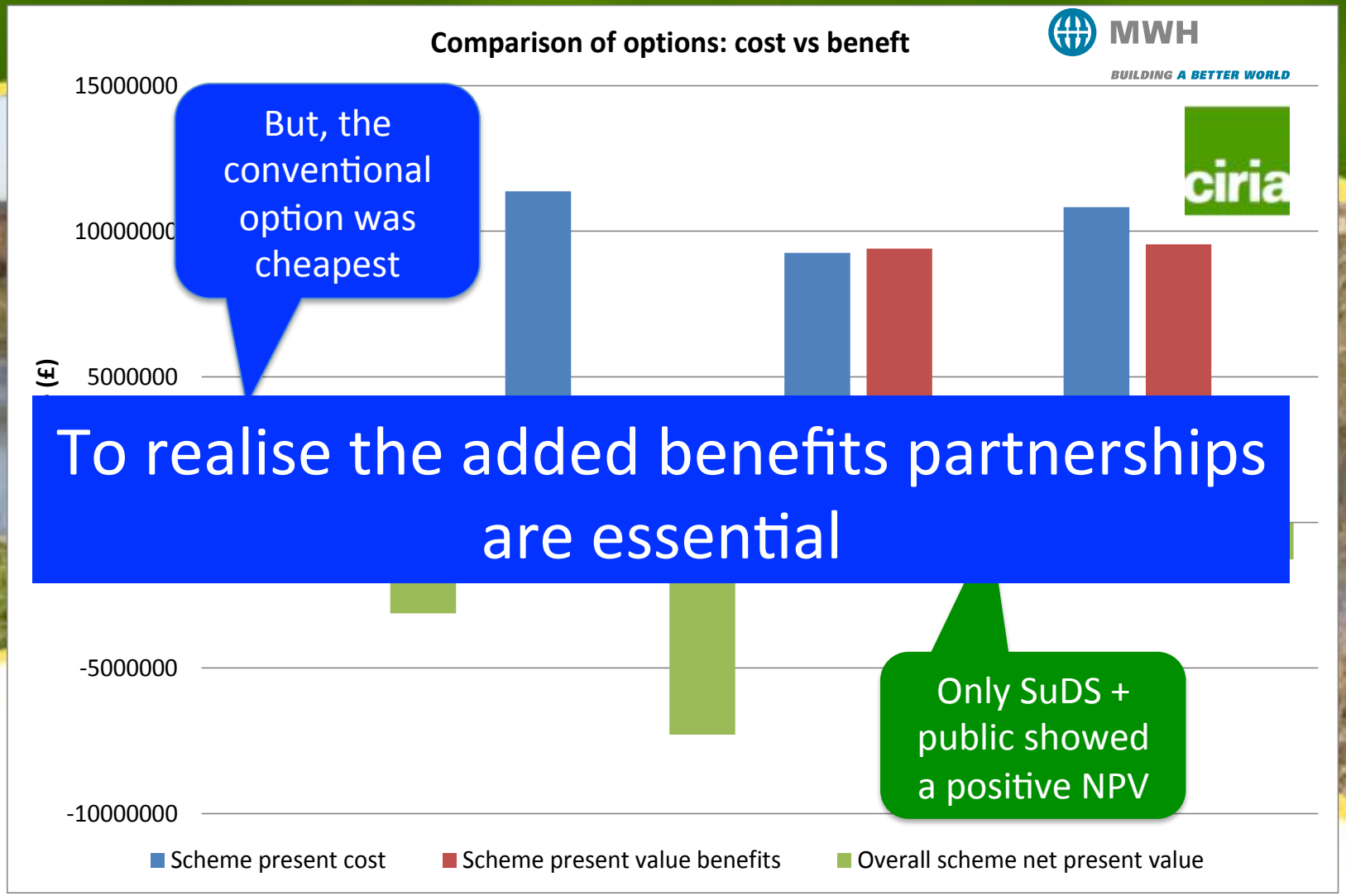
ciria

MWH

BUILDING A BETTER WORLD

BeST tool outcomes

No future scenarios considered



Issues with assessing multiple benefits

- Who pays?
- Who gains?

Should a private company be made to spend more in order to bring greater overall benefits to society?

- Complexity means that partnerships are essential for funding and spreading the benefits
- Double/multiple counting of benefits is a risk, together with uncertainty about outcomes - as we learn by doing we will gain confidence

Summary

- There have never been such good opportunities before for
  - Synergies:
  - Integrated water management
  - Multi-functional infrastructure
  - Multiple land uses
- Bringing disparate systems together – especially land use/ urban planning and water
- There are now the tools to deliver best technologies, use nature as infrastructure and to create clear business cases

http://watersensitivecities.org.au/

Multi-functional roundabout in Uptown Normal Illinois