



Blue Green Dream

Imperial College
London



The Greater London Sustainable Urban Drainage Schemes (SUDS) Debate

Based on the presentation at **ICE**, LONDON, 20th May 2013
A shorter version prepared for the meeting with Richard Benyon

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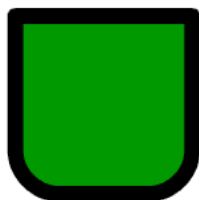


The presenter

- ❖ **Professor of Urban Water Systems. Imperial College**
- ❖ **Head of the Urban Water Research Group**
- ❖ **Editor-in-Chief, URBAN WATER JOURNAL**
- ❖ **Editor-in-Chief, URBAN WATER Book Series**
- ❖ **Special Advisor to UNESCO on Urban Water**
- ❖ **Coordinator of the EU projects: Blue Green Dream and RainGain**

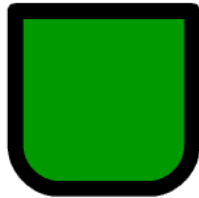


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To BGD or not to BGD that is NOT the question now
BGD deliverables customised to meet your needs, why
London should not miss this opportunity ?



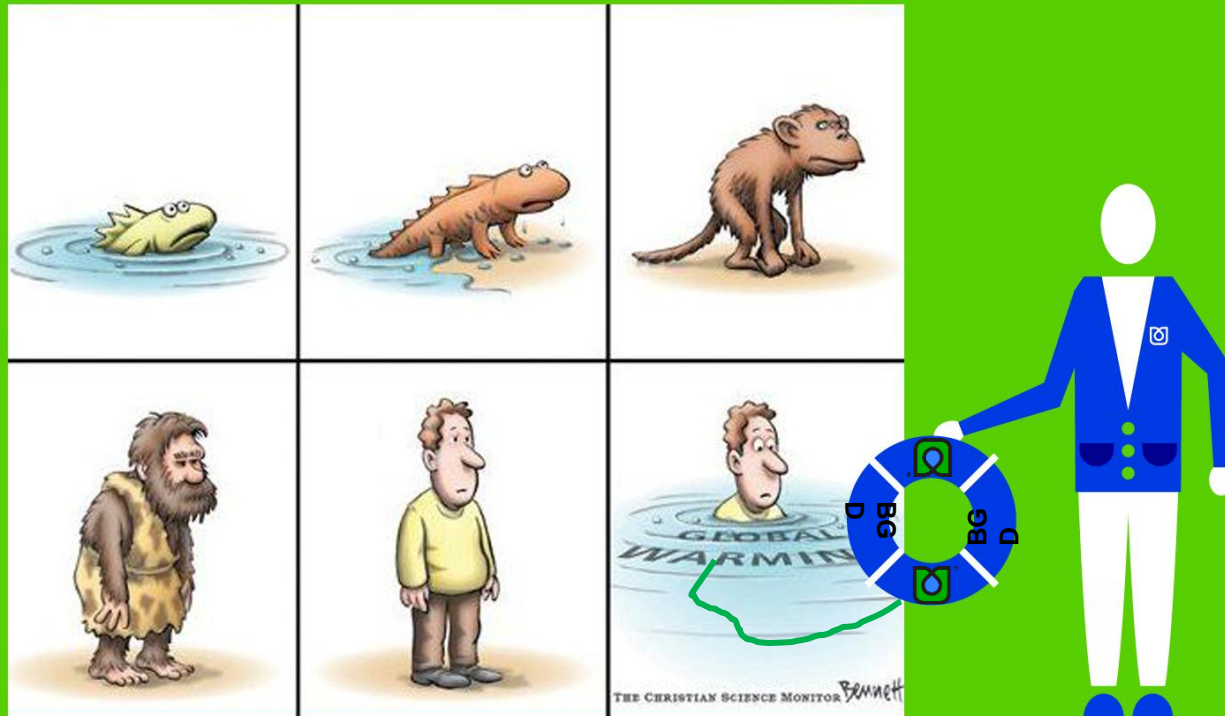
WHY **BGD** project ? Adaptation for CC

1. Climate change and increasing urbanization call for creative planning of new urban developments and retrofitting of existing urban areas to increase resilience to the adverse effects of CC.
2. Green and blue infrastructure assets, currently largely operating as two separate systems – no interactions.
3. A major change in the existing paradigm of design and operation of urban blue and green infrastructure and systems is urgently required to achieve the above aim.



IMPACTS OF CLIMATE CHANGE

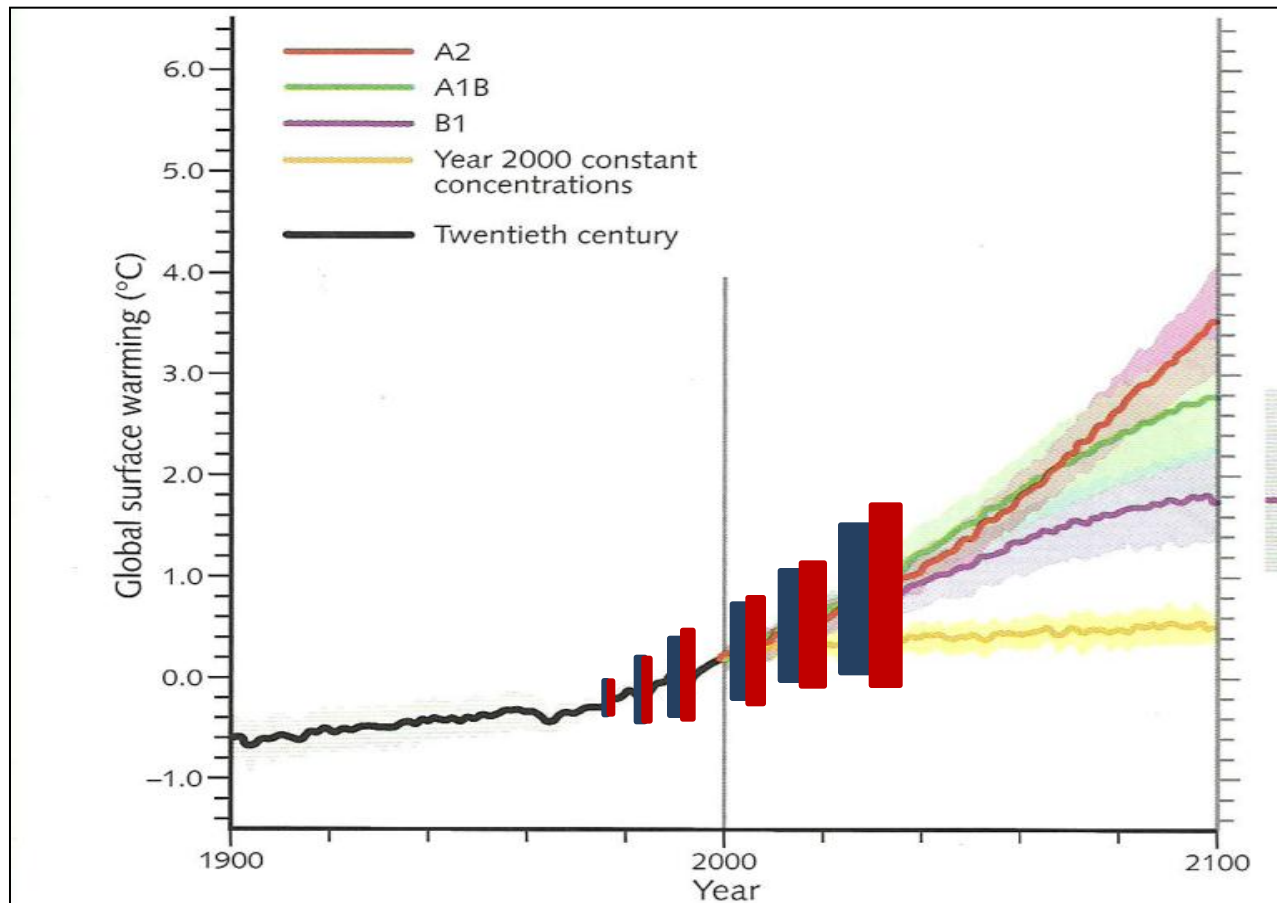
... AND MITIGATION





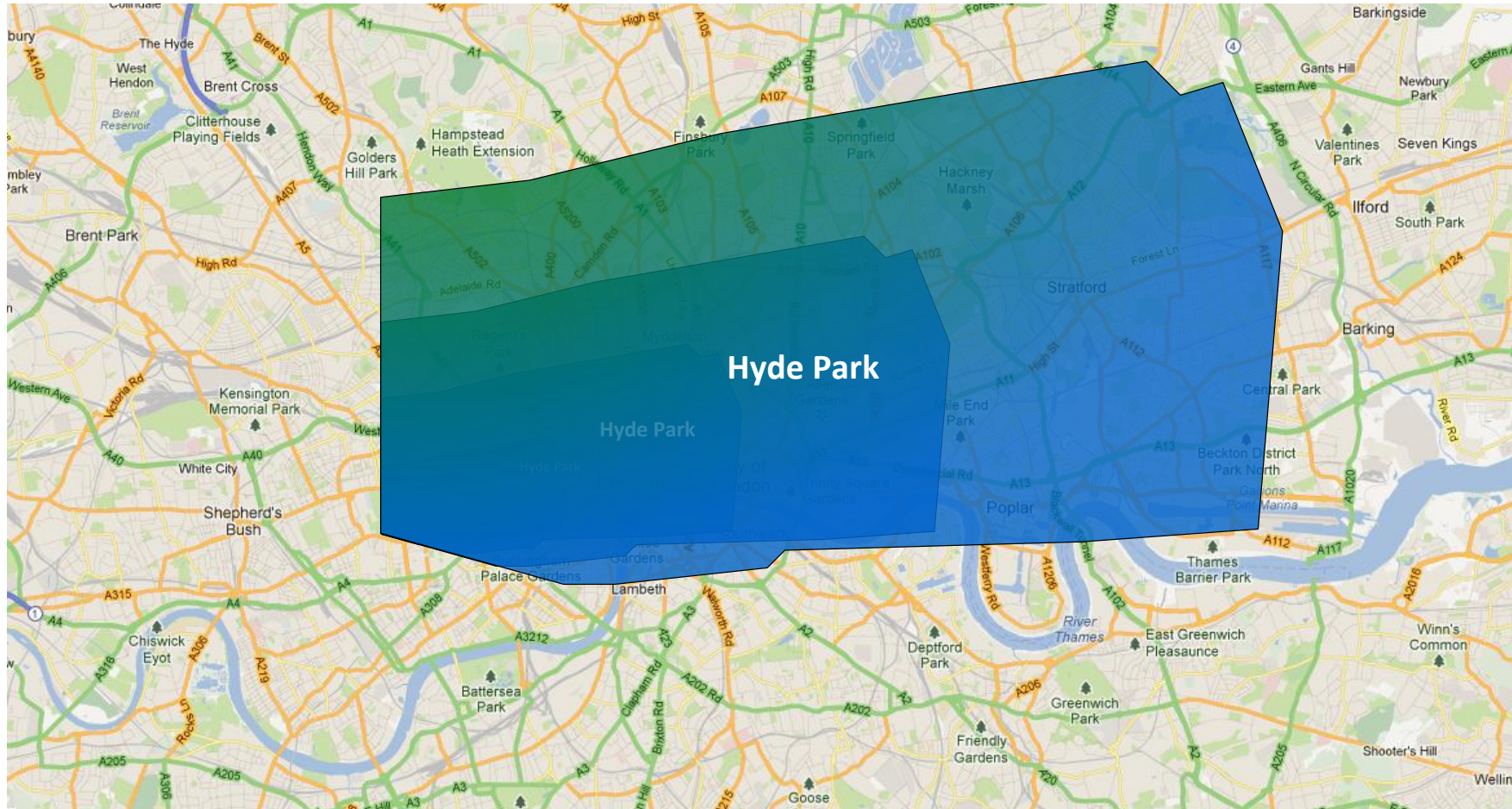
Flood, droughts, heat waves, cold spells, tsunamis

We are witnessing significant increase of both duration and magnitude of EXTREMES
In addition to long term trend in Climate Change





Urban creep LONDON loses 2.5 Hyde Park equivalent green spaces every year





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ISSUES TACKLED BY BGD



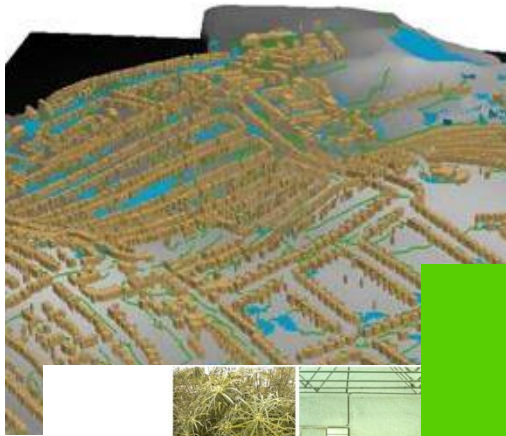
Water pollution

Droughts

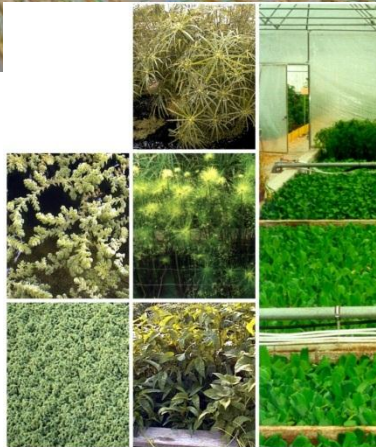
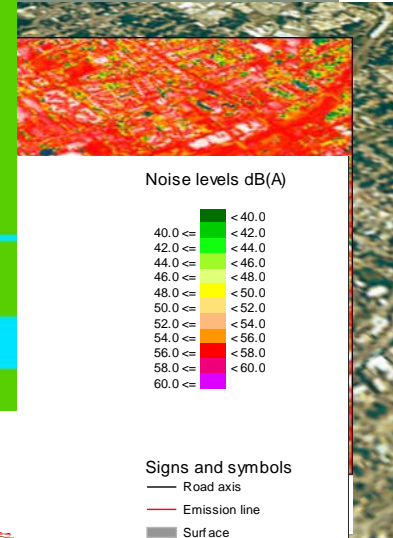
Air pollution

Heat island

Urban amenity and
Human health



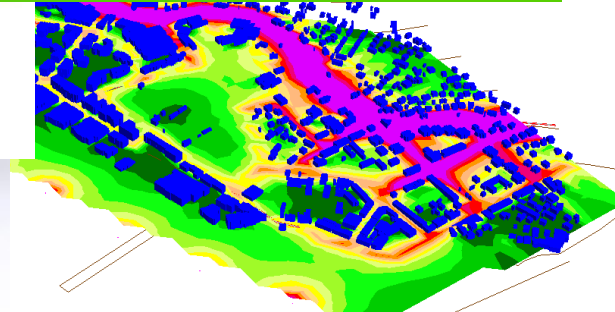
Water companies with hosepipe bans, spring 2012



Urban
agriculture

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Crime





SUDS are a step forward but not sufficient, adaptation for Climate Change call for more integrated solutions

Socio-Political Drivers

Tackling the Integrated solutions for adaptation of urban ecosystem services for CC

Water supply access & security

Public health protection

Flood protection

Social amenity, environmental protection

Limits on natural resources

Intergenerational equity resilience to climate change

Expansion of SuDS concept

Water Supply City

Sewered City

Drained City

SUDS

Water Ways City

Water Cycle City

Water Sensitive City

WSUD

BGD

Supply hydraulics

Separate sewerage schemas

Drainage, channelization

Point & diffuse source pollution management

Diverse, fit-for purpose sources & conservation promoting protection

Adaptive, multi-functional infrastructure & urban design reinforcing water sensitive behaviours

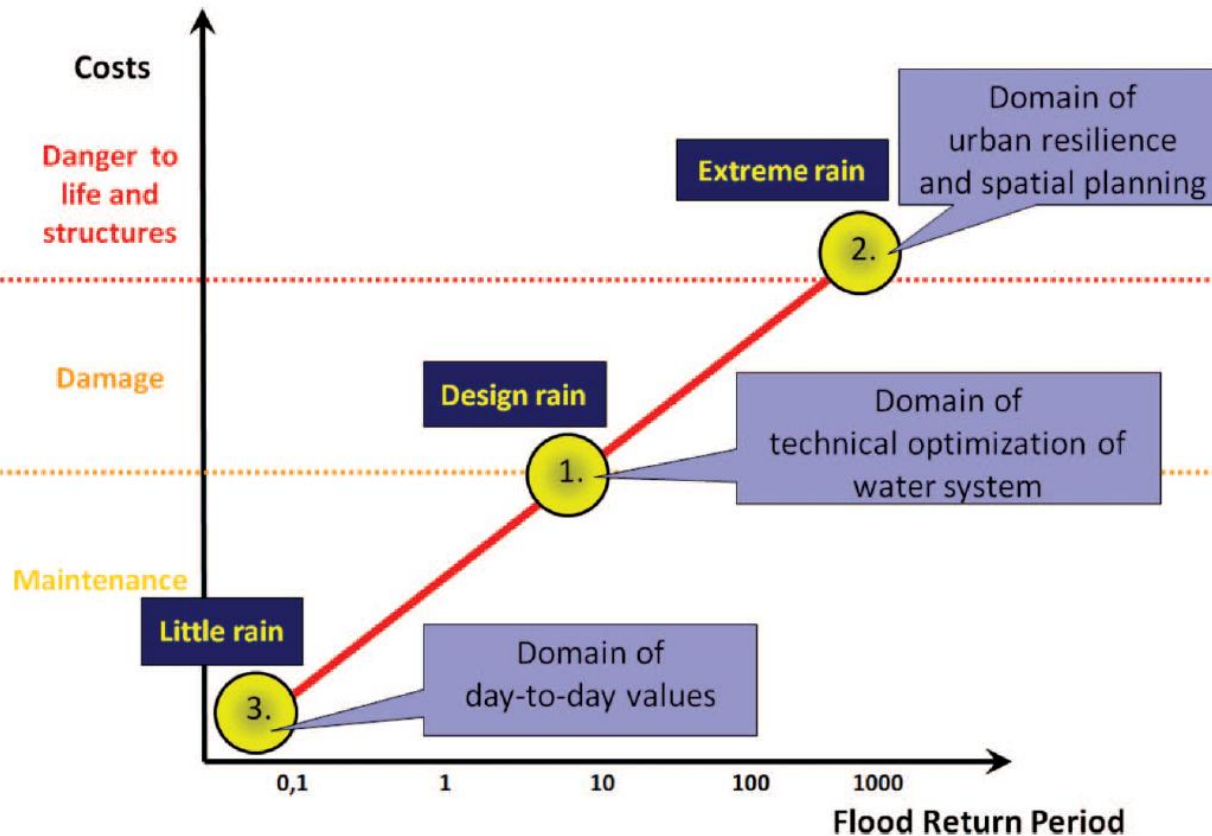
Expansion of SuDS concept

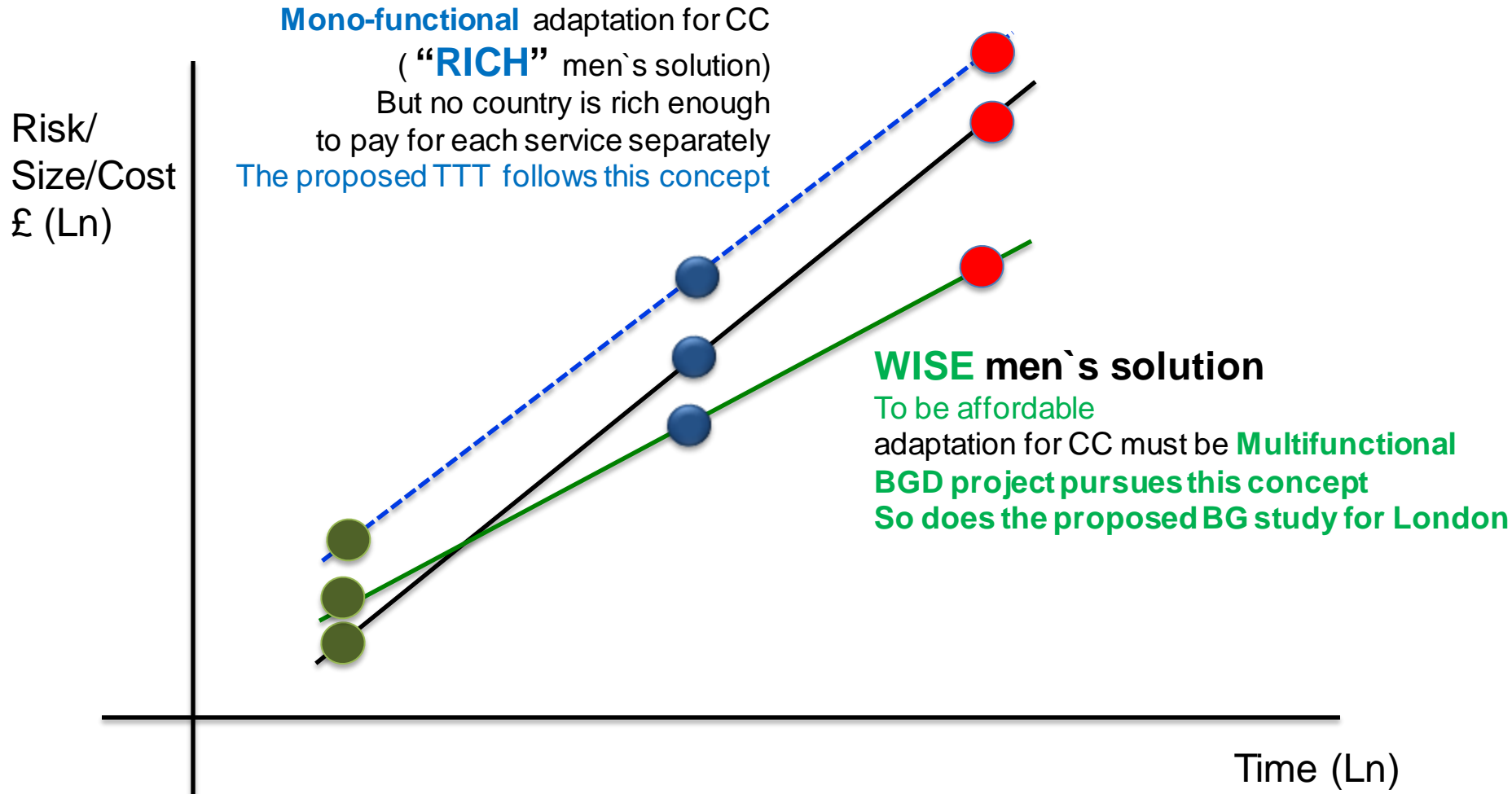
Optimal solution for adaptation of urban spaces to CC based on BG interaction with urban ecosystem services

Service Delivery Functions

WSUD: Water Sensitive Urban Design [CIRIA, 2013]

BG: Blue Green [Maksimovic, 2013]





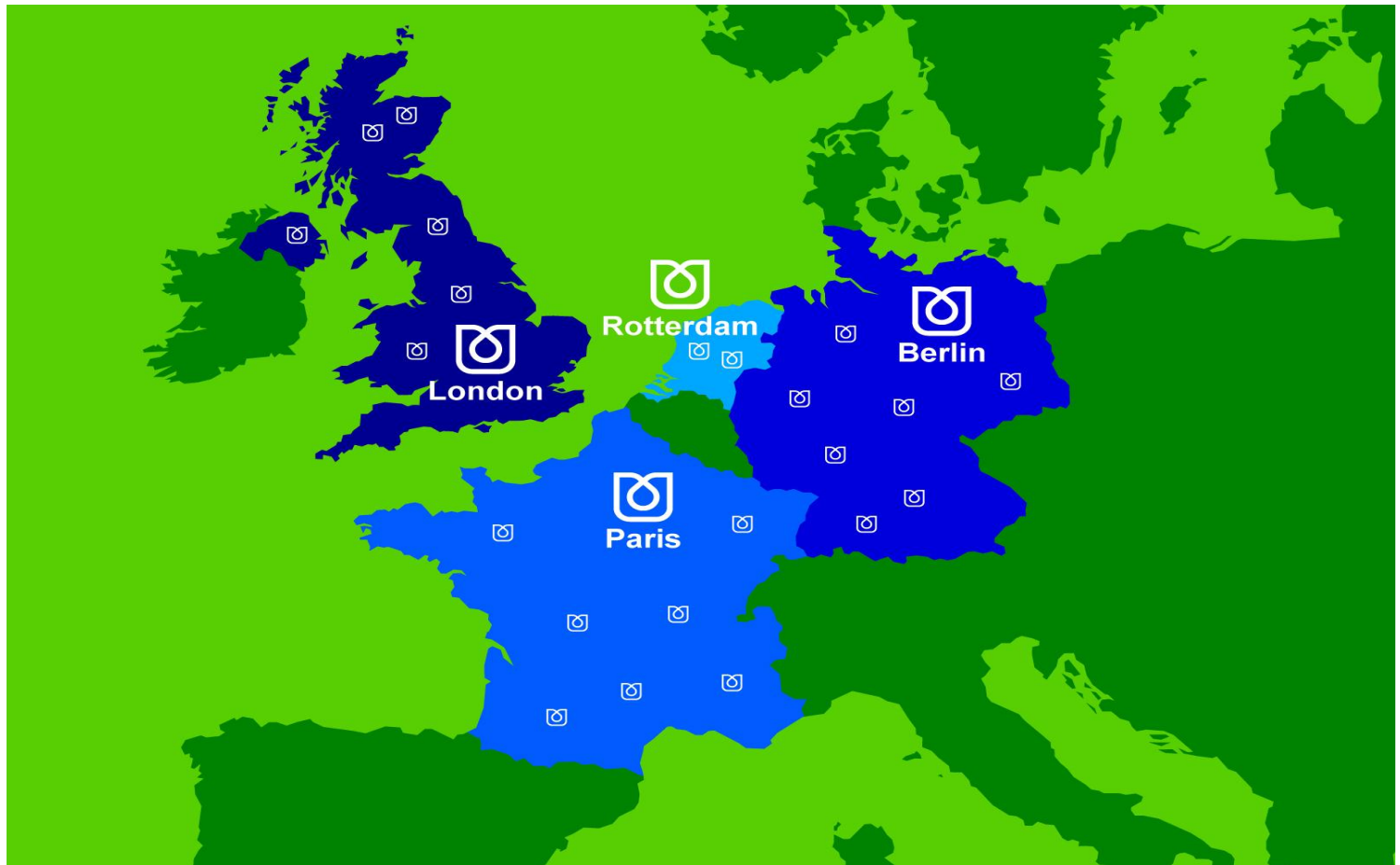
Three Points Approach (3PA) A tool to support climate change adaptation through transdisciplinarity and multifunctionality
(Adapted after C.F. Fratini a b , G.D. Geldof a c , J. Kluck d & P.S. Mikkelsen, Jun 2012.)



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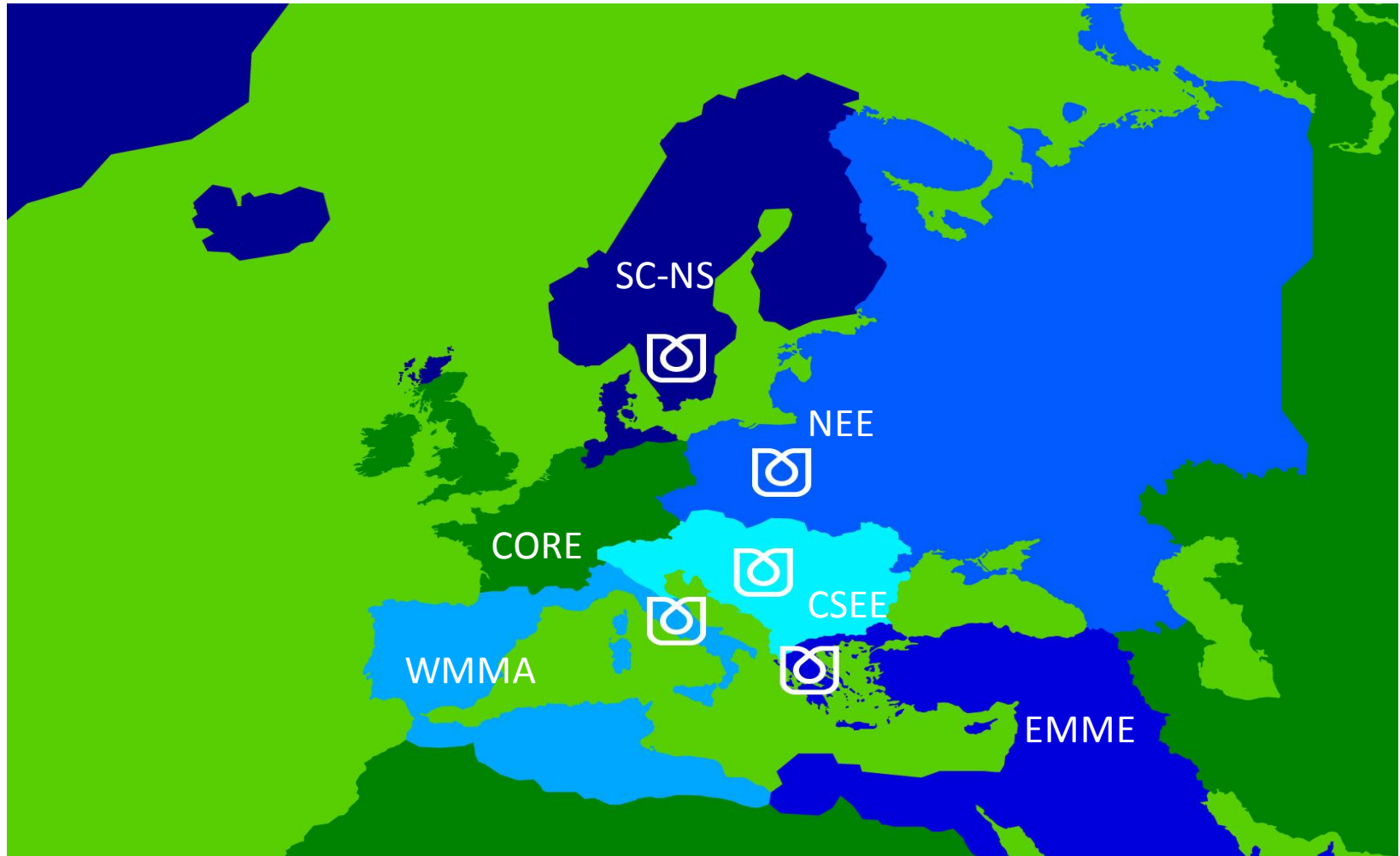


Current BGD project demo sites





BGD Regions in Europe

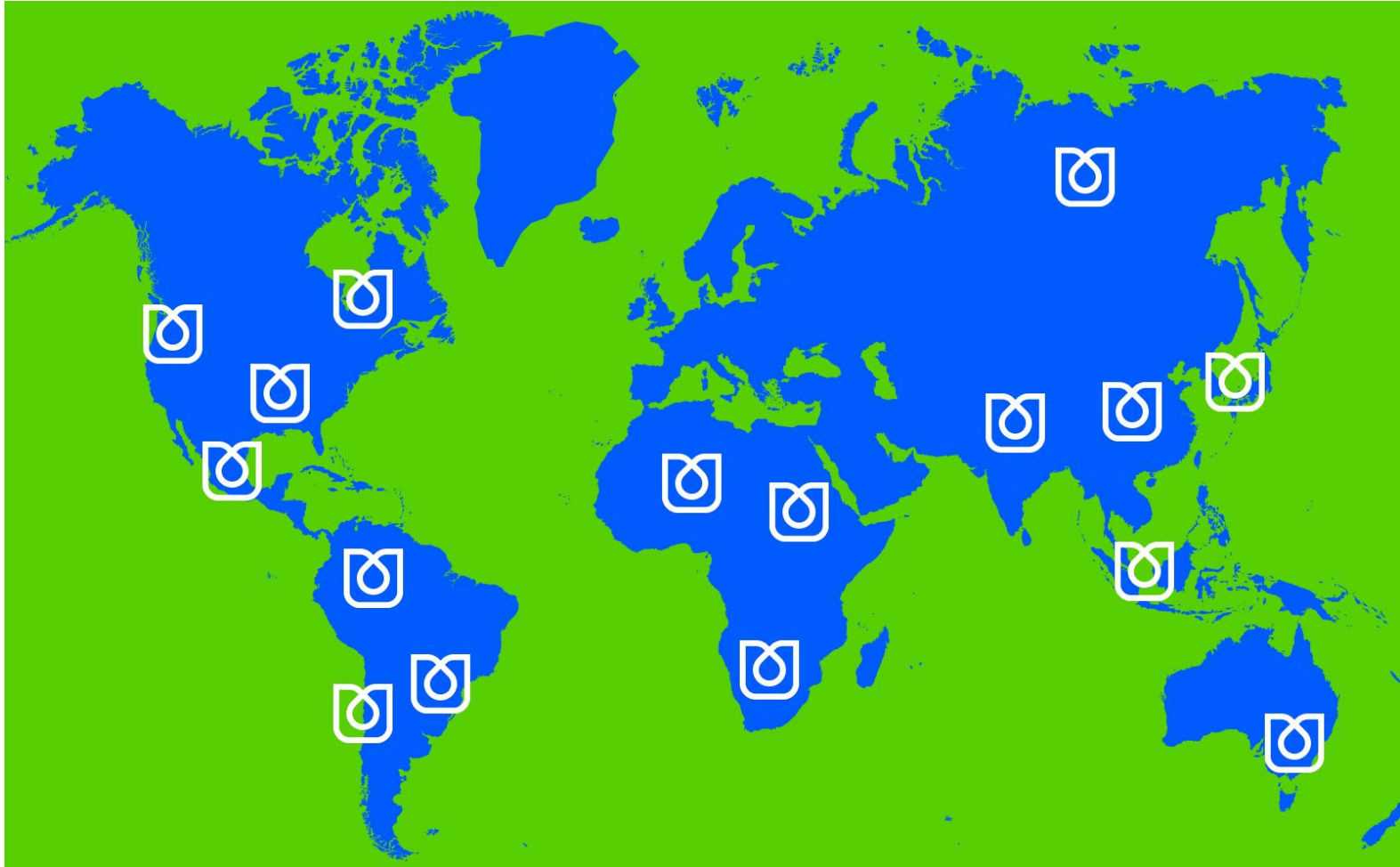




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BGD Regions for the global coverage

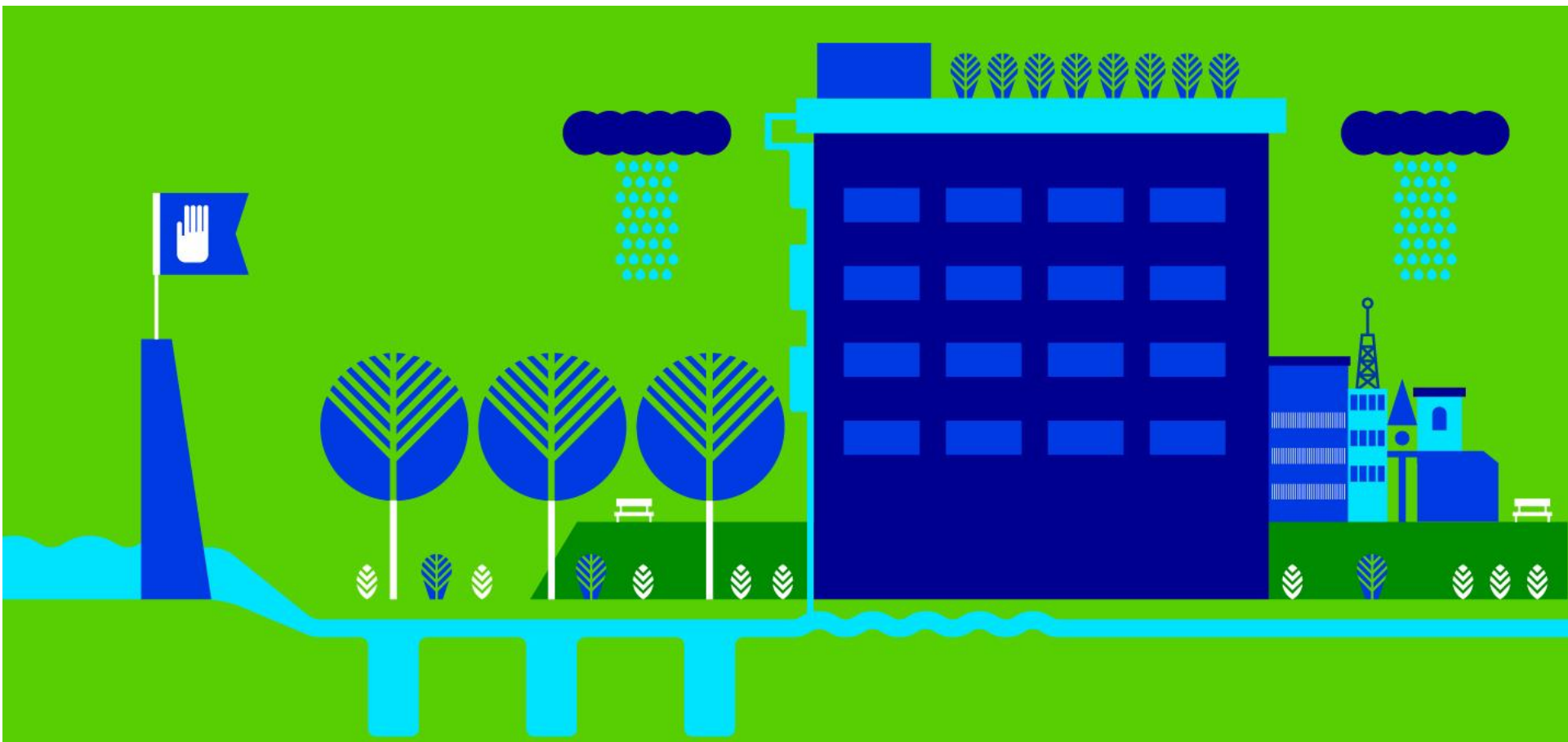




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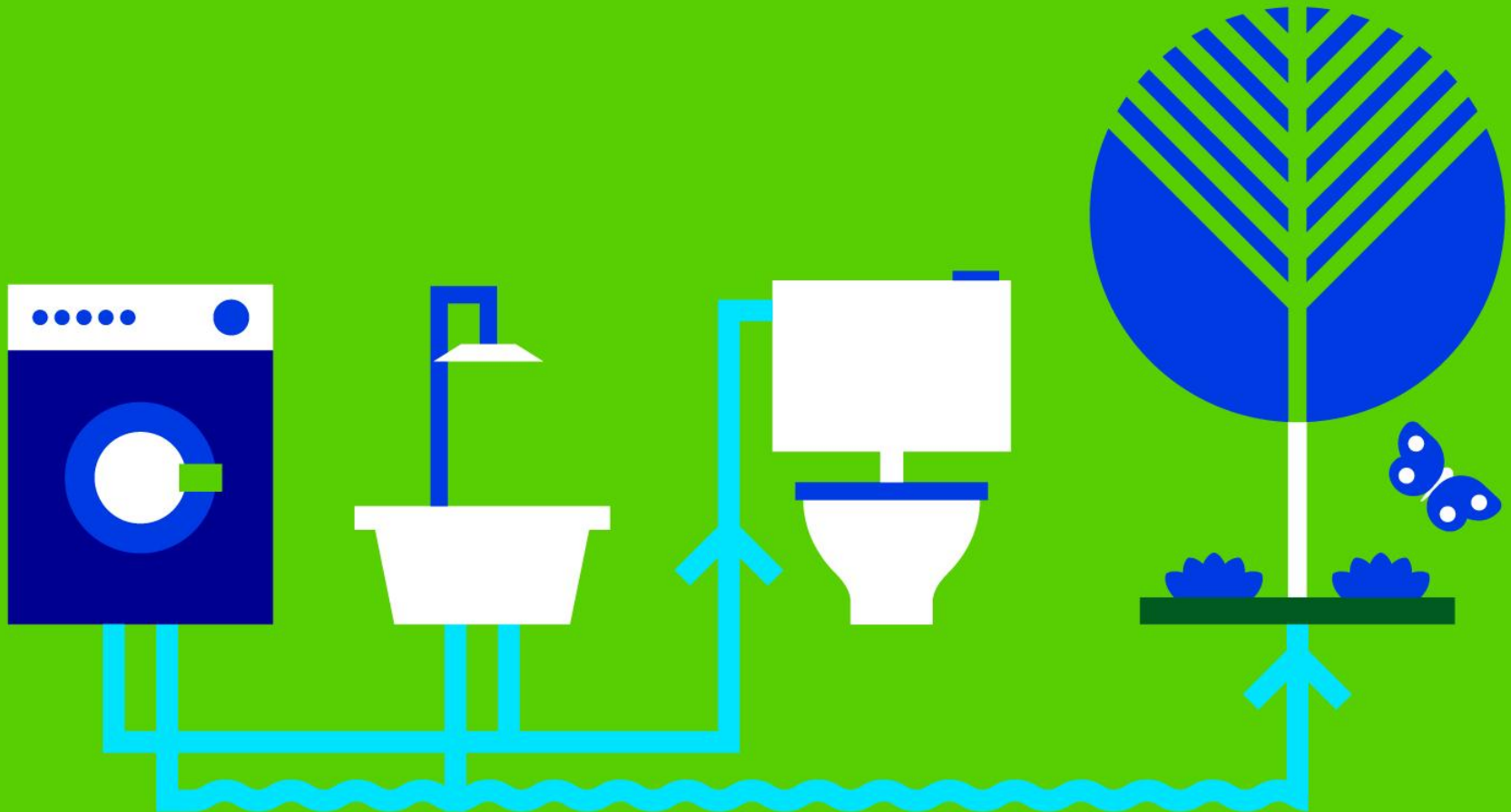


REDUCED PLUVIAL FLOOD RISK



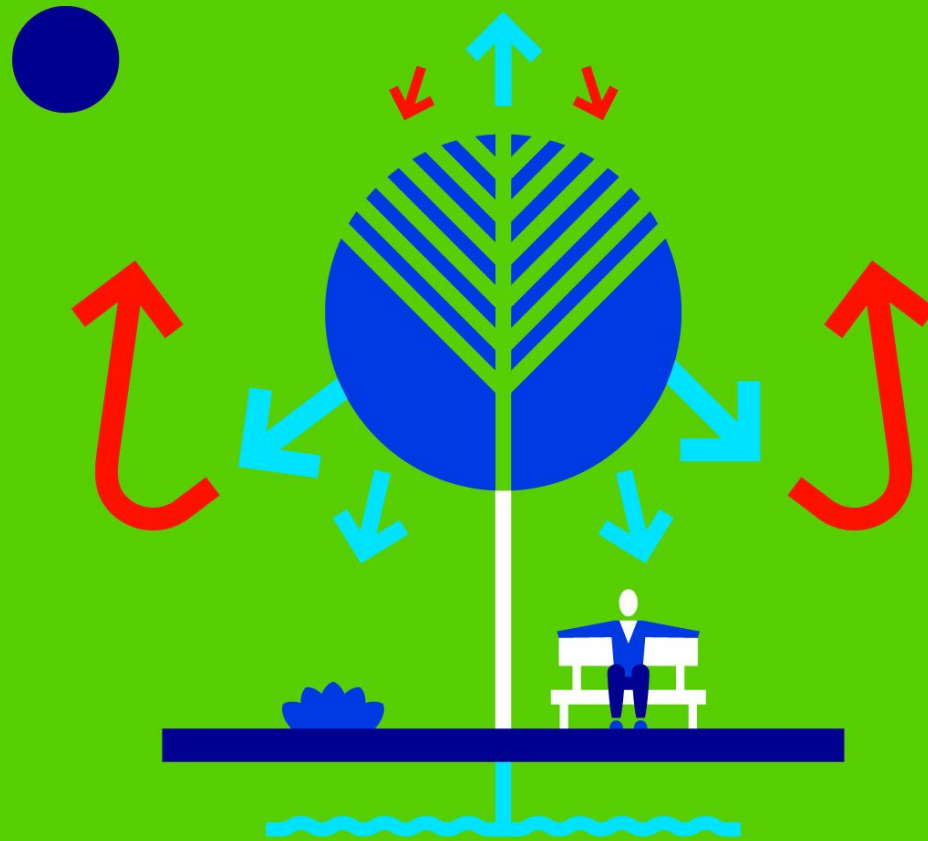


GREY WATER RECYCLING



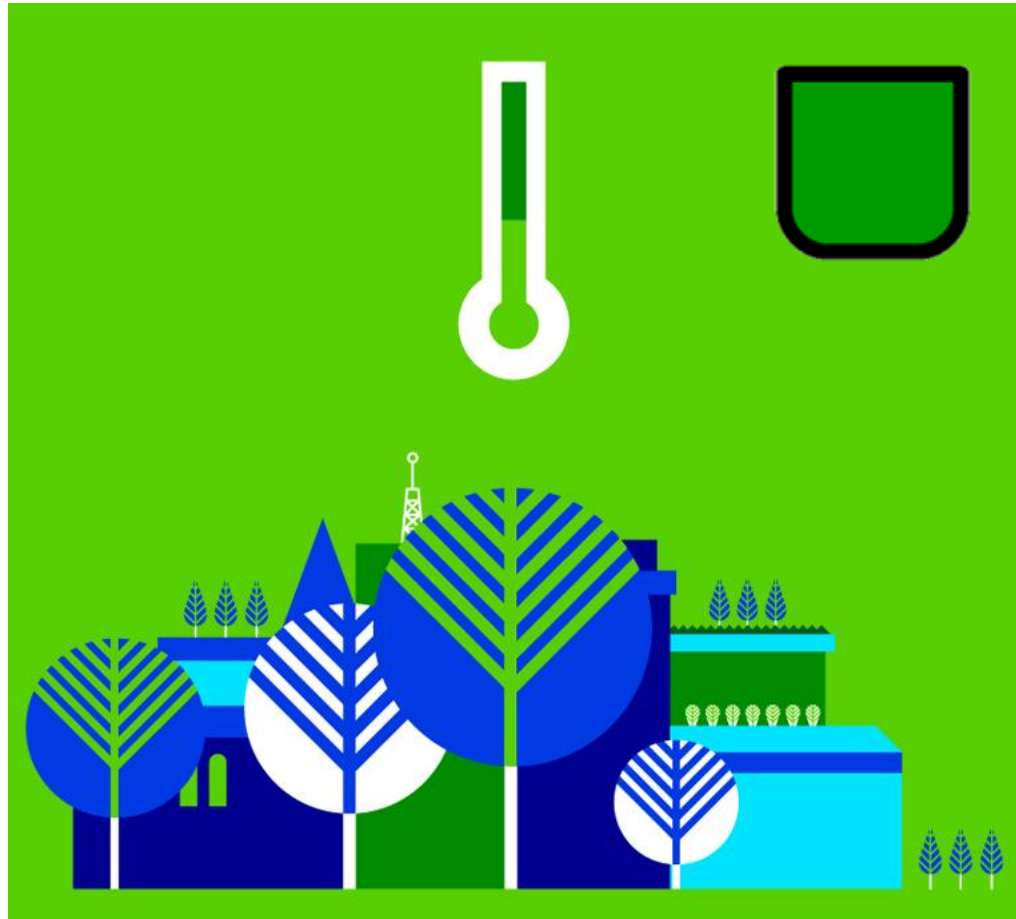


EVAPORATIVE COOLING





URBAN HEAT ISLAND

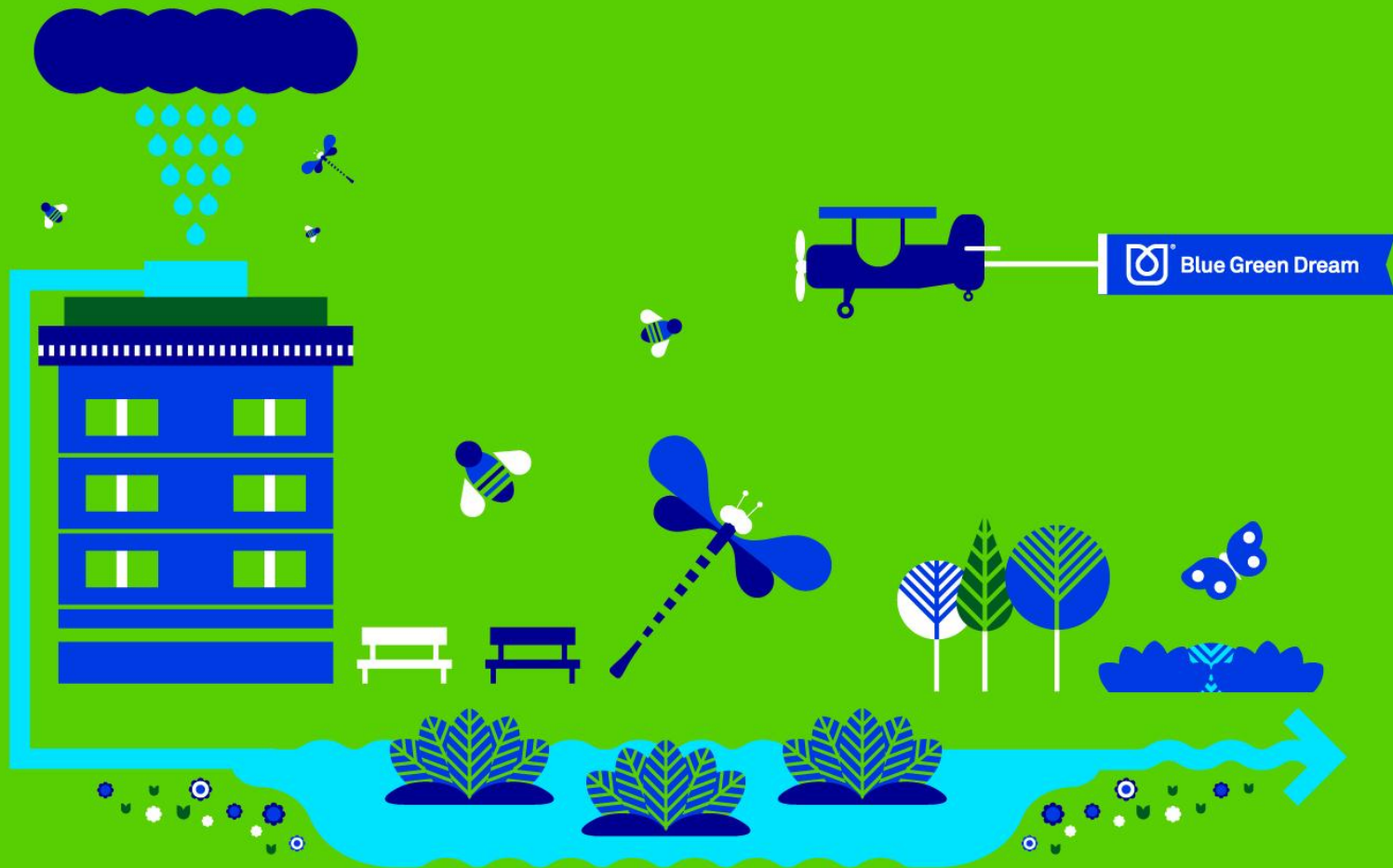




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ENHANCEMENT OF BIODIVERSITY





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INCREASED AMENITY AND URBAN HEALTH

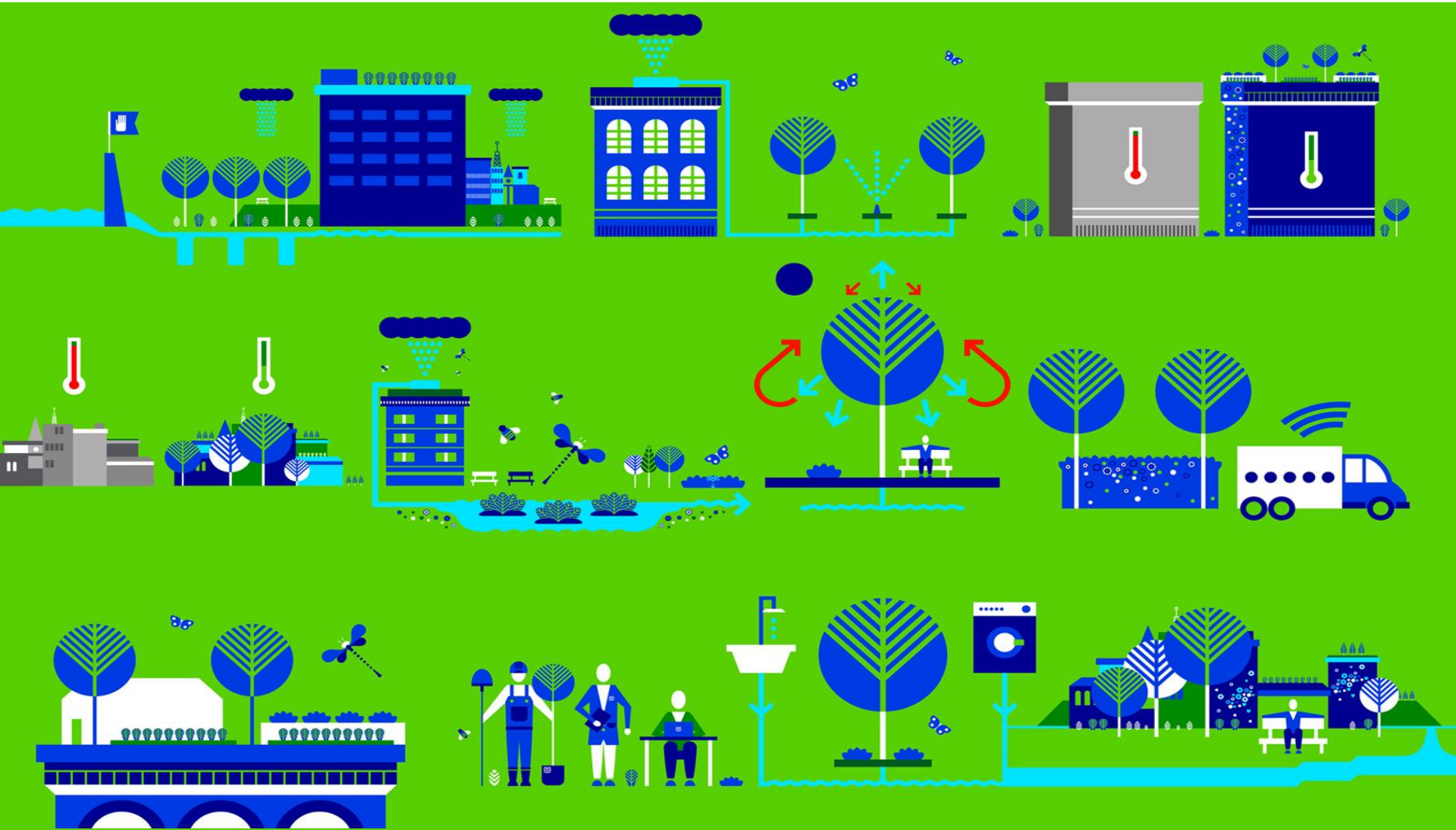




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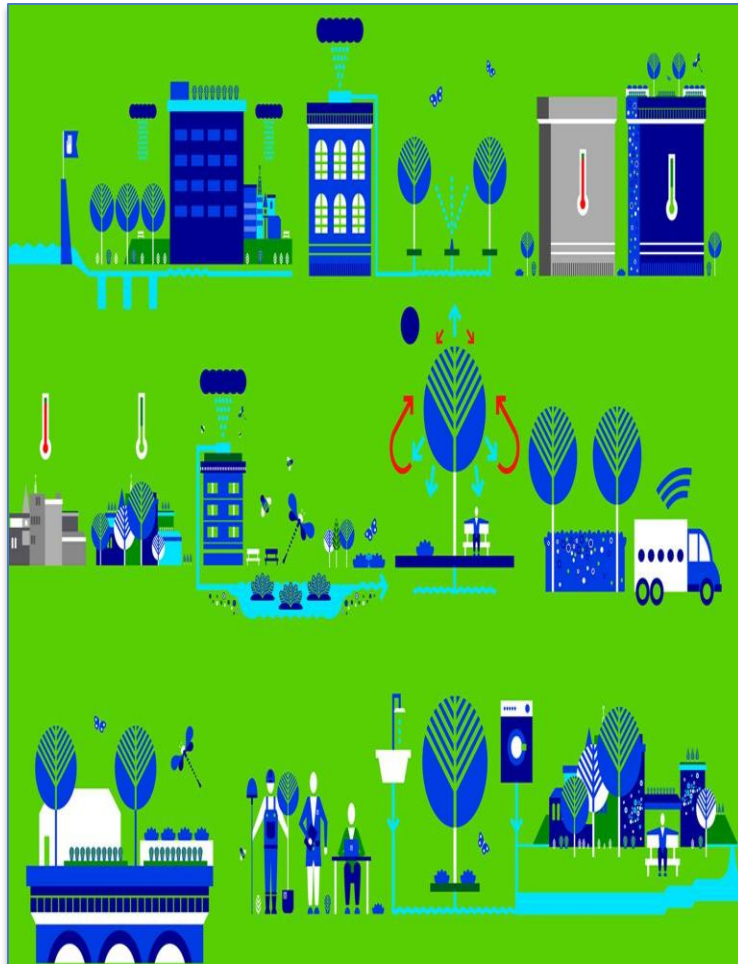


INTEGRATED MODELLING AND QUANTIFICATION OF IMPACTS ON URBAN ECOSYSTEM SERVICES





CLIMATE KIC PhD RESEARCH => BGD INTEGRATED MODELLING SYSTEM



WATER BALANCE

**NUTRIENTS & POLLUTION
MIGRATION**

**MICROCLIMATE &
HEAT ISLANDS**

**BGD FOR
ENERGY EFFICIENCY**

**PLANTS
FOR BG SOLUTIONS**

**BGD & ECOSYSTEM
SERVICES**

UK PhDs

FRENCH PhDs

GERMAN PhDs

DUTCH PhDs

**BGD INTEGRATED
MODELLING SYSTEMS**



Can LONDON afford to lag behind the leading cities in the world in UW systems (and why should it happen) ?

- ❖ **Lack of or outdated governmental strategy (DEFRA etc..)**
- ❖ **Slow uptake of the UK science results, while the other countries are gaining advantage**
- ❖ **Confusing strategy of FFC (EA) in Urban Flood Prediction**
- ❖ **“Disorientated” (or vanished) Innovation (R/D) strategy of Thames Water**
- ❖ **Piecemeal (silo) approach at all levels,**
- ❖ **Lack of incentives from bot central and local governments**

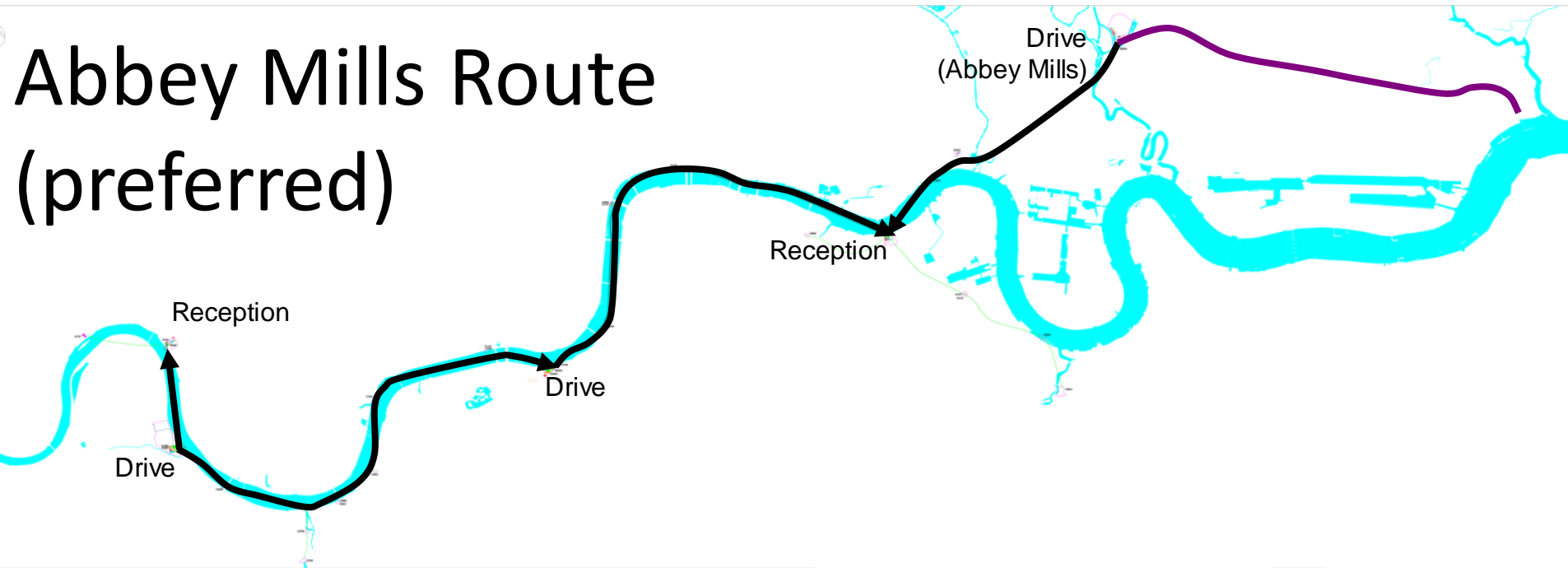


Thames Tideway Strategic Study used very biased and incomplete arguments in justifying the tunnel solution

Action before sewer: Source Control and Sustainable Urban Drainage Systems (SUDS)		
Within sewer network: Localised storage and separation		
In-river: More 'Bubbler' and 'Skimmer' vessels		
Intercept overflows: Central storage and transfer		



Abbey Mills Route (preferred)



The proposed (tunnel) solution is “mono-functional”, it only intercepts CSO’s spills of the return periods shorter than one year. Spilling will continue several times a year and will increase in the future.

Blue / Green solutions can provide the same (or even better) solution to the spillage and provide MANY ADDITIONAL BENEFITS (see the next slide)



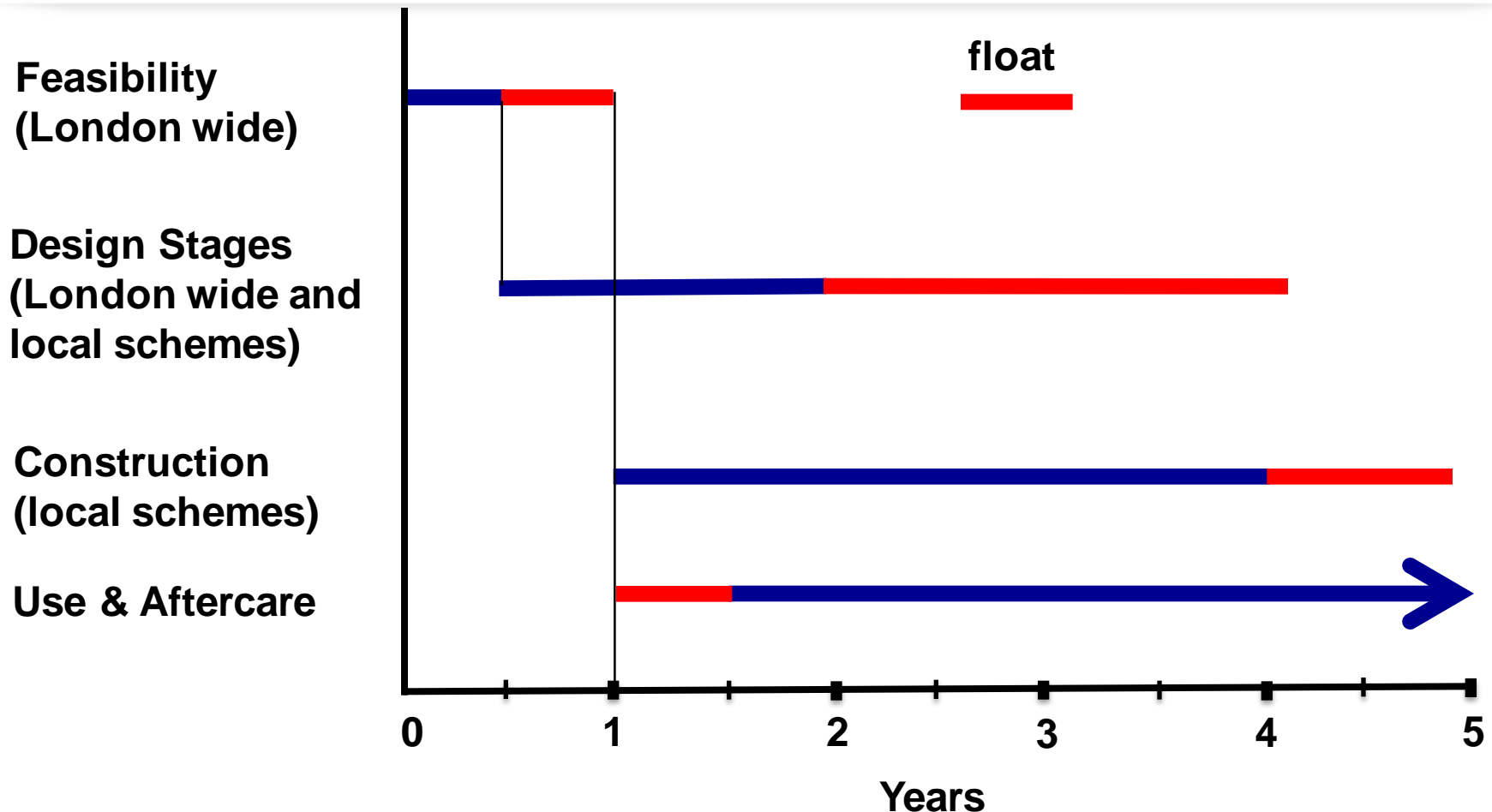
Surface (pluvial) flooding		
Water quality		
Droughts		
Urban heat island		
Air pollution		
Noise pollution		
Urban creep		
Biodiversity		
Urban amenity		
Social issues/Crime		
Urban agriculture		
Human health		
Job creation		



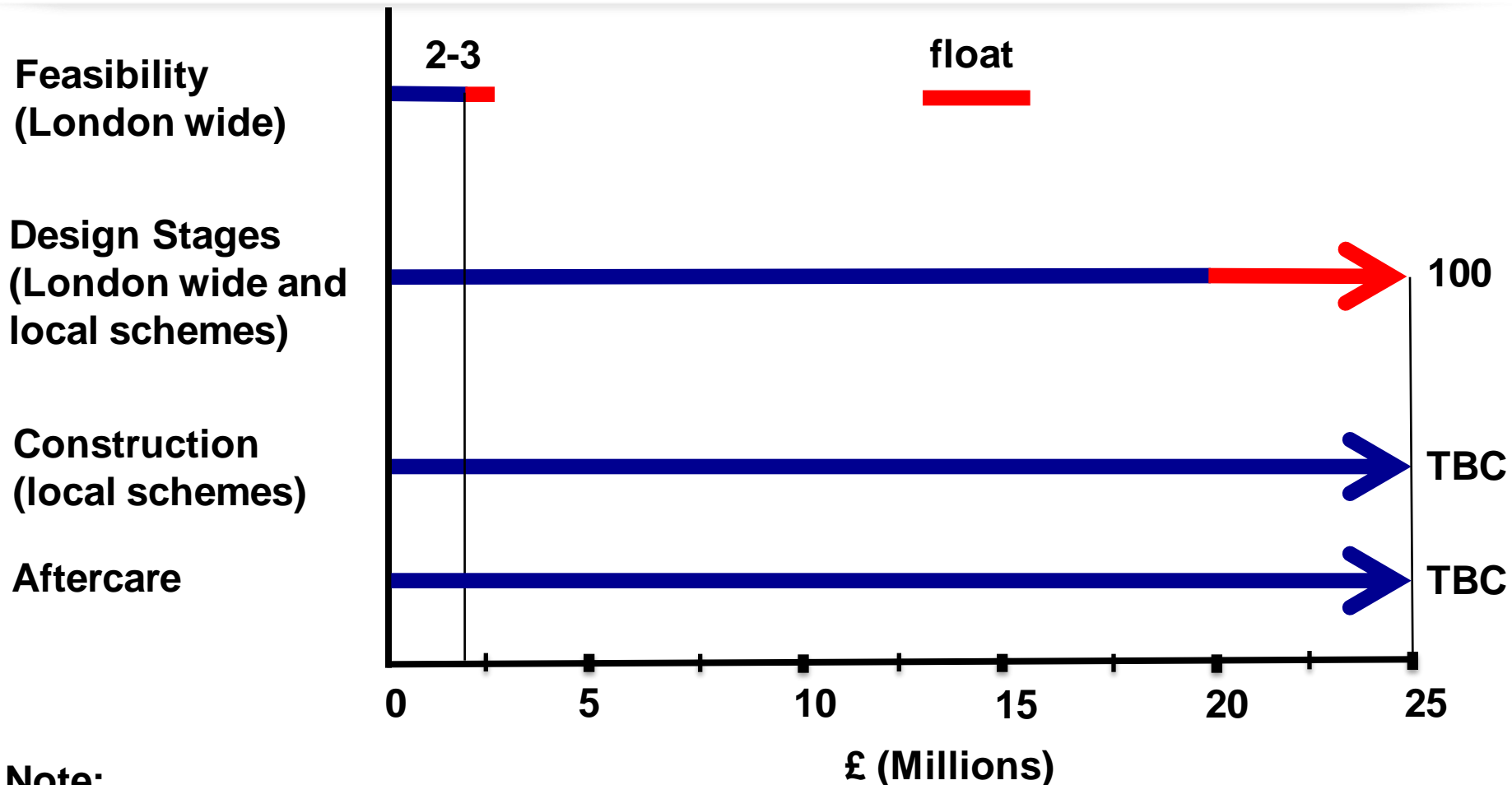
The OPTION: BLUE GREEN LONDON

What is proposed

- ❖ **A comprehensive BG Solution for London NOT to be confused with SUDS only, it stretches beyond SUDS**
- ❖ **Starting with (an INDEPENDENT) BG Study for London**
- ❖ **Multifaceted / Multifunctional (**WISE Men's solution**)**
- ❖ **Provides Integrated solutions for urban ecosystem services**
- ❖ **Requires multiple changes of “mental set-up” at ALL levels, better / faster incentivized procedures**
- ❖ **PUTS LONDON IN DRIVING SEAT AT THE GLOBAL SCENE**



Note:
Feasibility stage will include and report on grey infrastructure requirements as part of an holistic and symbiotic comprehensive solution for London



Note:

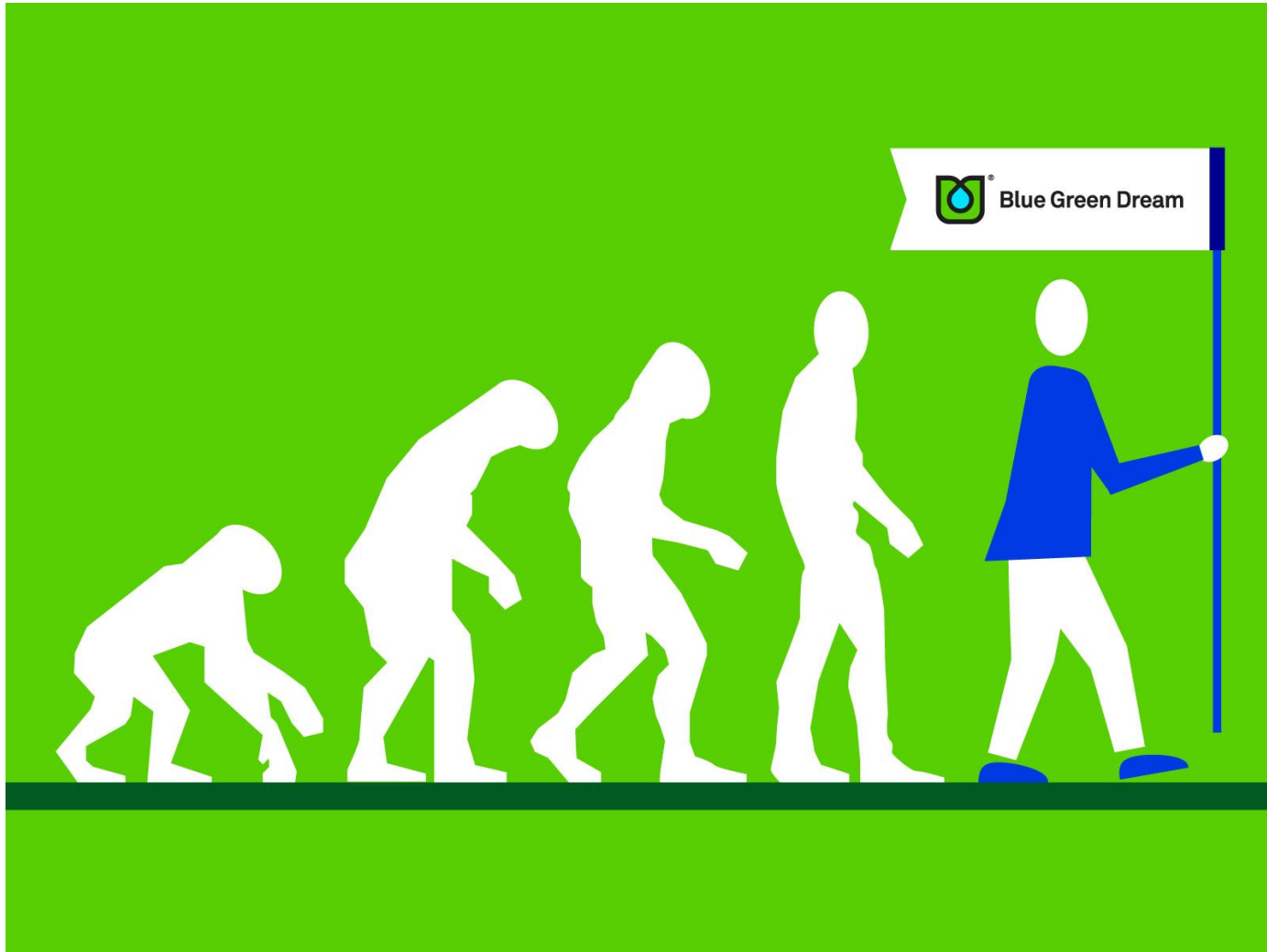
Feasibility stage and onward studies will require a consortia of design consultants guided by a steering committee. Construction and aftercare is predominantly local low skilled employment.



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EVOLUTION ... BGD ... NEW ERA IN HUMAN CIVILISATION DEVELOPMENT





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Urban Water Journal <http://www.tandfonline.com>

Urban Water Book Series <http://www.routledge.com/books/series/UWS/>

Blue Green Dream project <http://www.bgd.org.uk>

RainGain project <http://www.raingain.eu/en>

