SuDS Opportunities (Getting the right balance with conventional approaches)

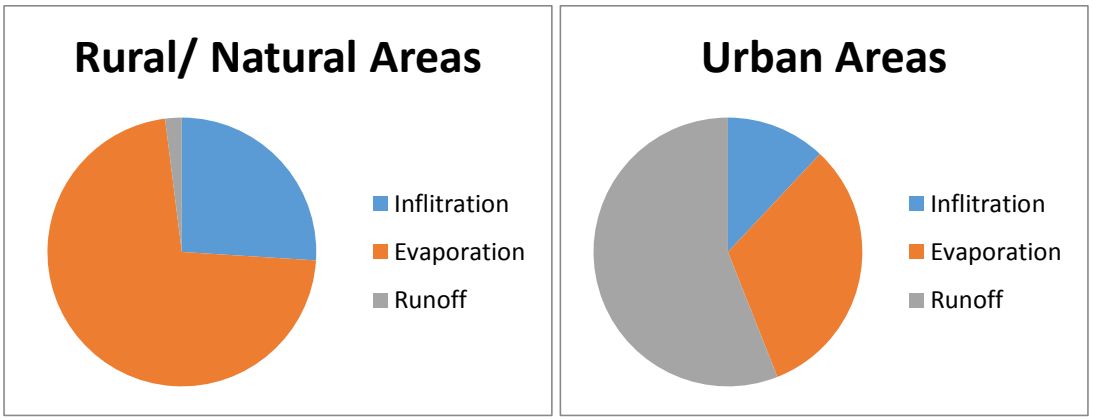
High level interpretation of the needs

The objective is to pilot sustainable urban drainage (SuDS) schemes on a **retrofit basis** and implement a rigorous evidence based methodology to valid the overall benefits of such schemes; in order to inform on the overall cost/benefit for the application of soft measures in densely urban areas as part of overall solution major solutions.

Providing real evidence to support SuDS are needed to provide:

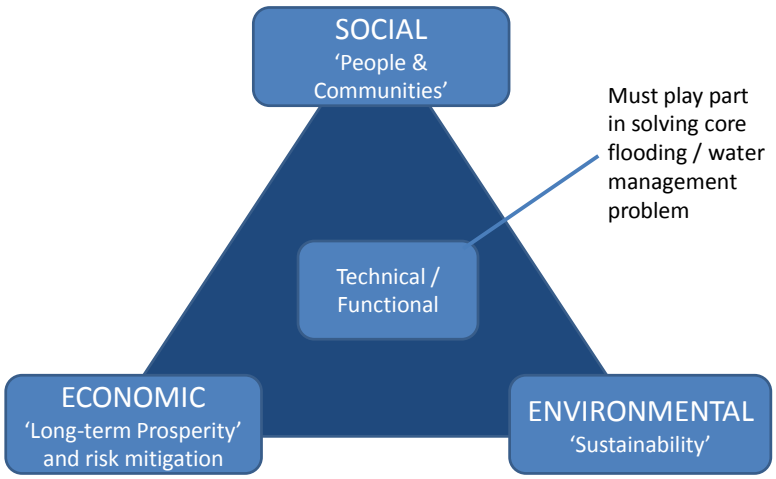
- Greener, less capital intensive solutions to extreme flood events and resultant sewer flooding
- Contribution to minimising flooding using soft measures
- Adapting to climate change (increased intense rainfall risk)
- Achieving economic and environmental sustainability
- Using the natural environment to partly act as the drainage conduit
- Creating side-opportunities for Improving the public realm (and green corridors) at the same time
- Managing storm water run-off generated by extreme rainfall with property level measures to capture/delay rainwater thereby reducing peak flows which overwhelm the collection system.
- Produce an evidence base to show the quantum of extreme storm events that can be delayed and hence the proportion on large civil capital investment (tunnel/pipes) that can be reduced
- Explore holistic range of measures to solve the root cause problem, as opposed to merely implementing heavy civil engineering measures only to address the effect. Looking for low impact green techniques, where possible.
- Help to provide part of a roadmap towards a greener, flood-proof sustainable sewer/drainage system for urban centres around the world.

Exploring practical and viable measures to soften the impact of run-off in densely urban areas:



Recognising also that latest planning guidance PPS25 requires SuDS solutions to be incorporated into new developments and building standards; and that EA requires a demonstration of “can’t make worst, ideally improve” for brown-field developments.

Traditional approaches have focused mainly on drainage quantity, whereas SuDS concentrate on quantity, quality and amenity; and considers the social (community), economic and environmental benefit overall:



Key issues of SuDS programmes

Although technically quite simple, the whole subject of SuDS is a 'messy problem'. Key issues include:

- Must engage with stakeholders (the carrot approach to reducing impact and impact on their properties; better public realm, nicer places, intangible knock-on effects). Must be open to concerns and suggestions (progressively build buy-in)
- Much of the implementation work is on property and public realm not under the direct control of the water utilities
- Getting the public to understand how extreme rainfall events can create sewer flooding events and how SuDS can help to reduce this, and have a benefit to the community as a whole (in ways beyond just water flood issues, such biodiversity, public realm improvement, local regeneration, more local jobs, better place to live, etc)
- Need data to create a real evidence base for deciding and policy and strategy for future. Data/information and methodology must stand up to scrutiny. In general the "jury is still out" on the benefits SuDS can create, whereas Ofwat, EA, Defra and certain UK Water Utilities are pushing ahead with a positive aspiration for SUDs as part of solutions
- Need clear metrics for determining actual performance – not always easy.
- How operable and maintainable is the SuDS solution; and the legacy whole life cost. (key issues around who own the solutions)
- Who owns the resultant SuDS solutions. Often not the Water Utility.
- Costs (costs for whom) versus benefits (benefits for whom)
- Differing soil/drainage geo-technicals, and ensuring the solutions are compatible

- Water quantity is relatively easy to measure and model; whereas water quality which can often be an issue within SuDS and is more challenging.
- The very early immature stages of SuDS approval bodies (SABs)
- The risk that one SuDS implementation merely moves the problem.

All of these issues need to be mapped out and methods to address the barriers formulated.

Approach

Our approach to such a project is:

- Draw upon past experience
- Brainstorm with client and key stakeholders, drawing in a range of specialists both technical and stakeholder engagement
- Clearly define the objectives of the project and the root causes
- Develop a rigorous evidence based monitoring programme, that can stand scrutiny for pre-SuDS and post-SuDS differential performance.
- Consider, using traditional methods closer to river outfall, and further upstream do more innovation SuDS.
- Rain gauge local rain intensity; flow metering at key outlets; presenting data for building and calibrating a model of the local drainage system. Because pre-SuDS and post-SuDS weather events will be different it is necessary to compare the pre and post models to demonstrate the differential. The differential being the benefit of the SuDS. This allows comparison of 'apples with apples'.
- Think ahead to how all the data can be used in a smart way – leading to smart integrated infrastructure.
- Undertake same season monitoring and including a winter period.
- Extend monitoring periods if extreme droughts are experience, as this could impact model calibration
- Use Google Earth ™ type desktop survey to identify property level projects
- The above relates to water quantity. Water quality may also be an issue, which presents a more complex and expensive issues, but this can also be done. SuDS are often projected as creating water quality benefits, and this may become important.

Potential solutions/measures include:

- Water butts (one or two linked) from roof drain pipe; can include narrow profile units.
- Stop or slow urban creep whereby rear gardens are patio'ed and front gardens are converted to concreted driveways and permeable land is concreted for car parking
- Source control- Roof drain down pipe disconnections to sewers
- Soakaways (often in urban cities like London, street facing property fronts drain to the combined sewer and rear property roofs drain to soakaways) – consider cross connection from front to rear.
- Permeable drives and patios
- Disconnection of cross connections to sewers

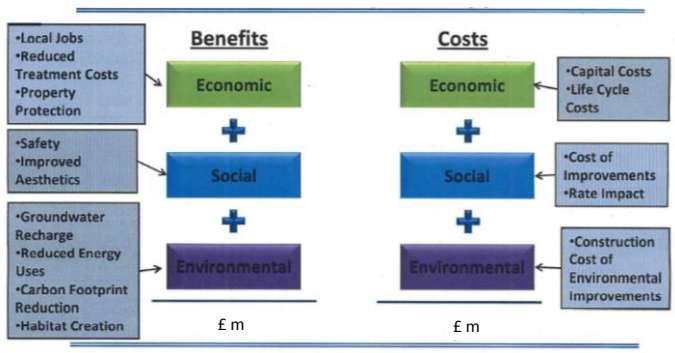
- Urban trees planting (benefits drainage, but also summer cooling, amenity, community wellbeing, and carbon reduction)
- Permeable pathways/slabs
- Filter drains / linear soakaway as the edge of handstanding
- Ponds and wetlands, within amenity areas.
- Establishment of pathway green verges, where viable
- Swales and infiltration trenches, where appropriate
- Rain gardens
- Grass roofs
- Green roofs
- 'Egg box'/'milk crate' type storm cells (e.g. foundations to supermarket car parks, etc)
- Underground attenuation cells
- Use of public realm to hold back water (allowing recreation parks to flood in short-term, in extreme events only)
- Ground water protection zones
- Simple property level flood protection such as air-brick issues (ensuring that SuDS measures don't increase risk of localised property flooding)

Evaluating the right solutions is a mixed multi-parameter evaluation of the following:

Method of evaluating

Example Criteria	Project 1	Project 2	Project 3
Social (0-30)			
Aesthetics	5	30	20
Jobs/Community Development	10	30	25
Recreation	30	20	20
Economic (0-30)			
Ability to Maintain	20	10	20
Economic Development	10	20	10
Capital Cost/Rate Impact	10	25	15
Environmental (0-30)			
Reduced Energy Use	30	15	30
Groundwater Recharge	20	15	0
Greenhouse Gas Reduction	30	20	30
TOTAL	165	185	170

Assessment of Cost / Benefit



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