

# What can Natural Capital do for our urban environments?

Greater Manchester Natural Capital Group  
Annual Conference

Wednesday 1<sup>st</sup> Feb 2017

The Lowry

9.30 – 16.30



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# Workshop C

## Innovative Finance & Delivery of SuDS



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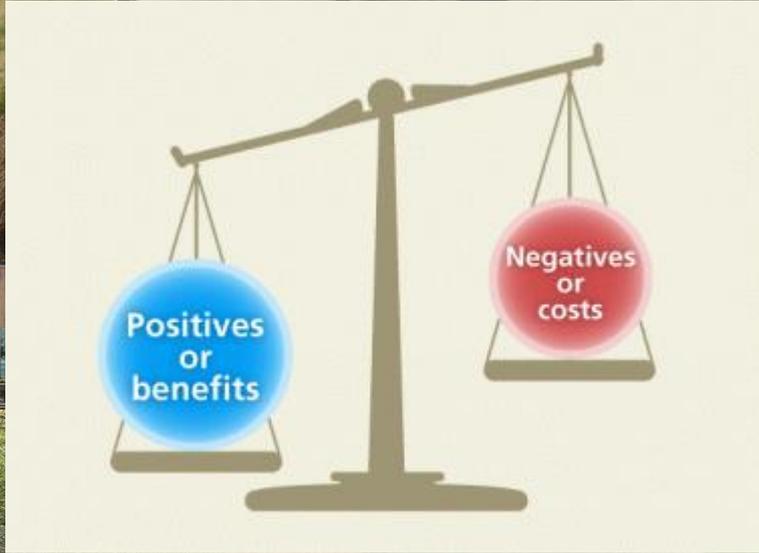


# The Economics of Sustainable Drainage (SuDS)

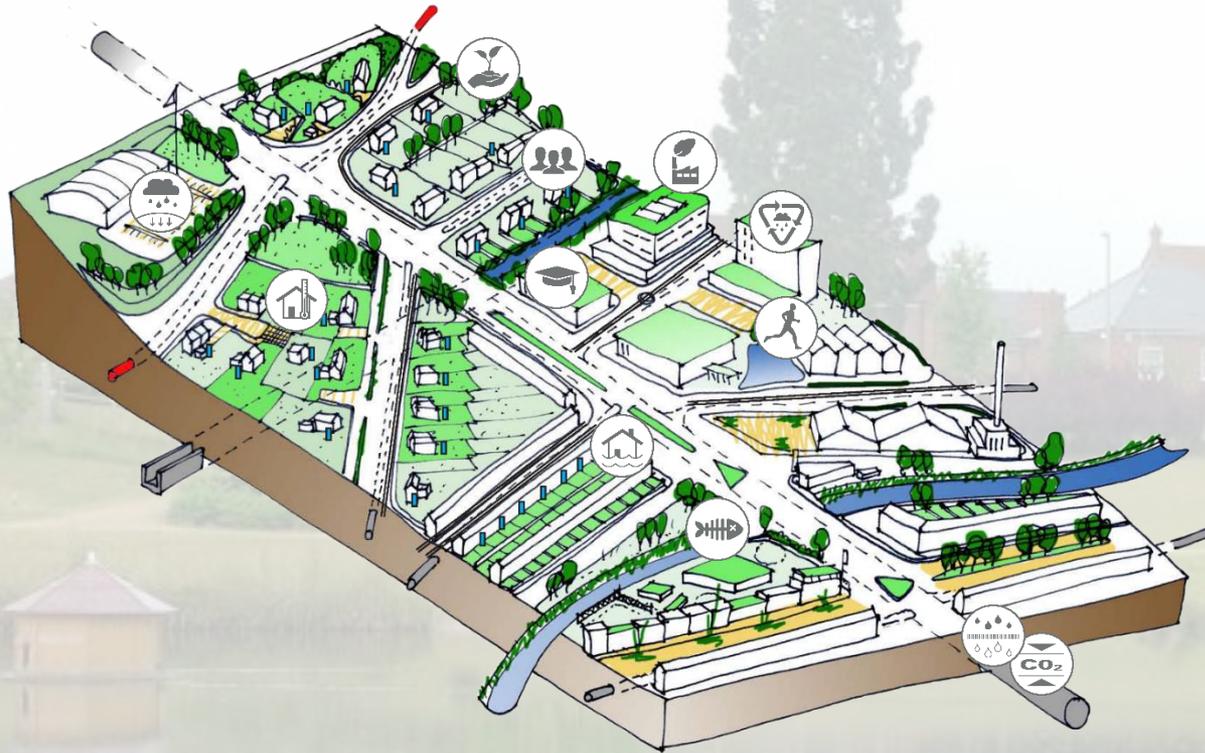
Bruce Horton

1<sup>st</sup> February 2017





# Placing a value on the benefits that SuDS bring



-  Air quality
-  Amenity
-  Biodiversity and ecology
-  Building temperature
-  Carbon reduction & sequestration
-  Crime
-  Economic growth
-  Education
-  Enabling development
-  Flooding
-  Groundwater recharge
-  Health
-  Pumping wastewater
-  Rainwater harvesting
-  Recreation
-  Tourism
-  Traffic calming
-  Treating wastewater
-  Water quality

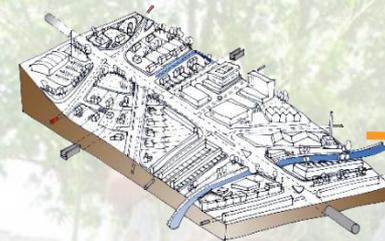
## What is B£\$T?

- A simple tool to help estimate the value of SuDS in monetary terms.
- Standalone and easy-to-follow, with technical guidance and user guide.
- Developed using best practice approaches to help quantify and monetise the benefit
- Freely available to download

## Why use B£\$T?

- It provides an estimate of the benefits from SuDS that can be readily compared to costs
- It can help to engage stakeholders who may be interested in SuDS
- Support you when looking for other funders
- It's simple to use, making use of best available information

## When to use B£\$T



Understand reasons  
for work &  
catchment

**B£\$T**  
Benefits of SuDS Tool



Develop designs /  
options



Estimate  
performance

**B£\$T**  
Benefits of SuDS Tool

Evaluate the benefits



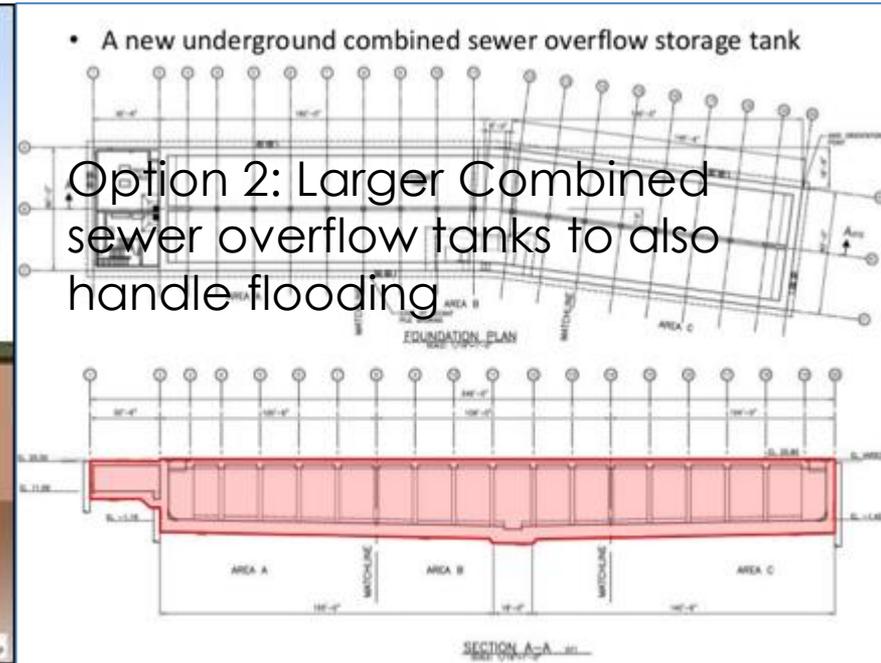
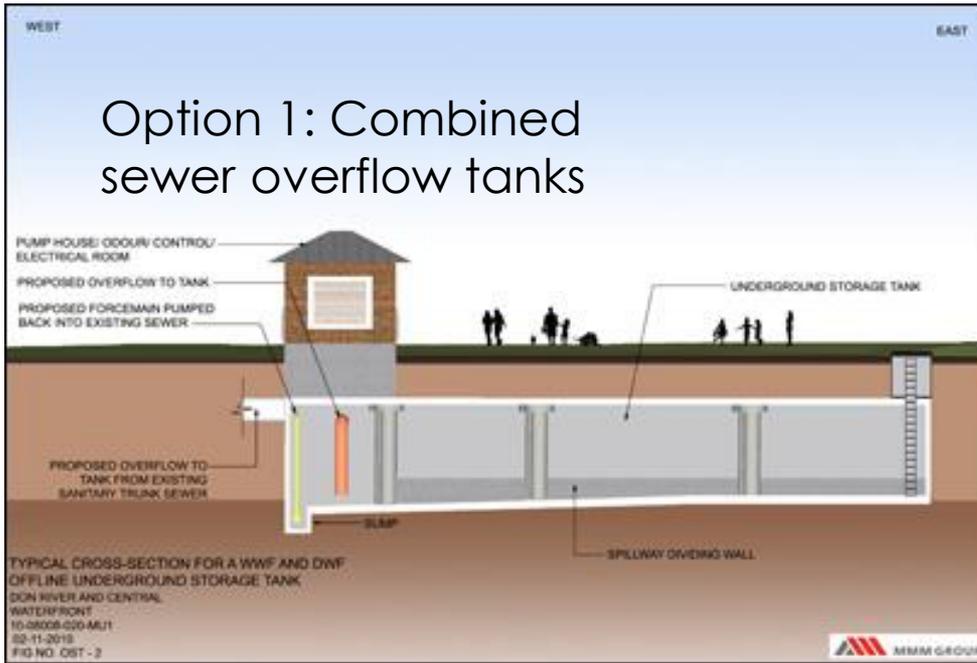
Leverage funding



Implement  
scheme

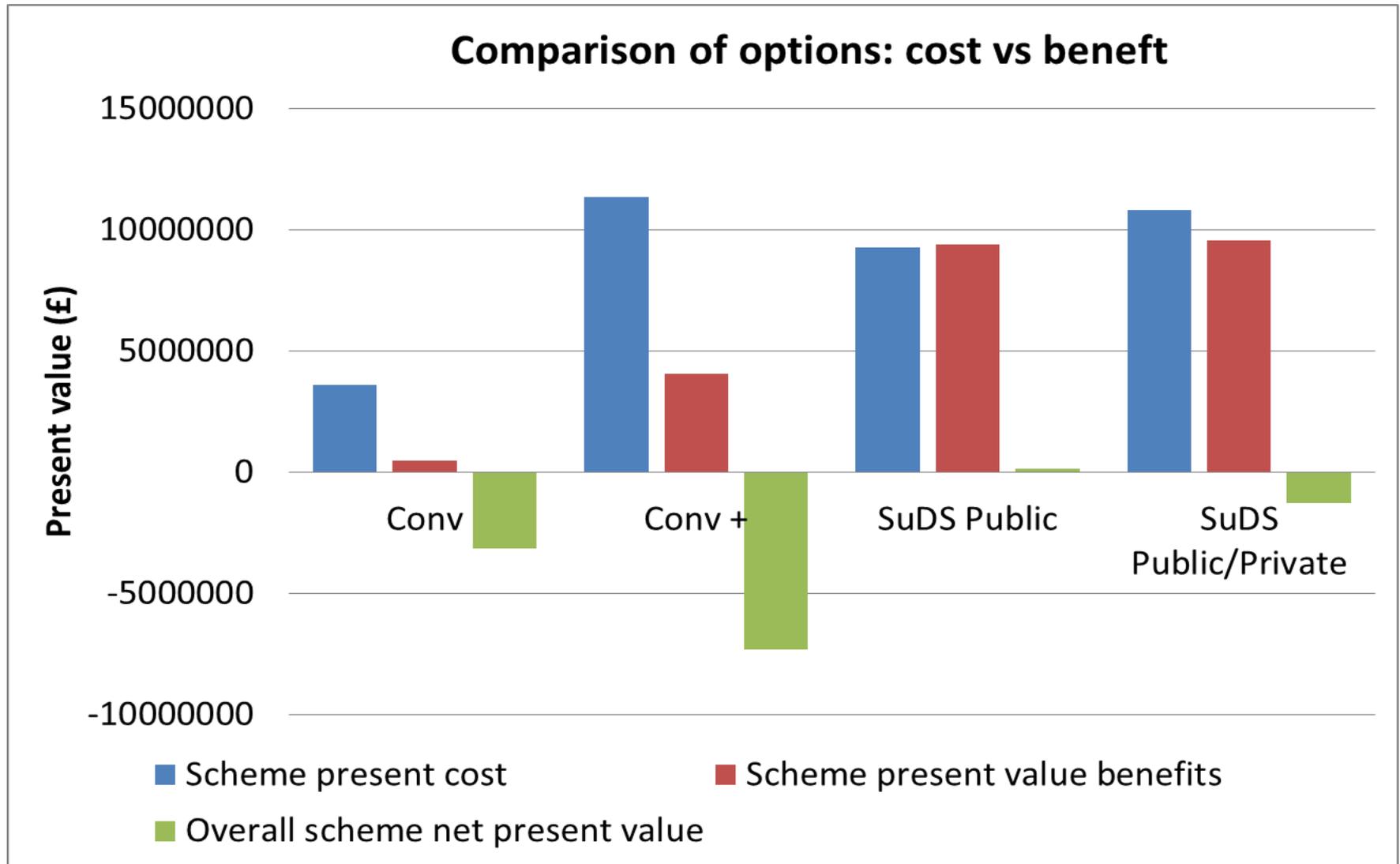
# Applying BeST – Retrofit Case Study





Option 4: SuDS in public spaces and private spaces

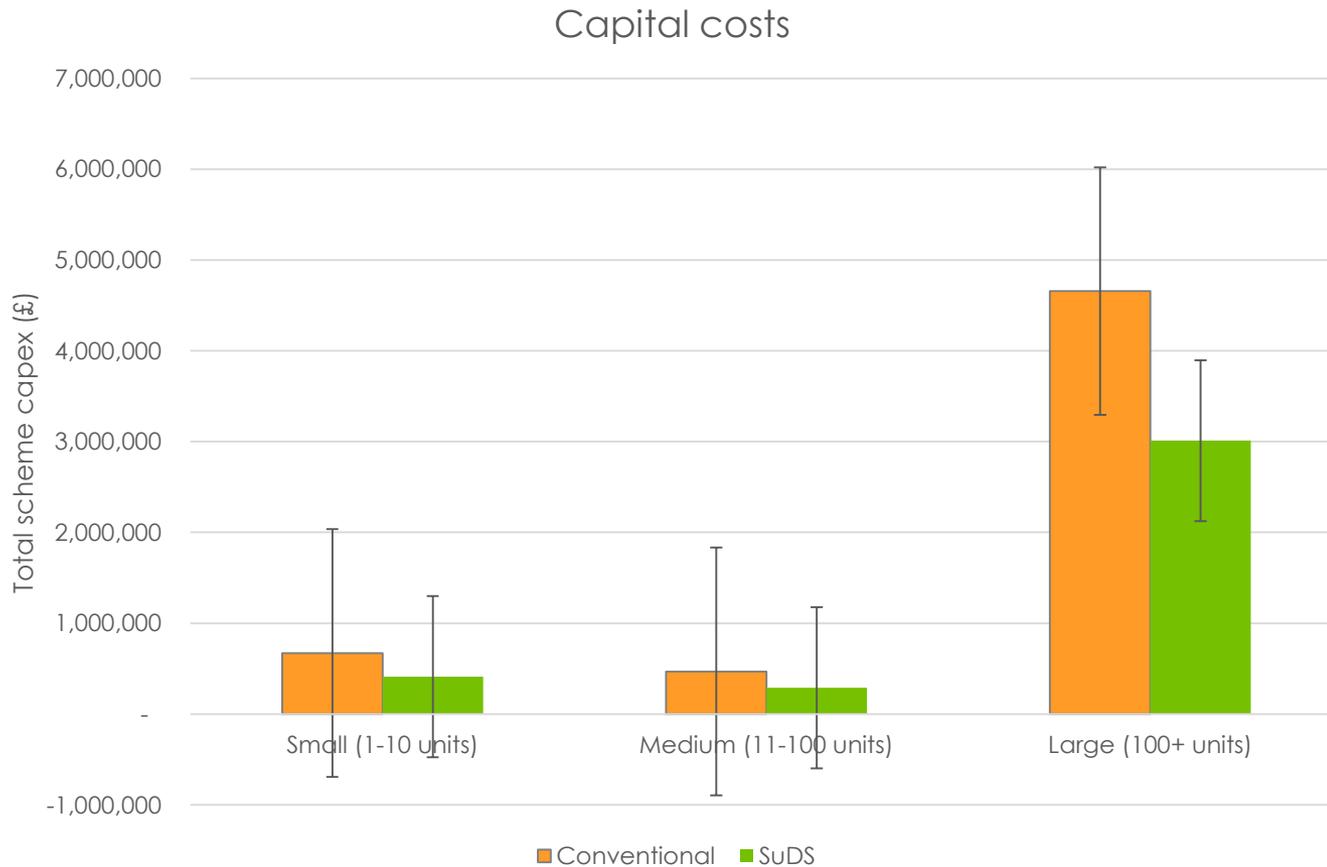
# Applying BeST – Retrofit Case Study



# SuDS on new developments

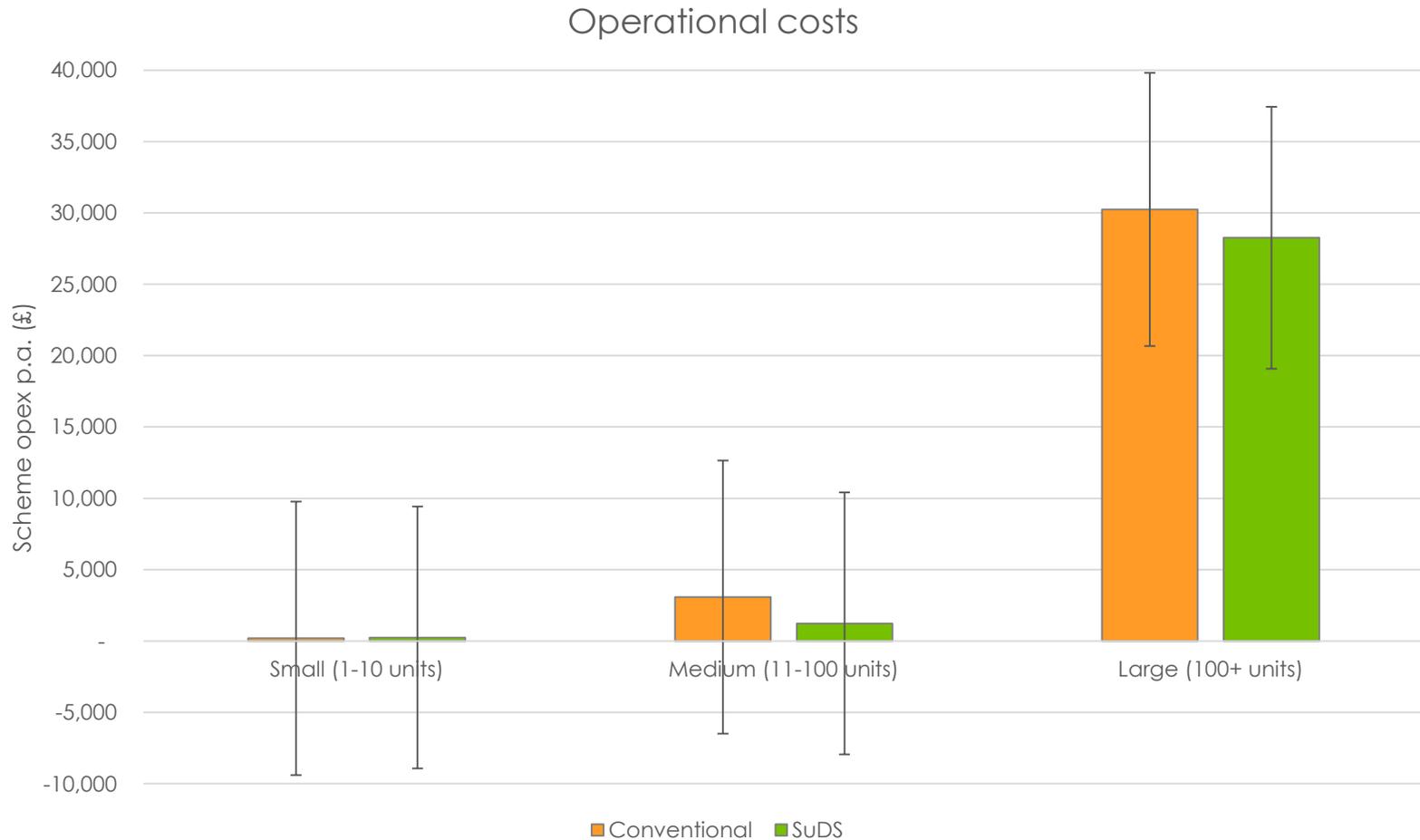
## Evidence from Wales

# Capital costs are lower

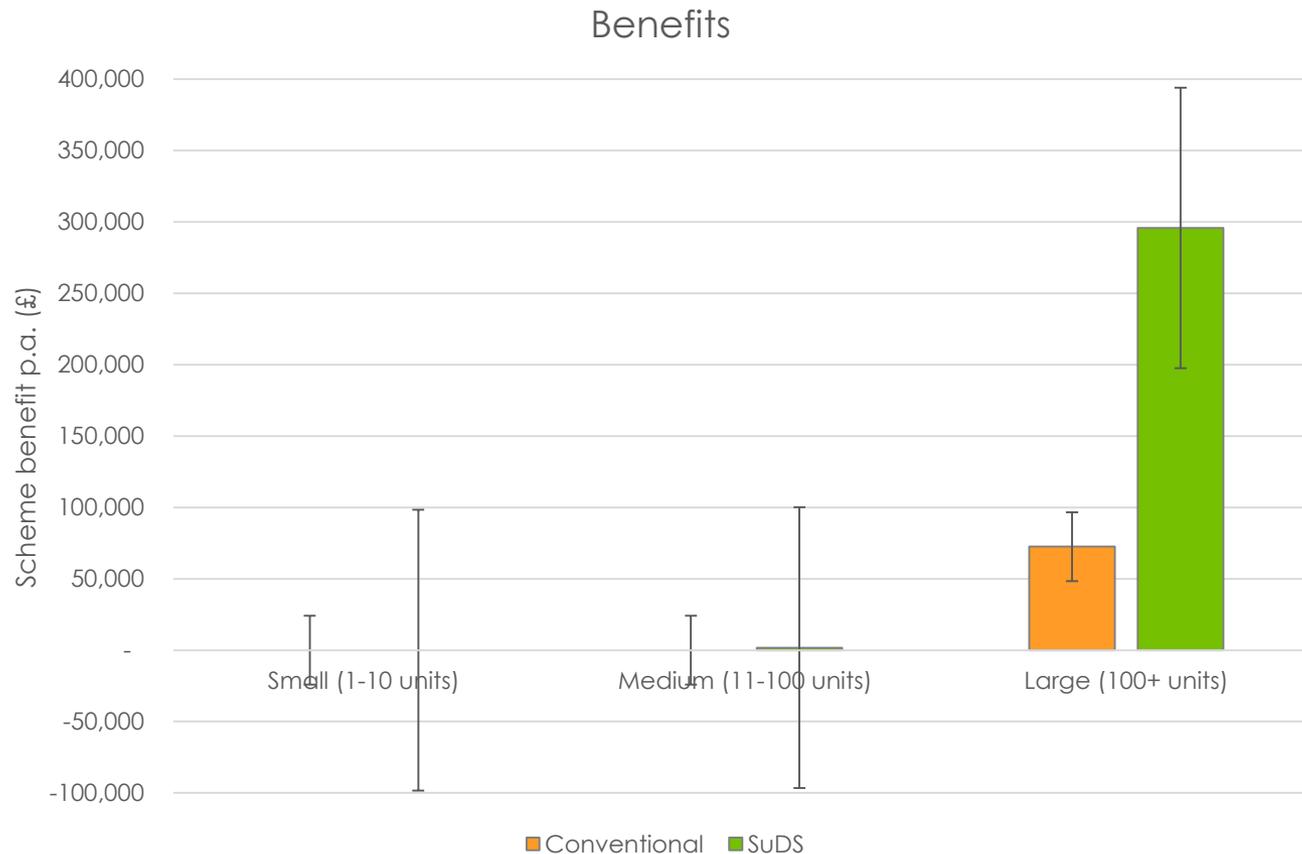


Use of SuDS  
could save  
Wales  
>£9,000 per  
new home  
in capital  
costs alone

# Operational costs are lower



# Benefits are greater



Use of SuDS could generate benefits >£300 per household per year on large developments

# Conclusions

- 1. Based on economics alone, the case for SuDS is very strong**
  - Cheaper**
  - Provide multiple benefits**
  - Not just an alternative to piped drainage**
- 2. Most benefits are undervalued**
- 3. Assessing and valuing benefits is possible and leads to better decisions**





# **Water resilient cities: building resilience and saving money through better surface drainage management**

Greater Manchester  
Natural Capital Group  
Annual Conference  
1<sup>st</sup> February 2017

**Katie Spooner  
Head of Water  
Business in the  
Community**

# Water Resilient Cities: Context

- Huge issues in the UK around flood risk, water quality and the resilience of urban settlements
- With austerity cuts, there is less funding available for such projects. Collaboration between interested parties can provide a viable alternative to shared problems.
- Area based surface drainage charges provide a mechanism to save money and access these benefits
- Sustainable urban drainage (SuDS) can support resilience and offers multiple environmental, social and economic benefits to multiple stakeholders

# Water Resilient Cities: A collaborative approach

ARUP



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# Water Resilient Cities: Project Overview

- Can a school can reduce surface water charges through sustainable drainage systems (SuDS)?
- Can they achieve a sustainable payback, over a reasonable period of time?
- There are currently:
  - Over **1,000 schools** in Greater Manchester.
  - Paying over **£4.3m** in surface water charges per year.
- Moving down a charging band could **save over £2m** - to be reinvested into SuDS measures in the short-term and educational benefits in the medium term.
- Applies only to the United Utilities operational area.

# Water Resilient Cities: Results

- Developed two models:
  - A site-based ready-reckoner for schools and site managers to assess the opportunity for SuDS on their sites and identify whether a payback is possible from reduced surface water charges.
  - A strategic model which extrapolated the findings of the school SuDS audits, and through analysis of charging data from United Utilities and the use of scenarios, developed options for a strategic programme of interventions.
- The information for schools included a Schools SuDS Audit Guide outlining the practical measures schools can take, case studies, and educational resources including a lesson plan and a video.

# Water Resilient Cities: Ready Reckoner

- An interactive tool to be used by site managers.
- Logging of potential SuDS options identified through the SuDS Audit, and providing standardised costs for the measures
- Enabling site managers to dynamically generate a site specific solution
- Determining whether a payback is possible
- Providing an understanding of the indirect (non-cash) benefits to the school and the surrounding community

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BUSINESS NETWORK

Site		Chorlton High School (Example 1)	
<b>Current Charges</b>		<b>Assessor</b>	Pete Stringer
Surface Water Band (from Bill)	10	<b>Payback Wanted</b>	3.0
Surface Water Charges (From Bill)	£ 54,313.57	<b>Estimated Payback</b>	1.5
Hard-standing area - school calculation or UU calculation (m2)	30,785	<b>Shortfall/Surplus</b>	-£24,164.90
Revised Band	10		
Revised Charges	£ 54,313.57		
Initial Saving	£ -		

**Summary of Measures**

Note: These costs are indicative only, refer to an expert for more accurate quotations.

Unit	Area Proposed	Area reduced	Capital m2		Maintenance		Annual cost
			+50%, +100%	Capital cost £	m2 +50%, +100%	m2 +50%, +100%	
Open channels on the surface	m length	0	0	£ 120.00	£ -	£ 1.10	£ -
Kerb / channel drainage	m length	0	0	£ 100.00	£ -	£ 1.10	£ -
Permeous and permeable surfaces	m2	0	0	£ 50.49	£ -	£ 1.08	£ -
Geocellular subsurface storage	m2	0	0	£ 35.37	£ -	£ 1.35	£ -
Filter strips	m2	65	3200	£ 8.65	£ 562.56	£ 0.14	£ 9.38
Infiltration trenches	m2	0	0	£ 86.55	£ -	£ 0.87	£ -
Rain Garden	m2	47.5	200	£ 70.74	£ 3,360.37	£ 1.35	£ 64.24
Bio-retention areas	m2	0	0	£ 70.74	£ -	£ 1.35	£ -
Soakaways	m2	65	2400	£ 288.49	£ 18,752.14	£ 0.14	£ 9.38
Filter drain	m3	0	0	£ 173.10	£ -	£ 0.87	£ -
Swales	m2	0	0	£ 21.64	£ -	£ 0.14	£ -
Infiltration basins	m2	0	0	£ 18.75	£ -	£ 0.29	£ -
Retention basin	m3	0	0	£ 51.93	£ -	£ 1.08	£ -
Retention basin	m3	0	0	£ 28.85	£ -	£ 1.44	£ -
Wetlands	m3	0	0	£ 5.90	£ -	£ 0.14	£ -
Wet Woodlands	m2	0	0	£ 40.36	£ -	£ 0.15	£ -
Trees (Dm2 each)	1	0	0	£ 721.24	£ -	£ 7.21	£ -
Green roofs	m2	0	0	£ 245.22	£ -	£ 7.21	£ -
Downpipe disconnection	1	0	0	£ 247.38	£ -	£ -	£ -
Water butts	1	0	0	£ 247.38	£ -	£ -	£ -
Downpipe planter	m3	0	0	£ 494.77	£ -	£ -	£ -
Rain water harvesting	1	0	0	£ 3,894.67	£ -	£ 360.62	£ -
Other - Use comments	Item	0	0	£ -	£ -	£ -	£ -
<b>Total m2 reduced (UU)</b>			<b>5800</b>	<b>£ 22,675.07</b>	<b>£ 82.99</b>		
<b>Total m2 reduced (Highways)</b>			<b>0</b>	<b>£ -</b>	<b>£ -</b>		

Result	
New UU Hardstanding area (m2)	24905
New UU Band	9
<b>New Charges (UU)</b>	<b>£ 21,091.44</b>

**Possible Measures from Site Audit**

Type (Choose)	Size of measure m2/m3/No.	Area Changed m2	Map Ref	Select
Green roofs	70	70	A	<input type="checkbox"/>
Filter strips	65	3200	B	<input type="checkbox"/>
Swales	65	100	C	<input type="checkbox"/>
Detention basin	500	6175	D	<input type="checkbox"/>
Wetlands	550	2400	E	<input type="checkbox"/>
Soakaways	65	2400	F	<input type="checkbox"/>
Downpipe planter	5	150	G	<input type="checkbox"/>
Downpipe planter	3.5	110	H	<input type="checkbox"/>
Green roofs	12.5	12.5	I	<input type="checkbox"/>
Downpipe planter	1.5	12.5	J	<input type="checkbox"/>
Green roofs	30	30	K	<input type="checkbox"/>
Rain Garden	22.5	100	L	<input type="checkbox"/>
Downpipe planter	1	50	M	<input type="checkbox"/>
Downpipe planter	1	50	N	<input type="checkbox"/>
Rain Garden	25	100	O	<input type="checkbox"/>
Green roofs	16	16	P	<input type="checkbox"/>
Green roofs	60	60	Q	<input type="checkbox"/>
Green roofs	900	900	R	<input type="checkbox"/>
Downpipe planter	5	450	S	<input type="checkbox"/>
Filter drain	45	256	T	<input type="checkbox"/>
Filter drain	50	336	U	<input type="checkbox"/>
Bio-retention areas	100	250	V	<input type="checkbox"/>
Green roofs	100	100	W	<input type="checkbox"/>
(Choose measure)			X	<input type="checkbox"/>
(Choose measure)			Y	<input type="checkbox"/>
(Choose measure)			Z	<input type="checkbox"/>
(Choose measure)			A1	<input type="checkbox"/>
(Choose measure)			A2	<input type="checkbox"/>
(Choose measure)			A3	<input type="checkbox"/>
(Choose measure)			A4	<input type="checkbox"/>

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# Water Resilient Cities: Strategic Area based investment Model

- Understand the opportunity to develop a SuDS as part of a strategic programme
- Economies of scale achieved through programme level investment
- Ranking of schools in terms of payback and investment
- Opportunity to apply to SuDs investment in other cities?

		Scenario 1 - Direct Benefits no Management						
Cost of measures (£m2)		£30	£60	£90	£120	£150	£200	
Payback	3	Number of Schools	181	82	51	31	24	15
		Cost of measures	£1,628,520	£644,580	£385,200	£250,560	£182,250	£111,800
		Potential savings	£1,479,442	£647,250	£385,506	£252,241	£184,195	£118,827
		Cost per School pa	£2,999	£2,620	£2,518	£2,694	£2,531	£2,484
		Annual charges reduced	£493,147	£215,750	£128,502	£84,080	£61,398	£39,609
		Hardstanding reduced	49,284	10,743	4,280	2,088	1,215	559
	5	Number of Schools	313	153	94	67	51	31
		Cost of measures	£4,332,180	£2,037,780	£1,241,100	£859,920	£642,000	£417,600
		Potential savings	£4,193,964	£2,045,516	£1,244,272	£862,319	£642,510	£420,402
		Unit Cost per School	£2,768	£2,664	£2,641	£2,567	£2,518	£2,694
		Annual charges reduced	£838,793	£409,103	£248,854	£172,464	£128,502	£84,080
		Hardstanding reduced	139,406	33,963	13,790	7,166	4,280	2,088
	10	Number of Schools	649	313	202	153	120	82
		Cost of measures	£14,525,340	£8,364,360	£5,493,060	£4,075,560	£3,234,150	£2,148,600
		Potential savings	£14,377,045	£8,387,927	£5,498,468	£4,091,033	£3,243,357	£2,157,501
		Unit Cost per School pa	£2,238	£2,672	£2,719	£2,664	£2,695	£2,620
		Annual charges reduced	£1,437,705	£838,793	£549,847	£409,103	£324,336	£215,750
		Hardstanding reduced	479,178	139,406	61,034	33,963	21,561	10,743

# Water Resilient Cities: Challenges

- Great variability in the costs of SuDS and difficult to attribute average cost, costing of £60-£120 are based on 100% optimism bias
- Variability of site and ground conditions
- Upfront capital costs
- Surface water drainage charges are specific to United Utilities area

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## Case Study: Chorlton High School

SuDS Audit – March 2016



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## Case Study: Burnage Academy for Boys

SuDS Audit – March 2016



### Background

Burnage Academy for Boys draws pupils from the Manchester districts of Burnage, Didsbury, Levenshulme, Longsight, Rusholme, Fallowfield, Withington, Hulme and Ardwick.

The college was founded in 1933 and it has gained a strong record of sporting, academic, artistic and cultural success. The 'Academy' has 953 pupils and over 148 teaching and support staff.

In 2010 a £17m redevelopment of the school under the Government's Building Schools for the Future programme was undertaken which saw the original 1930s and 1950s buildings demolished and replaced with a new building.

The remaining two modern buildings including the sports hall were refurbished and an all-weather sports pitch was constructed where the older buildings had once stood.

In the centre of the school footprint there is an elevated grass sports field.

The school which was previously a community school administered by Manchester City Council, was converted to academy status on 1 April 2014 and was renamed Burnage Academy for Boys.

located in Chorlton south Manchester, which was originally for Boys was founded in 1847 as a grammar school and during the 1960s it returned to being a comprehensive. It became a College in 2002. In May 2012, the school governors approved the decision to convert to an academy on 1 January 2013.

When Ayle College took over in 2002, the school received extra funding for a £17 million school to be together on one site for the first time in its history. Chorlton High School has, used both by students and the local community, including specialist drama and music, an all-weather pitch for sports and a gymnasium.

The Manchester building houses nearly 1500 pupils.

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# Water Resilient Cities: Next Steps

- Feasibility II:
  - Develop an understanding of the multiple benefits and management costs
  - Schools mapping and engagement
  - Business engagement: Wider application of the model and enabling environment
- Pilot
  - July 2017: Three sites (including 2 school sites) to test the feasibility
  - Development of a financial mechanism to support programmes at scale

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