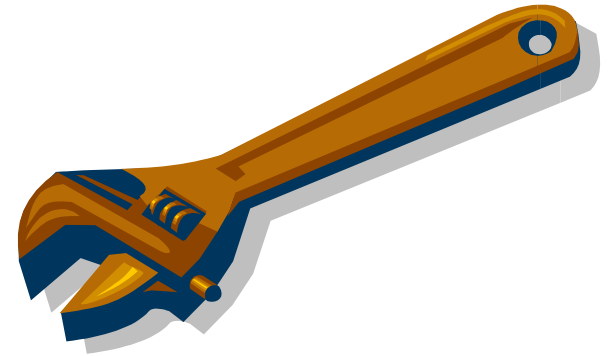


SuDS Tools



Roads, BeST and Simple

- Basic
 - SuDS for Roads Whole Life (and Carbon) Cost Tool
 - Over-run from S4Rds Project
 - 2010'ish
- BeST – Benefits from SuDS Tool
 - CIRIA
 - 2015
- SIA – Simple Index Assessment
 - SEPA
 - 2016

SuDS4ds - Whole Life Cost Tool

- Provides good indicative costs for SuDS
- Easy to learn and apply
- Useful carbon module as integrated benefit
- Not all SuDS – it's for roads, so no green roofs for example!

- Available at;
<http://www.scotsnet.org.uk/best-practice.php>

SUDS4Rds – WLC

Provides Indicative Costs for Various SuDS throughout life cycle

SuDS4RDs WLC Tool

The screenshot displays the Microsoft Excel interface for the 'SuDS4RDs WLC Tool'. The title bar indicates the file name: '9a - North Lan - Example 2 - SUDSforRoadsWLCandWLCarbonToolv118PROTECTEDUpdate1.5.12 - Microsoft Ex'. The ribbon shows 'File', 'Home', 'Insert', 'Page Layout', 'Formulas', 'Data', 'Review', and 'View'. A yellow security warning banner states 'Security Warning: Macros have been disabled. Enable Content'. The active cell is A1. The spreadsheet is organized into sections: 'General data' (row 1), 'Project Overview' (rows 3-13), and 'Supporting financial information' (rows 14-31). The 'Project Overview' section includes a table for project details and an 'Assumptions' table. The 'Supporting financial information' section includes a table for financial parameters and another 'Assumptions' table. The bottom of the spreadsheet shows a navigation bar with tabs: 'Introduction', 'Step-by-step guide', 'General', 'Ponds', 'Basins', 'Results', 'Results Tables', 'Carbon Results', 'Carbon Graphs', and 'Yearly Data'.

Project Overview		Assumptions
Project name	Strathclyde Loch	
Project description	Large Pond	
Location	Bellshill	
Location type	Urban	
Date	18th Sept 2013	
Option number	1	
		<i>This is for reference only - it is not used in the whole life cost analysis</i>

Supporting financial information		Assumptions
No. years for analysis	70	
Discount rate - 0-30 yrs (%)	3.5%	
Discount rate - 31-75 yrs (%)	3.0%	
Discount rate - 75-125 yrs (%)	2.5%	
		<i>This is the Green Book's recommended discount rates</i>
Are land costs to be included?	No	
Estimated land costs of (£/m ²)		
Land area of project (m ²)		
Estimated land costs for SUDS (£)	-	
Are easement costs to be included in the analysis?	No	
Estimated annual easement costs (£)		
		<i>Cost for total area, throughout life of analysis</i>
Planning and design costs (as % of construction costs)	5%	
Do you want operation and maintenance to start on the same year as construction (year 0)?	Yes	
		<i>Typically planning and design costs (for drainage) are calculated as a % of total construction costs. 3-5% is recommended for highways contracts, 5-10% is recommended for developments. For larger developments the % may be expected to be lower. If the user selects no the tool will assume maintenance will commence in year 1 (NB year 0 is the construction year)</i>

Simple Index Assessment Tool

For Water Environment Quality & Protection

- SEPA Tool to assess adequate SuDS measures for water quality
- Basic scoring approach for hazard
- Countered by SuDS provisions
- Can be downloaded at;
http://www.susdrain.org/resources/SuDS_Manual.html

Designing for Water Quality - Simple Index Approach

- Land use defines **Pollution Hazard Index**
- Different SUDS have differing potentials to reduce different pollutants
- SuDS provide **Mitigation index**
- CIRIA/HRWallingford has developed an Excel tool to assist with the assessment

Table 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	very low	0.2	0.2	0.05
Other roofs (typically commercial/industrial roofs)	low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ⁽¹⁾	medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ⁽¹⁾	high	0.8 ⁽²⁾	0.8 ⁽²⁾	0.9 ⁽²⁾

(1) Motorways and trunk roads should follow the guidance and risk assessment process set out in HD45/09 (Highways Agency, 2009)

(2) These should only be used if considered appropriate as part of a detailed risk assessment – required for all these land use types (Table 4.3). When dealing with high hazard sites, the environmental regulator should first be consulted for pre-permitting advice. This will help determine the most appropriate approach to the development of a design solution.

Table 26.3 Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS component	Mitigation indices ⁽¹⁾		
	TSS	Metals	Hydro-carbons
filter strip	0.4	0.4	0.5
filter trench	0.4 ⁽²⁾	0.4	0.4
swale	0.5	0.6	0.6
bioretention system	0.8	0.8	0.8
permeable pavement	0.7	0.6	0.7
detention basin	0.5	0.5	0.6
pond ⁽⁴⁾	0.7 ⁽³⁾	0.7	0.5
wetland	0.8 ⁽³⁾	0.8	0.8
proprietary treatment systems ^(5, 6)	<p>These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.</p>		

Total SuDS Mitigation Index \geq Pollution Hazard Index
(for each contaminant type) (for each contaminant type)

Total SuDS Mitigation Index = Mitigation Index $_1$ + 0.5 (Mitigation Index $_2$)

Where:

Mitigation Index $_n$ = Mitigation Index for Component 'n'

A factor of 0.5 is used to account for the reduced performance of secondary or tertiary components associated with already reduced inflow concentrations

- Expect source control in addition

[Simple Index Approach Tool](#)

Timescales

- RM08 to be changed
- Launched 12 November
- After 31 May – only SIA acceptable

Benefits of SuDS (BeST) Tool

- Very useful tool but takes time to grasp
- Comprehensive spreadsheet
- Better for real developments, i.e. serious proposals
- CIRIA development

BeST Tool

- Available free (but need to register) from;

<http://www.susdrain.org/resources/best.html>

The screenshot shows the BeST Tool interface, which is a spreadsheet application. The title bar indicates the active cell is B6 and the formula bar shows 'Air quality'. The spreadsheet has a header row (row 1) with the 'ciria' logo, the title 'Screening Questions and initial qualitative assessment', and an 'ENABLE PAGES' button. Row 2 contains project details: 'PROJECT DETAILS - No.: 0, Name: 0, Assmt. Version: 0, Date: Jan 1900.'. Row 3 is the main header for the table, with columns: 'Impact', 'Question', 'Further aspects to consider', 'Likely Impact', 'Open impact sheet?', 'Reasons /evidence for choosing the scale of the impact', and 'LINKS'. Rows 4-10 contain data for different impact categories: 'Air quality', 'Amenity', 'Biodiversity and Ecology', and 'Building'. Each row includes a question, a list of further aspects to consider, a 'Likely Impact' column (all empty), an 'Open impact sheet?' column (all containing 'NO'), a 'Reasons /evidence' column (all empty), and a 'LINKS' column (all containing a 'LINK' text). The bottom of the screen shows a navigation bar with tabs: 'CIRIA W045', 'HOME', 'Version Info', 'Project Inputs', 'Screening questions', 'Potential Stakeholders', 'Potential double counting', and 'Summary of outputs-Qualitative'. The status bar at the very bottom shows 'Ready'.

Impact	Question	Further aspects to consider	Likely Impact	Open impact sheet?	Reasons /evidence for choosing the scale of the impact	LINKS
Air quality	Will the drainage / SuDS also change the level of air pollution?	<ul style="list-style-type: none"> - Is the site in an air quality management area? - Will the scheme involve green infrastructure (e.g. tree planting, green roofs)? - Is the scheme in a populated area or a transport corridor? 		NO		LINK
Amenity	Will the drainage / SuDS also change the attractiveness of the place	<ul style="list-style-type: none"> - Does the scheme involve new/improved water bodies, landscaping or greening? - Is the scheme in a populated area, or an area used for recreation, work, commuting, tourism, etc? - Will SuDS components be visible to those living nearby or passing by? - Could the scheme lead to inconvenience/disruption to residents or others (e.g. during construction or loss of car parking)? 		NO		LINK
Biodiversity and Ecology	Will the drainage / SuDS also lead to a change in habitats for plants and animals	<ul style="list-style-type: none"> - Will the scheme impact on a designated site (e.g. SSSI, SAC, SPA), Habitats of Principal Importance (BAP priority habitats), a site of local importance for nature, or a non-designated site of local or regional value? - Will the scheme involve SuDS components that may improve these sites, or create new sites? 		NO		LINK
Building	Will the drainage / SuDS also change the potential for high	<ul style="list-style-type: none"> - Will the scheme involve green infrastructure (e.g. tree planting, green roofs) or water bodies providing evaporative cooling? 		NO		LINK

- Considers 19 possible “Impacts” that SuDS can provide benefits to

Glasgow [SWMP](#) Case Study

Available from website at

http://www.susdrain.org/files/resources/BeST/best_case_study_glasgow_swmp.pdf

Air quality

Amenity

Biodiversity (habitats)

Carbon sequestration / reduction

Crime

Economic growth

Education

Enabling development

Flexible infrastructure / CCA

Flood risk

Groundwater recharge

Health

Pumping wastewater

Recreation

Building Temperature

Tourism

Traffic calming

Treating wastewater

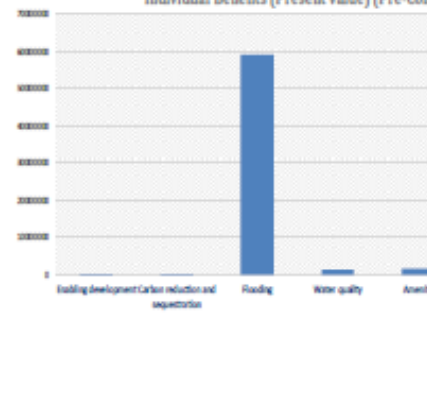
Water quality of receiving water

Table 1: Summary of results

Present Value Assessment Stage	Total Benefits PV	Total PV Costs	Net Value Present	Benefit Ratio Cost
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				
Present Value sensitivity - high				

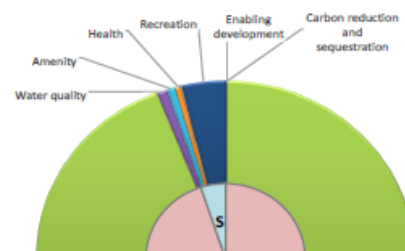
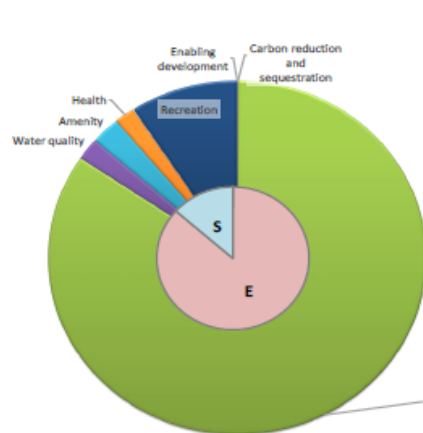
BeST Case Study - Glasgow

Individual Benefits (Present Value) (Pre-Confidence)



Individual Benefits (Present Value) (Post-Confidence)

Individual Benefits (Present Value) (Post-Confidence)



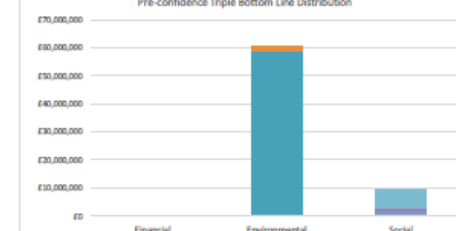
BeST Case Study - Glasgow

Figure 1: Breakdown of benefits per category



Figure 2: Distribution of benefits pre (left) and post (right) confidence

Pre-confidence Triple Bottom Line Distribution



Post-confidence Triple Bottom Line Distribution

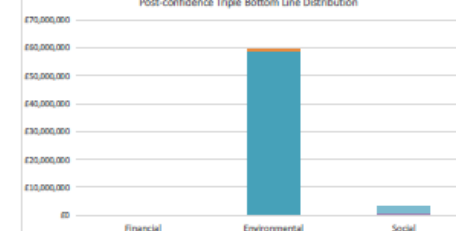


Figure 3: Breakdown of benefits under triple bottom line categories pre (left) and post (right) confidence

Comparison of present value benefits pre and post confidence and sensitivity testing



Comparison of net present value pre and post confidence and sensitivity testing

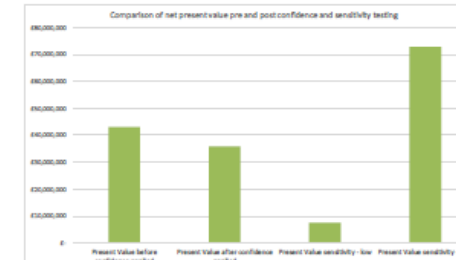
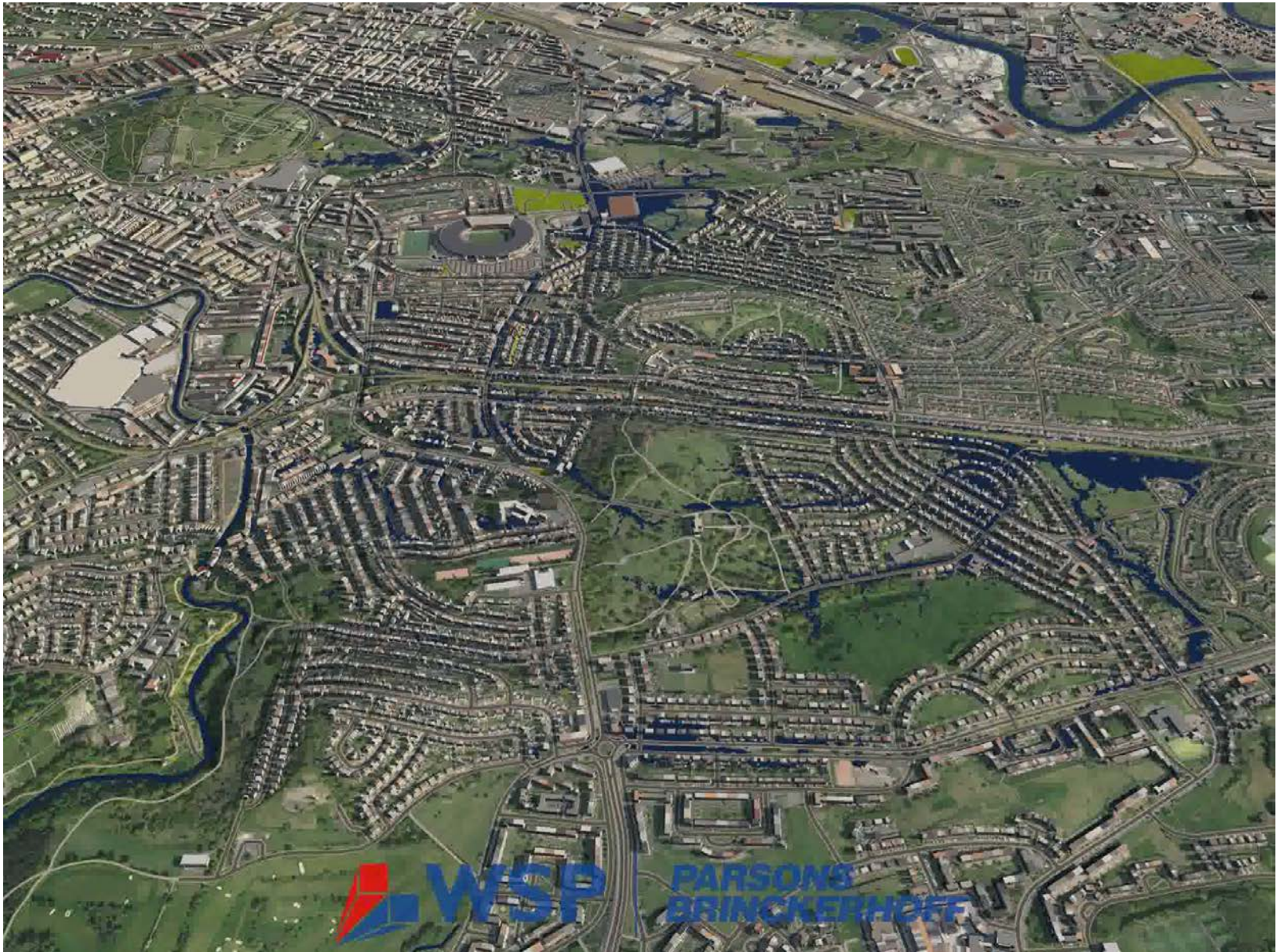


Figure 4: Comparison of benefits present value (left) and net present value (right) for pre and post confidence and sensitivity testing.

Visualisation Tools

Good for Community Engagement and Elected Member Sessions



Questions?

Discussion?

Notes?