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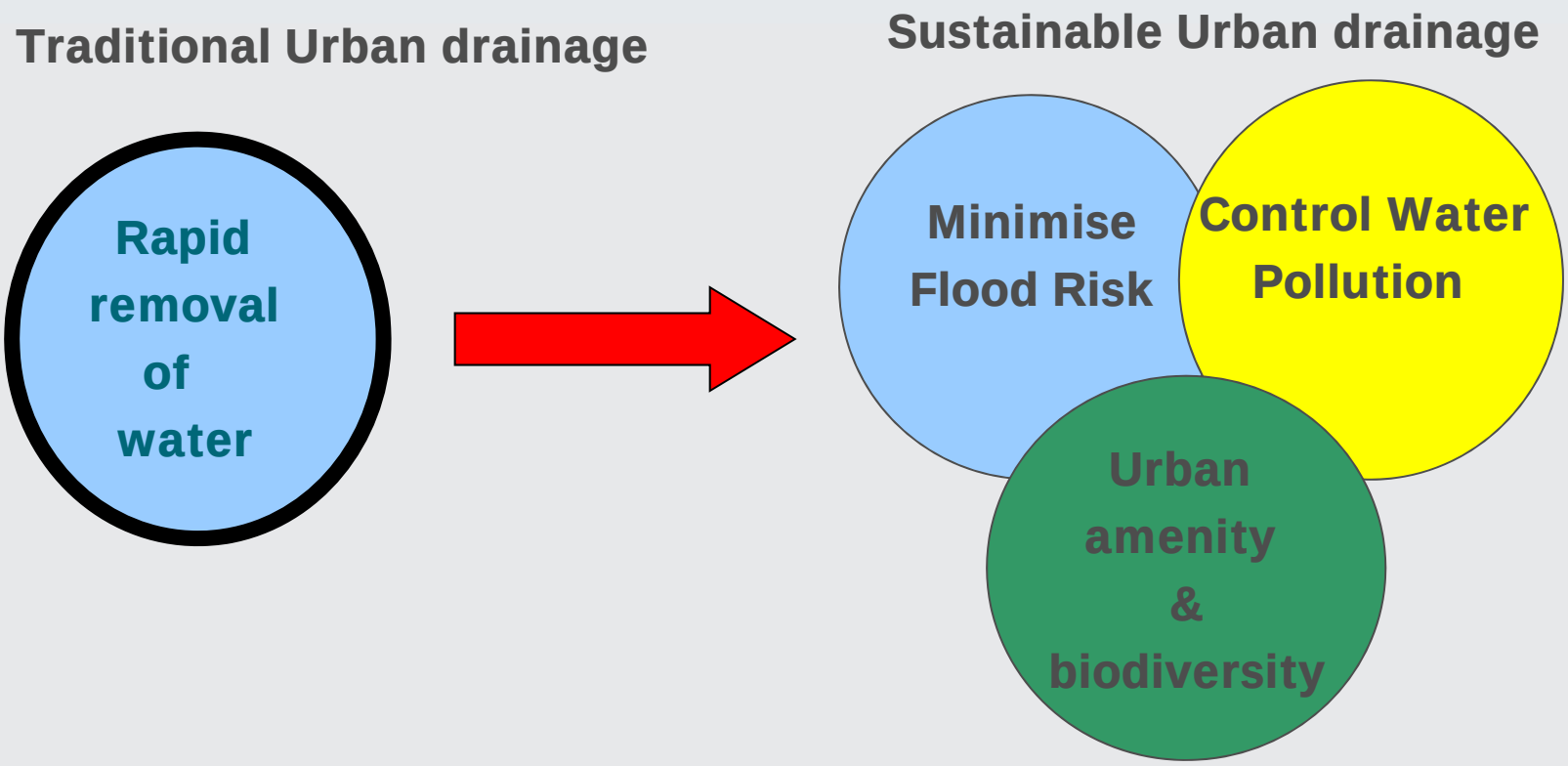
SuDS illustrations

Steven Wade

Sustainable Drainage Systems (SUDS)

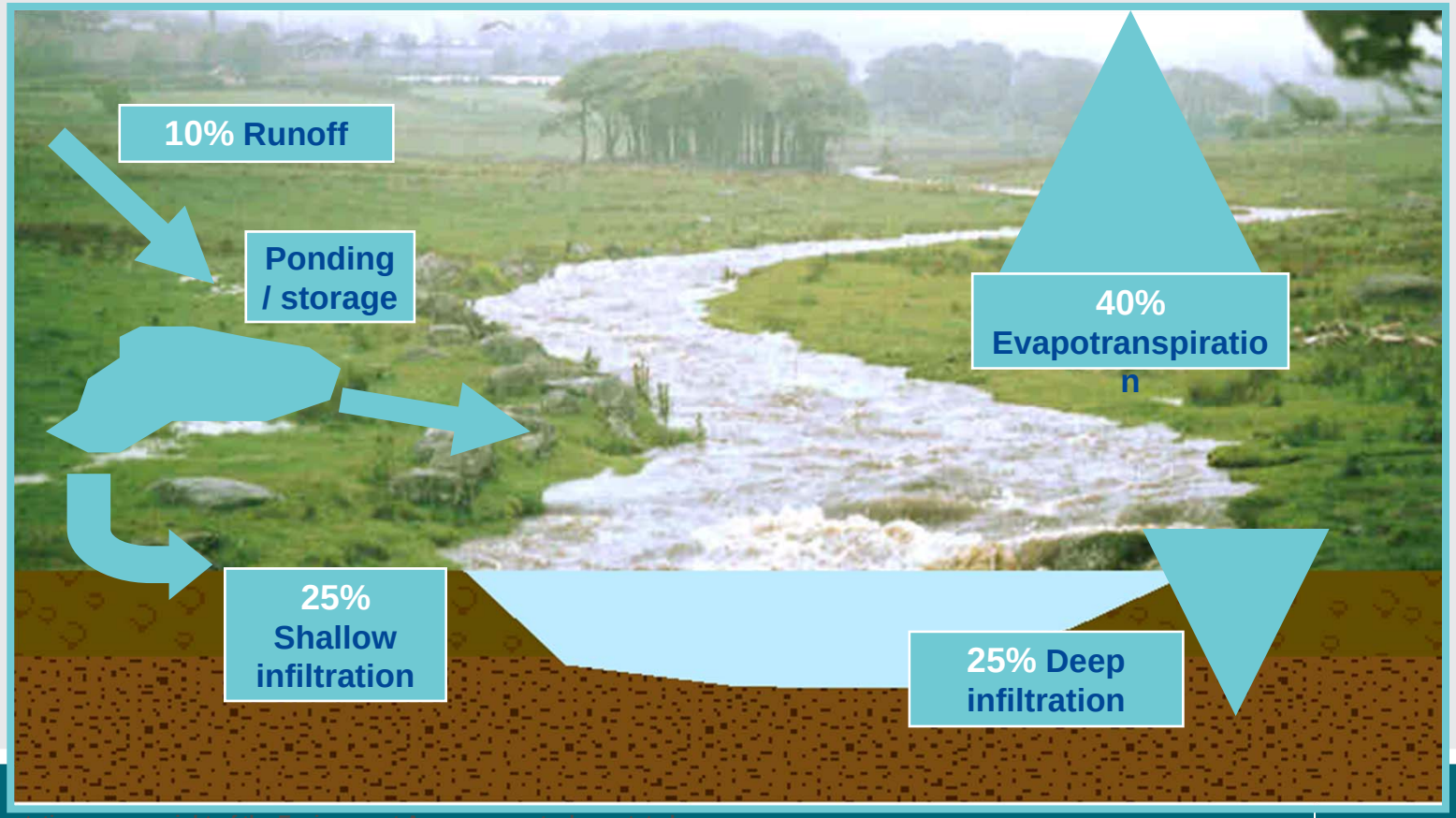
- **Sustainable drainage is a an approach, which unlike conventional drainage:**
  - **Replicate, as closely as possible, the natural flow pattern of a urban development site**
  - **Minimise the impact the site on flooding and pollution of rivers, streams and other water bodies**
  - **Manage water from developments in a sustainable manner**
  - **Provide amenity/biodiversity benefits**

SUDS Triangle



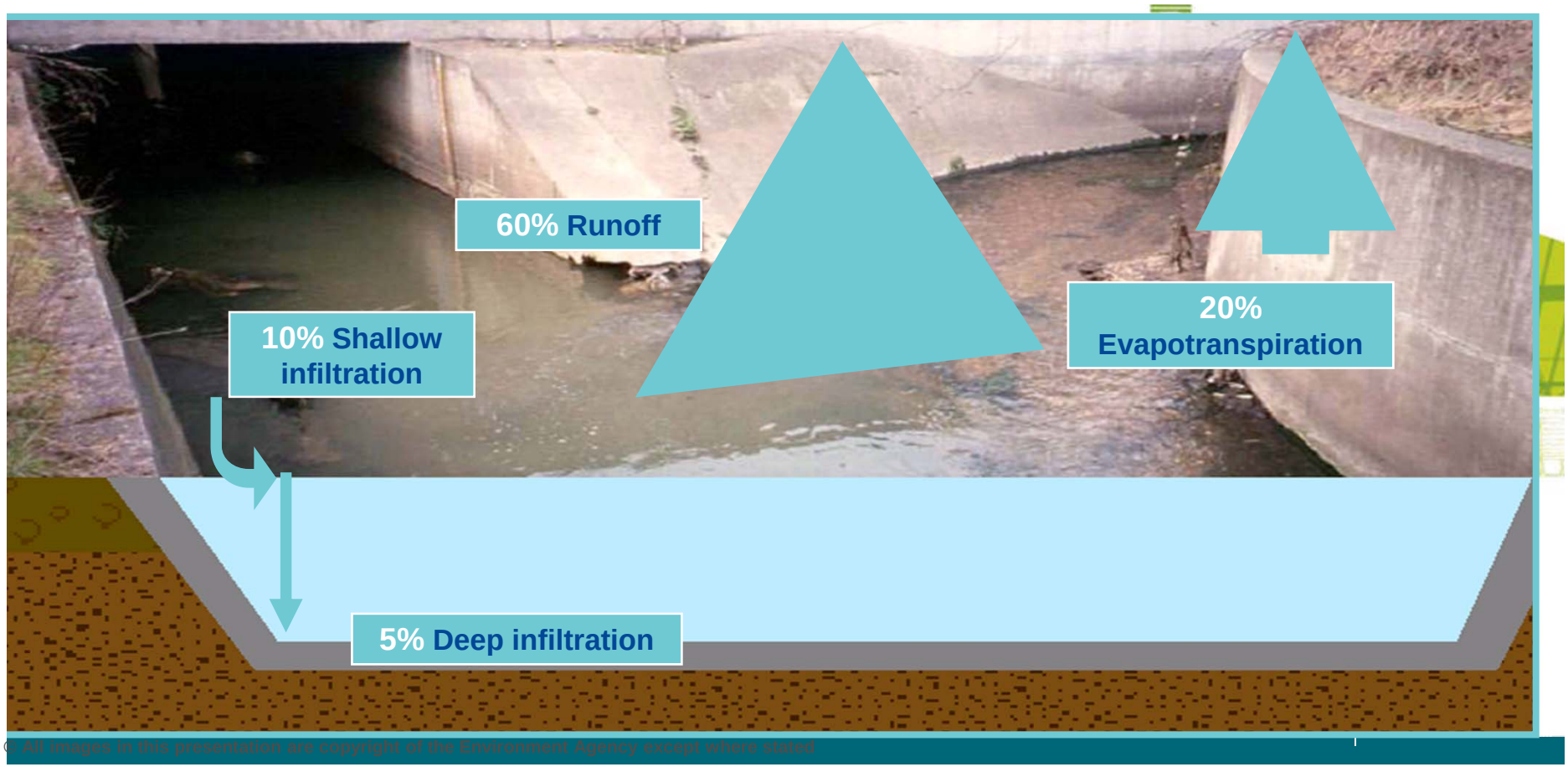
The effects of development on Water Quantity

An undeveloped catchment

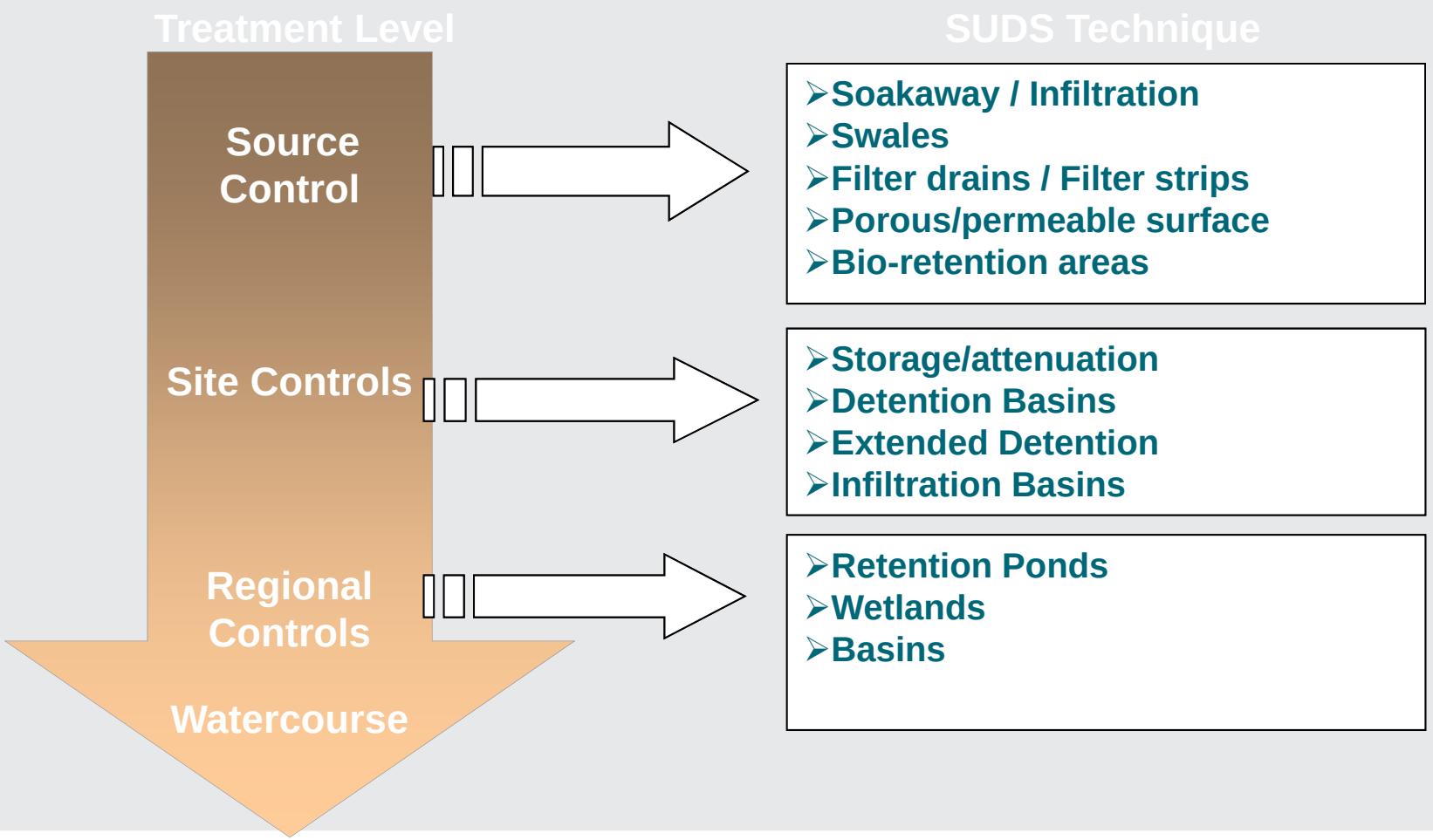


The effects of development on Water quantity

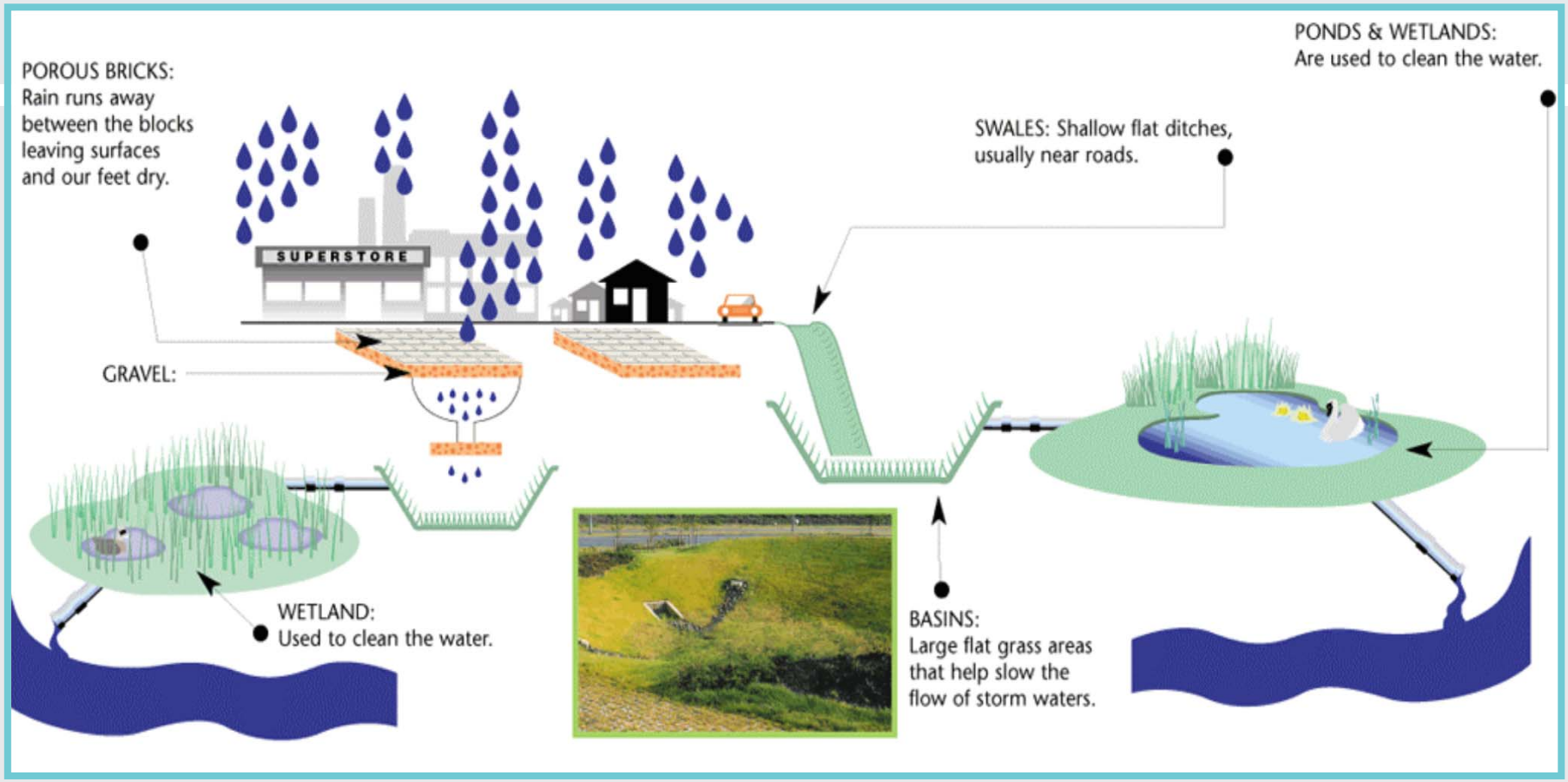
A developed catchment with conventional drainage



How do they operate? The SUDS Management Train



The management train



SUDS Sustainable Drainage Systems

- Mitigate the adverse effects of urban stormwater runoff on the environment
- Reduce runoff rates
- Encourage groundwater recharge
- Reduce pollutant concentrations
- Buffer accidental spills from road drainage
- Reduce discharges to rivers or combined sewer systems
- Enhance amenity and provide wildlife habitats

SUDS components & key issues

- source control techniques
- pre-treatment systems
- green roofs
- soakaways
- water butts
- rainwater harvesting systems
- filter strips
- filter trenches
- infiltration trenches
- swales
- bioretention
- pervious pavements
- geocellular systems
- sand filters
- infiltration basins
- detention basins

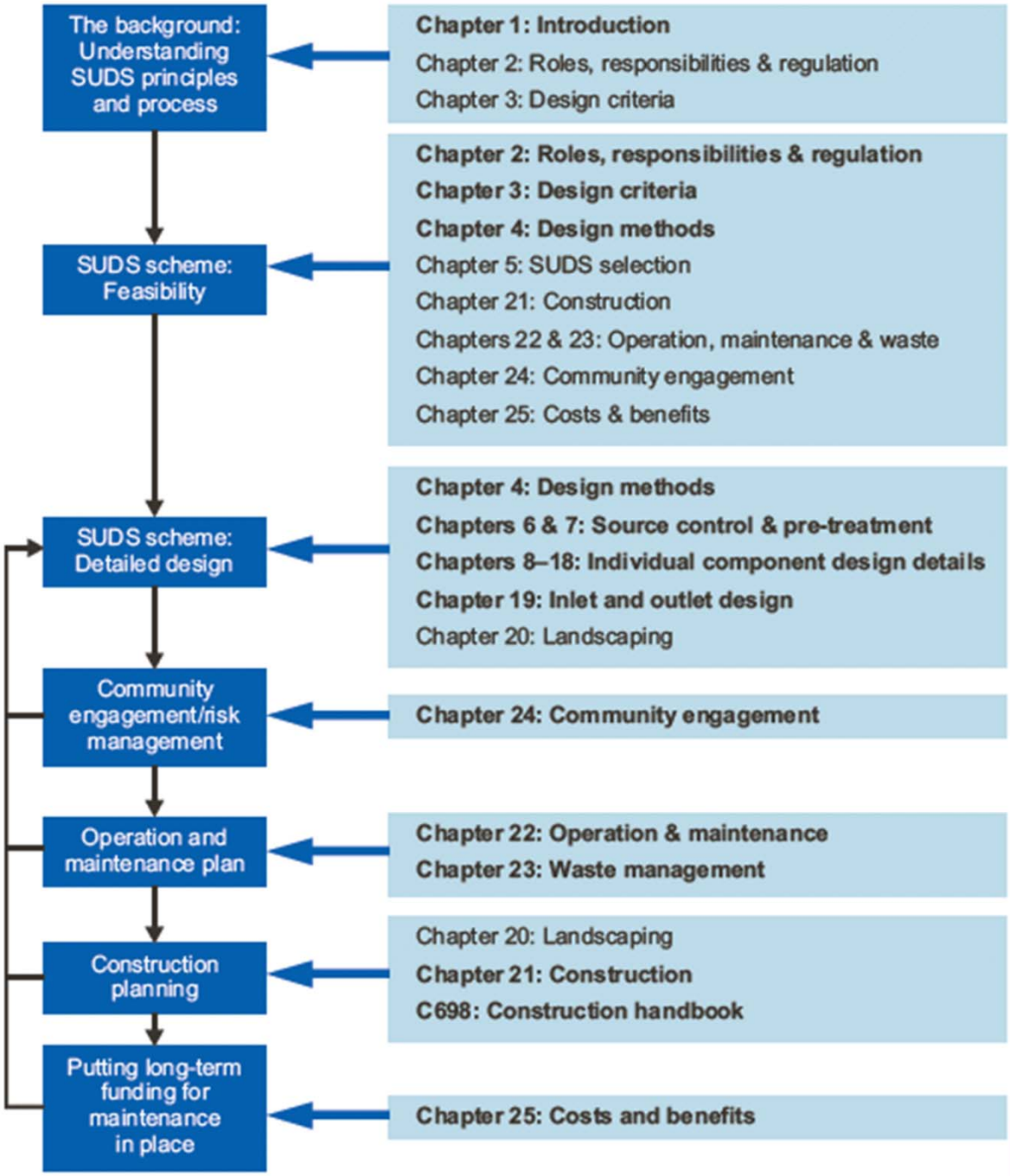
Management train

Sediment control

System maintenance

Open public space

SUDS Manual
CIRIA C697



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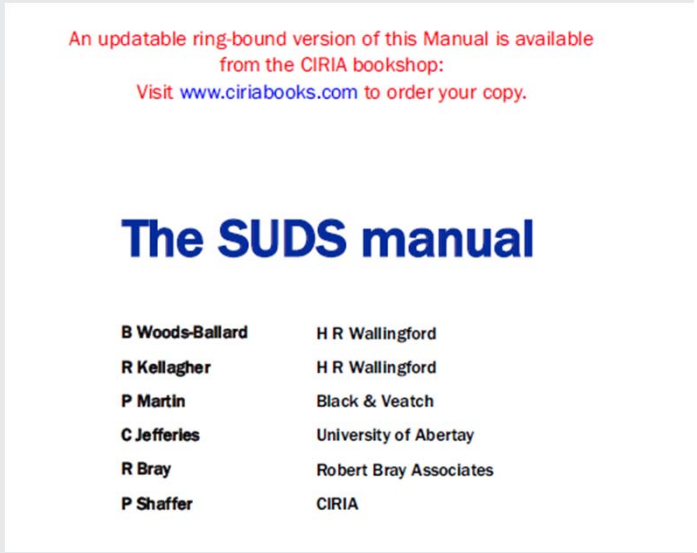

660 pages

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Design criteria

Table 3.5 *Summary of SUDS design criteria*

Criteria	Design event	Design objective
Hydraulic		
Protection against flooding:		
Protection against flooding from watercourse.	Catchment, 100/200 year event.	Control risks to people and property. Floor levels = Max river level + appropriate freeboard
Protection against flooding from drainage system.	Site, 10/30 year event.	No flooding on site, except where planned and approved.
	Site, 100/200 year event.	Control risks to people and property. Floor levels = Max flood storage levels + freeboard.
Protection against flooding from overland flows.	Site, 100/200 year event, short duration events.	Planned flood routing and temporary storage accommodated on site.
Protection against flooding from adjacent land.	Adjacent catchment, 100/200 year event.	Planned flood routing.

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Design criteria

Protection of watercourse:		
Rate of discharge.	Catchment, 1 year event.	***Attenuation storage*** to control 1 year site discharge rate to ≤ 1 in 1 year greenfield peak rate (or 2 l/s/ha).
	Catchment, 100/200 year event.	100/200 year site discharge rate to ≤ 1 in 100/200 year greenfield peak rate.
	All events.	Where possible, ***interception storage*** to prevent runoff from first 5 mm of rainfall.
Volume of discharge.	Catchment, 100 year event.	Where possible, ***long-term storage***/ infiltration to control 1 in 100 year discharge volume to ≤ 1 in 100 year greenfield volume. Usually applied to 6 hr event.
Water quality		
Protection of watercourse:	Site, < 1 year.	Where possible, ***interception storage*** to prevent runoff from first 5 –10 mm of rainfall. Treatment via SUDS components in series as a treatment train, the number of components depending on the pollution levels and environmental sensitivity.

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Climate change allowances

Category	Proposed climate change factors			
	1990–2025	2025–2055	2055–2085	2085–2115
Sea level – SE England	4.0mm/yr	8.5mm/yr	12.0mm/yr	15.0mm/yr
Sea level – SW England	3.5 mm/yr	8.0mm/yr	11.5mm/yr	14.5mm/yr
Sea level – NE & NW England, Scotland and N.Ireland	2.5 mm/yr	7.0mm/yr	10.0mm/yr	13.0mm/yr
Rainfall	5%	10%	20%	30%
River flow	10%	20%	20%	20%

Annex B PPS25, DCLG, 2007

Elvetham Heath

Scotland – mini swales

Drainage pipes underneath pick up runoff when it overflows down the grating for big events.

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M40

Scotland - roundabout

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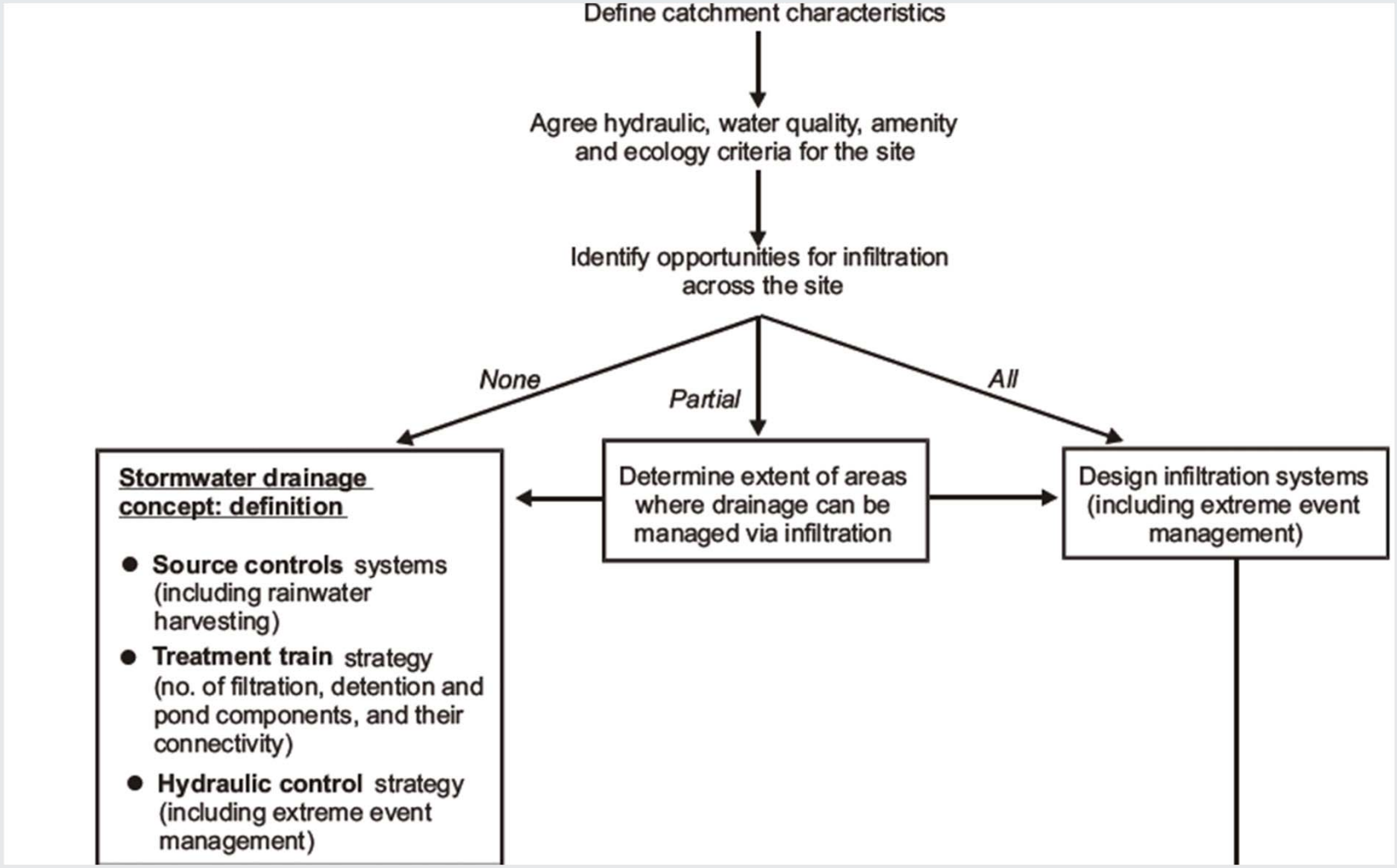
Questions


Define catchment characteristics
Agree hydraulic, water quality, amenity and ecology criteria for the site
Identify opportunities for infiltration across the site
None
Partial
All
Stormwater drainage concept: definition
Source controls systems (including rainwater harvesting)
Treatment train strategy (no. of filtration, detention and pond components, and their connectivity)
Hydraulic control strategy (including extreme event management)
Determine extent of areas where drainage can be managed via infiltration
Design infiltration systems (including extreme event management)