



Urban Trees for a Sustainable Climate

An introduction to SuDS, stormwater management, and urban tree pits Feat. TreeParker®

Alasdair Innes

www.gtspecifier.co.uk





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- Sponge cities
- Understanding SuDS principles
- Green-tech product solutions
 - green roofs
 - rain garden / bioretention soil
 - geo-cellular SuDS tree pits

Sponge Cities

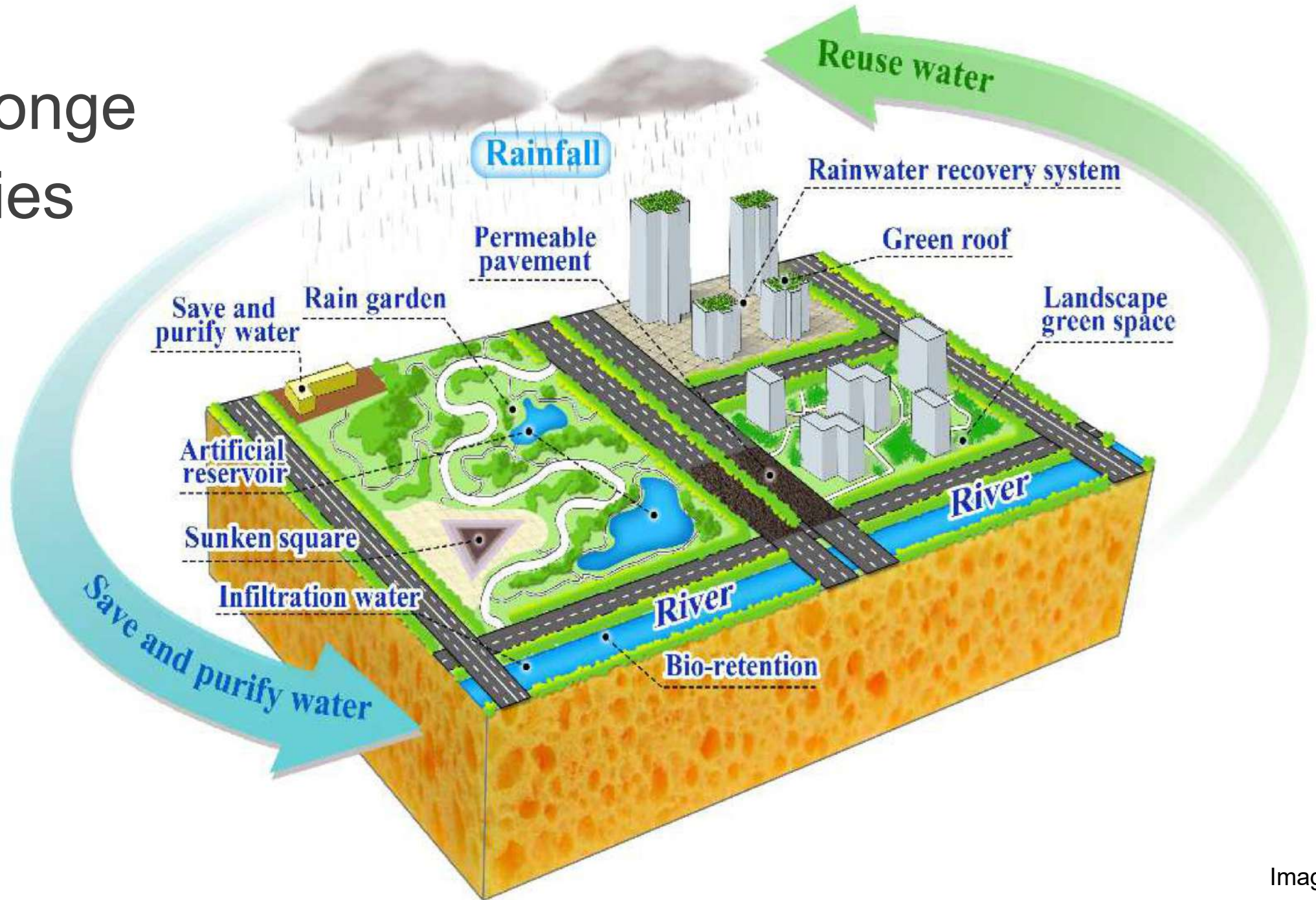
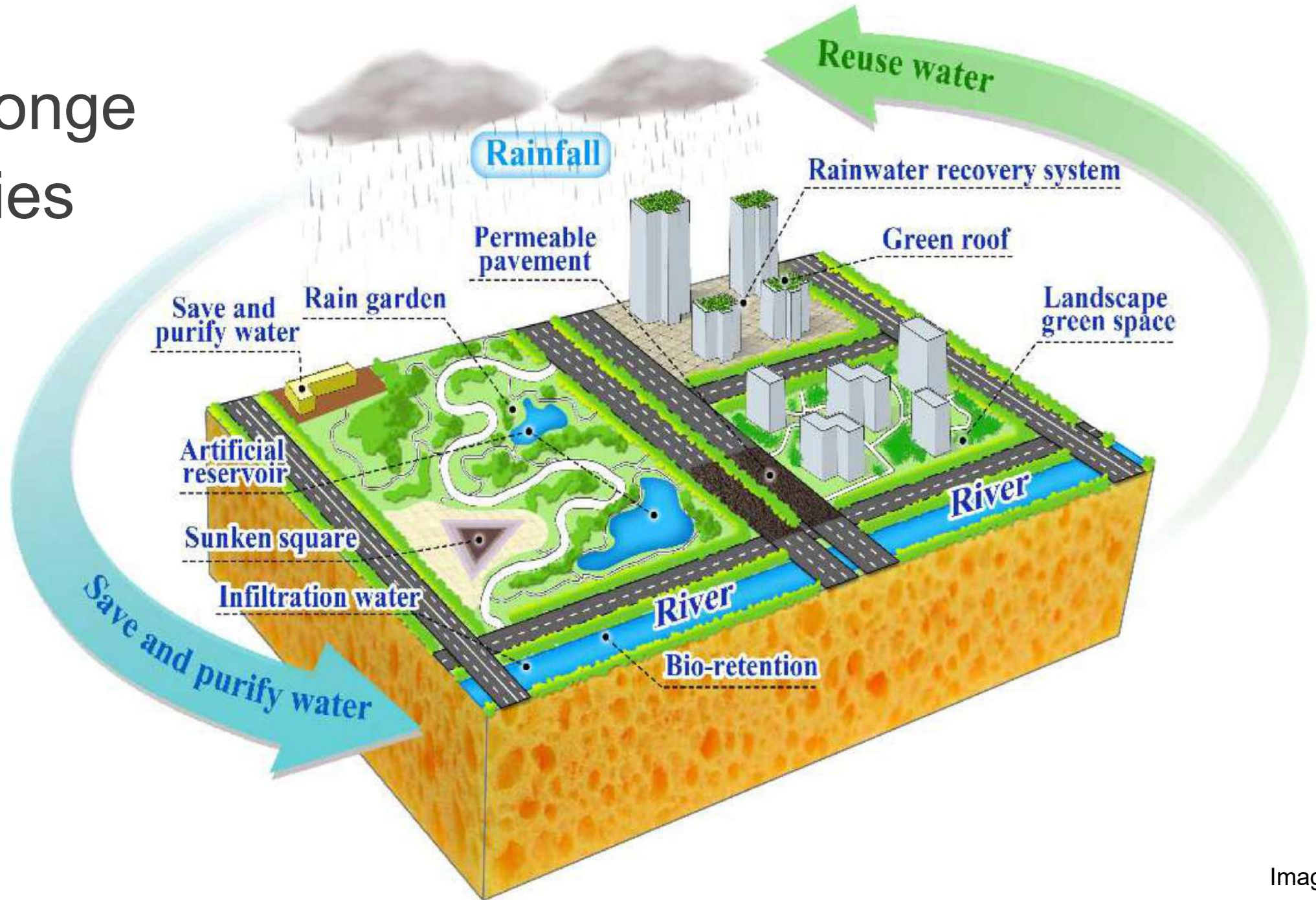




Image: Groundwork.org

Sponge Cities



Copenhagen Sponge City

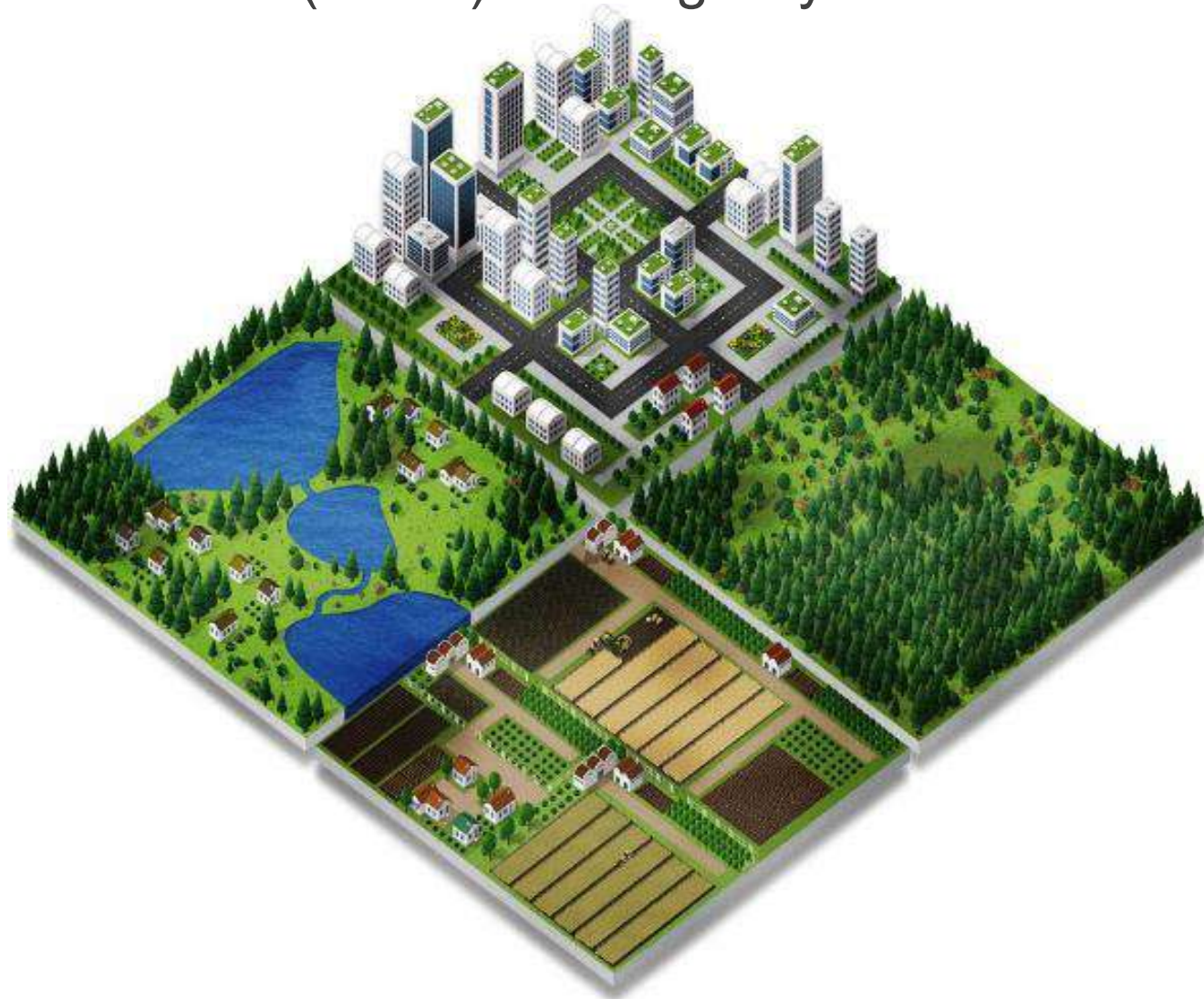




Image: Yale School of the Environment

What are SuDS?

Sustainable (urban) Drainage System



The Four Pillars of SuDS

Water Quantity

Managing how much runoff

Water Quality

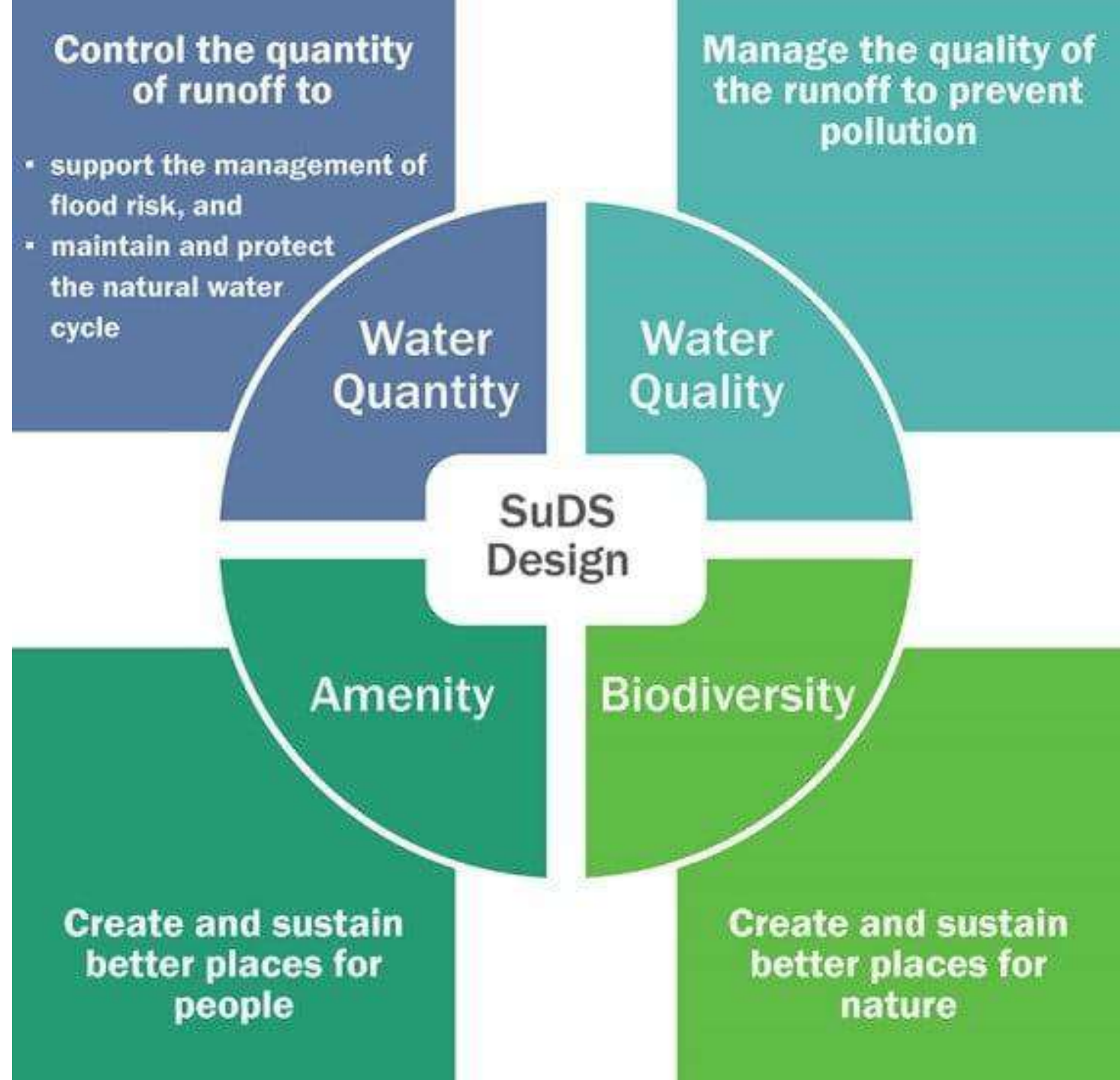
Improving the cleanliness

Amenity

Creating spaces for people to use

Biodiversity

Supporting plants and wildlife





Urban Effect on Source Runoff

URBAN

Run-off 95%



To Ground 5%



SUBURBAN

Run-off 70%



To Ground 30%



OPEN COUNTRY

Run-off 5%



To Ground 95%



Green Roofs



“Where possible, redevelopment and regeneration across the city should result in a greener rather than a greyer built environment.”

Greater London Authority / Urban Greening Factor for London / 24/07/2017

UGF: Urban Green Factor



Image: ANS Global UGF report 2019



Image: ANS Global UGF report 2019

GSF: Green Space Factor

(actual planning policy tool)

Surface Cover Type	Factor
Semi-natural vegetation (e.g. woodland, flower-rich grassland) created on site.	1
Wetland or open water (semi-natural; not chlorinated) created on site.	1
Intensive green roof or vegetation over structure. Vegetated sections only. Substrate minimum settled depth of 150mm – see livingroofs.org for descriptions ⁶ .	0.8
Standard trees planted in natural soils or with a minimum of 25 cubic metres soil volume per tree (preferably with load-bearing substrates and connected pits) – see Trees in Hard Landscapes for overview ⁷ .	0.8
Extensive green roof with substrate of minimum settled depth of 80mm (or 60mm beneath vegetation blanket) – meets the requirements of GRO Code (2014).	0.7
Flower-rich perennial planting – see Centre for Designed Ecology for case-studies ⁸ .	0.7
Rain gardens and other vegetated sustainable drainage elements – See CIRIA for case-studies ⁹ .	0.7
Hedges (line of mature shrubs one or two shrubs wide) – see RHS for guidance ¹⁰ .	0.6
Standard trees planted in individual pits with less than 25 cubic metres soil volume.-	0.6
Green wall –modular system or climbers rooted in soil – see NBS Guide to Façade Greening for overview ¹¹ .	.0.6
Groundcover planting – see RHS Groundcover Plants for overview ¹² .	0.5
Amenity grassland (species-poor regularly mown lawn).	0.4
Extensive green roof of sedum mat without substrate or other systems that do not meet GRO Code (2014) ¹³ .	0.3
Water features (chlorinated) or unplanted detention basins.	0.2
Permeable paving - see CIRIA for overview ¹⁴ .	0.1
Sealed surfaces (e.g. concrete, asphalt, waterproofing, stone).	0



European Commission

GREEN ROOFS

AS NATURE BASED SOLUTIONS FOR A BETTER LIFE IN CITIES

Better water management

Green blue infrastructure store up to 100 % of annual rainfall, restoring a natural water-cycle.

Reduced Urban Heat Island Effect

Green roofs provide a better insulation, leading to a decreased energy demand. Temperatures on traditional roofs can be up to 40°C higher compared to the green roof.

Increased energy efficiency of cooling systems

A temperature decrease of 1°C improves the efficiency of air conditioning for up to 2%.

Increased energy output of photovoltaic Solar panels

Energy production can be increased up to 16% by cooling down the surrounding when green roofs are installed under photovoltaic panels.

Reduced effects of severe storms

Green Roofs can minimise severe storms effect by cooling down roof surfaces and protect roofs from being damaged by the hail, acting as a punch absorber.

Increased urban biodiversity

Green roofs

- Create stepstones to invite more biodiversity into the cities
- Provide shelter and food for pollinators
- Filter small particles and provide more oxygen into cities



No Green Roof
Queen Caroline Estate



Green Roof
same rain event



Image: Chicago City Hall - National Geographic

Rain Gardens



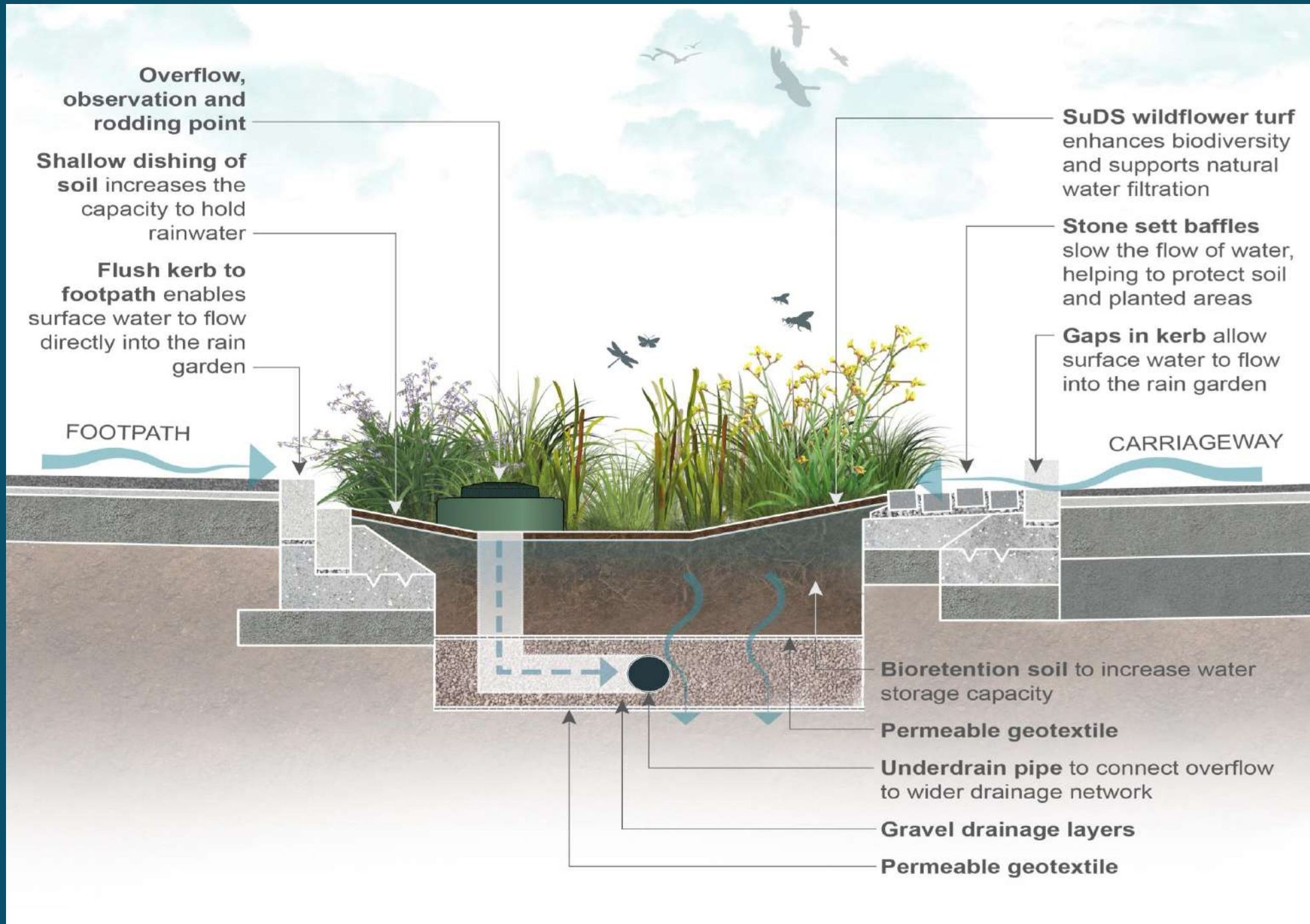
Bioretention Soil



	Bioretention - Standard	Bioretention - High Performance
Water & Air		
Total Porosity	38.6%	42.9%
Saturated Hydraulic Conductivity	2.1 mm min ⁻¹ 126.00 mm hour ⁻¹	6.2mm min ⁻¹ 372.0mm hour ⁻¹

1 tree pit 25m³ @ 800mm deep with 400mm **HP BR soil** = **5.4m³ - 5,400L void**

Versus 400mm **topsoil** @ 3.12m³ - 3,120L void



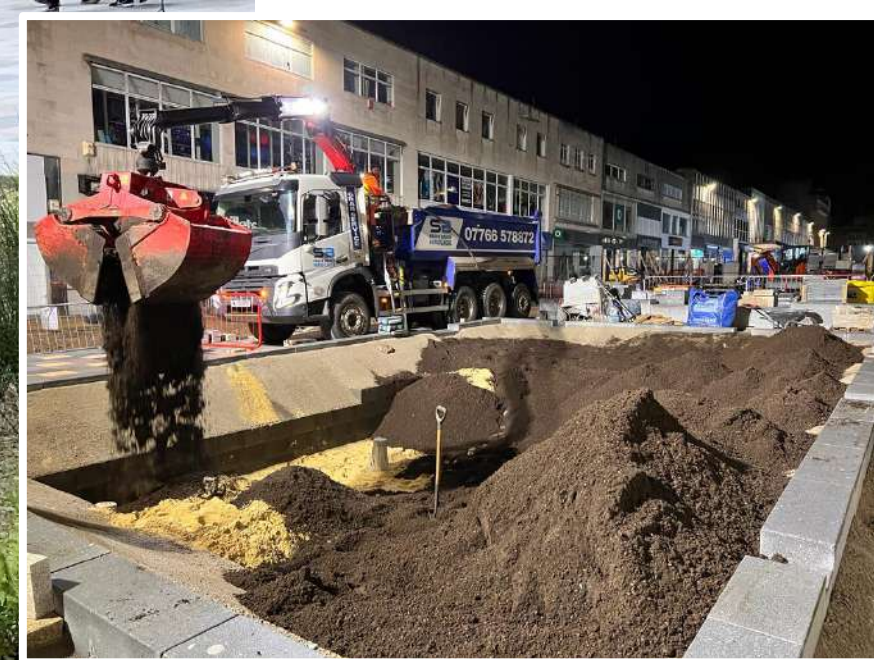


2022



2023

Images: Martha Redman



Plymouth Regeneration

Urban Tree Pits

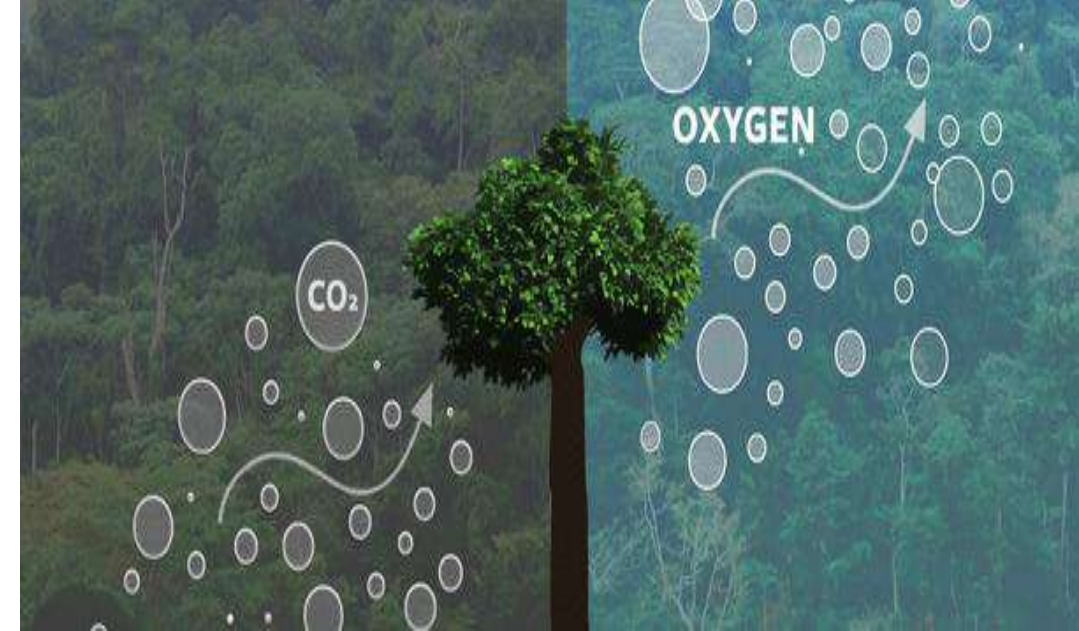
Featuring TreeParker[®]







Why more trees?



Grey v Green

Comparing two streets In Kraków, Poland

Grey

Green

Road 46.4°

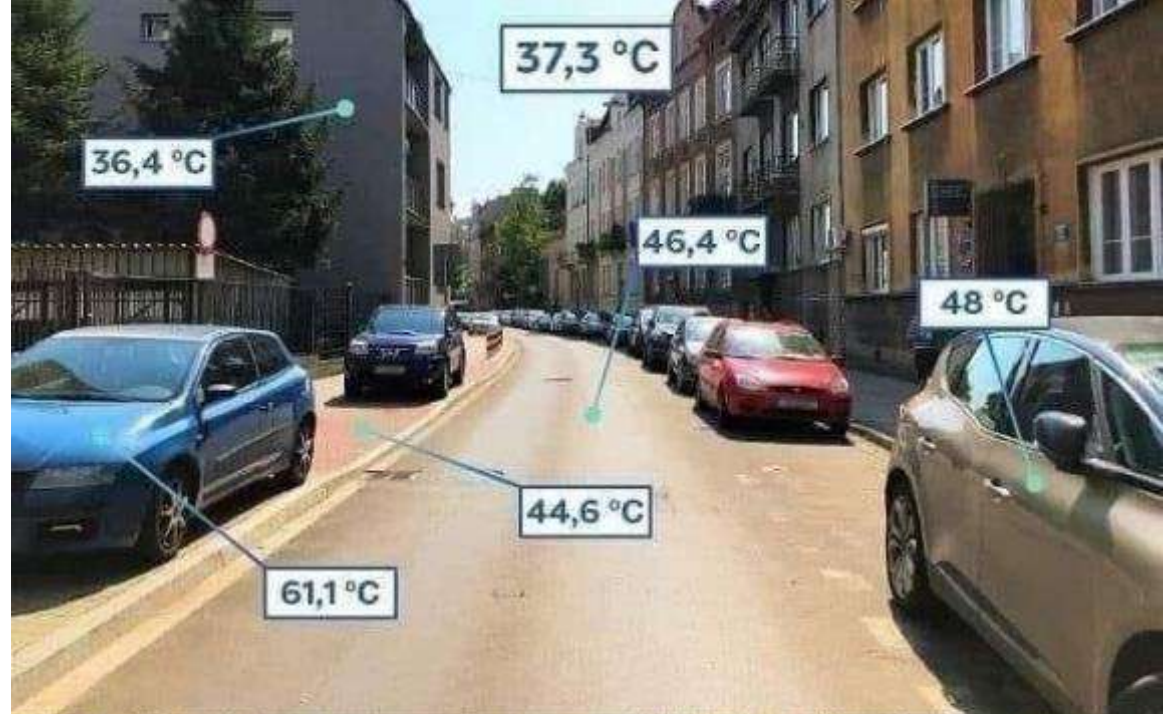
Road 22.8°

Air 37.3°

Air 27.4°

Walls 36.4°

Walls 26.3°



cooling effect

house values

filter pollution

calming

reduce wind speed

reduce noise pollution

added biodiversity/BNG

storm water attenuation







Image: Paul Miller



Not sure if serious.

Trees are Forestry Plants



But Instead...



**Soil compaction and
available rooting space**

Service lines and pipes

**Surface water /
irrigation (or lack of)**

Lack of nutrients

Contaminants



**Soil
compaction**

TreeParker®

“Cellular systems offer a feasible means of growing trees in otherwise almost impossibly hostile locations.”

British Standard 8545: 2014
Trees: from nursery to independence in the landscape





TreeParker Dimensions[®]

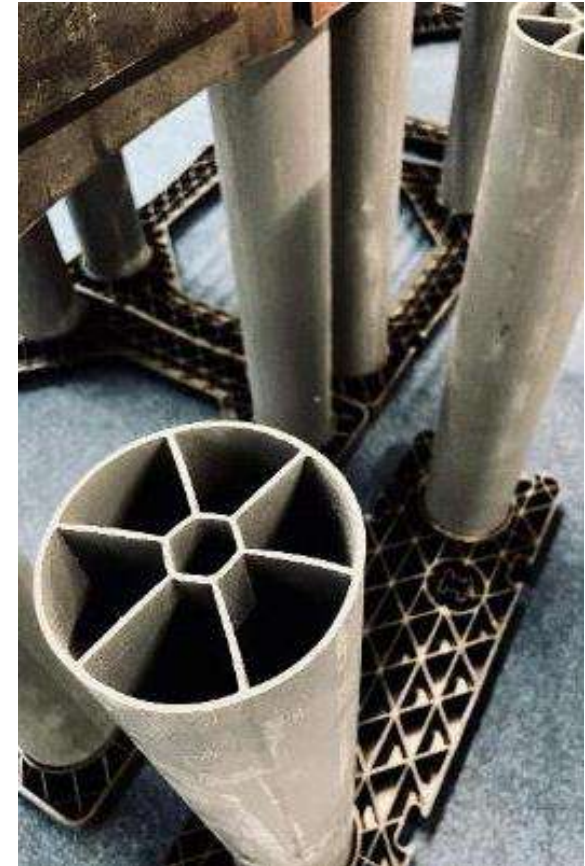
Dimensions: 605mm x 605mm x

400 / 600 / 800 / 1000 / 1200 / 1500mm

Various stock height options allow for flexible layouts and stepped gradients. No need to stack.

Legs can be trimmed on site to fit exact depth requirements.

Side unit 605 x 200mm available for most cost-effective layouts.





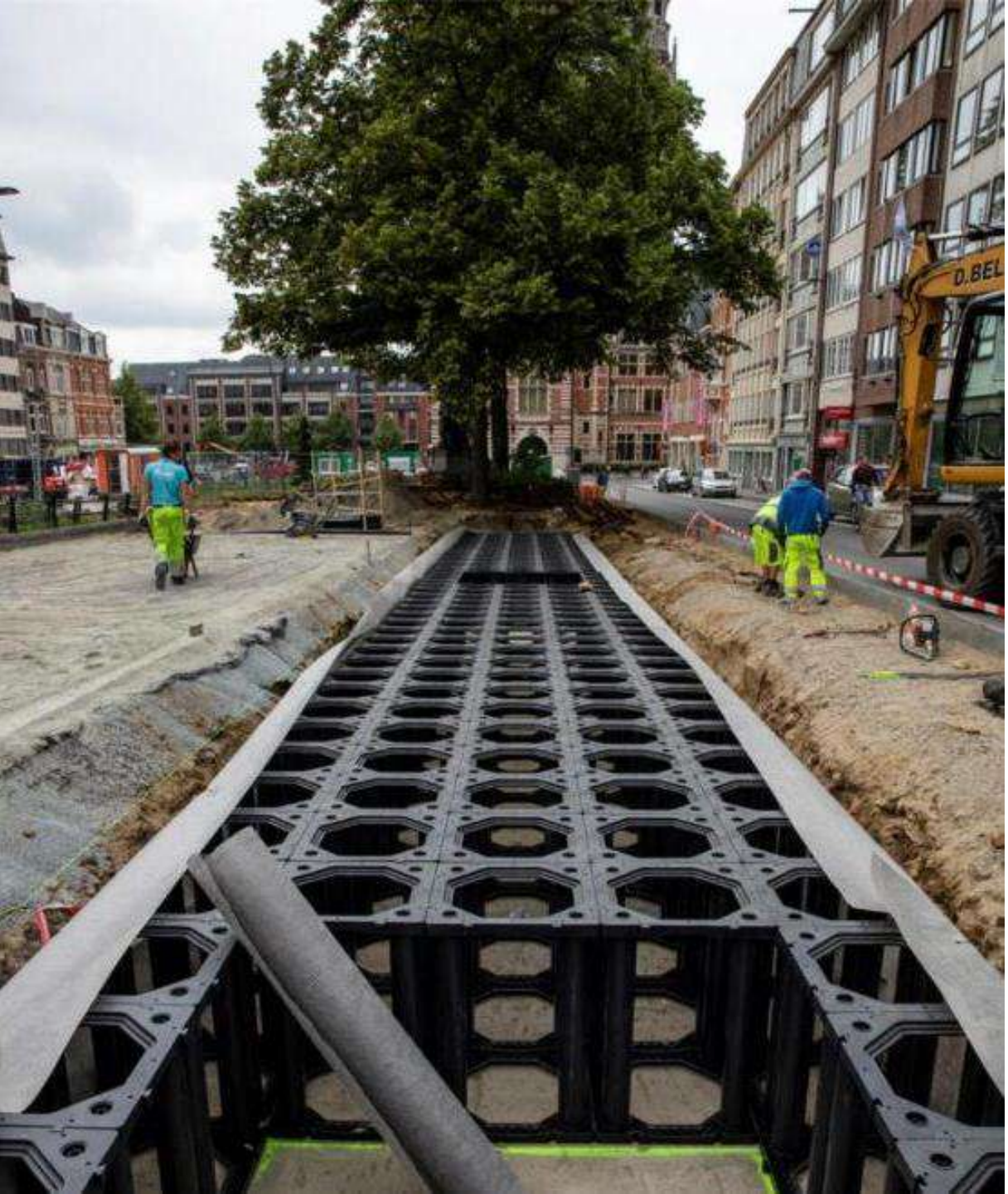






Image - belfastcity.gov.uk

Example 14m³ tree pit

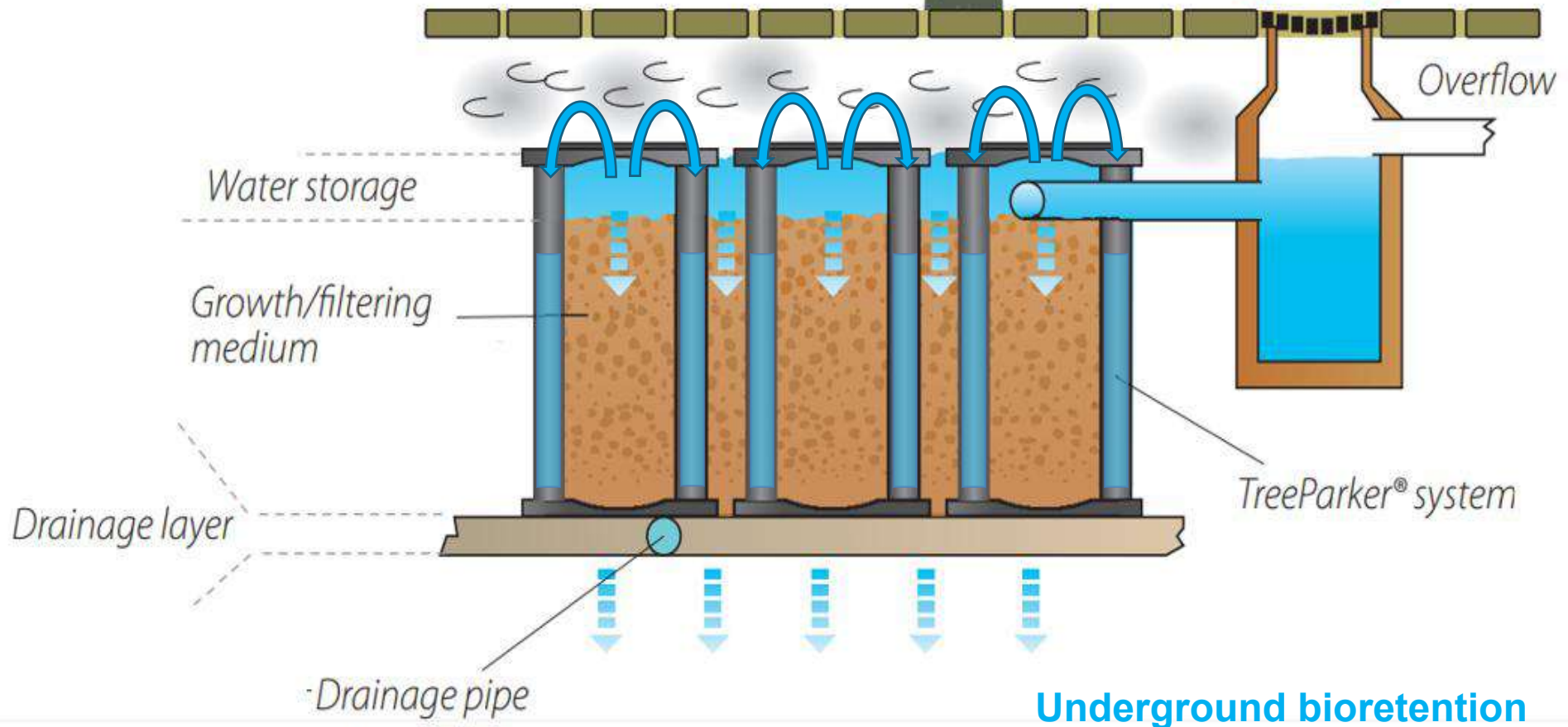
4.8m x 4.8m @800mm deep = 62 units

600mm soil depth + 200mm water/air gap

4.6m³ (4600L) water storage capacity

Plus c1.5m³ (1500L) capacity in 248 legs

Total potential attenuation capacity = 6.1m³ (6,100L)





Example 14m³ tree pit

4.8m x 4.8m @800mm deep = 62 units

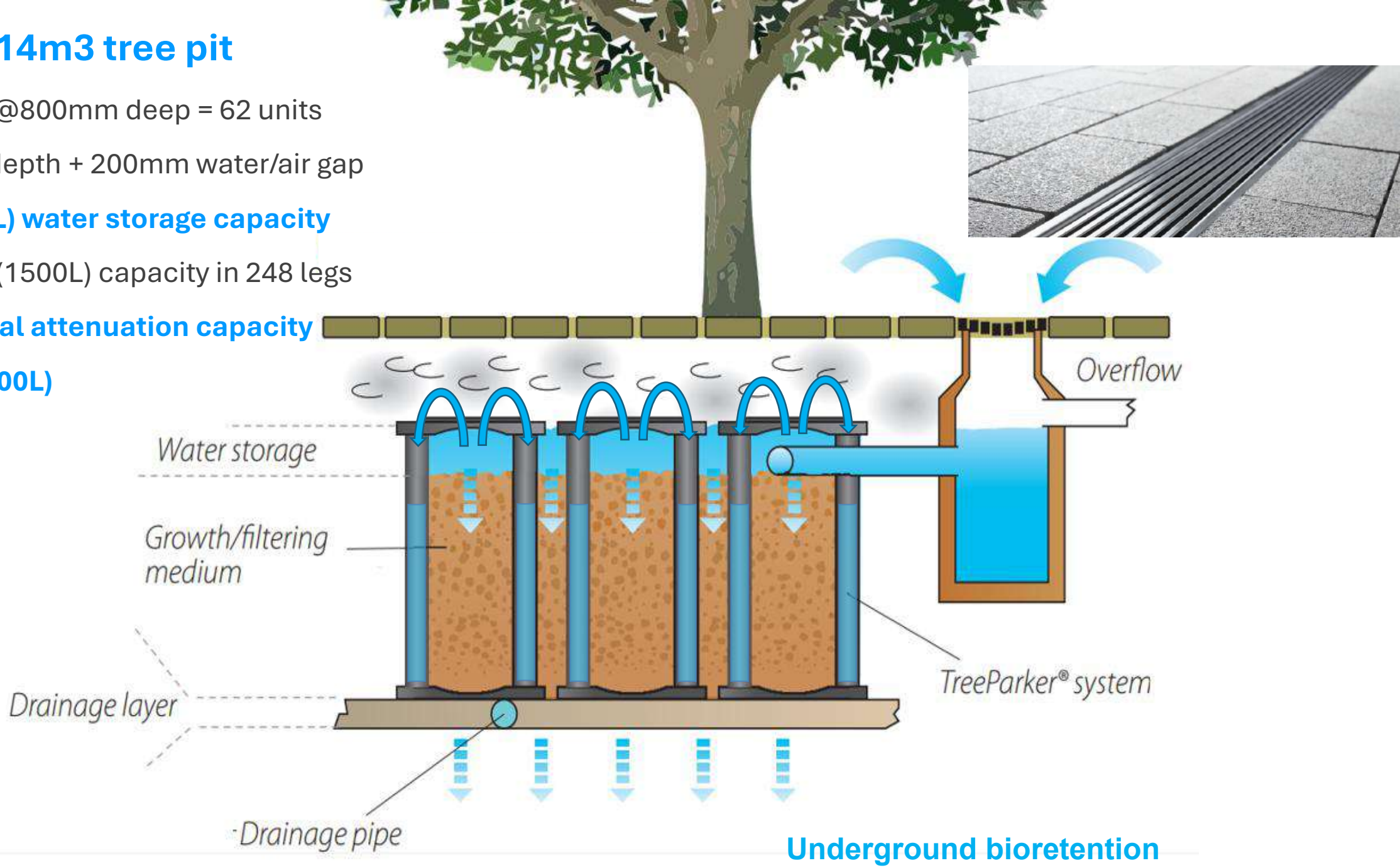
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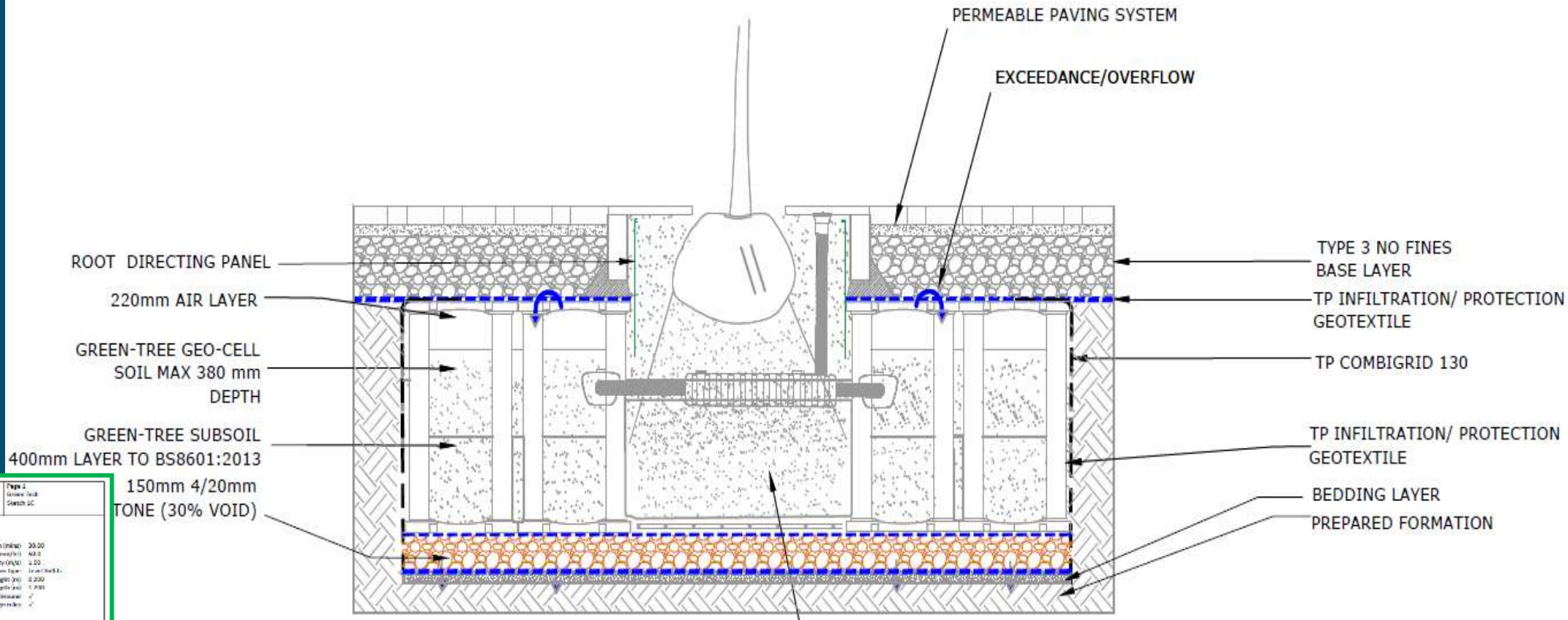
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Total potential attenuation capacity

= 6.1m³ (6,100L)



Underground bioretention



ROOT DIRECTING PANEL

220mm AIR LAYER

GREEN-TREE GEO-CELL
SOIL MAX 380 mm
DEPTH

GREEN-TREE SUBSOIL
400mm LAYER TO BS8601:2013

150mm 4/20mm
TONE (30% VOID)

PERMEABLE PAVING SYSTEM

EXCEEDANCE/OVERFLOW

TYPE 3 NO FINES
BASE LAYER

TP INFILTRATION/ PROTECTION
GEOTEXTILE

TP COMBIGRID 130

TP INFILTRATION/ PROTECTION
GEOTEXTILE

BEDDING LAYER

PREPARED FORMATION

MONA LINK
IRRIGATION/AERATION SYSTEM

SK1c - TREEPARKER SUDS TREEPIT
1000mm DEEP TREEPARKER SYSTEM WITH 200mm AIRGAP AND
150mm CLEAN STONE BASE
(INFILTRATION AND PERMEABLE PAVING - WHERE FEASIBLE)

green-tech

File: SK1c.cad File Path: C:\Users\j... Desktop
 Page: 1 of 1
 Search: UC

Design Settings

Methodology: FSR
 Maximum Time of Concentration (min): 30.00
 Minimum Rainfall (mm/h): 0.5
 Minimum Velocity (m/s): 1.0
 Minimum Siltation Rate (mm/h): 0.5
 Minimum Siltation Depth (mm): 1.0
 Minimum Siltation Volume (m³): 1.0
 Minimum Siltation Area (m²): 1.0
 Minimum Siltation Length (m): 1.0
 Minimum Siltation Width (m): 1.0
 Minimum Siltation Height (m): 1.0
 Minimum Siltation Depth (mm): 1.0
 Minimum Siltation Volume (m³): 1.0
 Minimum Siltation Area (m²): 1.0
 Minimum Siltation Length (m): 1.0
 Minimum Siltation Width (m): 1.0
 Minimum Siltation Height (m): 1.0

Nodes

Name	Area (m²)	Cover (mm)	Depth (m)	Flowing (m)	Depth (m)
Depth/Area 1	0.055	100.000	15.578	67.681	1.500

Simulation Settings

Methodology: FSR
 Run Region: England and Wales
 US-CO (mm): 20.000
 Rainfall: 0.800
 Summer CV: 0.750
 Winter CV: 0.840

Analysis Speed: Normal
 Run Speed: 100
 Run Down Time (min): 240
 Additional Storage (m³): 20.0
 Check Discharge Rate(s): 1
 Check Discharge Volume: 1

Storm Duration

IS	30	60	120	180	240	300	360	420	480	540	600	720	960	1440
Return Period (years)	1	10	20	50	100	200	500	1000	2000	5000	10000	20000	50000	100000
Climate Change (ICC %)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Additional Area (A %)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Additional Flow (Q %)	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Node Depth/Area 1 Depth/Area Storage Structure

Base Int Coefficient (m³/m²): 0.00000 Safety Factor: 2.0 Invert Level (m): 99.850
 Max Int Coefficient (m³/m²): 0.00000 Priority: 0.40 Time to full capacity (min):

Depth (m)	Area (m²)	Int Area (m³)	Depth (m)	Area (m²)	Int Area (m³)	Depth (m)	Area (m²)	Int Area (m³)
0.000	18.0	0.0	0.150	18.0	0.0	0.151	0.0	0.0

Node Depth/Area 2 Depth/Area Storage Structure

Base Int Coefficient (m³/m²): 0.00000 Safety Factor: 2.0 Invert Level (m): 99.850
 Max Int Coefficient (m³/m²): 0.00000 Priority: 1.00 Time to full capacity (min):

Depth (m)	Area (m²)	Int Area (m³)	Depth (m)	Area (m²)	Int Area (m³)	Depth (m)	Area (m²)	Int Area (m³)
0.000	12.3	0.0	0.225	12.3	0.0	0.223	0.0	0.0

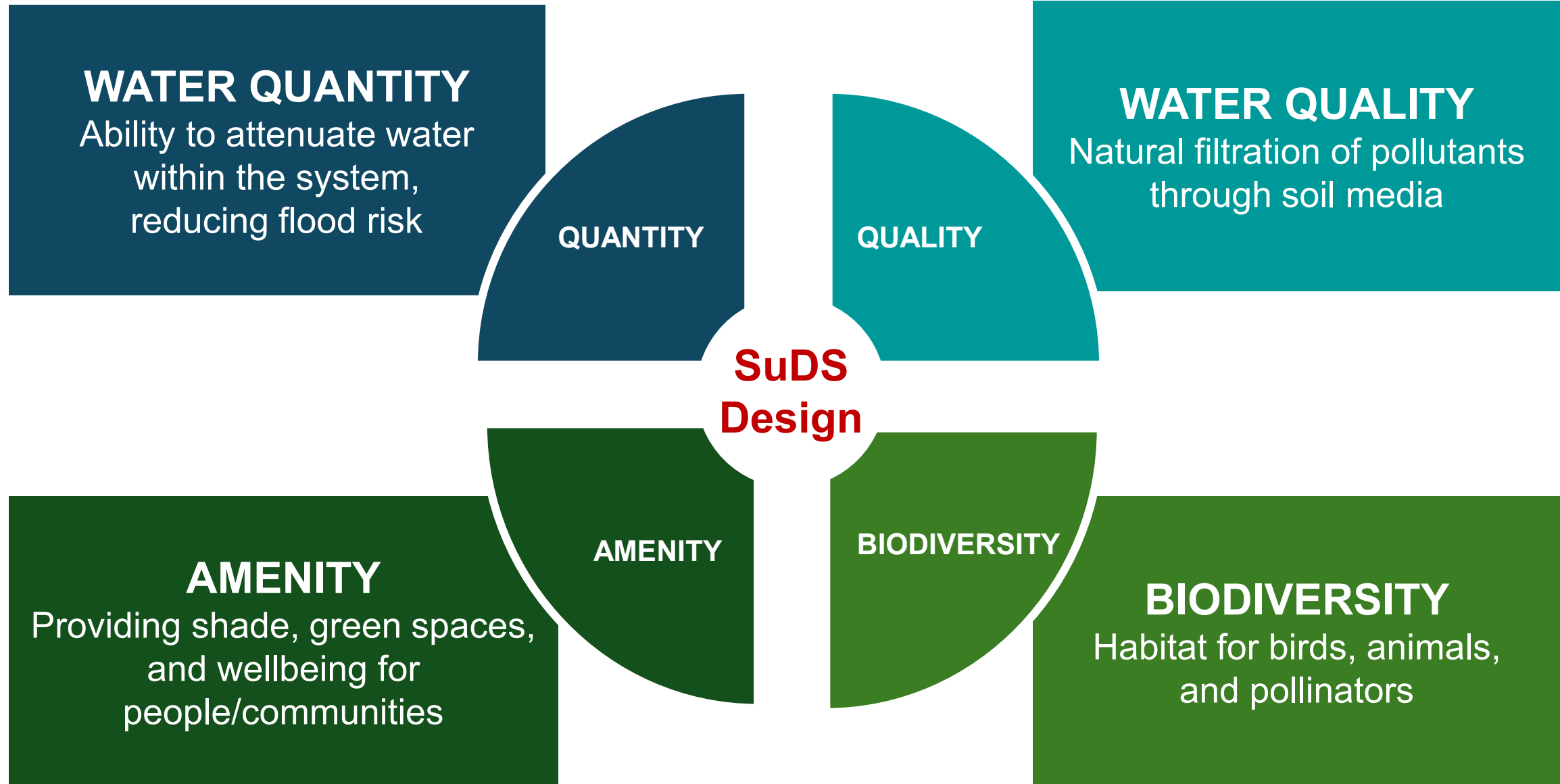
Project: SK1c - TreeParker SUDS TreePit
 Date: 2023-11-15 10:00:00
 User: j...

TreeParker® 436 cubic metre SuDS installation

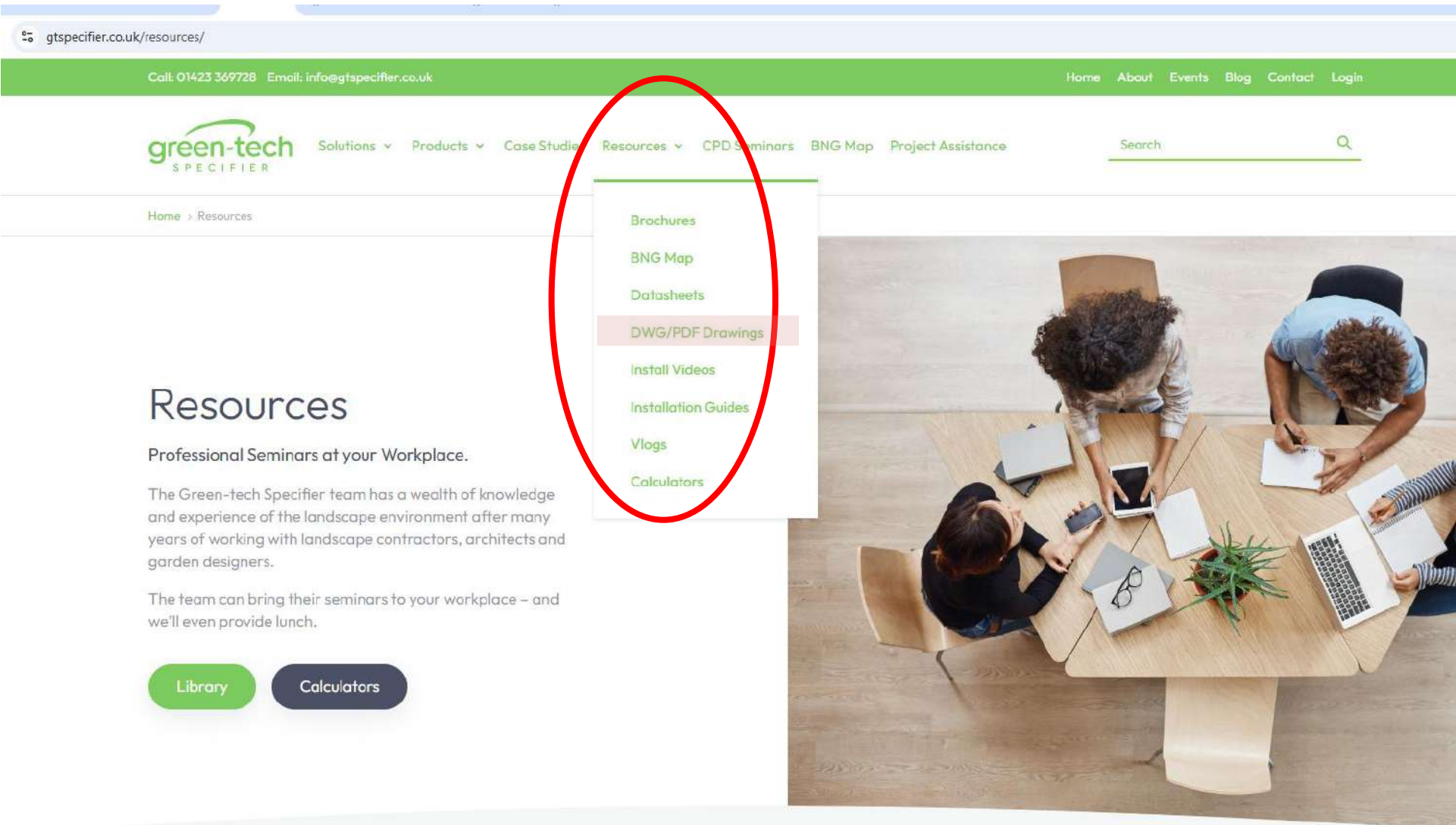


Antwerp – Media Square





gtspecifier.co.uk



Resources

Professional Seminars at your Workplace.

The Green-tech Specifier team has a wealth of knowledge and experience of the landscape environment after many years of working with landscape contractors, architects and garden designers.

The team can bring their seminars to your workplace – and we'll even provide lunch.

Library

Calculators



TreeParker® Tree Pit & Pavement Support System - Tree Pit Support and SuDS System ∞

● Verified by manufacturer 3 months ago ?

170UR7025 - 400 mm high

Variant:

170UR7025 - 400 mm high ▾

Third party certifications:



A modular support and engineered SuDS solution for urban tree pits and paving.

Jump to:

[Specification data](#)

[Sustainability data](#)

[Third party certifications](#)



+44 (0)1423 332114

[Website](#) ↗

Contact manufacturer



Compare

[Compare variants](#)

+ Add to spec

Thank You

alasdair.innes@green-tech.uk

