WATER SENSITIVE SA

Water sensitive urban design and urban heat mitigation

Mellissa Bradley, Program Manager

Flinders University
15 May 2017

Water Sensitive SA - established to build the capacity of all organisations with a role in the planning, design, approval, construction or maintenance of new developments and infrastructure to implement best practice water sensitive urban design (WSUD)

Water Sensitive SA Program Partners

WATER SENSITIVE SA

Natural Resources
Adelaide and Mt Lofty Ranges

LOCAL GOVERNMENT RESEARCH & DEVELOPMENT SCHEME

Australian Government | National Landcare Programme

STORMWATER SOUTH AUSTRALIA

City of Burnside

CITY OF ONKAPARINGA

CITY OF MARION

Local Government Association of South Australia

Government of South Australia

SA Water

CITY OF Salisbury

CITY OF Playford

CITY OF MITCHAM

MURRAY BRIDGE

EPA South Australia

Port Adelaide Enfield

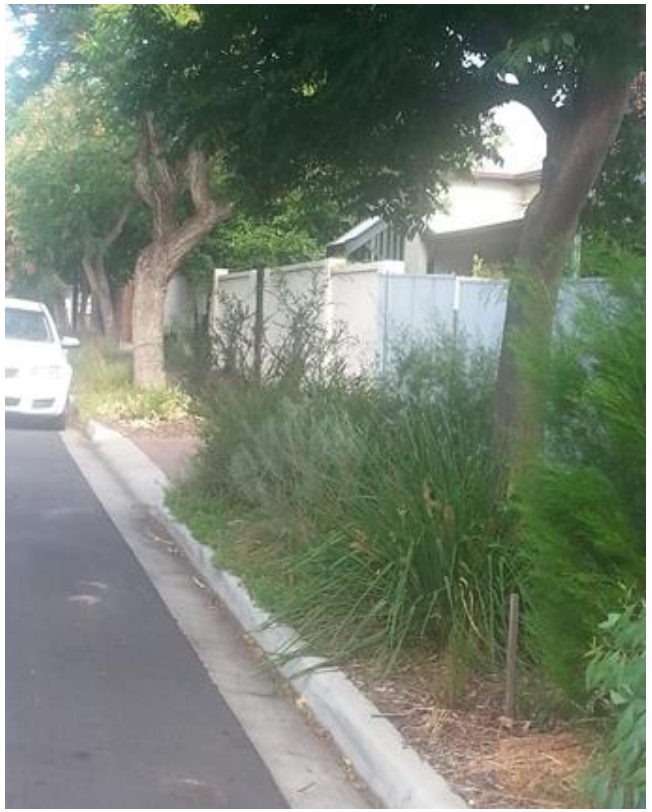
CITY OF TEA TREE GULLY Naturally Better

THE CITY of Unley

City of Charles Sturt

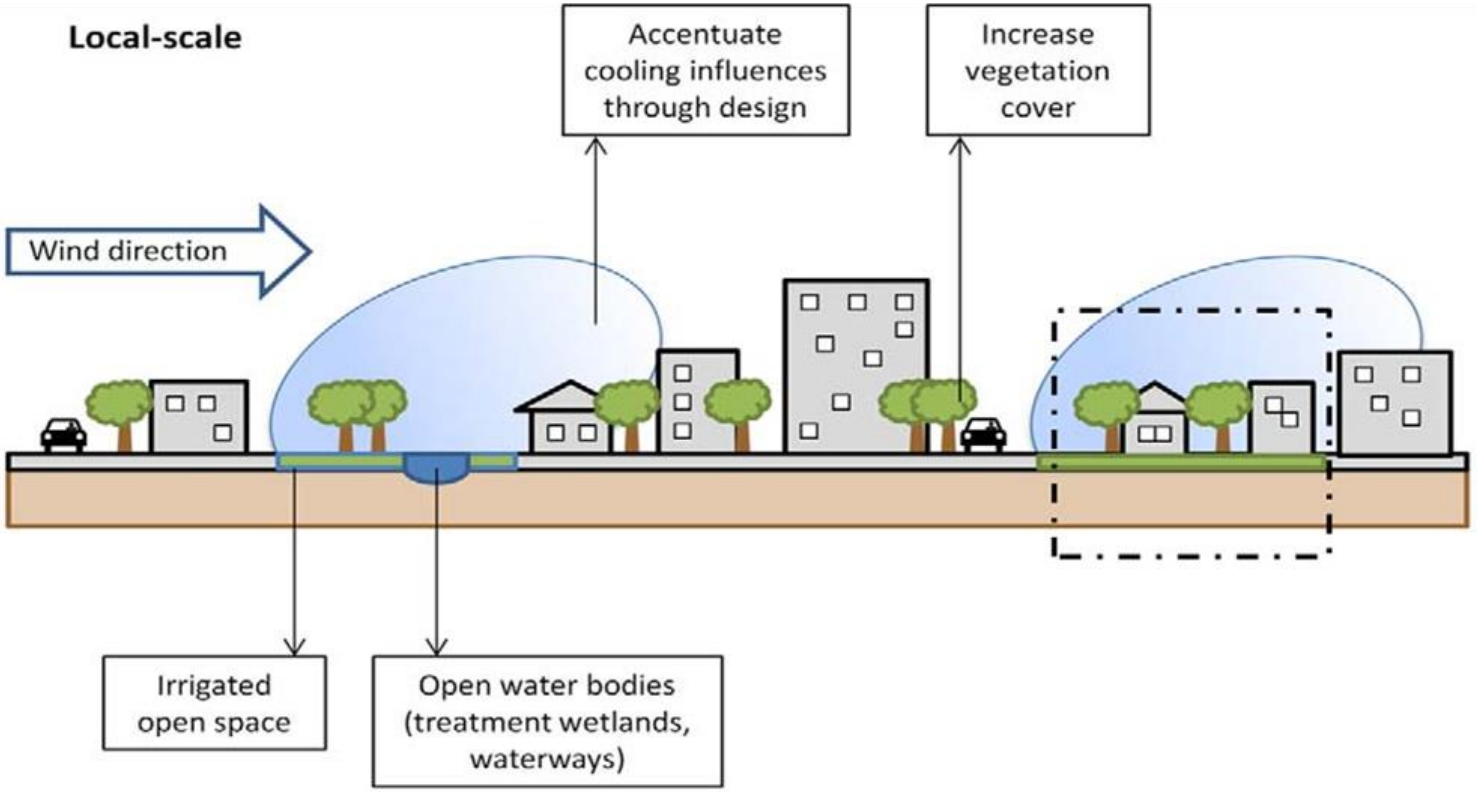
Guiding Principles of WSUD

- Re-integrate water back into urban landscape – create microclimate
- Re-use of water at source (or close as possible)
- Protect receiving water quality (streams and marine)
- Fit for purpose water use
- Solutions at a range of scales



Unions Street Dulwich, B-Pods (infiltration systems)

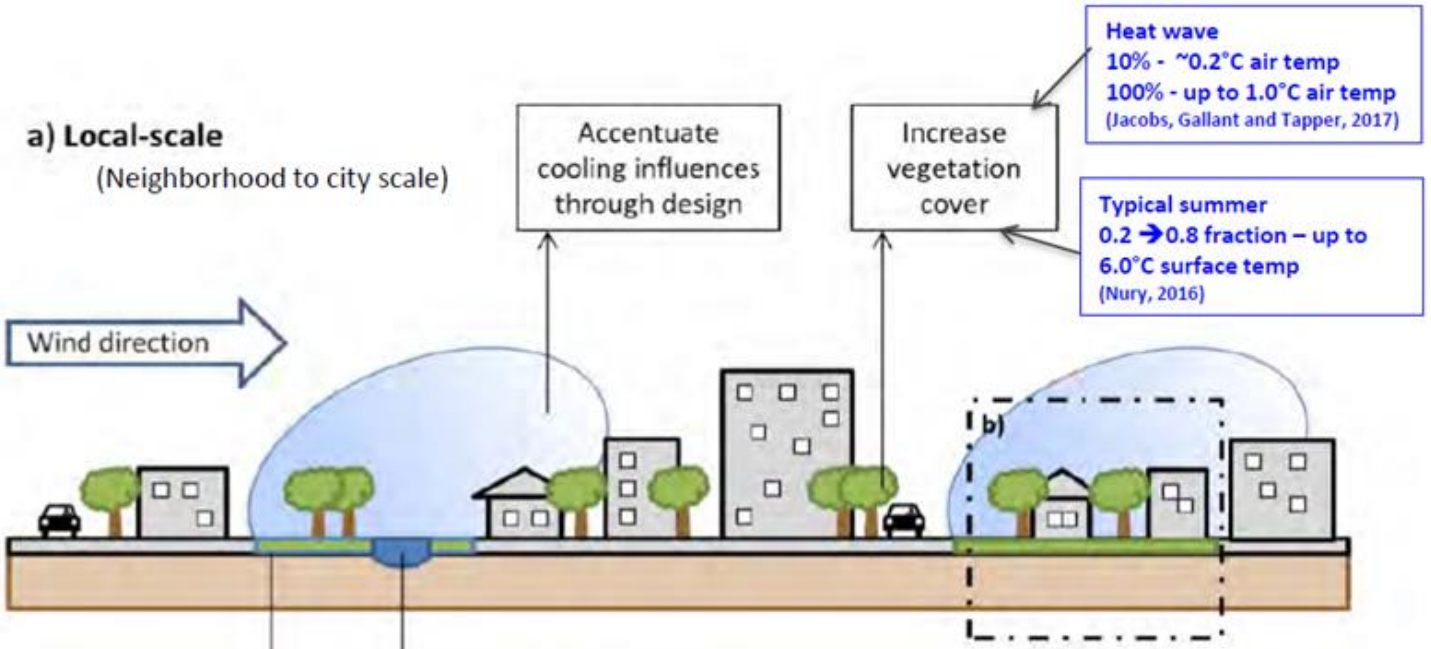
Urban water cycle ➡ Living Cities



Coutts. A. (2012)

Summertime WSUD Cooling

Various B3.1/3.2 publications



CRC for Water Sensitive Cities

UTCI – Universal Thermal Comfort index

Local scale WSUD solutions open water bodies

Oaklands Park Wetlands Source: City of Marion

Oaklands Park stormwater harvesting & re-use scheme

WATER SENSITIVE SA

About the site

Organisation
City of Marion
Development type
Public
WSUD feature type
Stormwater harvest and re-use
Total area of wetland
2.2 hectares
Cost
$9 million
Date completed
December 2013

Figure 1 Oaklands stormwater harvest and re-use project

Annual benefits

- ✓ Reuse of up to 200ML p.a. of stormwater for irrigation of up to 31 Council reserves replacing mains or groundwater use, or creating new irrigated areas
- ✓ Expected total treatment of 400-500 ML of stormwater p.a.

Local scale – stormwater harvesting & re-use

St Clair Wetlands

Laratinga Wetlands, Mount Barker recycled water

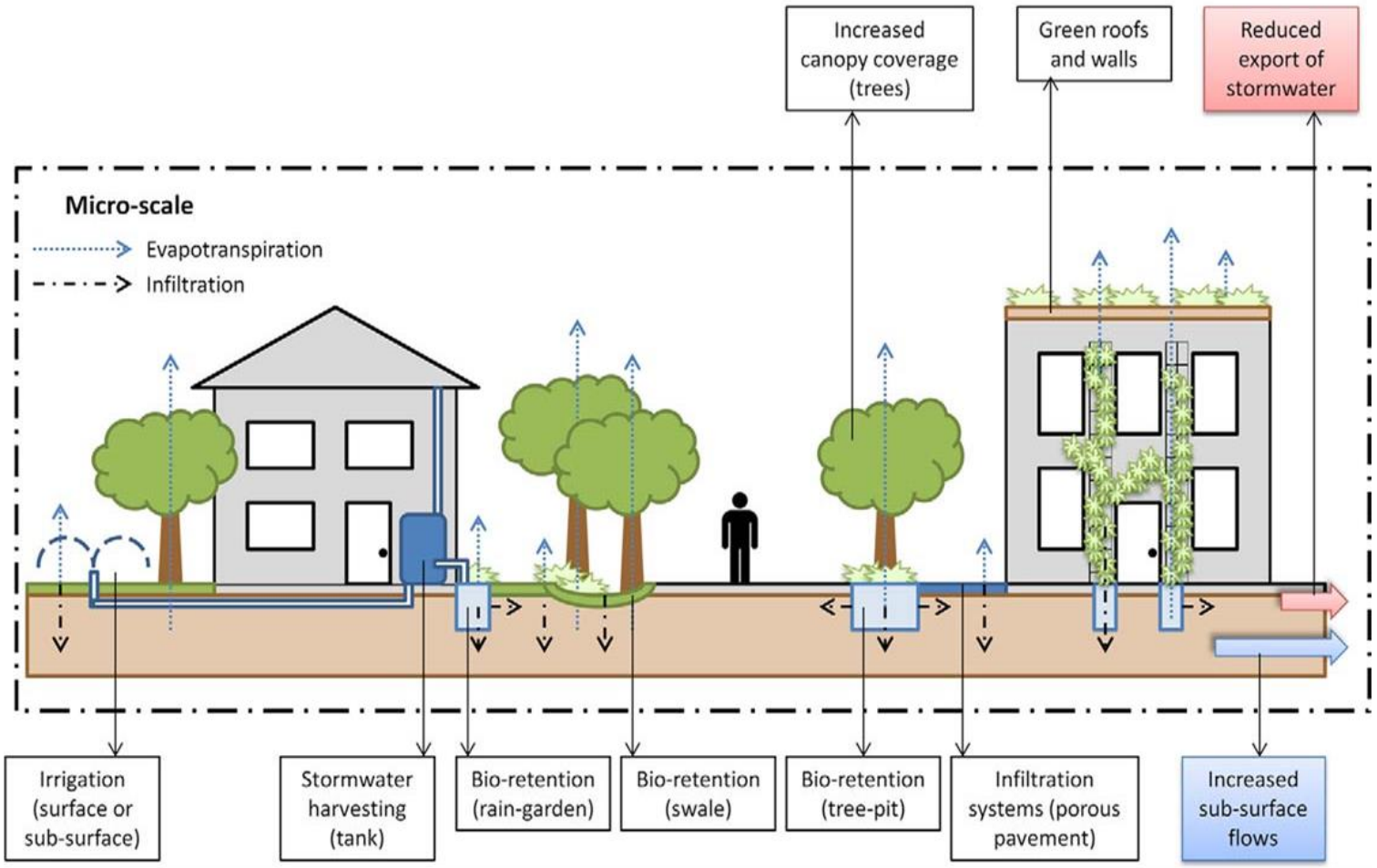
Image: Water Sensitive SA

Image: District Council of Mount Barker

Precinct scale

Kevin Taylor Park, Bowden Urban Village

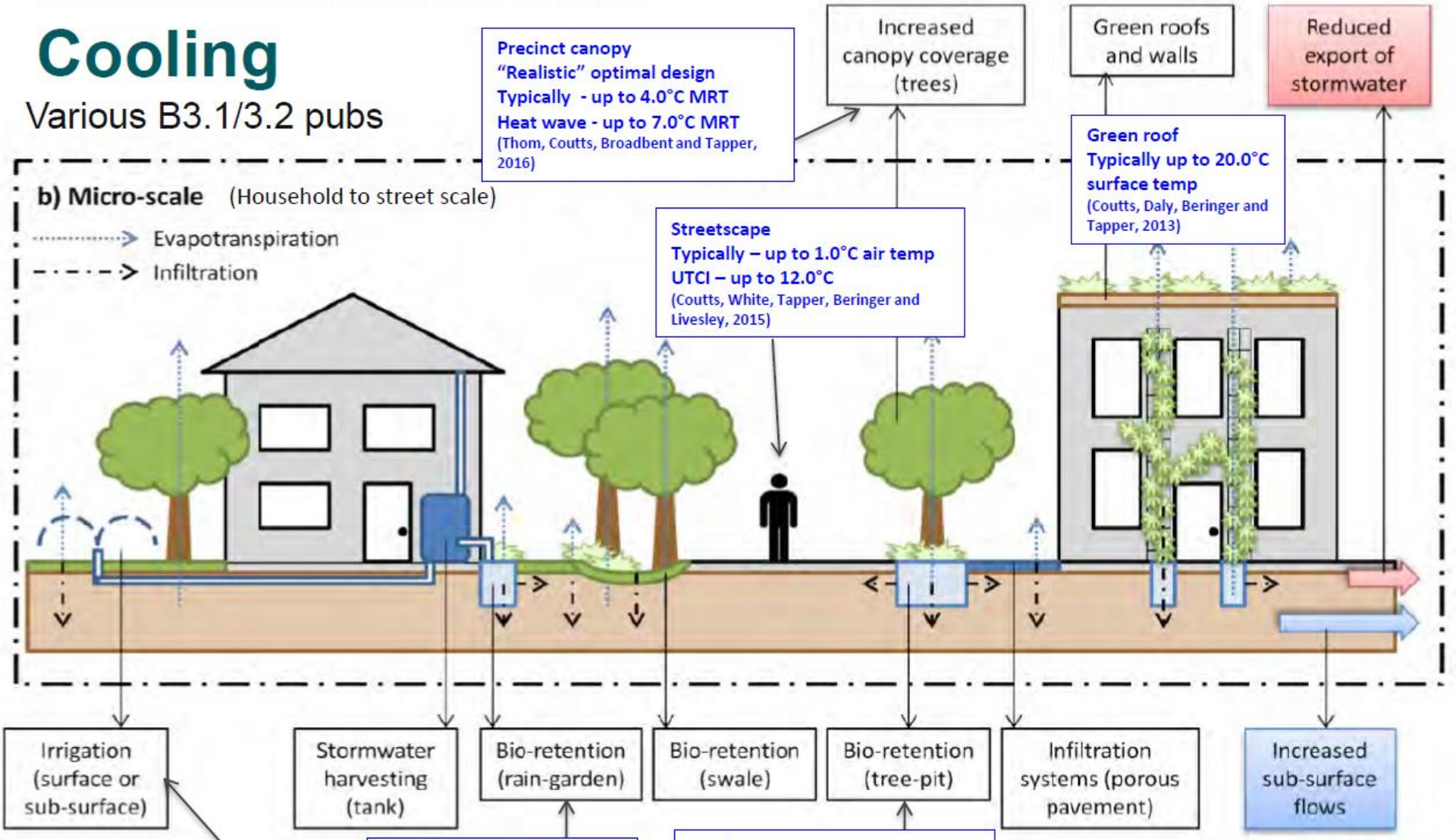
Urban water cycle ➡ Living Cities



Source: Coutts et al. (2012)

Summertime WSUD Cooling

Various B3.1/3.2 pubs



UTCI – Universal Thermal Comfort index
MRT – Mean radiant temperature

CRC for Water Sensitive Cities

Micro-scale WSUD solutions

1. Biofilters / raingardens
2. Infiltration systems

Drawing upon:

Adoption guidelines for stormwater Biofiltration systems
CRC for Water Sensitive Cities.

Designing Streetscape Raingardens
DesignFlow.

Construction of WSUD Assets
Maintenance of WSUD Assets
DesignFlow.

Angas Street, Adelaide adjacent SAPOL
Photo: Water Sensitive SA

Raingardens

Deacon Ave, Mile End

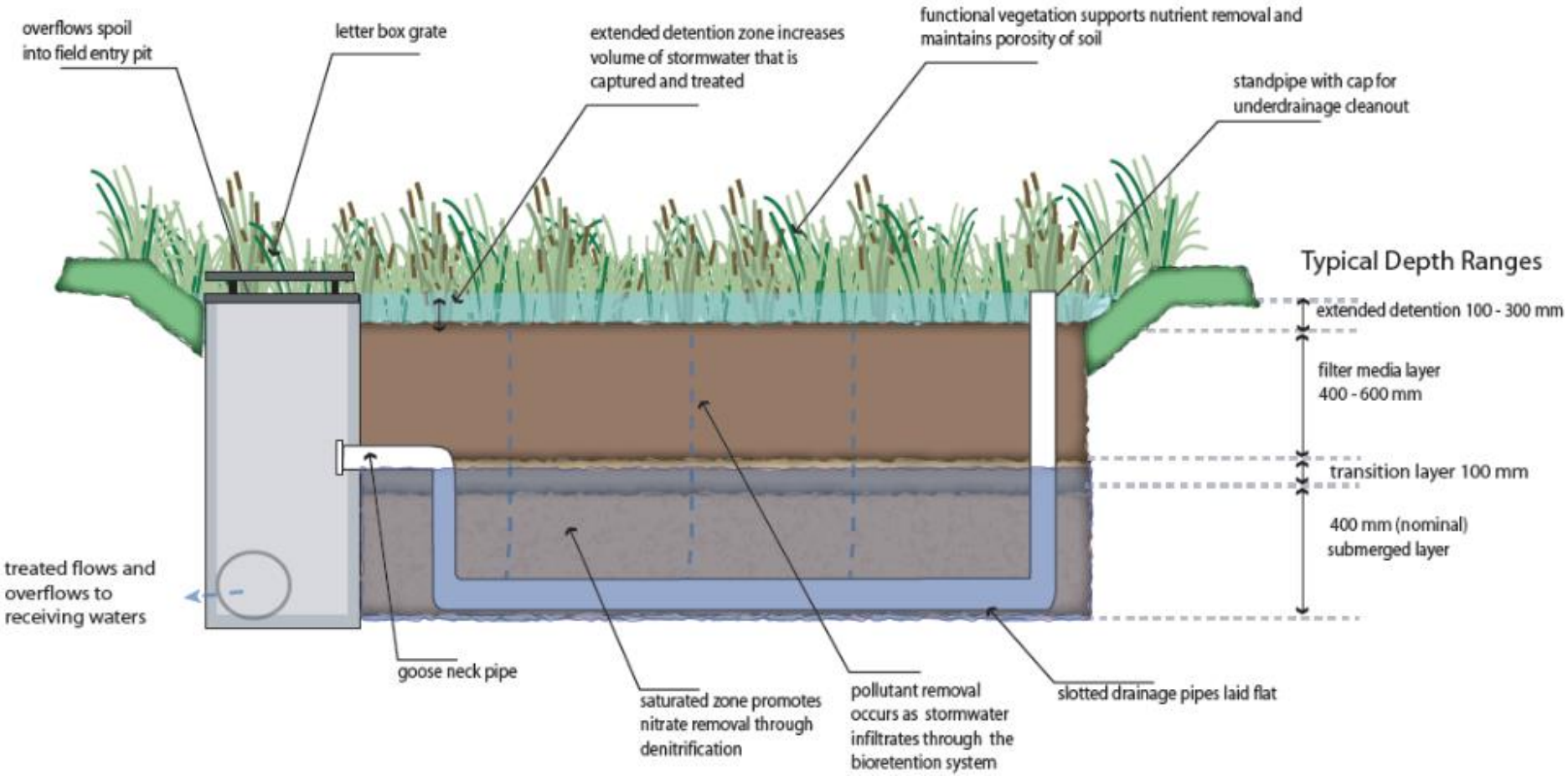

Franklin Street. Image: City of Adelaide

Lochiel Park, (SA)


Brooker Terrace, Richmond

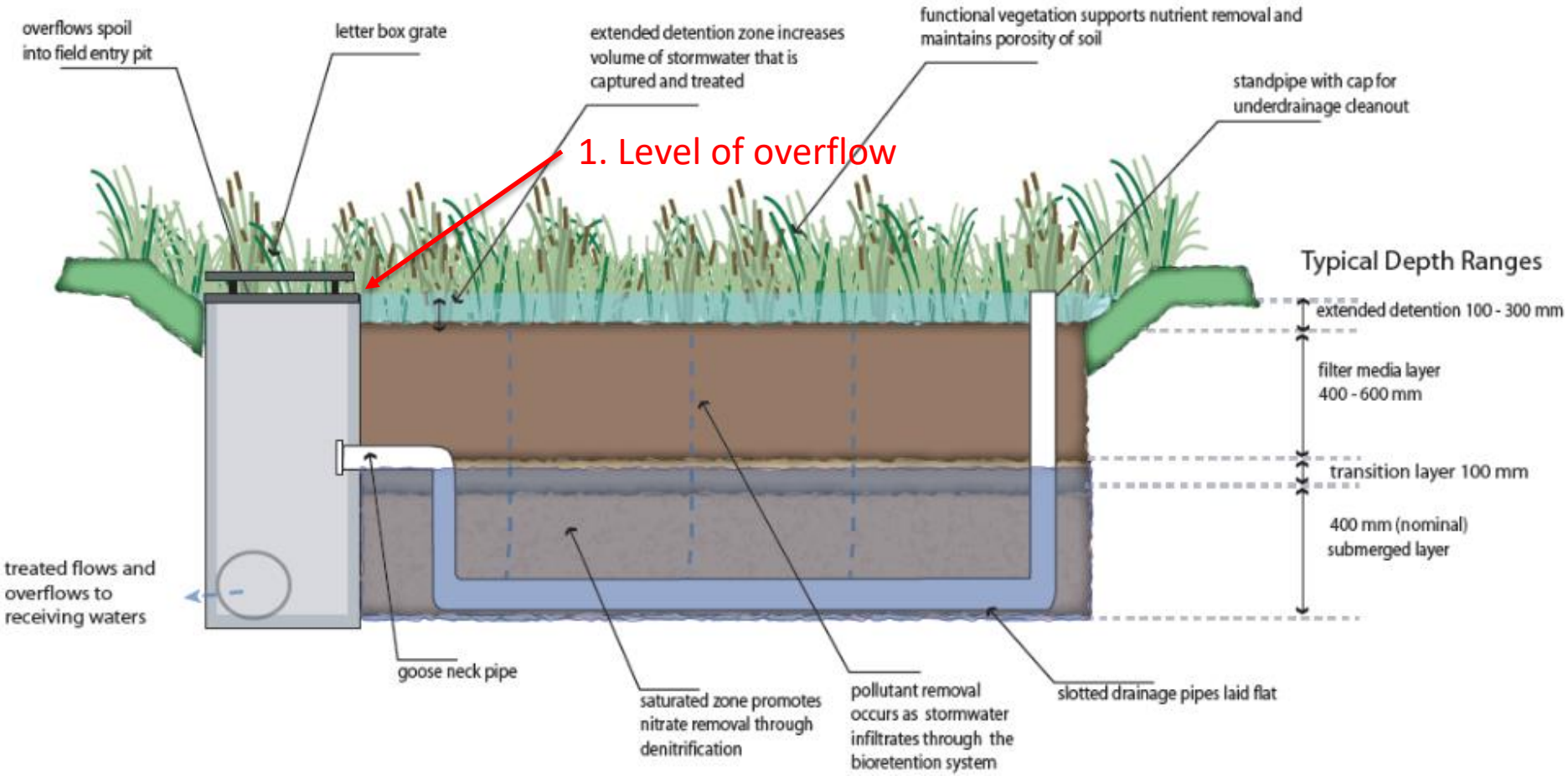

Jellicoe Street, Auckland (NZ) Source: DesignFlow

Raingardens - Overview



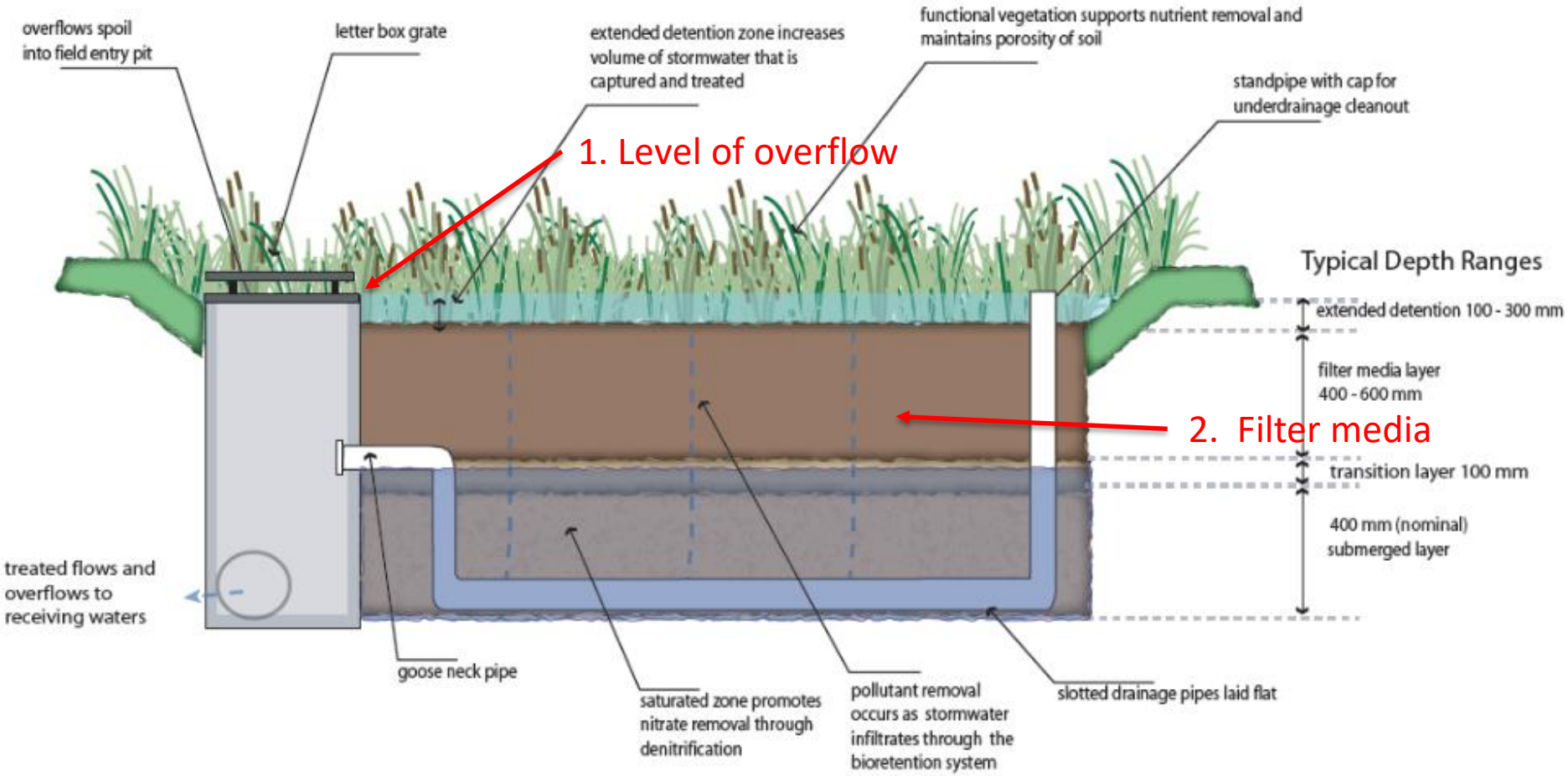
Source: Designflow

Raingardens - Overview



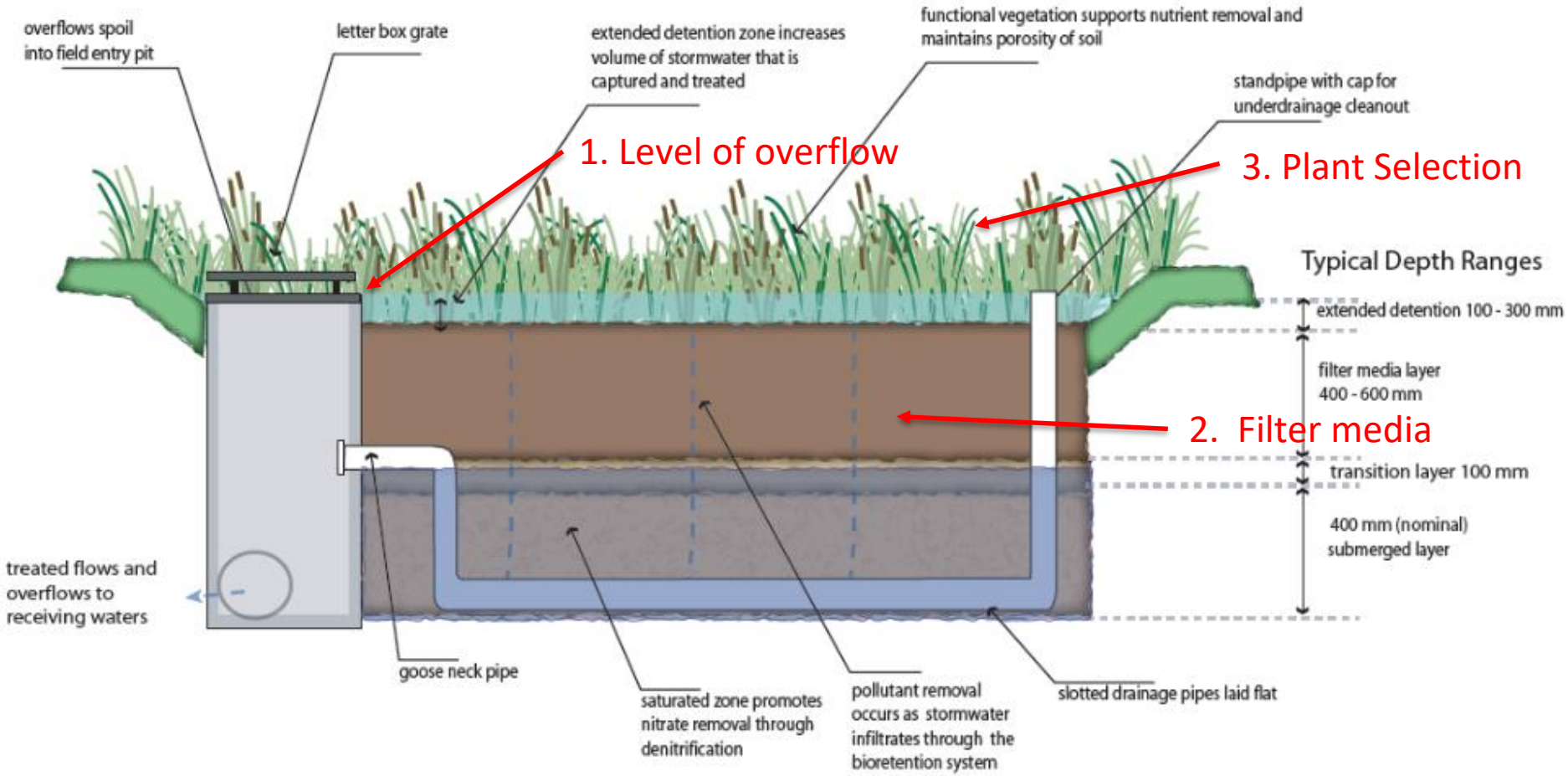
Source: Designflow

Raingardens - Overview



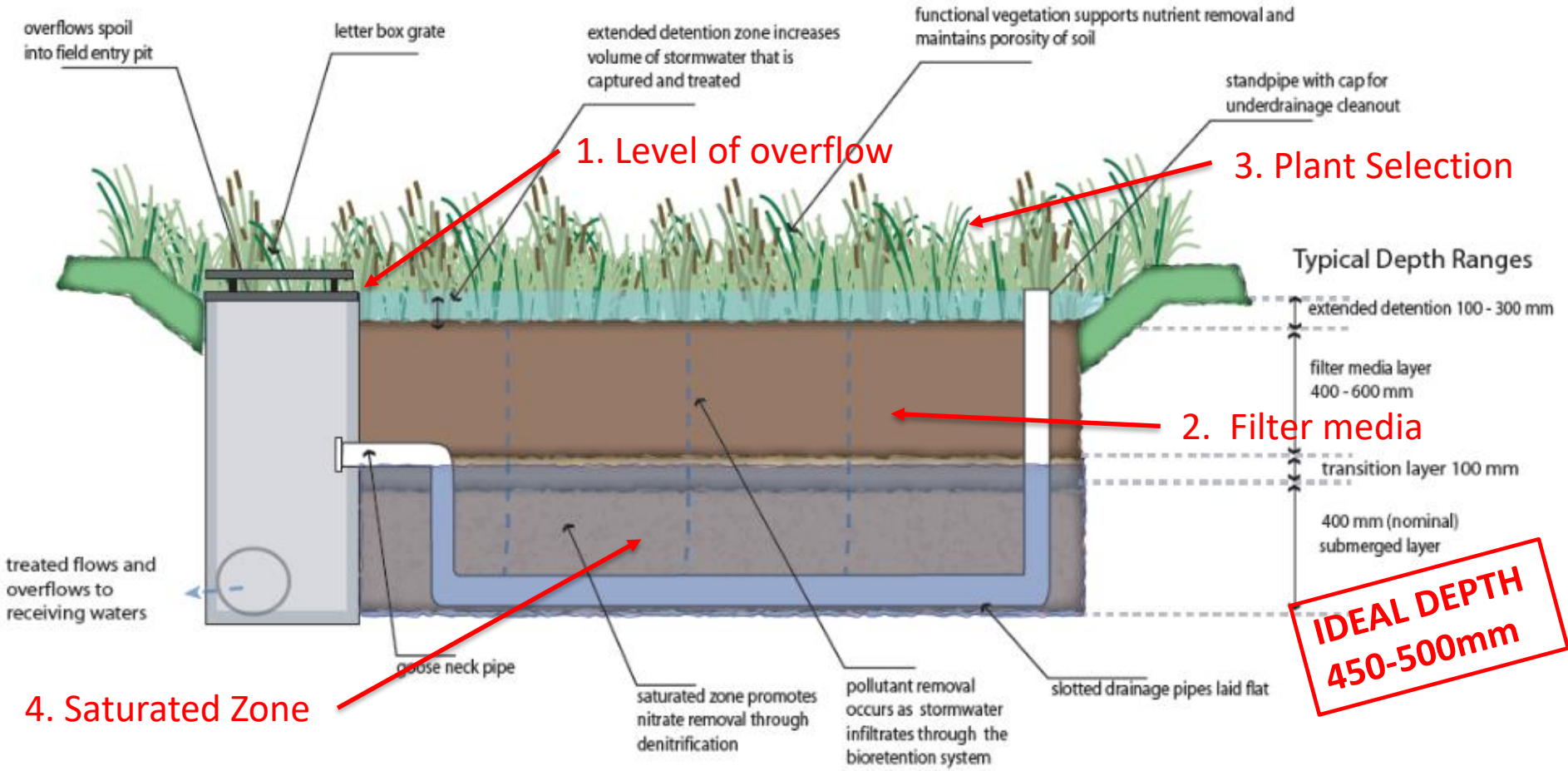
Source: Designflow

Raingardens - Overview



Source: Designflow

Raingardens - Overview

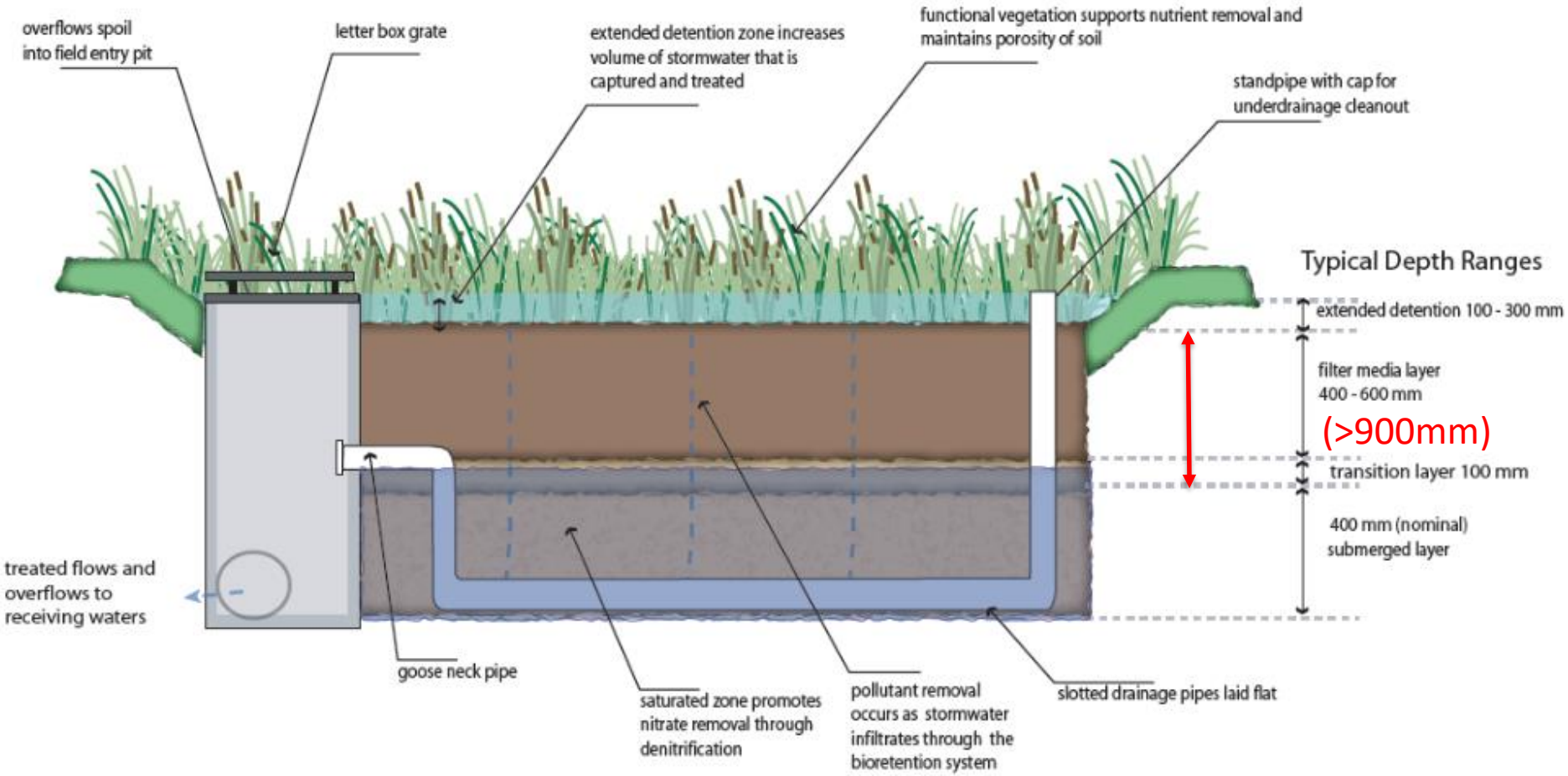


Source: Designflow

Trees & Raingardens

Angas Street raingarden early and established, showing arrangement of filter media
Images: Adelaide City Council and Water Sensitive SA

Filter media depth - Trees



Source: Designflow

Raingarden Species Selection

WATER SENSITIVE SA

Planting zones

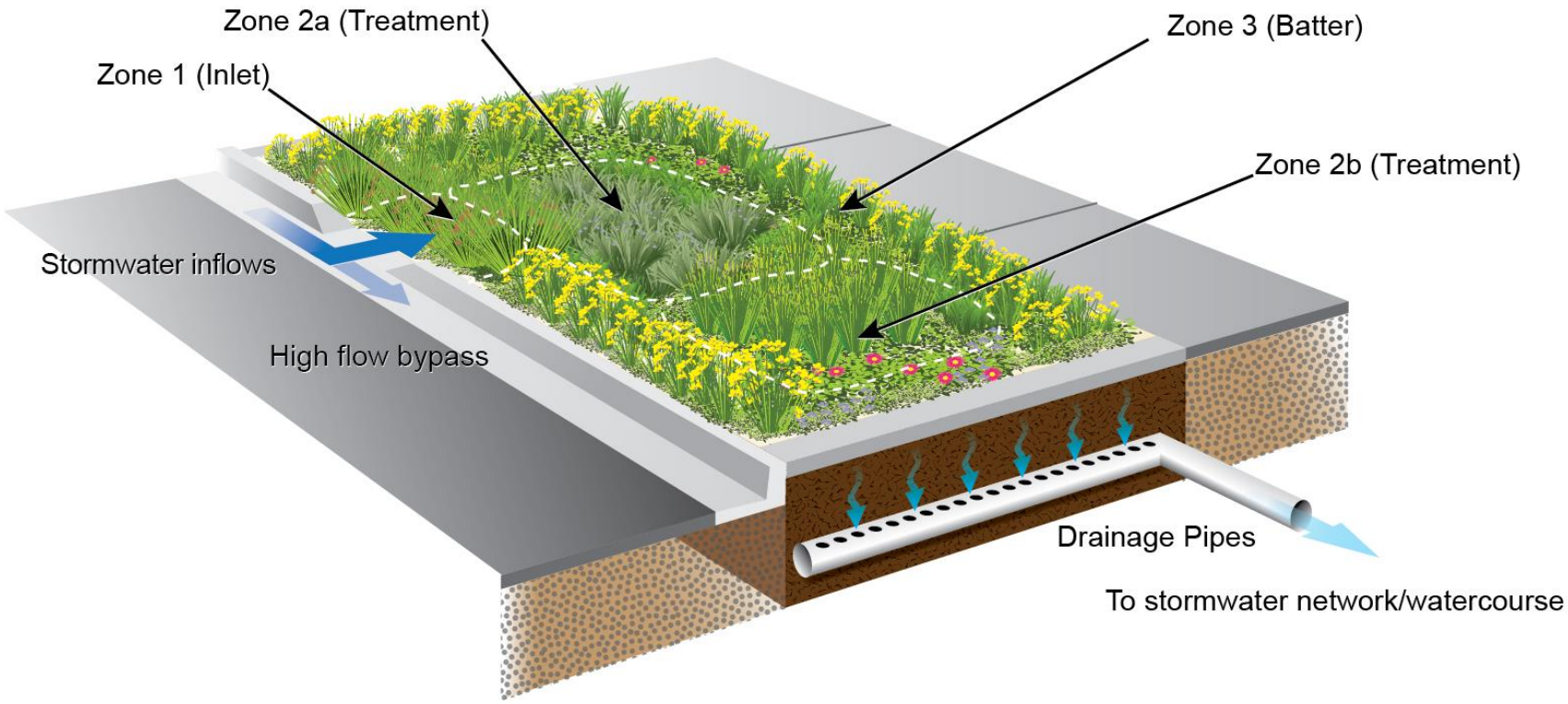


Figure 1 – Raingarden zones for plant selection

Raingarden Planting zones

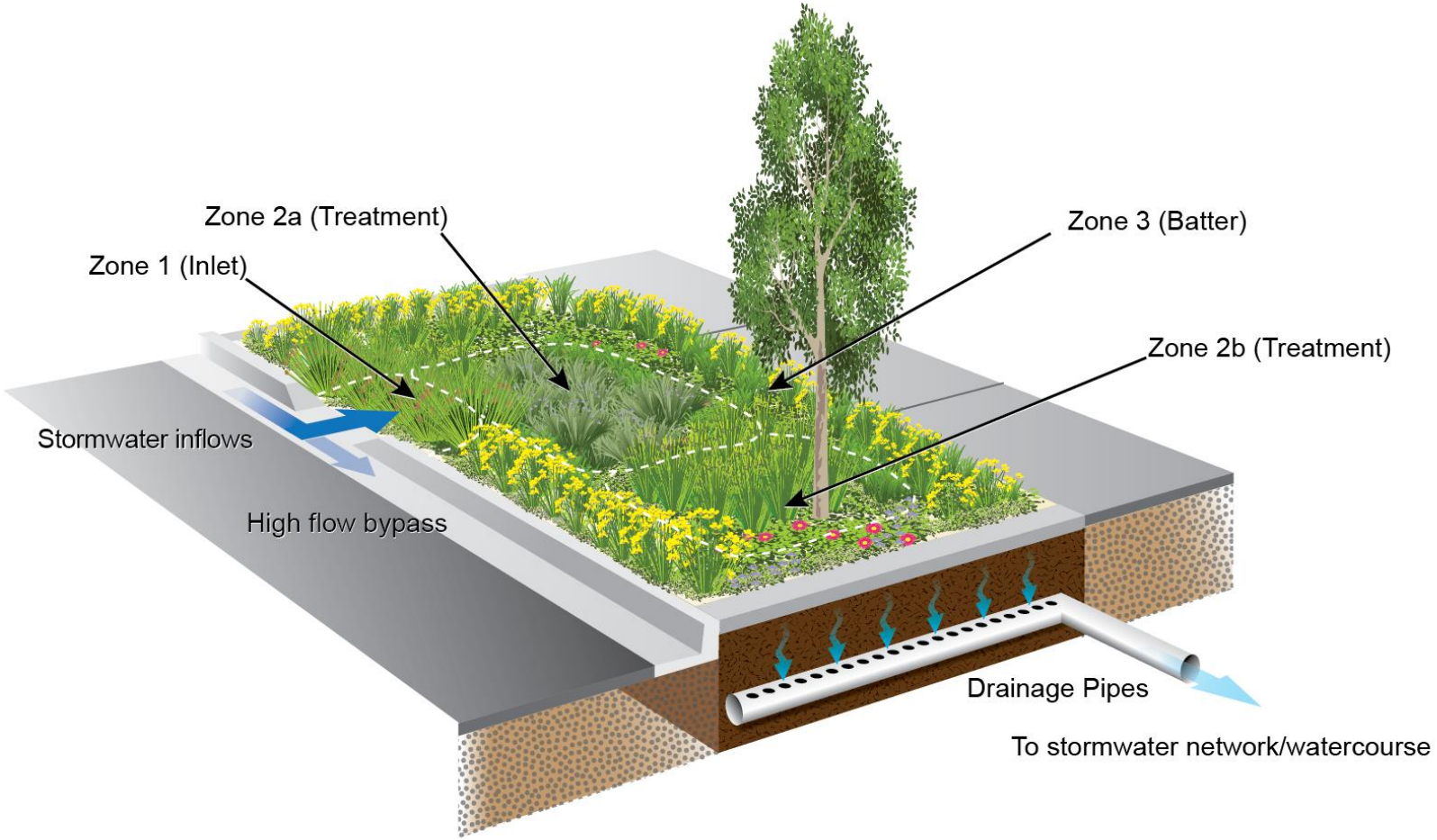


Figure 1 – Raingarden zones for plant selection

Plant species proven to be effective at Nitrogen removal

	Form	Zone				Species	Common name	Height (mm)	Preferred location	
		1	2a	2b	3					
		✓	✓			*Carex appressa*	Tall Sedge	1000	All	Less frost tolerant
		✓	✓			*Carex tereticaulis*	Rush Sedge	600-1200	All	Spiky
				✓	✓	*Goodenia ovata*	Hop Goodenia	1000-2500	All	Spreading shrub
		✓	✓	✓	✓	*Ficinia nodosa*	Knobby Club-rush	500-1500	All	Formerly *Isolepis nodosa*
		✓	✓			*Juncus amabilis*	Gentle Rush	600-1200	All	Less common juncus species in Adelaide region

Adapted from EPA Raingarden 500 guidelines

Plant species proven to be effective at Nitrogen removal

	Form	Zone 1	Zone 2a	Zone 2b	Zone 3	Species	Common name	Height (mm)	Preferred location
		✓	✓			*Carex appr*			
		✓	✓			*Carex tereti*			
				✓	✓	*Goodenia*			
		✓	✓	✓	✓	*Ficinia noc*			
		✓	✓			*Juncus am*			

Sedge	
Herb	
Mat forming	
Grass	
Shrub	
Tree	

Adapted from EPA Raingarden 500 guidelines

Plant species for companion planting

WATER SENSITIVE SA

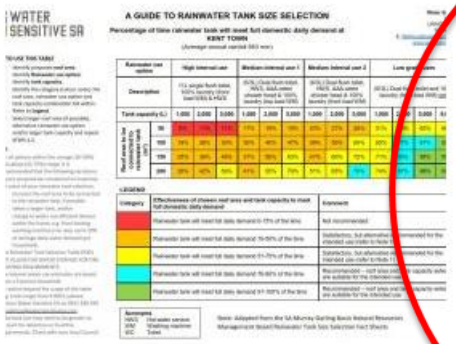
Image	Form	Zone				*Species*	Common name	Height (mm)	Preferred location	Comment
		1	2a	2b	3					
		✓	✓			*Bolboschoenus caldwellii*	Marsh Club Rush	300-1200	Often coastal	Spreading sedge
			✓	✓	✓	*Crassula helmsii*	Swamp Crassula	50	All	Spreading riparian herb, ground cover
			✓	✓	✓	*Dichondra repens*	Kidney weed	200	All	Spreading herb, ground cover
					✓	*Rannuculus lappaceus*	Australian Buttercup	500	Adelaide Hills	
			✓	✓	✓	*Selliera radicans*	Shiny Swamp-mat	50	All	Spreading riparian herb, turfy
					✓	*Wahlenbergia stricta*	Austral Bluebell	100-900	All	Spreading herb

Download raingarden guide

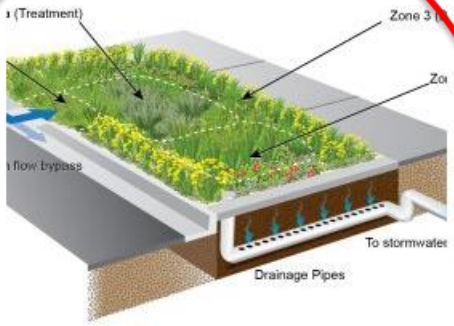
WATER SENSITIVE SA

Water Sensitive SA is a capacity building program that provides stakeholders across all disciplines within the development and urban water management industries, with the support they need to achieve the best water sensitive urban design outcomes.

LIVEABLE WATER SENSITIVE COMMUNITIES



A guide to rainwater tank size selection for Kent Town



Raingarden plant selection guideline

WSUD projects in SA - case studies, interactive map

Streetscale raingardens – design & practice, 24 May

Latest **News**

Call for abstract – AWA 2017 conference: Water in the community
27 April 2017

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Filter media

Specification

Bioretention Technical Design Guidelines:

- References Adoption Guidelines for Stormwater Biofiltration Systems, CRC for Water Sensitive Cities

Key Requirements:

- Hydraulic conductivity of 100-300 mm/hr
- Some organics (3-5%)
- Some silts and clays allowed (<5%)

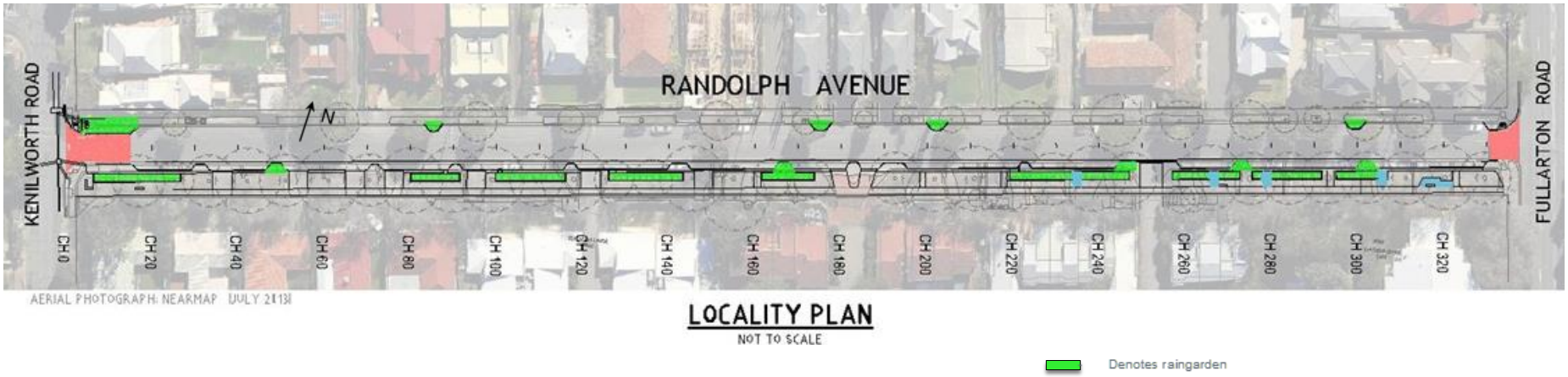
Source: Designflow

More information

Water Sensitive SA website

Raingarden 500 Grant Program

Randolph Ave, Streetscape Upgrade
City of Unley



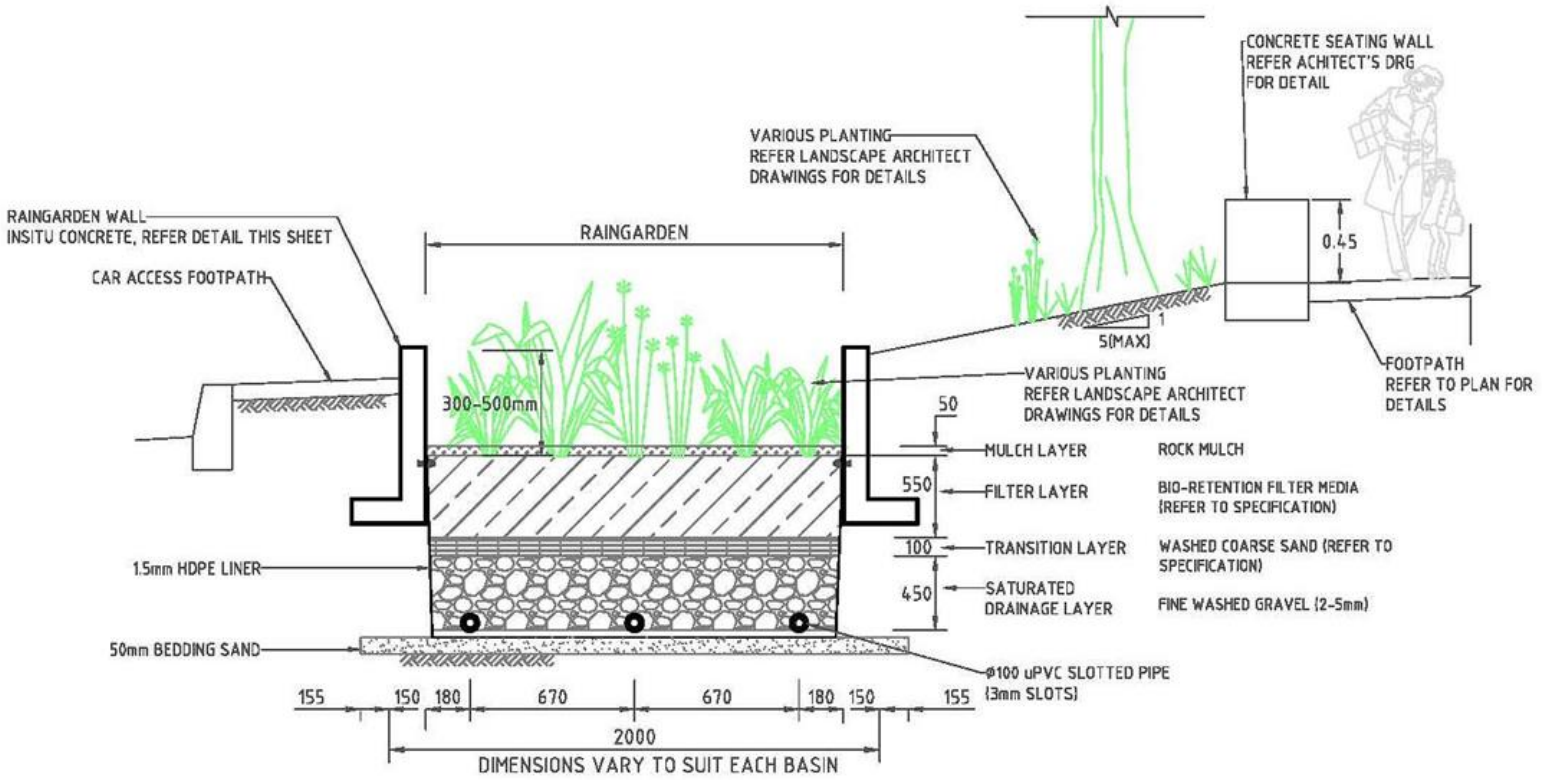
Bioretention – raingardens

- 10 raingardens of dimensions 1.70-2.10m wide x 6.75-25.5m long)
- Total area 245m2 (0.5% of impervious contributing catchment)
- A saturated zone of 450mm depth to assist plant viability and storage capacity
- A design infiltration rate of 160mm/hr through filter media
- HDPE lined system with no exfiltration

Stormwater infiltration wells

- 31 infiltration wells of dimensions 600x400x450 mm deep
- Waterproof membrane top and bottom with geofrabric and 20mm screenings around the perimeter, providing lateral infiltration to adjacent trees and garden beds.

Typical Raingarden Cross Section

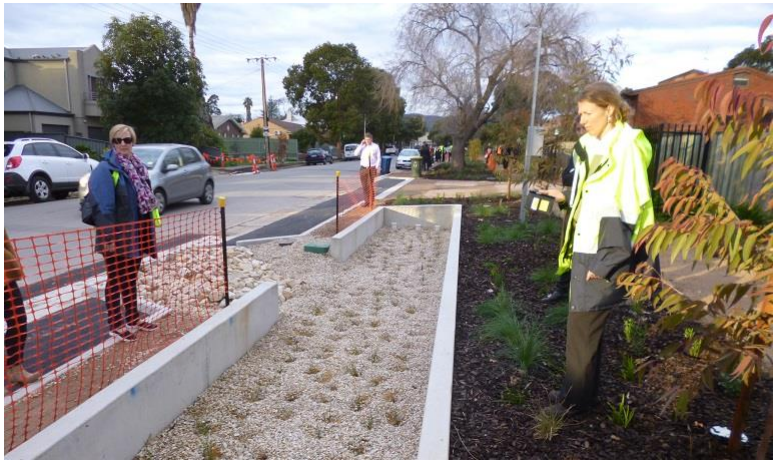


Raingardens and trees

Raingarden in full sun

Raingarden shaded to the west by mature tree

Infiltration systems the hero



July 2015 - establishment

January 2016

September 2016

WSUD projects - Images & designs

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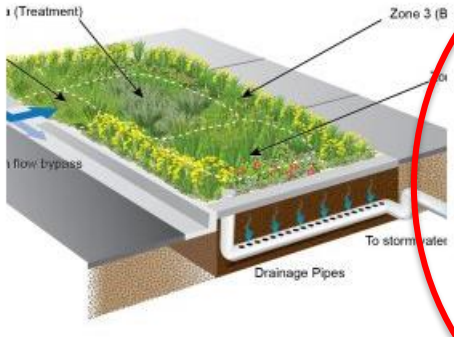

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WSUD project search

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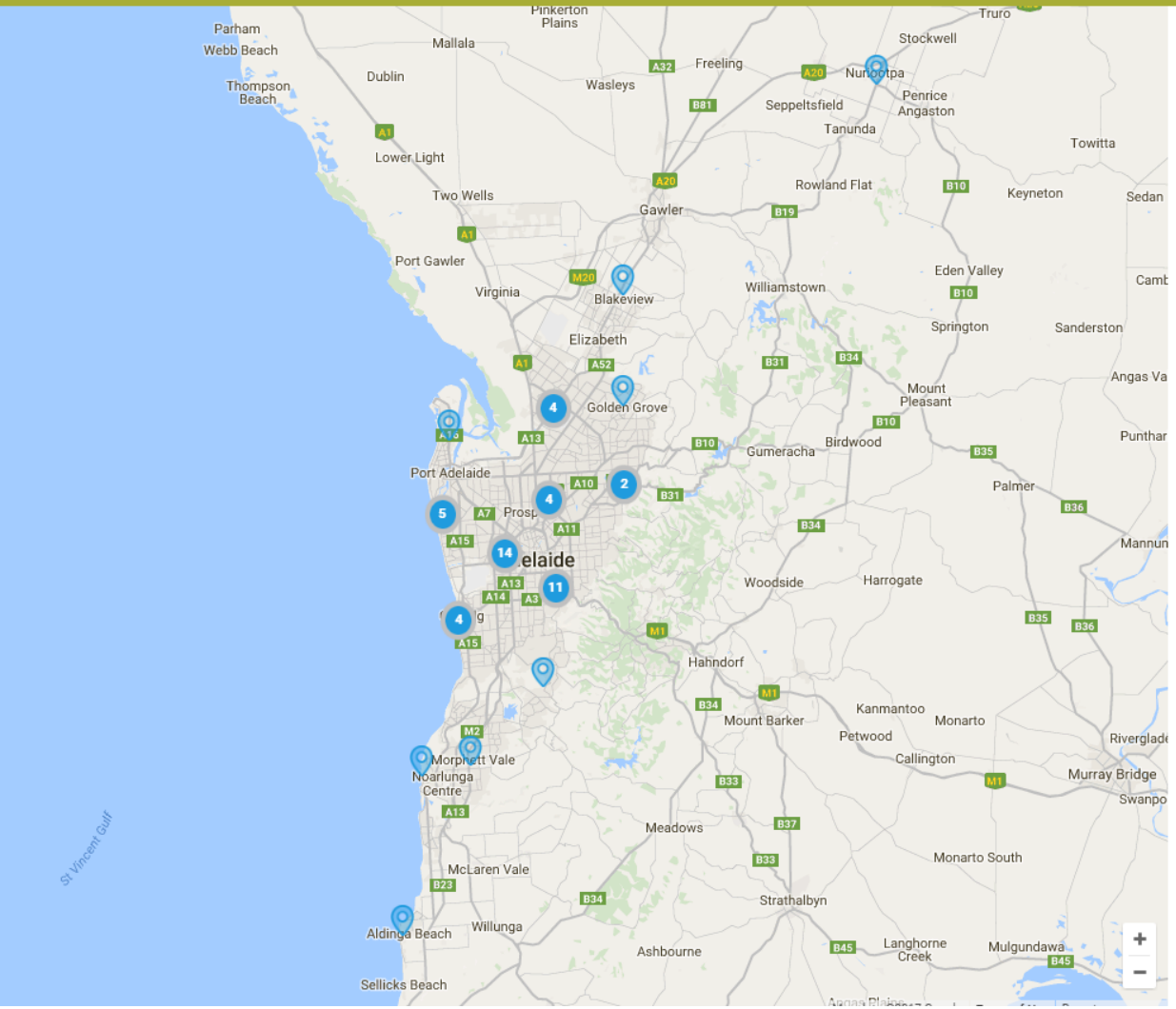


Interactive **Map**

Local government, developers and industry have shown leadership and innovation, integrated water sensitive urban design into their projects to deliver a wide range of benefits to the community.

The drivers behind any WSUD project may range from a need to provide water for recreational open space to protecting marine water quality. The solutions (referred to as WSUD element type) to these challenges may vary depending on these objectives, unique site constraints and available budget.

Water Sensitive SA has developed an interactive map that provides a filtering function to enable you to search for WSUD projects under the categories below.

Infiltration

Organisation / Local Government Area

Function / Driver

Development Type

56 projects matching the current criteria.

Reset

This map has been developed with a database kindly provided by the **Goyder Institute for Water Research**.

Do you have a new WSUD project you would like to submit or add more details and images to an existing project?

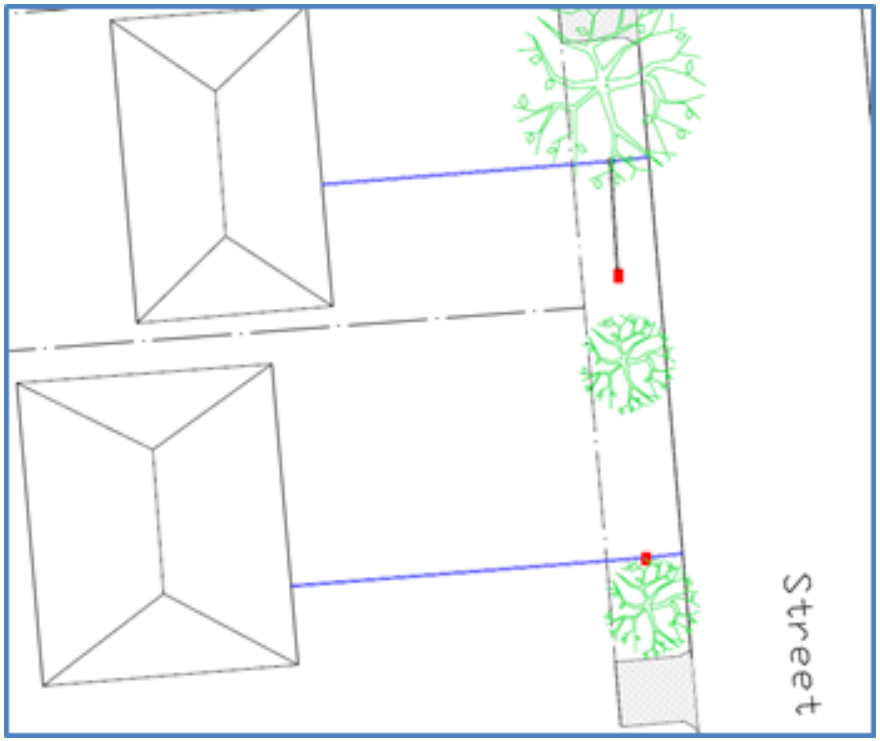
Update WSUD Project | Submit WSUD Projects

Infiltration systems

- Burnside B-Pods
- City of Mitcham
  - streetscapes and
  - reserves

East Parade, Kingswood Source: City of Mitcham

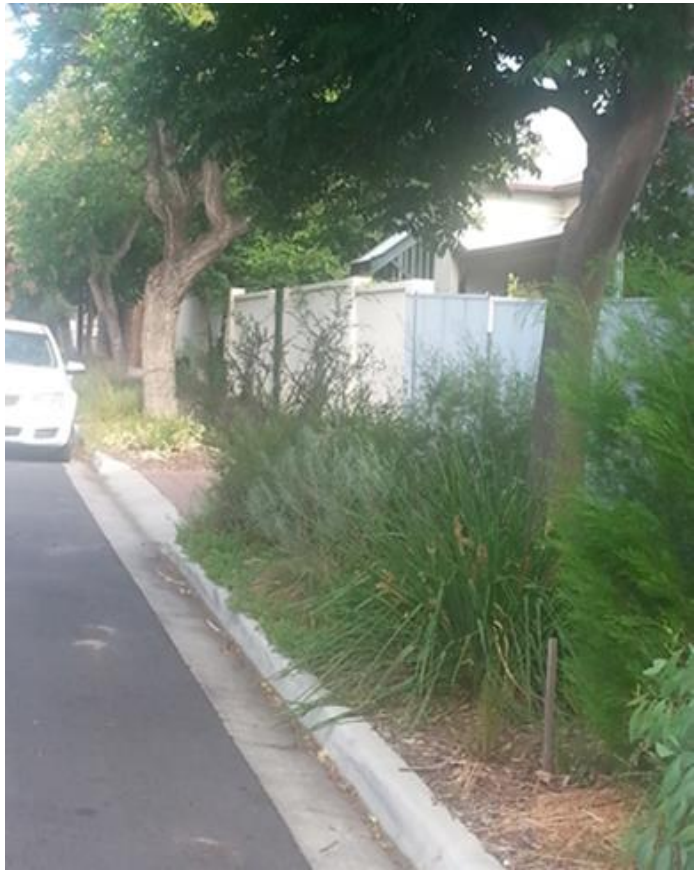
City of Burnside, B-pods



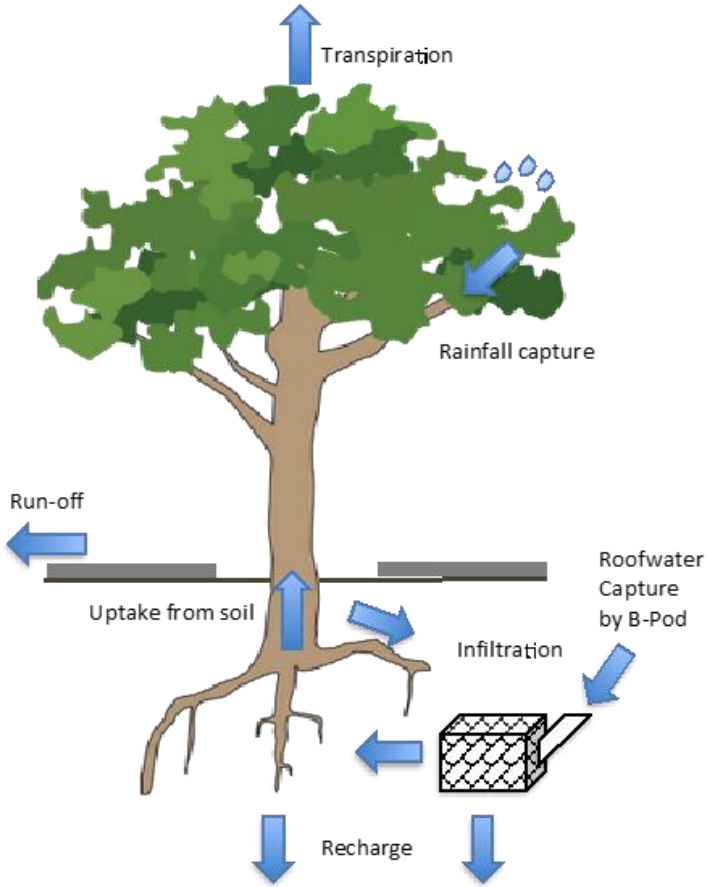
Typical B-Pod layout along a street Source: City of Burnside

B-Pod- Installation Source: City of Burnside

City of Burnside, B-pods



Union Street Dulwich



Street tree water cycle showing

Find case studies

www.watersensitivesa.com/resources/wsud-projects-title/case-studies-page/

Randolph Avenue Streetscape Upgrade Fullarton

A series of ten raingardens treat stormwater and 31 stormwater infiltration wells provide passive irrigation for new street trees.

Download PDF

Read more »

Burnside B-Pods

Catch it, keep it, use it: Burnside City Council's B-Pod stormwater retention cells support young and established street trees and a community landscaping project in the nature strip.

Download PDF

Read more »

Oaklands Park stormwater harvest & re-use project

Stormwater treatment wetland integrated into urban parkland that contributes to an aquifer storage and recovering scheme, which supplies water for irrigation of local parks and sporting fields.

Download PDF

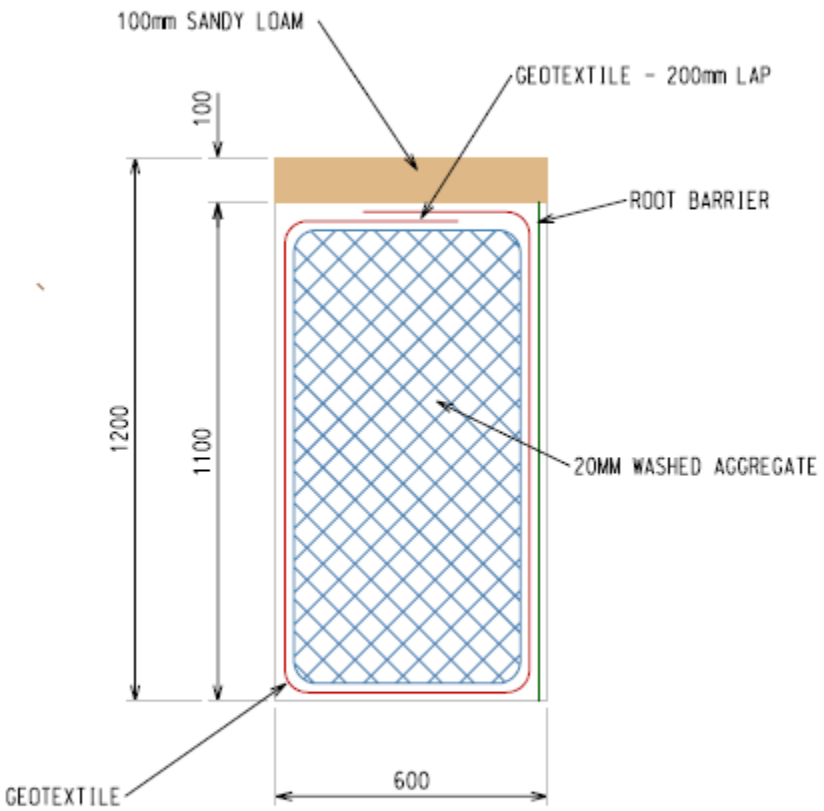
Read more »

City of Mitcham - Reserves

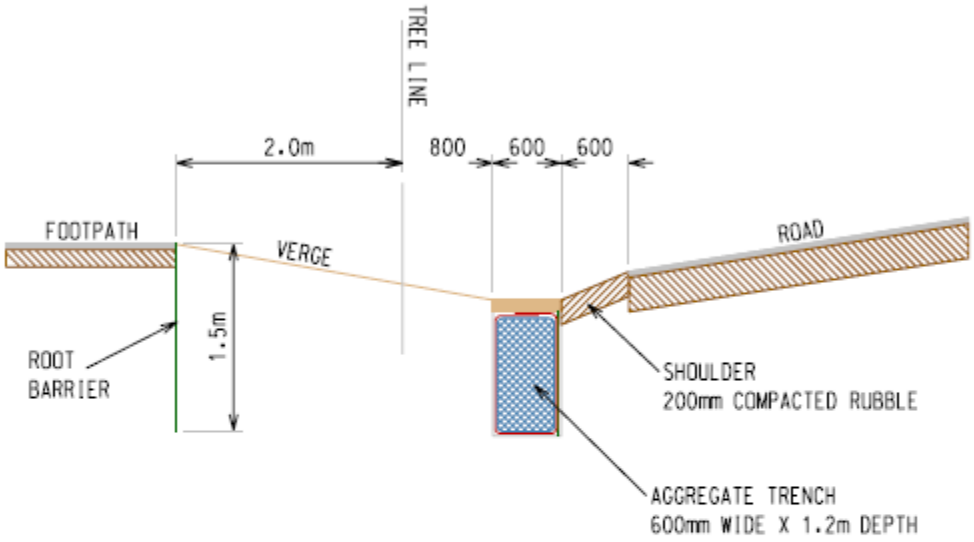
Letchford Street Reserve, Bedford Park, during construction
City of Mitcham

Letchford Street Reserve, Bedford Park, after construction
City of Mitcham

City of Mitcham – Doncaster Avenue



INFILTRATION TRENCH



INFILTRATION TRENCH LOCATION

TYPICAL DETAIL

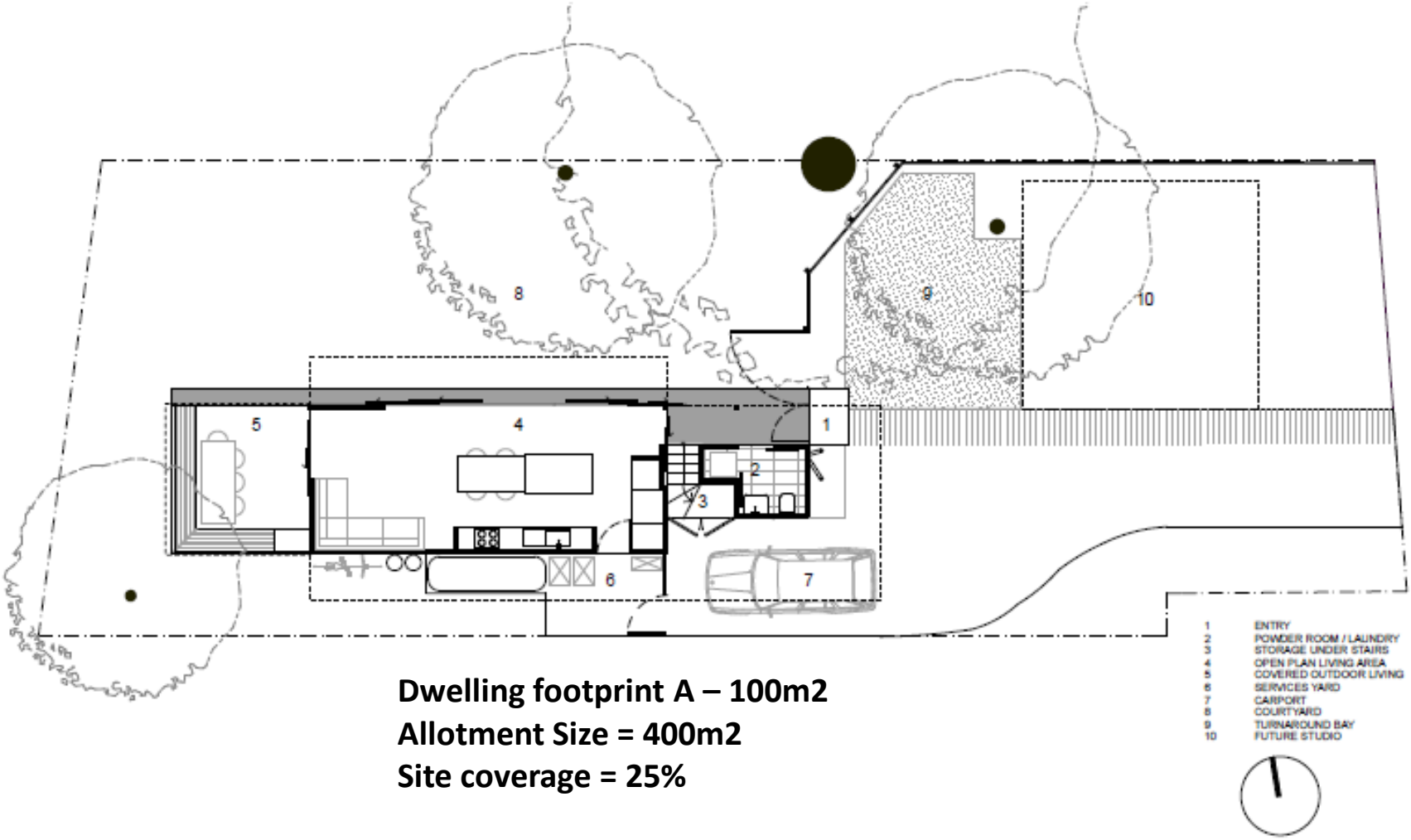
AGGREGATE FILLED INFILTRATION TRENCH

DONCASTER AVENUE, COLONEL LIGHT GARDENS

CITY OF MITCHAM

City of Mitcham – TreeNet inlets

The 100m2 house



Dwelling footprint A – 100m2
Allotment Size = 400m2
Site coverage = 25%

Source: Levesque & Derrick Architects, lada.com.au

5,000L rainwater tank for:

- Toilet flushing
- Laundry
- garden

Permeable pavements

Source: www.marshalls.co.uk

Source: Baden Myers

Upcoming training & events

WATER SENSITIVE SA

24 MAY 17 — **Streetscale raingardens - design & practice**

24 MAY - 9:00am to 4:15pm

20 JUN 17 — **Urban infill development - but not as we know it!**

20 JUNE - 10:00am to 12:30pm

Source: Monash University

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