Smart Partnerships, Smarter Assets: Passive Irrigation and Digital Innovation for Long-Term Urban Resilience

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#franc 2025

Stormwater Systems and Assets

New Housing Developments

- Housing Demand

- On August 16, 2023, the National Cabinet approved an ambitious new national target: to construct 1.2 million new well-located homes over a span of 5 years, starting from July 1, 2024.

https:///articles/national-cabinet-housing-supply-www.theurbandeveloper.comnew-deal

Case study: Frederick Street Catchment Project, SA

Catchment area 1969

Catchment area 1993

Case study: Frederick Street Catchment Project, SA

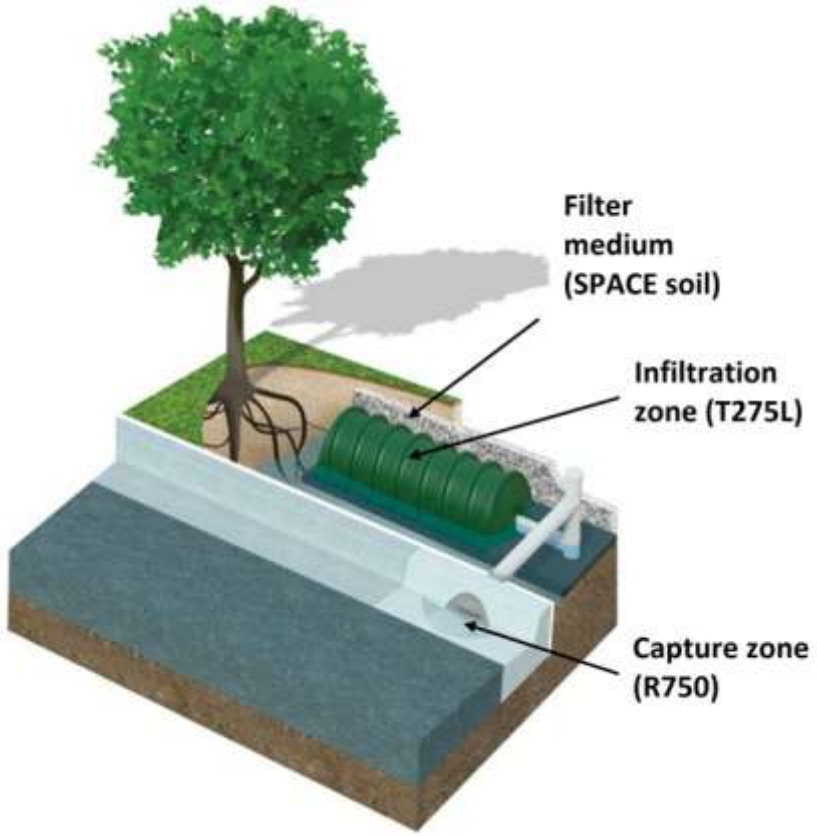
Catchment area 2013

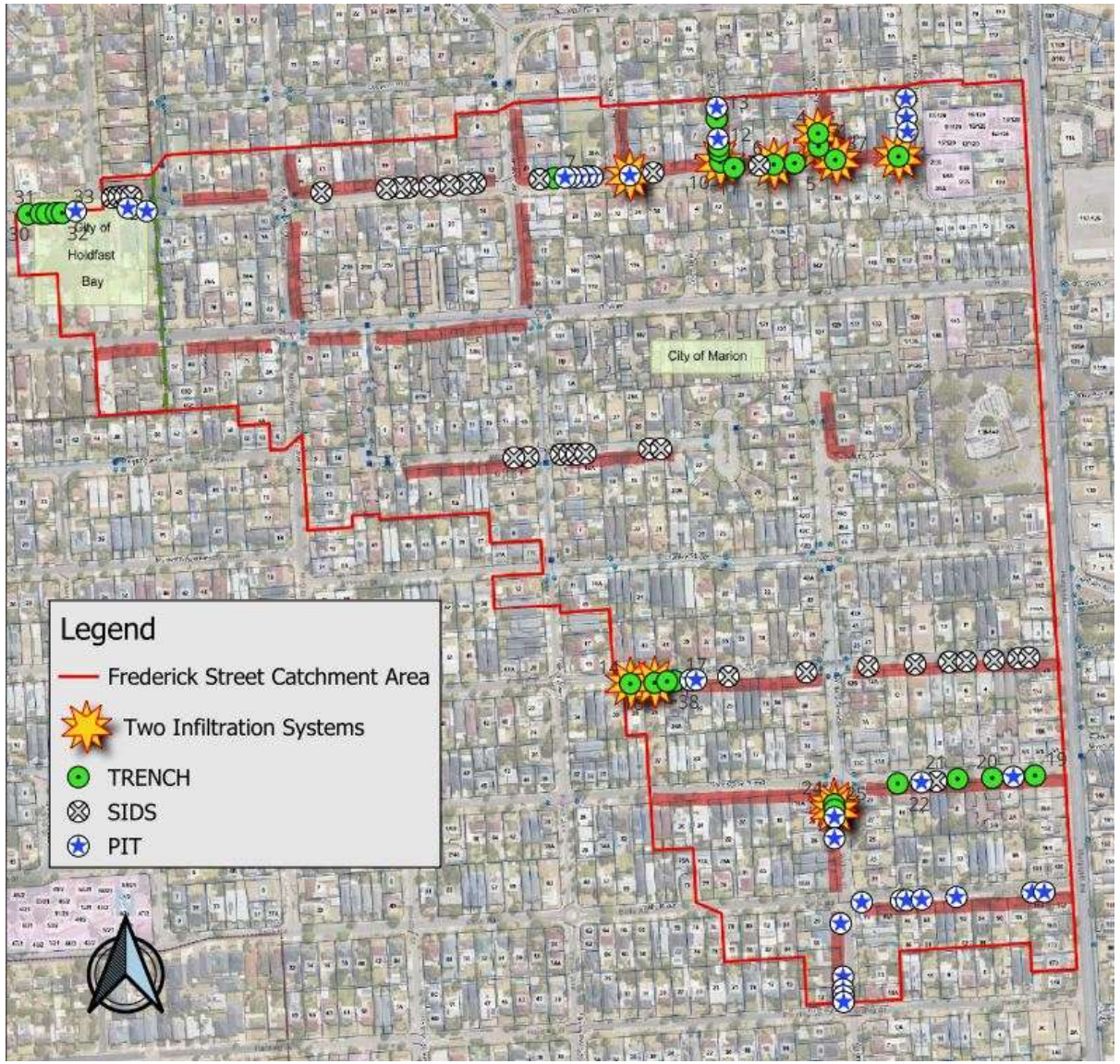
Catchment area 2023

Infiltration systems




Kerb SPACE inlet systems



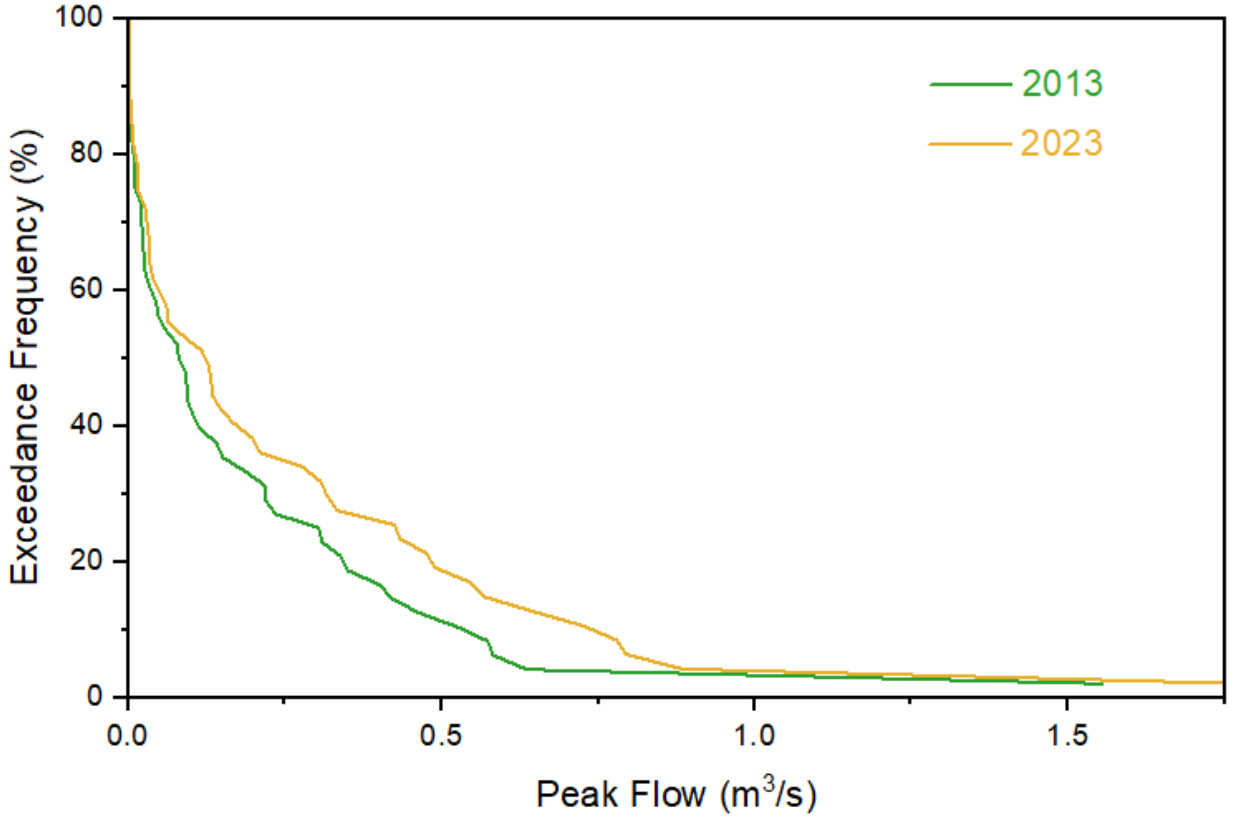


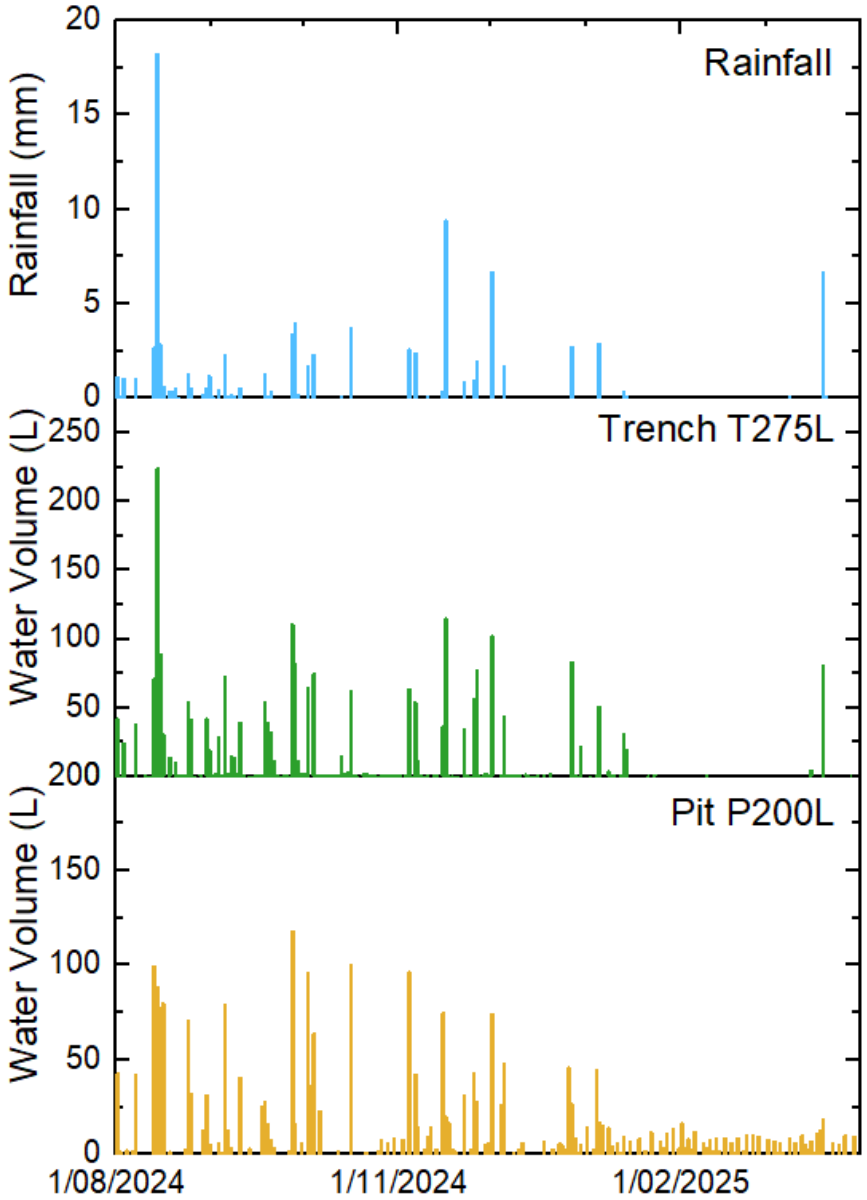
Case Study Area
Frederick St catchment,
Glengowrie – 47 hectares
City of Marion – 650 properties
City of Holdfast bay – 22 properties

Potential Benefit
10% flow reduction target

Preliminary Results

- 50 mm/hr Infiltration rate





Liping Pan PhD Student Flinders University

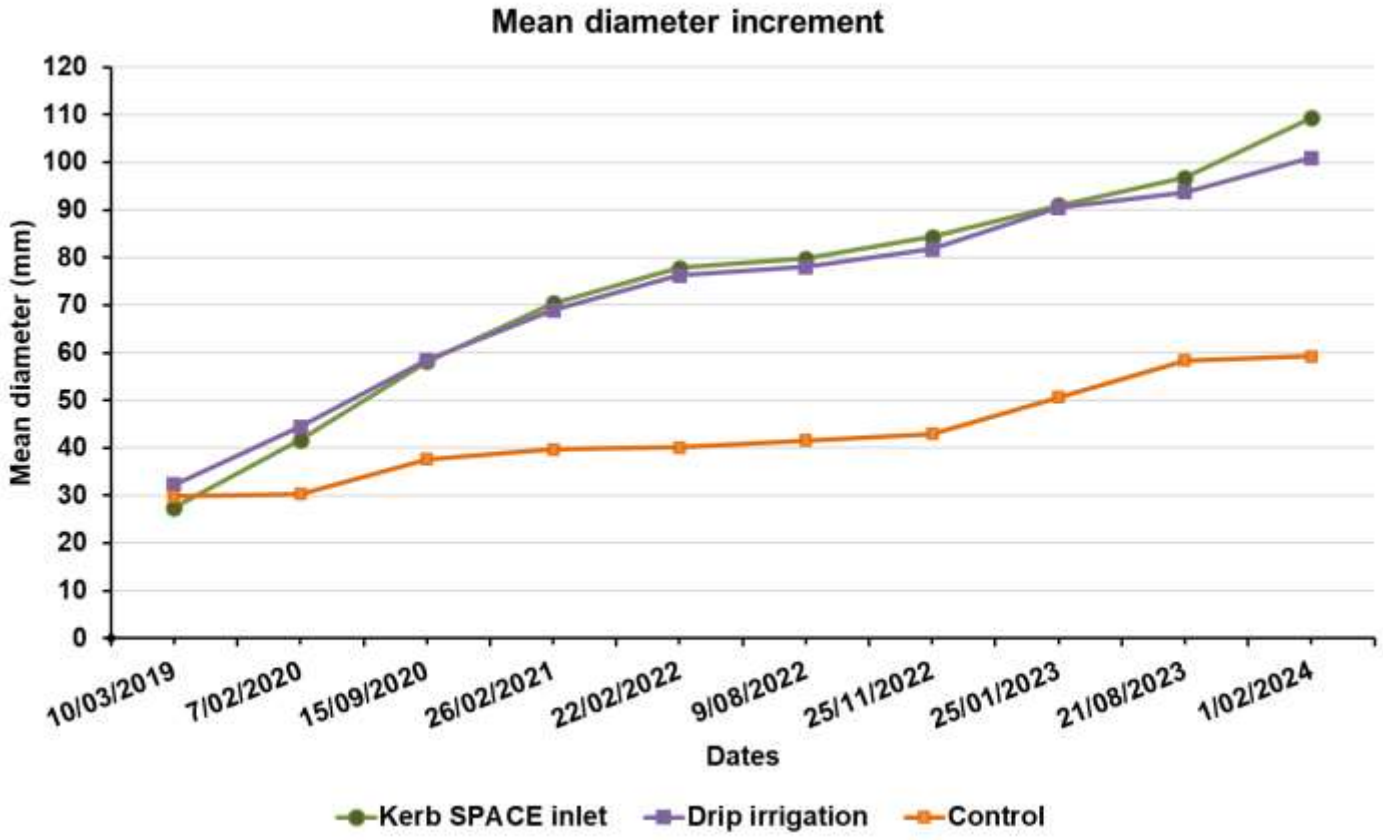
Trees and Droughts

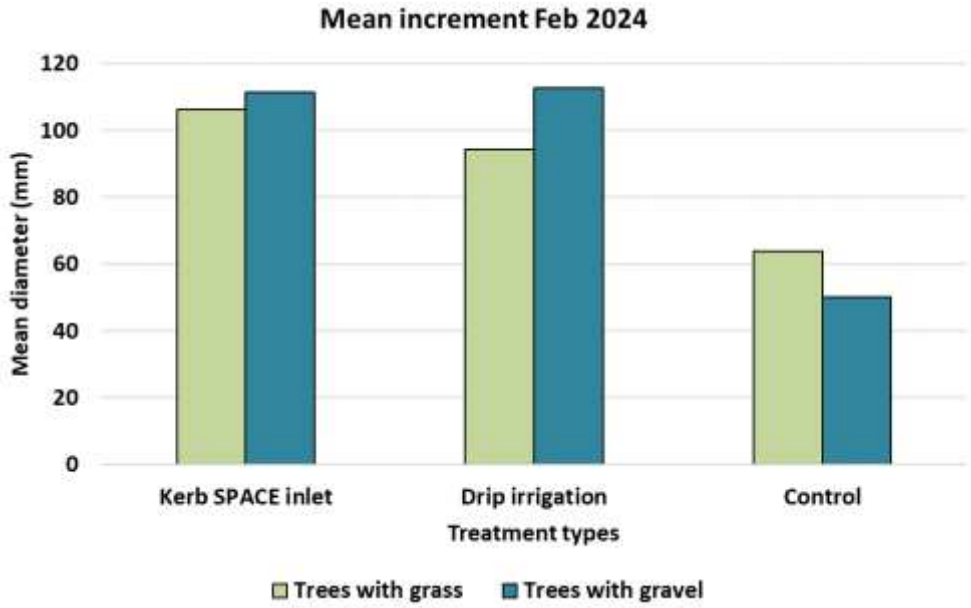
Region or Forest Type	Key Findings
Tropical Moist Forests	Mortality risk doubled over 35 years; carbon sink capacity declining
Eucalypt & Southeastern Forests	Up to 60% tree death from combined drought and heat stress
SW Australia (“Big Dry”)	~20% tree/shrub mortality recorded in dry spells
Urban & Coastal Plantings	Dieback driven by heat, low rainfall, and water competition
Mangroves (Gulf of Carpentaria)	7,000 ha died suddenly in 2015–16 — major ecological loss
South Australia Recent Drought	Severe ecosystem stress; up to one-third dieback in eucalypt collections
Mountain Ash Forests (Victoria)	Temperature rise linked to 25% projected tree loss by 2080

Aldridge Terrace, Marleston, SA

- *Zelkova serrata* (common name: Elm – Japanese) planted in 2019 and control trees on side roads

Results: Stem diameter





Irrigated vs Control Trees

Kerb SPACE Inlet

Drip Irrigation

Control

Case Study: Passive Irrigation, City of Playford SA

Angas Road, Hawthorn, South Australia

- **Study Conducted by Flinders University (2019 -20)**
- **Tree Species: White Cedar (Melia azedarach)**
- **Location: Jeffery Street and Egmont Terrace, Hawthorn, South Australia**

Mature trees with kerb Space inlets had:

- 17% greater transpiration per canopy area over the year
- 21% greater transpiration per canopy area during summer

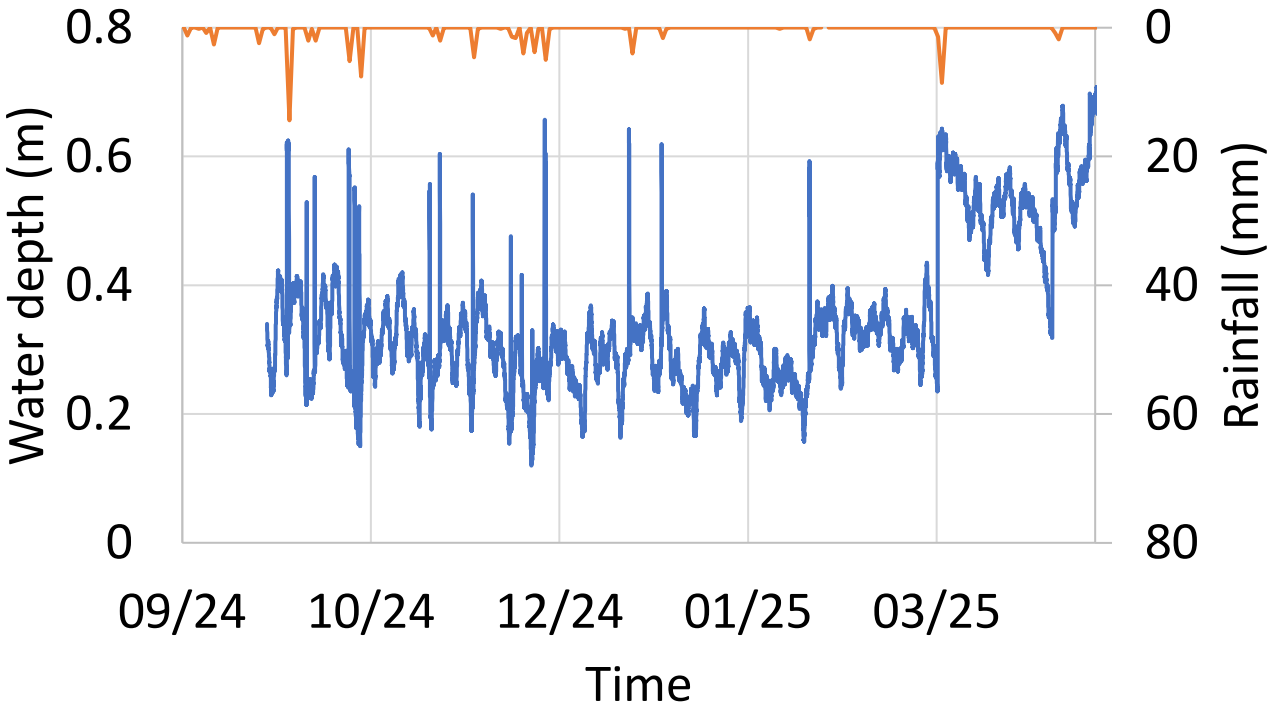
Saplings with Kerb Space inlets had:

- 77% greater trunk diameter growth (2016 – 2022)
- 59% greater height growth (2016 – 2022)

Gleeson, X., Johnson, T., Lee, G., Zhou, Y. and Guan, H., 2022. Enhanced Passive Stormwater Infiltration Improves Urban Melia Azedarach Functioning in Dry Season. Frontiers in Climate, p.45. https://www.frontiersin.org/articles/10.3389/fclim.2022.783905/ful

Catchment
Mackenzie Road

Preliminary results



Ponding issue: Partridge Street City of Holdfast Bay, SA

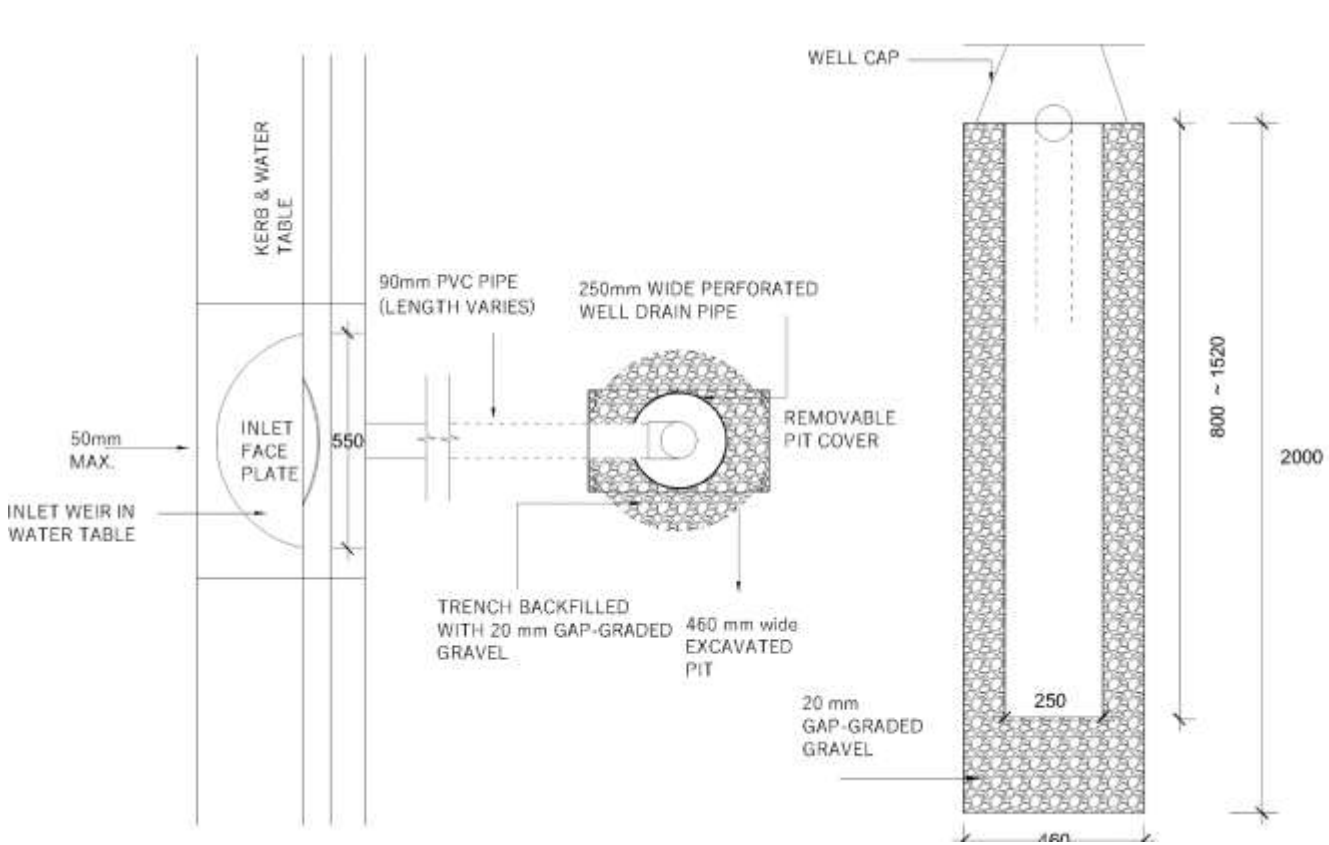
Ponding issue: Rose street Melrose Park, Mitcham, SA

Angas Road, Hawthorn, City of Mitcham, SA

Photo credit: Shahzd H.

Hawthorn Catchment is South of Adelaide CBD approx. 5 Km,
Area - 17.45 ha
2018 (181 Kerb Space Inlets)
Houses – 97 and 11 residential Units

Angas Road, Hawthorn, City of Mitcham, SA

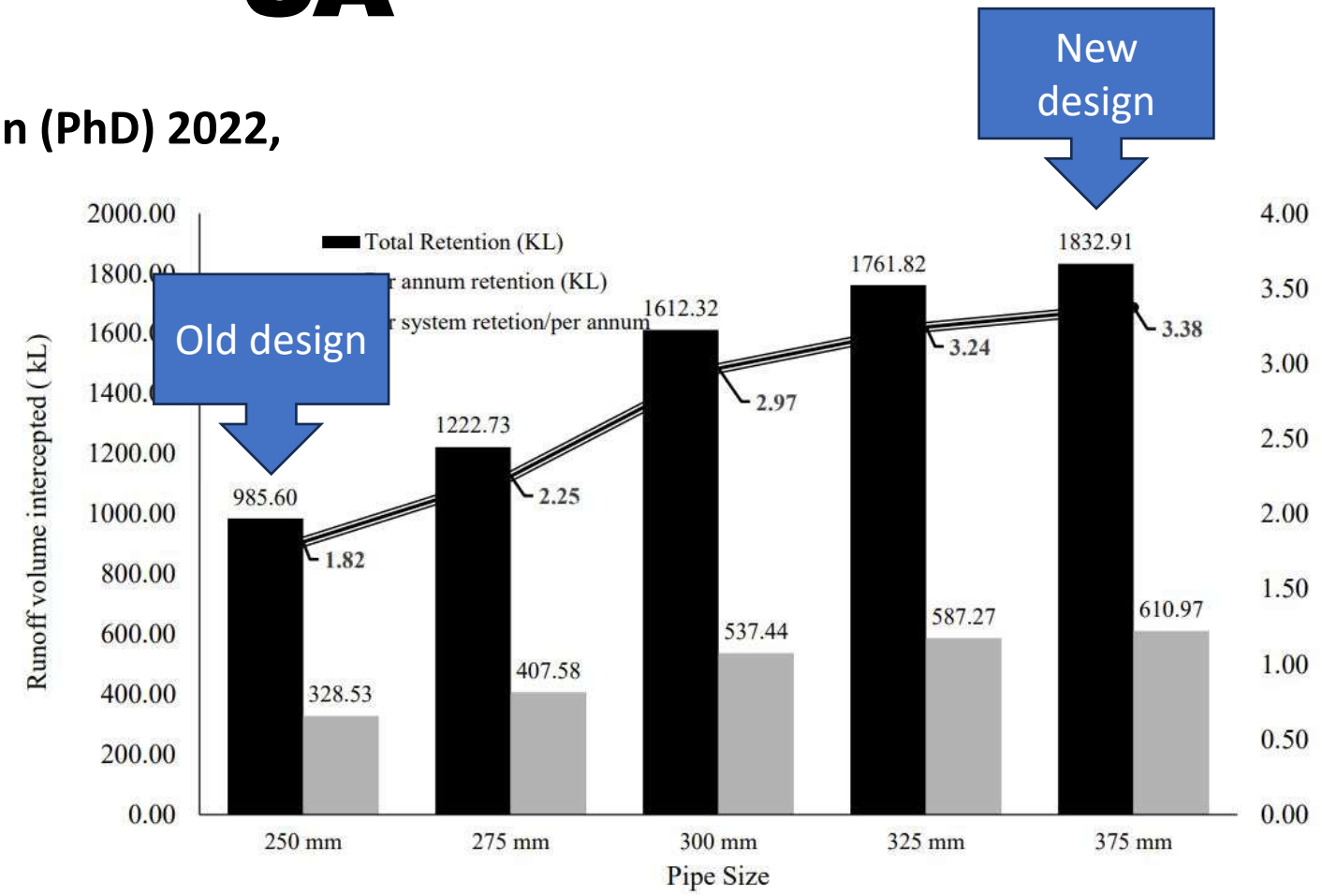


Shahzad, H, Myers, B, Hewa, G, Boland, J, Johnson, T & Sapdhare H. 2022, Analysing the impact of hydrological storage and connected impervious area on the performance of distributed kerbside infiltration systems in an urban catchment, Journal of Hydrology, 608.

Angas Road, Hawthorn, City of Mitcham, SA

Study conducted by Shahzad Hussain (PhD) 2022, University of South Australia

2018 (181 Kerb Space Inlets)
Rainfall: 57,090 m3
Reference discharge: 2670 m3
Observed discharged: 2340 m3
Saving: 14 %
Runoff Retained = 330 m3
Average capture per inlet: 1.8 kl



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Ponding issue: Partridge Street City of Holdfast Bay, SA

HOLDFAST BAY

18 December 2019

To The Resident
Partridge Street
GLENELG SOUTH SA 5045

Dear resident

We would like to share with you an upgrade in your street tha
noticed a small smiling stainless steel facia in the kerb in your
inlet') designed to take rain and to return it to the ground rath

What are the benefits?

1. Resolving long term ponding

These devices have been strategically placed at low lying zone
times of very wet weather ponding may still occur but thanks
short-term because the valuable rain is quickly diverted into t
because it has nowhere to go.

2. Benefits to street trees

By allowing rain to get into the ground the struggling street tr
irrigation as they grow in a harsh urban environment. Over tin
find this favourable source of water and become more resilien
be less dependent on other surrounding moisture sources as t
the TreeNet Inlets.

Yours sincerely

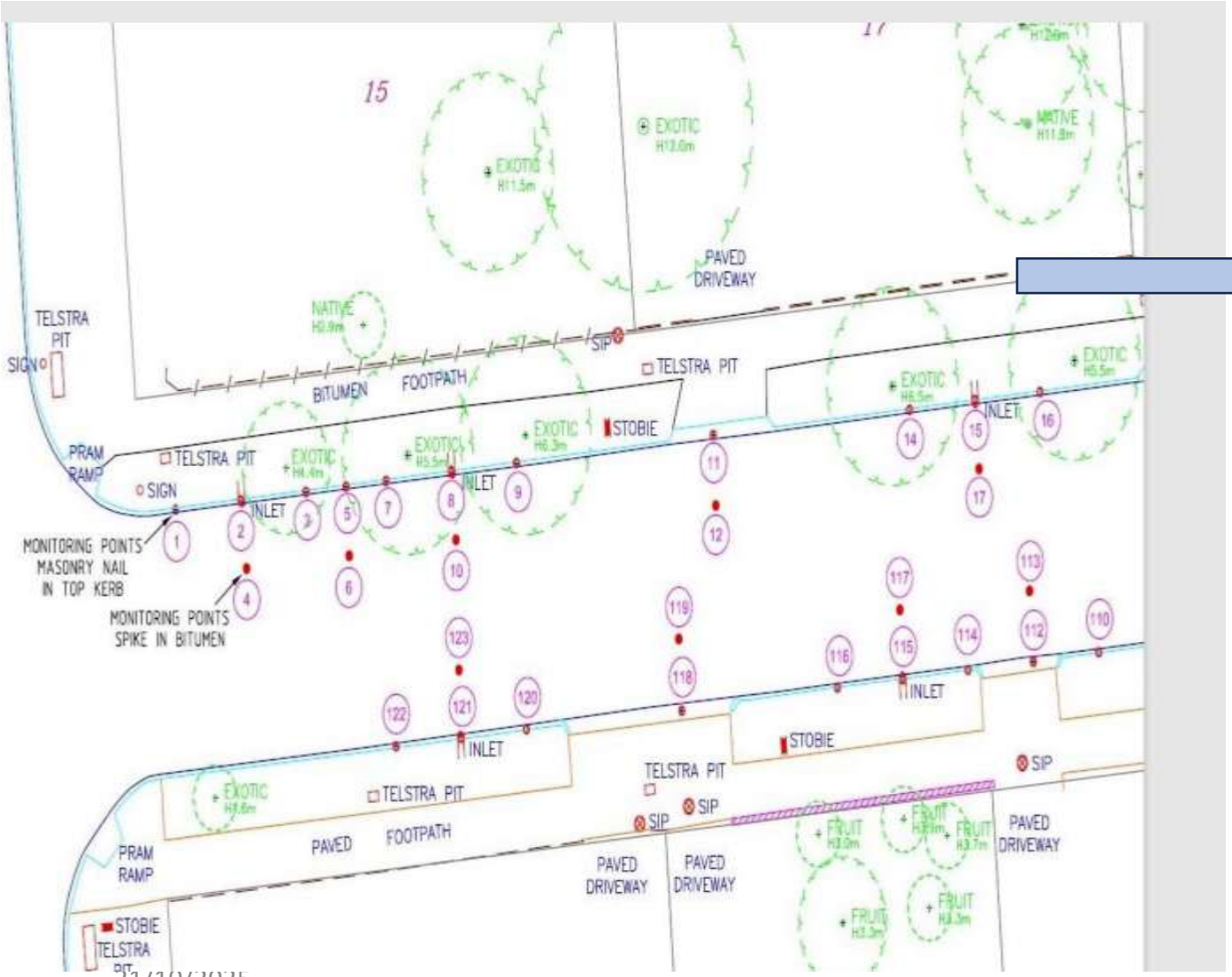
Ben Hall
TECHNICAL ARBORICULTURE OFFICER

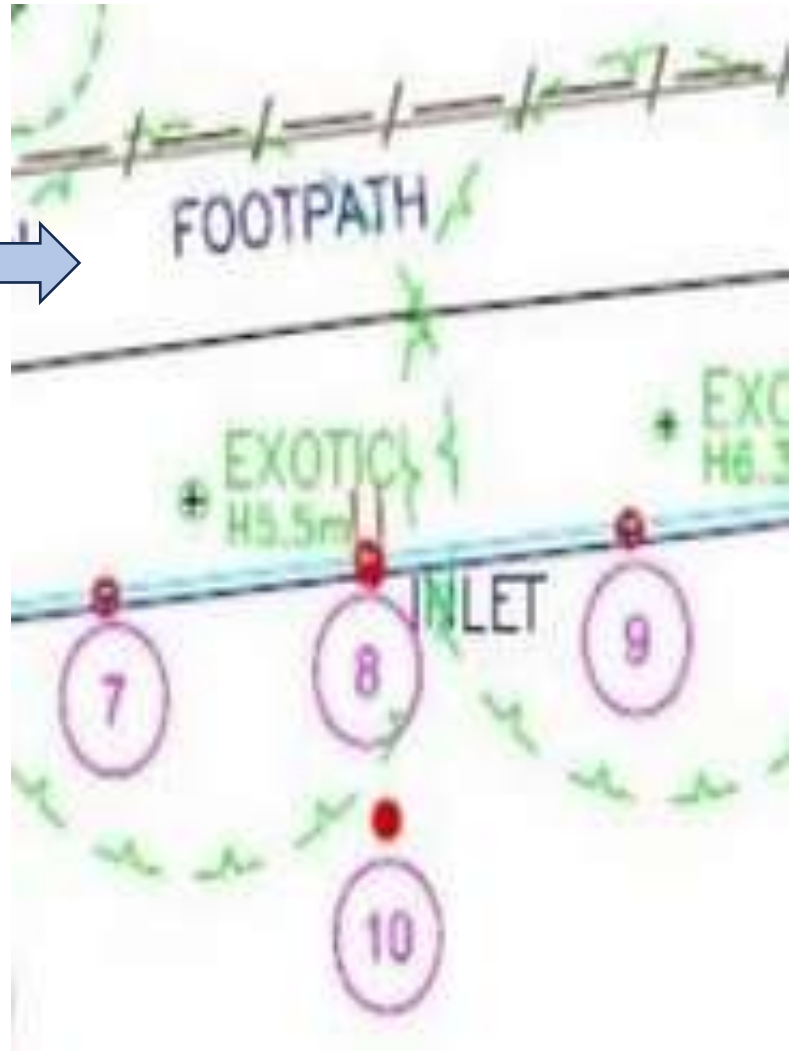
City of Melton, Victoria

- In 2018, the City adopted an Integrated Water Management Plan that set the policy direction of requiring the inclusion of passive irrigation of street trees in new developments and streetscape renewals.
- So far approx. 20,000 + inlets have been installed
- Future potential 130,000 trees with passive irrigation with inlet
- Research project (City of Melton and University of Melbourne
- Scalable Solution: Low installation cost at planning and development stage

Kerb Space inlet systems: soil movement

Kerb Space inlet systems: soil movement





Kerb Space inlet systems: soil movement

- Surveys were conducted between October 2014 and July 2016
- Objective : to measure the soil heave during wet season (June – August) and shrink during summer (Dec – Feb)

- Total 160 survey points Directly above near and midway between kerb inlets in the street.
- The survey points were established along the top and offset 2m on the road surface.
- The level data were referenced against a stable deep benchmark located in East Parade, kingswood.

Opportunities to incorporate Kerb Space Inlets

Projects		Projects	
New Development (Policy and Planning)	✓	Drainage/kerb/footpath upgrade	✓
Planting new trees/passive irrigation to street trees	✓	Planting new trees	✓
Road/Carpark Upgrade	✓	Local ponding issue - reconstruction	✓
Building or Upgrading sports facility	✓	Reduction of peak flows	✓
Drainage/kerb/footpath upgrade	✓	Reduction of downstream pollution	✓

Thank You

https://www.spacedownunder.com.au/

Infiltration zone: P200L (Pit Model)

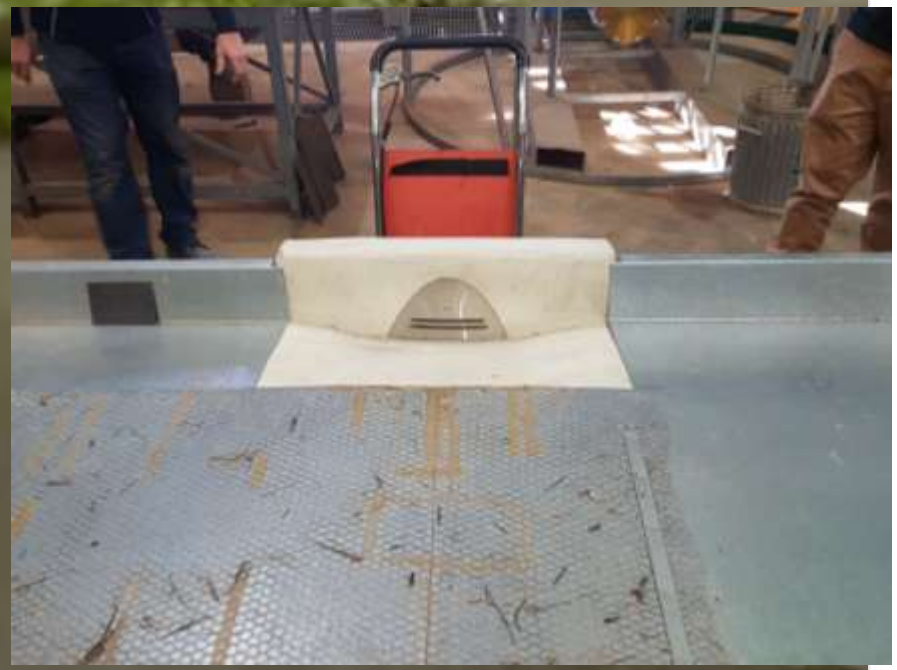
Stormwater Systems

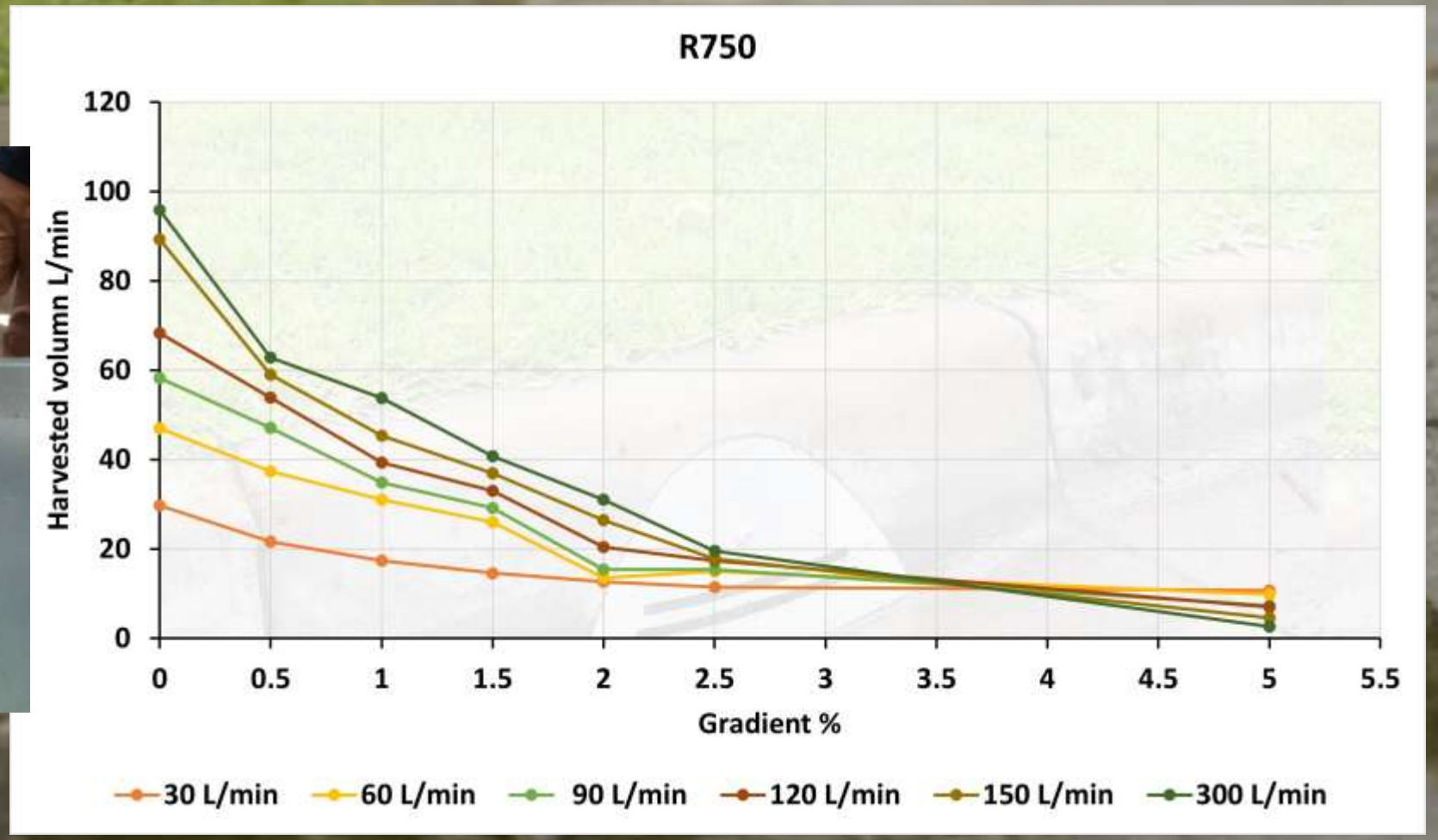
- Designed to take water away from our urban environments
- Buildings, footpaths and roads = less impervious surfaces
- No – water access for street tree roots
- Ponding/local flooding
- Increasing urban temperature

Port Pirie Greening Project, SA

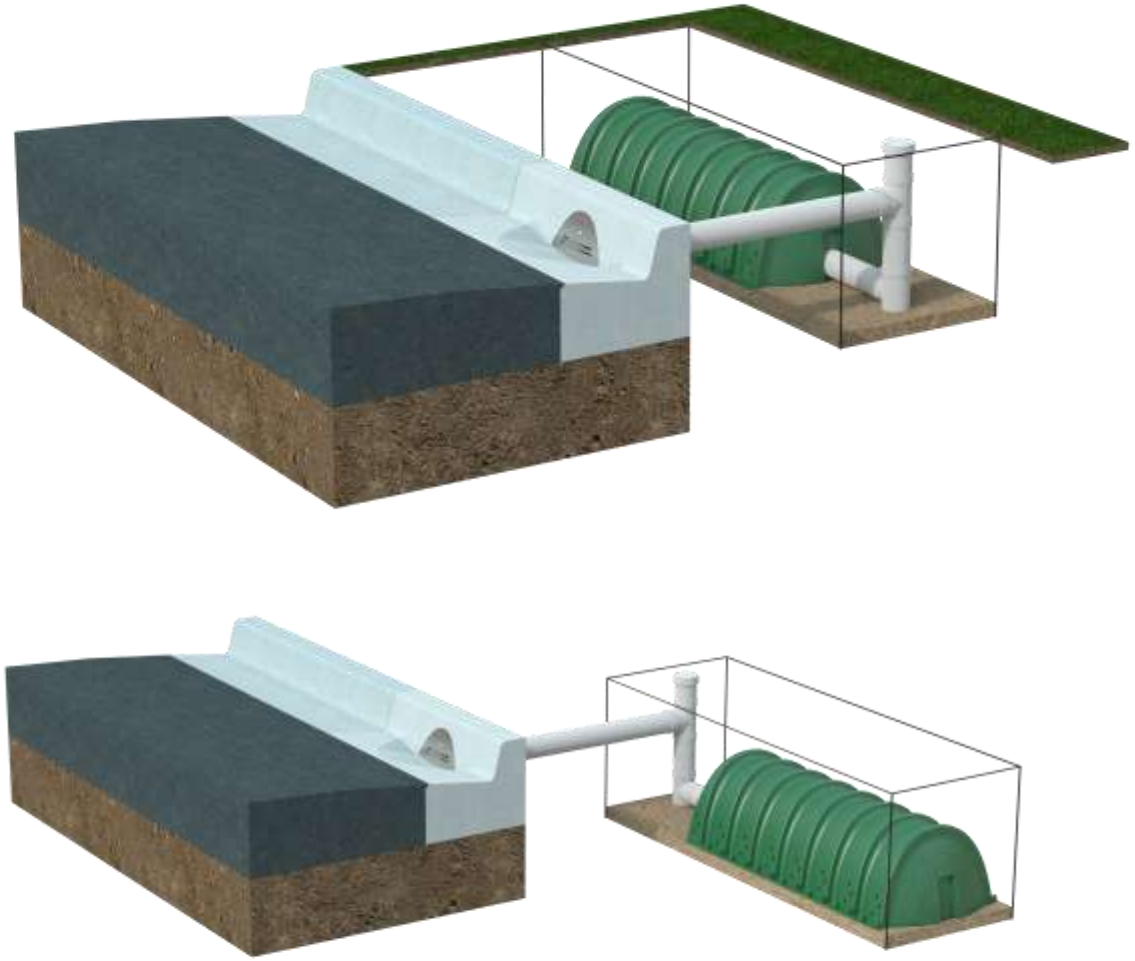
- Collaborative project
- Phase 1 – 130 inlets
- Shallow infiltration distribution models

Kerb Space inlet (R750)





Infiltration zone: T275L (Trench Model)



Keeping Water Where It Falls

- Solution for ponding problems
- Scalable solution for passive irrigation to street trees
- Soil Water Banking
- Help and support WOOD WIDE WEB
- Help to transform our cities into green Sponge and develop climate sensitive cities
- Reduce downstream flooding by slowing down runoff
- Maintain soil moisture
- Recharging Aquifers [Dr Peter Dillion, CSIRO Scientist (Retired)]