



Improve Street Tree Health and Support Urban Cooling

URBAN STORMWATER HARVESTING

A cost-effective and proven passive irrigation system to maximise stormwater infiltration to help street trees thrive.

Urbanisation, climate change and the water cycle pose significant challenges when establishing and maintaining green infrastructure.

Rapid urbanisation is changing the way water flows through catchments. With more streets and parks being sealed with paving and buildings, rainwater cannot soak into the soil to hydrate trees and plants, leading to additional stormwater runoff and potential flooding.

Increasingly frequent and intense rainfall events further increase flooding, damage to residential properties, and traffic chaos. The conventional approach to stormwater management is to divert runoff through pit and pipe networks, quickly transporting it into creeks, rivers and oceans. Pollutants carried in this runoff can include oils, fertilisers, detergents, litter, and sediment that can degrade aquatic and marine ecosystem health.

Upgrading stormwater systems to address increasing runoff quality and quantity issues can be prohibitively expensive, driving the need for a solution that's both cost-effective and environmentally sustainable.

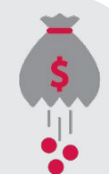
By 2050 it is predicted that 67% of the world population is expected to be living in urban areas. Both climate change and increasing urbanisation, are likely to negatively impact on water quality of rivers which, in turn, could have significant economic impacts for these communities.

H2Open Journal (2019) 2 (1): 146–167.



The United Nations Environment Programme estimates the costs of climate adaptation could range from \$140 billion to \$300 billion by 2030. Technology and innovative solutions are needed to enable strategic and critical infrastructure to adapt to changing conditions.

Climate adaptation for water infrastructure – Global Infrastructure Hub Dec 2020



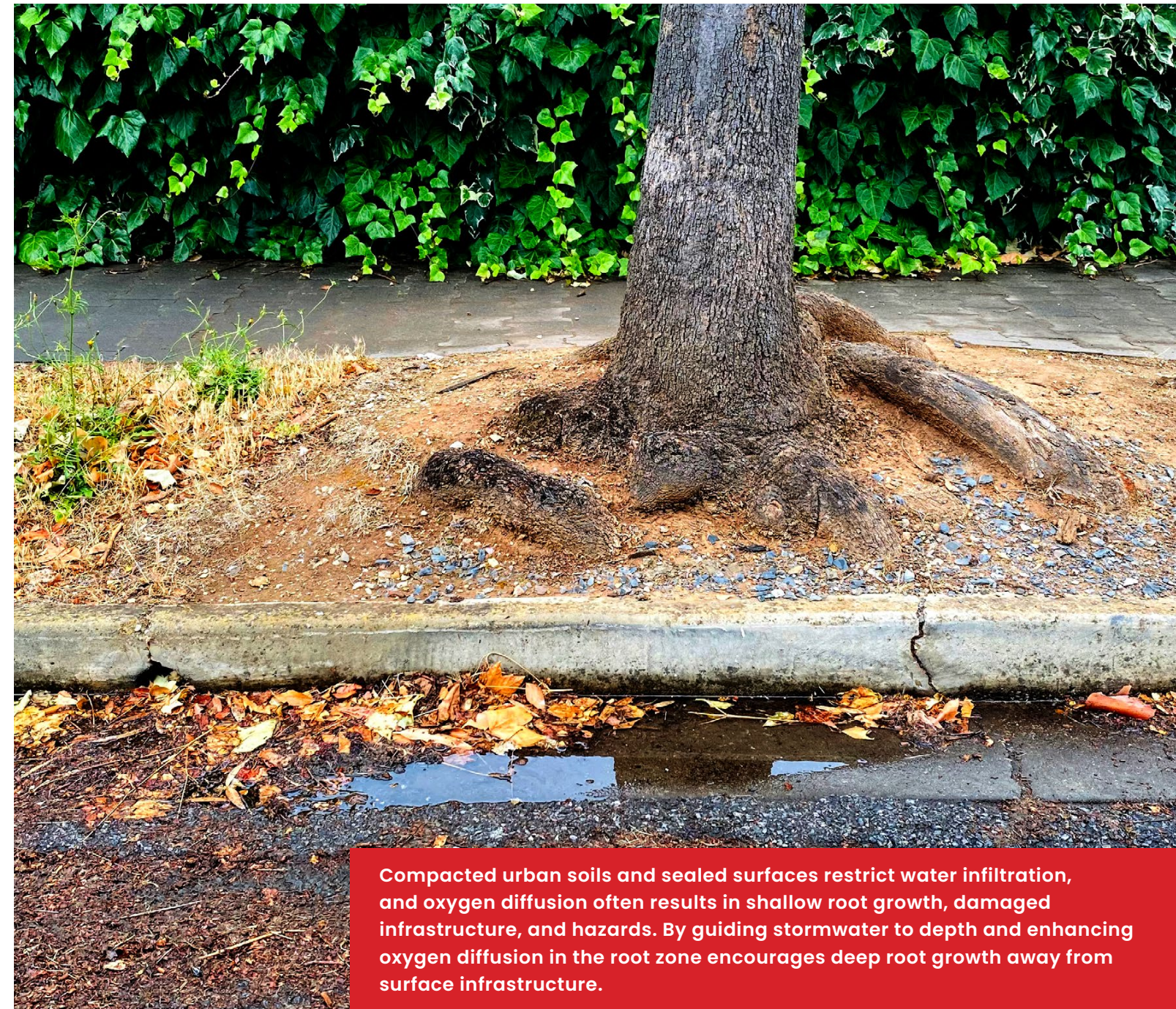
Stormwater is washing pollutants, such as phosphorus, nitrogen and heavy metals into creeks, rivers and oceans causing toxic algal blooms. Affecting aquatic life, reducing biodiversity, which in time may potentially impact the fishing and tourism industries.

EPA South Australia



Damage caused by tree roots to sidewalks, kerbs and gutters and sewers is a multimillion-dollar problem.

Arboricultural Journal



Compacted urban soils and sealed surfaces restrict water infiltration, and oxygen diffusion often results in shallow root growth, damaged infrastructure, and hazards. By guiding stormwater to depth and enhancing oxygen diffusion in the root zone encourages deep root growth away from surface infrastructure.

The increasing severity and frequency of storm events challenge conventional flood management and water supply methods. Adopting novel solutions to harvest, store, detain, and optimise stormwater use for appropriate purposes is crucial to meeting these challenges.

Our Kerb SPACE Inlet systems – reuse runoff for trees

WHAT IT DOES

Kerb SPACE Inlets are an emerging Water Sensitive Urban Design (WSUD) system that harvests stormwater runoff. TREENET inlets are designed for installation in existing or new kerb work and connect to an infiltration zone in the verge TREENET inlet systems are cost-effective, sensitive to existing infrastructure and are a low maintenance option for councils to implement.

Passive Irrigation to Street Trees

- 1 The redirected water reduces the volume of stormwater entering the underground system, mitigating the risk of local flooding and provide passive irrigation to street trees.

Treatment of Stormwater

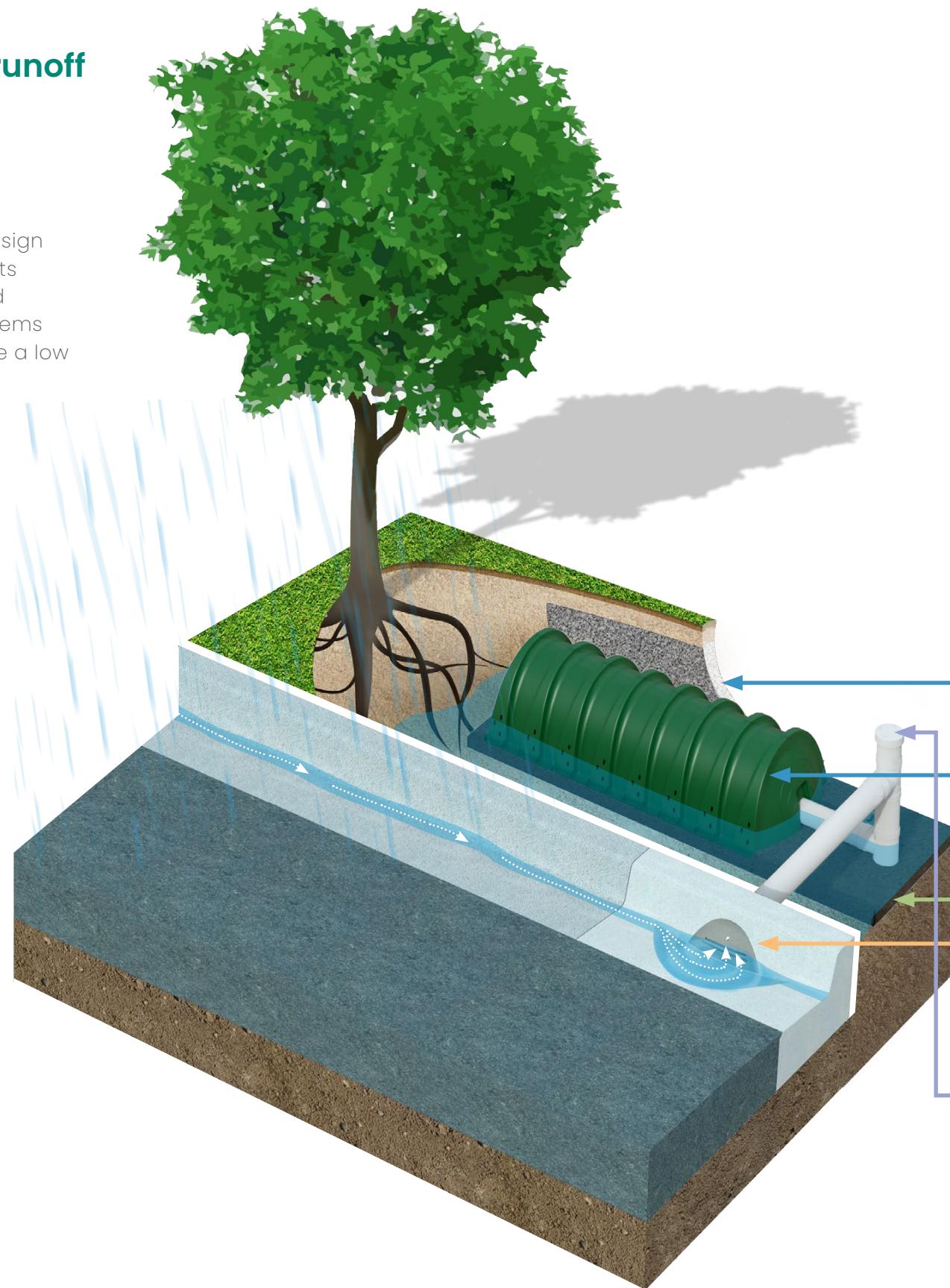
- 2 By directing the 'first flush' of stormwater into the soil, urban pollutants are locked up in-situ, where they are broken down by soil-borne organisms (bioremediation) to become nutrients for trees and plants.

Reduces Costs

- 3 Newly planted trees establish more rapidly with the Kerb SPACE system, which minimises servicing by water trucks after planting. Dispersed inlets working as part of a catchment wide water sensitive urban design solution can also reduce stormwater flows to avoid conventional drainage. These financial benefits can deliver long-term operational savings.

Environmentally Beneficial

- 4 By giving trees more water, the Kerb SPACE Inlet system increases their capacity to grow and cool their urban microclimates while beautifying our streets and suburbs.



HOW IT WORKS

Kerb SPACE Inlet (Capture Zone)

- 1 The kerb dish design slows water arriving at the inlet, causing sediment to settle out before the water enters the inlet. The slotted inlet cast into concrete kerb harvests the 'first flush' of stormwater, which is then piped to the infiltration zone.

Infiltration Pit/Trench (Infiltration Zone)

- 2 The detention capacity of the infiltration trench ensures sufficient water to sustain root presence and maximise infiltration. By locating infiltration zones between pairs of street trees, the nature of roots to grow towards a water source guides their growth away from built infrastructure, typically aligning roots between kerbs and footpaths, which minimised root damage, and hazards.

Filter Medium (Filter Zone)

- 3 Filter medium (gravel 10-14mm) provides treatment to stormwater before it enters into the surrounding soil.

Pipe Connections (Inspection Port)

- 4 The inspection port can be used to monitor water levels in the well, it can also be used to quickly deliver water to tree root zones for optimal sapling growth during prolonged dry conditions. Alternatively, during drought conditions reclaimed water can be delivered directly to the gutter by a water truck, for infiltration through the inlets.



R750 KERB SPACE INLET (CAPTURE ZONE)

The patented Kerb SPACE Inlet® design ensures sediment is deposited in the gutter and not in the stormwater harvesting system. Sediment is easily removed from the gutter by routine street sweeping. Research has shown that the inlet's design enables it to continue to function under field conditions for extended periods, even in streets with deciduous trees and with accumulated debris and sediment in the gutter.

Features and Benefits

- ▶ Manufacture from high corrosion-resistant stainless steel.
- ▶ Designed to allow stormwater to pass into the inlet while keeping sediment and debris out.
- ▶ Captures stormwater in low and high rainfall events.
- ▶ Harvested stormwater can be piped in any direction to avoid other street infrastructure.
- ▶ Easy installation with Kerb SPACE Inlet formwork (as shown on page 7)
- ▶ Value sensitive design and can be use at heritage sites.
- ▶ Locally made Australian product.

Material Specifications

R750 Series Faceplate – 304 Stainless Steel

Dimensions*

Length: 600mm

Height: 200mm

Kerb Types

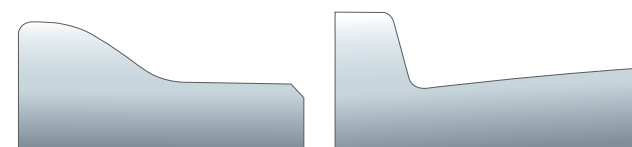
Barrier kerb and semi mountable

Number of Inlets Required

Designed to be installed in between two trees but but additional inlets can be installed for large trees or groups of trees.



R750 Series Barrier kerb



Semi Mountable Kerb

Barrier Kerb

NOTES:

*Product dimensions may change without notice. Please contact Space Down Under for specific design guidance, installation instructions, tree species selection or potential research trails.

INLET FORMWORK

Kerb SPACE Inlet formwork attaches inside standard kerbing boards to quickly locate the gutter dish, pipe fittings and faceplate block in the correct alignment. Inlets can be cast into the concrete of new kerbing or during renewal programs and retrofitted into existing kerbing.

Features and Benefits

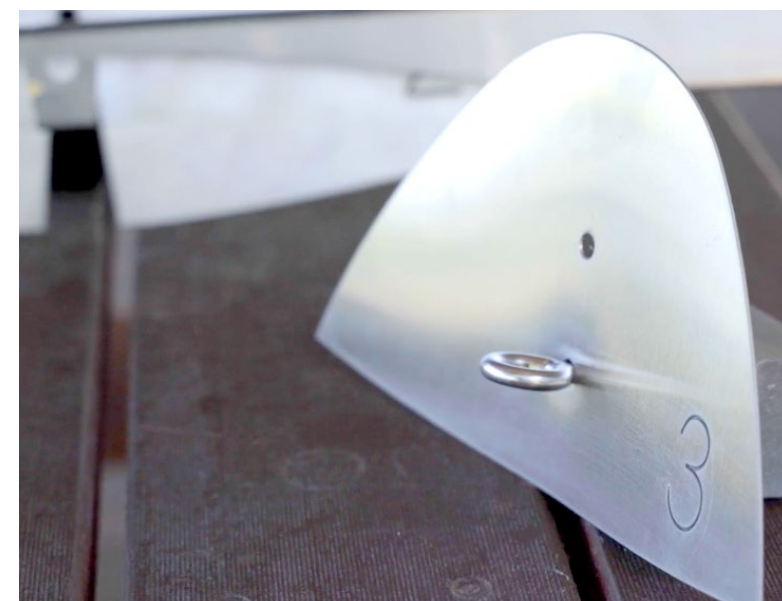
- ▶ The formwork can be reused many times, making it time and cost effective.
- ▶ Made from 304 high corrosion-resistant stainless steel, it will last the length of the project.
- ▶ Using the formwork ensures consistency and uniformity in Kerb SPACE Inlet installation, and saves set-up and concrete finishing time, which ultimately saves money.*
- ▶ Locally made Australian product.

Dimensions

Length: 660mm

Height: 205mm

Weight: 2.18kg



NOTES:

*Contact Space Down Under for other kerb style formwork. Product dimensions may change without notice.

T275L TRENCH MODEL (INFILTRATION ZONE)

The infiltration tank and trench is an integral part of the Kerb SPACE Inlet system. Stormwater is detained temporarily in the infiltration zone, until it soaks into the surrounding soil. Abundant water availability followed by enhanced oxygen diffusion as the system drains, supports localised tree root growth at the infiltration site in preference to growth toward kerbs, footpaths and gutters. By harvesting the 'first flush' of stormwater Kerb SPACE Inlet system keep urban pollutants out of creeks and rivers, the pollutants are bioremediated in the soil where they become nutrients for trees and other plant.

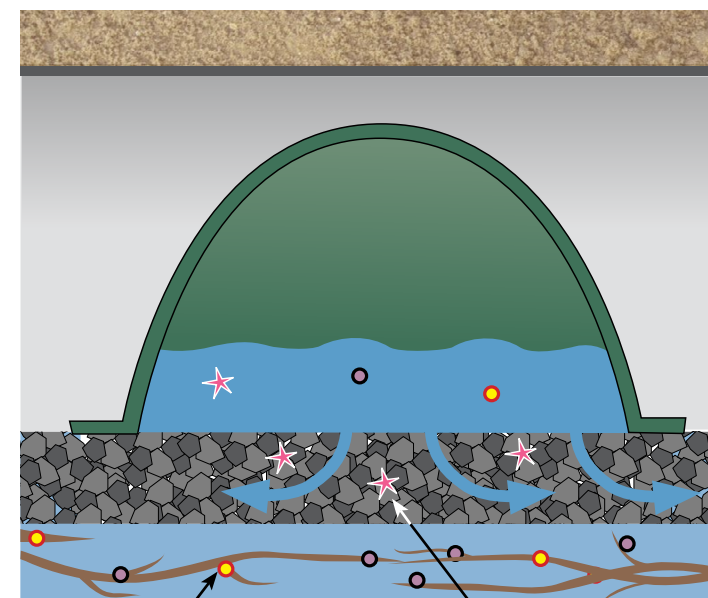
Features and Benefits

- ▶ Made from recycled wheelie bins to reduce carbon footprint and helps reduce waste from landfill.
- ▶ Located underground and out of sight, improving natural water cycle.
- ▶ Contributes to green sustainable practices.
- ▶ Fit-for-purpose design.
- ▶ Provide passive irrigation to trees (no pumps, electricity supplies or filters to be maintained).
- ▶ Locally made Australian product.



Trench model (T275L)

Trench Model Infiltration Process



Water soluble particles absorbed by treeroots

Insoluble particles trapped in filter medium

- Nitrogen (water soluble)
- Phosphorous (water soluble)
- ★ Heavy metals (insoluble)

Material Specifications

R275L – 100% recycled polypropylene (PE)

Dimensions*

Length: 1150mm

Width: 580mm

Height: 340mm

Capacity

275 litres (excluding infiltration)

Recommended Use

For installation in street verges between two trees, with water supplied by one Kerb SPACE Inlet. Alternatively, several infiltration trenches can be connected to irrigate dispersed trees.

NOTES:

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P200L PIT MODEL (INFILTRATION ZONE)

Material Specifications

P200L – 100% recycled polypropylene (PE)

Dimensions*

Diameter: 460mm

Height: 750mm

Capacity

200 litres (excluding infiltration)

Recommended Use

For installation in street verges between two trees, with water supplied by one Kerb SPACE Inlet. Alternatively, several infiltration trenches can be connected to irrigate dispersed trees.

NOTES:

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Pit model (P200L)





SPACE™ FILTER MEDIUM

A filter media is used in conjunction with our infiltration tanks and is key to the system's overall efficiency. It is imperative that a layer of gravel, sandy loam or other media line the base of the trench. This layer creates a buffer between the compacted earth and the water entering the inlet. This facilitates the first flush of around 300 litres of stormwater, allowing it temporary suspension before entering the water table.

The purpose of the filter medium is to assist in capturing nutrients such as Nitrogen and Phosphorus, suspended organics, hydrocarbons and heavy metals, all harmful to downstream aquatic environments. These nutrients however are beneficial once captured by our system as they are taken up by a nearby street tree. The organics and hydrocarbons are also bio remediated adding more nutrients and carbon to the soil. Heavy metals such as Zinc, Copper and Boron are removed from the stormwater system and locked up in either the filter medium or the surrounding soil.

Gravel, sandy loam, and recycled concrete are currently the most commonly used infiltration media. These materials have variable hydraulic characteristics and sorption capacity. The location of your installation will be a determining factor in deciding on what is suitable media to use. For example, cost-effective, readily available, and potential recycled materials could be sourced in your local area.

Space Down Under manufactures its own filter media called SPACE™ (Structural Permeable Aerated Compactable Earth). It's currently only available in South Australia and is made from the solid residue of potable water filtration processes. The South Australian Environment Protection Agency has approved SPACE™ as a filter medium in stormwater infiltration systems that receive runoff from streets via Kerb SPACE Inlet systems. SPACE™ is also approved for use as a base layer and shallow root growth deterrent beneath both impermeable and permeable paving.

WE BELIEVE IN CREATING GREENER, COOLER MORE LIVABLE CITIES

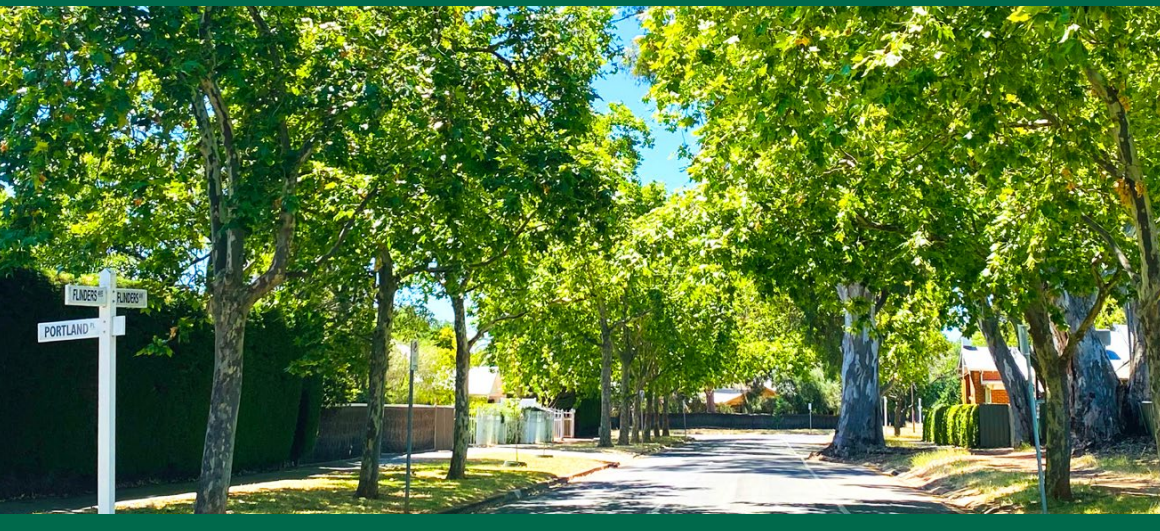
ABOUT US

Space Down Under focuses on developing, improving and delivering sustainable stormwater harvesting solutions to support healthy urban forests. We seek to nurture street trees and other plants to reconnect communities with nature in urban settings for all the health and wellbeing benefits this delivers. We provide solutions that can be applied at the urban street scale, where they are of most benefit and value to communities. Our products deliver fit-for-purpose stormwater to sustain urban trees to help to improve air and water quality, enhance human physical and mental wellbeing, reduce energy consumption, mitigate heat islands, and reduce carbon emissions. Simply put, Space Down Under supports the building of greener, more liveable cities for healthier communities.

David Lawry OAM, Space Down Under founder and director is committed to developing solutions that improve growing conditions for street trees in the changing climate. A scientist and teacher by trade, co-founder of Australia's national tree research organisation: TREENET Inc., and with more than 40 years working in urban forestry, including in-nursery production and landscape development, David's knowledge of trees is extensive. "We owe it to future generations to ensure we are doing all we can to preserve our environment. Whether you're building a new subdivision, planning a new park, renewing a road, or simply planting a new tree, I encourage you to install a Space Down Under TREENET Inlet system, and to join me in creating a greener, cooler, more liveable city."







A proven technology to improve urban forests and
to help restore more natural urban water cycles.



SPACE DOWN UNDER

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