
River for Liveability

Stormwater VIC 2019 Conference

Unlocking The Superpowers Of Street Trees

Green-Blue Infrastructure for Healthy Streets & Waterways

E2Designlab

Jarrold Luxton, Steven Buck

Acknowledgement of Country

The formally recognised Traditional Owners for the land on which we stand today are the Taungurung People.

The Taungurung People are represented by the Taungurung Land and Waters Council Aboriginal Corporation.



1. Background

2. Key design features

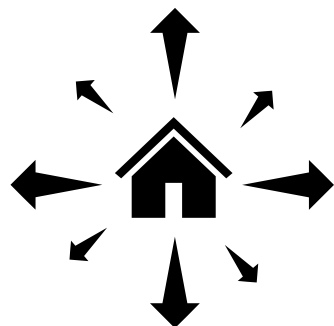
3. Adoption processes

4. A look to the future

Disruption: the Challenge



Global
Heating



Increased
Urbanisation

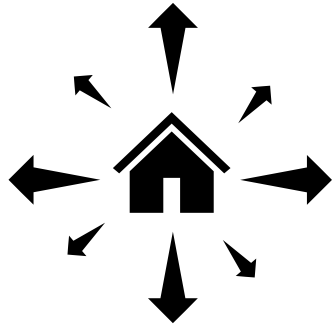


Rapid Population
Growth

Disruption: the Challenge



Global
Heating



Increased
Urbanisation



Rapid Population
Growth

Common local challenges

Impact/loss of
biodiversity

Greater heat stress

Greater flood risk

Reduced soil moisture

Constrained water
supplies

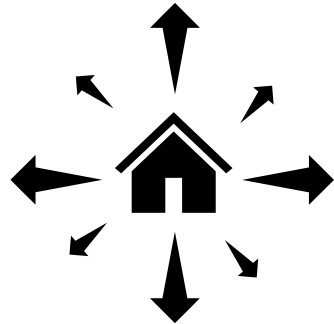
Need for multifunctional
outcomes

Disruption: the Challenge

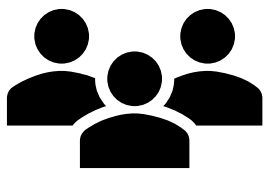
Common local challenges



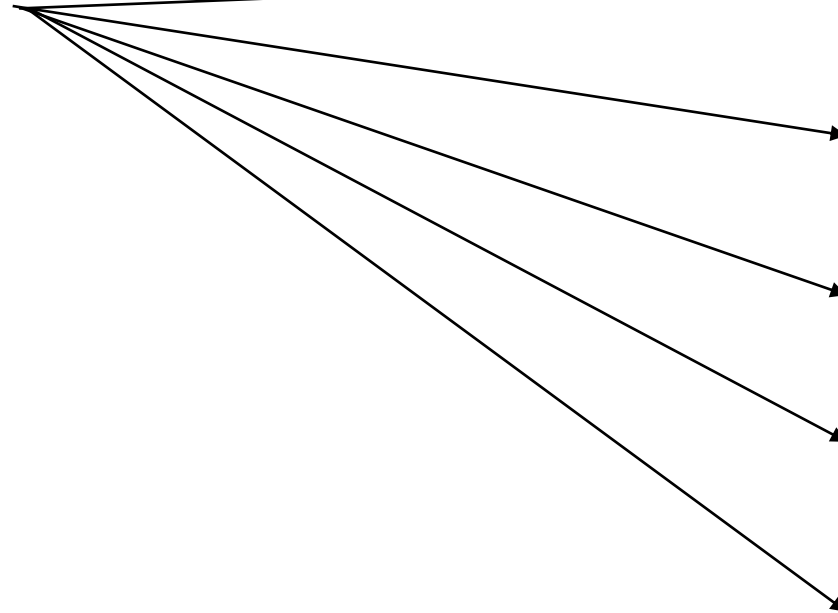
Global
Heating



Increased
Urbanisation



Rapid Population
Growth



Impact/loss of
biodiversity

Greater heat stress

Greater flood risk

Reduced soil moisture

Constrained water
supplies

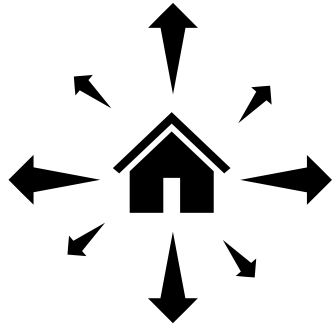
Need for multifunctional
outcomes

Disruption: the Challenge

Common local challenges



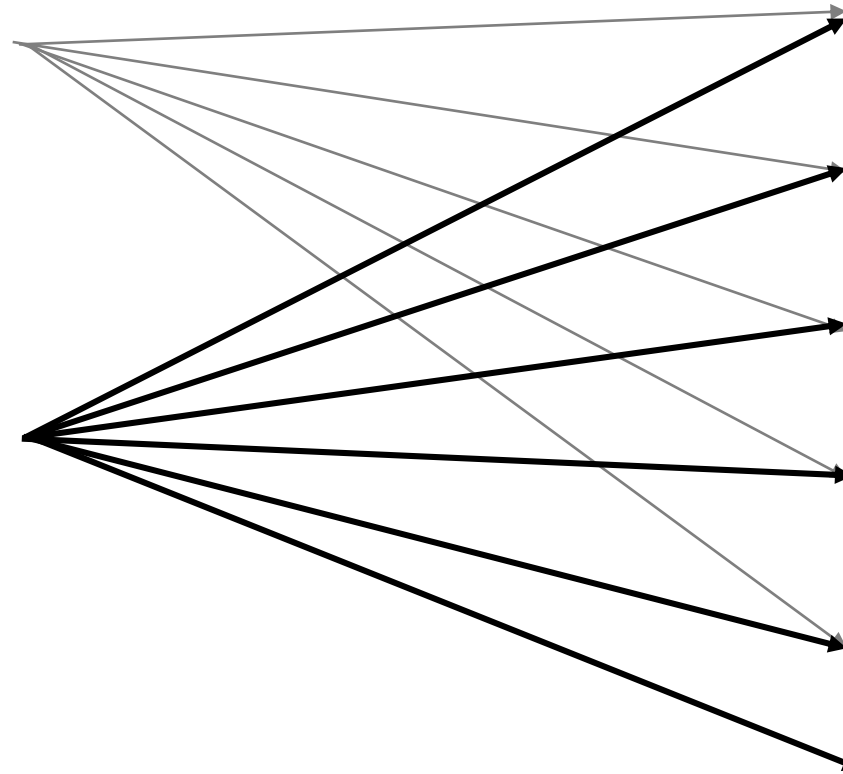
Global
Heating



Increased
Urbanisation



Rapid Population
Growth



Impact/loss of
biodiversity

Greater heat stress

Greater flood risk

Reduced soil moisture

Constrained water
supplies

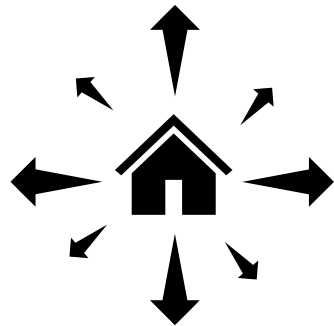
Need for multifunctional
outcomes

Disruption: the Challenge

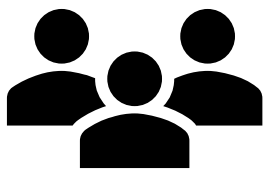
Common local challenges



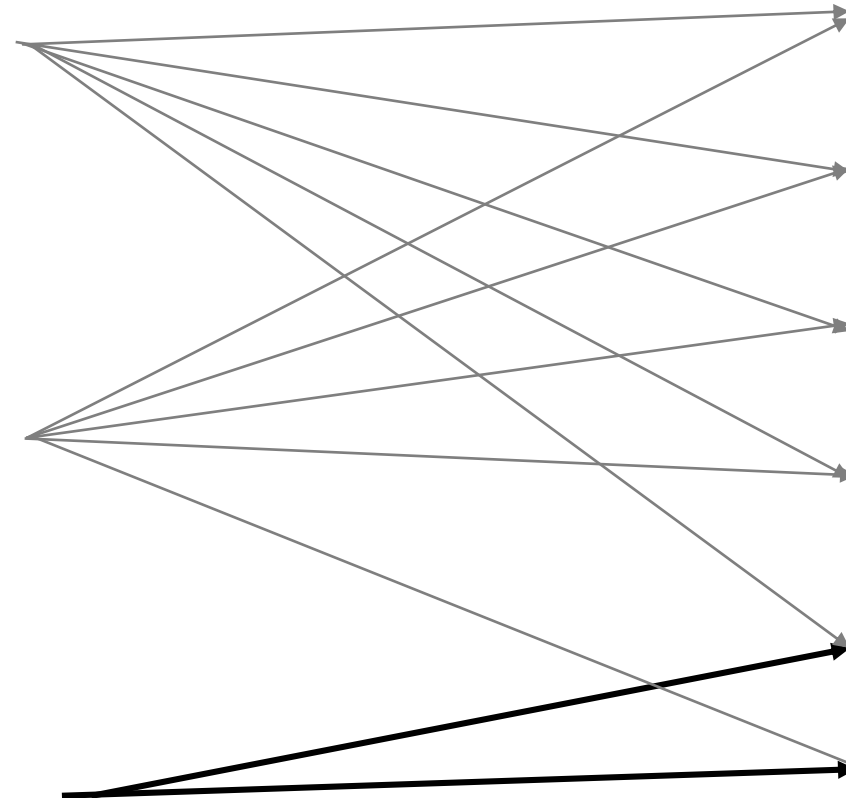
Global Heating



Increased Urbanisation



Rapid Population Growth



Impact/loss of biodiversity

Greater heat stress

Greater flood risk

Reduced soil moisture

Constrained water supplies

Need for multifunctional outcomes

Disruption: the Opportunity

- The stormwater industry is acutely impacted by these challenges

Impact/loss of
Biodiversity

Greater flood risk

Constrained water
supplies

Greater heat stress

Reduced soil moisture

Need for multifunctional
Outcomes

- Unlock the superpowers of the street tree



Grey Infrastructure



Flooding



Standard WSUD



Flooding



Enhanced
Biodiversity



Enhance Amenity
& Character



Stormwater
Treatment



Increased Soil
Health



Runoff
Detention



Runoff
Reduction



Green-Blue Street Trees



Flooding



Enhanced
Biodiversity



Enhance Amenity
& Character



Stormwater
Treatment



Increased Soil
Health



Quality Public
Spaces



Runoff
Detention



Healthy Trees &
Canopy Cover



Shade &
Cooling



Runoff
Reduction



Air Quality
Improvement



Improved
Community Health

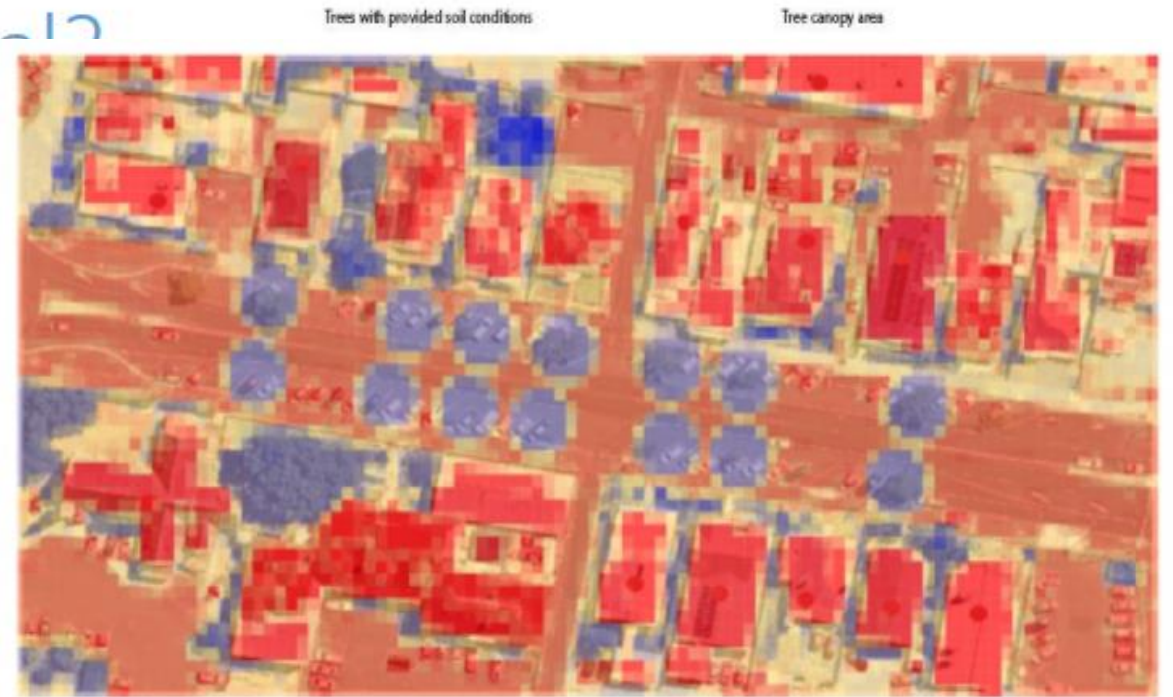


Reduced Mains
Irrigation



What do we know?

A



standard trees



LST (°C)

38.54

58.23

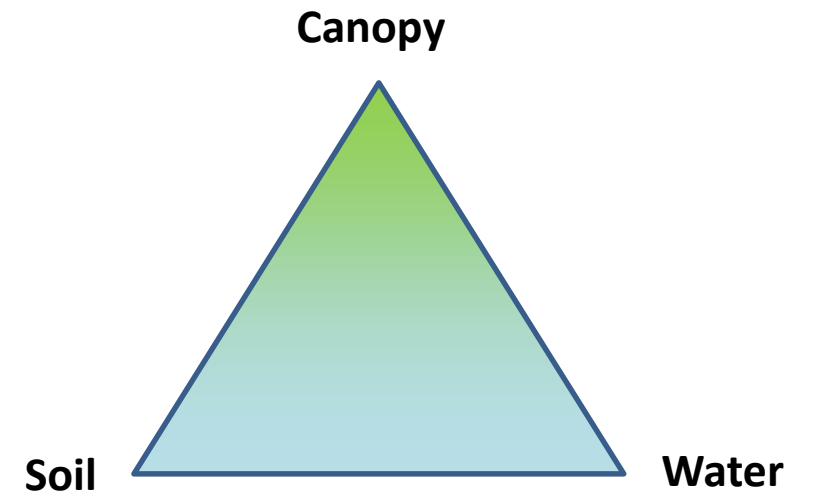
E2D

10

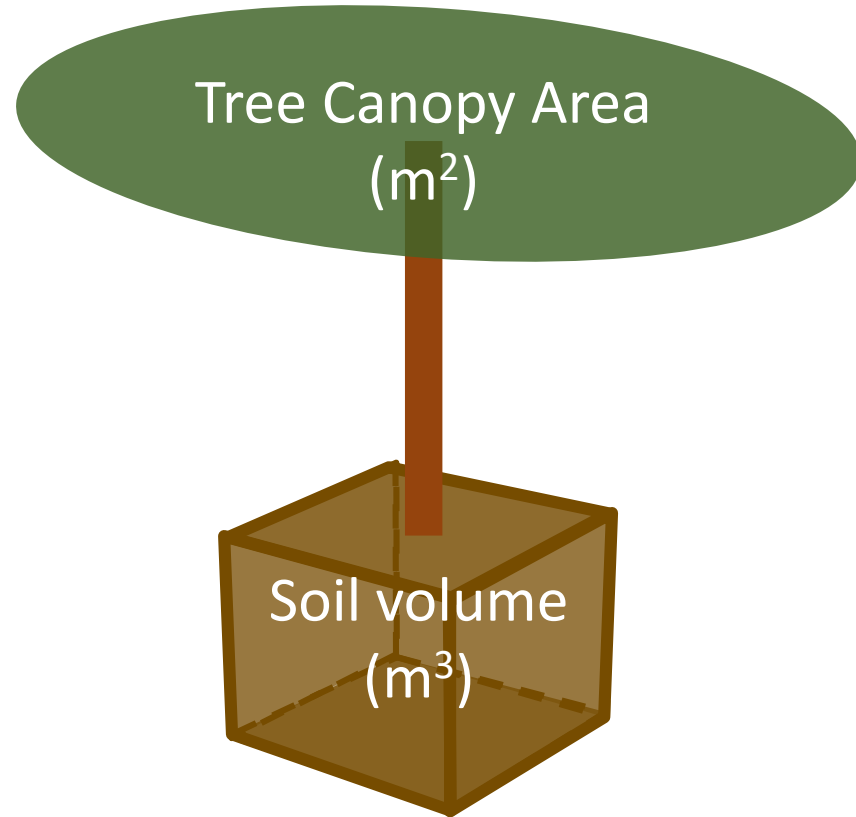
So what do they look like?



Keys to success



Soil & Canopy



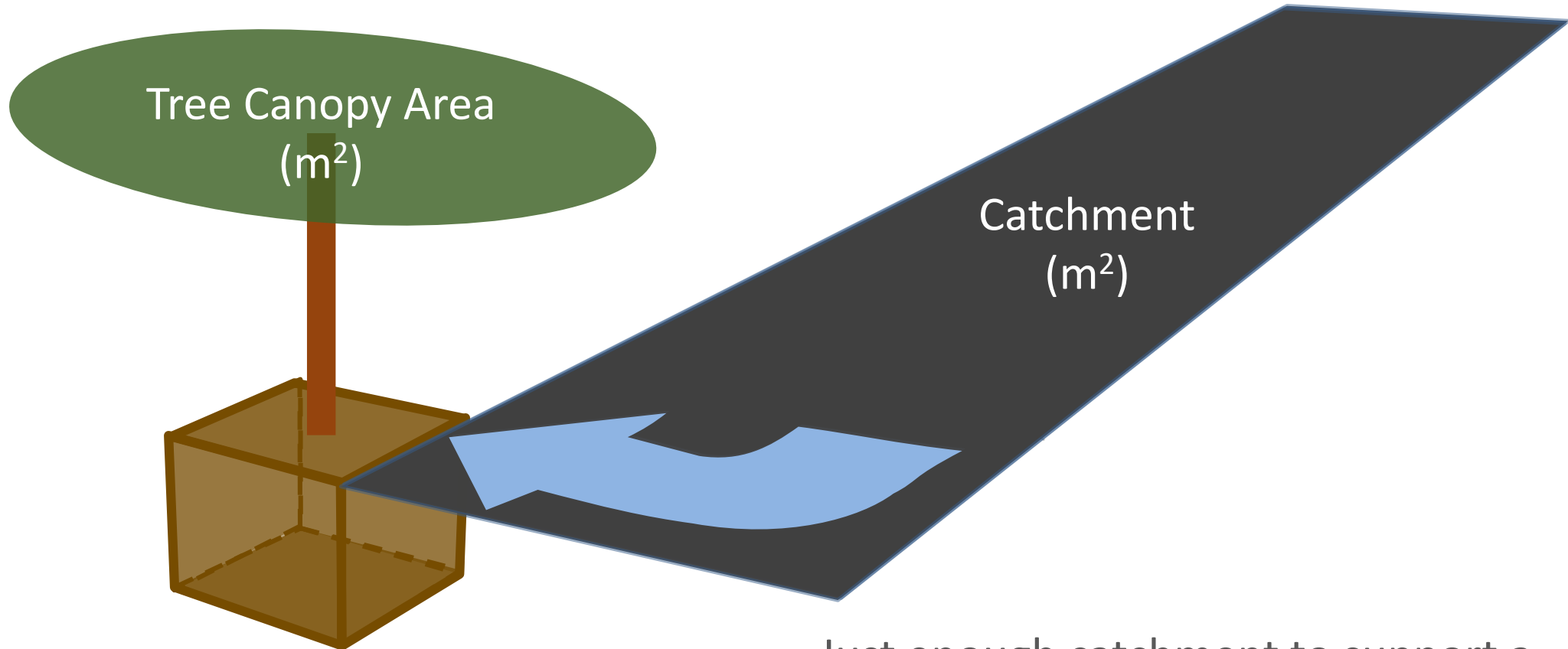
To support a healthy tree:

$$\text{Optimal Soil Volume (m}^3\text{)} = \frac{\text{Canopy area (m}^2\text{)}}{3}$$

Adapted from Urban (2008)

Where does water come into the picture?

Canopy & Water



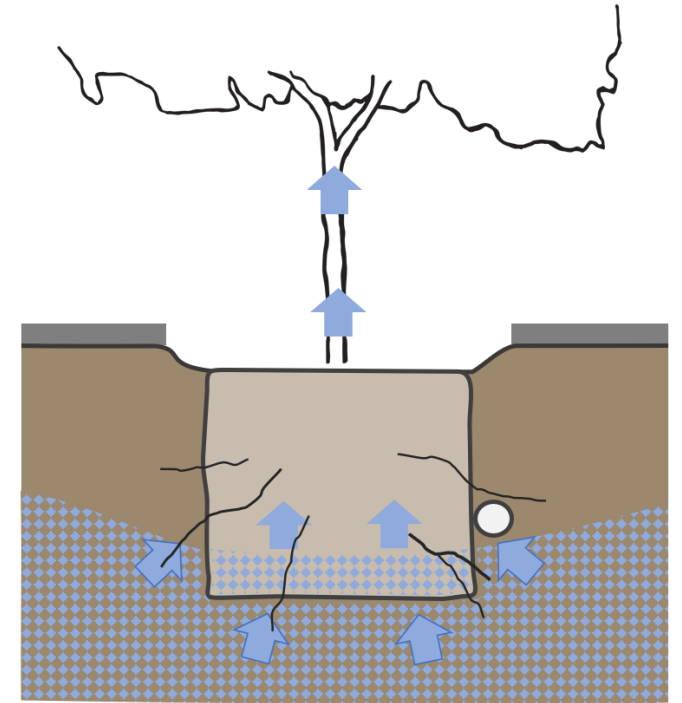
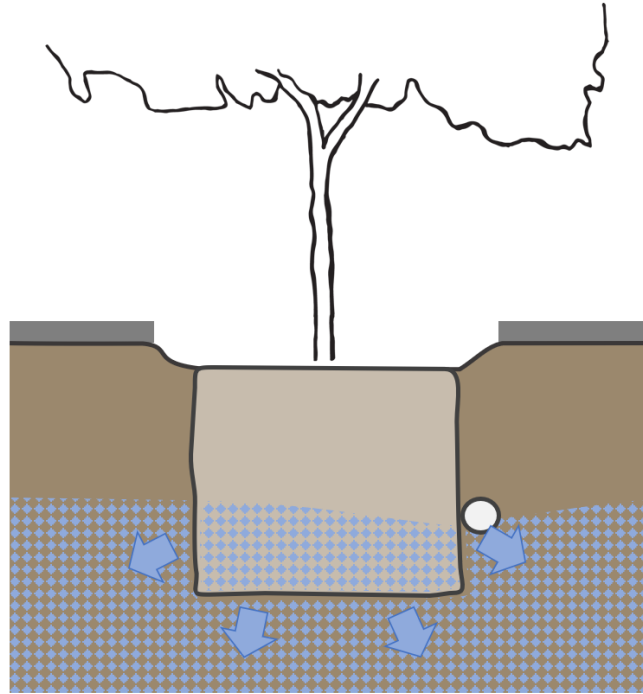
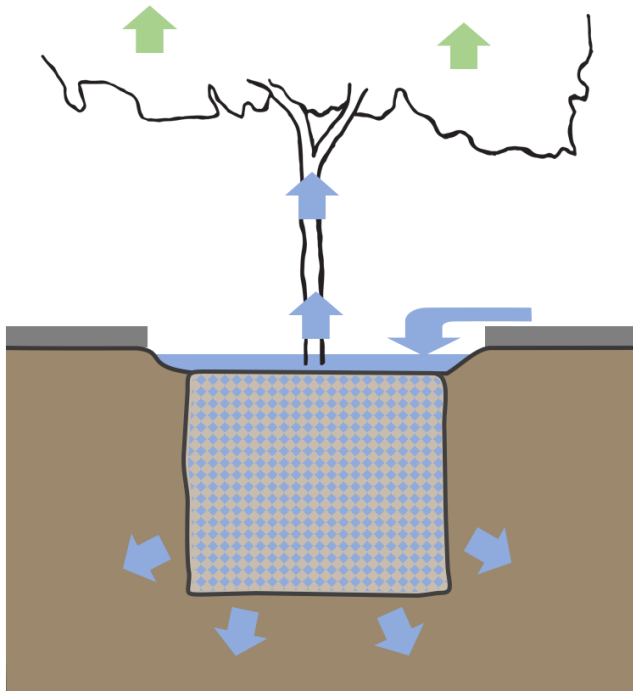
Just enough catchment to support a healthy tree in the optimal soil volume:

Great! So that's that?!

Supported canopy area (m²) = 10% x Catchment (m²)

Water & Soil

Hang on, a few more things...



Connection to surrounding soils

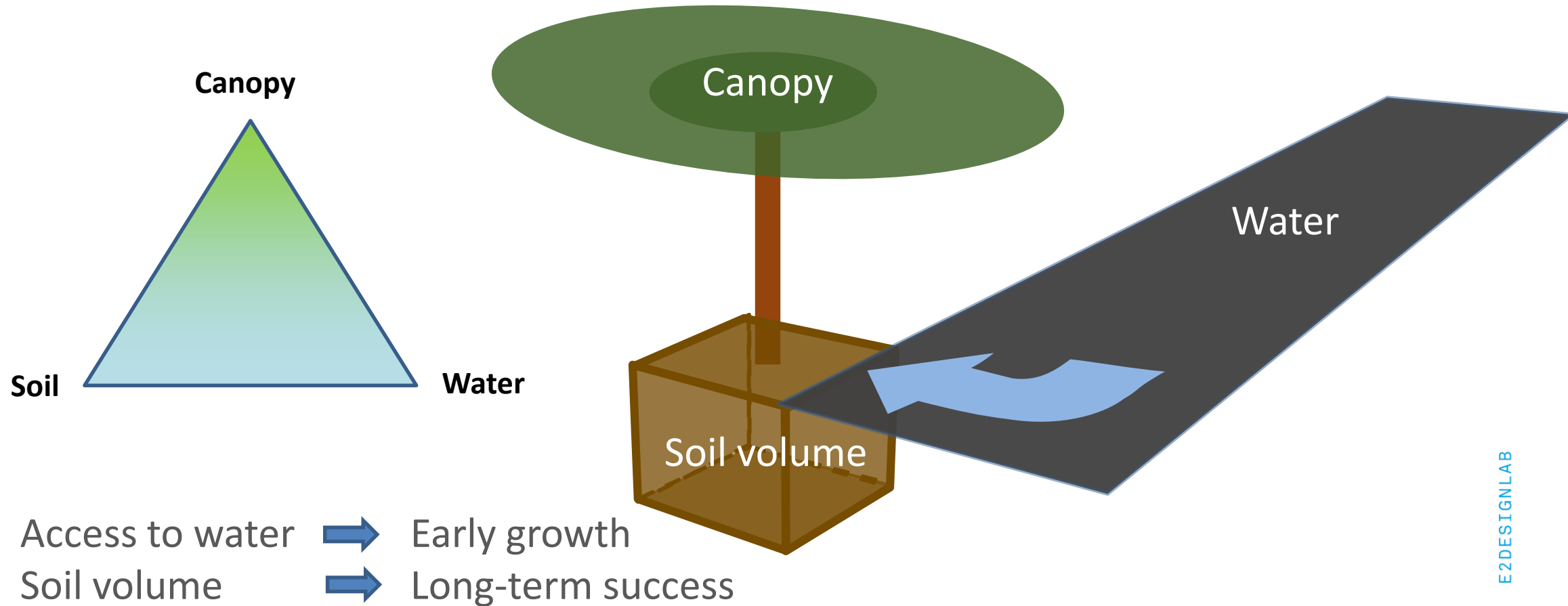
+

Drainage

=

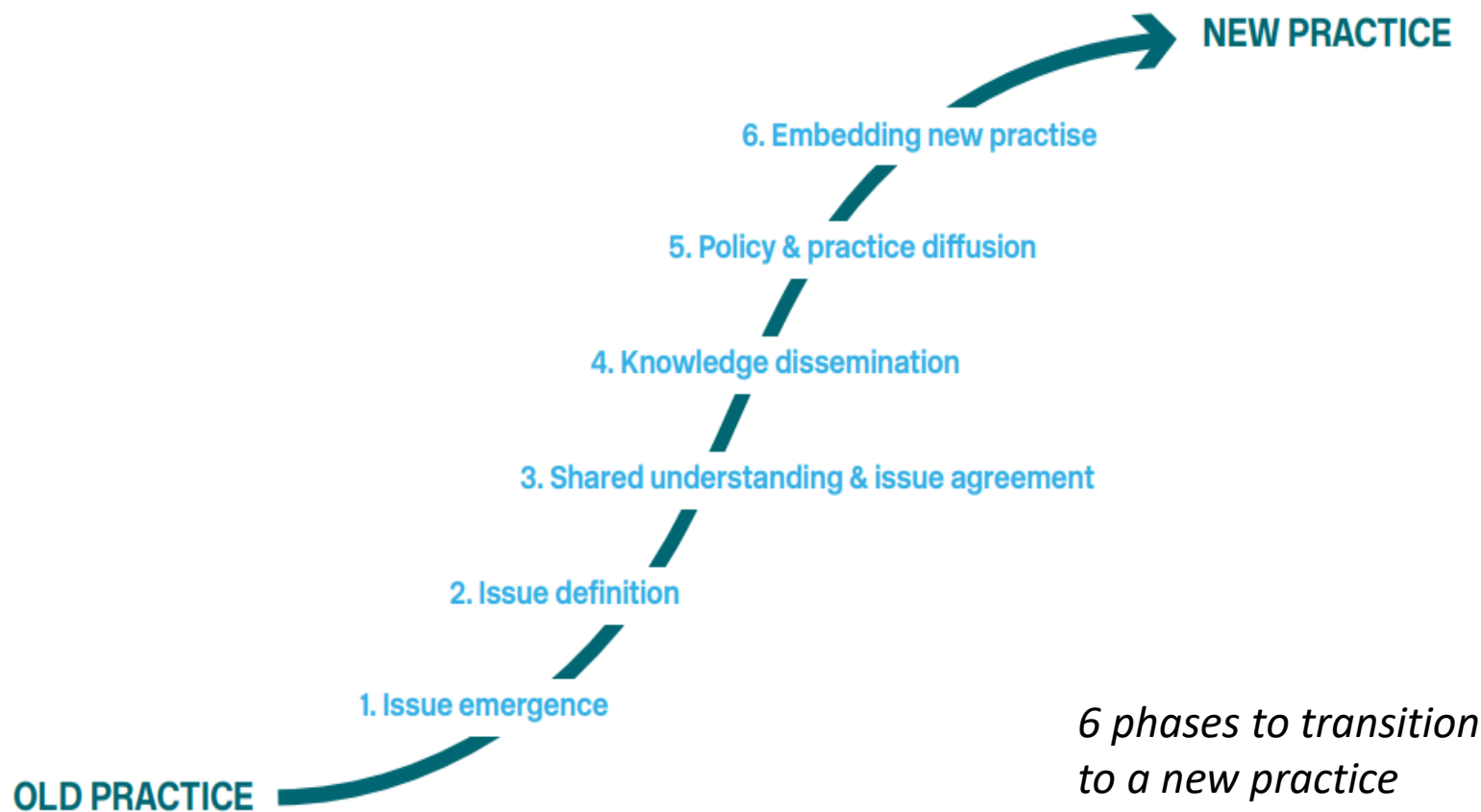
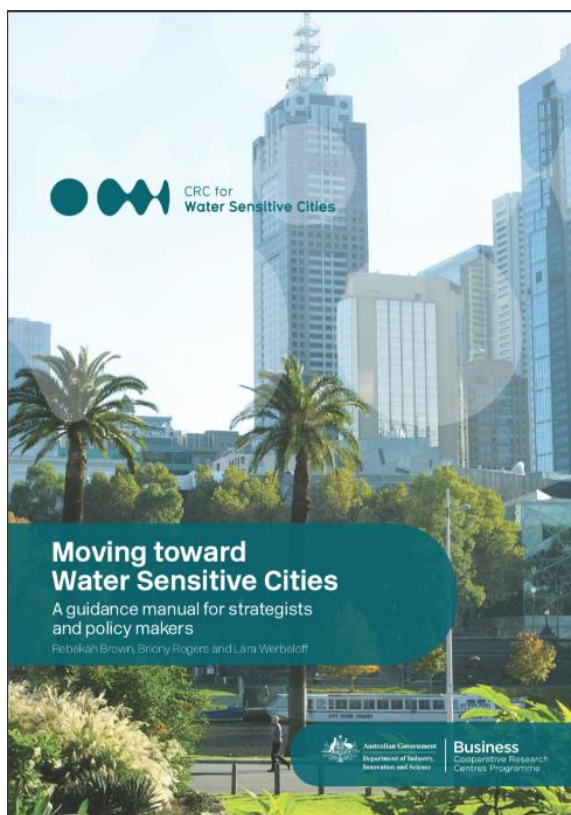
Happy Tree!

So what have we learnt?



How do we mainstream this?

Transition to a Water Sensitive City



How do we mainstream this?

Transition to a Water Sensitive City

5 enabling factors to transition to a new practice

1. Champions

Key networks of individuals and organisations

2. Platforms for connecting

(Semi) Formalised structures, and processes for coordination and alignment

3. Knowledge

Research, science & contextualised knowledge

4. Projects and applications

Experiments, demonstrations, & focus projects

5. Tools and instruments

Legislative, policy, regulative, & practice tools

A 'new' approach

		Enabling factors				
		Champions	Platforms for connecting	Knowledge	Projects and applications	Tools and instruments
Transition phase	1. Issue emergence	Issue activists		Issue highlighted	Issue examined	
	2. Issue definition	Individual champions	Sharing concerns and ideas	Causes and impacts examined	Solutions explored	Basic information
	3. Shared understanding & issue agreement	Connected champions	Developing a collective voice	Solutions developed	Solutions experimented with	Preliminary practical guidance
	4. Knowledge dissemination	Influential champions	Building broad support	Solutions advanced	Solutions demonstrated at scale	Early policy, regulation and targets
	5. Policy and practice diffusion	Organisational champions	Expanding the community of practice	Capacity building	Widespread implementation and learning	Effective policy, regulation and targets
	6. Embedding new practice	Multi-stakeholder networks	Guiding consistent application	Monitoring and evaluation	Standardisation and refinement	Comprehensive policy and regulation

← 5 enabling factors important for each phase

Example snapshot on a Council's progress in transitioning to a water sensitive city

← Established (Green)

← Developing (Yellow)

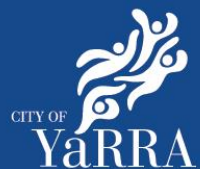
← To be developed (Grey)

A 'new' approach

City of Yarra

Embedding Green Infrastructure Guidelines - New Kerb Outstands

November 2018



ECOLOGY
ENGINEERING
DESIGN

E2DESIGNLAB

Top-down

Policy

Processes

Investment

Guidelines

Case studies

Tools

Training

Workshops

Steering groups

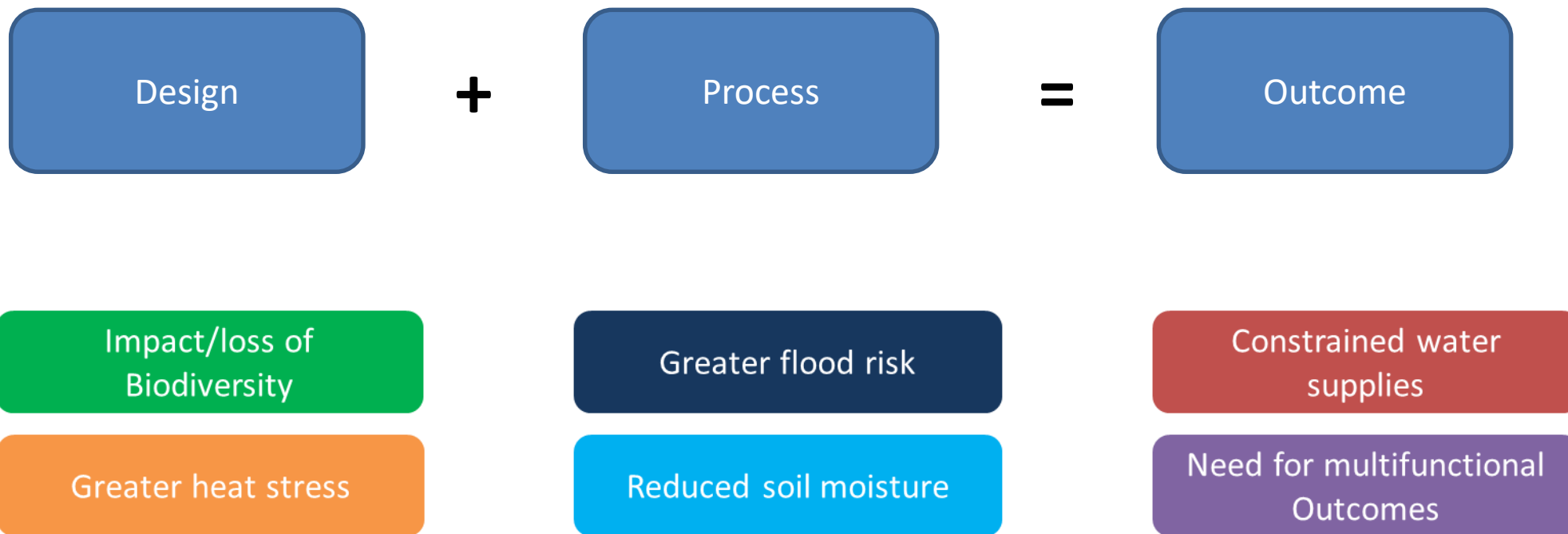
Champions

Community engagement

Bottom-up

Tools for Transition

Looking Forward



But how could we measure our success?

Permeability as a metric



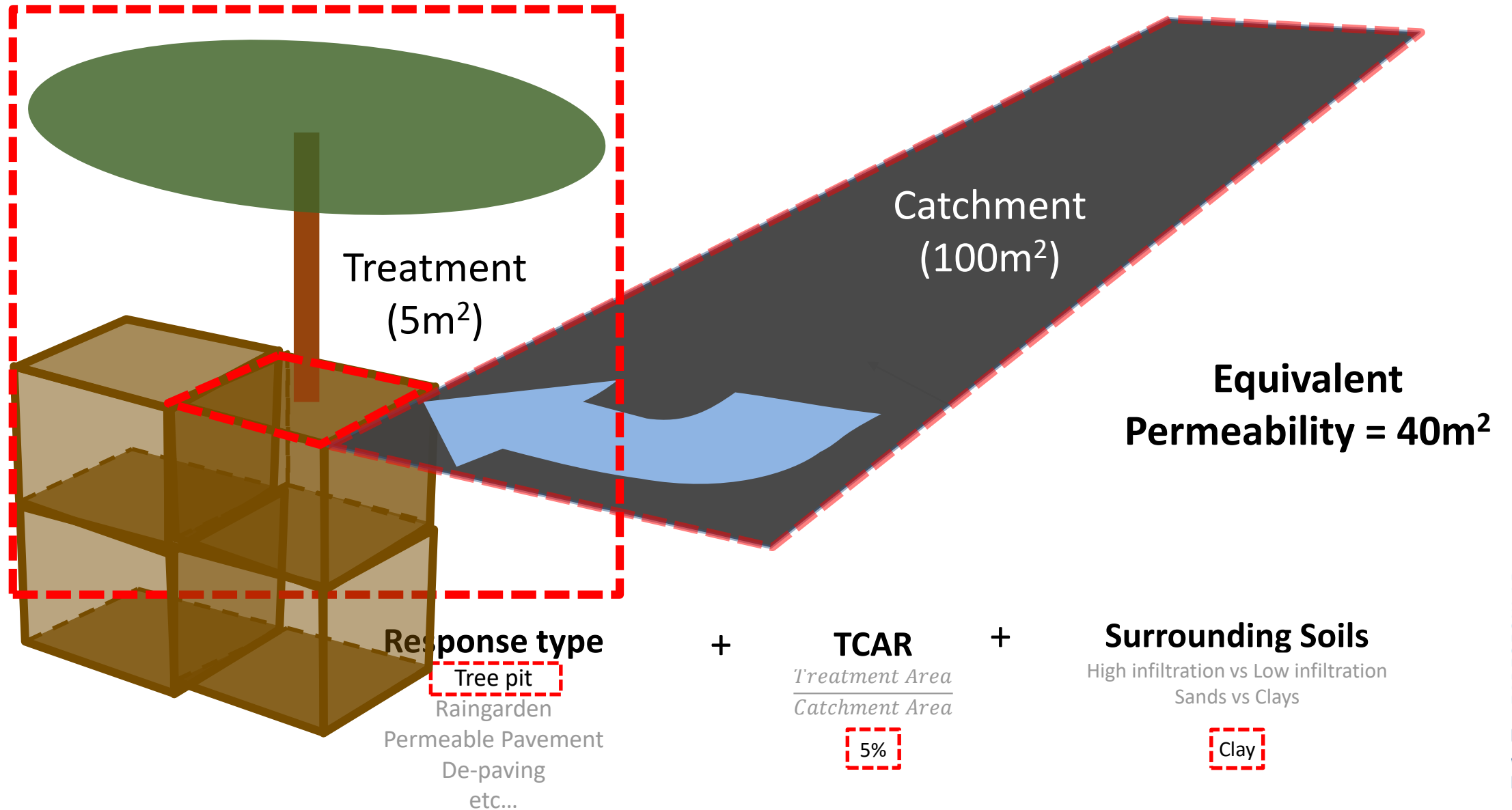
/ Naturalised water cycle

/ Catchment benefits

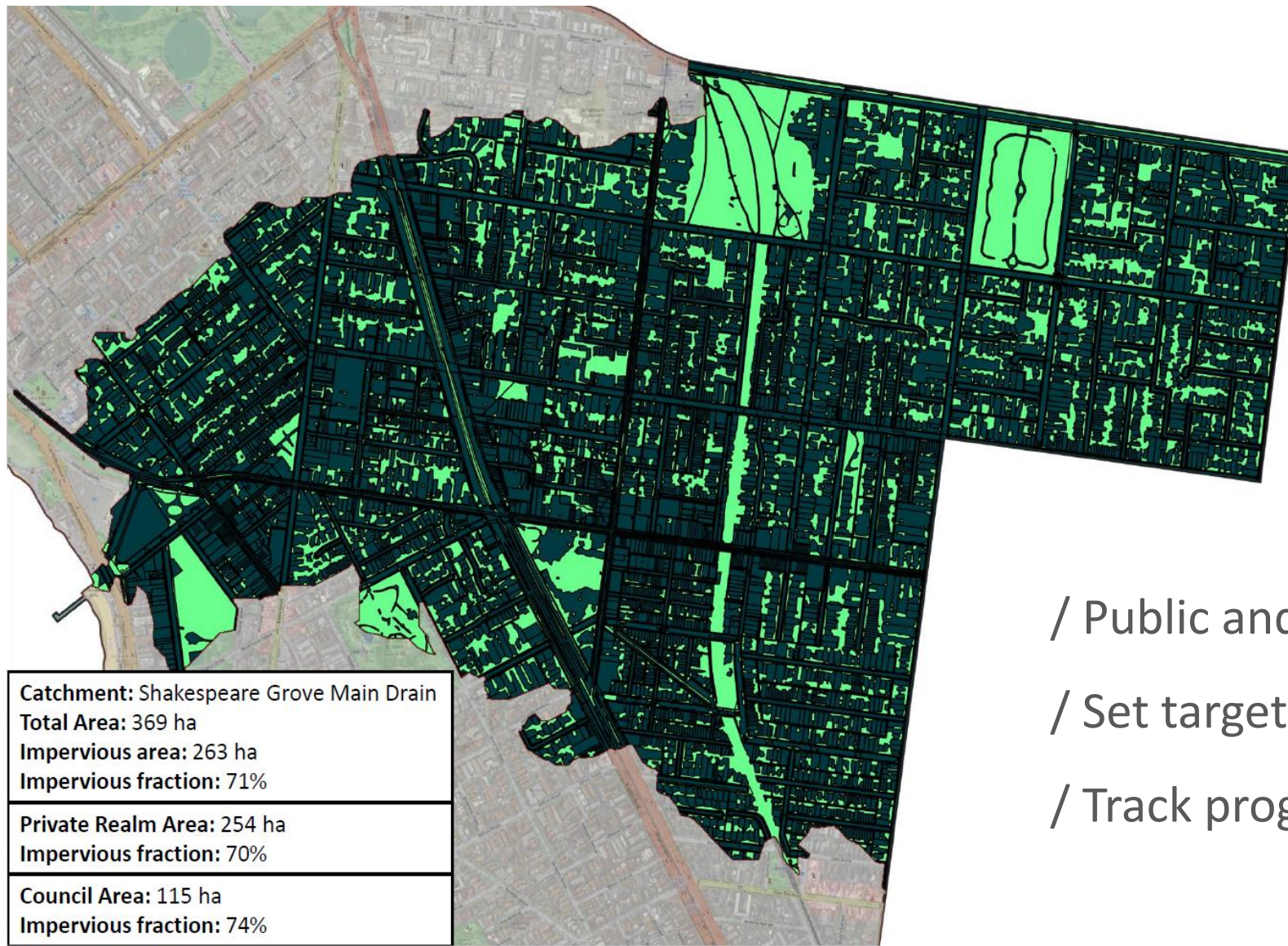
/ Waterways benefits

/ How do we measure it?

Permeability as a metric



Permeability as a target



/ Public and private baseline

/ Set targets

/ Track progress

Where could we get to?



Adapted from Melbourne Water

TREES

IN THE STREET

A STORY ABOUT THE
HIDDEN SUPER POWERS
OF STREET TREES.



OH BOY... I WISH THIS STREET WAS COOLER!



A SHADE CLOTH
AND AIR CON!
THAT'S BETTER.



JEEZ...
I WISH THIS STREET HAD
CLEANER AIR!



AIR FILTERS!
WHAT A GOOD IDEA.



HELP!
I WISH THIS STREET DIDN'T
FLOOD ALL THE TIME!



PIPES, PITS AND DRAINS.
THAT'LL HELP.



HMM...BETTER THROW IN SOME
SOLAR PANELS TO OFFSET THIS
ENERGY AND BE CARBON NEUTRAL.



IT'S A SHAME
THERE'S NO WILDLIFE IN THIS
STREET.

THERE...
BIRDS!

GREAT!

WHAT A
HANDSOME
... UM...
STRUCTURE!?



**BUT
WAIT!**

...

I THINK
I'VE SEEN
SOMETHING
LIKE THIS
BEFORE

**A LIVING
STREET
TREE!**

IT'S PERFECT.

