

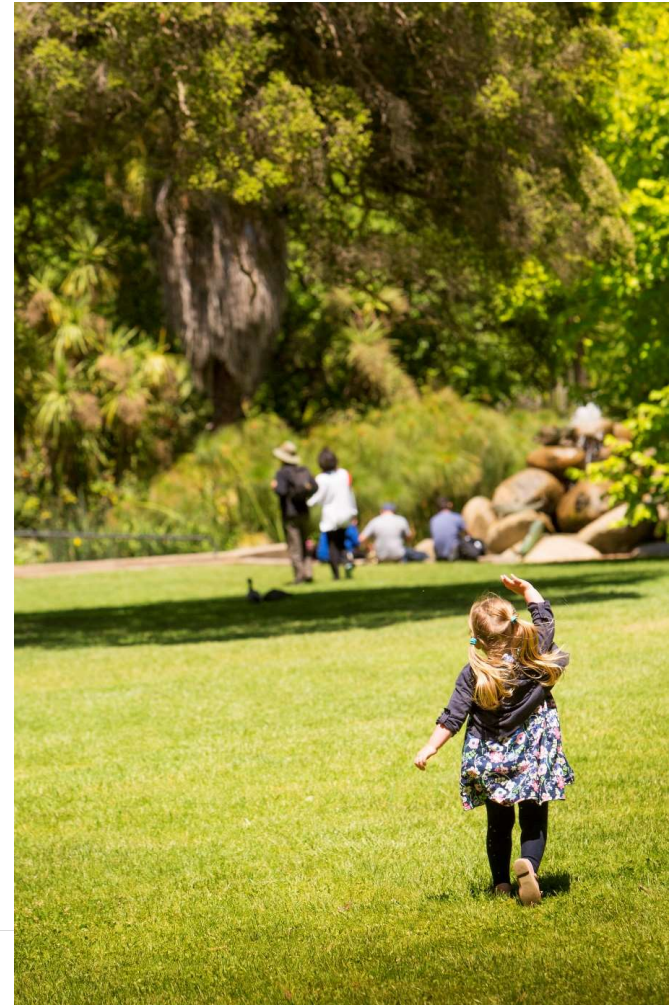


# Soil water banking to maximise the benefits of stormwater harvesting systems

Date: 7 June 2018  
Presenter: Kate Berg



- What is soil water banking?
- What are the benefits?
- Update on City of Melbourne's soil water banking trial



## Acknowledgements

- Living Rivers funding
- Geoff Connellan





## Soil Water Banking- What is it?

- Using the soil as additional storage facility
- Irrigating the deeper layers of soil
- Applying the water to depths greater than 500mm, and
- Outside the typical irrigation season
- Used to optimise capacity of a stormwater harvesting system



## Benefits to soil water banking

- More use of stormwater system in winter
- Improve stormwater quality
- Deeper watering of roots
- Improved tree health
- Adaptive measure to climate change
- Ability to become cool refuges during heat waves

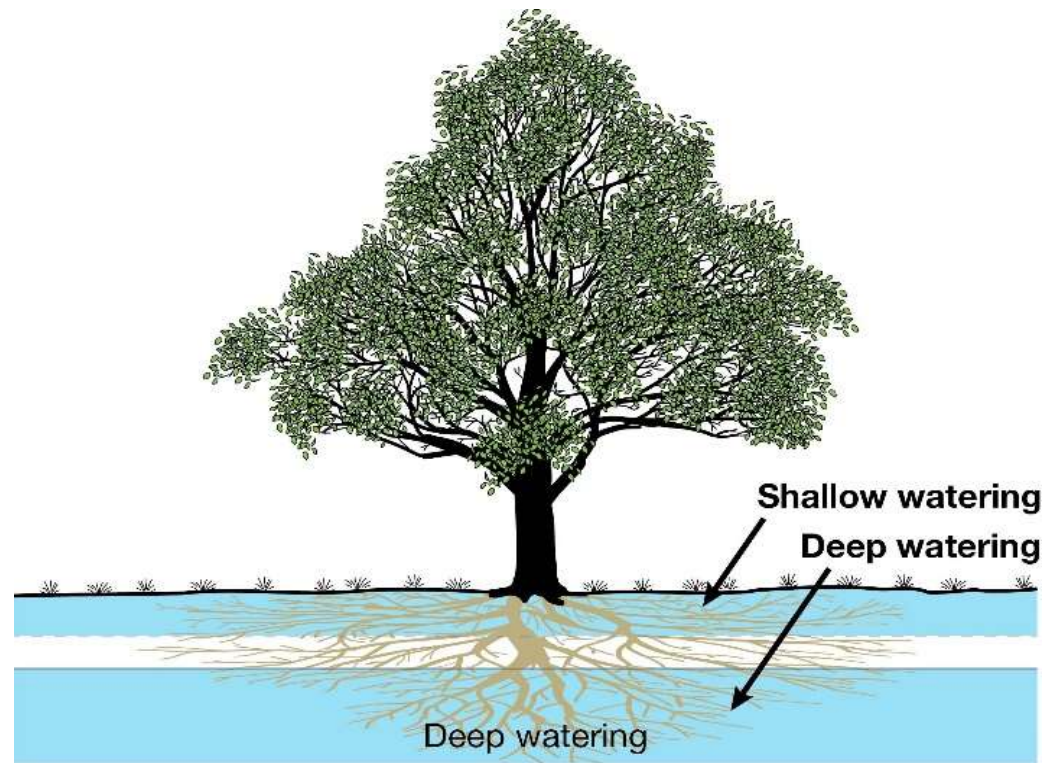


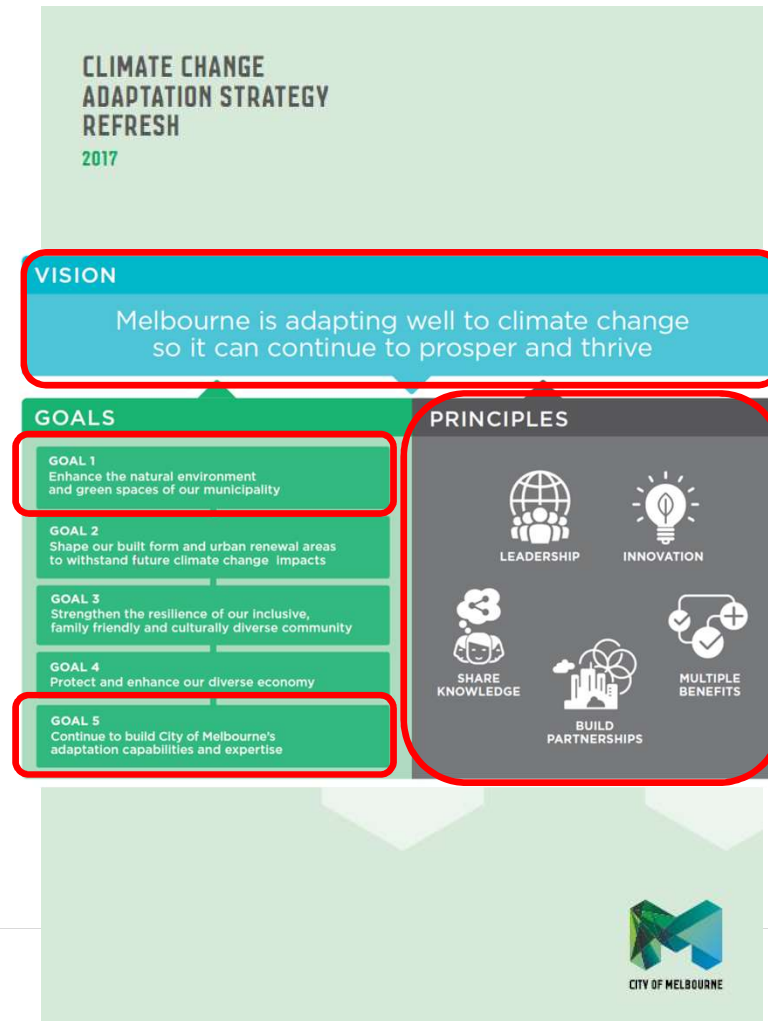
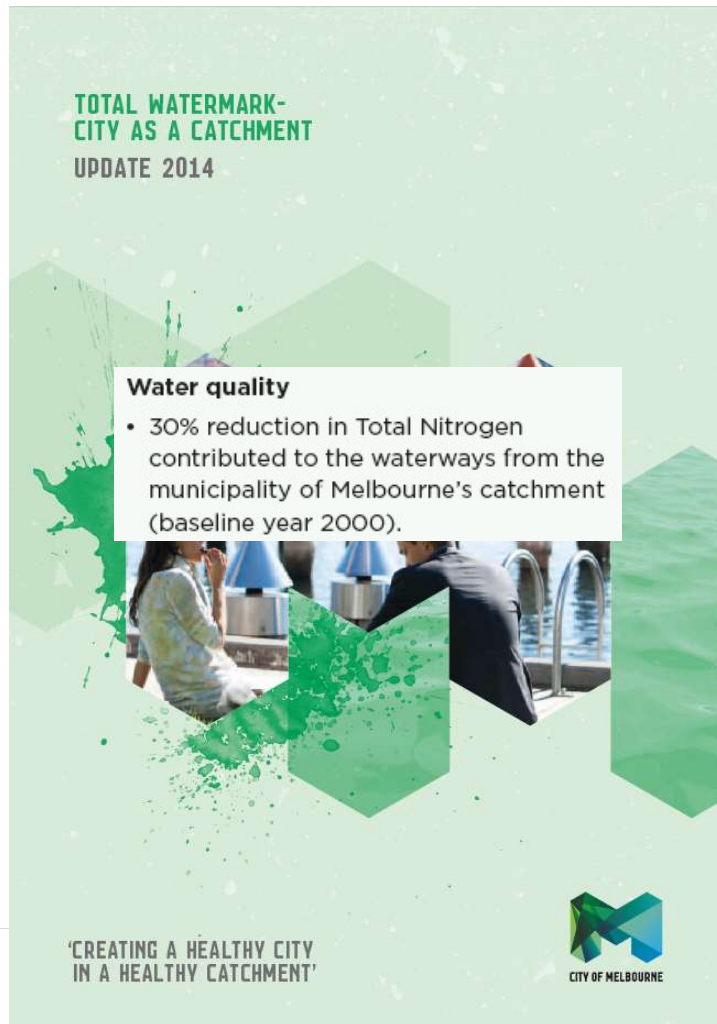
Figure 1. Shallow and deep watering of a tree (Geoff Connellan)



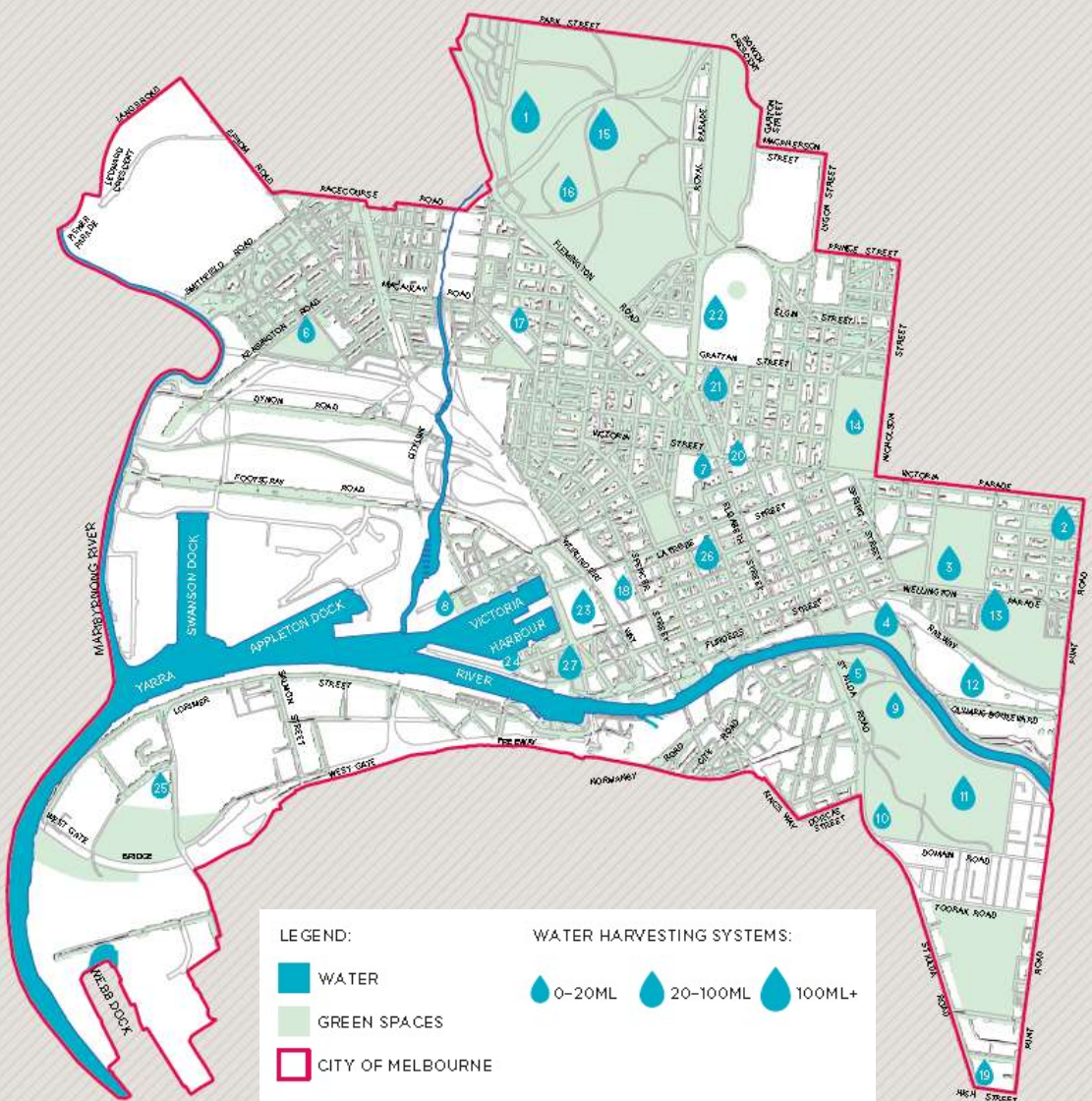


# City of Melbourne Trial

## Why did City of Melbourne want to explore soil water banking?







## COUNCIL

- 1 Royal Park Wetlands (160ML)
- 2 Darling Street, East Melbourne (21.3ML)
- 3 Fitzroy Gardens (69ML)
- 4 Birrarung Marr (30 ML)
- 5 Queen Victoria Gardens (20ML)
- 6 Kensington Community Centre (12ML)
- 7 Queen Victorian Market (5ML)
- 8 New Quay Park (2ML)

## PUBLIC

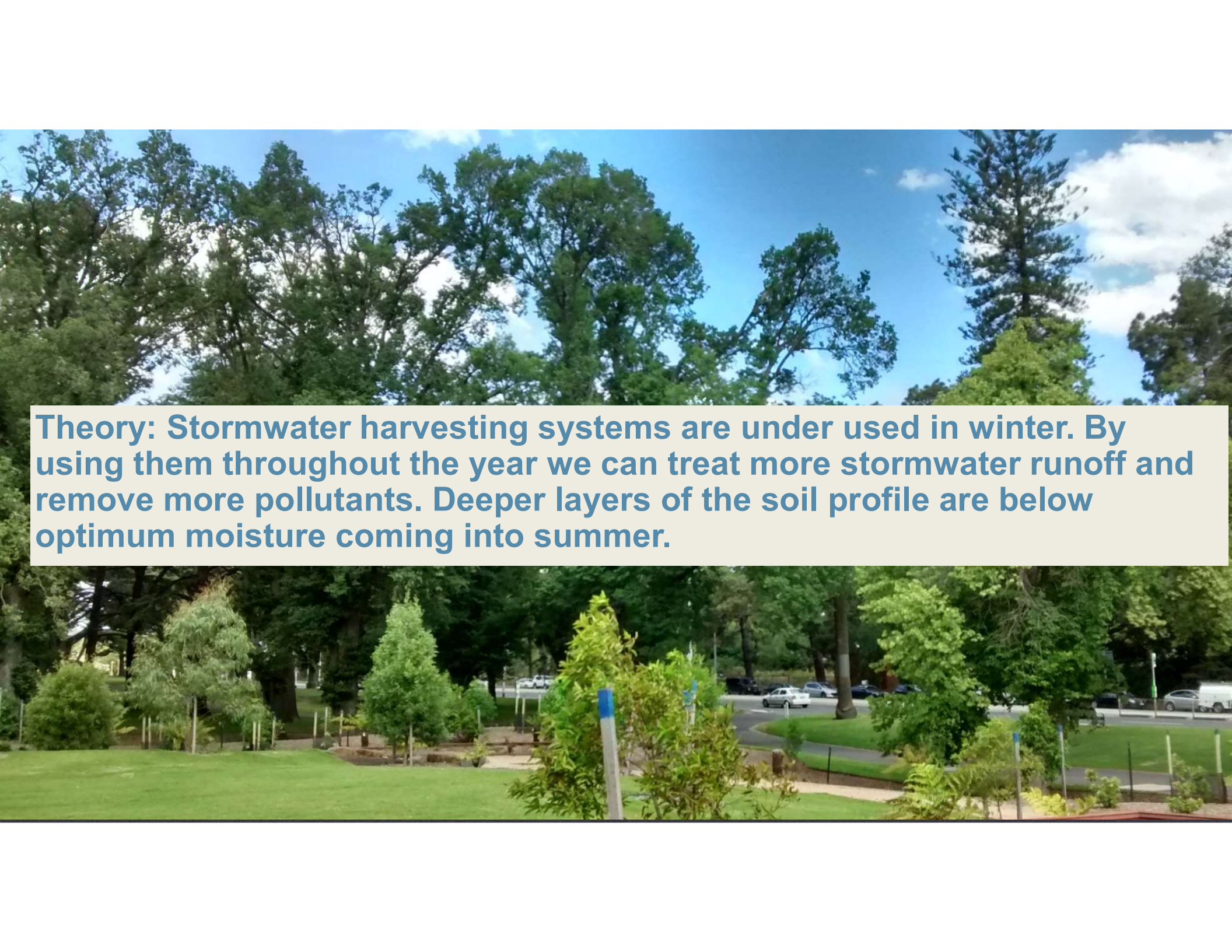
- 9 Sidney Myer Music Bowl (15ML)
- 10 The Shrine (5.8ML)
- 11 Royal Botanic Gardens (40ML)
- 12 Melbourne & Olympic Park (45ML)
- 13 MCC Sewer Mine (180ML)
- 14 Royal Exhibition Building Museum (6.4ML)
- 15 Melbourne Zoo (150ML)
- 16 State Netball & Hockey Centre (19ML)
- 17 Public Records Office (2.7ML)
- 18 Southern Cross Station (5ML)

## PRIVATE

- 19 Wesley College (20 ML)
- 20 200 Victoria Street (4ML)
- 21 University of Melbourne Economics Building (32ML)
- 22 Trinity College (30 ML)
- 23 Docklands Stadium (25ML)
- 24 Convesso (20ML)
- 25 Herald Weekly Times - Westgate Park (20ML)
- 26 500 Bourke Street (36ML)

ML+



The image shows a vibrant green landscape under a blue sky with scattered white clouds. In the foreground, there are several young, light-green trees and shrubs, some supported by wooden stakes. A paved road with a few cars is visible in the middle ground, surrounded by mature, dark-green trees. The overall scene is a well-maintained park or residential area.

**Theory: Stormwater harvesting systems are under used in winter. By using them throughout the year we can treat more stormwater runoff and remove more pollutants. Deeper layers of the soil profile are below optimum moisture coming into summer.**



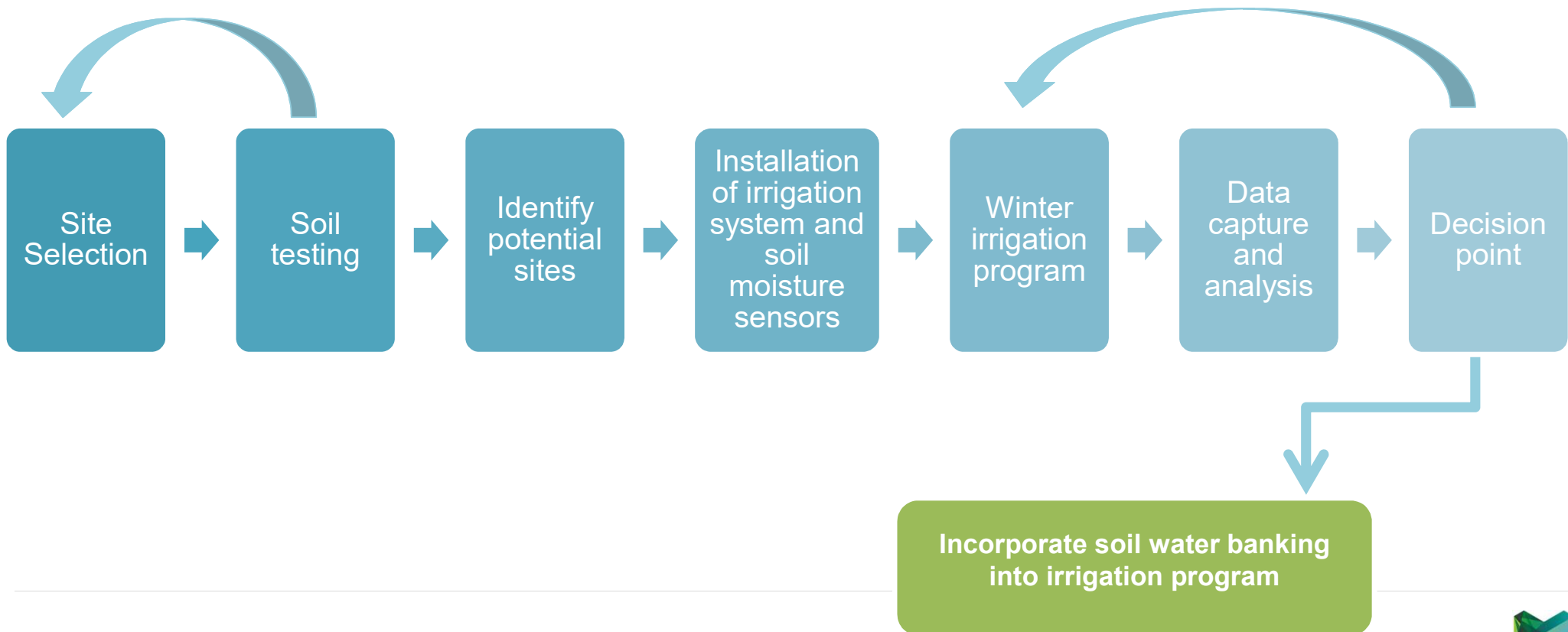
## Objective

Objective - Trial, monitor and provide recommendations on how to increase soil moisture down to 600-800mm without making the surface boggy

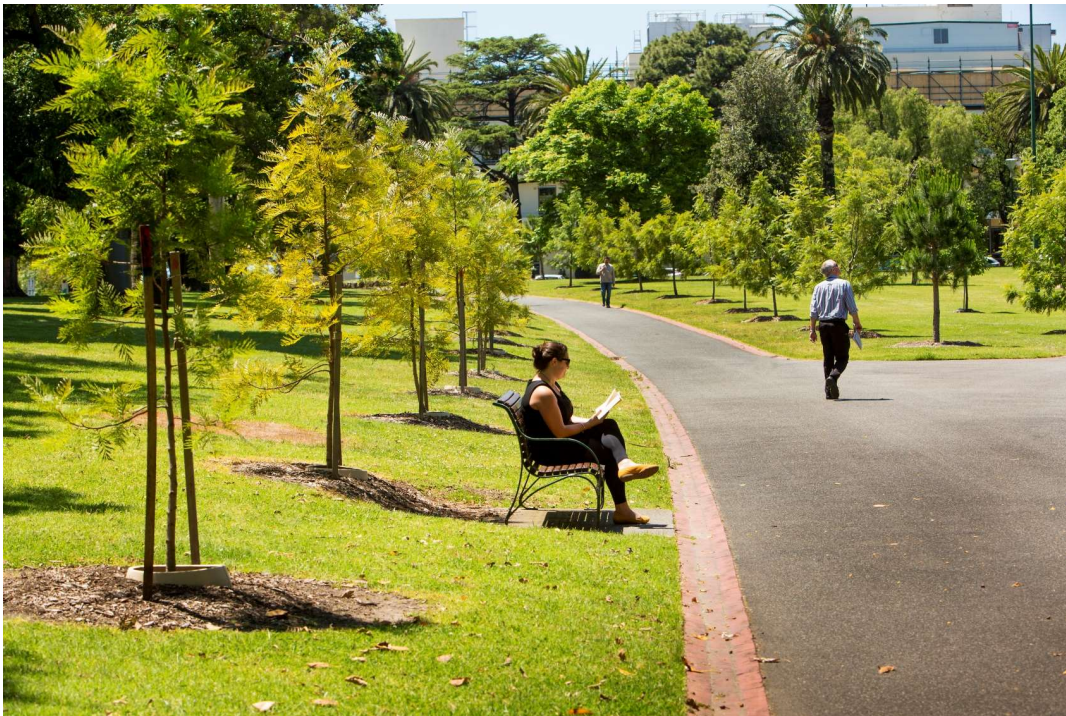




## Methodology



## Choosing a site – Fitzroy Gardens

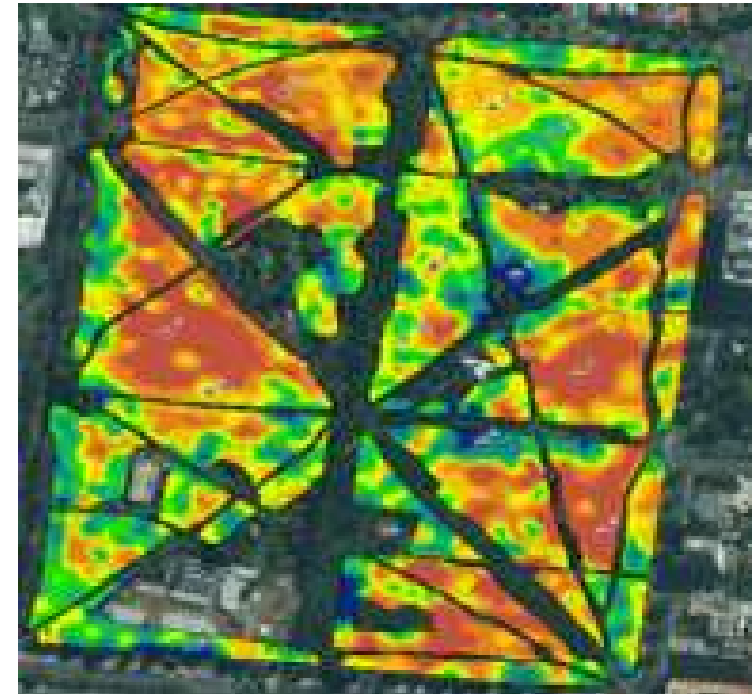


- During Millennium Drought, the irrigation in Fitzroy Gardens was restricted
- A stormwater harvesting system was introduced in 2010
- Two underground tanks with 5ML of storage
- Relatively young vegetation



## Soil Mapping

- EM38 technology was trialled for large scale mapping
- EM38 is good for understanding soil characteristics in parks - dry areas, salinity peaks, irrigation leaks.
- EM38 technology can't identify soil types in urban parks



## Soil Sampling

- Small scale traditional soil samples were taken
- Most of Fitzroy Gardens considered loam

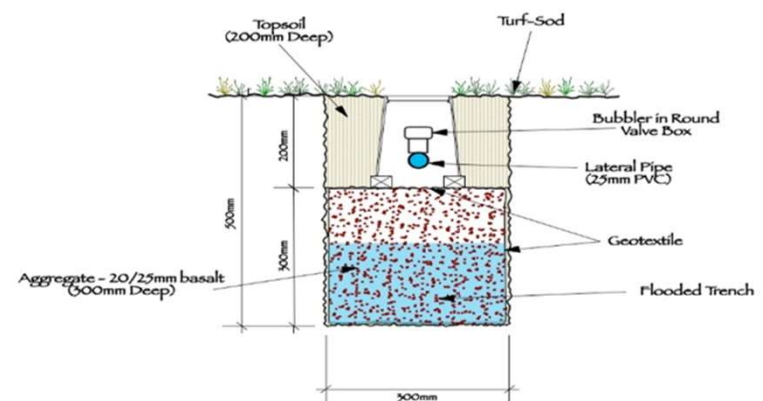




## Identify potential sites for Irrigation trenches and soil moisture sensors



- Developed a plan for the irrigation trenches – location, design
- Plan submitted and approved by Heritage Victoria for works



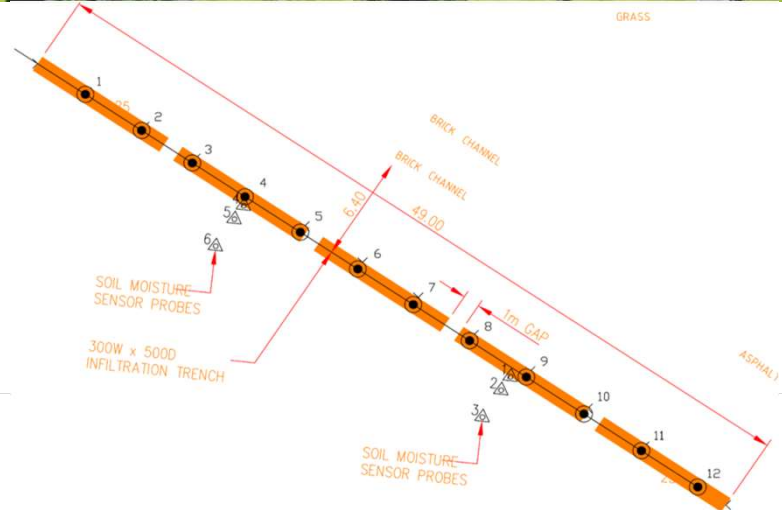
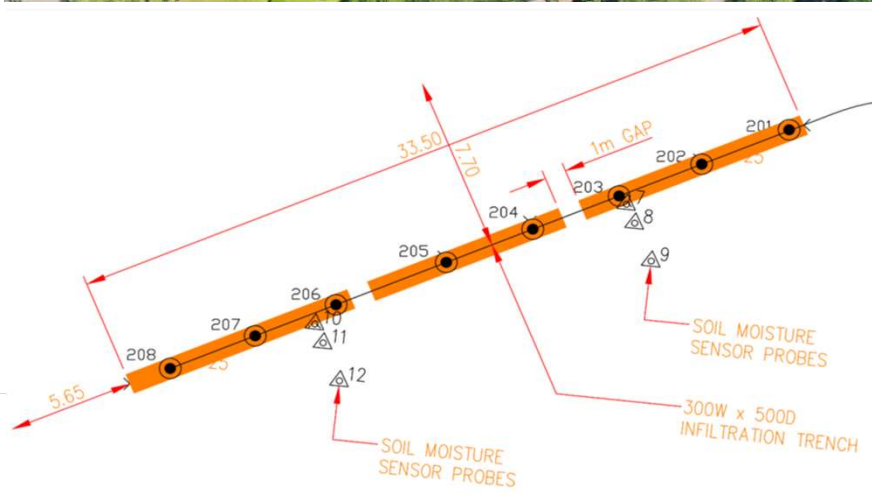
## Installation of Soil moisture probes

- Two types of probes
  - capacitance probes
  - TDR probe
- Web platform/computer interface
- Suitable hardware for a park

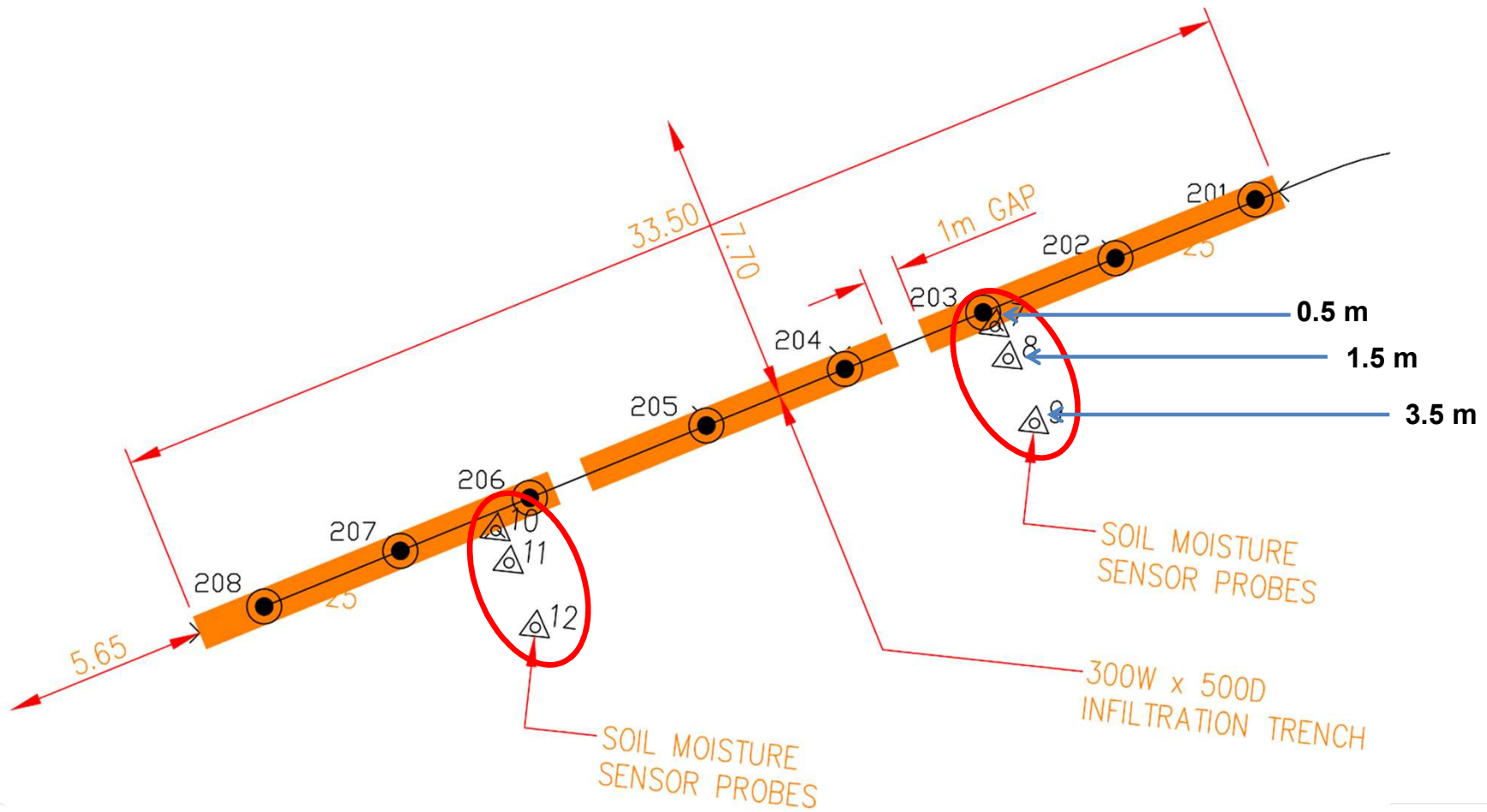




# Final site selection



## Irrigation System and soil moisture probes





## Summary of results

### Commonalities between east and west

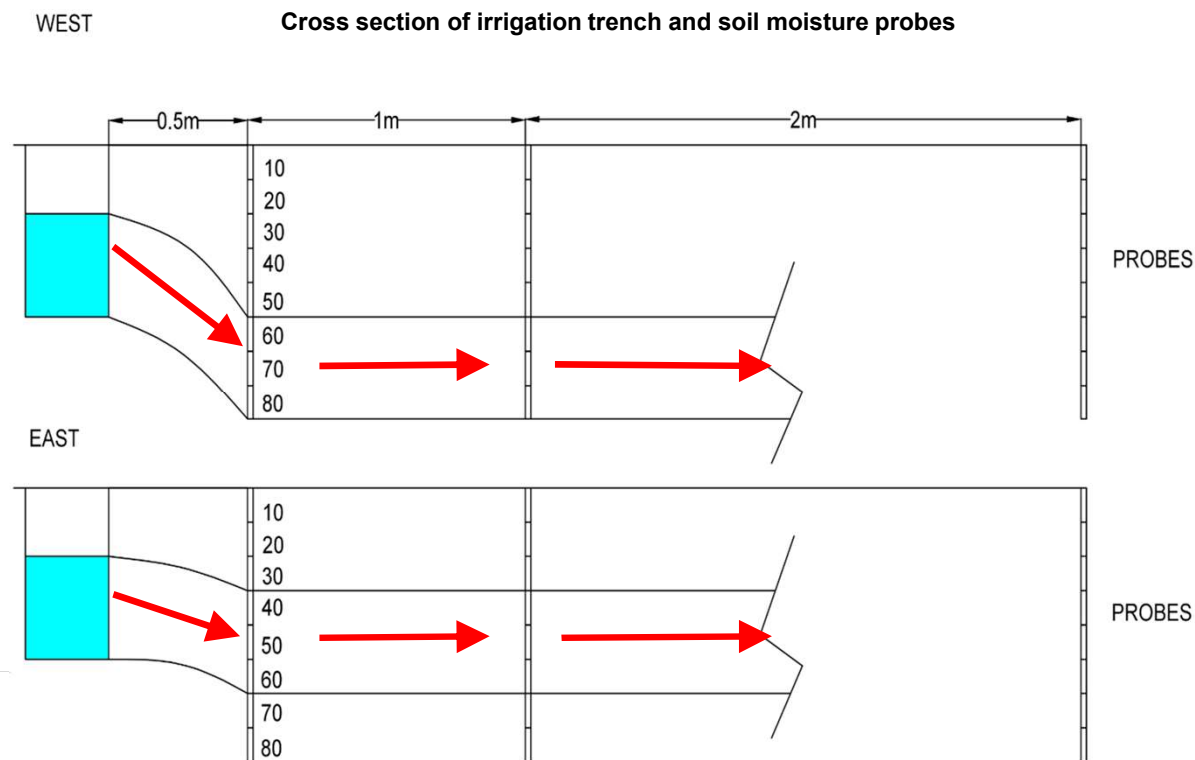
- All layers were affected by rainfall events.
- 1<sup>st</sup> and 2<sup>nd</sup> probes affected by irrigation
- 30 mins gap between the 1st distance and the 2nd distance
- 3<sup>rd</sup> probe not affected by the irrigation program
- Soils at 80cm saturated
- No waterlogging in upper layers

### West

- Layers between 60- 80cm layers at 0.5m 1.5m distances affected
- Serious water logging in the 70cm and 80cm layers

### East

- Irrigation program effecting layers 40-60cm below the surface



## Conclusion/ Learnings

- Lower layers of the soil increased in soil moisture
- Surface did not become boggy
- Lower layers (700-800mm) saturated quickly
- Data not conclusive at this stage
- 2018 winter trial scheduled
- Soil Water Banking Report available

### Key learnings

- Site selection critical
- Hard to prove the business case







**City of Melbourne's Soil Water Banking Trial – Thank you**