City of Melbourne

Transitioning Melbourne's urban landscapes – climate adaptation for future liveability

Amenity Arboriculture Conference Exeter 11.9.17

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CITY OF MELBOURNE


ST Australia
0418 303626

FAST FACTS

37.7 km² AREA

16 SUBURBS

486ha PARKLAND

62,090 DWELLINGS AT 30 JUNE 2014

844,000^ WEEKDAY POPULATION INCUDING RESIDENTS

579,000^ WEEKEND POPULATION INCUDING RESIDENTS

438,972* EMPLOYMENT

121** LANGUAGES

26,323* RESIDENTIAL STUDENT POPULATION

116,431^^ RESIDENTIAL POPULATION

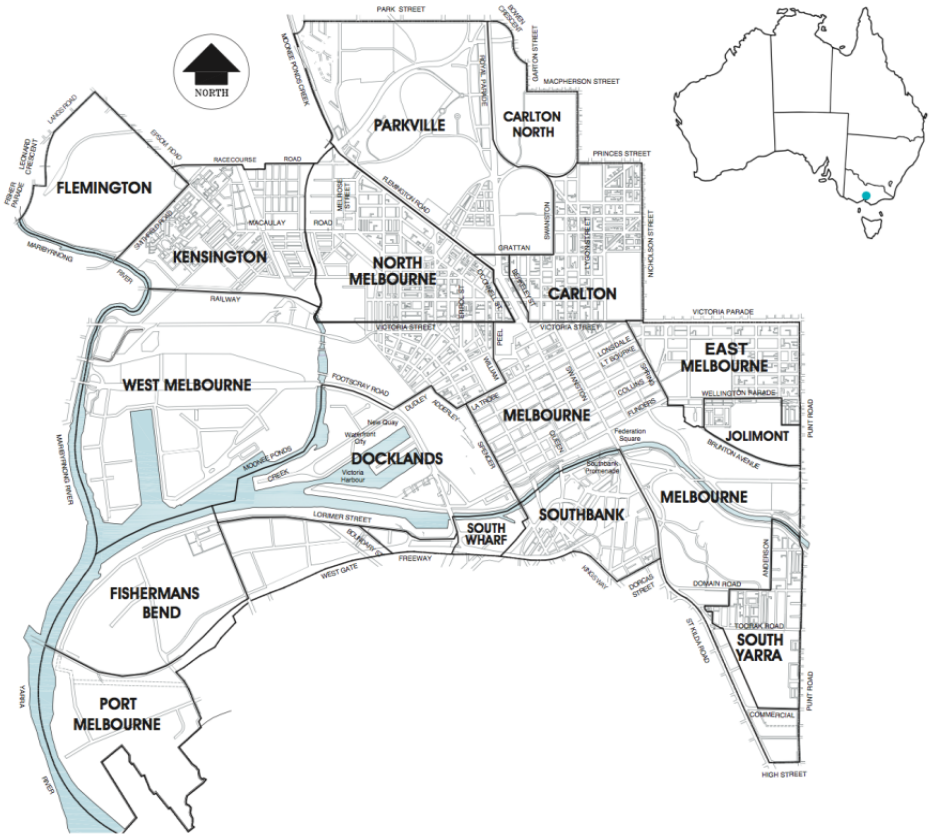
OPEN

18,221 BUSINESSES AT 30 JUNE 2014

138** CULTURAL BACKGROUNDS

*2010 **2011 ^2012 ^^2013

City of Melbourne



Our Goal

Strategically transforming our landscapes to respond to current challenges and to a dramatically different climate and population

To have ‘a city in a forest, rather than a forest in a city’

Three primary challenges

- **Population growth and intensification**
- **Urban heating**
- **Climate change**

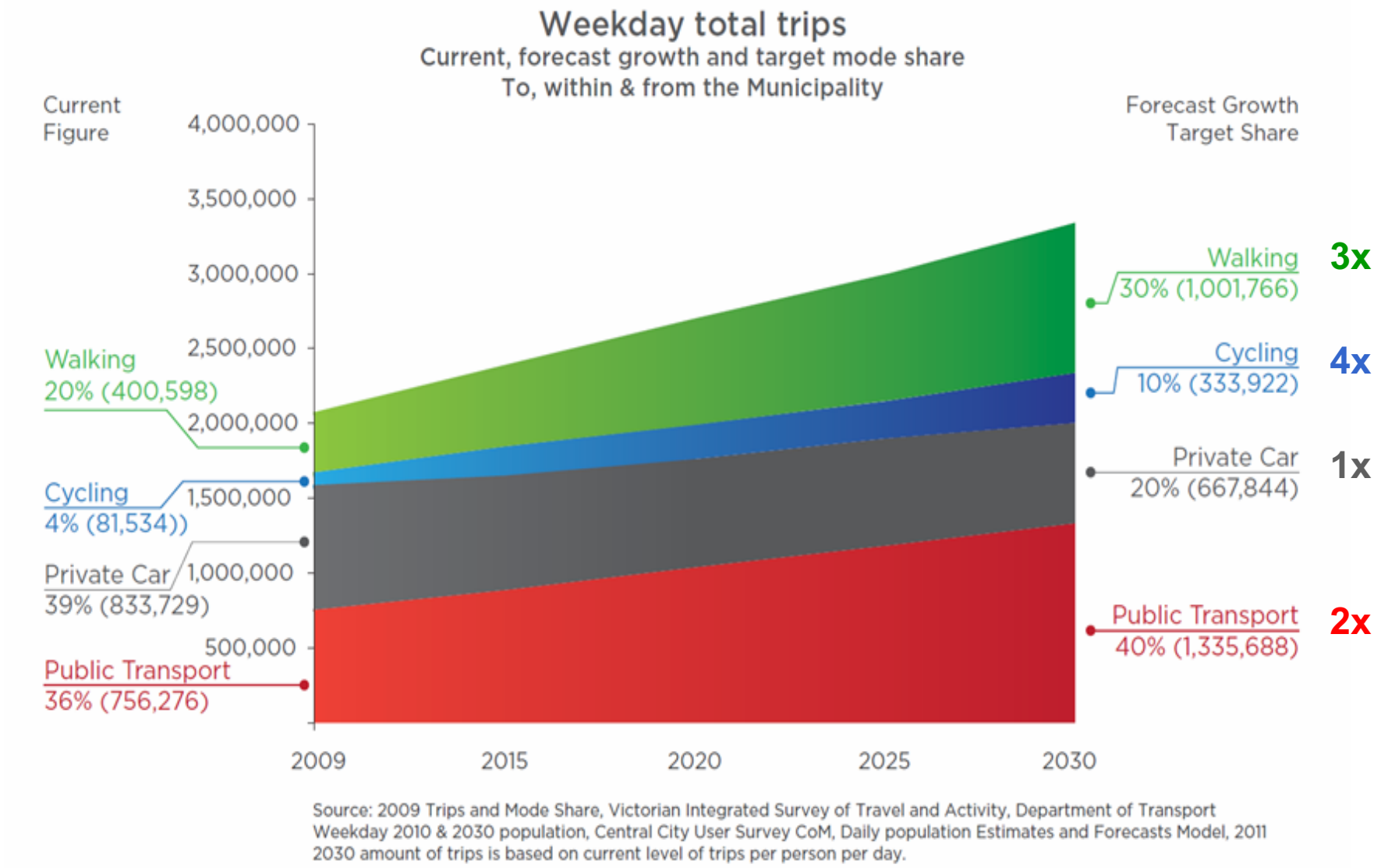
Population growth and intensification

City of Melbourne
Municipal Strategic Statement

Almost doubling the residential and working population over 30 years

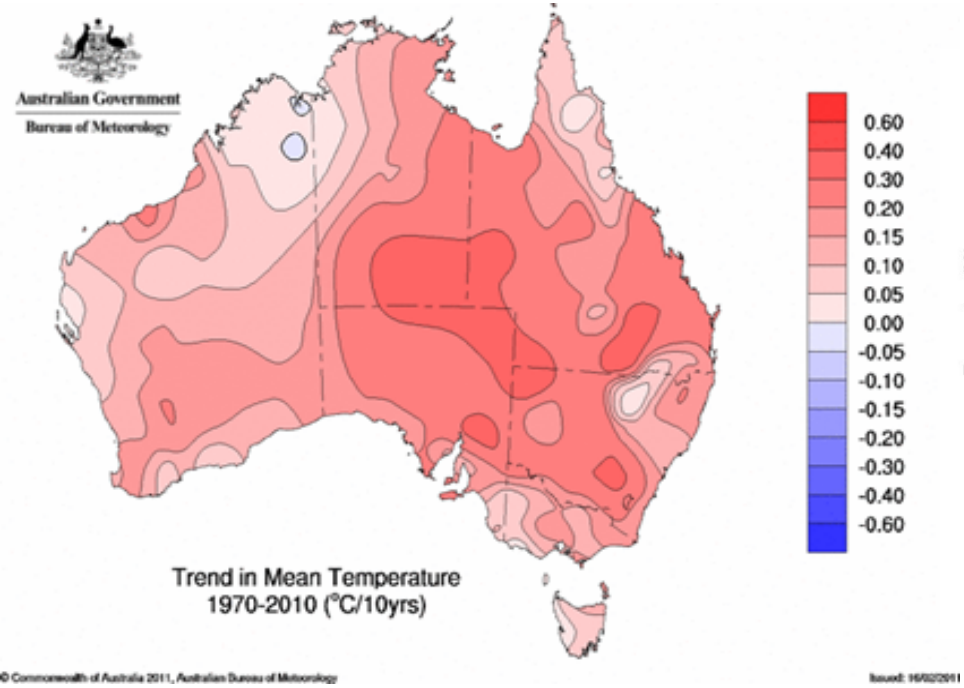
Forecast mode share

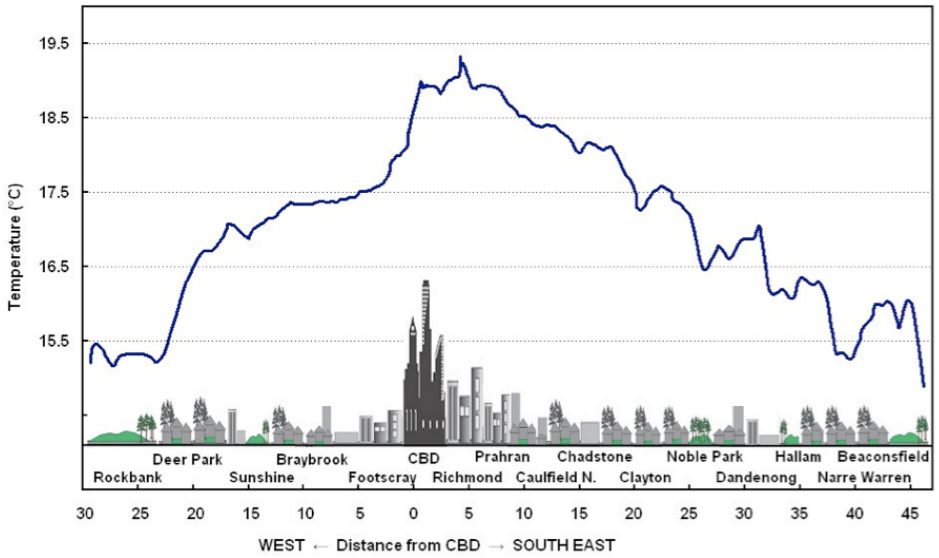
Total Weekday trips to+within+from the municipality



Source: 2009 Trips and Mode Share, Victorian Integrated Survey of Travel and Activity, Department of Transport
Weekday 2010 & 2030 population, Central City User Survey CoM, Daily population Estimates and Forecasts Model, 2011
2030 amount of trips is based on current level of trips per person per day.

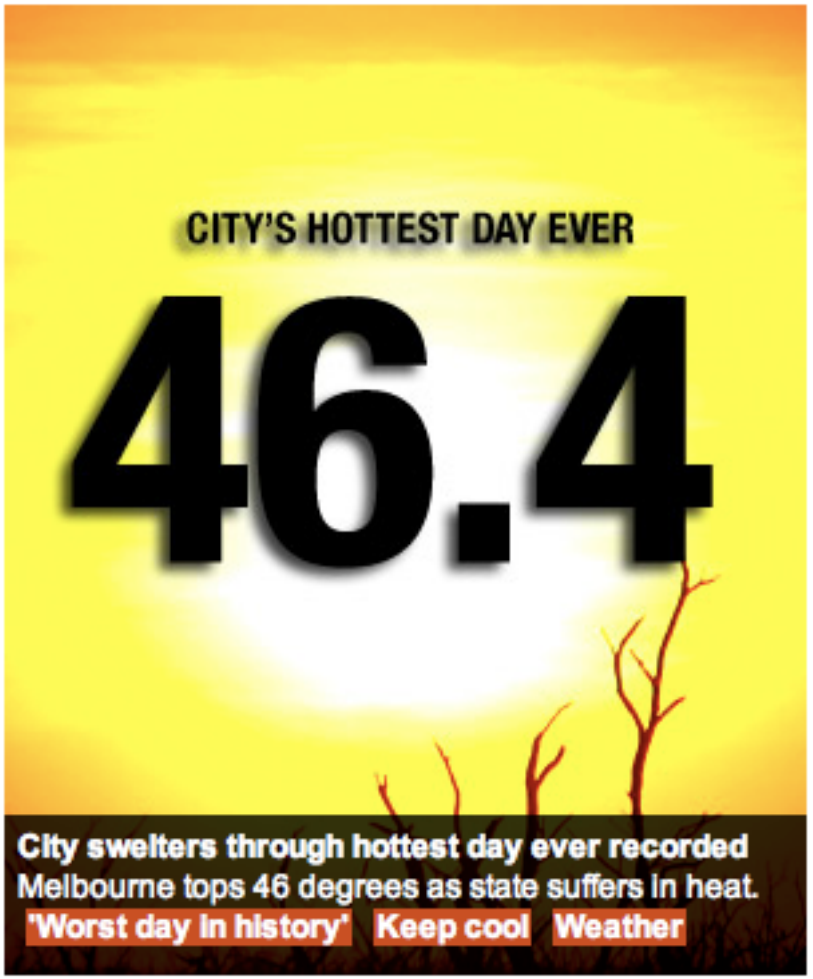
Climate change and urban heating



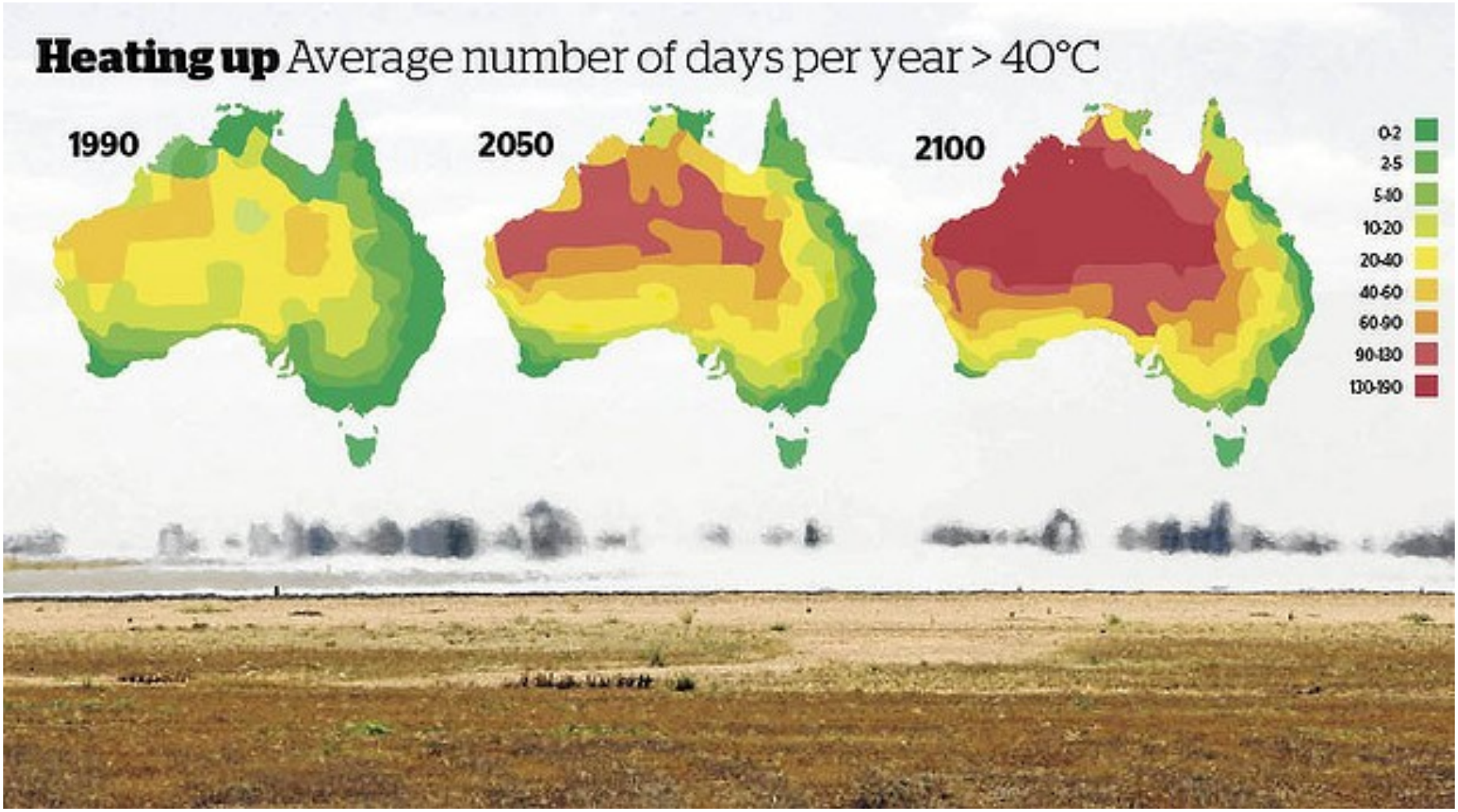


Heat-related mortality

4:22PM Saturday February 07, 2009



Heat


Heating up Average number of days per year > 40°C
1990
2050
2100
0-2
2-5
5-10
10-20
20-40
40-60
60-90
90-130
130-190

Useful life expectancy – current scenario

Overall

23% loss in 10 years

39% loss in 20 years

Heritage landscapes

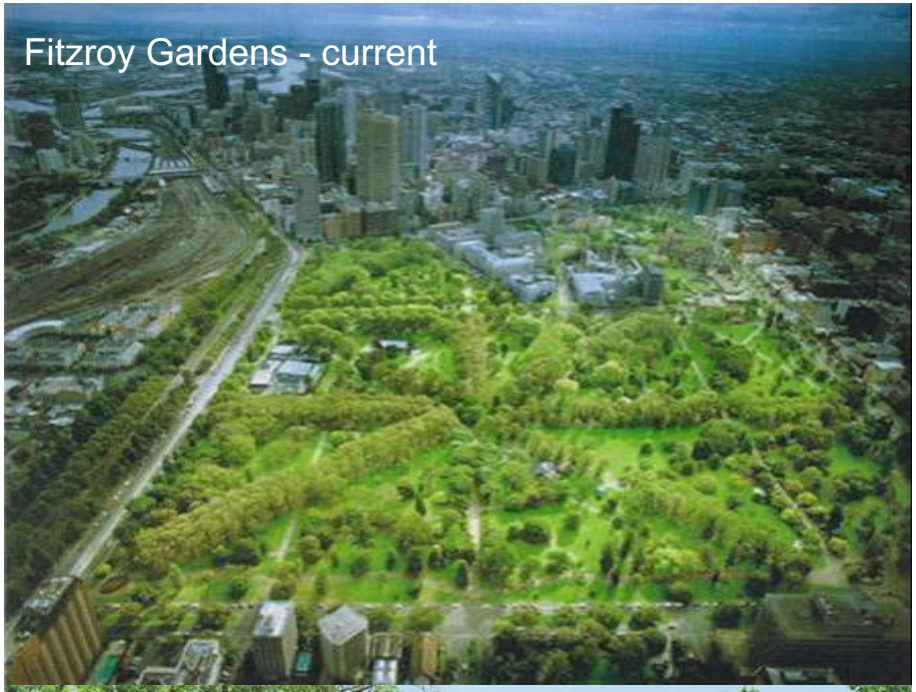
35% loss in 10 years

58% loss in 20 years

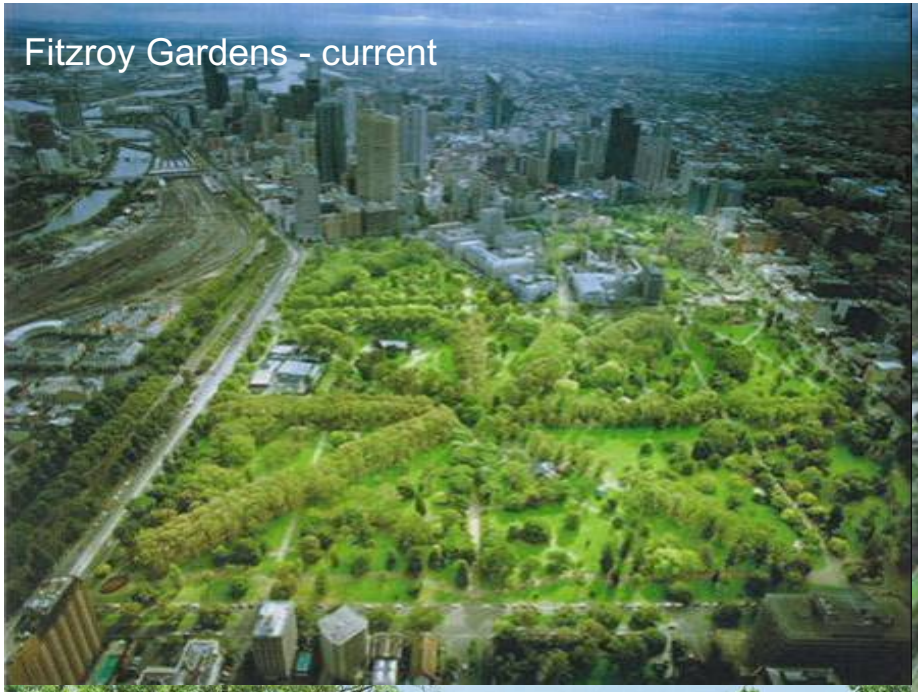
- 1 year to10 years
- 11-20 years
- 21-30 years
- 31-60 years
- 61+ years
- To Be Determined

Urban Forest Strategy
Declining trees – St Kilda Road

Potential scenario – parks and boulevards



Potential scenario – parks and boulevards



How to address the increase in these impacts and lack of resilience?

Major approaches

- **Multi-disciplinary** – using a broad range of learnings, research and data from industry experts, academics and decision makers (public and private)
- Setting **visionary targets** – based on understanding current conditions and future goals
- **Technical** analysis – employing technical data and suite of tools to quantify, assess and forecast the state of public realm assets and green infrastructure

BACKGROUND: INFLUENCING STRATEGIES

STRATEGIES

TOTAL WATERMARK CITY AS A CATCHMENT 2014

OPEN SPACE STRATEGY 2012

URBAN FOREST STRATEGY 2012

NATURE IN THE CITY STRATEGY 2017

CLIMATE CHANGE ADAPTATION STRATEGY 2017

GROWING GREEN GUIDE 2014

ZERO NET EMISSIONS BY 2020 UPDATE 2014

OUTPUTS

INCREASE STORM-WATER HARVESTING

INCREASE GREEN SPACE

DOUBLE CANOPY COVER

ENHANCE BIODIVERSITY

ADAPT TO CLIMATE CHANGE

INCREASE BUILDING GREENING

BECOME A CARBON NEURAL CITY

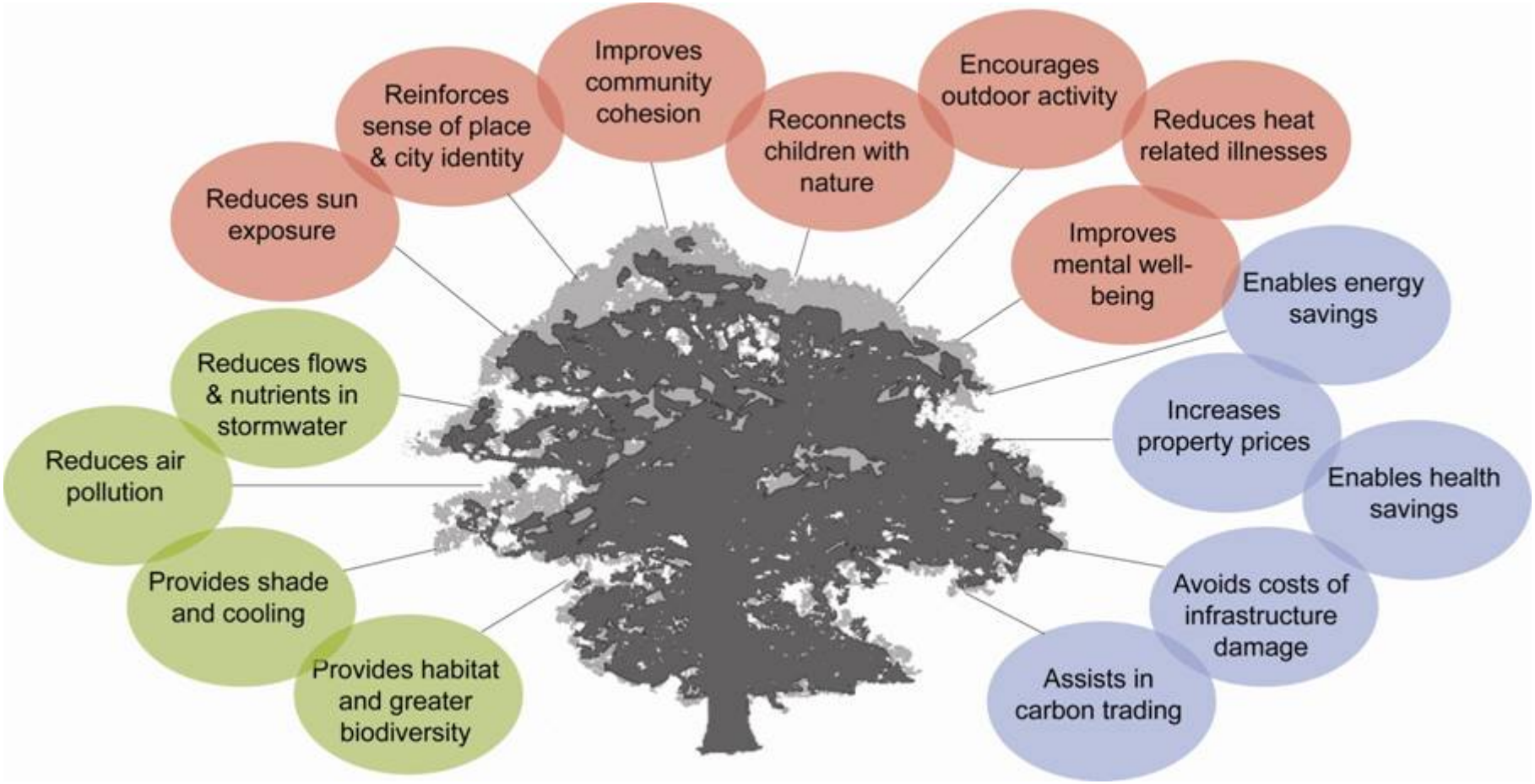
BENEFITS

GOAL = TO COOL MELBOURNE BY 4°C

IMPROVE LIVEABILITY, RESILIENCE, COMMUNITY HEALTH AND BIODIVERSITY

CITY OF MELBOURNE

Urban forest benefits



Summary of the benefits offered by urban trees (adapted from the Woodland Trust UK)

Urban Forest Strategy – Principles

1. Mitigate and adapt to climate change
2. Reduce the urban heat island effect
3. Design for health and wellbeing
4. Create healthier ecosystems
5. Become a water sensitive city
6. Position Melbourne as a leader in urban forestry
7. Design for liveability and cultural identity

Strategies and Targets

Strategy 1: Increase canopy cover
Target: Increase public realm canopy cover from 22 per cent to 40 per cent by 2040.

Strategy 2: Increase urban forest diversity
Target: The urban forest will be composed of no more than 5 per cent of any tree species, no more than 10 per cent of any genus and no more than 20 per cent of any one family.

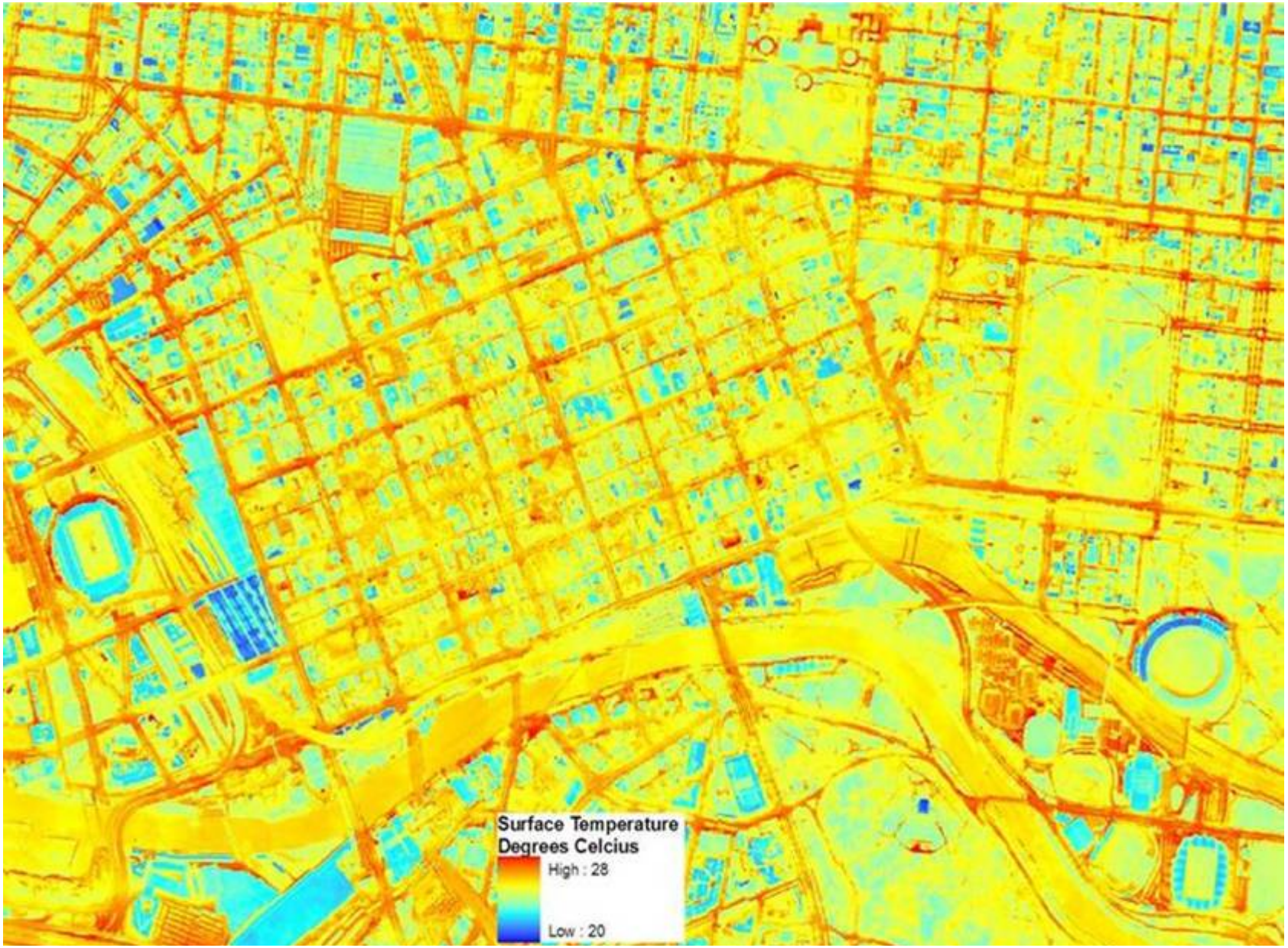
Strategy 3: Improve vegetation health
Target: 90 per cent of the City of Melbourne's tree population will be healthy by 2040
Design for health and wellbeing

Strategy 4: Improve soil moisture and water quality
Target: Soil moisture levels will be maintained at levels to provide healthy growth of vegetation
Become a water sensitive city

Strategy 5: Improve urban ecology
Target: Melbourne's green spaces will protect and enhance a level of biodiversity which contributes to the delivery of ecosystem services.

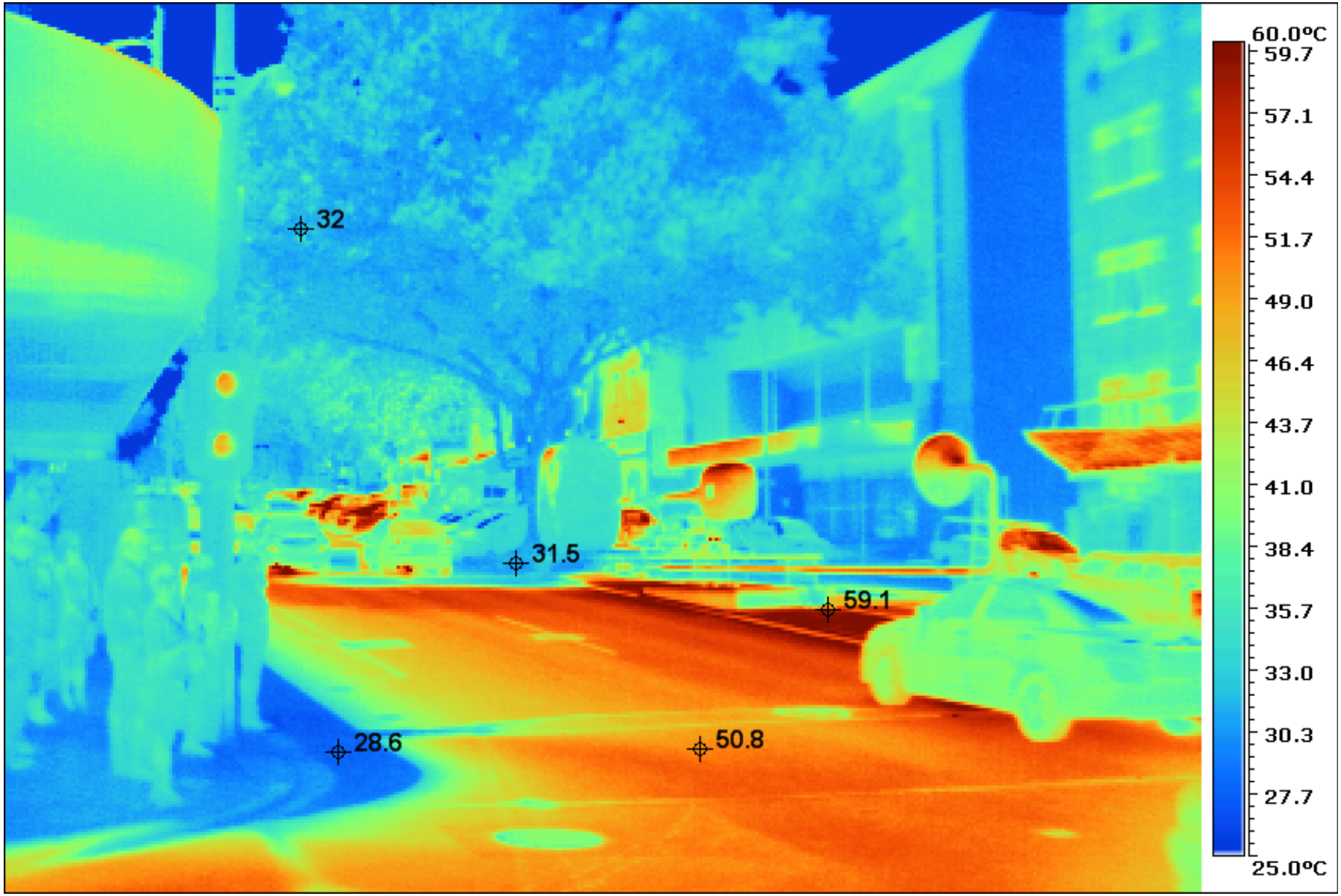
Strategy 6: Engage the community
Target: The community will have a broader understanding of the importance of our urban forest, increase their connection to it and engage with its process of evolution

Thermal imaging – city centre



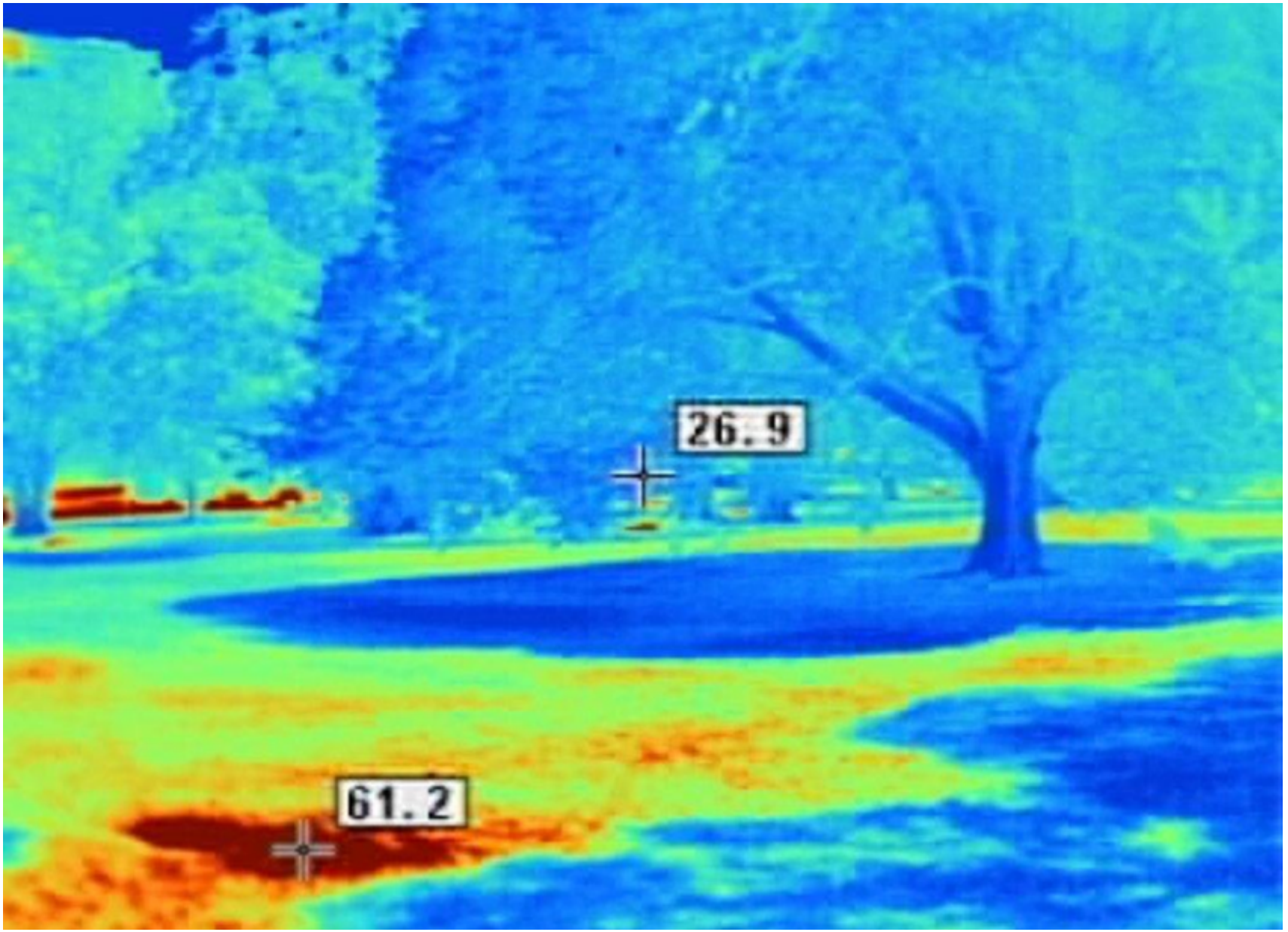
Ideal (goal) streetscape response

Ideal streetscape – thermal image

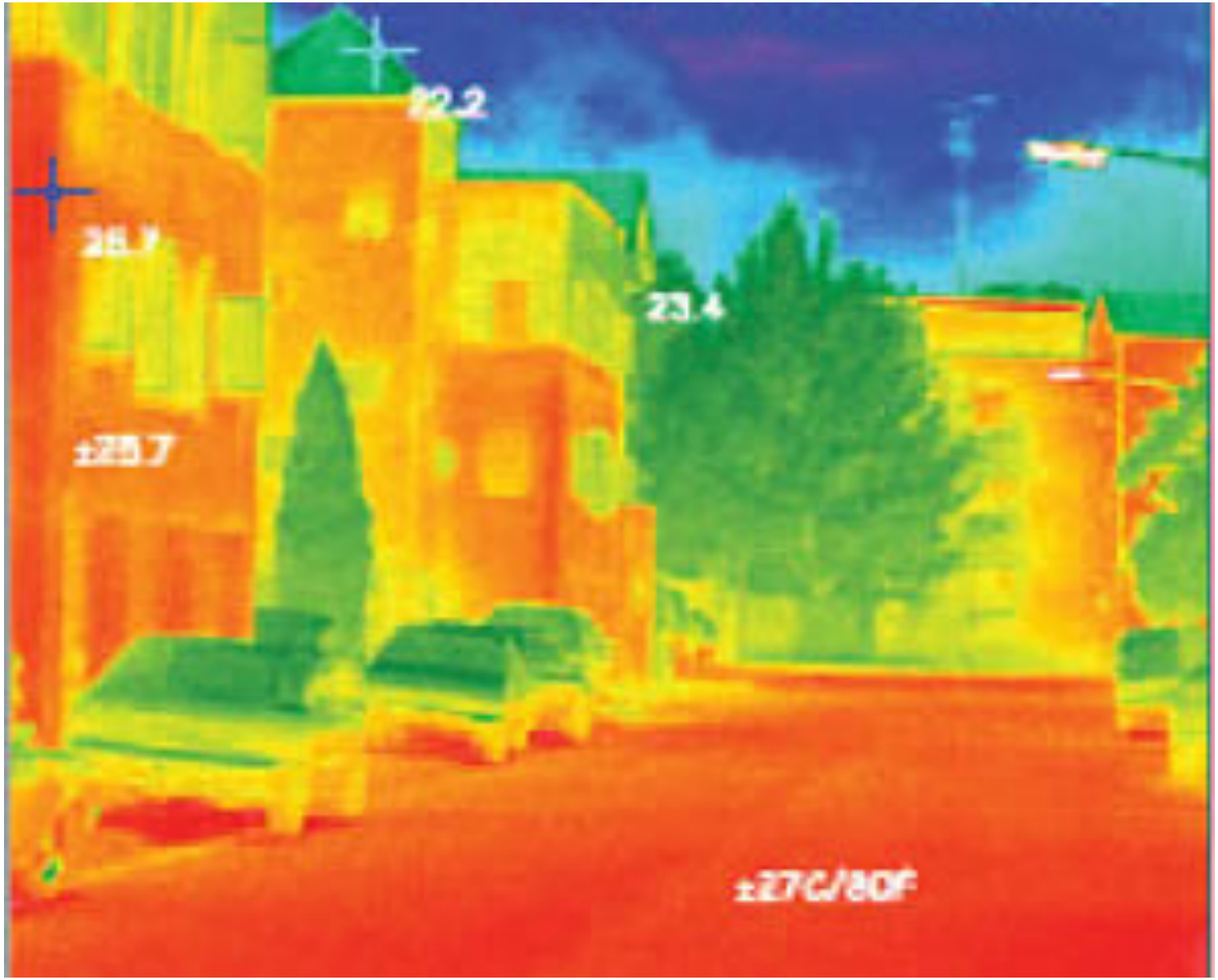


Increasing canopy cover efficiently

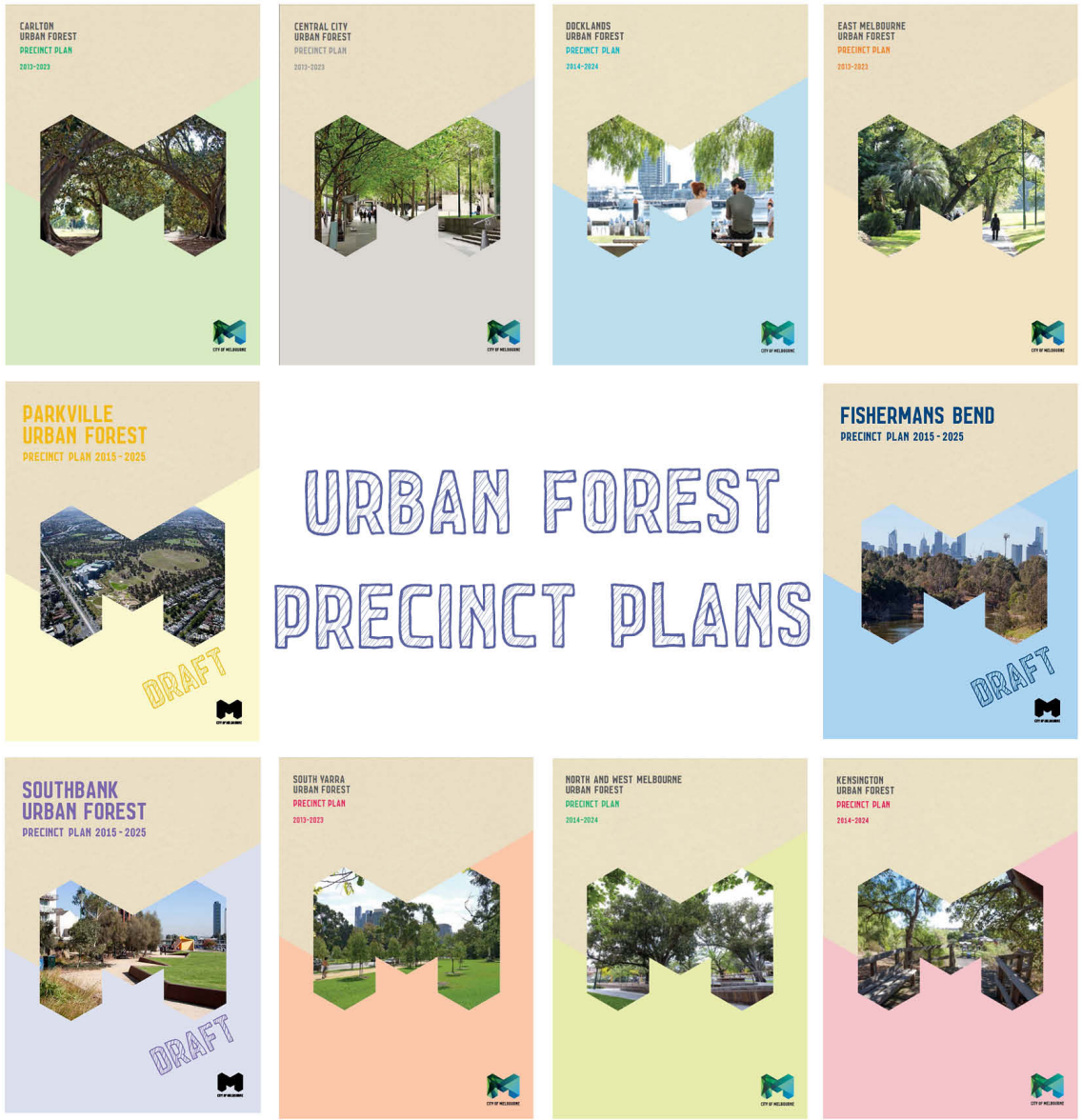
Thermal imaging – parklands



Thermal imaging – streetscapes



community partnership



Vision statements

THE VISION FOR PARKVILLE'S URBAN FOREST

WITH SHADY AND LAYERED VEGETATION, THE ICONIC PARKVILLE URBAN FOREST WILL BE SMART, PRODUCTIVE AND DIVERSE TO SUPPORT PEOPLE AND WILDLIFE WHILE RESPECTING THE EXISTING CHARACTER.

THE VISION FOR FISHERMANS BEND URBAN FOREST

THE FUTURE URBAN FOREST IN FISHERMANS BEND WILL BE A RESILIENT AND REGENERATIVE ECOSYSTEM THAT CELEBRATES AND IS ADAPTED TO ITS RIVERINE ENVIRONMENT, AND CONNECTS PEOPLE AND NATURE.

IT WILL BE A VIBRANT DESTINATION THAT INCORPORATES SHADY, INCLUSIVE CIVIC SPACES THAT ENHANCE INDIGENOUS LANDSCAPES AND FOSTER A SENSE OF COMMUNITY.

THE VISION FOR SOUTHBANK URBAN FOREST

THE SOUTHBANK URBAN FOREST WILL HAVE WATER SENSITIVE AND INNOVATIVE GREEN CORRIDORS FOR PEDESTRIANS AND WILDLIFE THAT INTEGRATE THE PUBLIC AND PRIVATE REALM.

A NETWORK OF DIVERSE AND VIBRANT PUBLIC SPACES WILL PROVIDE AN IMMERSIVE, SENSORY EXPERIENCE AT STREET LEVEL AND FROM ABOVE.


Deciduous
Pretty
Old
Fresh
Tall
Shady
Big
Healthy
Beautiful
Green
Large
Leafy
Nice
Attractive
Cool
European
Established
Relaxing
nice
pretty
old
buildings
green
parks
gardens
clean
beautiful
lots
trees
peaceful
very
leafy
area
busy
quiet
cafes
great
food
city
italian
close
restaurants
vibrant
cosmopolitan
shops
transport
atmosphere
pretty
multicultural
parks
busy
old
trendy
friendly
lovely
trees
students
people
area
leafy
beautiful
place
melbourne
Established
Big
Shady
Large
Old
Beautiful
Green
Leafy
Well
Mature
Lush
Majestic
Variety
Pretty
Attractive
Varied















East Melbourne Urban Forest Precinct Plan

Carlton

Central City

East Melbourne

South Yarra

Implementation – community preferences

South Yarra Urban Forest Precinct Plan 2013 - 2023

Community Priorities

South Yarra's Urban Forest Precinct Plan has been developed in collaboration with the community, which is reflected in the character, vision, planting plan and priorities defined for South Yarra's urban forest.

Consultation highlighted that South Yarra is home to exceptional trees, tree avenues and open spaces that are central to community identity and wellbeing. The community would like to see the heritage and character of South Yarra's urban forest respected while also creating opportunities to contemporise the landscape and increase the use of native trees that provide habitat for native birds.

Our work with the South Yarra community indicated a preference for trees that would provide large canopies, colour and habitat for native birds.

Desired future states defined by the community:

- Maintenance of existing tree character and important avenue plantings
- Tree planting on arterial roads and in narrow streets
- A diversity of trees that provide shade with green, leafy, lush canopies
- Use of native trees to provide habitat for birds and bees
- Visual interest that is diverse, engaging and spectacular through the use of shape, colour, shadows, productive trees and understorey planting
- Large trees and/or volume plantings that make a statement (sculptural) in urban, residential and parkland spaces.

Urban forest benefits highlighted through community consultation:

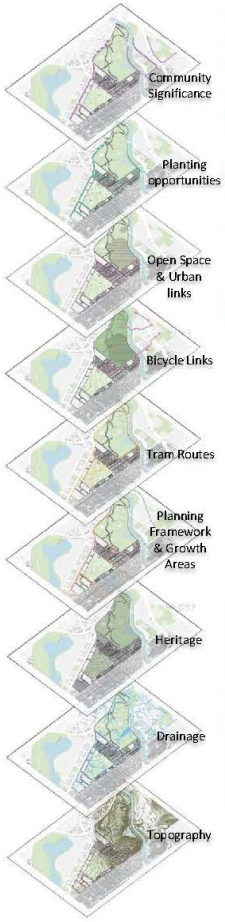
- Shade
- Biodiversity
- Food production
- Aesthetic beauty and screening
- Psychological benefits (e.g., sense of calm, soothing etc.)

Images selected as representing a preferred future for South Yarra's urban forest that includes colour, canopy, shade, seasonal change and habitat.

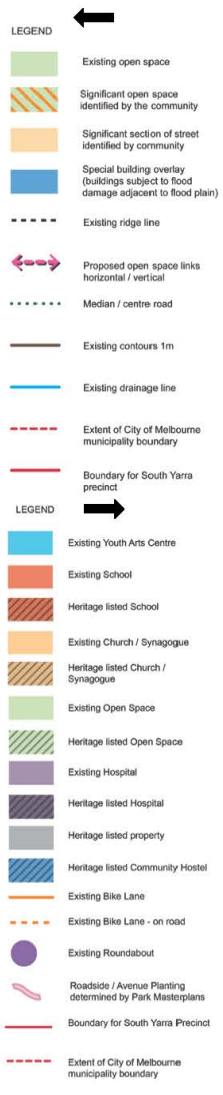
Geophysical, ecology, urban form, community

South Yarra Urban Forest Precinct Plan 2013 - 2023

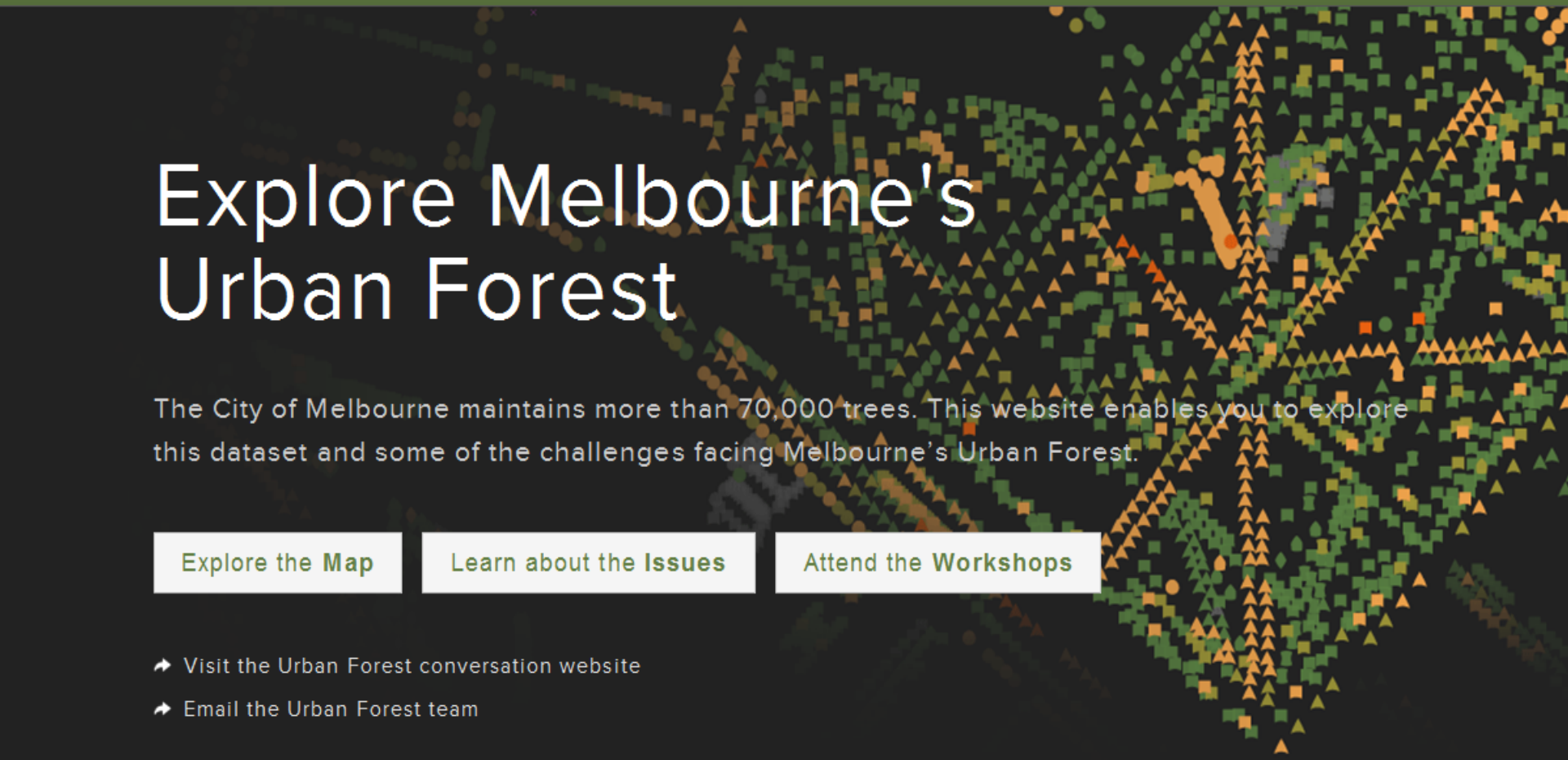
These maps show some of the many layers of information that influence the opportunities and objectives for tree planting in South Yarra Streets.



Map 3: Natural and Open Space Context



Map 4: Strategic Context



Explore Melbourne's Urban Forest

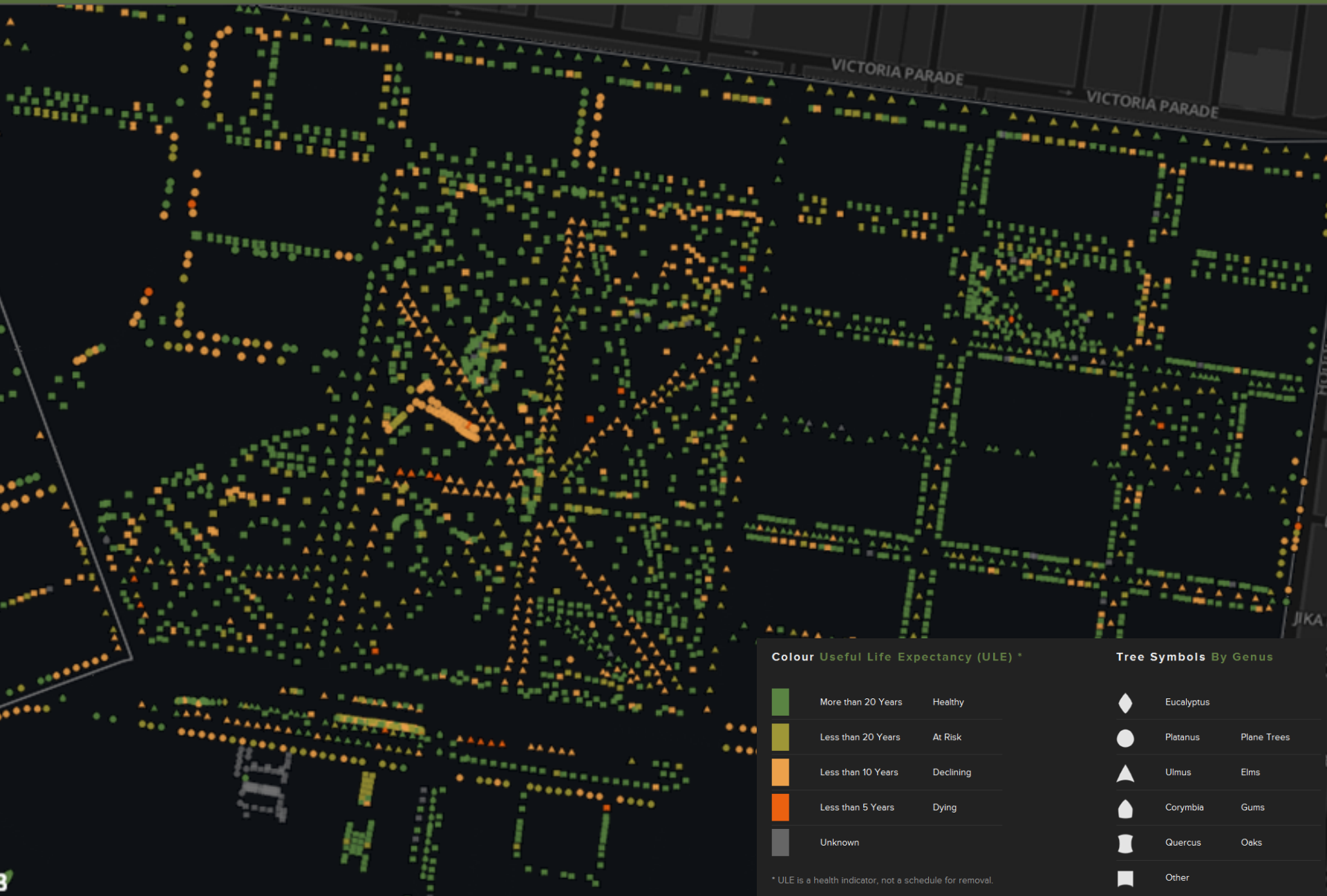
The City of Melbourne maintains more than 70,000 trees. This website enables you to explore this dataset and some of the challenges facing Melbourne's Urban Forest.

Explore the **Map** | Learn about the **Issues** | Attend the **Workshops**

- Visit the Urban Forest conversation website
- Email the Urban Forest team

MAP

Urban Forest Visual



Colour Useful Life Expectancy (ULE) *

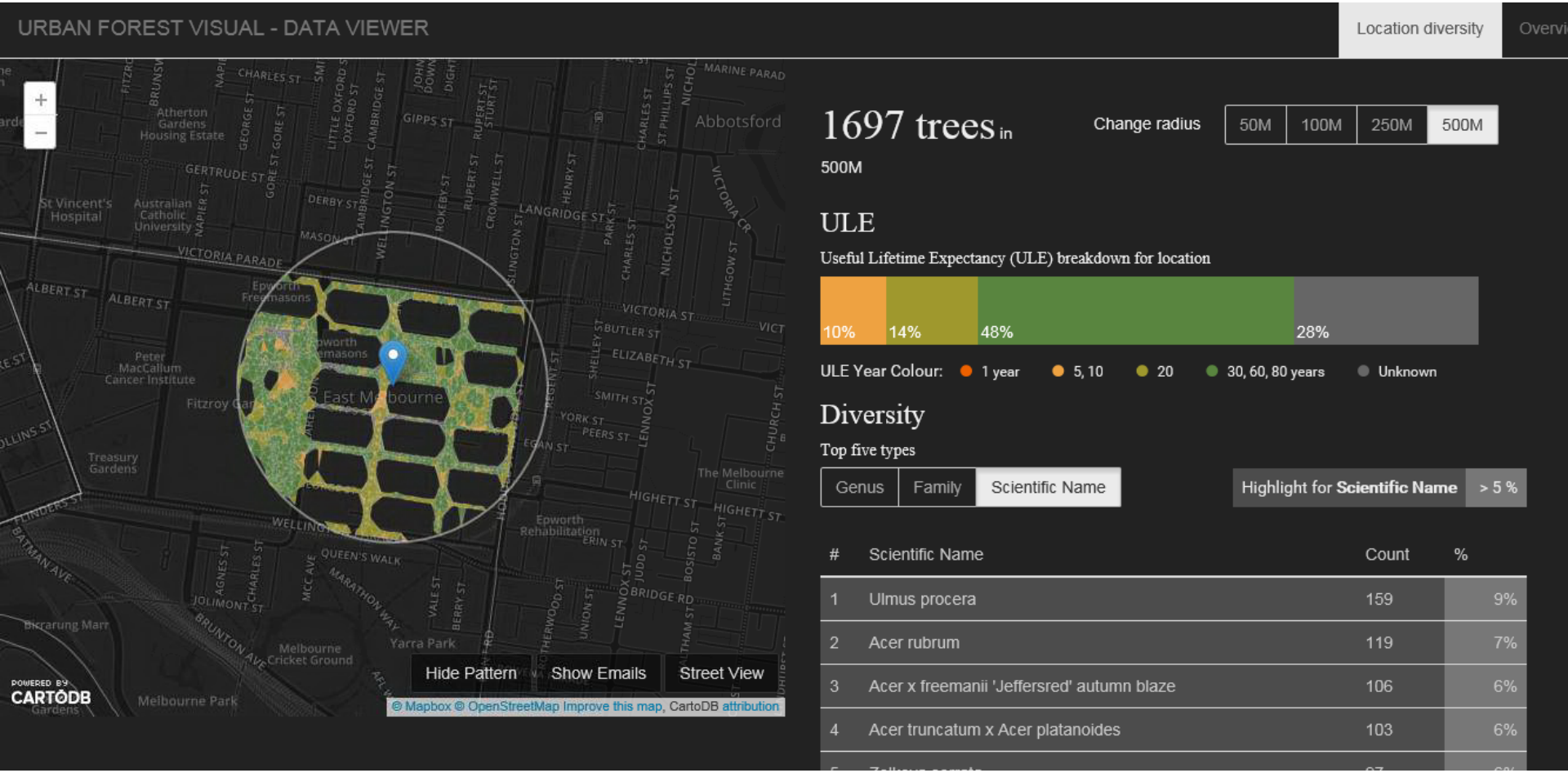
More than 20 Years	Healthy
Less than 20 Years	At Risk
Less than 10 Years	Declining
Less than 5 Years	Dying
Unknown	

* ULE is a health indicator, not a schedule for removal.

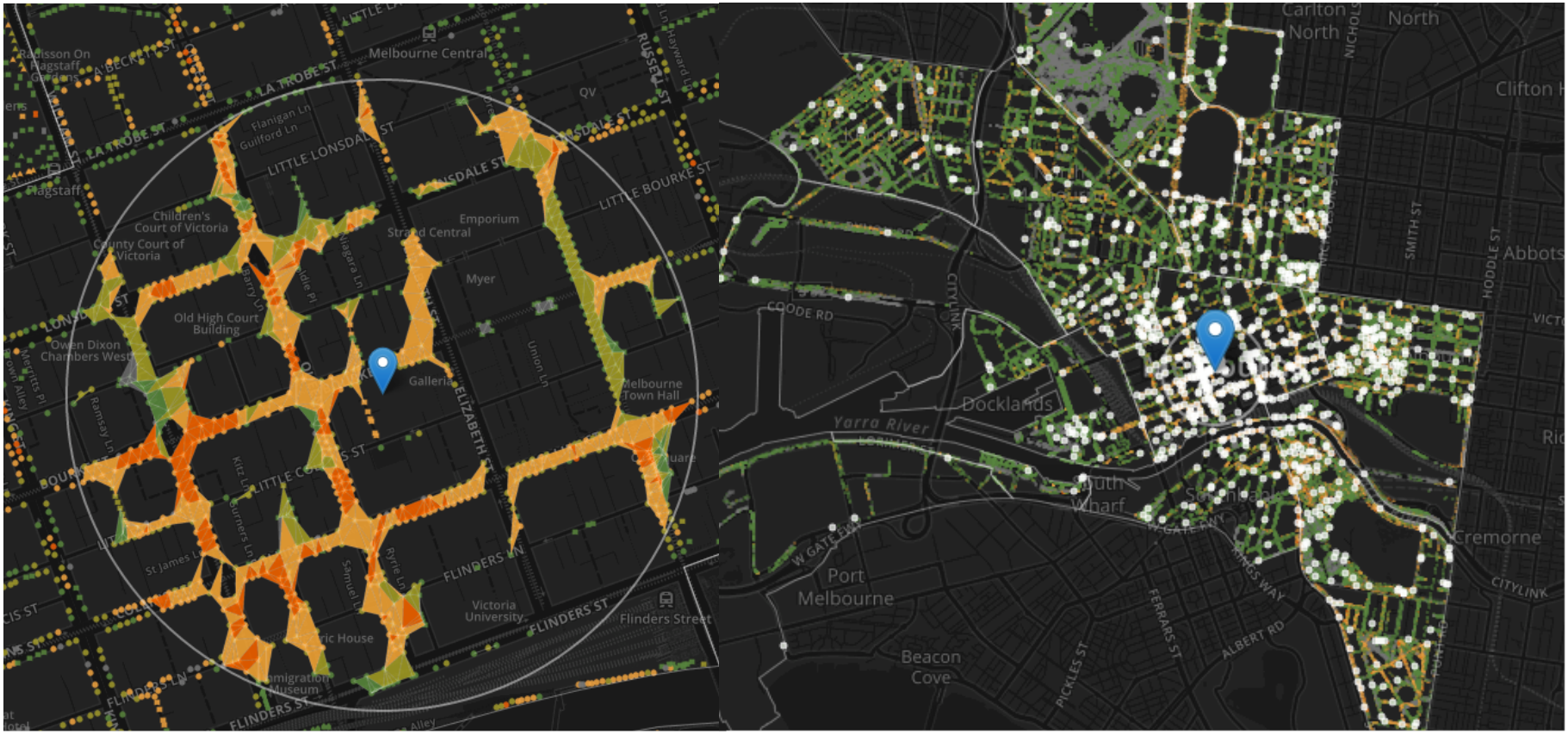
Tree Symbols By Genus

Eucalyptus	
Platanus	Plane Trees
Ulmus	Elms
Corymbia	Gums
Quercus	Oaks
Other	

Urban Forest Visual



Urban Forest Visual



‘Dialogue’ with a Golden Elm, Tree ID 1028612

Aug 12, 2013

Dear Tree,

If you are that big round beautiful low hanging tree I think you are my favourite tree. Such beauty on such an ugly road. Keep up the good work.

Nick

'Dialogue' with a Golden Poplar, Tree ID 1021637

September 22, 2013

I see you every morning, watch you change with the seasons. It makes me happy knowing you are there.

Alicia

‘Dialogue’ with a Chinese Elm, Tree ID 1030595

You are a nice tree and I can see you out my window. Hope you are well. Have a nice day. Jamie

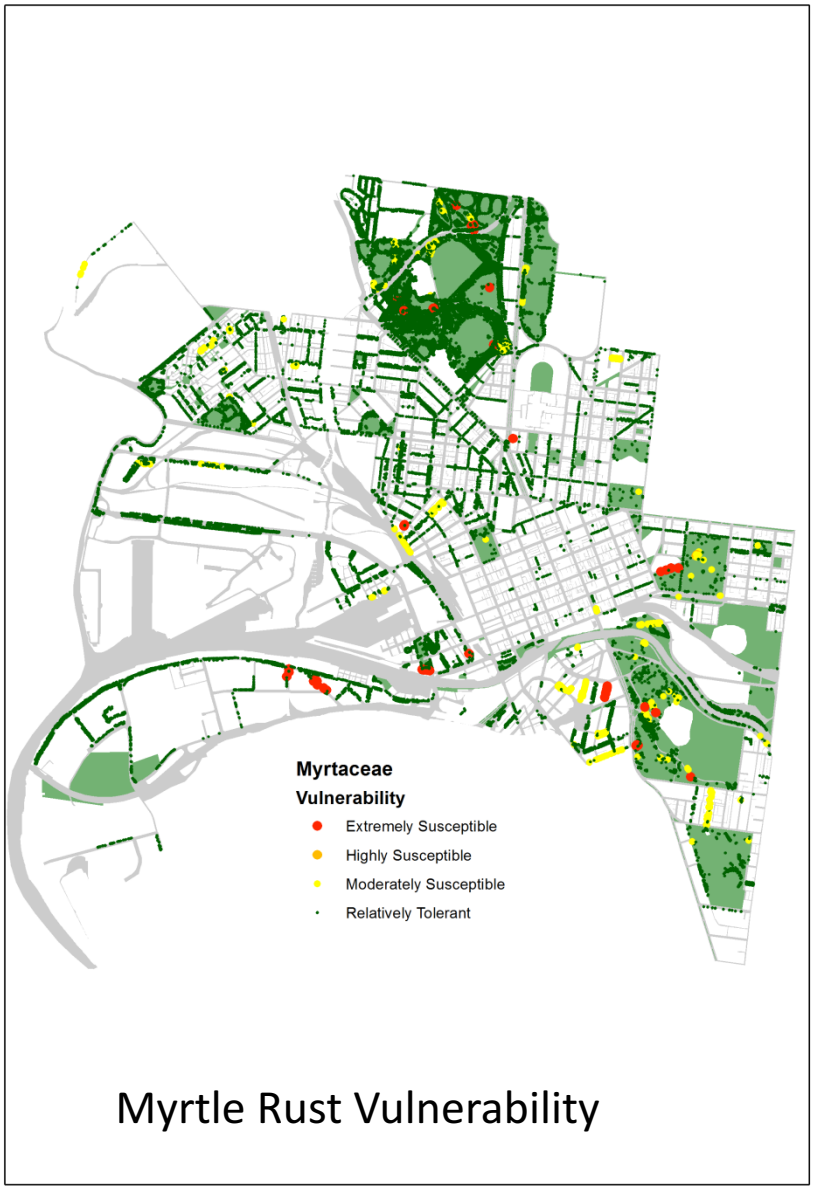
Dear Jamie, Thank you for your email. I am well and very much enjoying the beautiful weather today. I hope you are too. Kind Regards, Chinese Elm 1030595.

Chinese Elm 1030595…(or can I call you Dale??), I am loving the weather…but I am stuck inside and am so jealous of you soaking up the sun. You seem to be having a ball out there today. What did you get up to on the weekend? Jamie

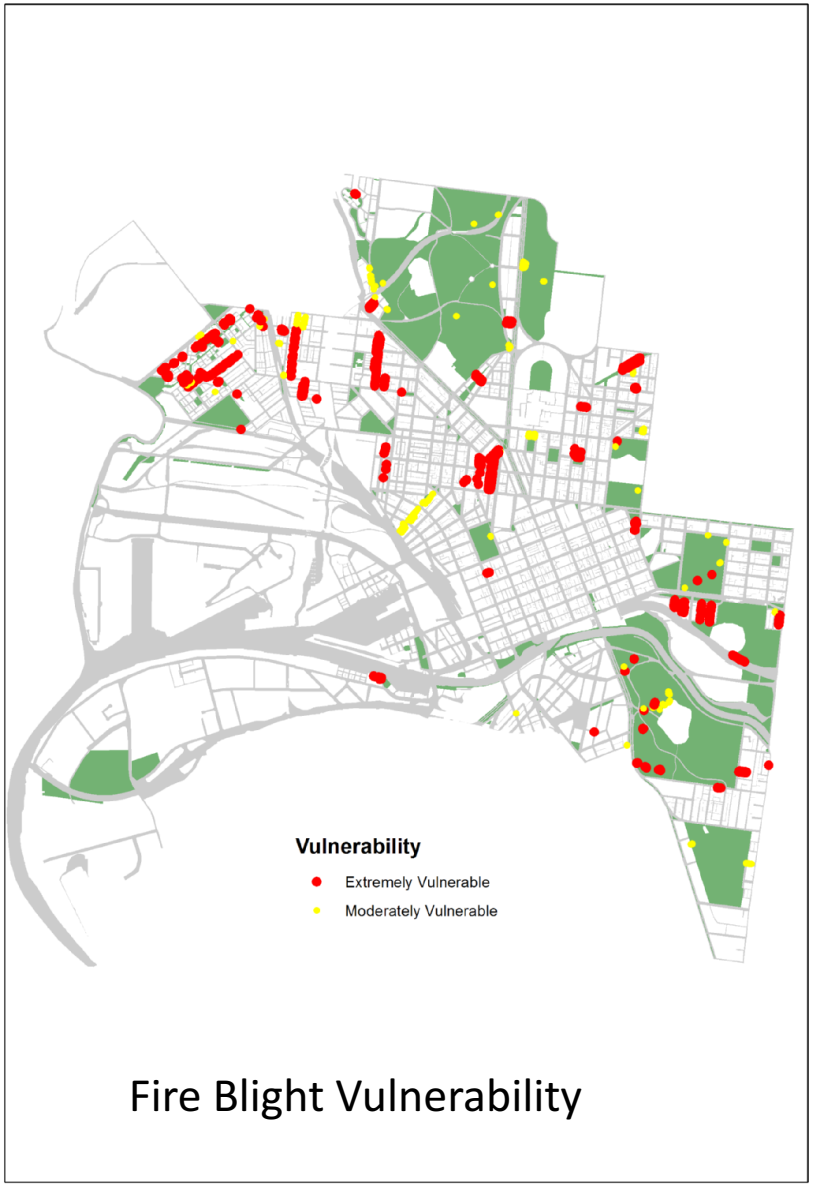
Dale… I like it. Sorry that you are stuck inside. A lunchtime stroll is a must today. I am really enjoying stretching my stomata and giving my chloroplasts a good workout. I spent the weekend well hydrated and preparing for the summer ahead. You?

Dale, I got a little dehydrated on Friday night and then spent the rest of the weekend re-hydrating. ;-) You have a prime location for tonight’s Brownlow....you might see some interesting things later in the evening. If you get a chance can you please drop a branch on a Collingwood player or twos head. Anyway, I might pop down and say g’day later in the day if I get a chance. Jamie

Pest and Disease Monitoring

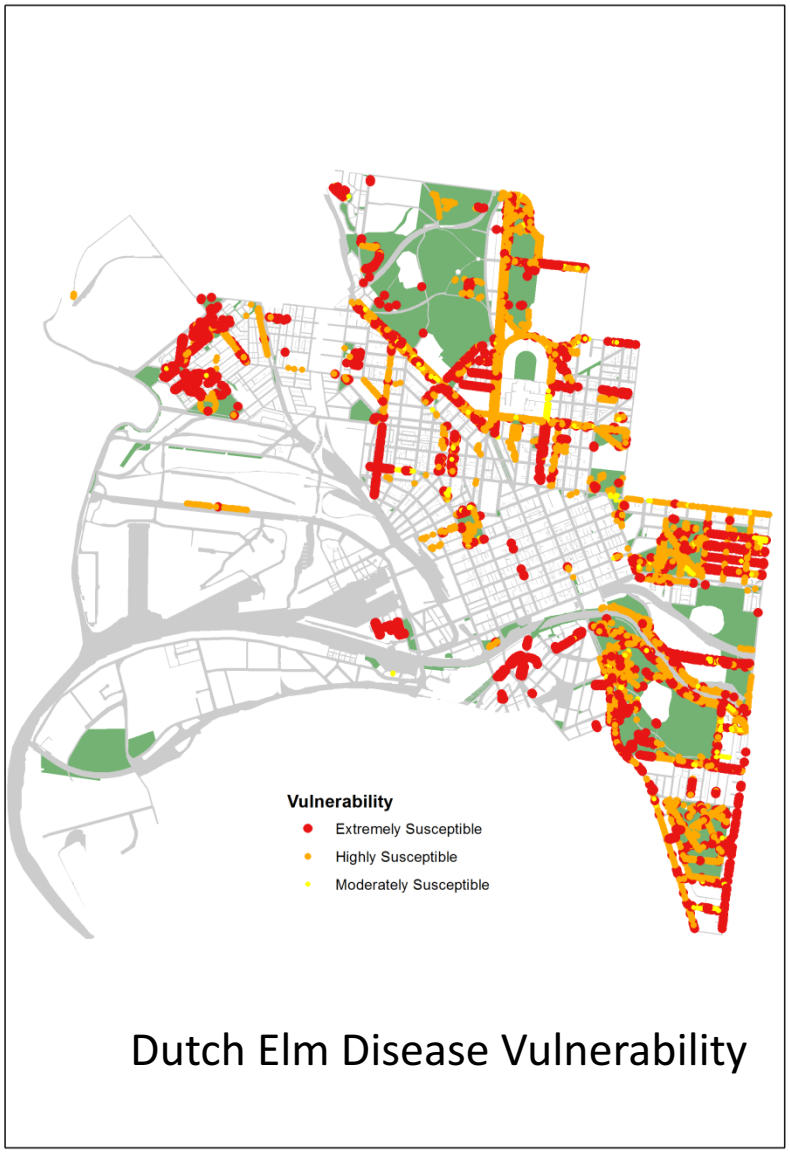


Myrtle Rust Vulnerability

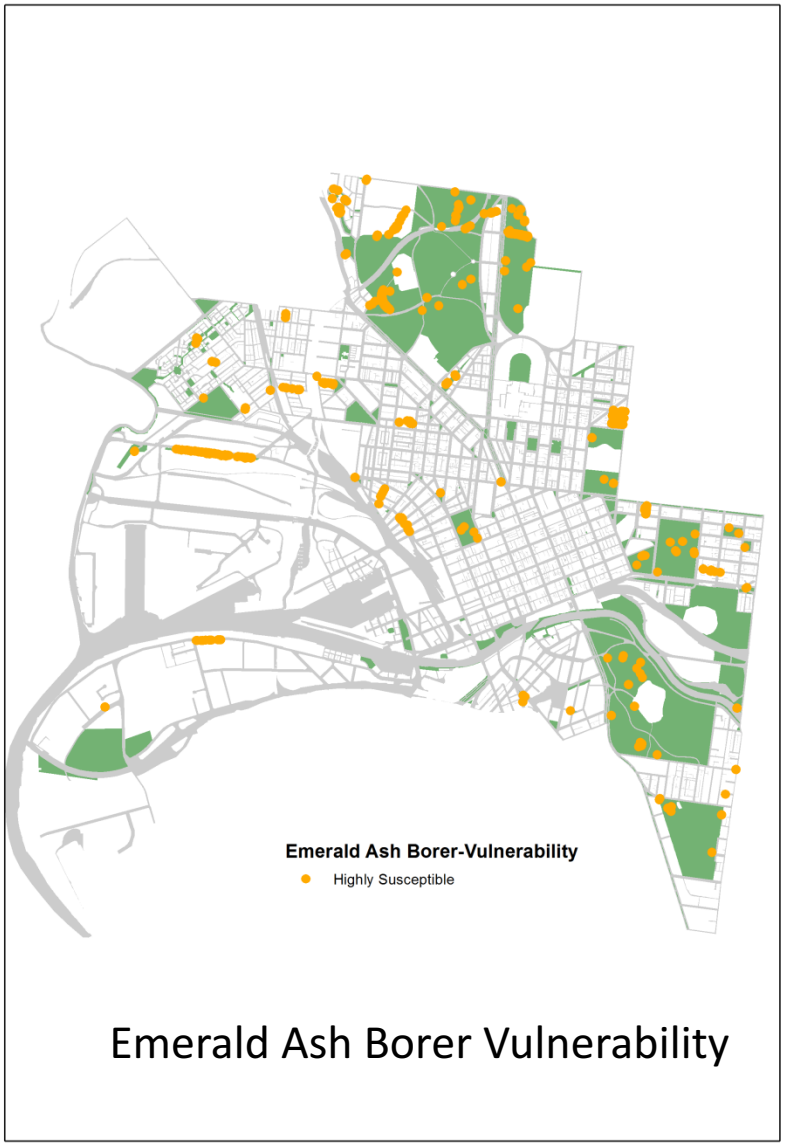


Fire Blight Vulnerability

Pest and Disease Monitoring

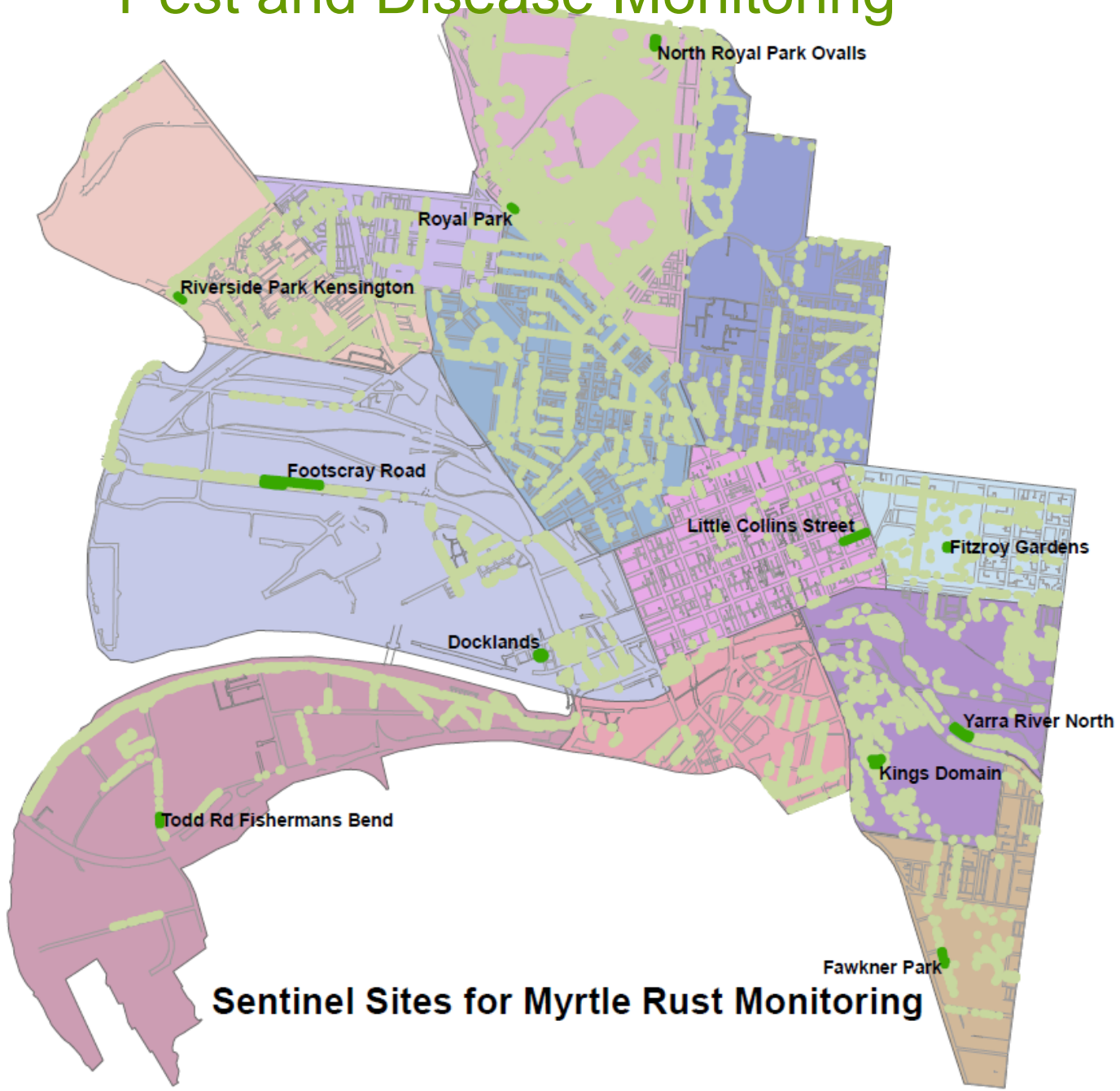


Dutch Elm Disease Vulnerability

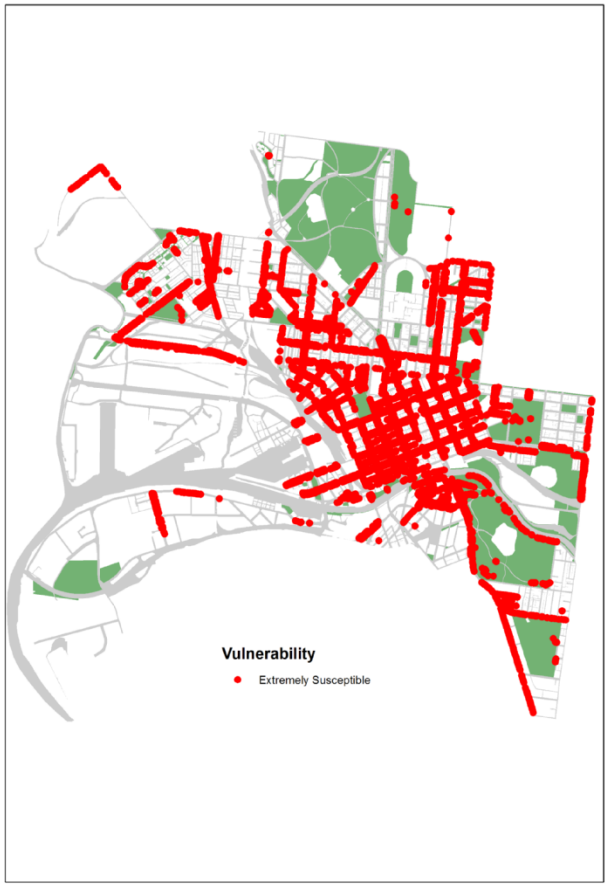


Emerald Ash Borer Vulnerability

Pest and Disease Monitoring



Pest and Disease Monitoring



Massaria Disease Vulnerability

CBD Precinct Species Diversification

Integrated Water Management

To inform 2018 target:

External research (CRC WSC)

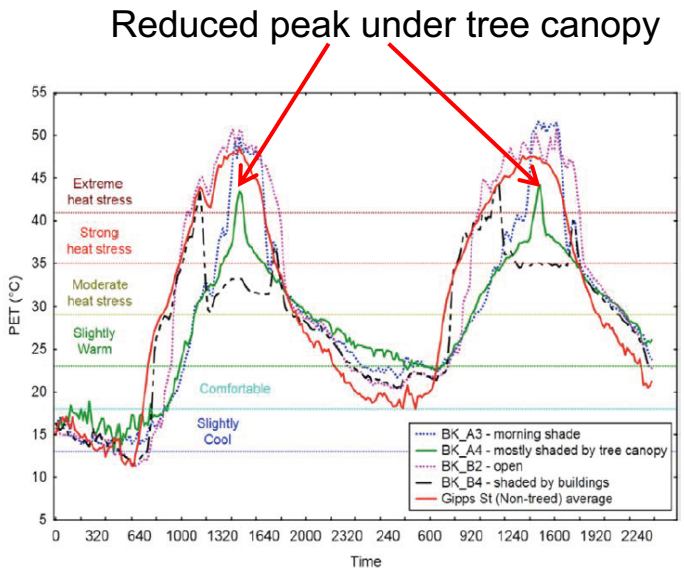
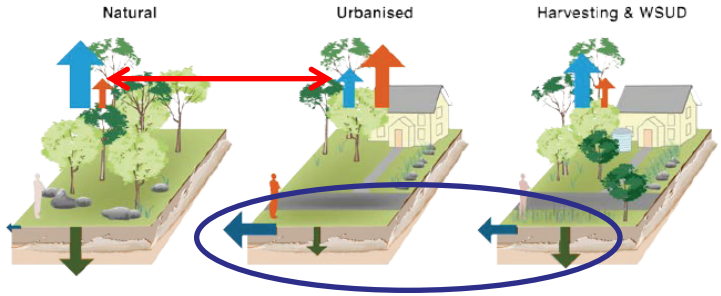
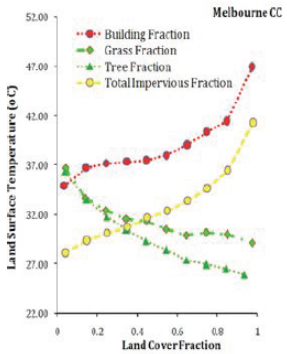


Figure 17. Influence of shade from trees and buildings on Physiological Equivalent Temperature (PET) in Bourke (BK) and Gipps Street, Melbourne, 24-25 February 2012. (Coutts *et al.*, 2013)[95]



Stream channel form and biodiversity			
Groundwater recharge	High	Low	Moderate
Evapotranspiration	High	Low	Moderate
Atmospheric heating and heat storage in buildings	Natural	Hotter	Closer to natural
Human thermal comfort	Neutral	Hot	Slightly warm
Surface runoff	Low and infrequent	High and frequent	Infrequent and moderate
Stream hydrology	Natural	'Peaky'	Moderated (both high flows and low flows)
Riparian vegetation	Intact	Degraded	Restored
Channel form	Natural	Severely degraded	Potential for recovery

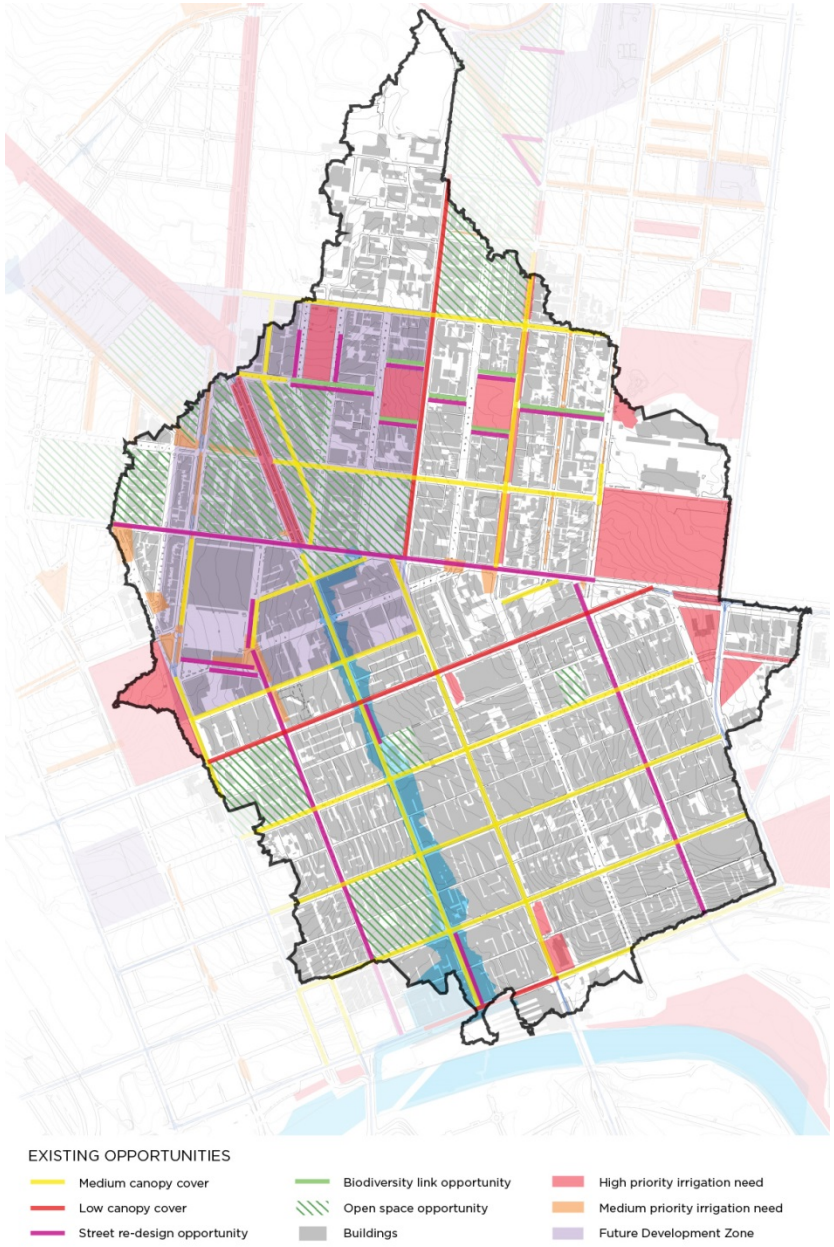
Figure 12. A synthesis of our understandings of urban impacts on the landscape, atmosphere and hydrology and the benefits of stormwater harvesting and WSUD.



10% increase in tree cover = reduction of land surface temperature of up to 4C

Figure 19. Relationships among summer daytime mean land surface temperature (LST) and various land cover fractions. Data are on a 30 m grid and temperatures are derived from a number of summer daytime satellite overpasses at approximately 11 am Eastern Summer Time.

Integrated Water Management



Existing / Known / Expected Opportunities

- Canopy cover
- Irrigation priorities
- Open Space opportunities
- Future development
- Major landowners

Proposed Targets

In line with targets set in Total Watermark – City as a Catchment, the Urban Forest Strategy and the Open Space Strategy

- 1:20 ARI (or equivalent) flow capacity of all council drains within the catchment.
- Alternative water use 8% of all demands by 2018, increasing to 20% by 2030.
- 40% of the Elizabeth Street catchment's soil surface is unsealed by 2030
- Stormwater quality improved by reducing Total Nitrogen in runoff by 20% by 2018, and by 30% by 2030
- 40% reduction in stormwater runoff by 2050
- 45% reduction in potable water use by 2050
- Canopy cover – 40% or more across the catchment
- Increase the provision of open space

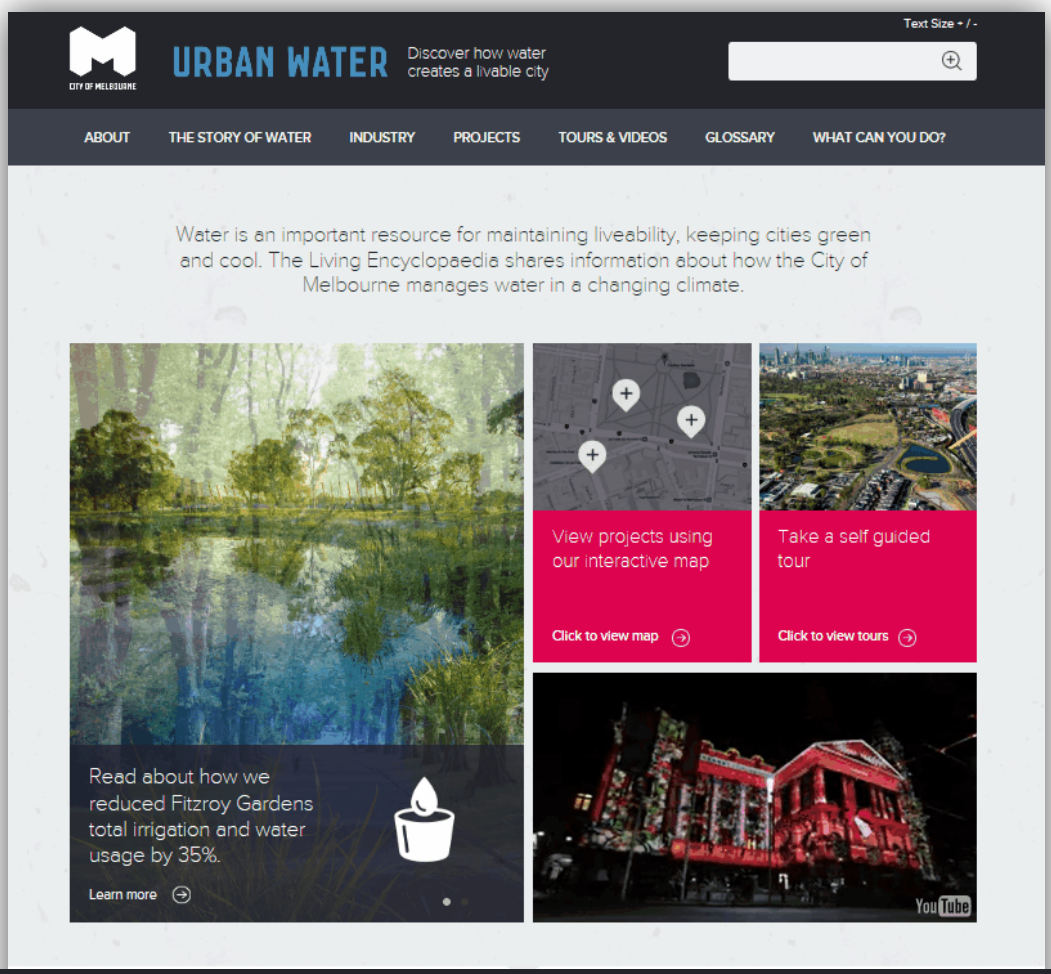
Water sensitive urban design

Stormwater harvesting – Darling St, East Melb

Urban Water Website

The **story of water**

- For a general community audience
- Explains what we are doing and why
- melbourne.vic.gov.au/urbanwater



CITY OF MELBOURNE

URBAN WATER

Discover how water creates a livable city

Making the invisible visible

Using interactive digital technologies:

animations, infographics, videos and self-guided tours.

‘Green streets’ structural soils & permeable asphalt

Permeable bluestone paving


ST.
COURTNEY
STREET
EET
ERROL STREET
Crown
Land
HARCOURT ST.
MARKET LANE
STREET

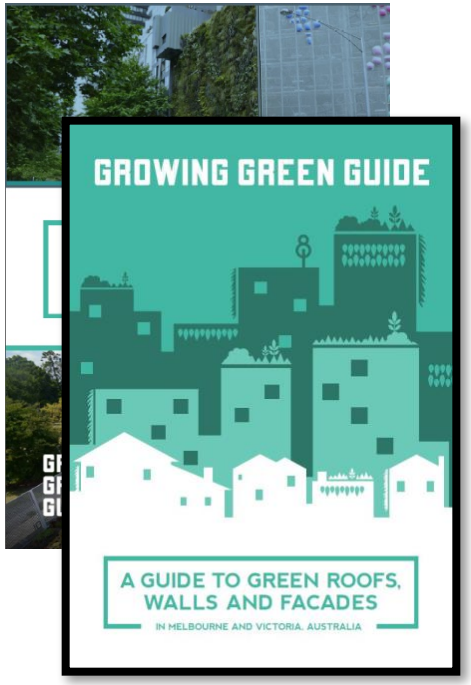

223
216
Errol Street
219
196
191
Market Lane

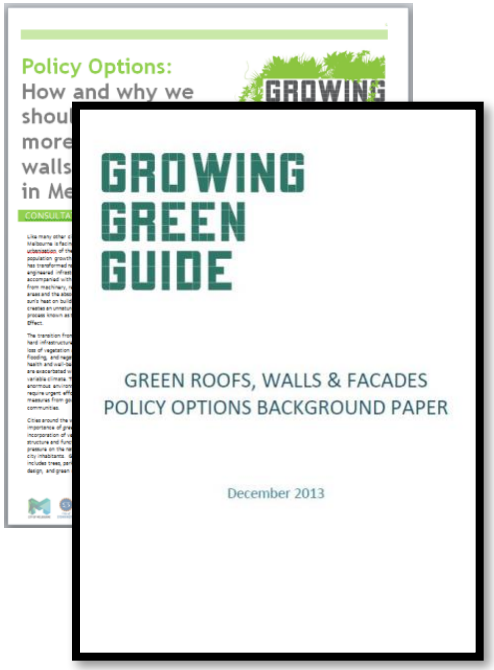
Growing Green Guide

Guidelines for design, construction and maintenance of green roofs, walls and facades

Policy Options for local councils and State Government

Investigation of **demonstration sites** in each municipality





CITY OF MELBOURNE · CITY OF STONNINGTON · Inner Melbourne Action Plan 'Making Melbourne More Liveable' · CITY OF PORT PHILLIP · CITY OF YARRA · THE UNIVERSITY OF MELBOURNE · MELBOURNE SCHOOL OF LAND & ENVIRONMENT · Victorian Adaptation & Sustainability Partnership · State Government Victoria

The Rooftop Project

Develop and test a method for assessing the suitability of any rooftop to be retrofitted with green roof, solar or cool roof technology.

- Create a spatial representation of the results
- Analyse the results for future strategic work

The Rooftop Project maps

Rooftop adaptation existing | Green rooftop intensive | **Green rooftop extensive** | Rooftop adaptation solar | Rooftop adaptation cool roof | How were rooftops mapped

Extensive green roofs are lightweight vegetated landscapes with a shallow layer of growing substrate (less than 20cm deep). They generally have lower water requirements and use small, low growing plants. Green roofs help to cool the city, improve building thermal performance of buildings, increase urban ecology and biodiversity, provide amenity, increase property values and reduce stormwater volumes.

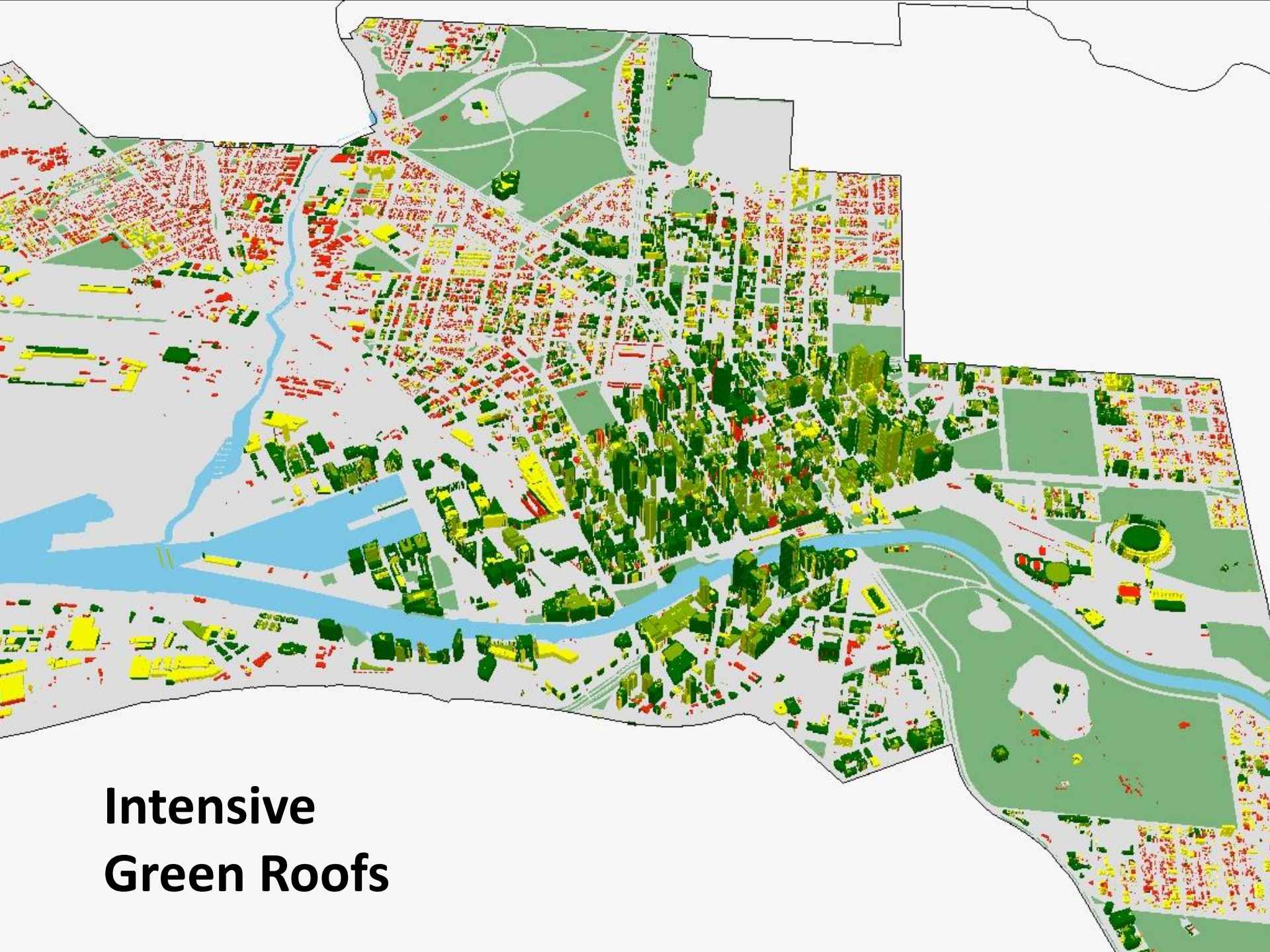
Look at the map to find your property and see what potential your roof has to be turned into a green roof.

Criteria

Criteria	Extensive Green Roofs	Intensive Green Roofs	Cool Roofs	Solar Panels
Roof load bearing capacity	✓	✓		
Useable roof area	✓	✓	✓	✓
Roof pitch (slope)	✓	✓	✓	✓
Insolation			✓	✓
Insulation			✓	
Roof colour			✓	
Access for use & maintenance	✓	✓		✓
Access for construction	✓	✓		✓
Architectural feature	✓	✓	✓	✓

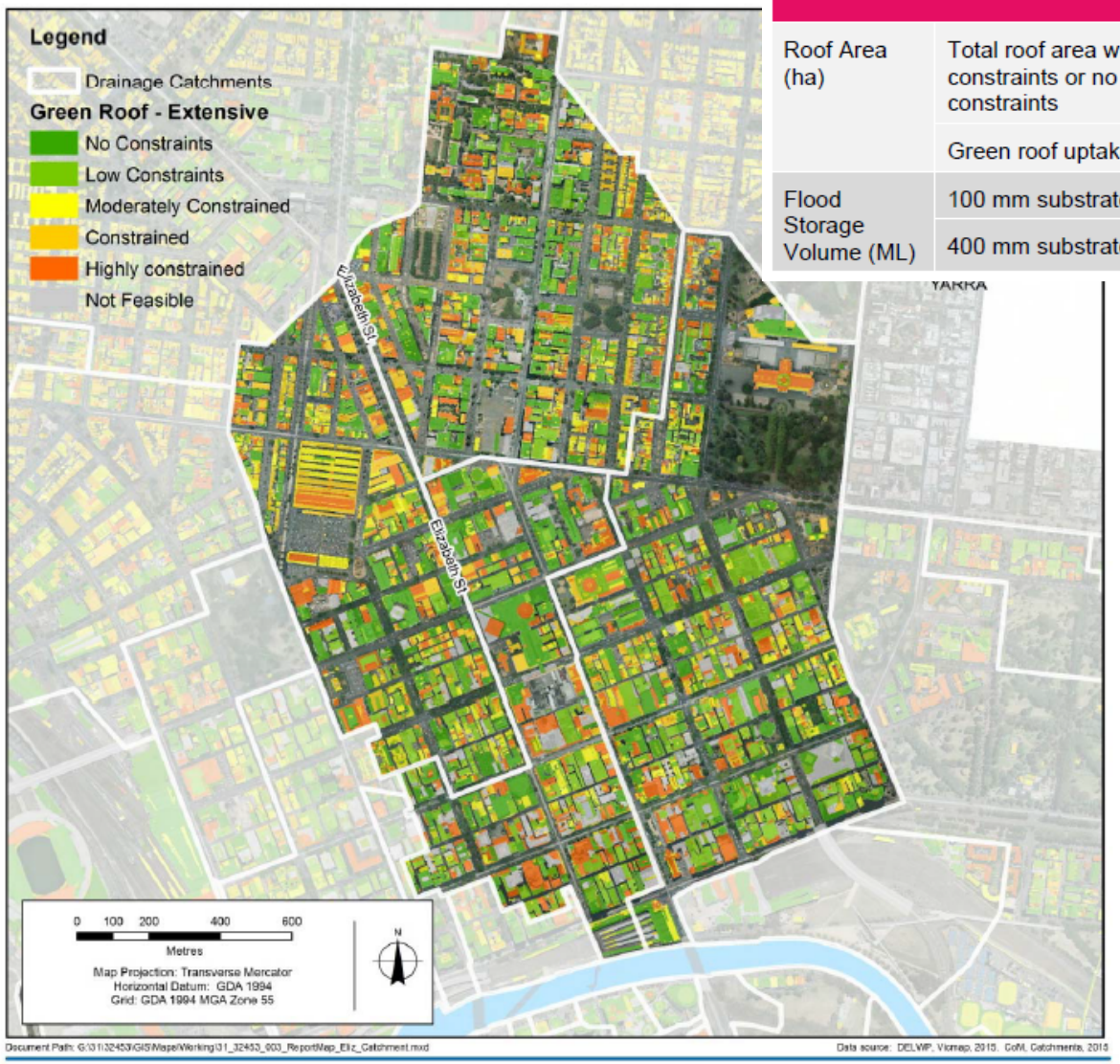
Load bearing was determined by the roof type (trafficable or non-trafficable), which have defined load bearing capacities under the building code. Building type and building age were also used to estimate load bearing capacity.


Extensive
Green
Roofs


Intensive
Green Roofs

Potential for creating water storage in Elizabeth Street Catchment

Figure 34 Elizabeth Street Catchment



Green Roof Uptake Scenario		Low Uptake 5% (by area)	Medium Uptake 15% (by area)	High Uptake 25% (by area)
Roof Area (ha)	Total roof area with low constraints or no constraints	65.5 ha	65.5 ha	65.5 ha
	Green roof uptake	3.27 ha	9.82 ha	16.37 ha
Flood Storage Volume (ML)	100 mm substrate	1.1 ML	3.4 ML	5.7 ML
	400 mm substrate	5.9 ML	17.7 ML	29.5 ML

The total additional storage volume required for the Elizabeth St Catchment was modelled at 6.8 ML

Future Urban Forest

Used global datasets of species distribution and climate to predict:

- Limiting factors to distribution of tree species
- The City of Melbourne's likely future climate
- The vulnerability of Melbourne's current trees
- Potential new tree species from Australia and cities elsewhere around the world

Urban Forest Fund

- Will support greening projects that are outside the scope of existing work
- Public and private realm
- The Fund will financially match successful projects dollar for dollar
- Will also accept donations from organisations and individuals

Citizen Forester Program

What is the Citizen Forester Program?

Community volunteers are **trained** and **empowered** to grow the urban forest and improve urban ecology by carrying out essential **advocacy, monitoring** and **research** tasks.

Program aims:

- Be fun, educational and rewarding for participants
- Provide useful data and research outcomes for Council that help to improve the health, longevity and size of the urban forest

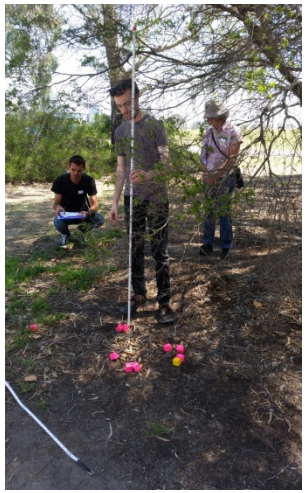
Outcomes

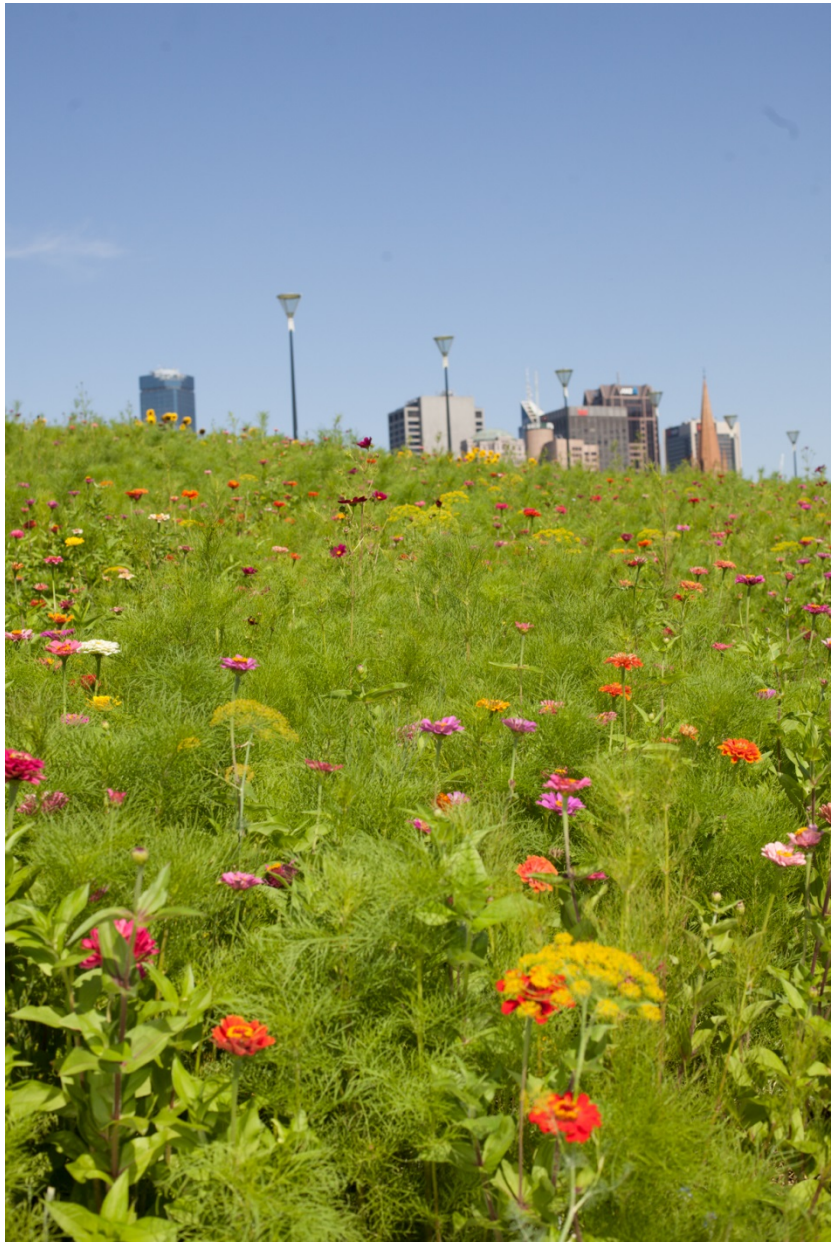
Benefits:

- Responded to the demand for more meaningful involvement
- Empowered, resilient community
- Ownership and stewardship of public assets
- Connection and belonging
- Increased capacity – us and them
- Healthier urban forest

"I'd love to register my interest in the Citizen Urban Forester voluntary projects. It would be an amazing opportunity to help out with any projects and learn more about the nature in our urban landscape!"
- Laney, Citizen Forester

"Thanks to the team for a such an enjoyable and interesting training session yesterday. We'd love to be involved in similar activities in the future."
- Lee, Citizen Forester



Coexisting with nature

… in the urban epoch more than ever we need creative urban design and planning that makes nature the centrepiece, not an afterthought…

T Beatley, 2011

melbourne.vic.gov.au/urbanforest
melbourneurbanforestvisual.com.au