MITCHELL SHIRE COUNCIL

Council Meeting Attachment

SUSTAINABLE COMMUNITIES

20 JUNE 2016

7.14

RESILIENT MELBOURNE STRATEGY

Attachment No: 1

Resilient Melbourne Strategy

RESILIENT MELBOURNE

VIABLE
SUSTAINABLE
LIVEABLE
PROSPEROUS

Resilient Melbourne acknowledges the Traditional Owners of the Land, and their strength, resilience and pride as the oldest continuous culture in the world.

About 100 Resilient Cities

PIONEERED BY THE ROCKEFELLER FOUNDATION
100 RESILIENT CITIES

100 Resilient Cities – Pioneered by the Rockefeller Foundation (100RC) helps cities around the world prepare to meet the physical, social and economic challenges that are a growing part of the 21st century. Melbourne was selected from 372 applicant cities around the world to be among the first wave of 32 cities to join the 100RC network.

100RC offers each member city:

- funding for a Chief Resilience Officer, to coordinate resilience-building efforts
- expert support to develop a resilience strategy
- membership in a global network of peer cities to share ideas and solutions
- use of the 100RC Platform – a group of leading service providers who offer in-kind support to member cities.

Resilient Melbourne sets out the first resilience strategy for Greater Melbourne. It is a joint project of 32 metropolitan Melbourne councils, Melbourne's academic, business and community sectors, and the Victorian Government, all supported by 100 Resilient Cities – Pioneered by the Rockefeller Foundation. This strategy was published by the City of Melbourne, May 2016.

PEOPLE ARE AT THE HEART OF ALL CITIES

A resilient Melbourne will draw on the strengths of our diverse communities and geographies, to pursue our shared interests, embrace our differences and be stronger together. We will help communities prepare for change and whatever the future may hold. We will work today, tomorrow and together, towards a viable, sustainable, liveable and prosperous Melbourne.

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WELCOME AND OVERVIEW

Resilient Melbourne marks an important point in Melbourne's development. It presents the first of our city's resilience strategies: a starting point that brings together individuals and organisations critical to the resilience of Melbourne and its diverse communities. It offers a new way to deal with the chronic stresses and acute shocks we are likely to experience, and to achieve our vision of a city that is viable, sustainable, liveable and prosperous, today and long into the future.

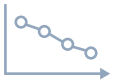
This strategy alone will not secure that vision. But by publishing this strategy, we are taking this work to our communities, seeking the active involvement of people and organisations who want to help protect and improve the lives of Melburnians: from individuals and small community groups to our largest institutions and corporations.

We invite you to tell us how you are helping to strengthen Melbourne as it prepares for the future. Let us know about new ways of working, or projects that could transform parts of the city for the better. We continue to seek additional partners for many of the actions set out here, and we will need to develop many more. We look forward to working with you.

This strategy is the result of the work of more than 1,000 individuals from 230 organisations, Melbourne's 32 local councils, and many Victorian Government departments. We thank everyone involved for their commitment to this great collaboration.

The *Introduction* (p. 7) explains the origins of *Resilient Melbourne* and why urban resilience is important, both globally and locally. *Melbourne in context* (p. 16) describes the progression of our city, from the land of traditional owners to the multicultural and modern metropolis it is today, including the chronic stresses and acute shocks that we face.

This sets the scene for why we are pursuing our four resilience objectives, each of which reflects an area where local government can take a leading role in building a more resilient Melbourne, in partnership with other sectors. These objectives are shown in the diagram on page 5 and are described in more detail on pages 37-53. The diagram also sets out how we will achieve these objectives, through four action areas that encourage collaboration between disciplines and sectors, to implement three flagship actions, 15 supporting actions and 15 aligned local actions (see below for definitions). This is all described in more detail in the sections *Adapt* (p. 60-87), *Survive* (p. 88-109), *Thrive* (p. 110-137) and *Embed* (p. 138-154). Throughout the document we also highlight how the 100RC network is contributing to Melbourne's efforts in 'learning from others' and '100RC global network in action'.



EXAMPLES OF MELBOURNE'S CHRONIC STRESSES

- Rapid population growth
- Increasing social inequality
- Increasing pressures on our natural assets
- Unemployment, particularly among young people
- Climate change
- Increasing rates of alcoholism and family violence

EXAMPLES OF MELBOURNE'S ACUTE SHOCKS

- Bushfires
- Floods
- Heatwaves
- Disease pandemics
- Infrastructure-related emergencies
- Extremist acts, including cyber-crime

Types of actions in *Resilient Melbourne*

Flagship:
Key initiatives with the potential for metropolitan-wide involvement and transformational outcomes.

Supporting:
Initiatives with the potential to improve Melbourne's resilience on a range of scales – some may affect only a few council areas, while others could apply across the metropolitan area.

Aligned:
Existing initiatives that align with Resilient Melbourne principles and have the potential for further local government input.

In developing this strategy, we have followed three guiding principles, agreed at the outset of our work: build on Melbourne's existing structures and institutions; avoid duplication of effort and investment, and; deliver tangible benefits to our communities. Although achieving our long-term objectives will require work over generations – thirty years or more – the actions in this strategy will bring real results starting today. These projects are affordable, scalable, replicable and measurable. They will support our communities' efforts to adapt to the accelerating changes we face, to survive no matter what shocks occur, and to confidently thrive, building a Melbourne that offers a higher quality of life to all of its citizens, now and for future generations.

We encourage you to read on and find out more about what all this means in practice, and share the strategy with your networks. We hope you enjoy this strategy, and we welcome your responses.

You can contact the Resilient Melbourne team at resilence@melbourne.vic.gov.au.

The mayors and CEOs of Melbourne's metropolitan councils came together to discuss finalising the strategy. They were joined by the Resilient Melbourne Steering Committee at Melbourne Town Hall on 14 April, 2016.

VISION

In a resilient Melbourne, our diverse communities are viable, sustainable, liveable and prosperous.

Objectives

STRONGER TOGETHER

Empower communities to take active responsibility for their own and each other's wellbeing, safety and health.

A DYNAMIC ECONOMY

Provide diverse local employment opportunities that support an adaptable workforce that is ready for the jobs of the future.

OUR SHARED PLACES

Create and sustain buildings, infrastructure and activities that promote social cohesion, equality of opportunity and health.

A HEALTHIER ENVIRONMENT

Enable strong natural assets and ecosystems alongside a growing population.

Action Areas

Today, tomorrow and together, we will take action to:

ADAPT
Reduce our exposure to future shocks and stresses
(p. 60)

SURVIVE
Withstand disruptions and bounce back better than before
(p. 88)

THRIVE
Significantly improve people's quality of life
(p. 110)

EMBED
Build resilience thinking into our institutions and ways of working
(p. 138)

FLAGSHIP ACTION
Metropolitan urban forest strategy
(p. 62)

FLAGSHIP ACTION
Emergency management community resilience framework for Victoria
(p. 90)

FLAGSHIP ACTION
The metropolitan cycling corridor network
(p. 112)

KEY SUPPORTING ACTION
The Resilient Melbourne Delivery Office
(p. 142)

In addition to the three flagship actions, there are:

15
SUPPORTING ACTIONS

15
ALIGNED LOCAL ACTIONS

See page 59 for a summary of all actions

List of abbreviations

100RC	100 Resilient Cities – Pioneered by the Rockefeller Foundation
ABM	Association of Bayside Municipalities
CEO	Chief Executive Officer
CRC	Cooperative Research Centre
CRO	Chief Resilience Officer
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEDJTR	Department of Economic Development, Jobs, Transport and Resources
DELWP	Department of Environment, Land, Water and Planning
DHHS	Department of Health and Human Services
DPC	Department of Premier and Cabinet
EMV	Emergency Management Victoria
GDP	gross domestic product
GST	goods and services tax
HPV	Human papillomavirus
ICLEI	Local Governments for Sustainability
ICT	information and communications technologies
MAP	Melbourne Apartments Project
MAV	Municipal Association of Victoria
MPA	Metropolitan Planning Authority
MUDRI	Monash University Disaster Resilience Initiative
NCAT	Northern College of the Arts and Technology
OECD	Organisation for Economic Co-operation and Development
PVT	Preventing Violence Together
PwC	PricewaterhouseCoopers
SEIFA	Socio-Economic Indexes For Areas
SME	small to medium enterprises
STEM	science, technology, engineering and mathematics
TAFE	Technical and Further Education
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VAMPIRE	Vulnerability Analysis of Mortgage, Petroleum and Inflation Risks and Expenditure
VICSES	Victoria State Emergency Service
WREMO	Wellington Region Emergency Management Office

INTRODUCTION

Resilient Melbourne is the culmination of work by people from across sectors, council boundaries and community groups, coming together to consider a shared challenge: what can we do to protect and improve the lives of Melburnians, now and in the future?

Developed with the support of 100 Resilient Cities – Pioneered by the Rockefeller Foundation (100RC) – the strategy sets out a series of distinct, yet connected, actions that will help make Melbourne a viable, sustainable, liveable and prosperous city, long into the future.

Our changing city.

Melbourne is a 'city of cities'. This strategy refers to Melbourne as the metropolitan area comprising 32 local government authorities, as shown below.

EASTERN SUBREGION

- Boroondara
- Knox
- Manningham
- Maroondah
- Monash
- Whitehorse
- Yarra Ranges

NORTHERN SUBREGION

- Banyule
- Darebin
- Hume
- Mitchell (part of)
- Moreland
- Nillumbik
- Whittlesea

WESTERN SUBREGION

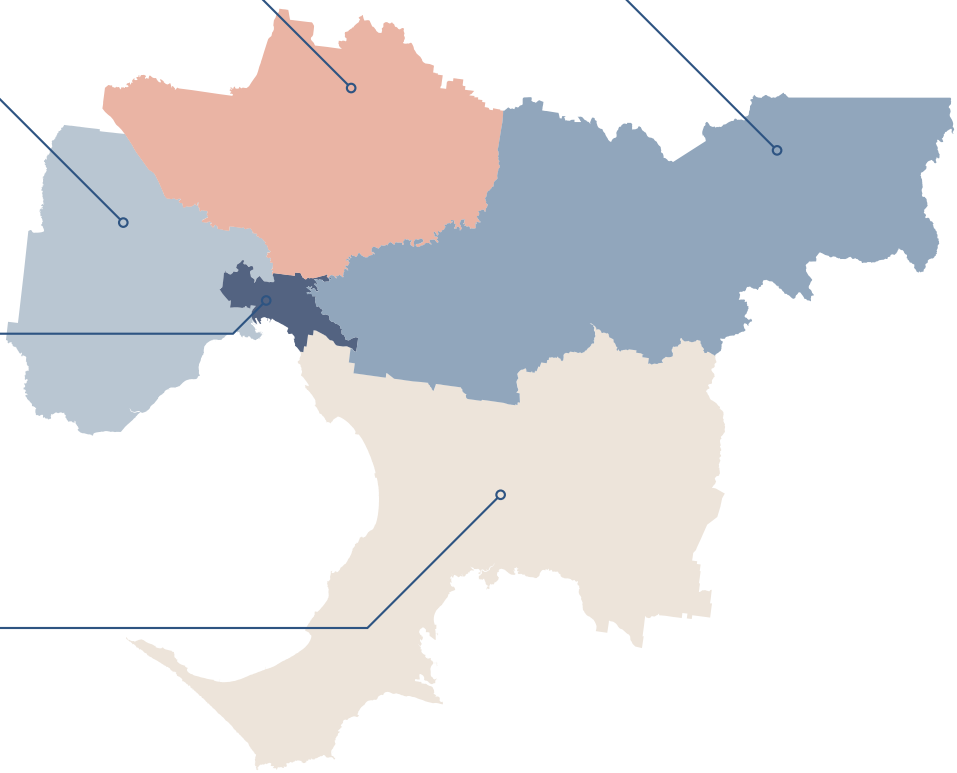
- Brimbank
- Hobsons Bay
- Melton
- Moonee Valley
- Wyndham

CENTRAL SUBREGION

- Maribyrnong
- Melbourne
- Port Phillip
- Stonnington
- Yarra

SOUTHERN SUBREGION

- Bayside
- Cardinia
- Casey
- Frankston
- Glen Eira
- Greater Dandenong
- Kingston
- Mornington Peninsula



Urban resilience and 100 Resilient Cities

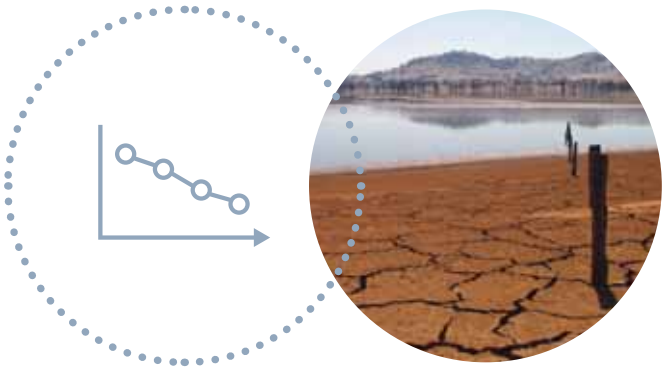
The world's population is projected to reach 9.5 billion in 2050, with 75 per cent of these people living in cities.[1] The Rockefeller Foundation pioneered the 100RC initiative in response to the trends of urbanisation, globalisation and climate change.

As cities grow larger, the likely consequences of unexpected events are ever greater for individual cities. Cities are also more numerous and increasingly interdependent, meaning the effects of events in one place can be felt around the world. Meanwhile, climate change increases the likelihood of greater numbers of catastrophic events happening.[2]

Already, Australia is one of the world's most urbanised countries – almost 90 per cent of Australians live in urban areas, mainly on our eastern seaboard and we are vulnerable to a wide range of stresses and shocks.[3]

Definition of resilience

100RC defines urban resilience as the capacity of individuals, institutions, businesses and systems within a city to adapt, survive and thrive no matter what kind of chronic stresses and acute shocks they experience.



CHRONIC STRESSES

Challenges that weaken the fabric of a city on a day-to-day or cyclical basis. Examples include sea level rise, increasing pressures on healthcare services, unemployment, and deeper social inequality.

ACUTE SHOCKS

Sudden events that threaten a city. In Melbourne, examples of acute shocks include heatwaves, bushfires, floods, influenza pandemics, and extremist acts, including cyber-crime.

Why the *Resilient Melbourne* project?

Melbourne is a vibrant and proudly multicultural city of 4.3 million residents, originating from more than 180 different countries. A 'city of cities', Melbourne is made up of 32 local government authorities (councils) spread over 10,000 square kilometres around Port Phillip Bay, comprising hundreds of diverse local neighbourhoods, each with its own character, cultural mix and set of advantages and problems.

Today, the scale and pace of demographic change in Melbourne are unprecedented. Projections suggest that by 2051 Melbourne will be home to approximately 7.7 million people, and is likely to be Australia's largest city.[4] Globalisation continues to disrupt our economy and society, while climate change is increasing the risk of extreme events and undermining many of the assumptions used to plan and develop our city.

To cope with this increasing complexity and uncertainty, we need a new approach. This must be centred on our communities, supporting and enabling them to adapt to these accelerating changes and the associated stresses, to survive no matter what shocks occur, and to confidently thrive. This approach will link new resilience-building actions with existing efforts – this way we can build a Melbourne that is a better place for future generations to live in, and whose services and advantages can be enjoyed by all of its citizens.

Our three levels of government – local, state and Commonwealth – and hundreds of business and community organisations need to be part of this new approach, making resilience part of everything they do. To create the environment for communities to adapt, survive and thrive, we must innovate, be adaptable and flexible, collaborate across traditional boundaries and sectors, and act now, for the long term. *Resilient Melbourne* will be an important contributor to this process, turning uncertainty into opportunity.

Shoppers at Melbourne's Queen Victoria Market - the largest open air market in the Southern Hemisphere.

How was this strategy developed?

Resilient Melbourne is a true collaboration – led by councils – across levels of government, business and community. It is based on engagement with over 1000 stakeholders across Melbourne, Australia and the broader 100RC network.

The strategy has been developed in two phases. It was launched with an agenda setting workshop in April 2014. With this providing some valuable initial context, the work began in earnest towards the end of that year. This involved broad research and consultation to better understand strengths and vulnerabilities likely to affect Melbourne's resilience. It included identifying our city's critical physical and social infrastructure, along with the shocks and stresses that could threaten them in the future, described further below in *Melbourne in context*. Through a series of discussions and meetings we also sought to understand perceptions of Melbourne's resilience, including initiatives and practices that are already contributing to the resilience of our city.

Based on this information, in June 2015 we released *Melbourne's Preliminary Resilience Assessment*, which was the first of its kind in Australia. The document was informed and supported by the mayors and chief executive officers (CEOs) of Melbourne's metropolitan councils and proposed five discovery areas for deeper investigation by working groups.

The members of these working groups were subject matter experts, led by local government CEOs. Using desktop research, spatial mapping, surveys, interviews, and innovative design sessions attended by organisations from diverse sectors, the working groups further investigated the discovery areas, the opportunities and challenges associated with each. The research and engagement helped us shape our vision for a resilient Melbourne – a city that is viable, sustainable, liveable and prosperous, long into the future. Having undergone thorough examination, our five discovery areas evolved into the four long-term objectives described on pages 37-53.

Drawing on local ideas and examples of excellence from around the world (notably from cities in the 100RC network), our working groups identified more than 200 relevant opportunities to tackle resilience challenges and help achieve these objectives. We then tested and refined each opportunity using the principles of the 100RC City Resilience Framework, including the 'resilience lens' and qualities of resilience (see opposite). This ensured that the actions in this strategy have resilience thinking at their core, and that they will bring the broadest possible benefits. To achieve these they are organised under four action areas described on page 55.

PHASE I
Nov '14 – June '15

Understand the context

- Stakeholder roundtables and meetings
- Stresses, shocks and assets
- Resilience perceptions and existing actions

→ Preliminary Resilience Assessment
→ Five discovery areas

Local government-led working groups

- 230 organisations
- More than 1000 individuals
- Local ideas and leading global practice

Vision for a resilient Melbourne + Resilience challenges

→ Over 200 opportunities

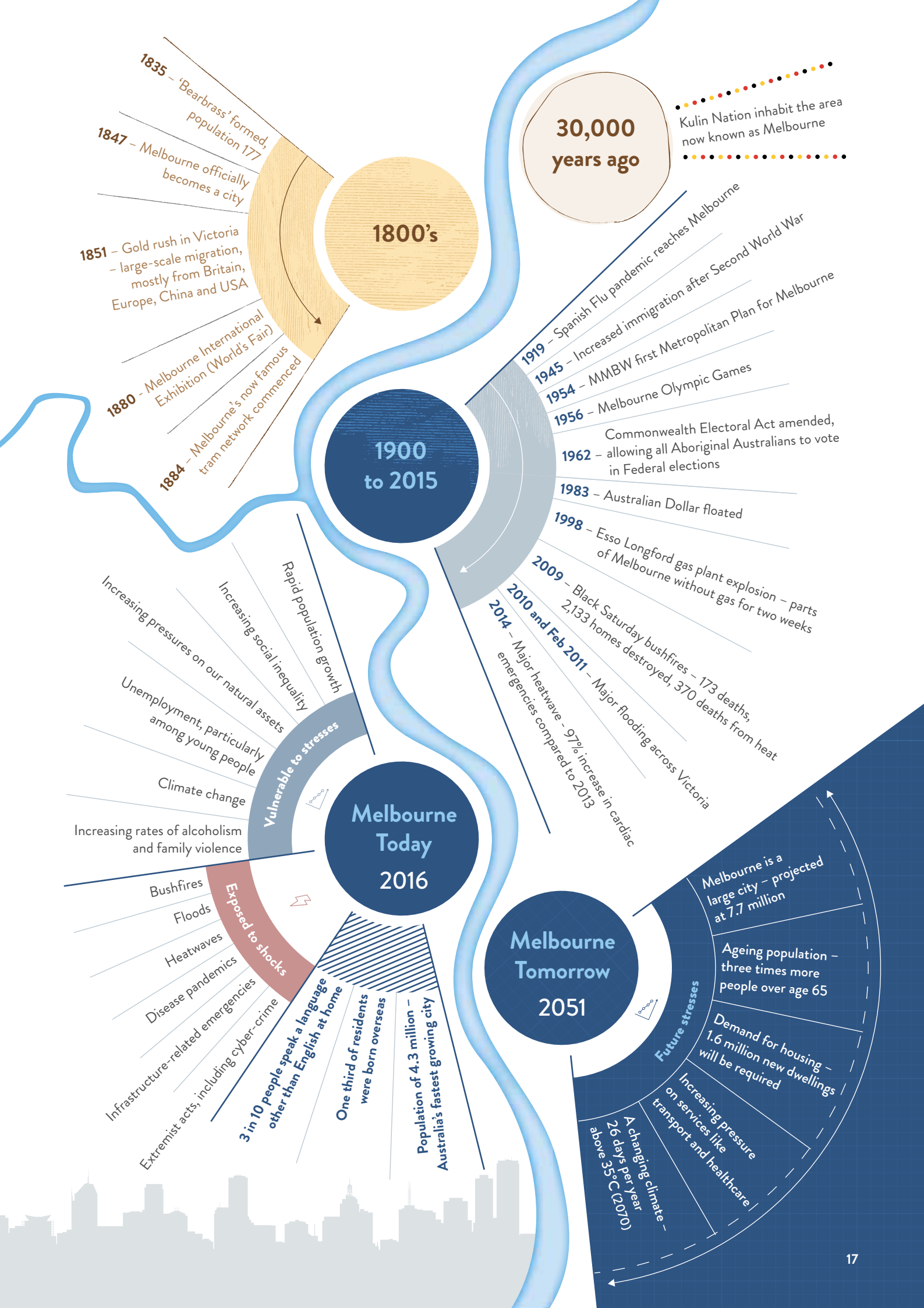
PHASE II
July '15 – May '16

THE 100RC CITY RESILIENCE FRAMEWORK

Resilient Melbourne Strategy

- **3 FLAGSHIP ACTIONS**
- **15 SUPPORTING ACTIONS**
- **15 ALIGNED LOCAL ACTIONS**

MELBOURNE IN CONTEXT


30,000 years ago
Kulin Nation inhabit the area now known as Melbourne
1800's
1835 – 'Bearbrass' formed, population 177
1847 – Melbourne officially becomes a city
1851 – Gold rush in Victoria – large-scale migration, mostly from Britain, Europe, China and USA
1880 – Melbourne International Exhibition (World's Fair)
1884 – Melbourne's now famous tram network commenced
1900 to 2015
1919 – Spanish Flu pandemic reaches Melbourne
1945 – Increased immigration after Second World War
1954 – MMBW first Metropolitan Plan for Melbourne
1956 – Melbourne Olympic Games
1962 – Commonwealth Electoral Act amended, allowing all Aboriginal Australians to vote in Federal elections
1983 – Australian Dollar floated
1998 – Esso Longford gas plant explosion – parts of Melbourne without gas for two weeks
2009 – Black Saturday bushfires – 173 deaths, 2,133 homes destroyed, 370 deaths from heat
2010 and Feb 2011 – Major flooding across Victoria
2014 – Major heatwave - 97% increase in cardiac emergencies compared to 2013
Melbourne Today 2016
Vulnerable to stresses
Rapid population growth
Increasing social inequality
Increasing pressures on our natural assets
Unemployment, particularly among young people
Climate change
Increasing rates of alcoholism and family violence
Exposed to shocks
Bushfires
Floods
Heatwaves
Disease pandemics
Infrastructure-related emergencies
Extremist acts, including cyber-crime
3 in 10 people speak a language other than English at home
One third of residents were born overseas
Population of 4.3 million – Australia's fastest growing city
Melbourne Tomorrow 2051
Future stresses
Melbourne is a large city – projected at 7.7 million
Ageing population – three times more people over age 65
Demand for housing – 1.6 million new dwellings will be required
Increasing pressure on services like transport and healthcare
A changing climate – 26 days per year above 35°C (2070)

Melbourne's Indigenous communities and colonial past

A resilient Melbourne recognises the value of the diversity and strength of Aboriginal and Torres Strait Islander cultures. We want an inclusive community – one where Melbourne's social and economic advantages can be fully enjoyed by the First Peoples of this land.

The land surrounding where the Birrarung (Yarra River) runs into the Nerm (Port Phillip Bay) is Kulin country. At the time of European settlement, the local Aboriginal population was estimated at somewhere between 10,000 and 20,000 people. The place now known as Melbourne is one in which Aboriginal people have lived, cared for country, and maintained their distinctive culture, for at least 30,000 years.[7] This longevity alone demonstrates the resilience of our First Peoples.

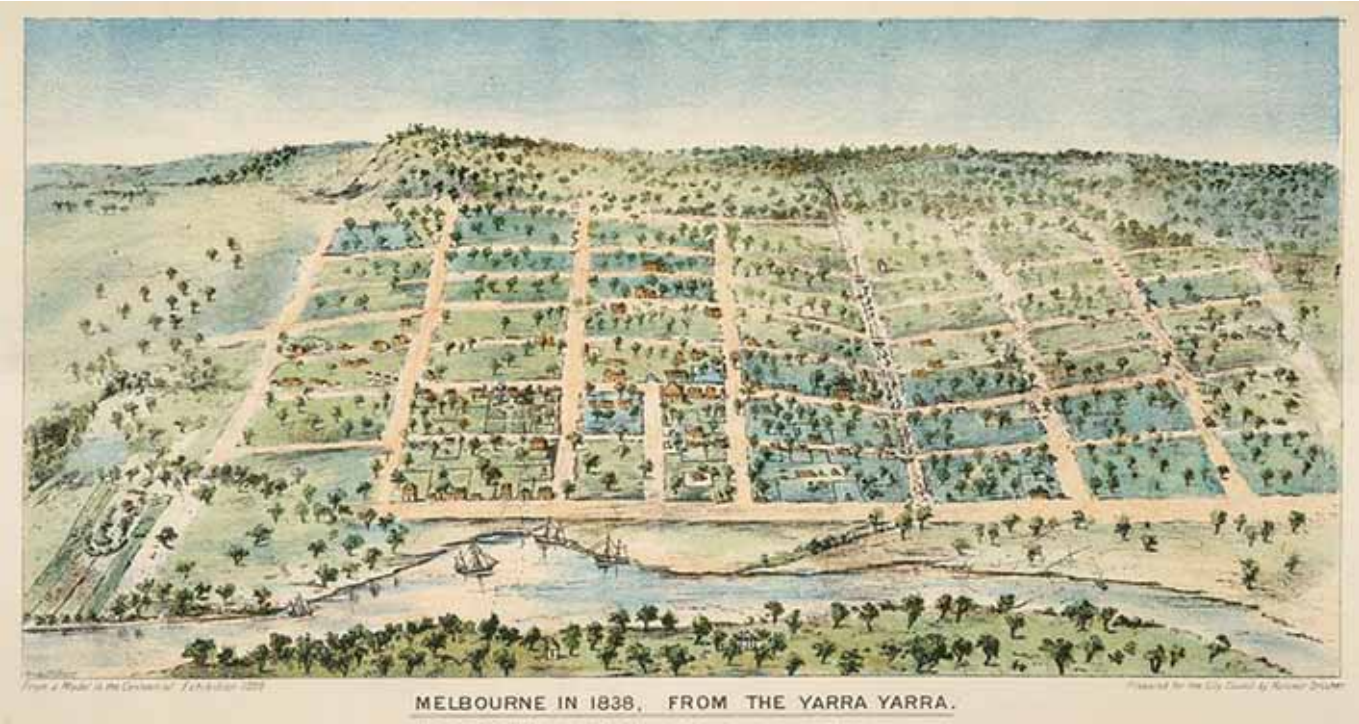
Although there are many stories and places in and around Melbourne that contain evidence of this connection to country, it is not always apparent to people who visit, live or work here. Nevertheless, Melbourne today is a significant gathering place for Aboriginal and Torres Strait Islander people, and is regarded by many as the hub of Victorian Aboriginal communities.

Traditional Aboriginal cultures and communities were severely and irrevocably harmed by the arrival of Europeans. The actions of explorers, whalers, sealers and settlers all took their toll on Aboriginal society. These repercussions are still felt today. Aboriginal Australians have strived to retain their culture and identity through the period of non-Indigenous settlement, for more than two centuries.

Performing Tanderrum, the traditional ceremony of the Kulin Nations, to open the 2015 Melbourne Festival.

In 1835, the fledgling community that would become Melbourne was called 'Bearbrass'. There were 177 new settlers (142 male, 35 female), 13 buildings and some 26,000 sheep.[8] For the European arrivals, Melbourne was at the far edge of the known world. It was a harsh environment that would have demanded resilience – people needed to be resourceful and adaptable to live here. If crops failed, sickness struck, or fire destroyed property, the new settlers had no outside support to turn to.

The grid that surveyor Robert Hoddle laid out for the settlement in 1837 had unusually wide streets and abundant parklands, more suited to a large city than to the small town that existed at the time. Even as a 'remote and sleepy wool port', this place possessed something that inspired visions of a grand future.[9] The first non-indigenous settlers survived then thrived, adapting to their new environment and laying the cultural, economic and physical foundations of the modern city that is Melbourne today.



The 'Hoddle Grid' in 1838, painted by Clarence Woodhouse.

Today, Melbourne is a liveable city

Melbourne is a stable and cohesive society, with many residents enjoying a high standard of living and quality of life, supported by ready access to education and healthcare. In Melbourne, a challenge for our resilience is maintaining these advantages and making them available to everybody.

Melbourne is known internationally for its excellence in urban design, creativity, culture and innovation. We have a sporting precinct at our heart, and throughout the city we enjoy cultural institutions such as art galleries, museums, libraries and theatres. Melbourne is recognised as a UNESCO City of Literature and as a UNESCO City of Learning (Melton), and is a major centre for street art, music and theatre.[10] All of these strengths support and contribute to our rich and diverse culture.

These amenities and our culture create economic opportunities and have contributed to Melbourne being consistently ranked as one of the world's most liveable cities for more than a decade.[11] These rankings reflect our high levels of stability and security, access to healthcare, education and culture, advanced infrastructure and relatively clean environment.

However, these rankings do not consider factors such as housing affordability or account for inequality across Melbourne. While our city is liveable for those with easy access to essential services and a well-paying job, living in the world's sixth-most expensive city presents major difficulties for many Melburnians, particularly in areas of entrenched disadvantage and those located furthest from the central business district.[12]

Inequality in Melbourne has other causes too. For example, gender, race and disability still influence a person's earning potential. The average weekly earnings of women in Victoria are 14 per cent lower than those of their male counterparts.

In 2013, average weekly disposable incomes of Melbourne's Indigenous population were $135 less than the incomes of non-Indigenous Melburnians ($564 versus $699).[13] Alongside this, people with a disability are likely to have lower incomes, due to lower workforce participation, and are often forced to rely more on government allowances such as the Disability Support Pension.[14]

Selected findings from research into Melburnians' perceptions around community cohesion[48]

Have a strong sense of belonging

72% to their local neighbourhood

88% to the city as a whole

Agree that people of different backgrounds get along well together

66% of all Melburnians

76% of central Melbourne residents

Believe most people in their neighbourhood can be trusted

30% of people aged 15-34

45% of people over 35

Are confident their neighbourhood would pull together in an emergency

41% of all Melburnians

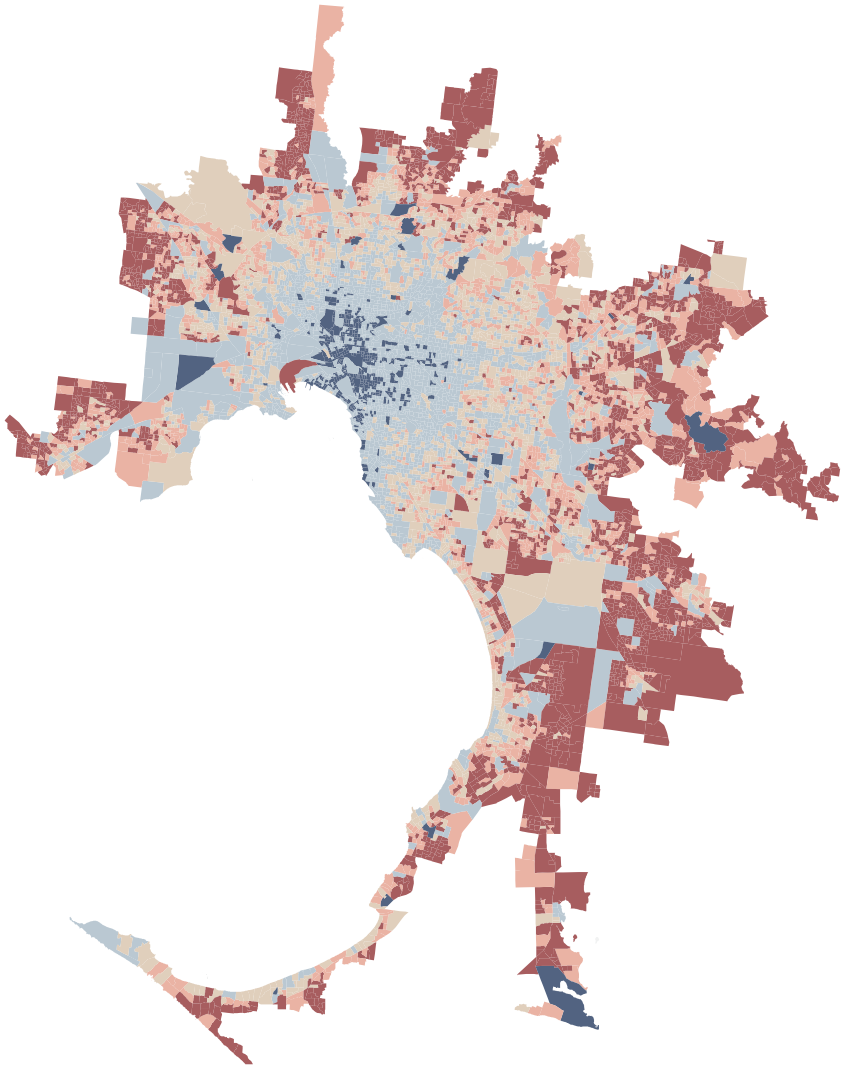
52% for those who also report a strong sense of belonging to where they live

From left: the Melbourne Cricket Ground; Child with Stormwater Australia prize won by Banyule City Council; Hosier Lane, Melbourne; 2014 African Music & Cultural Festival.

Vulnerability Analysis of Mortgage, Petroleum and Inflation Risks and Expenditure (VAMPIRE) Index, 2011

Since the Second World War, Melbourne's growth has radiated outwards from the central business district. A 2012 parliamentary inquiry into liveability in outer suburban Melbourne found that this, and the rapid rate of growth, 'has placed significant pressure on existing infrastructure and created strong demand for new infrastructure'.[15] *Outer suburban communities have poorer access to employment, services and transport, and are at higher risk of becoming isolated and disconnected.*[16]

The map below shows how more car-dependent areas are more vulnerable to fluctuations in factors such as petrol prices and interest rates.



LEGEND

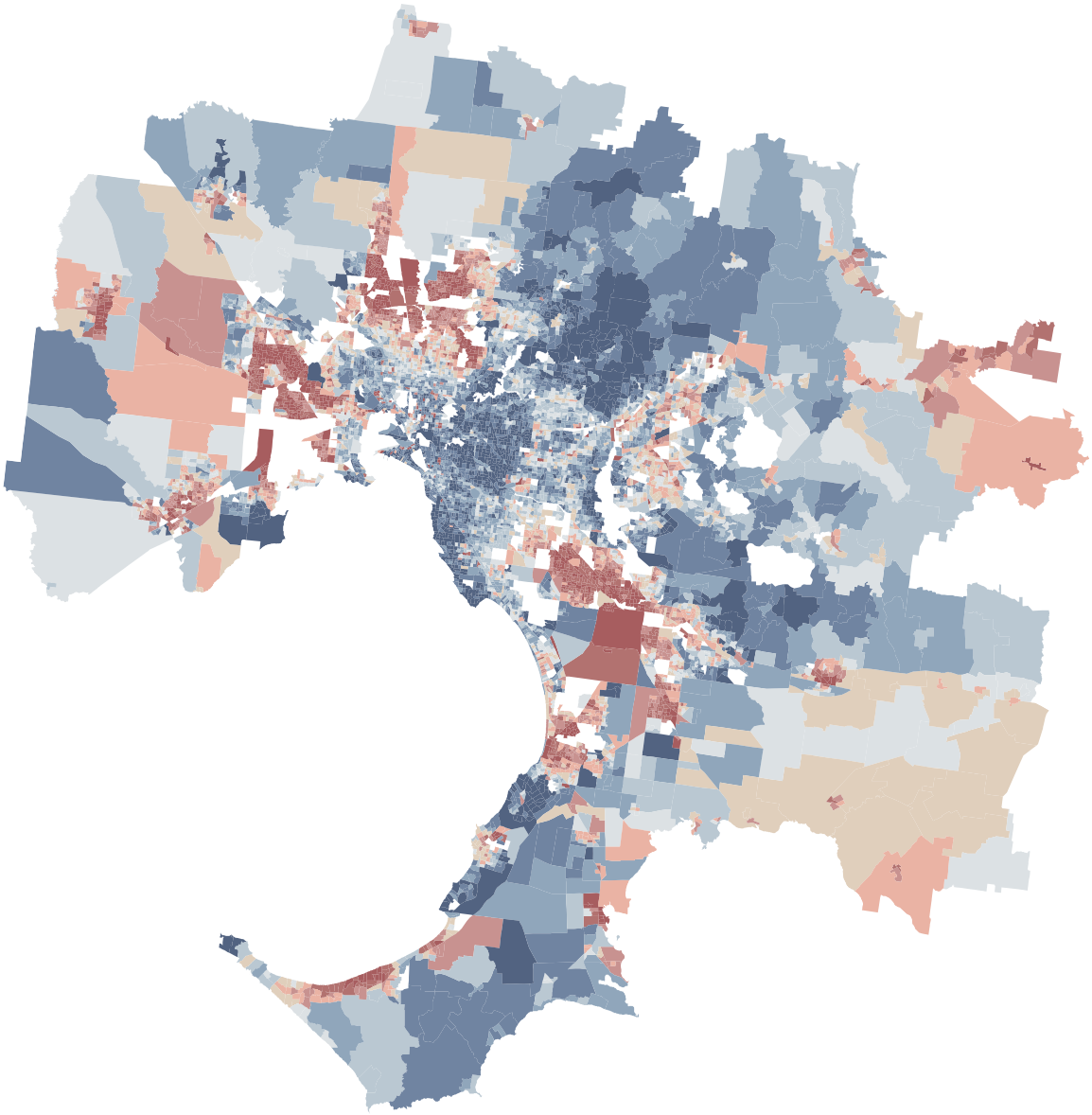
Very High Vulnerability — Minimal Vulnerability

Source: Griffith University - Urban Research Program, 2015, VAMPIRE 2011 for Australian Capital Cities. Accessed from AURIN Portal on 2016-03-18.

Socio-Economic Indexes for Areas (SEIFA)

Geographic disadvantage is entrenched in many communities. Despite a proliferation of social initiatives led by Commonwealth and state governments, many areas that were disadvantaged decades ago remain disadvantaged today.[17] *Melbourne's councils, thanks to their strong links with their local communities, are well placed to tackle these inequities.*

The map below shows the spread of disadvantage across Melbourne. High disadvantage is defined as low access to 'material and social resources and ability to participate in society', which include factors such as employment, English-speaking proficiency and household income.



LEGEND

Most Disadvantaged ● ● ● ● ● ● ● ● ● ● Least Disadvantaged

Source: Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2011 (cat. no. 2033.0.55.001). Accessed from the AURIN Portal 2016-03-18.

Proudly multicultural and diverse

Melbourne's diversity is a major strength, but to be truly resilient our society must also be cohesive, to avoid the stresses caused by disunity, and to be able to act as one when shocks do strike.

Melburnians born overseas – Top 8 countries of birth (2011)

	Change since 2001
UK 165,487	1.5%
India 106,549	261.9%
China 90,934	154.4%
Italy 68,799	-15.1%
New Zealand 67,076	45.7%
Vietnam 67,041	0.1%
Greece 48,292	-13.4%
Sri Lanka 42,674	63.8%

Across the Greater Melbourne area, nearly one-third of residents were born overseas, with the largest numbers coming from the United Kingdom (4.2 per cent), India (2.7 per cent), China (2.3 per cent), Italy (1.7 per cent) and New Zealand (1.7 per cent).[18] There are also substantial Vietnamese, Sri Lankan and Malaysian-born communities, in addition to recent South African and Sudanese migrants. Across Melbourne, 33 per cent of people speak a language other than English at home.[19] Melbourne has the largest Greek-speaking population outside Europe – comparable to some larger cities in Greece – and the surname Nguyen is our second-most common surname, after Smith.[20]

Inclusion and integration are essential qualities of resilience, both for systems and people. Melbourne has a long history of inclusion and many see our acceptance of new arrivals as one of our greatest strengths. However, there have been problems, including racial intolerance, although at comparatively low levels compared to some other parts of the world.

Immigration from overseas is set to be the greatest contributor to Melbourne's and Victoria's population growth, with an average of 48,000 people estimated to arrive every year between 2006 and 2036.[21] This movement of people brings new skills and greater cultural understanding, as well as connecting us more deeply to the rest of the world. It will be essential to our wellbeing as a society and our overall resilience that as our population grows and becomes more culturally diverse, we continue to welcome newcomers and the diversity they bring.

Melbourne's most multicultural municipalities are Greater Dandenong and Brimbank, where respectively 64 per cent and 56 per cent of residents speak a language other than English at home.[22] Unfortunately, these municipalities also rank first and third in Victoria on the Socio-Economic Indexes for Areas (SEIFA) measure of disadvantage, indicating that establishing a prosperous life in Melbourne can be difficult for many people arriving from overseas.[23]

Globally and regionally connected

What happens around the world is felt in Melbourne, and what we do here can affect people's lives far beyond our own city. We prosper thanks to our connections but when systems fail or events happen in places with which we trade and engage, our resilience may be threatened by those very linkages.

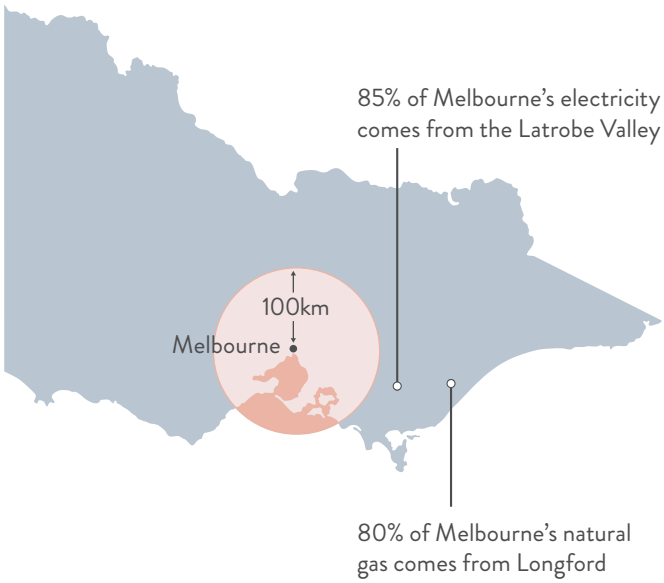
Melbourne has been at the centre of numerous technological and scientific innovations that have improved lives across the world – the bionic ear, the human papillomavirus (HPV) vaccine and the 'black box' flight recorder all had their origins in Melbourne, to name just a few. We have also developed world-leading approaches to tackling social and environmental issues, such as in emergency management and water-sensitive urban design.

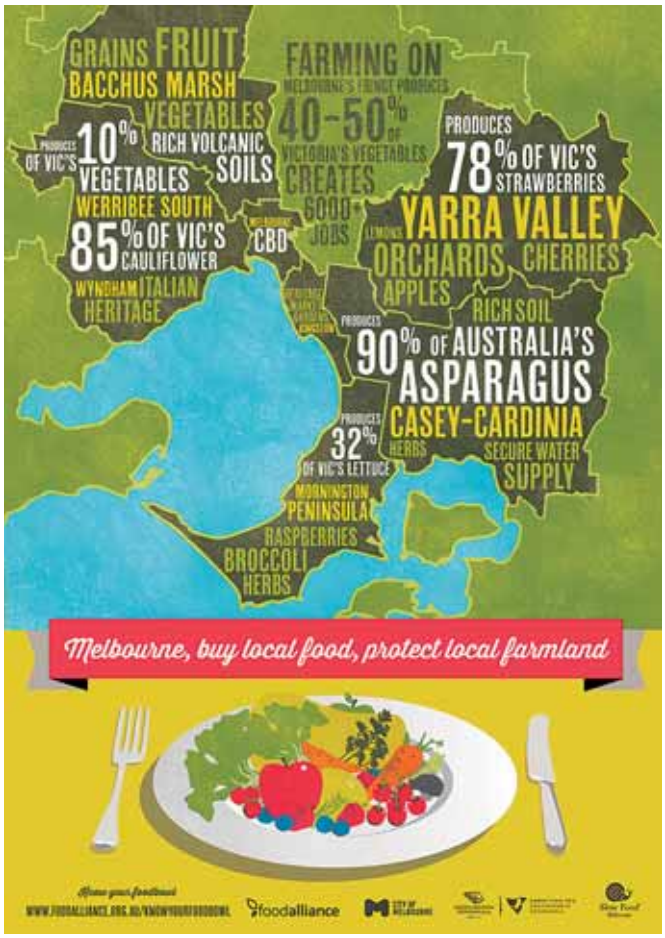
We are active in global programs that support resilience building. In addition to 100RC, Melbourne participates in the C40 Network, which connects cities around the world on climate change-related challenges. The UN Global Cities Compact Programme is also managed from Melbourne and we host ICLEI (Local Governments for Sustainability) for the Oceania region. We look to use these networks to assist not just Melbourne but a broad range of other countries and their cities.

Melbourne is connected to global economic trends through trade, people and the flow of information. Our increasing links to Asia present significant opportunities, as a growing Asian middle class comes to Melbourne seeking high quality produce, education, healthcare and holiday destinations. But this level of global connectedness also brings some risks, by making Melbourne vulnerable to economic events and trends overseas, such as the recent slowing of growth in China.

Lloyds Risk Register has identified an international market collapse as the greatest threat to Melbourne's insurable gross domestic product. Cyber-crime, which can originate anywhere in the world, was ranked second.[24]

Key food and energy sources for Melbourne





Metropolitan Melbourne is highly dependent on other parts of Victoria, as well as on other cities and states in Australia. For instance, 41 per cent of Melbourne's fresh produce is currently grown within 100 kilometres of the city, but as urban development spreads outwards to accommodate population growth, the resulting loss of agricultural land could reduce this figure to 18 per cent by 2050.[25] The current trend is towards greater reliance on produce from interstate and overseas, which exposes Melbourne to longer supply chains that are more vulnerable to shocks such as severe weather, extreme currency fluctuations and political unrest.

Melbourne is also heavily reliant on activities outside the metropolitan area for its energy supply.[26] Existing energy sources, notably brown coal mined and burned in the La Trobe Valley to generate electricity, contribute directly to environmental stresses. The grid that this energy fuels is further vulnerable to shocks in the form of extreme events, whether natural or man-made.

Food map produced by the Food Alliance initiative - 40-50% of Victoria's total vegetable production occurs on Melbourne's fringes.

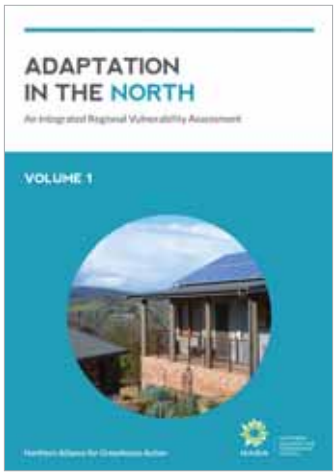
Active in building resilience

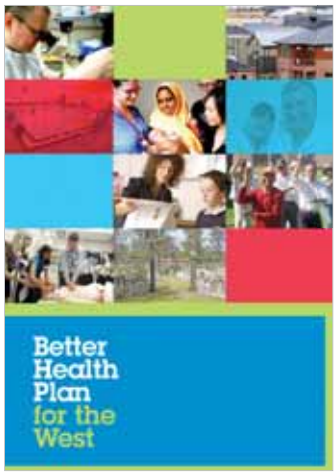
We build our resilience in many ways, directly and indirectly, consciously and otherwise. Our future resilience will be determined by how well we unite and integrate efforts and investments.

In addition to the international networks highlighted above, resilience-building in Melbourne is fundamentally influenced by policies at Commonwealth, state and local government levels, and across a number of ministerial portfolios and agencies. These policies are undergoing significant reform. Australia is shifting its focus on managing and responding to emergencies, to proactively building resilience, as shown by the 2011 *National Strategy for Disaster Resilience.*[27] The importance of cities to Australia's future was recognised by the appointment, in 2015, of a federal minister for cities and the built environment. [28]

At the state government level, *Plan Melbourne*, Melbourne's metropolitan planning strategy, is currently being refreshed to incorporate responses to climate change, lack of affordable housing and infrastructure commitments.[29] *Plan Melbourne* is part of a web of reviews and initiatives such as regional growth plans, precinct structure plan guidelines, open space and boulevard plans, and the Yarra River strategies.

The recently created Infrastructure Victoria is initiating a consultation process to begin developing a 30-year infrastructure strategy for Victoria (page 137 describes this aligned local action in more detail).





At the local government level, each of Melbourne's 32 councils has a range of strategies that, together, contribute to Melbourne's overall resilience. Every council has a council plan, municipal health and wellbeing plan, municipal emergency management plan, and a planning scheme. Most councils also publish documents on specific issues, such as economic development strategies and climate change adaptation plans.

Melbourne's multiplicity of councils enables each municipality to tailor its activities to suit its local community. Councils also regularly collaborate on important issues, often forming regional groupings (for example, the *Inner Melbourne Action Plan and Lead West*). But we may still be missing opportunities to implement more effective and efficient solutions available on different scales. Councils are at the front line in tackling problems – such as the effects of social exclusion and isolation – that cross municipal boundaries. The cooperative approach promoted by *Resilient Melbourne* can be a catalyst for better coordinating these efforts across multiple municipalities.

We need to coordinate and act better together because despite all of the attention to resilience-building by government, many businesses and community organisations, we continue to face significant chronic stresses and acute shocks, as described in the following pages.

"This is a rare and unique opportunity to think and act collectively. The impact of our decisions will be seen in decades to come."

Tracey Slatter,
Chief Executive Officer,
City of Port Phillip

Open space in Cardinia Shire Council.

ALIGNED LOCAL ACTIONS

This icon indicates existing initiatives that align with the Resilient Melbourne vision and have the potential for further local government involvement.

Faced with chronic stresses

Despite our many efforts and relative wealth overall, as a city we face stresses that weaken the fabric of our society, further entrench disadvantage, and may trigger the shocks of the future. Chronic stresses act like 'shock amplifiers', increasing both their likelihood and the harm they cause.

RAPID POPULATION GROWTH

Between 2006 and 2011, Growth Area councils on Melbourne's fringe (Casey, Cardinia, Hume, Melton, Whittlesea and Wyndham) grew by 183,726 people – 50 per cent of metropolitan Melbourne's total population growth.[30] A mixture of high birth rates – 80 babies are born each week to Wyndham families – and migration make Whittlesea and Wyndham Australia's two fastest-growing municipalities, with Casey and Melton also in the top ten.[31]

Rapid population growth makes it more difficult to provide adequate infrastructure and services, and increases the pressure on the city's outer regions in particular. The rate and scale of development is testing our natural environment and the benefits it provides, such as clean air, climate regulation, water filtration and recreational opportunities.

Although recent research undertaken for *Resilient Melbourne*, as well as annual surveys conducted by the Scanlon Foundation, show that Melbourne has relatively high levels of social cohesion,[32] there is a concern that our current development is inadequately integrating new arrivals into established neighbourhoods and opportunities.

A CHANGING ECONOMY AND HIGHER UNEMPLOYMENT

In parallel with a growing population, our economy is moving away from its traditional manufacturing past. While Melbourne is still home to some of Australia's significant manufacturers, our economy is becoming more knowledge and service-based, with strengths in finance, healthcare and education. For instance, among all Organisation for Economic Co-operation and Development (OECD) countries, Australia in 2014 had the highest proportion of international students enrolled in its tertiary institutions.[33] Melbourne is home to some of Australia's largest universities, education services are a major industry and International students are now a significant part of Melbourne's multicultural population.

The shift away from manufacturing has resulted in higher unemployment, particularly in the south east (7.7 per cent) and northwest (8.1 per cent) of the city.[34] Further advances in digital technology and automation are expected to cause the loss of even more manufacturing jobs in coming years – analysis by PricewaterhouseCoopers (PwC) indicates that 39 per cent of Melbourne's workers are currently in jobs at risk of disappearing.[35]

Additionally, income disparity in Australia grew consistently between 1995 and 2012.[36] This corresponds with rising median house prices across Melbourne, less access to the property market, as well as increasing homelessness, as shown to the right.

Trends in housing and homelessness

Median house prices

1980 — 3 x — Median annual income — 7.5 x — Today

Average age of first home buyers

1970 — 26 years → 31 years — 2011

Homelessness

28% 2012 (compared to 1996)

From top: The Ornamental Lake in Melbourne's Royal Botanic Gardens was nearly empty during the Millennium Drought; 'Shelter' by local photographer Vicki Barmby.

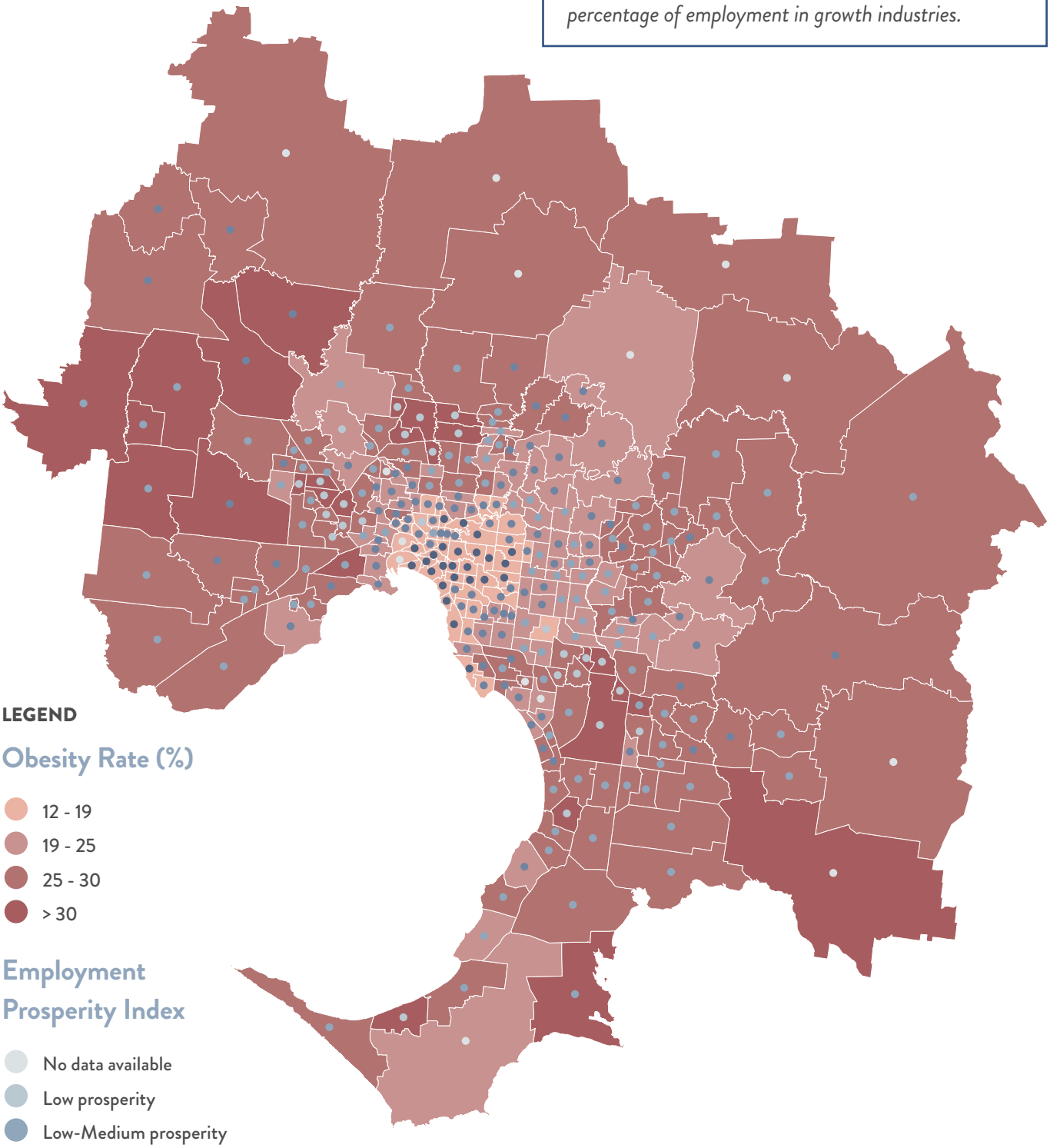
PRESSURES ON OUR QUALITY OF LIFE AND HEALTHCARE SYSTEM

The stresses caused by economic inequality and geographic disadvantage can lead to other stresses, such as increased traffic congestion and longer commuting times. Along with factors such as employment vulnerability, these stresses correlate with higher frequency of alcoholism and a 62 per cent increase in reported family violence incidents since 2010-11.[40] This reflects an interdependency of problems that we must tackle if we are to reduce the serious consequences of these stresses.

Additionally, Melbourne's population is ageing, and we are seeing increasing rates of preventable illnesses. If current trends continue, it is estimated that more than 30 per cent of 5–19 year olds will be overweight or obese by 2025, as well as 83 per cent of males and 75 per cent of females aged 20 years and over.[41] These trends place significant strains on our healthcare system. For the period from 2002–03 to 2032–33, annual health expenditure for diabetes across Australia is expected to increase by 401 per cent, from $1.4 billion to $7 billion, largely owing to higher rates of obesity.[42] Increasing rates of mental illness will also contribute – in Victoria, the current economic cost of mental illness has been estimated at $5.4 billion per year, of which half ($2.7 billion) represents lost productivity and workforce participation.[43]

DISTRIBUTION OF OBESITY AND ECONOMIC PROSPERITY

This map shows a correlation between lower obesity rates and higher economic prosperity of residents, particularly in inner Melbourne. The Economic Prosperity Index (EPI) considers factors such as average income, unemployment rate, and the percentage of employment in growth industries.



Sources: University of Adelaide - Public Health Information Development Unit, 2014, SA2 Health Risk Factors - Modelled Estimate (Obesity Rate per 100).

University of Newcastle - Centre of Full Employment and Equity, 2015, Economic Prosperity Index for Australia 2011 (Growth Industry). Accessed from AURIN Portal on 2016-03-19

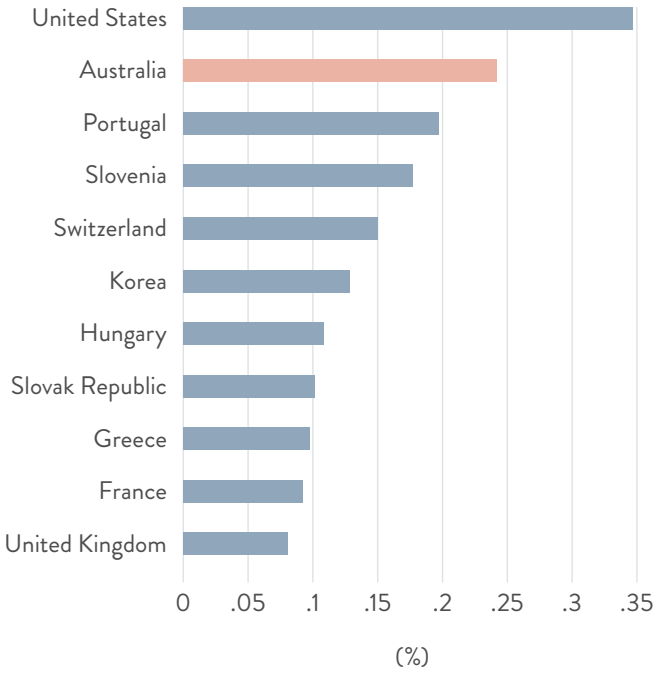
Vulnerable to acute shocks

Melbourne is exposed to natural disasters such as extreme heat, bushfires and floods, and emerging shocks like disease pandemics and extremist acts. As our city grows and is also affected by climate change, we need to be prepared for multiple shocks to occur at once.

NATURAL DISASTERS

The cost of natural disasters in Victoria is significant. Damage caused by floods in the Port Phillip and Westernport catchments alone is estimated at approximately $400 million per year, while the total cost of natural disasters between 2003 and 2013 has been valued as high as $19.9 billion.[44]

Percentage GDP lost from extreme weather events, 1993-2012



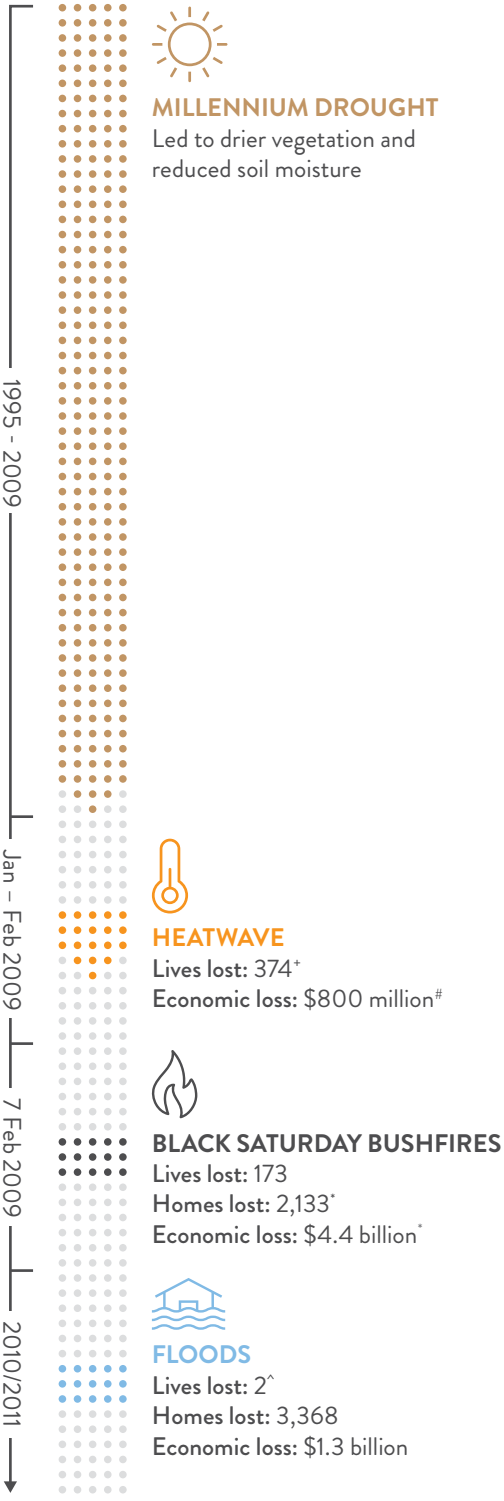
Right, from top: Country Fire Authority truck at the 2009 Kinglake Fires; Flooding outside the Salvation Army store in Windsor.

The *National Strategy for Disaster Resilience* notes that most disasters – although seeming to be sudden or unexpected events – begin slowly, because they usually arise from environmental conditions that create vulnerability to a triggering event. For example, between 1995 and 2009 Melbourne experienced a severe drought that significantly reduced reserves of potable water, as well as creating low soil-moisture levels and extremely dry vegetation.[45] The chronic stress of drought placed extreme pressure on agricultural industries and created ideal conditions for bushfires.

Then, in 2009 several devastating shocks occurred concurrently: the Black Saturday bushfires killed 173 people, destroyed thousands of homes, and disrupted power supplies to nearly 500,000 people, while the accompanying heatwave was linked with 374 more deaths due to heat-related illness.[46] In late 2010 and early 2011, heavy rain from the west brought some of the worst floods ever seen in this part of the world.[47] Climate change, population growth and urban development will make these kinds of events more frequent, more severe, and will affect more people.

Melbourne also experiences the indirect effects of natural disasters elsewhere in our region – for example, floods in agricultural areas can inflate food prices, and fire crews based in Melbourne's east are regularly called on to tackle bushfires in rural areas.

Drought, heatwave, bushfire and flood – how stresses and shocks work together



* Bushfire Royal Commission findings
\+ ABS
^ Lifesaving Victoria 2010/11 report
\# CSIRO (2010) "Change: Adapt now for the future", p.2. http://www.csiro.au/Organisation-Structure/Flagships/Climate-Adaptation-

Not only do shock events harm those most vulnerable, they can also create their own stress consequences. The Australian Business Roundtable for Disaster Resilience and Safer Communities notes that the social costs of natural disasters 'tend to persist over a person's lifetime, while most tangible costs are one-off'.[48] Following shock events, we find notably increased rates of mental illness, family violence and suicide, often some years after families or communities appear to have recovered from the event.

HUMAN-DRIVEN SHOCKS

Pandemic influenza is Victoria's third-highest priority emergency risk.[49] Aside from the obvious health ramifications, pandemics have the potential to cripple Melbourne's economy, particularly given the high concentration of employment in inner Melbourne municipalities. For instance, the 2009 outbreak of H1N1 (Swine Flu) was estimated to have reduced Australia's gross domestic product by as much as 1.3 per cent, due to workplace absenteeism and lower business investment, even though fewer than 1,000 cases of the illness were reported across Australia.[50]

Transport infrastructure emergencies are also a major risk for Melbourne.[51] The full closure of the CityLink, Burnley and Domain tunnels in October 2012 due to a technical failure showed how such incidents can cascade through our city systems, testing the extent of redundancy, i.e. additional capacity to cope with unexpected circumstances, in our transport network, and leading to widespread congestion across all major modes of transport (road, rail, tram, bus). Our rapid population growth, increasing demand for transport, ageing infrastructure and greater incidence of extreme weather events will all contribute to these risks.

Over the coming years we will also face new types of shocks caused by humans. For instance, Lloyd's City Risk Index ranks cyber-crime as Melbourne's second-greatest threat to insurable gross domestic product ($3.87 billion), ahead of floods and disease pandemics.[52]

MELBOURNE'S RESILIENCE OBJECTIVES

Resilient Melbourne has identified four long-term (30 years or more) resilience objectives. For each of these, local government can take a leading role, in partnership with other sectors. Even more importantly, we agreed to concentrate on tackling our chronic stresses and developing actions that will make Melbourne stronger and more resilient whatever shocks we may face, rather than focusing on particular shock events.

Our long-term objectives

All *Resilient Melbourne* objectives are interdependent. To be truly resilient our people must support each other and must have places that encourage this support. This requires a strong economy, so we can invest in infrastructure and services across our entire city and to give all our citizens opportunities to generate income. And all of this will be affected – for better or worse – by the state of our natural environment.

To read more about the process for determining the four resilience objectives, and *Resilient Melbourne* more broadly, visit our website: www.resilientmelbourne.com.au/

"We need to collaborate as a group of metropolitan councils, and also collaborate with state government and private industry. None of us can do it alone."

Simon McMillan,
Chief Executive Officer,
Banyule City Council

STRONGER TOGETHER

Empower communities to take active responsibility for their own and each other's wellbeing, safety and health.

A DYNAMIC ECONOMY

Provide diverse local employment opportunities that support an adaptable workforce that is ready for the jobs of the future.

OUR SHARED PLACES

Create and sustain buildings, infrastructure and activities that promote social cohesion, equality of opportunity and health.

A HEALTHIER ENVIRONMENT

Enable strong natural assets and ecosystems alongside a growing population.

Stronger together

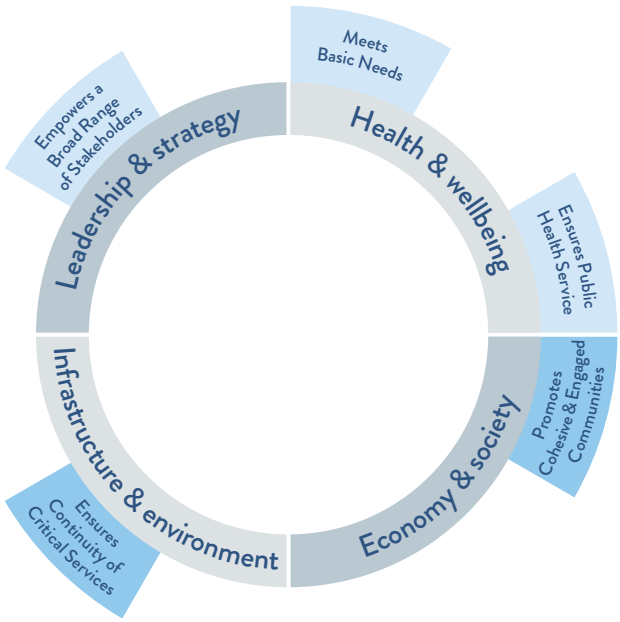
Empower communities to take active responsibility for their own and each other's wellbeing, safety and health.

WHY IS THIS OBJECTIVE IMPORTANT?

Melburnians, like most Australians, generally see themselves as resourceful and resilient in the face of shocks. However, research undertaken by Resilient Melbourne found that only 41 per cent of Melburnians are confident that their neighbourhood would pull together in an emergency, and only 39 per cent believe that most people in their neighbourhood can be trusted.[53]

This suggests that we are not as cohesive as we imagine. Such perceptions place increased pressure on our emergency services by reducing community self-reliance. With a less certain future and more extreme events likely, equipping our citizens to be more self-reliant and mutually supportive is likely to be crucial for their and the city's resilience.

In the past, Australia focused its efforts almost exclusively on responding to the after-effects of disasters, rather than on preventing or mitigating disasters before they happen. A recent report by the Australian Government Productivity Commission found that 97 per cent of disaster funding is spent on response activities, while the Australian Business Roundtable for Disaster Resilient and Safer Communities suggests that investing in disaster preparedness and resilience-building could reduce government disaster response budgets by 50 per cent.[54]



"The emphasis needs to be on 'with' the community. Community is at the heart of resilience. Sure there is emergency management, urban planning and other aspects, but building community resilience and working with community is core."

Frank Archer,
Director,
Monash University Disaster Resilience Initiative

We are fortunate to have governments that are able to respond to disaster events. However, this is contributing to a common perception that our safety and preparedness are someone else's responsibility, and that governments can always be relied upon to come to the aid of those who do not plan ahead. We need our communities to be better able to recognise the hazards they face, to plan to manage risks and their consequences for themselves and their broader communities, supported by certainty that governments will always help the most vulnerable and those who are simply unfortunate.

This phenomenon of under-preparedness is demonstrated by widespread under-insurance among Australians. Research by the Insurance Council of Australia found that 81 per cent of homeowners and renters do not have sufficient insurance cover to resume the same standard of living following a crisis; this is also true of many small to medium business enterprises.[55]

Melbourne's *Preliminary Resilience Assessment* identified greater self-reliance and personal responsibility as important factors in easing pressure on our healthcare system.[56] While all levels of government have responsibilities to create and maintain conditions that give people control over their lives, at present, many community, market and government structures do not encourage this. All too frequently we deliver services in ways that lead to dependence, rather than fostering capacity and empowering our citizens.

In keeping with the approach of the Victorian Government, and of many councils, Resilient Melbourne acknowledges that social factors such as education, income and access to open spaces are crucial to a person's capacity to lead a healthy lifestyle.

In contributing to this objective, we will support actions that:

- help us understand what motivates communities and individuals to be more proactive about each other's wellbeing
  - *Understanding the drivers of community resilience* on page 94.
- develop new ways of operating that empower communities to be more active in their safety and wellbeing
  - *An emergency management community resilience framework for Victoria* on page 90.
- build new community networks, and strengthen existing ones
  - *The Neighbourhood Project* on page 74.
- help people at risk of exclusion form strong social bonds
  - *Multicultural water safety and settlement* on page 98.
  - *Young and Resilient living labs* on page 126.
- make insurance affordable for more people
  - *Innovative insurance* on page 104.

Graphic output from the Resilient Melbourne Accelerated Design Forum ('A stronger society' discovery area), held in August 2015.

Our shared places

Create and sustain buildings, infrastructure and activities that promote social cohesion, equality of opportunity and health

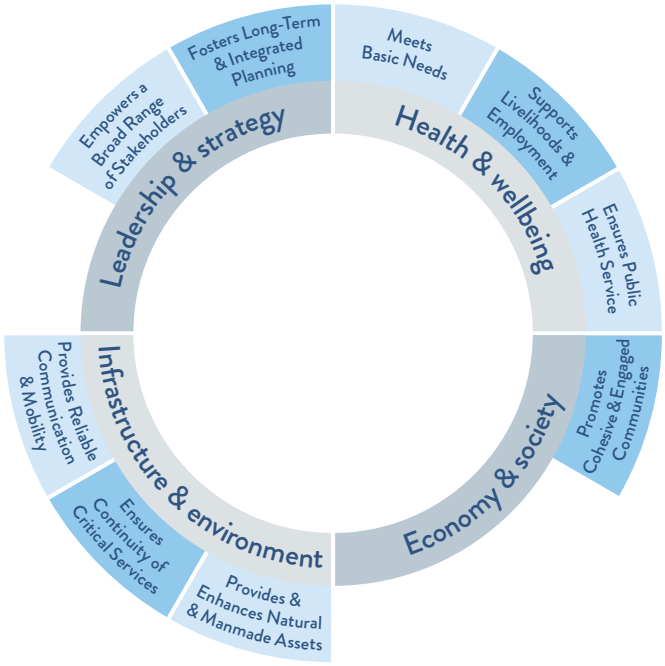
WHY IS THIS OBJECTIVE IMPORTANT?

The OECD defines a socially cohesive society as one that 'works towards the wellbeing of all its members, fights exclusion and marginalisation, creates a sense of belonging, promotes trust and offers its members the opportunity of upward mobility'.[57] Members of socially cohesive communities are better equipped to support one another through good times and bad.

Melbourne's physical form plays a major role in the cohesiveness of its communities. Affordable and suitable housing – a United Nations-recognised basic human right – efficient transport networks, and community infrastructure (including healthcare, educational facilities and recreational spaces) are all essential for building and maintaining social cohesion.

Providing infrastructure to support cohesive communities is a challenge for all of Melbourne, not only in its most disadvantaged areas, as highlighted on pages 22-23.

For instance, Southbank in the central business district is now home to more than 11,000 residents, most living in high-rise buildings, but the postcode has no school, bank or post office.[58] While Southbank benefits from its close proximity to the amenities of the central business district and South Melbourne, in some cases this kind of development can result in socially isolated residents, who have inadequate support networks to improve their everyday quality of life, or to turn to in times of need.



While providing adequate and equitable access to infrastructure is a major goal for Melbourne's resilience, we must also think about the activities and behaviours that lead to cohesive, fair and healthy communities – and how we can promote them. In 2010, the Grattan Institute examined the decision-making arrangements of successful cities. It concluded that 'high and sustained levels of public engagement in decision-making' and collaboration across different sectors of society are crucial. [59]

Cohesive communities are also better able to share resources and support each other in response to shocks and stresses. Following extreme events, cohesive communities make the means to survive and thrive – particularly capital and skills – available more quickly and to more people.

"On the one hand, we need to make resilience easy – something people can be proud of and do as part of day-to-day life. On the other, we also need to have hard conversations with community about planning. It's a long game – a 40 to 50 year game."

Kate Siebert,
Executive Officer,
Emergency & Community Safety,
Yarra Ranges Shire Council

In contributing to this objective, we will support actions that:

- trial new ways of providing community infrastructure and services, such as housing, transport and energy

  New apartments trial for social housing residents on page 78.

- create opportunities by working together and sharing resources in good times and bad

  Local government renewables group purchasing on page 82.

- actively involve citizens and communities in making decisions

  Community-led neighbourhood renewal and development pilot projects on page 116.

- use urban form to encourage greater social interactions

  Community-led neighbourhood renewal and development pilot projects on page 116.

- create spaces that enable people to come together to tackle shared challenges

  Young and Resilient living labs on page 126.

Below, from left: 2013 Reclink Community Cup - an annual Australian Rules football match held in Elsternwick; Members of the Young and Well CRC Youth Brains Trust.

LEARNING FROM OTHERS – SOCIAL COHESION IN CHICAGO'S HEATWAVE[60]

When a heatwave struck Chicago in 1995, two neighbourhoods – Auburn Gresham and Englewood – had almost identical demographic profiles. While both communities were exposed to similar heat, a built environment that fostered community connections meant that Auburn Gresham residents were more likely to check on each other, particularly on vulnerable and elderly people. Englewood, on the other hand, was experiencing a prolonged period of economic and physical decline, as well as lower levels of social cohesion.

The death rates from the heat wave were dramatically different: Englewood suffered 33 deaths per 100,000 people, while Auburn Gresham had just 3 deaths per 100,000. This shows how strong, connected communities can reduce harm caused by the shock events that will inevitably affect cities. This is a particularly instructive example for Melburnians as we face a future with more frequent and intense extreme heat events as a result of climate change.

ALIGNED LOCAL ACTION

Resilient Melbourne will work with the CSIRO (Australia's national science agency) to conduct an initial assessment of a range of metropolitan systems and their exposure to heat stress. The assessment will include local transport networks, healthcare systems, energy and water utilities, and other local support networks, including interdependencies between them. It will provide a scientific basis for councils to understand risk, and will assist inform recommendations to reduce vulnerability and support integrated planning and decision-making.

ABOUT THIS PROJECT'S 100RC PLATFORM PARTNER

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is Australia's national science agency. CSIRO research initiatives use science to solve real issues that make a difference to people, industry and the planet.

Through CSIRO's 'City Engines' web-based tool, cities can integrate climate adaptation and disaster risk reduction into action plans for more resilient cities. Through risk management, it aims to guide city partners to identify options that reduce the impact of climate change and variability.

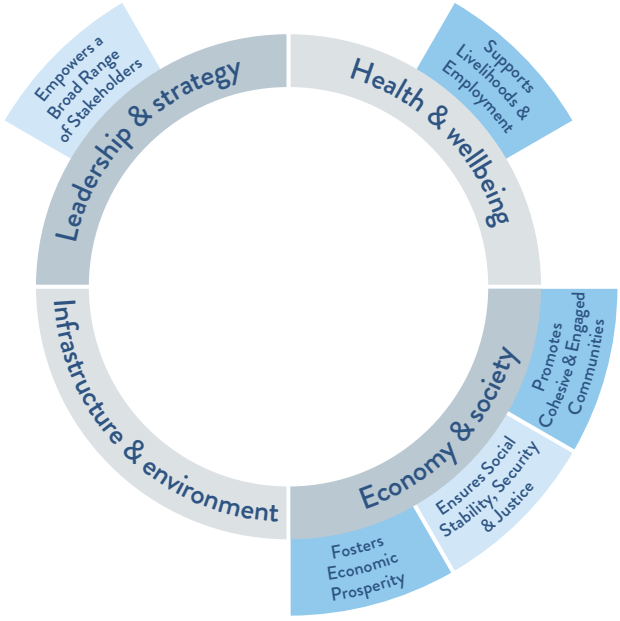
Below, from top: One of several community-led parklet projects across Melbourne; Launched in 2010, the Melbourne Bike Share network has 600 bicycles operating from 51 stations from Collingwood to St Kilda.

A dynamic economy

Provide diverse local employment opportunities that support an adaptable workforce that is ready for the jobs of the future.

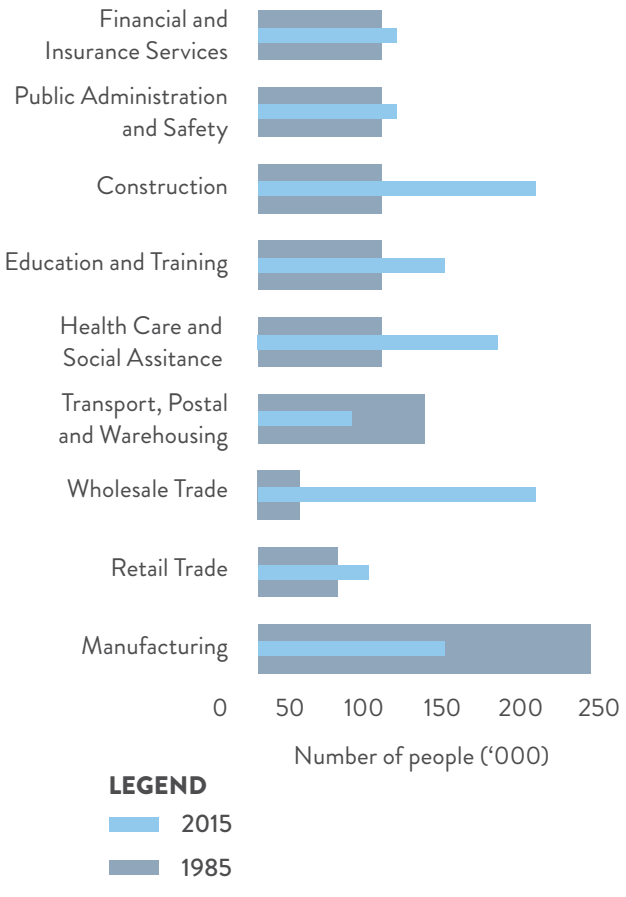
WHY IS THIS OBJECTIVE IMPORTANT?

Providing employment opportunities is critical to increasing the resilience of our city as a whole, as well as that of particular communities and individuals. Employment creates bonds based on common interests, and widens support networks. It enables us to buy services such as insurance, and provides income we can use to recover from shock events. Opportunities for diverse and fulfilling employment also help reduce a range of chronic stresses, such as homelessness, poverty, mental illness and domestic violence.



As described on page 30, Melbourne's economy is moving away from a heavy manufacturing past, towards higher-skilled jobs. For this reason, we need a workforce equipped to work in emerging industries, some of which may not yet even exist. Governments are increasingly aware that businesses competing in a global economy need more employees proficient in science, technology, engineering and mathematics (STEM). Although 75 per cent of Australia's fastest-growing occupations now require these skills, the number of STEM university graduates is not increasing, the number of graduating high school students (Year 12) studying STEM subjects is declining, and businesses are struggling to find STEM-skilled employees.[61]

Melbourne employment by industry



More generally, schools that are accessible to local communities are fundamental infrastructure to support this objective. Melbourne's rapid growth in particular locations, such as inner city and fringe areas, needs to be complemented with new schools.

> The PricewaterhouseCoopers (PwC) report, *A Smart Move*, predicted that shifting 1 per cent of Australia's workforce into science, technology, engineering and mathematics roles would add $57.4 billion to gross domestic product (net present value over 20 years).[62]

Although Melbourne has an extensive heavy rail system and the world's largest tram network by track length, where a person lives significantly influences their access to jobs.[63] Today, fewer than 10 per cent of employees in outer-ring municipalities work within 10 kilometres of home. This has contributed to a stretching of the peak commuting periods, making it harder to avoid traffic congestion when travelling to and from work.[64] Studies have linked lengthy commutes to ill health, including higher stress levels and lack of sleep.[65] *Resilient Melbourne* recognises that these trends pose a risk to Melbourne's future resilience and encourages actions that will improve economic activities across our metropolitan area.

Above, from top: A Monash University biochemistry laboratory; Members of the Young and Well CRC brains trust.

In contributing to this objective, we will support actions that:

- give Melburnians the right skills for the jobs of the future

  ↳ *STEM mentoring Melbourne* on page 130.

- help address societal challenges while equipping people to generate an income

  ↳ *Young and Resilient living labs* on page 126.

- promote a broader spread of successful new and small and medium-sized enterprises across Melbourne's entire metropolitan area, encouraging small employment clusters and service centres, as described in Plan Melbourne

  ↳ *Innovative business models* on page 134.

"By providing Melburnians with opportunities to gain relevant and transferrable skills, we are preparing our communities and economy to survive and thrive in the face of a changing global marketplace."

Chris Eddy,
Chief Executive Officer,
Hobsons Bay City Council

Graphic output from the Resilient Melbourne Accelerated Design Forum ('A competitive metropolis' discovery area), held in August 2015.

THE 100RC GLOBAL NETWORK IN ACTION

Nine 100RC cities are focusing on creating prosperous communities in post-industrial economies. Despite our different histories and geographies, we all have shared experiences that can help each of our cities solve entrenched challenges.

Cities currently involved are Boulder, Bristol, Christchurch, Durban, Glasgow, Melbourne, Pittsburgh, Rotterdam and Vejle.

Ageing industrial infrastructure on the Maribyrnong River.

A healthier environment

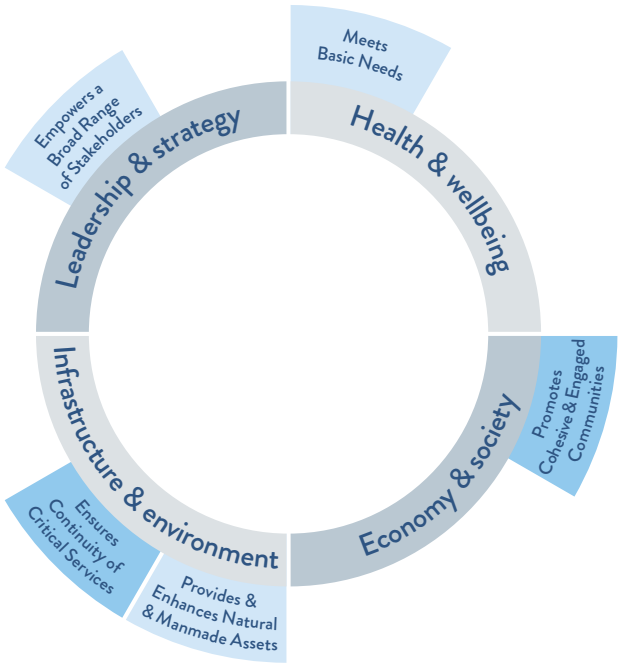
Enable strong natural assets and ecosystems alongside a growing population.

WHY IS THIS OBJECTIVE IMPORTANT?

Although our unique natural environment poses threats such as bushfires and floods, we also directly rely on it for our livelihoods and wellbeing. Melbourne's parks, forests, gardens and wetlands help clean the air we breathe, reduce noise, regulate the climate, filter water, and give us places for recreation, to name just a few. The *Plan Melbourne Refresh Discussion Paper* recognises that our non-urban areas provide important amenity and have inherent natural value, as well as supporting industries such as tourism, food production and horticulture. It states clearly that these areas should not be considered 'vacant land awaiting urban development'. These are just some of the reasons why people are increasingly valuing the economic benefits of our natural environment, in addition to its inherent value.

Despite such awareness, our natural assets are coming under increasing pressure as more development is needed to support our growing population. Rezoning and infill development are increasing population densities in inner and middle Melbourne, while new residential and industrial developments in outer areas often require clearing of remnant grassland, woodland or arable land. These trends are contributing to problems such as higher urban temperatures, increased runoff, and greater pressure on drainage infrastructure.

Melbourne faces these problems in the context of increasing pressures from climate change (p. 53). Research by Monash University has shown that maximum temperatures of 29 degrees Celsius and above increase the rate of heat-related illness and death in people over 64 years of age.[68] Melbourne is a coastal city; over time, rising sea levels will cause erosion and inundation that will damage our coastal areas, while at the same time more and more people are competing for access to this coastal land. [69]



The urban forest in the City of Melbourne alone was recently valued at $700 million – this accounts for the natural services these trees provide, as well as factors such as the increase in nearby property values.[67]

Protecting our natural assets saves money in the long run. Once a natural asset is lost, it is expensive, and in many cases impossible, to recreate or recover it. Such losses increase our reliance on hard infrastructure – for example, expensive sea walls to protect us against storm surges once natural systems such as mangroves are lost.

In contributing to this objective, we will support actions that:

- extend and link existing efforts to strengthen our natural assets and the ecosystem services they provide

  ↳ *Metropolitan urban forest strategy* on page 62.

- promote new and cost-effective ways to manage our natural resources more efficiently and reduce environmental damage

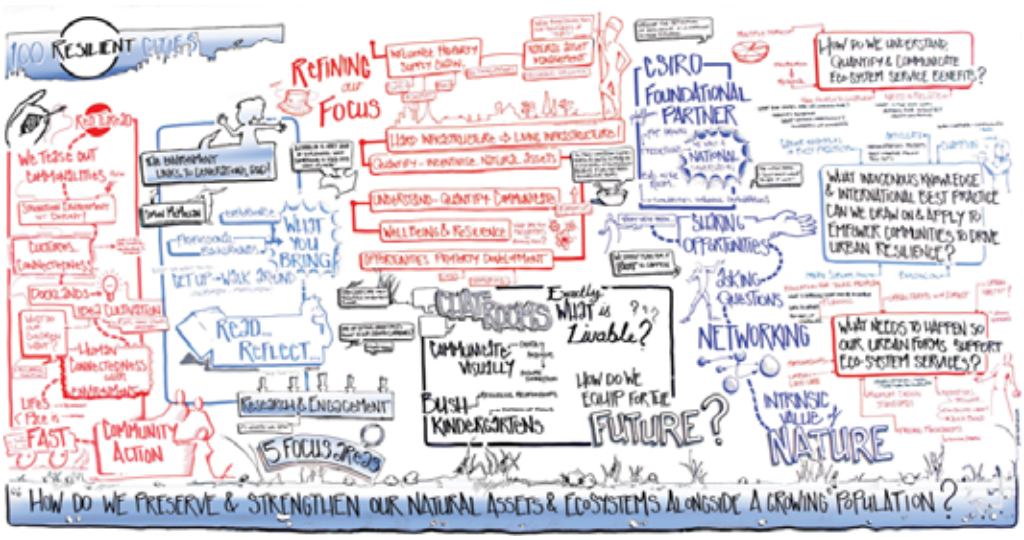
  ↳ *Integrated water management framework* on page 68.

- explore imaginative ways to put nature back into communities

  ↳ *The Neighbourhood Project* on page 74.

THE 100RC GLOBAL NETWORK IN ACTION

In an effort to strengthen their natural assets, several 100RC cities, including Melbourne and Durban, are sharing their experiences and innovative approaches to understanding the links between climate change, water and biodiversity, and better ways both to protect biodiversity and to use nature to provide hard infrastructure services such as flood defences.

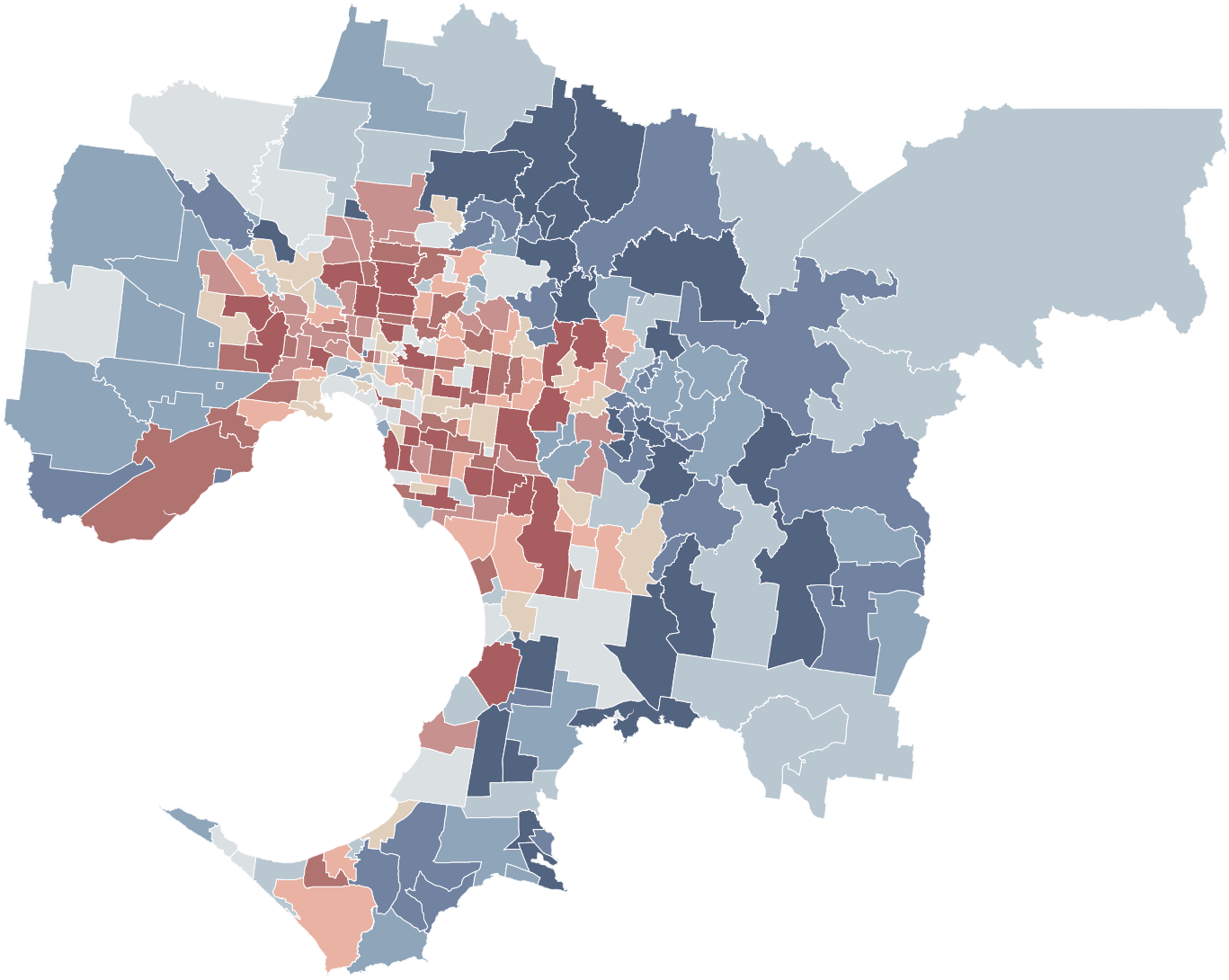


Below, from left: A pelican soars above the Western Treatment Plant, which is an internationally significant wetland visited each year by many migratory species; Graphic output from the Resilient Melbourne Accelerated Design Forum ('A healthier environment' discovery area), held in August 2015.

Vulnerability to heatwaves

This map shows vulnerability of residents to extreme heat events. Vulnerability is a function of exposure, sensitivity of the exposed population, and capacity to adapt.

Urban green spaces play a key role in cooling our city and reducing exposure to heatwaves. Although parts of Melbourne have extensive green spaces, some Melbourne municipalities have among the lowest rates of tree canopy cover in Australia.



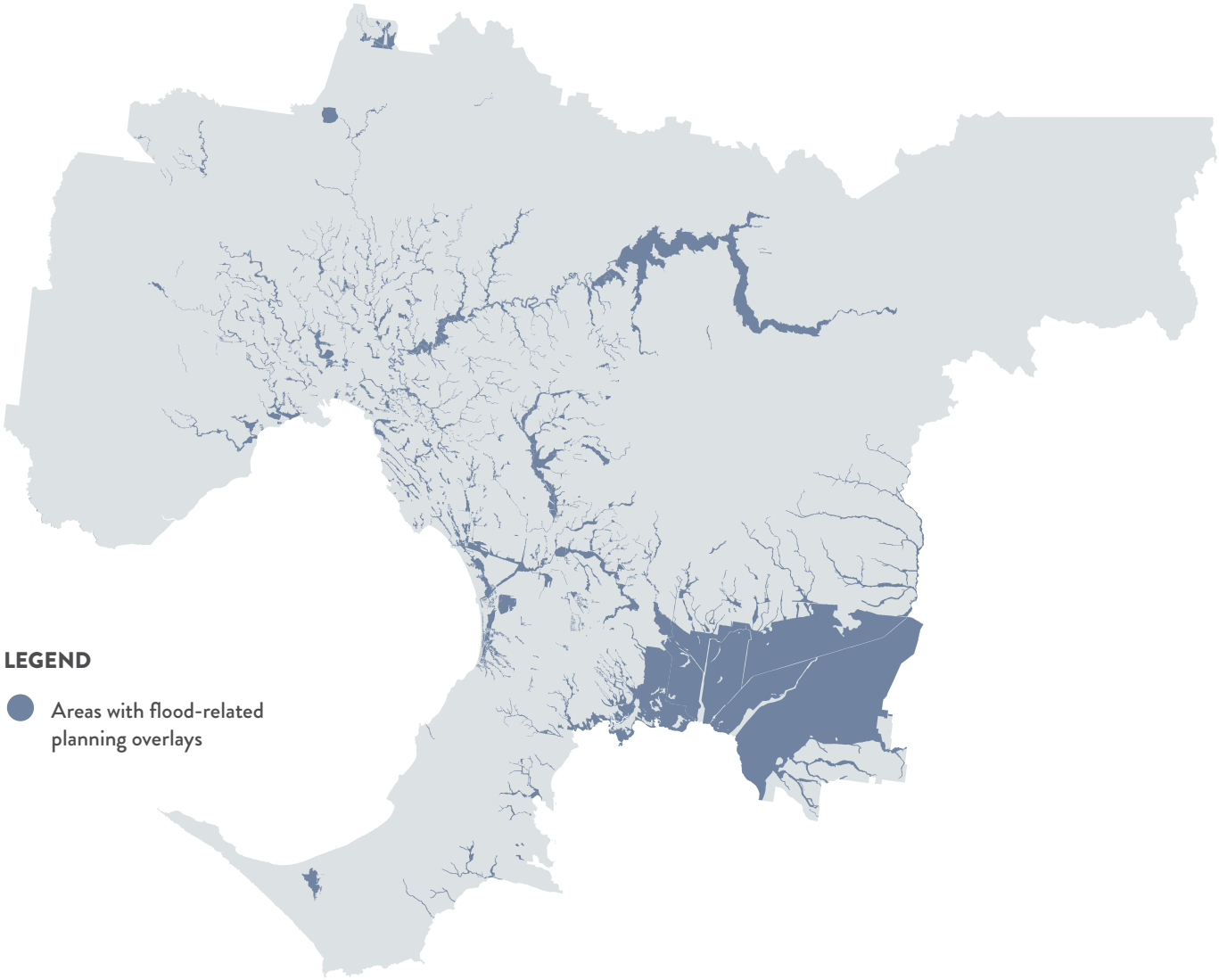
LEGEND

Most Vulnerable — Least Vulnerable

Source: Loughnan, ME, Tapper, NJ, Phan, T, Lynch, K, McInnes, JA, 2013, A spatial vulnerability analysis of urban populations during extreme heat events in Australian capital cities, National Climate Change Adaptation Research Facility, Gold Coast.

Flood risk

This map shows areas listed as prone to flooding in local planning schemes (Flood, Land Subject to Inundation, or Special Building overlays). The extent of flood-prone areas is expected to grow under projected climate change.



RAINFALL

By 2070, annual rainfall is expected to decrease by 11% and come in more intense bursts.

SEA LEVEL

By 2070, the sea level along Victoria's coast is expected to rise by 26 - 59cm.

FLOODS / STORMS

Increased likelihood and severity of floods and events such as storm surges in Melbourne.

Source: Department of Environment, Water, Land and Planning, 2016, Planning Schemes Online, accessed 2016-02-15.

ACTIONS FOR A RESILIENT MELBOURNE

Four action areas: adapt, survive, thrive, embed

This section introduces the first set of actions that will help achieve our vision for a resilient Melbourne. They are a starting point for exploring new ways of working that will build our resilience for decades to come. The actions will achieve long-term benefits in ways that can be implemented now.

All actions are relevant to, but not necessarily owned by, local government. In investigating actions that will help achieve our vision, four clear action areas emerged. These action areas keep our communities at the centre of everything we are seeking to achieve, describing the different ways we will meet our objectives, building Melbourne's resilience against all potential shocks and stresses. They require an interdisciplinary focus, delivering multiple benefits and breaking out of narrower, more traditional structures such as 'society, economy and environment'.

TODAY, TOMORROW AND TOGETHER, WE WILL TAKE ACTION TO:

A playground for young and old in Cardinia Shire.

Building on existing structures and efforts

Melbourne is home to many passionate individuals and innovative organisations already helping communities to adapt, survive and thrive in the face of shocks and stresses. This strategy builds on their efforts by bringing successful actions and practices to a wider audience, as well as linking together those who may be taking similar approaches in isolation from one another.

The actions in this strategy are all directly supported by *Resilient Melbourne*. While implementation of some actions will be led by the Resilient Melbourne Delivery Office, most will be led by partners across community, academic and business sectors, as well as local and state government agencies.

By working together on these actions, partners will improve Melbourne's collective resilience and will learn by doing; delivering tangible benefits for Melbourne's communities while simultaneously generating new knowledge on how best to build resilience.

Implementing the actions

Resilient Melbourne must contribute to Melbourne's resilience quickly and tangibly. For each action described in this section, we have identified action leads, partners and initial funding sources. Selected projects will also receive significant support from one or more 100RC Platform Partners. These partners are leading service providers that offer in-kind support to members of the 100RC network.

We are currently creating implementation plans – monitoring and evaluation will be built into each action from the start. Each plan will include preliminary indicators for measuring results, which will be reviewed before starting.

The Resilient Melbourne Delivery Office will oversee the implementation of this first *Resilient Melbourne* strategy. This approach is supported by the 32 councils of Melbourne, led by the City of Melbourne, Emergency Management Victoria (EMV), the Municipal Association of Victoria (MAV), the Department of Environment, Land, Water and Planning (DELWP), and the Department of Premier and Cabinet (DPC).

We have identified three flagship actions. These have the potential to move us significantly towards achieving our vision of a more resilient Melbourne: viable, sustainable, liveable and prosperous, today and for the long term.

Our three flagship actions are a metropolitan urban forest strategy (p. 62), emergency management community resilience approach for Victoria (p. 90) and metropolitan cycling network (p. 112).

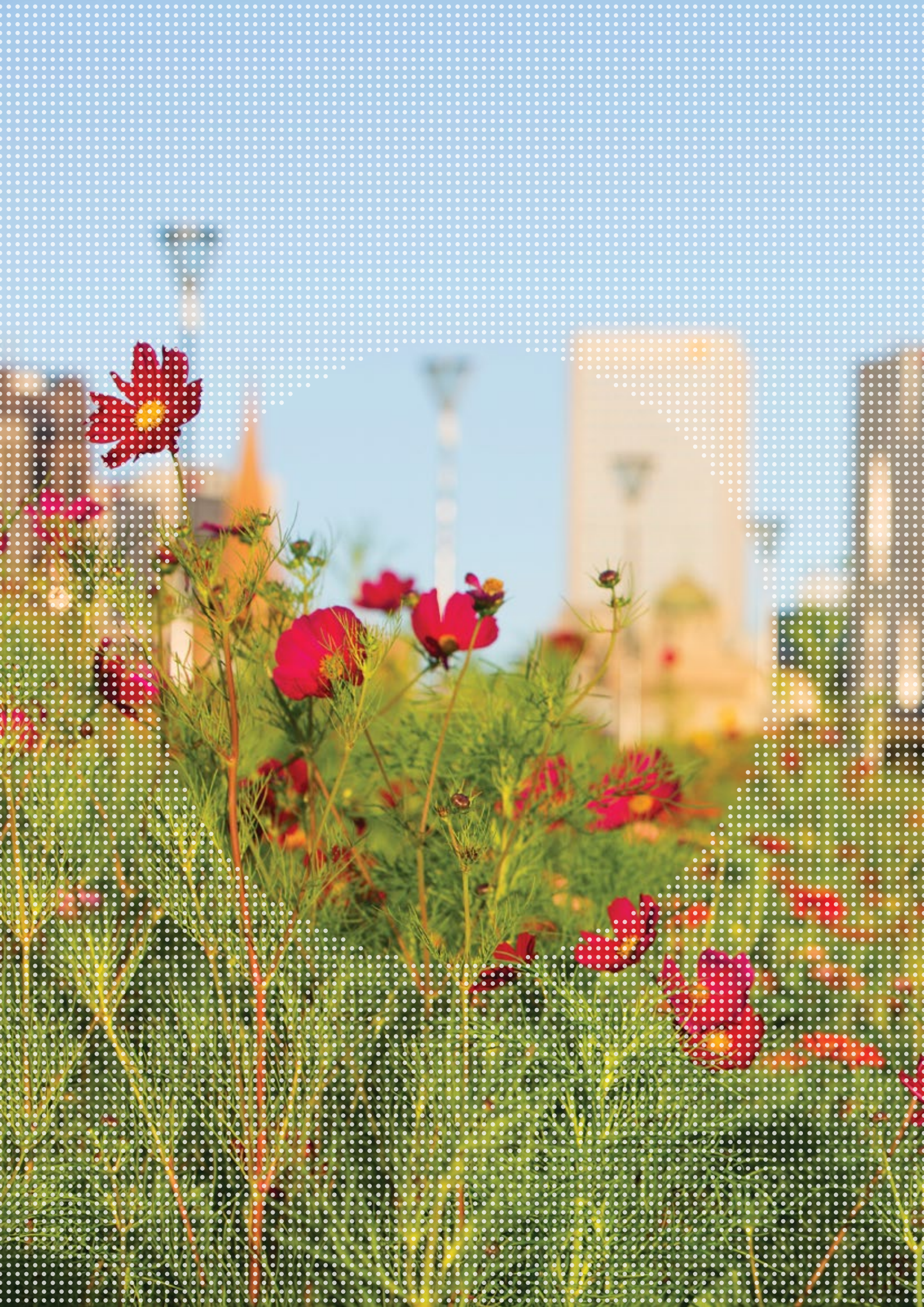
IS YOUR CITY OR ORGANISATION INTERESTED IN GETTING INVOLVED IN ANY OF OUR ACTIONS?

We welcome technical partners, co-sponsors and cities interested in learning from, or contributing to, this work – please contact resilience@melbourne.vic.gov.au

Each action will help achieve several resilience objectives

	ACTION	PAGE	ACTION TYPE	RESILIENCE OBJECTIVES: Stronger together	Our shared places	A dynamic economy	A healthier environment
ADAPT	Metropolitan urban forest strategy	62	Flagship	Related goal	Related goal		Primary resilience goal
	Integrated Water Management Framework	68	Supporting		Related goal		Primary resilience goal
	The Neighbourhood Project	74	Supporting	Related goal	Primary resilience goal		Related goal
	New apartments trial for public housing residents	78	Supporting	Related goal	Primary resilience goal		
	Local Government Renewables Group Purchasing	82	Supporting	Related goal	Primary resilience goal		Related goal
	National Climate Resilience and Adaptation Strategy	61	Local Aligned		Related goal	Related goal	Primary resilience goal
	Association of Bayside Municipalities Adaptation Planning	73	Local Aligned		Related goal		Primary resilience goal
	Working with Melbourne's tertiary and further education colleges and upper secondary schools to support STEM education	87	Local Aligned	Related goal		Primary resilience goal	
	Ask Izzy	81	Local Aligned	Primary resilience goal		Related goal	
SURVIVE	An emergency management community resilience framework for Victoria	90	Flagship	Primary resilience goal	Related goal	Related goal	Related goal
	Understanding drivers of community resilience	94	Supporting	Primary resilience goal	Related goal		
	Community-based resilience compendium	100	Supporting	Related goal	Related goal	Related goal	Related goal
	Innovative insurance	104	Supporting	Primary resilience goal		Related goal	
	IBM Smarter Cites Challenge and Twitter Data	109	Local Aligned	Primary resilience goal		Related goal	
	Flood Management Strategy – Port Phillip and Westernport	93	Local Aligned	Primary resilience goal			Related goal
	Multicultural water safety and settlement	98	Local Aligned	Primary resilience goal	Related goal		
	'Refuge': the role of art and culture in preparedness	103	Local Aligned	Primary resilience goal	Related goal		Related goal
	Building preparedness through relationships in Koori and culturally and linguistically diverse communities	107	Local Aligned	Primary resilience goal	Related goal		
THRIVE	The metropolitan cycling network	112	Flagship	Related goal	Primary resilience goal		Related goal
	Community-led neighbourhood renewal and development pilot projects	116	Supporting	Related goal	Primary resilience goal		
	Citymart Challenge – involving citizens in mobility and transport	120	Supporting	Related goal	Primary resilience goal	Related goal	
	Young and Resilient Living Labs	126	Supporting	Primary resilience goal	Related goal	Related goal	
	STEM Mentoring Melbourne	130	Supporting	Related goal		Primary resilience goal	
	Innovative business models	134	Supporting	Related goal		Primary resilience goal	Related goal
	VicHealth Mental Wellbeing Strategy	111	Local Aligned	Primary resilience goal	Related goal		
	Melbourne Metro Rail Project	125	Local Aligned	Related goal	Primary resilience goal	Related goal	Related goal
	Preventing Violence Together	129	Local Aligned	Primary resilience goal	Related goal		
	30-year Infrastructure Strategy for Victoria	137	Local Aligned	Related goal	Primary resilience goal	Related goal	Related goal
EMBED	The Resilient Melbourne Delivery Office	142	Supporting	Related goal	Related goal	Related goal	Related goal
	City of Melbourne chair in resilient cities	148	Supporting	Related goal	Related goal	Related goal	Related goal
	Resilience Training for Local Government	152	Supporting	Related goal	Related goal	Related goal	Related goal
	Working to embed resilience and build social cohesion	151	Local Aligned	Primary resilience goal			

Flagship Action Supporting Action Local Aligned Action Primary resilience goal Related goal

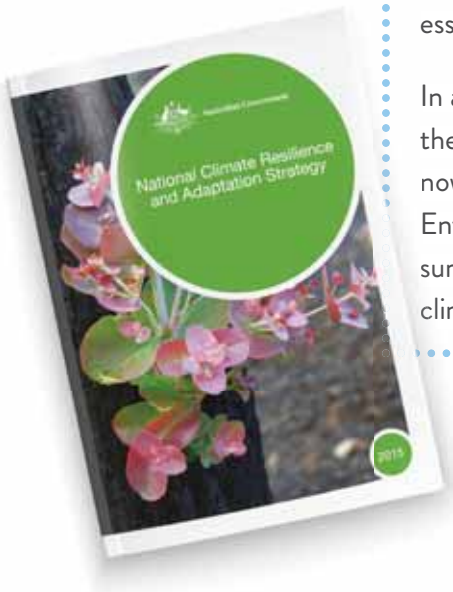


ADAPT

A resilient and adaptive Melbourne will look for ways to reduce our exposure to shocks and stresses that are an increasing part of everyday life.

In an adaptive Melbourne, our institutions must be flexible and responsive to emerging information, regularly adjusting the way they deliver services as the pace of social, environmental and economic change in our city continues to accelerate. The needs of the future – such as housing for a growing and ageing population, making better use of nature's resources, and developing new skills – will not be met by sticking to old approaches.

Individuals and communities must also be adaptable in the face of rapid change. By providing access to education, information and knowledge, an adaptive Melbourne will give citizens the resources they need to become more resilient.



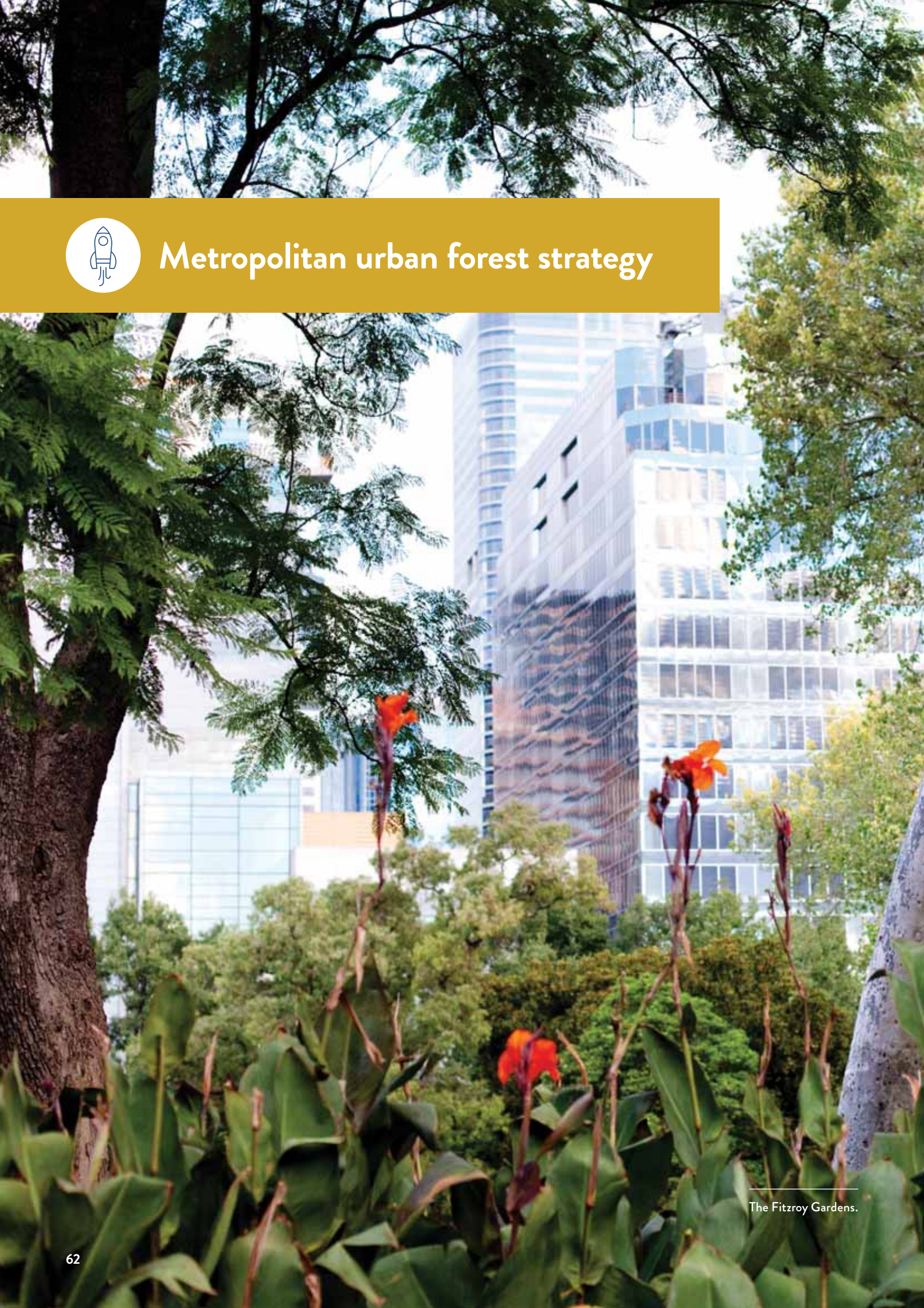
ALIGNED LOCAL ACTION

National Climate Resilience and Adaptation Strategy

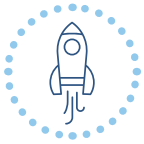
In December 2015, the Australian Government released a *National Climate Resilience and Adaptation Strategy*,[70] which sets out how Australia is managing climate risks. It mentions *Resilient Melbourne* as a key project currently under way and notes that resilience-building can mean many things, such as limiting or removing human-caused pressures on natural systems (like land clearing or pollution), or giving vulnerable communities reliable access to information and essential services.

In addition to the work described in the actions, the Resilient Melbourne Delivery Office is now working with the Victorian Department of Environment, Land, Water and Planning to make sure we are consistent with Victoria's emerging climate adaptation strategy.

Metropolitan urban forest strategy



The Fitzroy Gardens.



Extend and link existing urban greening, reforestation and nature initiatives across Melbourne, to improve wellbeing and reduce our exposure to hazards such as heatwaves and flooding.

RESILIENCE CHALLENGE

Melbourne's liveability relies on a healthy natural environment for basic human needs such as clean air, fresh drinking water and a comfortable climate. However, the way our city is growing is putting these at risk.

Some of Melbourne's local government areas already have among the lowest urban tree canopy ratios in Australia.[71] Rezoning and infill development are resulting in less green space and higher population densities in inner and middle Melbourne. On Melbourne's fringes, new suburbs are being built on arable land and areas of remnant native vegetation. Where rain once soaked easily into permeable soils, reducing peak stream flows and the risk of flash floods, hard surfaces like roofs and roads now dominate. These same hard surfaces, unshaded by vegetation, also absorb the sun's heat – peak inner metropolitan temperatures are 7 degrees Celsius higher than those in surrounding rural areas.[72]

This is all occurring in the context of climate change, which will cause more frequent heatwaves, droughts and extreme rainfall. While the effects of these phenomena will be widespread, they disproportionately affect already vulnerable members of our communities, including older residents, people who are unwell, and those who are financially disadvantaged.[73]

PRIMARY RESILIENCE OBJECTIVE	Enable strong natural assets and ecosystems alongside a growing population
RELATED OBJECTIVES	Create and sustain buildings, infrastructure and activities that promote social cohesion, equality of opportunity, and health
STRESSES	• Climate change • Development pressures on ecosystem services • Higher rates of chronic illness • Ageing population • Increasing pressure on healthcare services • Decreasing social equality • Lower rates of community participation
SHOCKS	• Flood • Heatwave • Drought • Marine pollution

THE ACTION

Across Melbourne, urban greening and revegetation projects are being undertaken by local councils, water authorities, community groups, and regional collaborations such as Greening the West. Victorian Government agencies such as DELWP and Parks Victoria also play key roles in this area.

This action will result in a metropolitan urban forest strategy for all of Melbourne. This strategy will enable all those currently involved, and others wanting to deliver urban greening projects in future, to understand how their efforts can best contribute to improving ecosystem health and services such as urban cooling and flood mitigation. It will achieve this by:

- highlighting how and where existing initiatives can be expanded
- enabling the sharing of resources and knowledge by linking together currently disparate efforts
- providing councils better information about their existing tree canopy cover, making resources available for public and private entities
- providing opportunities for utility providers and infrastructure owners to address implementation barriers and help make Melbourne greener and cooler.

THE 100RC GLOBAL NETWORK IN ACTION

In the 100RC network, the city of Boulder, Colorado, in the USA is also pursuing the benefits of city-wide greening. As part of this action, the Resilient Melbourne Delivery Office will collaborate with Boulder and its Chief Resilience Officer to share approaches and information.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

The metropolitan urban forest strategy will bring city-wide benefits that cannot be achieved by individual councils, suburbs, infrastructure operators or neighbourhoods in isolation. Greening on a metropolitan scale could truly transform our city. In addition to a range of amenity and biodiversity benefits, from a resilience perspective, a greener Melbourne means:

- shadier, cooler metropolitan areas
- lower flood risk for people and assets
- less stormwater and nutrients entering waterways and Port Phillip Bay.

These also bring further benefits to communities. For example, research has repeatedly shown that greener cities have lower levels of obesity and other chronic illnesses, higher levels of physical activity, and improved mental health.[74]

This action will link with and be supported by the Integrated Water Management action, described next.

A metropolitan urban forest strategy would support a range of flora, fauna and recreational opportunities.

IMPLEMENTATION

PARTNERS

Lead: The Nature Conservancy (100RC Platform Partner)

- Resilient Melbourne Delivery Office
- All metropolitan councils
- Trimble (100RC Platform Partner)
- Parks Victoria
- Department of Environment, Land, Water and Planning
- Lead West
- Horticulture Innovation Australia and 202020 Vision

NEXT STEPS

By December 2016:

- Partners set up project governance structure
- The Nature Conservancy to coordinate collection of existing data from councils and state government agencies
- Trimble builds on existing data sets and supplements them using its proprietary geographic information systems
- The Nature Conservancy and Resilient Melbourne Delivery Office explore innovative financing opportunities

By December 2017:

- The Nature Conservancy to build on mapping and data sets to develop the metropolitan urban forest strategy for councils, state government agencies, households and community groups
- Resilient Melbourne Delivery Office manages collaboration with partners to develop a strategy suitable for implementation across metropolitan Melbourne.

ABOUT THIS PROJECT'S 100RC PLATFORM PARTNERS

The Nature Conservancy is a leading conservation organisation, working around the world to protect ecologically important lands and waters for nature and people. It tackles threats to conservation involving climate change, fire, fresh water, forests, invasive species, and marine ecosystems.

As part of the 100RC Platform, The Nature Conservancy offers expertise in mapping, measuring and valuing the goods and services that nature provides. This allows decision makers to evaluate the trade-offs of alternative management choices, helping them pinpoint areas where investment in natural capital can benefit both human development and conservation.

Trimble provides advanced positioning technology and mobile solutions. As part of the 100RC Platform, Trimble is providing access to its eCognition Essentials remote-sensing classification software, which can help cities better understand their current land-cover conditions and changes in land use.

Integrated water management framework

Native grass planting in Fawkner, organised by Merri Creek Management Committee.

Enable better use of existing water resources, and reduce our exposure to drought and flood, by developing decision-support tools that encourage water-sensitive urban design and integrated water management.

RESILIENCE CHALLENGE

Climate change will exacerbate flooding in our urban areas, while lower annual rainfall and fewer days of rain will place further stress on our urban vegetation. Building yet more traditional storm drains and pipes is expensive and disruptive, while continuing to water trees and areas of vegetation during droughts is itself resource intensive, with regards water and labour, as well as financially.[75]

Experience in places such as the Netherlands suggests that there are better ways to live with and harness water than through heavy engineering alone.[76] New, integrated solutions will reduce the risks to safety and financial security of thousands of Melburnians in flood-prone areas, while smarter ways of retaining water in our urban landscape will support existing and future vegetation during times of drought.

PRIMARY RESILIENCE OBJECTIVE	Strengthen our natural assets and ecosystems alongside a growing population
RELATED OBJECTIVES	Create and sustain buildings, infrastructure and activities that promote social cohesion, equality of opportunity, and health
STRESSES	• Drought • Development pressures on ecosystem services
SHOCKS	• Flooding • Heatwaves

THE ACTION

This action will develop guidance and decision-making tools to better enable councils to expand the use of water-sensitive urban design and integrated water management techniques that are suited to their local contexts. These will build upon approaches already being applied in many parts of Melbourne, and work in conjunction with water authorities, other infrastructure operators and DELWP, which is currently developing a new water plan for Victoria.

Additionally the action will develop a common language and framework across different levels of government, enabling more coordinated approaches to managing water in different regions and sub-catchment areas.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

This action will improve councils' understanding of water-sensitive urban design and integrated water management techniques, helping them to:

- use these approaches in their stormwater management plans, thus reducing flood risk, improving water security and leading to cooler and greener urban areas
- conserve potable water, allowing additional urban greening and bringing associated health benefits to local communities
- bring together disparate sets of data (normally collected for single purposes) to enable better analysis
- involve community groups from the first stages of planning water management projects, allowing them more of a say in the physical form of their community and the use of water resources
- make public the costs and benefits of managing water – both to the community and government.

Below, from left: Stamford Park is a 52 ha site adjacent to Corhanwarrabul Creek in Rowville – the site is of regional biological significance and of high cultural interest; Community stormwater harvesting project under construction in Banyule City Council.

IMPLEMENTATION

PARTNERS

Leads: Manningham City Council and the CRC (Cooperative Research Centre) for Water Sensitive Cities

- Participating metropolitan councils
- Department of Environment, Land, Water and Planning
- Melbourne Water, City West Water, South East Water, Yarra Valley Water
- Victoria University – developers of the Local Government Economic Framework for Green Infrastructure
- Monash Sustainability Institute

NEXT STEPS

By October 2016:

- CRC for Water Sensitive Cities holds a meeting of decision makers from the principal water sector organisations, including water authorities and retailers, to agree on targets and allocate responsibilities.
- CRC for Water Sensitive Cities and Resilient Melbourne Delivery Office considers ways to attract additional partners.

By December 2016:

- Initial development of the guidance and decision-support tool. The tool will provide open-source information about water sources, catchments and flood zones, typology of geographies and technologies to support decision making by local government, other landholders and precinct operators.

By early 2019:

- Complete the pilot, refinement and then broader application of typologies, guidance and tools.

Altona Beach.

ALIGNED LOCAL ACTION

Association of Bayside Municipalities adaptation planning

Port Phillip Bay is an important recreational, economic and environmental asset, not only to Melbourne but to all of Australia. Melbourne's development has placed the bay under stress, and bayside municipalities will face an increasing number of shock events originating in the bay, such as coastal storm surges and flooding from sea-level rise.

Many of the actions required to protect Port Phillip Bay rely on a coordinated effort across councils and all levels of government. But not all areas of Melbourne fully understand how activities that occur upstream affect the health of the bay, or the threats posed by climate change.

In response, Victoria's 10 bayside councils formed the Association of Bayside Municipalities (ABM) to coordinate their efforts. They have begun work on a regional coastal adaptation framework that will protect Port Phillip Bay's value for tomorrow. To date, a document describing the present situation has been prepared. A discussion paper will then provide a basis for consulting bayside councils and other parties. An exploration of adaptation options will include a high-level risk screening of potential hazards and impacts.

The Resilient Melbourne Delivery Office will look to work with the ABM and its project partners to support the implementation of identified resilience-building actions, including addressing the impacts of upstream regions on the health of the Bay.

The Neighbourhood Project

A parklet created by temporarily closing a small street in Abbotsford.

The Neighbourhood Project

Through training and building capacity, this initiative will help community groups transform under-used land around Melbourne into a network of new public spaces.

RESILIENCE CHALLENGE

Many Melburnians lack easy access to basic community infrastructure, such as parks and playgrounds. This diminishes people's health and wellbeing and reduces social cohesion. With a growing population and constrained natural and financial resources, we need to provide the community infrastructure that fosters social cohesion, equal opportunity and liveability.

Despite pressures on available space, up to 30 per cent of land in Australian cities remains vacant or under-used.[77] While such spaces have the potential collectively to comprise a large network of community spaces, council processes and limited resources can deter people from harnessing them for community benefit and use.

PRIMARY RESILIENCE OBJECTIVE	Create and sustain buildings, infrastructure and activities that promote social cohesion, equality of opportunity and health
RELATED OBJECTIVES	Empower communities to take active responsibility for their own and each other's wellbeing, safety and health Enable strong natural assets and ecosystems alongside a growing population
STRESSES	• Lower rates of community participation • Decreasing social equality • Climate change • Development pressures on ecosystem services
SHOCKS	• Greater community cohesion and access to open space builds resilience to a range of shocks

THE ACTION

The Neighbourhood Project will provide 12 months of capacity building, resources and mentoring to participating communities in how to turn under-used land into green spaces. This will include training in design and project management.

The Neighbourhood Project will also tackle barriers that impede community-led place-making projects, such as planning scheme requirements. It will work with councils to better understand and remove these barriers, while still ensuring that councils can fulfil their legal and public safety obligations.

The action will transform 24 under-used spaces in 8 neighbourhoods into useful community public spaces, using a 'tactical urbanism' methodology.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

- A more active citizenry and stronger social networks will make community groups better able to carry out community infrastructure projects in the future.
- It is estimated that approximately 12,000 people will benefit indirectly from improvements to their neighbourhoods.
- Councils will be better able to help create public open space, rather than just regulate it.

Play Streets allow neighbourhoods to close streets to non-local traffic for a day of free, unstructured activity like street cricket and child's play.

IMPLEMENTATION

PARTNERS

Lead: CoDesign Studio

- Resilient Melbourne Delivery Office
- Municipal Association of Victoria
- Participating metropolitan councils
- Community groups and community members
- Myer Foundation

NEXT STEPS

April–May 2016:

- Following the launch of the expression of interest process at Resilient Melbourne's meeting of metropolitan mayors and their CEOs in April 2016, applications for projects are now being submitted to CoDesign Studio.

By July 2016:

- Identify the first participating councils.

Initial projects to run 2016–19.

New apartments trial for public housing residents

Knox City Council affordable housing.

New apartments trial for public housing residents

The Resilient Melbourne Delivery Office will support efforts to replicate a new development that puts home ownership within reach of more public housing tenants.

RESILIENCE CHALLENGE

Victoria's 65,000 social and community dwellings ('public housing') are lifelines for some of Melbourne's most vulnerable people. However, there is a serious shortage of supply – at present the waiting time for public housing is approximately 11 years, and with little new stock being developed, this is unlikely to shorten.[78]

Nationally, the deficit of affordable housing for low- to middle-income households was estimated at 211,000 dwellings in 2011, up from 138,000 in 2006.[79] Assuming historic demographic and supply trends continue, this gap will increase to nearly 370,000 dwellings by the end of 2016, and 663,000 by 2031.

There are many success stories in Melbourne's social and community housing sector – individuals and families who have improved their economic circumstances to the point where home ownership is within reach. However, with much of Melbourne's social and community housing stock located in inner city areas with high property values, it is extremely difficult for residents to afford suitably sized accommodation in a similar area, close to their existing social networks and employment. This can result in these individuals remaining in social housing indefinitely, or buying homes in more affordable outer suburban areas, where they have no community connections.

THE ACTION

The Melbourne Apartments Project (MAP) will put home ownership within reach of more public housing tenants and provide a funding stream for the development of further similar projects. A pilot project is already under way at one site in inner Melbourne, where new two- and three-bedroom apartments are being offered solely to social housing tenants who meet specific eligibility criteria. Having assessed this approach, we believe it could be replicated in a number of areas around Melbourne, and the Resilient Melbourne Delivery Office is working with partners to identify sites and funding for further developments.

PRIMARY RESILIENCE OBJECTIVE	Create and sustain buildings, infrastructure and activities that promote social cohesion, equality of opportunity, and health
RELATED OBJECTIVES	Stronger together
STRESSES	• Decreasing social equality • Worsening housing affordability • Unemployment
SHOCKS	Having safe and affordable housing builds resilience to a range of shocks, such as heatwaves and disease pandemics

The current pilot project is being run on a not-for-profit basis. This means no GST (goods and services tax) is payable and marketing costs are negligible, so properties can be offered for a significantly lower price – approximately 35 per cent below market value. An innovative financing method rewards purchasers for each of the first four years they reside in the property.

The Resilient Melbourne Delivery Office is working with the creators and financial backers of MAP to identify new locations and partners to turn an innovative pilot into something able to address a systemic challenge.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

- Individuals will move from social housing into high-quality private housing, at a stable and affordable price, and in a location that allows them to maintain connections to their local networks and employment.
- The transition from social to private housing will free up social housing stock, for which there is a considerable waiting list in Melbourne.

IMPLEMENTATION

PARTNERS

Lead: Resilient Melbourne Delivery Office

- Melbourne Apartments Project
- Community Sector Banking
- Participating metropolitan councils
- A Melbourne property developer (identity is confidential)
- Melbourne City Mission
- Department of Health and Human Services
- Private organisations, non-for-profit sector, community housing providers

NEXT STEPS

Melbourne Apartments Project and Resilient Melbourne Delivery Office determine immediate opportunities and ways to scale-up and replicate the project.

By early 2017:

- Establish method for selecting sites and partners.
- Run information seminar describing outcomes and opportunities for potential partners.
- Determine initial councils and development opportunities for first replication of the existing project.

From mid-2017

- Start planning and approval processes and begin construction.
- Monitor and report on outcomes and lessons learnt.

ALIGNED LOCAL ACTION

Ask Izzy

Ask Izzy was recently launched in Melbourne by Prime Minister Malcolm Turnbull and the Lord Mayor of Melbourne, Robert Doyle.

Ask Izzy is a free, location-based mobile website that helps homeless Australians find food, shelter, health and other critical support services. On any night, one in 200 Australians are homeless; almost 80 per cent of them own a smartphone. Ask Izzy allows people to search more than 350,000 services across Australia, anonymously.

Ask Izzy has been designed by people who are or have been homeless, and developed in partnership with not-for-profit group Infoxchange, Google, realestate.com.au, News Corp Australia, and more than 20 other partners.

Local government renewables group purchasing

Wind energy in Victoria generates over 1,200MW annually.

Local government renewables group purchasing

This action will enable participating councils to invest in renewable energy, thus diversifying energy sources and shifting to cleaner technologies.

RESILIENCE CHALLENGE

Melbourne is heavily reliant on electricity generated in the Latrobe Valley, which leaves us vulnerable to energy disruptions from shock events such as bushfires, blackouts during heatwaves and acts of sabotage.[80] Diversifying the sources of electricity supplying Melbourne's grid, while increasing renewable generation, can help reduce this reliance, and will bring health benefits from less burning of coal.

Additionally, we must tackle the chronic stresses of climate change and the more frequent and intense shock events it is causing. For this reason reducing our greenhouse gas emissions by increasing the proportion of renewable power in our energy mix is a resilience issue. Councils wish to take action, but individual councils are often too small to make cost-effective purchases or to negotiate effectively.

PRIMARY RESILIENCE OBJECTIVE	Create and sustain buildings, infrastructure and activities that promote social cohesion, equality of opportunity and health
RELATED OBJECTIVES	Empower communities to take active responsibility for their own and each other's wellbeing, safety and health Enable strong natural assets and ecosystems alongside a growing population
STRESSES	• Climate change • Development pressures on ecosystem services
SHOCKS	• Electricity supply disruption • Heatwave • Bushfire • Terrorism • Infrastructure failure

THE ACTION

This action builds on a pilot project led by the cities of Melbourne, Moreland, Port Phillip and Yarra. It will give councils a group purchasing process for buying energy from new, utility-scale, renewable power sources. It will enable councils to support the emerging renewables industry, in a way that is financially efficient, by pooling resources and tackling financial, regulatory, risk and market barriers together.

THE 100RC GLOBAL NETWORK IN ACTION

The 100RC cities of Boulder (Colorado) and Berkeley (California) are doing significant work to diversify and decentralise their municipal power sources. The Resilient Melbourne Delivery Office will collaborate with these cities and their Chief Resilience Officers to share information about successful projects and lessons learnt.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

This action will help councils to:

- diversify Melbourne's power sources, reducing our vulnerability to supply failures in the Latrobe Valley, or transmission failures between these generators and Melbourne
- directly support the renewable energy industry, improving its cost-competitiveness with fossil fuel sources, which may contribute to greater long-term affordability for households, and bring health benefits
- help reduce greenhouse gas emissions, thus contributing to global efforts to address climate change.

Local government renewables group purchasing

IMPLEMENTATION

PARTNERS

Leads: Cities of Melbourne, Moreland, Port Phillip and Yarra

- Resilient Melbourne Delivery Office
- Participating metropolitan councils
- High energy users in each council area
- Energy regulator
- Department of Economic Development, Jobs, Transport and Resources
- Melbourne's universities, technical and further education colleges, and other institutions

NEXT STEPS

Within 3 months:

- Establish working team.

Within 12 months:

- Review progress of existing project and determine opportunities for expansion.

Within 18 months:

- Pending review, identify funding sources and devise draft model.

ALIGNED LOCAL ACTION

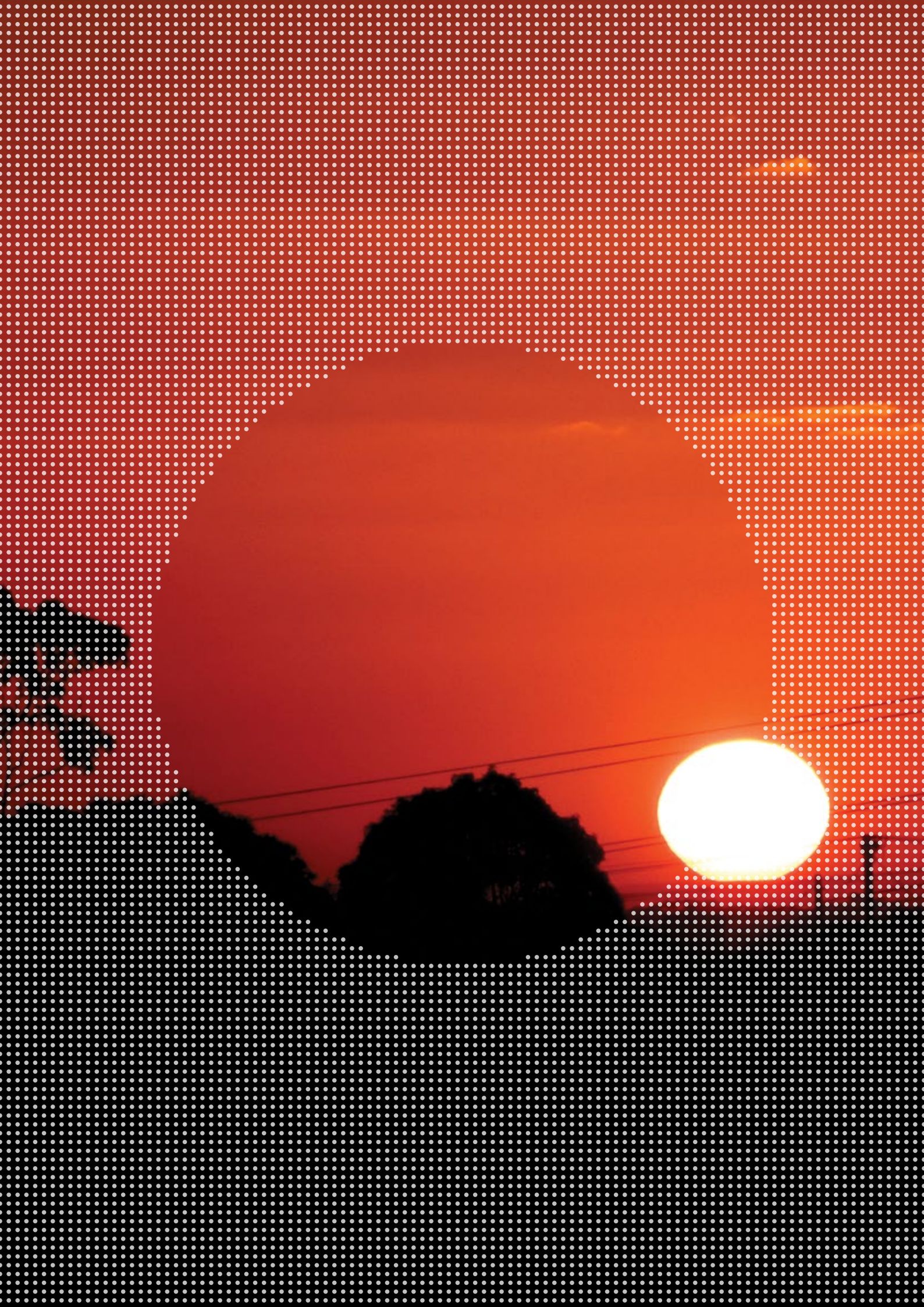
Working with Melbourne's tertiary and further education colleges and upper secondary schools to support STEM education

Australia's former Chief Scientist, Professor Ian Chubb, has stated that 75 per cent of the fastest-growing occupations now require STEM skills and knowledge, yet Australia lags behind many other developed countries in school-level maths and science skills.[81] In response to these trends, the Victorian Government and other groups across Melbourne are encouraging increased STEM education.

An innovative approach led by the Northern College of the Arts and Technology (NCAT) has been successful in providing students aged between 14 and 18 with industry experience and an associate degree qualification, while supporting and inspiring them to equip themselves for the jobs of the future.

Local government connects closely with citizens, yet has traditionally had little role in education provision. As part of Resilient Melbourne, local government is exploring opportunities to build on local strong connections with TAFEs and upper secondary schools to extend the work led by NCAT into other tertiary and further education colleges and upper secondary schools across metropolitan Melbourne.

Sample analysis at Monash University.



SURVIVE

A resilient Melbourne must be equipped to withstand disruptions, and bounce back from them better than before.

An adaptive Melbourne seeks to avoid and minimise the effects of disruptions. But there will be some shocks that we cannot prevent. Our communities and systems must be able to deal with these, collectively and as individuals.

LEARNING FROM OTHERS – WELLINGTON REGION EMERGENCY MANAGEMENT OFFICE (WREMO)

The city of Wellington, capital of New Zealand, is a member of the 100RC network. It is made up of nine councils. As in Melbourne, this brings some difficulties when coordinating emergency management and disaster risk management activities between multiple organisations.

WREMO was founded in 2012 as a semi-autonomous organisation to coordinate disaster risk management across Wellington's nine councils. WREMO has evolved from a traditional response-focused organisation into a facilitator, helping its local councils and communities determine their own approaches and action plans.

To achieve this, WREMO invested heavily in community development and participation, in order to involve partners more closely and to foster innovation. A strong emphasis on end-user perspectives and collaboration from the outset has become central to WREMO's approach.

Initiatives such as Tsunami Blue Lines, Community Response and Resilience Planning, Community Emergency Preparedness Training, and irreverent use of social media, have helped make the community more connected, and improved the region's capacity to manage disaster risks.

"The most important thing we have learned over the past four years is that we have a responsibility to understand the needs of our end-users and adapt our operations to suit them, not us. This has forced us to re-examine much of what we thought we knew as emergency management professionals and modify how we think, engage, train and deliver. Because we've become better listeners, our partnerships are stronger than they have ever been and our communities now approach us with exciting ideas that we are able to explore together".

– **Dan Neely**,
Manager of Community Resilience, WREMO.

An air ambulance lands at Essendon Airport.

An emergency management community resilience framework for Victoria

By ensuring activities across all our emergency management agencies have community benefit at their core, working across sectors we will foster communities that are better prepared to withstand shocks and bounce back strongly.

RESILIENCE CHALLENGE

The future of emergency management in Melbourne and across Victoria will be shaped by global challenges and their local repercussions. As well as climate change – including more frequent and extreme weather events – we will face changes in population demographics and technology, and greater risk of pandemics and other security threats.

In this context, a major task is to ensure that our financial and human investments in emergency service agencies promote community resilience. In other words, these agencies must do more than simply fight fires or respond to other extreme events – they must support community wellbeing, liveability, sustainability and viability.

This requires emergency management agencies to collaborate not just across different response agencies, on which notable progress has been made, but with entirely different sectors altogether, as Emergency Management Victoria (EMV) states, 'working in conjunction with Communities, Government, Agencies, and Business'.

Emergency service agencies have broad and deep relationships with their communities, meaning they are well-placed to foster community resilience. However, traditional notions of 'community' in Melbourne are changing, which requires new approaches to engaging people. If our excellent emergency service agencies are to function as community resilience leaders, this will require some cultural change.

PRIMARY RESILIENCE OBJECTIVE	Empower communities to take active responsibility for their own and each other's wellbeing, safety and health
RELATED OBJECTIVES	All
STRESSES	• High unemployment • Endemic violence • Drought • Environmental events
SHOCKS	• Extreme heat • Bushfires • Floods • Earthquakes • Extremist acts

THE ACTION

This action will develop a comprehensive community resilience framework for Victoria's emergency management sector. This is a key action of the *Victorian Emergency Management Strategic Action Plan 2015–18*, a three-year rolling plan that outlines the Victorian Government's plans for creating safer and more resilient communities. The Resilient Melbourne Delivery Office and EMV are working together to develop an approach to community resilience that is relevant to communities and the emergency management sector alike, and is practical and consistent across local governments and their communities, including business and community organisations.

The framework will be a lens through which sector-wide activities can be viewed, to ensure that that all activities have community benefit at their core. It will help the sector ensure that empowering communities and their leaders to develop awareness, shared responsibility and self-reliance will be part of all emergency management activities, plans, programs and systems.

EMV will map Victoria's resilience challenges, using the Cities Resilience Framework, and highlight desired community outcomes (such as 'protection against bushfire' or 'social connectedness') against each emergency service agency's roles and responsibilities. They will also identify which other actors are required to achieve the community outcomes. EMV will then consult on these findings, and use the responses to develop the framework and guidance for use.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

- Builds a shared understanding of resilience for the public and the emergency management sector.
- Establishes a framework for embedding resilience in planning for emergencies and disasters in metropolitan Melbourne and beyond, improving alignment between agencies, local government and service providers.
- Creates increased visibility of the roles of different actors, beyond just emergency management agencies, to achieve EMV's vision of 'safer, more resilient communities'.

Parents attending a Bushfire Planning Workshop in Emerald.

IMPLEMENTATION

PARTNERS

Lead: Emergency Management Victoria

- Resilient Melbourne Delivery Office
- All metropolitan councils
- Emergency management agencies
- Emergency Services Leadership Group
- State Crisis and Resilience Council (Risk and Resilience Sub-Committee)
- Local Government Victoria

NEXT STEPS

March 2016:

- Work began to develop the framework. This work is being overseen by a steering committee and reference group with representatives of the resilience and emergency management sector and Victorian Government resilience practitioners.

By September 2016:

- Initial framework complete and ready for testing.

ALIGNED LOCAL ACTION

Flood Management Strategy – Port Phillip and Westernport

We can't always stop floods from happening, but we can plan for and manage the risks, and reduce the consequences. For this reason, the *Flood Management Strategy – Port Phillip and Westernport* was completed in 2015. It sets out how participating organisations will work together over the next five years to understand and better manage flood risks, support flood-emergency preparation and response, and achieve the best social, economic and environmental results.

The strategy was produced by Melbourne Water, in collaboration with more than 70 organisations, including local government, and 250 individuals.

It sets the following long-term vision:

> ***"Together we are aware, responsive and resilient. Communities, business and government understand flooding, plan for challenges, and take action to manage risks."***

Melbourne Water is coordinating governance and implementation of actions in the strategy, with the input and participation of councils and endorsing organisations.

Understanding drivers of community resilience

Understanding drivers of community resilience

This initiative will advance our knowledge of barriers and opportunities for community members helping one another. It will be used to inform practical, targeted programs that encourage more cohesive communities, in good times and bad.

RESILIENCE CHALLENGE

To equip communities to take active responsibility for their own and each other's wellbeing, safety and health, we need to better understand what knowledge and resources individuals and communities need. An early insight from this work is that many Melburnians would like to support their neighbours more and be more active in their communities, but they feel they lack the skills or capacity to be more involved.

PRIMARY RESILIENCE OBJECTIVE	Empower communities to take active responsibility for their own and each other's wellbeing, safety and health
RELATED OBJECTIVES	All
STRESSES	All
SHOCKS	All

THE ACTION

Resilient Melbourne has begun an attitudinal study that will help us to develop more effective programs to inspire and equip people to be more active in their communities. The research will provide us with:

- A better understanding of Melburnians' motivations and barriers to participating in community resilience activities
- A better understanding of the issues, needs and opportunities associated with community members helping one another
- A benchmark against which we can measure changes in beliefs and behaviours in the future.

This research will help the Resilient Melbourne Delivery Office and others (including the Community Resilience Unit – see page 151) develop programs that address community sentiment and individual attitudes about taking more responsibility, and help people reach out to others, create connections and support each other in good times and bad.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

- Identify what motivates people to connect within their communities and develop initiatives based on what actually motivates people.
- Improve the effectiveness of programs that encourage communities to know their neighbours and create connections to support one another – when times are good and in times of crisis.
- Provide a baseline for monitoring community activities and attitudinal changes.
- Work towards a more cohesive and connected city in the longer term.

Understanding drivers of community resilience

IMPLEMENTATION

PARTNERS

Lead: City of Melbourne

- Community Resilience Unit, Department of Premier and Cabinet (p. 151)
- Emergency Management Victoria
- All metropolitan councils
- City of Melbourne professorial chair in resilient cities (p. 148)

NEXT STEPS

By mid-2016:

- Complete the study currently under way and publish research outcomes

From late 2016:

- Research outcomes will be used as a platform for broader engagement with a wide range of community-based partners.
- Influence existing approaches to community project delivery and use this research to design, develop and deliver new projects and programs.
- Resilient Melbourne Delivery Office to work with research organisation to monitor community sentiments over the five years of the Office's operation and establish long-term research approaches.

"Income is not the sole indicator of wellbeing and resilience. Household incomes in some of our neighbourhoods are higher than in others, yet in some of the more affluent-seeming areas people are more likely to go without meals. In other areas seen as struggling, communities are more established, there are stronger connections with neighbours, and more people grow their own food – people are better equipped to help one another in times of need."

David Turnbull,
Chief Executive Officer,
City of Whittlesea

ALIGNED LOCAL ACTION

Multicultural water safety and settlement

Migration will be the greatest contributor to Victoria's future population growth, with an average of 48,000 people estimated to arrive annually between 2006 and 2036. Programs that provide a solid foundation for cultural integration, as well as offering opportunities for people to learn valuable language and practical skills, are essential for the safety and wellbeing of our communities.

Life Saving Victoria's multicultural water safety and settlement program teaches water skills to refugees, new arrivals and international students, and helps them settle in to Melbourne. The initiative includes swimming lessons, beach programs, a 'meet a lifeguard' program in classrooms, regional open-water learning experiences, and accredited training programs. Perhaps most importantly, it gives participants the chance to establish new social networks, through the recreational, volunteer and employment opportunities it creates.

The initiative aims to remove barriers to participation, such as:

- distance or lack of transport
- cost of swimming lessons
- lack of facilities and equipment
- cultural and language differences
- lack of 'learn to swim' and water safety programs in schools.

Program participation is up from 1,956 people in 2006–07 to more than 13,000 people in 2014–15. All participants were reached via one of the 300 partnering multicultural agencies and organisations.

There is now an opportunity for local government to work with Life Saving Victoria to extend the benefits in more centres across Melbourne. Other emergency management agencies are also looking at how they can build on the success of this program by incorporating similar culturally inclusive approaches into their activities (e.g. grass fire awareness).

Community-based resilience compendium

Community-based resilience compendium

We will develop a compendium of Melbourne's leading resilience-building practices, to support community-based resilience efforts.

RESILIENCE CHALLENGE

Currently, no single resource exists for understanding, promoting and sharing the many efforts that people across Melbourne make to help communities adapt, survive and thrive in the face of shocks and stresses. In many cases, efforts in different councils and communities produce unnecessary duplication.

THE ACTION

Monash University Disaster Resilience Initiative (MUDRI) and EMV are developing a community-based resilience compendium, which explores how different communities prepare and strengthen their response to disasters and emergencies.

Working with Resilient Melbourne, EMV and MUDRI are expanding the scope of the compendium, to take a broader view of urban resilience, encompassing not just shock events but actions and programs tackling the chronic stresses that weaken the fabric of our society. This will encourage more holistic discussion, collaboration and sharing knowledge on how to build a resilient Melbourne.

The community-based Resilience Compendium will identify and showcase leading practices and lessons learnt, facilitate networks so that communities can share and distribute community-based resilience ideas and successes to other communities, and document evidence for building more resilient and safer communities.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

- Communities and urban resilience practitioners in metropolitan Melbourne will have a centralised resource for accessing information on resilience-building efforts, and a platform to share and promote their own actions and useful information.
- Greater sharing of resources and less duplication of effort will promote more efficient use of resources.
- In the longer term, all Melburnians will be better able to access advice on developing effective community resilience-building actions.

PRIMARY RESILIENCE OBJECTIVE	Empower communities to take active responsibility for their own and each other's wellbeing, safety and health
RELATED OBJECTIVES	All
STRESSES	All
SHOCKS	All

IMPLEMENTATION

PARTNERS

Lead: Monash University Disaster Resilience Initiative

- Emergency Management Victoria
- Resilient Melbourne Delivery Office
- All metropolitan councils

NEXT STEPS

November 2015:

- Submissions to the compendium opened – Emergency Management Victoria and Resilient Melbourne Delivery Office are supporting MUDRI in identifying leading actions and promoting alignment across sectors.

By mid-2016:

- MUDRI finalises initial round of case studies and stories.

By end of 2016:

- Compendium is developed into an online hub.
- Resilient Melbourne Delivery Office plays key role in launching and supporting MUDRI's compendium through www.resilientmelbourne.com.au and the Resilience Indicators Community of Practice.

Ongoing:

- Regular updates following the launch of the compendium.

Reading up on Melbourne at the 'Integrated Plans and Actions' Accelerated Design Forum.

ALIGNED LOCAL ACTION

'Refuge': the role of art and culture in preparedness

'Refuge' will be a research-action event where artists and disaster management professionals work with local, regional and international communities to devise responses to a natural disaster scenario. The project, to be led by artists, will involve configuring Arts House and North Melbourne Town Hall as a place of community refuge, as a rehearsal in preparedness and building community networks and connections. Evaluation will contribute to policy on the role of artistic and cultural communities in emergency management plans, preparedness, resilience and recovery.

Over the five years of the project, Refuge will simulate four natural disaster scenarios:

- seven days of extreme heat leads to city-wide power outages and reduced access to food and accommodation
- a North Melbourne community hosts a community evacuated from Natimuk in western Victoria
- a North Melbourne community is evacuated and hosted by the Natimuk community
- a North Melbourne community hosts environmental refugees from Tuvalu.

Refuge is a collaboration between Arts House, the University of Melbourne, the Performing Studies International conference, and a range of organisations involved in emergency management in Victoria.

The Resilient Melbourne Delivery Office will participate in planned 'Refuge' events, share lessons across local government, and explore opportunities for running similar events.

Innovative insurance

Flooding cuts off the Narre Warren - Cranbourne Road after heavy rains during the night of 4 February 2011.

Innovative insurance

The Resilient Melbourne Delivery Office will support innovative approaches that make fit-for-purpose insurance affordable to more Melburnians. This means more of our residents will be able to bounce back when unexpected shocks threaten their livelihoods and prosperity.

RESILIENCE CHALLENGE

Each year, Australian communities suffer significant losses as a result of natural disasters and other unforeseen events. Personal insurance cover protects the assets of individuals and allows them to return to their former standard of living after such crises.

However, one in five Australian adults does not have general insurance cover for their home, contents or car.[82] Generally, this is because they are unable to afford conventional insurance, or the level of cover available is too high for their need. The majority of these people are living on low incomes. For many of them, cars are a lifeline – without a car they might be unable to reach their place of work and might be cut off from essential services and established social networks.

Following an accident, theft or major crisis, people facing economic hardship are often unable to repair or replace assets that are essential for their livelihoods or basic needs. Given the increasing regularity and severity of natural disasters in Australia, and the risk of accident or theft, it is important that the assets of vulnerable members of the community are properly insured, to prevent people from slipping into further hardship or financial stress.

PRIMARY RESILIENCE OBJECTIVE	Empower communities to take active responsibility for their own and each other's wellbeing, safety and health
RELATED OBJECTIVES	Provide diverse local employment opportunities that support an adaptable workforce, prepared for the jobs of the future
STRESSES	• Crime • Accident
SHOCKS	• Bushfire • Flood • Storm

THE ACTION

This first element of this action is based on developing education sessions to encourage people who might otherwise be considered vulnerable to take out insurance cover, thus increasing their personal resilience. It will draw on local government networks and communication channels to reach members of the community who might not traditionally have insurance. The action will build on 'Essentials' by AAI Limited, an innovative insurance scheme that provides basic, affordable and accessible home and contents and car insurance to low-income individuals. Developed by Good Shepherd Microfinance in collaboration with Suncorp, 'Essentials' is for people who have a pension or healthcare card, receive regular Centrelink payments, or have an annual household income of less than $48,000. Customers can choose to insure their contents, car, or both, and pay their premium in annual, monthly or fortnightly instalments through Centrepay (Australian Government Department of Human Services).

Suncorp developed Essentials with a view to driving increased competition and innovation in the insurance industry, particularly around more accessible insurance offerings. The Resilient Melbourne Delivery Office will build from this platform and work with additional partners to establish new forms of insurance at various scales, including for small businesses.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

- Better insurance cover helps individuals and families recover from natural disasters, crises and bad luck events by enabling them to repair or replace critical assets.
- By making personal insurance products available to low-income individuals, it helps people take active responsibility for their wellbeing, safety and health.
- It will be a catalyst to competition and innovation in the low-income segment of the insurance market, where only one company currently offers a policy.

IMPLEMENTATION

PARTNERS

Lead: Resilient Melbourne Delivery Office

- Suncorp (Essentials by AAI)
- Good Shepherd Microfinance
- All metropolitan councils

NEXT STEPS

From May 2016:

- Develop education sessions for local government network meetings and/or community hubs.
- Run pilot education session with two local governments and review outcomes.
- Deliver education sessions in other local government areas.

During 2017:

- Partner with other insurance providers on different insurance models.

ALIGNED LOCAL ACTION

Building preparedness through relationships in Koori and culturally and linguistically diverse communities

In an effort to improve community resilience and preparedness, Victoria State Emergency Service (VICSES) and Melbourne Water joined forces to create the *Flood management Strategy – Port Phillip and Westernport*.

This strategy demonstrated the importance of involving groups that are often marginalised. VICSES concentrated its efforts on leaders and members of Koori and culturally and linguistically diverse communities, using events created by the community to build understanding and relationships within communities, rather than for them. As well as Koori projects in Maroondah and Darebin areas, relationships have been forged with Jewish, African and Islamic communities. Resources have also been developed to help volunteers communicate with non-English speaking people during emergency incidents.

ALIGNED LOCAL ACTION

IBM Smarter Cities Challenge and Twitter data

Melbourne is ever more complex and we need to be able to communicate with our citizens in the most effective ways, particularly in times of severe disruption. At the moment, different organisations use different channels, depending on the situation. Further, citizens are self-organising and using social media to inform one another when unexpected events occur.

As part of the IBM Smarter Cities Challenge, Melbourne is drawing on the expertise of senior IBM personnel to consider how we can make better use of technology to improve the resilience and safety of our citizens across our metropolitan region. IBM will also consider how social media information created by people in real time can help authorities respond to an unexpected event.

The City of Melbourne is one of three Smarter Cities selected in the 2015–16 cycle to receive an additional grant from Twitter. Twitter will provide access to both current and historic data relating to Melbourne, which can enable time-lapsed geographic mapping of the movement patterns of city residents, analysis of citizens' sentiments towards existing or proposed policies and programs, and heat-mapping of food-borne illnesses and other infectious diseases. Insights gleaned from this data will be incorporated into IBM's recommendations.

Members of the Young and Well CRC brains trust.

THRIVE

‘Thrive’ actions aim to significantly improve quality of life.

Access to employment, open space, transport and services – including digital technologies and social media – has a powerful influence on quality of life. Helping Melburnians thrive means increasing community inclusion and participation, opening up new opportunities, and seeking new ways to improve health and wellbeing, including mental health.

ALIGNED LOCAL ACTION

VicHealth Mental Wellbeing Strategy

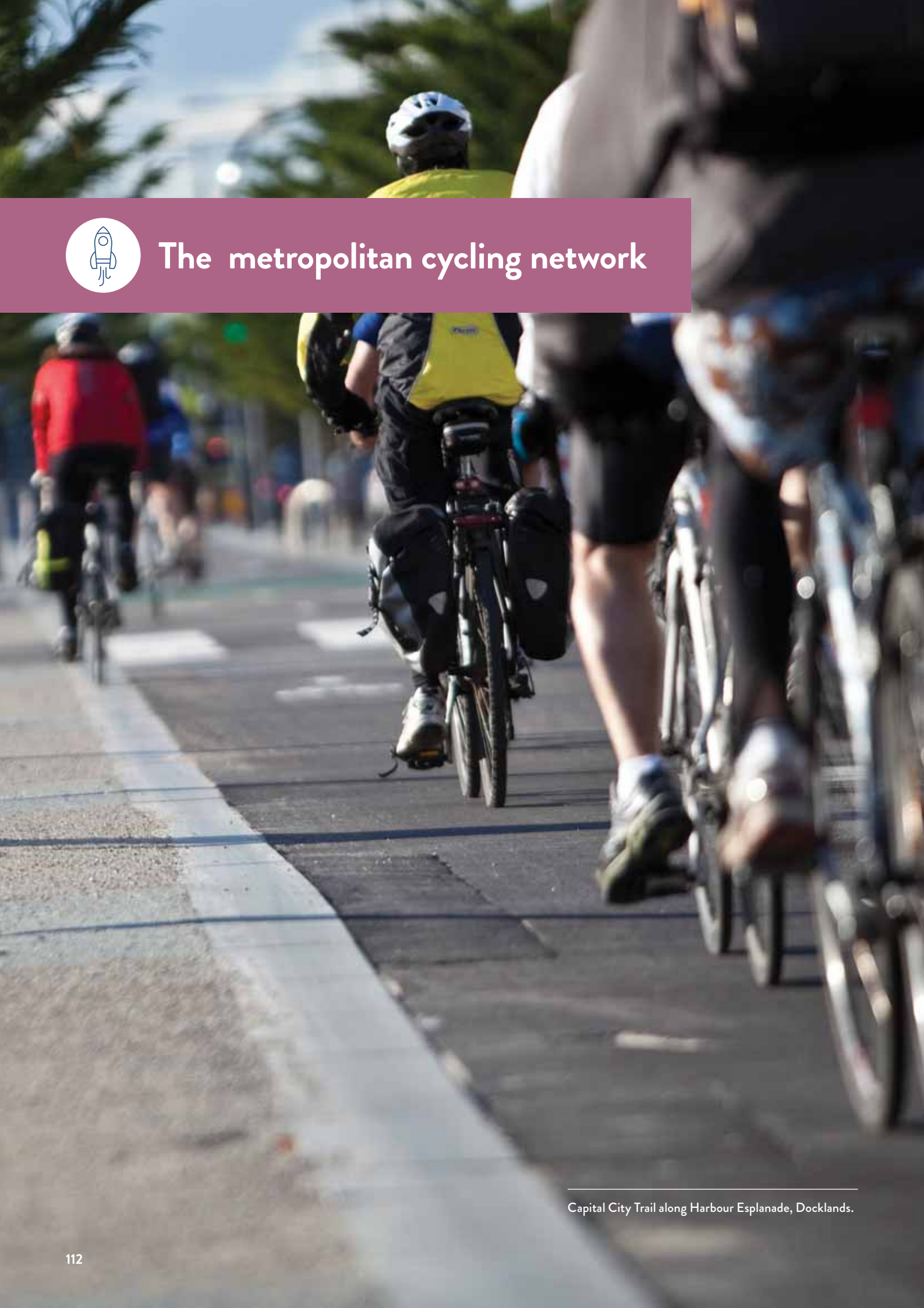
The *VicHealth Mental Wellbeing Strategy 2015–2019* is part of VicHealth’s campaign to improve the health and wellbeing of one million Victorians by 2023.[83]

This strategy is informed by the CSIRO and VicHealth’s Bright Futures report, which states that focusing on people 12–25 years old was important part of improving mental wellbeing in the community.[84] The report notes the importance of educating and preparing people in this age group to be resilient and adaptable in a world characterised by decreasing job security, the fluidity of globalisation and technology, increasingly diverse societies and increasing exposure to the internet. These matters are all addressed to some degree in *Resilient Melbourne*. They are important to local government, which will work with VicHealth as appropriate.

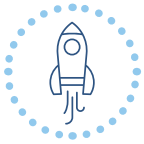
The capacity to be autonomous, regulate one’s emotions, have self-confidence and empathy, and solve problems, are critical resilience abilities for our entire community. A priority of VicHealth’s *Mental Wellbeing Strategy 2015–2019* is building these qualities in young people, so that they are integrated and self-perpetuating for decades to come.

Previous page: The Emerald Market is a self funded enterprise and provides a regular community gathering point, builds community independence through small entrepreneurship and reinforces local relationships.

The metropolitan cycling network



Capital City Trail along Harbour Esplanade, Docklands.



The metropolitan cycling network

Melbourne's metropolitan councils will collaborate with citizens and Victoria's main transport bodies to establish a metropolitan bicycle path network, to help make cycling a safer and more practical alternative to car travel.

RESILIENCE CHALLENGE

Although Melbourne has an extensive network of public transport, the 2011 census found that 60.6 per cent of Melburnians drive a car to work.[85] When coupled with a rapidly growing population, this heavy reliance on private vehicle travel is leading to increasing congestion on our roads. An Infrastructure Australia report recently predicted that the annual cost of congestion and delays on Melbourne's road network will triple to $9 billion by 2031. It also forecast that demand on Melbourne's public transport network will grow by 89 per cent in the next 15 years.[86]

The mode and duration of commuting have been linked to health problems – for example, lengthy commutes contribute to higher stress levels, shorter sleeping times, and generally lower self-reported health. In inner Melbourne suburbs, where several transport types are available, 70 per cent of residents receive sufficient regular exercise and only 14 per cent are considered obese. By contrast, in Melbourne's more car-dependent west, some 30 per cent (around 146,000 adults) are obese – the sixth-highest level of obesity and physical inactivity in Victoria.[87]

An important characteristic of a resilient city is flexibility – having a number of alternative ways to provide services and respond to changing circumstances. Similarly, resilient cities have redundancy built into their systems – this means intentionally having spare capacity, so that systems can continue to function should they experience an unexpected disruption. For mobility, this means giving people the ability to choose between multiple, effective modes of transport.

Redundancy and choice are also important in extreme events. For example, in the face of Super Storm Sandy, many New Yorkers used bicycles to make their way home from the city centre when buses, subway and overland trains could not operate.

Cycling is already very popular in Melbourne, with the Australian Bicycle Council estimating that 877,000 Victorians ride a bicycle in a typical week.[88] With 40 per cent of all car trips in Melbourne being less than two kilometres, cycling is a good alternative in many cases.[89] However, Melbourne's disjointed network of bicycle paths discourages cycling in many areas, as missing links force cyclists to take less direct and more hazardous routes.

PRIMARY RESILIENCE OBJECTIVE	Create and sustain buildings, infrastructure and activities that promote social cohesion, equality of opportunity, and health
RELATED OBJECTIVES	Empower communities to take active responsibility for their own and each other's wellbeing, safety and health Enable strong natural assets and ecosystems alongside a growing population
STRESSES	• Higher rates of chronic illnesses • Traffic congestion
SHOCKS	• Transport infrastructure emergency

THE ACTION

The Resilient Melbourne Delivery Office will work with councils across Melbourne to coordinate a metropolitan proposal for establishing cycle paths and corridors that is both holistic in scope and tailored to local needs. This work will link closely with the Victorian Cycling Strategy, which is currently being updated and will then be implemented by Active Transport Victoria, a unit in the Department of Economic Development, Jobs, Transport and Resources (DEDJTR).

This planning and coordination initiative furthers the objectives of the Victorian Government, specifically the Active Transport and cycling commitments outlined in *Plan Melbourne*, by:

- pooling knowledge from researchers, government and infrastructure agencies and cycling advocacy groups
- drawing on local government and infrastructure agency expertise to plan the metropolitan bicycle path network and connect existing bicycle paths, building on existing initiatives such as the Northern Trails initiative
- encouraging local government and infrastructure agencies to build new bicycle paths.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

Providing safer and more practical cycling routes across Melbourne will:

- increase people's transport choices, building additional redundancy into the transport network
- make the community more connected, with greater opportunities for social interaction
- encourage individuals to improve their health and wellbeing
- reduce the use of cars for short journeys, reducing congestion and lowering emissions
- make government transport spending more efficient, through improved planning, prioritisation and coordination.

Below, from left: The Galada Tamboore Cycle Path at Craigieburn; Darebin council's new Back Street Shimmy bike route maps being distributed by food trucks at Croxton Station, Northcote.

IMPLEMENTATION

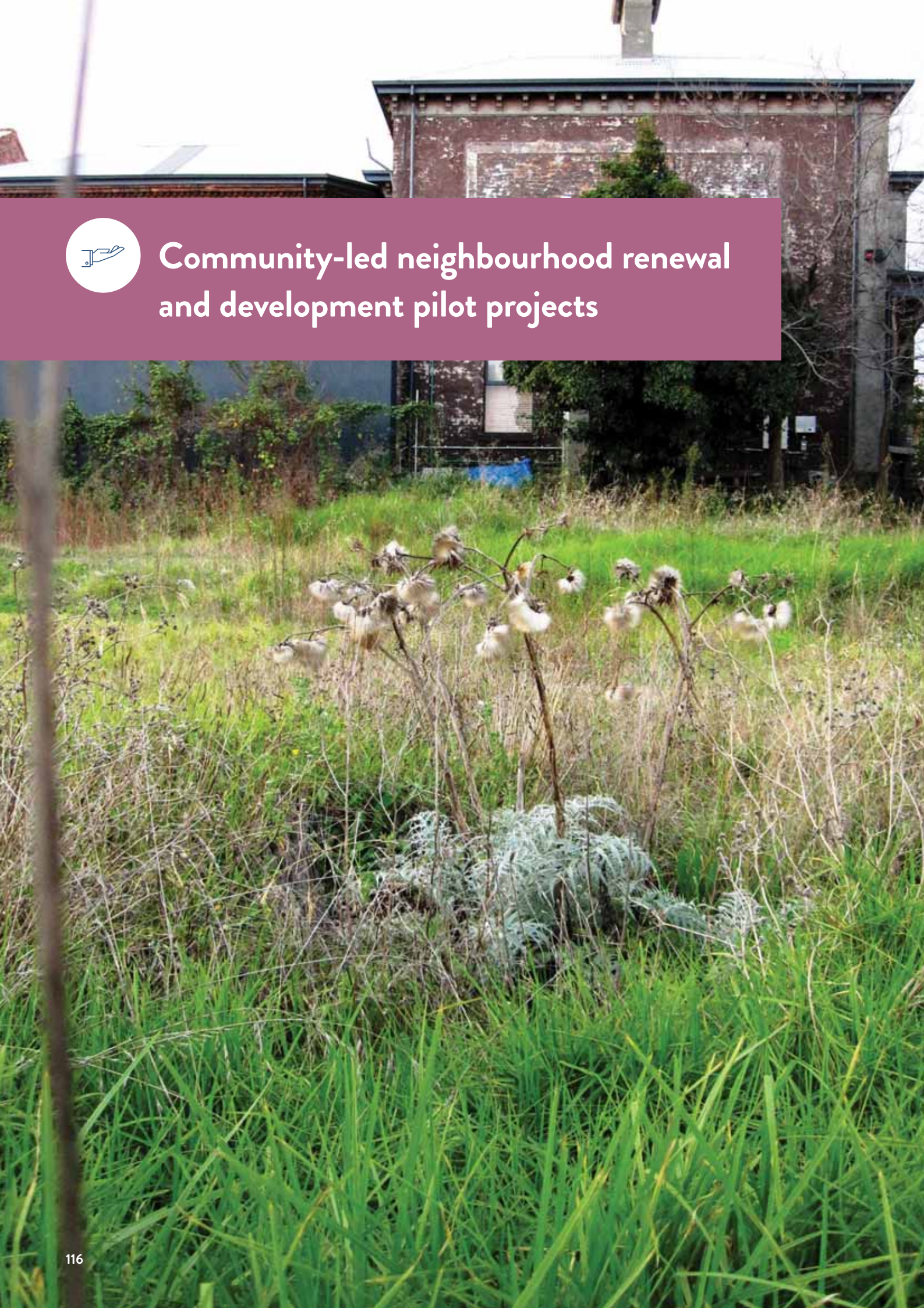
PARTNERS

Lead: Resilient Melbourne Delivery Office

- All metropolitan councils
- Active Transport Victoria (to start operations on 1 July 2016)
- Department of Environment, Land, Water and Planning
- Melbourne Water
- Metropolitan Planning Authority (MPA)
- Parks Victoria
- VicRoads
- VicTrack

NEXT STEPS

- The Department of Economic Development, Jobs, Transport and Resources is currently analysing information collected from the updated Victorian Cycling Strategy community consultation sessions held in late 2015.
- Resilient Melbourne will work with the organisations above to present a collective metropolitan government view and implementation ideas.
- The updated Victorian Cycling Strategy will be published in 2016.



Community-led neighbourhood renewal and development pilot projects

Community-led neighbourhood renewal and development pilot projects

Property companies will trial new ways of putting residents at the heart of neighbourhood and local infrastructure planning and operations.

RESILIENCE CHALLENGE

The built form of our cities and neighbourhoods strongly influences the type and quality of community connections and interactions. Although the rapid pace and large scale of development across Melbourne can act as barriers to consultation, meaningfully involving people in making decisions about their built and natural environment can foster stronger community identity and make places more desirable, in new and established areas.

PRIMARY RESILIENCE OBJECTIVE	Create and sustain buildings, infrastructure and activities that promote social cohesion, equality of opportunity, and health
RELATED OBJECTIVES	Empower communities to take active responsibility for their own and each other's wellbeing, safety and health
STRESSES	• Lower rates of community participation • Decreasing social equality • Development pressures on ecosystem services
SHOCKS	All – cohesive communities pull together and support one another in times of shock

THE ACTION

The community-led neighbourhood renewal and development pilot projects will support citizen participation in neighbourhood and local infrastructure planning. In its first round, this will involve partnerships with up to five property companies. The project will include a range of development types, from multi-unit buildings to redevelopments of entire precincts, located in inner, middle and outer Melbourne municipalities. We anticipate that some of the developments will be entirely new, while others will be scheduled or already established, with developers willing to try new ways of putting residents at the heart of decision making.

Property companies and their partners will:

- test a range of tools and frameworks, both existing (such as Green Star Communities, Ecodistricts) and new, to collaborate and share in decision making
- measure results and report on their findings, working in conjunction with academic and other partners
- contribute to a body of publicly available guidance on participatory planning across Melbourne.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

- Participating communities will be better able to influence and shape their neighbourhoods to meet their specific needs and interests. By fostering a greater connection with their home and those around them, residents are expected to benefit from better urban design and greater personal wellbeing.
- Stronger community connectedness will be developed, enabling communities to cope better in times of shock or stress.
- Based on these trials and published research, local government, property, utilities, transport and academic sectors should better understand how to use participatory planning to identify and deliver services that meet the needs of specific communities in different circumstances.

Community-led neighbourhood renewal and development pilot projects

IMPLEMENTATION

PARTNERS

Lead: Resilient Melbourne Delivery Office

- Participating developers and metropolitan councils, in partnership
- Property Council of Australia
- Green Building Council of Australia
- Australian Sustainable Built Environment Council
- RMIT University

NEXT STEPS

An expression of interest has been released to members of peak bodies (Property Council of Australia and the Australian Sustainable Built Environment Council)

By late 2016:

- Select participating developers and councils.

From 2017:

- Publish initial guidance materials to enable pilot projects to start.

Until 2027:

- Individual pilot projects will run for up to 10 years – trials will vary depending on the characteristics of each site, such as the scale of the development.

Citymart Challenge – involving citizens in mobility and transport

Traffic congestion is increasingly becoming an issue in Melbourne.

Citymart Challenge – involving citizens in mobility and transport

Citymart, a 100RC Platform Partner, will crowd-source potential solutions for reducing transport congestion in ways that increase positive social interactions.

RESILIENCE CHALLENGE

Traffic congestion is a sign that current infrastructure is inadequate, as well as itself being a source of stress for individuals and communities. Congestion may also reflect people being forced to live further from their work owing to housing and other costs, weak local economies, and public transport options being impractical or simply less convenient than car travel.

Congestion increases the costs and reduces the efficiency of business and households. Infrastructure Australia estimates the annual economic cost of Melbourne's congestion at over $2 billion.[90] Too often we look at the solution to congestion as one requiring significant investment in yet more infrastructure, ignoring the deep well of innovation that exists within the public at large and innovative businesses that may offer solutions frequently not considered by policy makers.

Travel can lead to social interaction, but in congestion these interactions are less likely to be enlivening or uplifting. If people can be encouraged to get out of their cars, or to make better use of car transport, there may be opportunities to reduce the stress of congestion and to improve connections between neighbours and communities more broadly.

PRIMARY RESILIENCE OBJECTIVE	Create and sustain buildings, infrastructure and activities that promote social cohesion, equality of opportunity and health
RELATED OBJECTIVES	Provide diverse local employment opportunities that support an adaptable workforce, prepared for the jobs of the future
STRESSES	• Lower rates of community participation • Unemployment, particularly among young people • Traffic congestion
SHOCKS	• Transport infrastructure emergency

THE ACTION

Citymart, which is described in more detail below, will crowd-source potential solutions from around the world to achieve two important goals simultaneously: reducing congestion while promoting increased positive social interactions.

Citizens and entrepreneurs, locally and globally, will be encouraged to propose solutions to reducing Melbourne's congestion. This will provide decision makers with access to a vast knowledge resource – citizens and entrepreneurs – to find innovative solutions to this increasingly pressing problem. An internationally recognised expert panel will assess ideas and identify a winning solution for implementation.

Initially, citizens and entrepreneurs will be asked four simple questions:

- What is your idea for solving congestion in Melbourne?
- How will it help people to interact better?
- How ready is your solution?
- How can we measure its success?

THE 100RC GLOBAL NETWORK IN ACTION

Citymart is currently working on related problems in the 100RC cities of Bristol, Da Nang and Oakland. The Resilient Melbourne Delivery Office will collaborate with these cities and their Chief Resilience Officers to share lessons.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

- The winning initiative will reduce congestion and improve social interactions.
- The action will support a culture of social entrepreneurialism and a society that is adaptable and open to innovation.

Heavy traffic on Alexandra Avenue.

Citymart Challenge – involving citizens in mobility and transport

IMPLEMENTATION

PARTNERS

Leads: Citymart and the Resilient Melbourne Delivery Office

- To be determined through Citymart process
- All metropolitan councils
- Infrastructure Victoria
- Department of Economic Development, Jobs, Transport and Infrastructure

NEXT STEPS

By August 2016

- Establish the project review panel, informed by established Citymart processes.

By January 2017

- Plan and run the open source procurement challenge.
- Panel assesses projects and selects winner.

March 2017

- Resilient Melbourne Delivery Office, in partnership with agencies, seeks approval to pursue winning submission.
- Timing for the implementation of the winning project to be determined by scale, cost and complexity of winning solution.

ABOUT THIS PROJECT'S 100RC PLATFORM PARTNERS

CITY MART MARKETPLACE FOR CITIES

Citymart provides cities with open tools, methods and services to transform their communities through high-impact urban and social innovations.

Through Citymart Challenges, Citymart provides cities with a problem-based procurement service. Citymart will help a city define its problem statement and run an open challenge process to source the best available solutions to meet their needs from global solution providers. The open nature of Citymart Challenges has provided direct economic benefit by increasing and broadening competition among providers, and inspiring new approaches to achieve a city's objectives.

Citymart Challenges can be applied to procurement or pilot projects and will help a city gain valuable market intelligence to source the best available market solutions to implement their resilience strategies.

The X'trapolis model train is built locally and is the most modern in Metro's fleet.

ALIGNED LOCAL ACTION

Melbourne Metro Rail Project

While *Resilient Melbourne* supports diversifying local economies across Melbourne, our resilience as a metropolitan area also depends on a strong, accessible, central city.

Currently, Melbourne's 15 radial suburban train lines feed into Melbourne's central business district via the City Loop tunnel. This creates a major bottleneck in our public transport network and prevents us from increasing network capacity to serve our rapidly growing population.

In 2015, the Victorian Government announced the construction of a 9 kilometre rail tunnel from Kensington in the city's north, to South Yarra, via the central city. The Melbourne Metro Rail Project will also deliver five new stations and cost approximately $10.9 billion, with works to begin in 2017.

Melbourne Metro will reduce the rail network's vulnerability to failure by providing entirely separate end-to-end lines from Sunbury in the west to Cranbourne-Pakenham in the south-east. Additionally, 39,000 more passengers will be able to reach and leave the central city during the morning and afternoon travel peaks.

Greater capacity on the public transport network will reduce congestion across all modes of transport. The project will be equivalent to removing 18,000 cars from the city's roads during the busiest hours of the day, and will provide public transport users with an alternative to taking trams along Swanston Street, currently the city's busiest tram and pedestrian corridor.

Young and Resilient Living Labs

Members of the Young and Well CRC brains trust.

Young and Resilient Living Labs

Young people will be helped to design, create and test out their own technology-based strategies to tackle stresses and shocks affecting youth mental health.

RESILIENCE CHALLENGE

Australia's performance on international innovation indicators is one of the lowest among OECD countries.[91] From a mental health perspective, we have a limited understanding of the relationship between risk and resilience, and we often don't translate new evidence about resilience and vulnerability into policy and practices. Involving young people in making decisions is essential if we are to improve in this respect.

In Australia, 14 per cent of children aged 4–12 years have mental health problems, rising to 19 per cent among adolescents (13–17 years) and 27 per cent for young adults (18–24 years).[92] Twenty per cent of young people aged 12 to 25 had personally experienced a mental health, alcohol or other substance use problem in the last five years.[93]

PRIMARY RESILIENCE OBJECTIVE	Empower communities to take active responsibility for their own and each other's wellbeing, safety and health
RELATED OBJECTIVES	Provide diverse local employment opportunities that support an adaptable workforce, prepared for the jobs of the future Create and sustain buildings, infrastructure and activities that promote social cohesion, equality of opportunity and health
STRESSES	• Unemployment, particularly among young people • Family violence • Alcohol and drug abuse • Increasing pressure on healthcare services • Lower rates of community participation
SHOCKS	• Numerous at the level of individuals and cohorts of young people

THE ACTION

Building on work conducted with the University of Western Sydney as part of the Australian Government's Cooperative Research Centres Program (CRC), the Young and Well CRC will develop up to five living laboratories across metropolitan Melbourne, one in each of Melbourne's sub-regions. The Resilient Melbourne Delivery Office will coordinate between potential partners to develop the living labs. The Young and Resilient living labs will bring together young people, researchers, policy makers, employers, health practitioners, parents and technology providers to investigate, design, create and test innovative technology-based strategies that equip young people to tackle personal problems and promote individual, community and social wellbeing. The laboratories will:

- develop and test strategies for minimising harm and supporting the resilience of young people and their communities
- research the role of technologies in the lives of young people
- foster processes for generating new software, apps, initiatives and enterprises that help young people build the skills and access the services that will equip them to improve their personal wellbeing and resilience
- be a catalyst for community-based initiatives to support the resilience of young people.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

This action provides:

- technological solutions to mental health problems experienced by young people
- increased social connectivity and sense of belonging, particularly among youth
- improved resilience of younger citizens
- skills and opportunities for young people from vulnerable groups who might otherwise struggle to gain employment or generate an income.

IMPLEMENTATION

PARTNERS

Lead: Young and Well CRC

- Participating metropolitan councils
- Regional Development Australia committees across Melbourne
- VicHealth
- Foundation of Young Australians

NEXT STEPS

Resilient Melbourne is currently working with several groups of councils to establish the first of these living labs. A process is under way to find the best location, based on accessibility for vulnerable young people, shared objectives of participating municipalities, and cost effectiveness.

Early 2017:

- Launch the first living lab, to operate initially for three years.

ALIGNED LOCAL ACTION

Preventing Violence Together

Launched in 2010 and led by Women's Health West, Preventing Violence Together (PVT) is the regional partnership and action plan for primary prevention of violence against women in Melbourne's west. Involving 18 signatory organisations, the action plan was the first of its kind in Victoria, and is now being replicated across Melbourne's regions.

Achievements of the PVT partnership include:

- working with 57 executive leaders on gender equity
- staff training on preventing violence against women in culturally and linguistically diverse communities
- developing resources, including gender audit guidelines
- advocacy, including a submission to the Victorian Royal Commission into Family Violence.

In Melbourne's southeast, the Together We Can initiative is also tackling family violence. Led by Cardinia Shire Council, Family Life and the University of Melbourne, it brings together the efforts and resources of a range of organisations, including schools, businesses, all levels of government, and the community sector. The process began with a community convention, held in late April 2016, to share what is already working well, identify what is still needed, and start finding solutions together.

For more information on these initiatives, see http://whwest.org.au/health-promotion/prevent-violence/preventing-violence-together/ and http://togetherwecan.org.au/about-us/.

STEM mentoring Melbourne

STEM mentoring Melbourne

Young people who might otherwise never be exposed to people in senior professional roles will meet leading and inspirational Melbourne based and international science, technology, engineering and mathematics (STEM) professionals, and learn about how they got to their current positions.

RESILIENCE CHALLENGE

Australian students are faced with a growing number of career and education choices, but not all are equipped to make fully informed decisions. We need to help students make smart choices about their futures, and we must communicate the advantages and value of careers in STEM, in a way that is inclusive and actively reaches out to disadvantaged and isolated students.

This is particularly important in Melbourne: our economy is rapidly shifting from its traditional manufacturing base. Meanwhile, we have high rates of immigration, meaning that many people do not have established networks that open up employment opportunities, while long-time residents may have very strong networks that can be hard for new arrivals to penetrate.

PRIMARY RESILIENCE OBJECTIVE	Provide diverse local employment opportunities that support an adaptable workforce prepared for the jobs of the future
RELATED OBJECTIVES	Create and sustain buildings, infrastructure and activities that promote social cohesion, equality of opportunity and health
STRESSES	• Decreasing social equality • Lower rates of community participation • Unemployment, particularly among young people
SHOCKS	• Global economic crisis or downturn

THE ACTION

LifeJourney is a social-purpose driven business that lets students test-drive future STEM careers and learn from top industry professionals through a free, interactive, online platform which in Australia is known as The Day of STEM. It links students with mentors in a secure online environment, allowing students to get a real-life appreciation of what happens in the professional world and how these executives got to where they are today. It also provides an opportunity to learn about STEM careers, develop new skills, and to understand industry challenges facing Australia now and in the future. The goal is to help students find their own passion and identify career paths that they may not otherwise have known to be available to them.

A tunnel boring machine creates a 1.2km tunnel for the Melbourne Main Sewer Replacement Project.

The Day of STEM platform works with top STEM-related professionals from major Australian organisations to inspire students to identify and then pursue their dreams, providing them with an educational roadmap as they begin their own career journeys.

LifeJourney's technology enables a single mentor to inspire and guide 10,000 or more students at the same time and has an ambitious target of reaching 2.5 million students across Australia, with potentially up to 1 million in Melbourne alone.

The Resilient Melbourne Delivery Office is working with LifeJourney to tailor the Day of STEM service so that local government and other partners can help the service to reach our young people who are least likely to get this guidance from any other source.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

The action will:

- provide inclusive opportunities for a broad range of students to learn about STEM careers
- promote mathematical and scientific literacy across Melbourne's population
- foster a job market that is equipped with the skillsets that match the needs of the economy.

STEM mentoring Melbourne

IMPLEMENTATION

PARTNERS

Lead: LifeJourney

- Resilient Melbourne Delivery Office
- All metropolitan councils
- Regional development agencies
- Technical and further education colleges
- The first Australian organisations to sign up to provide mentors include Telstra, Optus, Westpac, AMP, Twitter, Lockheed Martin, BAE Systems, Deloitte, CISCO, Collingwood Football Club and SAS. Another 20 are in negotiations to join the program.

NEXT STEPS

- We are working with LifeJourney to recruit additional mentors from non-traditional STEM backgrounds and industries.
- We are working with a range of agencies to make LifeJourney more widely available, particularly to frequently excluded students.

Innovative business models

Help Melbourne's small to medium enterprise sector prepare for future shocks and stresses by collaborating with Melbourne's senior business students.

RESILIENCE CHALLENGE

Melbourne's small to medium enterprises (SMEs) are essential to our city's vitality. In addition to being an indicator of and contributor to the success of our economy, these businesses are highly vulnerable to shocks and stresses. Following an extreme event, one-third of affected SMEs close and never reopen.[94]

THE ACTION

To help Melbourne's SMEs understand their biggest business problems and vulnerabilities, and put management plans in place, the Resilient Melbourne Delivery Office will work with B Lab Australia & New Zealand to deliver 'B Corporation' training to SMEs. This will use the basic 'B Impact Assessment', which is a free online resource that helps businesses to understand their business operations and their impacts. It is therefore an affordable way for SMEs and emerging businesses to prepare for future shocks and stresses. It also provides a platform and tools for interested businesses to understand and improve the social and environmental effects of their operations.

Students from Melbourne's business schools, working through established business training programs, will help deliver training on applying the B Impact Assessment and taking actions based on the assessment findings, giving mature and experienced students access to new networks, while providing SMEs with affordable business advice.

PRIMARY RESILIENCE OBJECTIVE	Provide diverse local employment opportunities that support an adaptable workforce prepared for the jobs of the future
RELATED OBJECTIVES	Empower communities to take active responsibility for their own and each other's wellbeing, safety and health Enable strong natural assets and ecosystems alongside a growing population
STRESSES	• Unemployment, particularly among young people • Decreasing social equality • Lower rates of community participation
SHOCKS	• Business disruption in the face of extreme events • Global economic crisis or downturn

A fishmonger in Footscray.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

- A greater number of our new businesses and SMEs will have stronger plans in place to manage their businesses on a day-to-day basis.
- Those businesses that choose to pursue the more advanced 'B Corporation Certification' will put social and environmental benefits at the core of their business practices.

IMPLEMENTATION

PARTNERS

Lead: B Lab Australia and New Zealand

- Resilient Melbourne Delivery Office
- Participating metropolitan councils
- Better Business Coalition
- MBA students from Melbourne's major universities

NEXT STEPS

July-October 2016:

- B Lab Australia and New Zealand and Resilient Melbourne Delivery Office to design the program.

By early 2017:

- Hold pilot sessions.

Mid-late 2017:

- Develop the full program.

ALIGNED LOCAL ACTION

30-year Infrastructure Strategy for Victoria

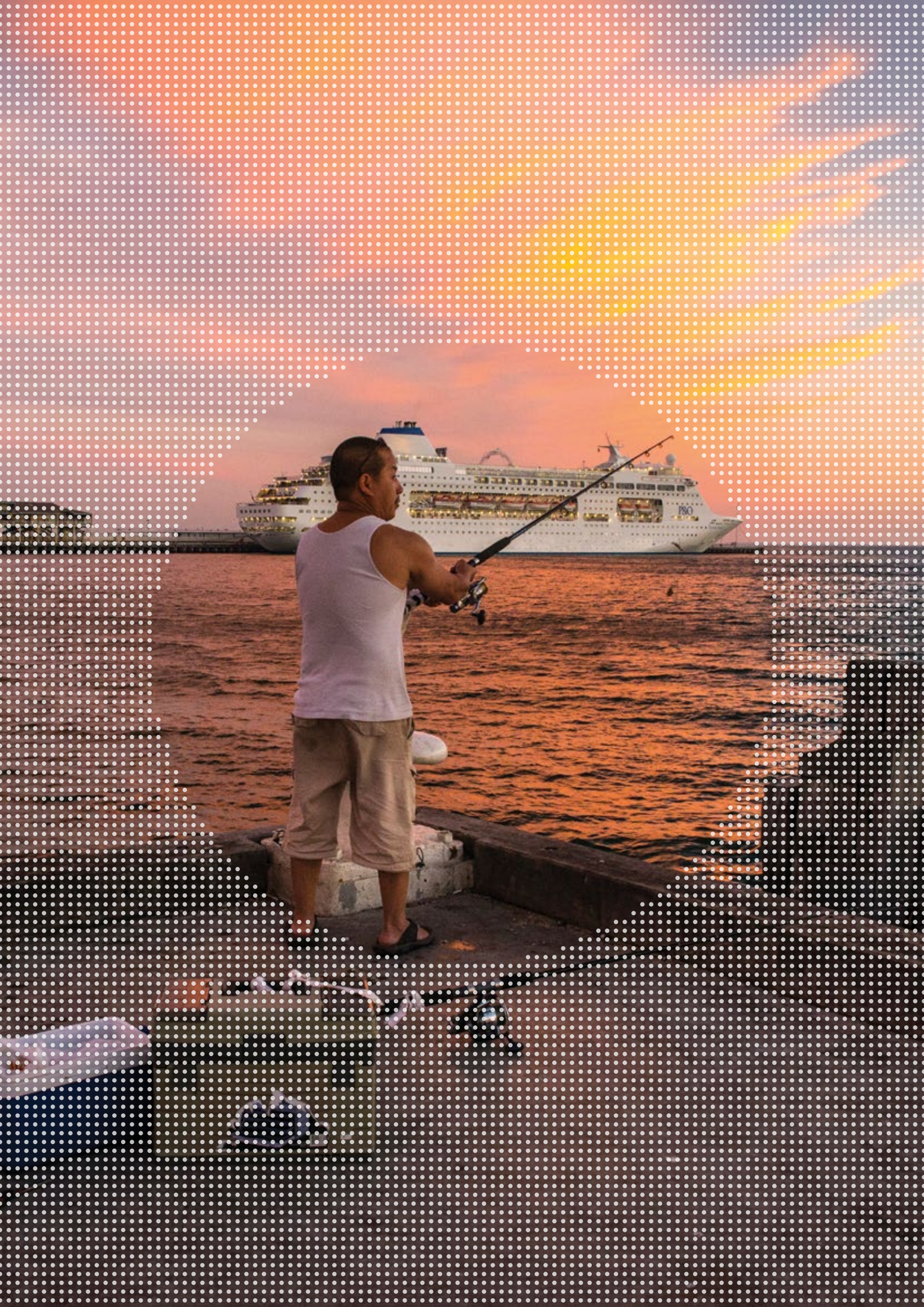
A key challenge for a resilient Melbourne is developing and maintaining the infrastructure needed to support a thriving, competitive city. In pursuit of this, Infrastructure Victoria was established in 2015 as an independent statutory authority to guide decision making on Victoria's infrastructure needs and priorities. It provides expert advice to government, undertakes research and prepares a 30-year infrastructure strategy for Victoria.

Work on the 30-year strategy, which will outline short-, medium- and long-term infrastructure priorities, is now under way. The strategy will cover energy, water and waste, transport, education and training, health and human services, justice, culture, civics, science and agriculture, and information and communications technologies (ICT). Consultation will occur throughout 2016, with the final strategy to be published by the end of the year.

One of the 30 draft objectives is 'build resilience to shocks', as unexpected events are likely to disrupt Victoria's society, environment and economy over the coming decades. These shocks could be anything from natural disasters, pandemics, ICT disruptions, global economic crises and terrorism, to relatively minor but more frequent disruptions to transport networks.

Victoria's vulnerability to these shocks will partly be determined by the resilience and adaptability of its infrastructure. Infrastructure Victoria's 30-year strategy aims to ensure that Victoria's infrastructure is able to adapt and respond positively to unexpected events.

Infrastructure Victoria is working with the Resilient Melbourne Delivery Office to best align our respective efforts.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EMBED

In a resilient Melbourne resilience thinking, planning and actions will be core to our institutions and ways of working.

To achieve our objectives and enable our communities to adapt, thrive and survive, our various levels of government and our organisations must ensure that their policies and practices actively increase our collective resilience. They need to understand how they can actively improve community resilience, through their own decisions, the cultures they foster and how they cooperate. Existing and emerging organisations need to consider resilience consequences in all they do and be prepared to manage the shocks and stresses that may directly impact them in order to contribute to the resilience of our city as a whole.

And we need to track our progress. Identifying successes and learning from mistakes will help us communicate honestly and clearly with our communities, supporting them in their own efforts.

Statement of support from Michael Berkowitz, Chief Executive Officer and President of 100 Resilient Cities

"We at 100 Resilient Cities commend Melbourne for the way it is taking on the challenge of working at a metropolitan scale, working with existing structures and governance models in new ways to deliver resilience dividends for its communities.

Numerous 100RC cities work in similar metropolitan arrangements so learning how to address resilience issues at this scale is critical. Additionally, cities are increasingly globally interconnected, so learning alongside Melbourne about collaboration at a local scale will help us to better collaborate globally.

The idea of a temporary Office to embed resilience into existing institutions and organisations is novel. Conceptually it makes sense. Most importantly, if it is right in Melbourne's local context, that should be the greatest determinant of success and we will look for what lessons others may draw from this.

We believe that the initial 100RC Platform Partners with whom you are working, including CSIRO, The Nature Conservancy, Trimble and Citymart, will provide an incredible starting point for implementing this strategy. The ability of the Office to draw from these and other platform partners as you go forward will add notable weight to the resources able to be shared across Melbourne.

We wish you well in your efforts – now the hard work really begins as you move from strategy making to true resilience-building. We are committed to working with you as you take this next step. We hope that as a collective of 32 local government areas working together and across sectors you live up to your aspiration of being a city that others look to for advice and support on resilience-building. We look forward to being with you and being part of that great knowledge sharing."

LEARNING FROM OTHERS – BARCELONA

In 2007 the City of Barcelona was grappling with a mix of infrastructure and environmental difficulties that may be familiar to Melburnians. The city was in the midst of Spain's worst drought in 40 years, leading to stringent water restrictions, construction of desalination plants and serious consequences for water-dependent businesses. Around the same time, it experienced a major electricity outage that left more than 350,000 households and businesses without power for more than 56 hours.

In response, the City of Barcelona developed the 3S (Security of Services Supply) project, which brought together infrastructure owners, operators and government agencies to better understand vulnerabilities and interconnections between different elements of the urban infrastructure. The assessments identified that the city's infrastructure management systems were not well integrated and did not have extra capacity that could be drawn upon should basic systems fail.

These findings were acted upon by multi-stakeholder working groups called Urban Resilience Boards, which have identified and managed more than 40 projects to better prepare Barcelona for future shock events. Projects included setting up a 'situation room' that coordinates information critical to the day-to-day functioning of the city, and undertaking a comprehensive audit of Barcelona's network of tunnels. Following the success of the projects, the city created the Department of Urban Resilience to coordinate resilience-related efforts and collaborate with international institutions to share ideas and experiences.

The Sagrada Familia, Barcelona.

The Resilient Melbourne Delivery Office

Sarah Firth captures the conversation at the 'Stronger Society' Accelerated Design Forum in August, 2015.

The Resilient Melbourne Delivery Office

Establish an office to oversee implementation of *Resilient Melbourne*; develop a range of capacities in metropolitan local government; and embed resilience principles and actions more broadly across metropolitan Melbourne and relevant institutions.

RESILIENCE CHALLENGE

Resilient Melbourne has been developed through collaboration across sectors, led by local government. If we are to realise its full potential, this collaboration will need to continue and grow, drawing in more organisations, communities and individuals. The launch of this strategy is just the starting point.

In the short term, resources are needed to put in place the actions proposed in this strategy. To make sure that the resilience vision for Melbourne's communities lives beyond this first strategy, further resources and ongoing leadership are needed, to build on the partnerships and networks already established through *Resilient Melbourne*.

"There is a unique opportunity to link the resilience of our communities to the council planning processes, as well as council budgets currently under development. There may be existing allocations for actions and specific programs, and in some cases, councils may be undertaking existing actions and programs that can be built upon."

Stephen Wall,
CEO
Maribyrnong City Council

THE ACTION

The temporary Resilient Melbourne Delivery Office (the Office) is being established for a five year period to provide sufficient time to deliver on the commitments made in this strategy and to determine the appropriate organisations to achieve resilience outcomes for many years to come.

The Office has been created to unite the efforts made by numerous organisations and individuals over the past 18 months. It will oversee the implementation of this strategy, supported in particular by the 32 councils of Melbourne; Emergency Management Victoria; the Municipal Association of Victoria; the Department of Environment, Land, Water and Planning; and the Department of Premier and Cabinet.

The Office will help ensure that the actions described in *Resilient Melbourne* are implemented successfully, and maintain the involvement of Melbourne councils and other partners. It will oversee the establishment of a governance structure for each action, refinement of the actions, development of new actions, and monitoring and reporting on progress of the actions. Additionally, the Office will work with local government and its relevant associations to embed resilience-building actions in council plans and processes.

The Office will ensure the delivery of the next strategy and determine the appropriate organisations and institutions to do this work beyond the five years of the Office's operation. Linked to this, it will advocate for resilience principles to be built into relevant policies and actions. For example, Resilient Melbourne coordinated a submission from local government CEOs to the current review of Victoria's *Local Government Act 1989*. This is a major opportunity for Melbourne's 32 councils to formally integrate resilience principles into the way they do business, by making resilience-building activities an explicit objective in the revised Act.

The Office will manage the generation, holding and dispersal of funds from private sector and philanthropic partners, and the pro-bono contributions of services from 100RC Platform Partners, to create a lasting, multi-sectoral approach to preparing Melbourne for the future and its emerging challenges. It will also establish close links with the City of Melbourne professorial chair in resilient cities (p. 148) and be a bridge between local partners and 100RC, for sharing knowledge and resources.

Through these activities, the Office will support Melbourne's resilience and contribute to national and international resilience-building.

Reporting on Melbourne's resilience efforts

Providing feedback to our communities and institutions on Melbourne's current resilience, and on the results of resilience-building projects that have been implemented, will be critical in maintaining support for this strategy, and bringing about change. The Office will report on the state of city resilience as well as on effectiveness of each individual action proposed in *Resilient Melbourne*.

The Delivery Office will inform through a range of channels, including annual report processes. The Office will continue to improve its website to become a substantial resource of resilience information for Melbourne, drawing from local actions, as well as from the 100RC network.

Monitoring

While developing *Resilient Melbourne*, we established a Resilience Indicators Community of Practice. Bringing together organisations with roles central to understanding Melbourne's resilience, it will agree measures of Melbourne's resilience, gather relevant data, improve its accessibility and quality.

Organisations participating in the Resilience Indicators Community of Practice include the Community Resilience Unit of the Department of Premier and Cabinet, VicHealth, the Australian Urban Research Infrastructure Network, Community Indicators Victoria, several universities, and other organisations already funding resilience-related research, such as the Scanlon Foundation's work on social cohesion.[95]

Melbourne's 32 councils are already crucial to these efforts, as they research and analyse demographic, economic, environmental and property information to plan for and support their services, community programs and capital projects.

In addition to such sources, we intend to apply the City Resilience Index, based on the City Resilience Framework developed by the Rockefeller Foundation and 100RC. This will enable us to monitor our resilience in line with other cities globally, enabling further collaboration.

Evaluation and review

Before we implement an action, we will agree performance measures. Evaluating how actions work in practice will be essential to building resilience. Little in *Resilient Melbourne* has a guaranteed result. Indeed, a great part of the value of this work is a willingness to experiment, to try out new ways of working together. Evaluating actions, changing them if necessary, and being open about what has and has not worked, will be a significant benefit of *Resilient Melbourne*, both locally and across the 100RC network.

To assess its own effectiveness, the Office will use the LBG international methodology for measuring community impact (http://www.lbg-online.net/). This will help us understand what resources the Office has attracted to our collective efforts, how those resources have been used, and what has been achieved.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

- The Office will be a central point for attracting the resources needed to embed resilience principles and actions across Melbourne, its institutions, organisations and systems.
- A temporary (five-year) structure will allow us to realise benefits and build on the investment made to date, while remaining true to our guiding principles of building on existing structures, reducing duplication, and delivering tangible benefits to Melbourne's diverse communities.
- Monitoring will ensure that we understand what does and does not work in improving resilience.
- Reporting publicly will maintain the credibility of this work and help us communicate the facts to more diverse parties.

IMPLEMENTATION

PARTNERS

Lead: Resilient Melbourne Delivery Office

- All metropolitan councils
- Emergency Management Victoria
- Local Government Victoria
- Municipal Association of Victoria
- Department of Premier and Cabinet
- Corporate and philanthropic partners

NEXT STEPS

- Initial funding has been secured, to ensure immediate running of the Office, which will be officially launched in mid-2016. This will enable us to build on our early work, ensuring a seamless transition from strategy development to implementation.
- The Resilient Melbourne Steering Committee has been refreshed to reflect broader metropolitan input. It will ensure we continue to seek the greatest possible opportunities at a metropolitan scale, relevant to local communities within individual councils.
- We are seeking additional funding and new partnerships, to make sure that the temporary Office will operate effectively over its five-year existence.

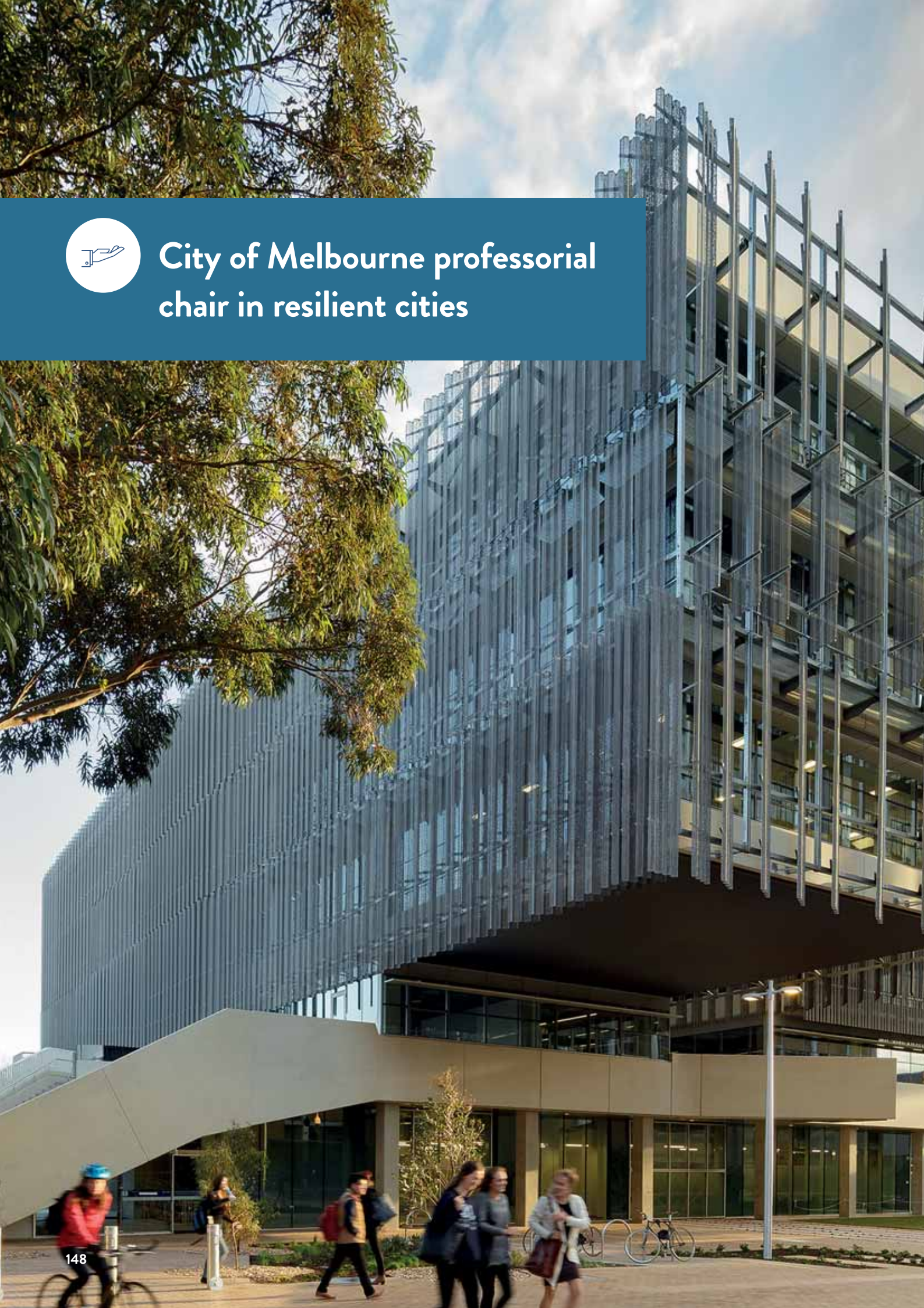
By late 2017:

- First update report published

By July 2021:

- The Office will complete its mission.

City of Melbourne professorial chair in resilient cities



City of Melbourne professorial chair in resilient cities

Establish a professorial position to lead and coordinate academic work on practical resilience-building actions in Melbourne.

RESILIENCE CHALLENGE

A wide range of activities has already contributed to Melbourne's current level of urban resilience. At the same time, research conducted over the past 18 months through 100RC and others has led to new ways of thinking on the subject. Melbourne's strong academic institutions can help make our city a prominent contributor to emerging international urban resilience practices. To understand how to apply urban resilience across the city, Melbourne's academic bodies need to be part of international resilience research and involved in its local implementation.

THE ACTION

The professorial chair in resilient cities is being established at the University of Melbourne, in partnership with the City of Melbourne. This chair will coordinate academic work in the field of resilience between the university, the City of Melbourne and a range of external parties, including universities across Melbourne.

The chair will work with all of the University of Melbourne's faculties and interests, and will play a key role in influencing and stimulating local and international public debate and policy in urban resilience. The incumbent will also support the efforts of the Resilient Melbourne Delivery Office and will help build knowledge and embed resilience into academic research projects and other activities. This will likely include being an important contributor to the Resilience Indicators Community of Practice (p. 145).

All: Melbourne University's new school of design building was opened in October, 2014.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

- fosters the work of *Resilient Melbourne* and makes it an integral part of the work of our universities, helping us meet our long-term objectives.
- provides a central coordinating point for research into resilience.
- strengthens Melbourne's academic credentials in resilience, while contributing to this rapidly expanding field of practice and research.
- supports Melbourne's leadership as a resilient and desirable place to live.

City of Melbourne professorial chair in resilient cities

IMPLEMENTATION

PARTNERS

Leads: University of Melbourne and City of Melbourne

- Participating metropolitan councils
- Major universities in Melbourne and overseas

NEXT STEPS

2016:

- The professorial chair in urban resilience commences initial five-year appointment.
- Professorial chair and Chief Resilience Officer to determine shared research agenda.
- Professorial chair identifies opportunities for partnerships and grants – continuing research presents longer opportunities and timeframes.

ALIGNED LOCAL ACTION

Working to embed resilience and build social cohesion

In May 2015, the Hon. Daniel Andrews MP, Premier of Victoria, announced the establishment of the Social Cohesion and Community Resilience Taskforce. Its aim is to facilitate collective action across governments, community and academia to strengthen social cohesion and community resilience, and prevent violent extremism. The Community Resilience Unit in the Department of Premier and Cabinet was established to support the Taskforce.

The Taskforce recognised that the issues are complex, difficult to understand and interconnected, and that steps taken by governments alone will not succeed. Thus the Strategic Framework to Strengthen Victoria's Social Cohesion and the Resilience of its Communities was developed, in partnership with communities, academics, service providers, philanthropic foundations, businesses and other interested parties.[96]

This document identifies ways for governments, communities, families and young people to work together on projects that promote social inclusion. The Resilient Melbourne Delivery Office and metropolitan councils will continue working closely with the Community Resilience Unit to strengthen Melbourne's social cohesion. The Taskforce has been funded for four years.

Resilience training for local government

Resilience training for local government

Incorporate resilience principles into all levels of the local government sector, through a new training program aimed at officer-level staff and above.

RESILIENCE CHALLENGE

The Commonwealth and Victorian governments, as well as local governments, all develop policies and actions that have major implications for the ability of Melbourne and its communities to withstand, respond to, and thrive in the face of shocks and stresses. Local government is increasingly responsible for implementing such policies, often with limited resources, particularly in the area of emergency management and in dealing with the unintended consequences of policy and funding changes.

THE ACTION

A resilience training program is being developed for local government employees across metropolitan Melbourne. It is based on leading global practice in urban resilience and will equip council officers with the knowledge and resources to incorporate resilience principles into their day-to-day decision making, processes and cultures.

Although the training must cover much more than emergency management, it will reflect the findings of Local Government Victoria's current review of local government's capability and capacity in managing emergencies. We will also work with the Department of Health and Human Services (DHHS) on a project to help those 1,400 Victorian organisations that deliver services for DHHS in emergency situations (which include local councils) to be better prepared and more resilient.

BENEFITS – HOW DOES THE ACTION SUPPORT OUR RESILIENCE OBJECTIVES?

- Incorporating urban resilience principles into local government cultures will lead to more robust, long-term, inclusive policies and implementation plans.
- Greater cooperation will lead to more efficient and effective services.
- Officers in all councils will better understand resilience thinking and will learn practical ways to incorporate resilience planning into council actions.

IMPLEMENTATION

PARTNERS

Lead: Resilient Melbourne Delivery Office

- LG Pro
- Local Government Victoria
- Municipal Association of Australia
- Victorian Local Government Association
- Emergency Management Victoria
- Department of Health and Human Services
- Local government employees

NEXT STEPS

Mid-2016:

- Design of the program begins.

Following November 2016 local government elections:

- Resilient Melbourne Delivery Office provides support for councillor briefings.

By December 2016:

- Program design is completed.

February 2017:

- First full training session runs – sessions continue on an ongoing basis.

What comes next?

Thank you for your interest in *Resilient Melbourne*. It is one step in an on-going approach that builds on the tremendous efforts and achievements of many people, over a long time, to make Melbourne a successful, inclusive and modern city.

The actions in *Resilient Melbourne* test out new ways of working. By monitoring their results on several levels, we will not only learn what works well and what could be improved for specific actions, but also how different actions may combine to produce greater, and sometimes unexpected, benefits.

By drawing on our shared experiences, and learning from these and future actions, together we will foster a resilient Melbourne, a city that is viable, sustainable, liveable and prosperous, long into the future.

Please be part of the effort. Identify actions you would like to be involved in or let us know of actions that you think are already contributing to our objectives. We are constantly looking for new partners, new ways of working and new ways to finance and resource actions.

Visit: **www.resilientmelbourne.com.au**

Email: **resilience@melbourne.vic.gov.au**

An iconic multi-media bus shelter in Emerald.

Questions and answers – *with Chief Resilience Officer, Toby Kent*

Over the last 18 months I have had the privilege of meeting with hundreds of leading actors across government, academic, business, infrastructure, emergency management, environment, community and health sectors. With the support of the Resilient Melbourne team, we have fielded a range of questions about the Resilient Melbourne initiative and resilience thinking more generally. Below are some of the most frequently asked questions. The *Glossary* on page 163 also contains some useful definitions.

What is resilience?

This project uses the 100RC definition of urban resilience: the capacity of individuals, institutions, businesses and systems within a city to adapt, survive and thrive no matter what kind of chronic stresses and acute shocks they experience.

What are shocks and stresses?

Shocks are sudden, often unexpected, events that threaten a city. Examples include bushfires, floods and heatwaves. Stresses are longer-term problems that weaken the fabric of a city on a day-to-day or cyclical basis. Examples include sea-level rise, increasing pressures on healthcare services, unemployment, stretched public transport systems, and high levels of family violence.

Is resilience the same as sustainability? What about liveability?

Resilience in Melbourne's context incorporates elements of sustainability and liveability.

Sustainability means balancing economic, social and environmental factors. It is concerned with how we can manage resources to ensure future generations have the same opportunities that we enjoy today.

Liveability is the sum of many elements that contribute to quality of life. These include the built and natural environments, economic prosperity, social stability, and access to educational, cultural, entertainment and recreational opportunities.

Although successful cities are sustainable and liveable, they may still be vulnerable to shocks and stresses. Cities must evolve and adapt in response to changing circumstances, such as population growth, a volatile global economy and climate change. Without this adaptability, accumulating stresses or sudden shocks can put liveable and sustainable cities at risk, resulting in social breakdown, physical collapse or economic deprivation.

Why is being 'viable' part of the vision? Surely Melbourne is already viable?

Melbourne today is undoubtedly a viable city. However, the nature of resilience thinking means we cannot simply take our current situation for granted. If Melbourne is to remain viable and liveable in the long term, we need to acknowledge our own vulnerabilities and work hard to overcome them. To achieve a truly desirable future we should be prepared to consider the undesirable, including what it would look like were communities or the city as a whole to be 'unviable'. We must equip ourselves, building on our strong foundations, so that when disruptions happen, our

communities and systems can cope and recover, collectively and as individuals.

Who prepared this strategy?

Resilient Melbourne is a true collaboration across levels of government, business and community. This document was drafted by the Resilient Melbourne Project Team (based at City of Melbourne), with the assistance of our strategy partner AECOM, and supported by 100RC. Senior leaders and staff from metropolitan Melbourne's councils were key contributors and reviewers of the strategy.

For more detail on the strategy development process, see pages 14-15. For the members of the Resilience Project Team, Resilient Melbourne Steering Committee, and Strategy Review Panel, see page 158.

How does this fit with other strategies like Plan Melbourne and the State Water Plan?

Resilient Melbourne aims to incorporate resilience thinking into all that we do, as well as build on existing resilience-building efforts. Therefore, links to existing documents such as Plan Melbourne and the State Water Plan are crucial.

For example, *Resilient Melbourne* has been developed with the involvement of the Community Resilience Unit of the Department of Premier and Cabinet, which recently released the *Strategic Framework to Strengthen Victoria's Social Cohesion and the Resilience of its Communities*. This close association will continue as we implement *Resilient Melbourne*.

Is this just a strategy for local government?

No. Although Melbourne's councils are essential to the resilience of Melbourne's diverse communities, many of the problems that our city faces are too complex and interconnected for local governments to address on their own. Everything in *Resilient Melbourne* is relevant to local government, but responsibility for implementing its proposals needs to be shared.

Resilient Melbourne must encourage new collaborations and ways of working between individuals, businesses and government institutions to achieve the shared goal of a resilient Melbourne.

Isn't this work the state or federal government's responsibility?

Yes. But responsibility is not limited to state and federal governments; creating a resilient Melbourne is the responsibility of us all. Councils, individuals, communities, businesses, academics, not-for-profit organisations – all have responsibilities and roles to play.

While this strategy provides a starting point, progress towards greater resilience ultimately needs to be led by the citizens of Melbourne. A resilient city needs a large number of resilient individuals and families in its communities – such cities are better able to respond quickly and effectively to shocks and stresses.

Why don't I see more actions addressing our infrastructure shortcomings?

Resilient Melbourne focuses on areas where local government is well placed to take a leading role. While councils manage important municipal infrastructure, much of Victoria's critical infrastructure (such as energy supply networks) and transport systems (such as major roads) is managed at the state and federal levels. Any problems with these will need significant public and private investment to fix. This document highlights several major infrastructure initiatives being undertaken at a state level that are not led by *Resilient Melbourne*, but that share the same aims (p. 125 and p. 137).

Acknowledgements – it takes a city!

Resilient Melbourne was made possible by the generous support of the Rockefeller Foundation and 100 Resilient Cities.

We also thank the following Chief Resilience Officers, who provided inspiration: Jeff Hebert (New Orleans), Beck Dawson (Sydney) and Mike Gillooly (Christchurch).

Resilient Melbourne is the result of the effort and collaboration of many people across our 32 municipalities. Many busy people have given their time to take part in workshops, meetings, conferences and day-to-day discussions. We hope they will continue to be involved as we implement the first actions, and seek the next generation of actions that will build our resilience over the decades to come.

Many thanks also to our strategy partner, AECOM, for its guidance and support. We also acknowledge the in-kind contributions of CSIRO, PwC's The Difference, Ernst and Young, the Australian Urban Research Infrastructure Network (AURIN) and Spatial Media.

We acknowledge the following people who contributed actively to *Resilient Melbourne*, which is a reflection of their specific roles, hard work and bright ideas:

Resilient Melbourne Steering Committee

- **Mark Duckworth**, Department of Premier and Cabinet
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  Emergency Management Victoria
- **Stephen Zelez**,
  Hobsons Bay City Council

With thanks to all the above and many, many more, from the Resilient Melbourne Team:

- **Toby Kent**,
  Chief Resilience Officer
- **Geoff Lawler**,
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  Resilience Coordinator
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We look forward to making Melbourne more resilient together.

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Glossary

Chief Resilience Officer – a position funded by 100RC to lead a city's resilience-building efforts; the author of a city's resilience strategy.

delivery areas – important areas or issues to investigate during Phase II of the resilience strategy.

preliminary resilience assessment – a document that establishes an initial, qualitative understanding of the city's strengths and weaknesses against the City Resilience Framework of drivers and sub-drivers.

redundancy – intentionally building spare capacity into a system, meaning it can continue to function should it experience an unexpected challenge.

resilience – the capacity of individuals, communities, institutions, businesses and systems in a city to survive, adapt and grow, no matter what chronic stresses or acute shocks they encounter.

Resilience Indicators Community of Practice – a group of practitioners already involved in assessing and reporting on elements of Melbourne's resilience, brought together to agree a collective approach for the city

Resilience Project Team – the Chief Resilience Officer, supported by staff from City of Melbourne and strategy partner AECOM.

Resilience Steering Committee – a small group of relevant decision-makers responsible for guiding the delivery of *Resilient Melbourne*.

resilience strategy – a plan for building resilience in a city. The strategy articulates the city's resilience priorities and specific initiatives for immediate implementation, as well as its longer-term plans.

Resilience Working Groups – groups of representatives of a wide variety of organisations and interests from across the metropolitan councils, who will contribute their time, experience and expertise to deliver *Resilient Melbourne* in Phases II and III.

Resilience Working Team – a group of staff from City of Melbourne and external agencies, who provide expert advice on particular subject matter, to help develop and implement *Resilient Melbourne*.

risk – the severity and likelihood of a shock or stress occurring.

risk assessment – a comprehensive assessment of the severity, likelihood and probability of a shock or stress occurring, and of the effect of the shock or stress on the city's critical infrastructure and ability to function.

shock (or **acute shock**) – a sudden event that threatens a city, such as an earthquake, flood, disease outbreak or terrorist attack.

stakeholder – an individual, group of people, or organisation, either within or outside city government, with the capacity or influence to help build resilience.

stress (or **chronic stress)** – a longer-term problem that weakens the fabric of a city on a day-to-day or cyclical basis. Examples include high unemployment, an overtaxed or inefficient public transport system, endemic violence, and chronic food and water shortages.

References

[1] United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2015 Revision: Key Findings and Advance Tables*, United Nations, New York, 2015, http://esa.un.org/unpd/wpp/publications/files/key_findings_wpp_2015.pdf.

[2] 100 Resilient Cities, 'Frequently asked questions (FAQ) about 100 Resilient Cities', New York, 2016, www.100resilientcities.org/pages/100rc-faq#/-_/.

[3] World Bank Group, 'Urban population (% of total)', 2016, http://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS.

[4] Department of Transport, Planning and Local Infrastructure, 'Plan Melbourne by numbers: fact sheet', Melbourne, 2014, www.planmelbourne.vic.gov.au/__data/assets/pdf_file/0020/131492/Fact-Sheet-Plan-Melbourne-by-Numbers-May-2014.pdf.

[5] City of Melbourne, *Resilient Melbourne: Preliminary Resilience Assessment: Identifying the Focus Areas for Melbourne's Resilience Strategy*, Melbourne, 2015, http://lgpro.com/downloads/SIG_meeting_documentation/Volunteering/Endorsed_Resilient_Melbourne_Preliminary_Resilience_Assessment.PDF.

[6] Ove Arup & Partners International Limited, *City Resilience Framework*, 2014.

[7] Gary Presland, *The First Residents of Melbourne's Western Region*, Harriland Press, Melbourne, 1997.

[8] Edward Jenks, *A History of the Australasian Colonies (From their Foundation to the Year 1911)*, 3rd edn, Cambridge University Press, 1912.

[9] Melbourne Water, 'History of the Yarra River', n.d., www.melbournewater.com.au/aboutus/historyandheritage/History-of-our-rivers-and-creeks/Pages/History-of-the-Yarra-River.aspx.

[10] UNESCO and Melbourne City of Literature, 'Melbourne: A city of literature', n.d., www.cityofliterature.com.au.

[11] The Economist Intelligence Unit, *A Summary of the Liveability Ranking and Overview August 2015*, London, 2015, www.vancouvereconomic.com/wp-content/uploads/2015/08/EIU-Liveability-Ranking-Aug-2015.pdf; OECD, 'OECD Better Life Index: Australia', n.d., www.oecdbetterlifeindex.org/countries/australia/; United Nations Development Programme, *Human Development Report 2015: Work for Human Development: Briefing Note for Countries on the 2015 Human Development Report*, [United Nations, New York, 2015], http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/AUS.pdf.

[12] The Economist Intelligence Unit, *Worldwide Cost of Living Report 2015 ... A summary*, London, 2015, http://ifuturo.org/documentacion/WCOL-March.pdf.

[13] Nicholas Biddle, *CAEPR Indigenous Population Project: 2011 Census Papers: Paper 11: Income*, Centre for Aboriginal Economic Policy Research, Australian National University, Canberra, [2012], http://caepr.anu.edu.au/sites/default/files/cck_indigenous_outcomes/2013/07/2011CensusPaper11_Income%20upd.pdf.

[14] VicHealth, *Disability and health inequalities in Australia Research summary*, Melbourne, August 2012, http://cwhgs.unimelb.edu.au/__data/assets/pdf_file/0011/639164/VH_Disability_Summary_web1.pdf

[15] Outer Suburban/Interface Services and Development Committee of the Parliament of Victoria, *Inquiry into Liveability Options in Outer Suburban Melbourne*, Parliamentary Paper no. 149, Session 2010–12, Victorian Government Printer, Melbourne, 2012, p. 128, www.parliament.vic.gov.au/images/stories/committees/osisdv/Liveability_Options/OSISDC_Liveability_20121212_FINAL_WEB_amended_20130131_condensed.pdf.

[16] Terry Burke and Kath Hulse, *Spatial Disadvantage: Why is Australia Different?*, Australian Housing and Urban Research Institute, Swinburne University of Technology, Melbourne, 2015, www.ahuri.edu.au/research/research-papers/spatial-disadvantage-why-is-australia-different.

[17] ACOSS, *Inequality in Australia: A Nation Divided*, Australian Council of Social Service, Sydney, 2015, www.acoss.org.au/wp-content/uploads/2015/06/Inequality_in_Australia_FINAL.pdf.

[18] Australian Bureau of Statistics, '2011 Census QuickStats: All people – usual residents: Greater Melbourne', n.d., www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/2GMEL.

[19] Australian Bureau of Statistics, '2011 Census QuickStats'; Craig Butt and Allison Worrall, 'Melbourne language study reveals a cacophony of diversity,' The Age, 12 July 2014, www.theage.com.au/victoria/melbourne-language-study-reveals-a-cacophony-of-diversity-20140711-zt4b4.html.

[20] City of Melbourne, 'Melbourne celebrates its Greek culture', media release, 11 November 2008, www.melbourne.vic.gov.au/news-and-media/pages/cf1f5bce-8ec0-4224-b558-4a9b5ddc42c4.aspx; Sensis Data Solutions, *Top 50 names in the Great Melbourne area:* information provided to Resilient Melbourne by Sensis Data Solutions, 2016.

[21] Department of Planning and Community Development, *Victoria in Future 2008: Victorian State Government Population and Household Projections 2006–2036: Second Release – September 2009, Melbourne, 2009*, http://s3.amazonaws.com/zanran_storage/www.dpcd.vic.gov.au/ContentPages/1777556570.pdf

[22] City of Greater Dandenong, *Profile of Health and Wellbeing in Greater Dandenong 2016*, n.d., www.greaterdandenong.com/document/.../health-and-wellbeing-profile; Brimbank City Council, 'City of Brimbank: Language spoken at home', n.d., http://profile.id.com.au/brimbank/language.

[23] profile id. *G21 Region, SEIFA – disadvantage by Local Government Area*, Community Profile, 2011 http://profile.id.com.au/g21-region/seifa-disadvantage

[24] Lloyds, 'Lloyd's City Risk Index 2015–2025: Melbourne', n.d., www.lloyds.com/cityriskindex/locations/city/melbourne.

[25] VEIL: Victorian Eco Innovation Lab, 'Melbourne at 7 million: Losing farmland due to urban sprawl', n.d., www.ecoinnovationlab.com/project_content/melbourne-urban-sprawl-infographic.

[26] Latrobe City Council, *Latrobe City Council Submission: Energy Green Paper*, Morwell, 2014, www.latrobe.vic.gov.au/files/1548fb18-9a90-4362-ba7d-a3dc00bd5d8b/141030_Latrobe_City_Submission_Energy_Green_Paper_FINAL.pdf; Australian Energy Market Operator (AEMO), *Victorian Gas Planning Report: Gas Transmission Network Planning for Victoria*, 2013.

[27] Council of Australian Governments, *National Strategy for Disaster Resilience: Building our Nation's Resilience to Disasters*, 2011, https://www.coag.gov.au/node/81.

[28] The Hon. Jamie Briggs MP, Minister for Cities and the Built Environment, 'Appointment to the ministry', media release, 21 September 2015, http://environment.gov.au/minister/briggs/2015/mr20150922.html.

[29] Department of Transport, Planning and Local Infrastructure, *Plan Melbourne: Metropolitan Planning Strategy*, Victorian Government, 2014, www.planmelbourne.vic.gov.au/Plan-Melbourne.

[30] Department of Environment, Land, Water and Planning, 'Data and research: Population: Census 2011: Quick facts', n.d., www.dtpli.vic.gov.au/data-and-research/population/census-2011/quick-facts.

[31] Wyndham City Council, 'Wyndham Council calls on State to fund infrastructure upgrades', media release, 29 January 2016, www.wyndham.vic.gov.au/aboutwyndham/pubmedia/media/2016/january/wyndham_council_calls_on_state_to_fund_infrastruct; Australian Bureau of Statistics, '3218.0: Regional Population Growth, Australia, 2012–13', updated 30 March 2015, www.abs.gov.au/ausstats/abs@.nsf/Products/3218.0~2012-13~Main+Features~Main+Features?OpenDocument.

[32] Andrew Markus, *Mapping Social Cohesion*, The Scanlon Foundation surveys 2014. http://scanlonfoundation.org.au/wp-content/uploads/2014/10/2014-Mapping-Social-Cohesion-Report.pdf

[33] OECD, 'Australia – Country note – Education at a glance 2013: OECD indicators', [2013], www.oecd.org/edu/Australia_EAG2013%20Country%20Note.pdf.

[34] Australian Government Department of Employment, 'Victoria: Unemployment rate by labour force region', February 2016, http://lmip.gov.au/default.aspx?LMIP/LFR_SAFOUR/VIC_LFR_LM_byLFR_UnemploymentRate.

[35] Based on analysis by PwC for *Resilient Melbourne*.

[36] ACOSS, *Inequality in Australia: A Nation Divided*.

[37] ACOSS, *Inequality in Australia: A Nation Divided*.

[38] Ryan Fox and Richard Finlay, 'Dwelling prices and household income', *Reserve Bank of Australia Bulletin*, December 2012, pp. 13–22, www.rba.gov.au/publications/bulletin/2012/dec/pdf/bu-1212-2.pdf.

[39] Crisis Help Network, 'Homeless people Melbourne statistics: The appalling, unpleasant truth of it all', n.d., www.melbourne.homeless.org.au/statistics.html; Australian Bureau of Statistics, '2049.0 – Census of population and housing: Estimating homelessness, 2011', 12 November 2012, http://abs.gov.au/ausstats/abs@.nsf/Latestproducts/2049.0Main%20Features22011; Genworth Financial Inc., *Genworth International Mortgage Trends Report*, first edn, June 2011, www.genworth.com.au/imtr-ebook/en/pdf/1124212796.pdf.

[40] Crime Statistics Agency, 'Family incidents, 1 December 2015, http://www.crimestatistics.vic.gov.au/home/crime+statistics/year+ending+30+june+2015/family+incidents

[41] Victorian Department of Human Services, *Future Prevalence of Overweight and Obesity in Australian Children and Adolescents, 2005–2025*: Melbourne, 2008, https://www2.health.vic.gov.au/about/publications/researchandreports/Future%20prevalence%20of%20overweight%20and%20obesity%20in%20Australian%20children%20and%20adolescents%202005-2025.

References

[42] Victorian Department of Human Services, F*uture Prevalence of Overweight and Obesity*.

[43] Boston Consulting Group (BCG), *Improving Mental Health Outcomes in Victoria: The Next Wave of Reform*, Melbourne, 2006.

[44] Tom Delbridge and Cam Walker, *Natural Disasters and a Warming Climate: Understanding the Cumulative Financial Impacts on Victoria*, Friends of the Earth, Melbourne, 2014, https://issuu.com/samcg/docs/cost_of_dis/0.

[45] Tim Cowan and Wenju Cai, 'The recent drought over southeast Australia: Climate drivers and impacts', https://publications.csiro.au/rpr/download?pid=csiro:EP106942&dsid=DS1; South Eastern Australian Climate Initiative (SEACI), 'The millennium drought and 2010/11 floods', Factsheet 2 of 4, 2011, www.seaci.org/publications/documents/SEACI-2Reports/SEACI2_Factsheet2of4_WEB_110714.pdf.

[46] Parliament of Victoria, *2009 Victorian Bushfires Royal Commission: Final Report: Summary*, Parliamentary Paper No. 332, Session 2006–10, Victorian Government Printer, Melbourne, July 2010, www.royalcommission.vic.gov.au/finaldocuments/summary/PF/VBRC_Summary_PF.pdf; Environment Victoria, 'Victoria, heatwaves and climate change', Melbourne, http://environmentvictoria.org.au/heatwaves; CFA, 'About Black Saturday.' Country Fire Authority, Victoria, 2015, www.cfa.vic.gov.au/about/black-saturday/.

[47] Victorian Floods Review, 'Review of the 2010–11 flood warnings and response', Melbourne, 2001, www.floodsreview.vic.gov.au/; Life Saving Victoria, *2010/2011 Victorian Drowning Report*, Melbourne, 2011, www.lifesavingvictoria.com.au/resources/documents/LSV_Drowning_Report_FA_2.0_single_pages.pdf; Neil Comrie, *Review of the 2010–11 Flood Warnings and Response: Final Report*, Victorian Government, Melbourne, 2011, www.floodsreview.vic.gov.au/images/stories/documents/review_20101011_flood_warnings_and_response.pdf.

[48] Australian Business Roundtable for Disaster Resilience and Safer Communities, *The Economic Cost of the Social Impact of Natural Disasters*, Deloitte Access Economics, 2016, http://australianbusinessroundtable.com.au/assets/documents/Report%20-%20Social%20costs/Report%20-%20The%20economic%20cost%20of%20the%20social%20impact%20of%20natural%20disasters.pdf, p. 25.

[49] Department of Justice, *Emergency Risks in Victoria: Report of the 2012–13 State Emergency Risk Assessment*, State of Victoria, Melbourne, 2014, http://assets.justice.vic.gov.au/justice/resources/ccae0110-ea30-4f89-85a2-2bfb4eb06bbf/repor_stateemergencyriskassessment2014emergencyrisksinvictoria.pdf.

[50] RiskLogic, 'Social and economic costs of influenza', 12 October 2010, www.risklogic.com.au/2010/10/social-and-economic-costs-of-influenza/.

[51] Department of Justice, *Emergency Risks in Victoria*.

[52] Lloyd's, 'Lloyd's City Risk Index 2015–2025: Melbourne'.

[53] Colmar Brunton, research commissioned for *Resilient Melbourne*, March 2016.

[54] Australian Business Roundtable for Disaster Resilience and Safer Communities, *Building our Nation's Resilience to Natural Disasters*, Deloitte Access Economics, Canberra, 2013, www.ncoa.gov.au/docs/submission-australian-business-roundtable-for-disaster-resilience-and-safer-communities-attachment.pdf; Australian Government Productivity Commission, *Natural Disaster Funding Arrangements: Productivity Commission Inquiry Report*, vol. 1, no. 74, Melbourne, 2014, www.pc.gov.au/inquiries/completed/disaster-funding/report/disaster-funding-volume1.pdf.

[55] Quantum Market Research, *Understand Home Insurance Research Report,* Insurance Council of Australia, 2014, http://understandinsurance.com.au/assets/research/ICA%20Understand%20Home%20Insurance_Report.pdf; PSC Insurance Brokers, 'Underinsurance rife in Australian SMEs', [2016], www.pscinsurance.com.au/2016/03/04/underinsurance-rife-in-australian-smes/.

[56] City of Melbourne, *Resilient Melbourne: Preliminary Resilience Assessment*.

[57] OECD, *Perspectives on Global Development 2012: Social Cohesion in a Shifting World*, OECD Publishing, Paris, 2011, p. 17.

[58] Southbank Residents Group Inc., 2012, *Annual Report FY12*, www.southbankresidents.com.au/uploads/1/0/7/4/10746558/srg_annual_report_fy12.pdf; Simon Johanson, 'Southbank skyscraper to soar over city', *Sydney Morning Herald*, 15 July 2014, www.smh.com.au/business/southbank-skyscraper-to-soar-over-city-20140715-zt8ix.html.

[59] Jane-Frances Kelly, *Cities: Who Decides?* Grattan Institute, Melbourne, 2010, p. 4, http://grattan.edu.au/report/cities-who-decides/.

[60] Eric Klinenberg, 'Adaptation: How can cities be "climate-proofed"?, *The New Yorker*, 7 January 2013, www.newyorker.com/magazine/2013/01/07/adaptation-2; Sarah Goodyear, 'Resilience is about relationships, not just infrastructure', *CityLab*, 3 January 2013, www.citylab.com/weather/2013/01/resilience-about-relationships-not-just-infrastructure/4305/.

[61] Australian Industry Group, *Lifting our Science, Technology, Engineering and Maths (STEM) Skills*, 2012, www.aigroup.com.au/portal/binary/com.epicentric.contentmanagement.servlet.ContentDeliveryServlet/LIVE_CONTENT/Publications/Reports/2013/Ai_Group_Skills_Survey_2012-STEM_FINAL_PRINTED.pdf; Kurt Becker and Kyungsuk Park, 'Effects of integrative approaches among science, technology, engineering, and mathematics (STEM) subjects on students' learning: A preliminary meta-analysis', *Journal of STEM Education: Innovations and Research*, vol. 12, no. 5–6, July–September 2011, pp. 23–37.

[62] PricewaterhouseCoopers Australia (PwC), *A Smart Move: Future-proofing Australia's Workforce by Growing Skills in Science, Technology, Engineering and Maths (STEM)*, 2015, http://pwc.docalytics.com/v/a-smart-move-pwc-stem-report-april-2015.

[63] Yarra Trams, 'Facts & figures', n.d., www.yarratrams.com.au/about-us/who-we-are/facts-figures/.

[64] Jane-Frances Kelly and Paul Donegan, 2015, *City Limits: Why Australia's Cities are Broken and How we Can Fix Them*, Melbourne University Press, 2015.

[65] Ding Ding et al., 'Driving: A road to unhealthy lifestyles and poor health outcomes', *PLoS ONE*, 9 June 2014, http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0094602.

[66] Victoria State Government, *Plan Melbourne Refresh: Discussion Paper*, Melbourne, 2015, http://refresh.planmelbourne.vic.gov.au/plan-melbourne-refresh-discussion-paper, p. 20.

[67] City of Melbourne, *Urban Forest Strategy: Making a Great City Greener 2012–2032*, City of Melbourne, 2014, www.melbourne.vic.gov.au/SiteCollectionDocuments/urban-forest-strategy.pdf.

[68] Margaret E. Loughnan et al., *A Spatial Vulnerability Analysis of Urban Populations to Extreme Heat Events in Australian Capital Cities: Final Report*, National Climate Change Adaptation Research Facilty, 2013, www.nccarf.edu.au/sites/default/files/attached_files_publications/Loughnan_2013_Spatial_vulnerability_analysis.pdf.

[69] Department of Climate Change, *Climate Change Risks to Australia's Coast: A First Pass National Assessment*, 2009, p. 8, www.environment.gov.au/system/files/resources/fa553e97-2ead-47bb-ac80-c12adffea944/files/cc-risks-full-report.pdf.

[70] Australian Government, *National Climate Resilience and Adaptation Strategy*, Commonwealth of Australia, 2015, www.environment.gov.au/climate-change/adaptation/publications/national-climate-resilience-and-adaptation-strategy.

[71] 202020 Vision, *Where Are All the Trees? An Analysis of Tree Canopy Cover in Urban Australia*, 2014, http://202020vision.com.au/media/7145/where_are_all_the_trees.pdf; Brent Jacobs et al., *Benchmarking Australia's Urban Tree Canopy: An i-Tree Assessment*, prepared for Horticulture Australia Limited by the Institute for Sustainable Futures, University of Technology Sydney, 2014, www.ngia.com.au/Attachment?Action=Download&Attachment_id=1852.

[72] A.M. Coutts et al., *The Urban Heat Island in Melbourne: Drivers, Spatial and Temporal Variability, and the Vital Role of Stormwater*, 2009, https://www.clearwater.asn.au/user-data/resource-files/Urban_Heat_Island_in_Melbourne2009.pdf.

[73] Stephen Livesley and Melanie Davern, 'Fewer trees leave the outer suburbs out in the heat', *The Conversation*, 27 November 2014, https://theconversation.com/fewer-trees-leave-the-outer-suburbs-out-in-the-heat-33299.

[74] Jonathon P. Sadler et al., 'Bringing cities alive: The importance of urban green spaces for people and biodiversity', in Kevin J. Gaston (ed.), *Urban Ecology*, Cambridge University Press, Cambridge, 2010.

[75] Agriculture and Resource Management Council of Australia and New Zealand, and Australian and New Zealand Environment and Conservation Council, *National Water Quality Management Strategy: Australian Guidelines for Urban Stormwater Management*, Commonwealth of Australia, 2000, www.environment.gov.au/system/files/resources/30f22565-8ec8-4308-80a2-a6e4554a55cd/files/urban-stormwater-management-paper10.pdf.

[76] Erik Mostert, 'Integrated water resources management in the Netherlands: How concepts function', *Journal of Contemporary Water Research & Education*, no. 135, December 2006, pp. 19–27, www.ucowr.org/files/Achieved_Journal_Issues/v135Integrated%20Water%20Resources%20Management%20in%20The%20Netherlands.pdf.

References

[77] CoDesign Studio, 'The Neighbourhood Project: Reinventing Australia's public spaces, from the ground up', n.d., www.theneighbourhoodproject.org/.

[78] Department of Human Services, *New directions for social housing*, A framework for a strong and sustainable future, 2014, http://www.dhs.vic.gov.au/__data/assets/pdf_file/0006/864906/New_Directions_for_Social_Housing_A_Framework_for_a-Strong_and_Sustainable_Future.pdf

[79] Maryann Wulff et al., *Australia's Private Rental Market: The Supply of, and Demand for, Affordable Dwellings*, Australian Housing and Urban Research Institute, [Melbourne], 2011, www.ahuri.edu.au/__data/assets/pdf_file/0011/2243/AHURI_Final_Report_No168_Australias_private_rental_market_the_supply_of,_and_demand_for,_affordable_dwellings.pdf.

[80] Latrobe City Council, *Latrobe City Council Submission: Energy Green Paper*; Australian Energy Market Operator (AEMO), *Victorian Gas Planning Report*.

[81] Australian Government Office of the Chief Scientist, *Science, Technology, Engineering and Mathematics in the National Interest: A Strategic Approach: A Position Paper*, Commonwealth of Australia, Canberra, 2013, www.chiefscientist.gov.au/wp-content/uploads/STEMstrategy290713FINALweb.pdf.

[82] Good Shepherd Microfinance and Suncorp Group, 'Australian-first insurance for people on low incomes', media release, [2015], www.suncorp.com.au/insurance/sites/default/files/fm/campaigns/protect-the-north/pdfs/essentials-media-release-final-version.pdf.

[83] VicHealth, *VicHealth Mental Wellbeing Strategy 2015–2019*, Victorian Health Promotion Foundation, Melbourne, 2015, www.vichealth.vic.gov.au/media-and-resources/publications/mental-wellbeing-strategy.

[84] VicHealth and CSIRO, *Bright Futures: Megatrends Impacting the Mental Wellbeing of Young Victorians Over the Coming 20 Years*, Victorian Health Promotion Foundation, Melbourne, 2015, www.vichealth.vic.gov.au/media-and-resources/publications/youth-megatrends-report.

[85] profile.id, 'Greater Melbourne; Method of travel to work', n.d., http://profile.id.com.au/australia/travel-to-work?WebID=260.

[86] Infrastructure Australia, *Australian Infrastructure Audit: Our Infrastructure Challenges: Executive Summary*, Australian Government, 2015, http://infrastructureaustralia.gov.au/policy-publications/publications/files/Australian-Infrastructure-Audit-Executive-Summary.pdf.

[87] Australian Bureau of Statistics. National Health Survey, First Results. Australia, 2014-15, 4364.0.55.001 http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/CDA852A349B4CEE6CA257F150009FC53/$File/national%20health%20survey%20first%20results,%202014-15.pdf

[88] Cycling Victoria, *Annual Report 2013–2014*, Melbourne, 2014, http://vic.cycling.org.au/Portals/17/Admin/Annual%20Report%202014%20final.pdf.

[89] Environment Victoria, 'Active transport', n.d., http://environmentvictoria.org.au/content/active-transport.

[90] Infrastructure Australia, *Australian Infrastructure Audit Report*, Our Infrastructure Challenges, May 2015 http://infrastructureaustralia.gov.au/policy-publications/publications/files/Australian-Infrastructure-Audit-Volume-1.pdf

[91] Office of the Chief Economist, *Australian Innovation System Report 2014*, Australian Government Department of Industry, 2014, www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Documents/Australian-Innovation-System/Australian-Innovation-System-Report-2014.pdf.

[92] Patrick McGorry et al., 'Youth mental health services', I*nPsych (Bulletin of the Australian Psychological Society)*, August 2006, www.psychology.org.au/publications/inpsych/youth_mental_health.

[93] J.M. Burns et al., 'The internet as a setting for mental health service utilisation by young people', *Medical Journal of Australia*, vol. 192, no. 11, 2010, S22–S26.

[94] Richard Blundel et al., Resilience and recovery: SME experiences of extreme weather events and other external threats. In: Institute for Small Business and Entrepreneurship (ISBE) 2014, 5-6 November 2014, Manchester.

[95] Andrew Markus, *Mapping Social Cohesion*, The Scanlon Foundation surveys 2014. http://scanlonfoundation.org.au/wp-content/uploads/2014/10/2014-Mapping-Social-Cohesion-Report.pdf

[96] Victoria State Government, *Strategic Framework to Strengthen Victoria's Social Cohesion and the Resilience of its Communities*, version 1, Victorian Government, Melbourne, 2015, http://apo.org.au/files/Resource/strategic_framework_to_strength_victorias_socoal_cohesion.pdf.

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