



A MORE RESILIENT AND ENVIRONMENTALLY SUSTAINABLE MELBOURNE



KEY POINTS

The planning system can help reduce greenhouse gas emissions and build our resilience to reduce our exposure to climate change impacts.

Strategic environmental principles, improving hazard mapping and new planning tools can help respond to climate change challenges and build resilience.

Environmentally sustainable design and actions to encourage renewable energy will deliver environmental outcomes, such as reductions in greenhouse gas emissions, and create a more sustainable Melbourne.

Better integrating climate change planning responses into land use planning and the natural and built environment is a clear challenge for the planning system.

While **Plan Melbourne 2014** contains significant directions on ‘environment and water’ that are widely supported and will be retained in **Plan Melbourne 2016**, it lacks recognition of the climate change challenge.¹⁸ The regional growth plans that complement **Plan Melbourne 2014** address the issue more thoroughly.

The MAC (2015) report highlights that climate change and sustainability issues in its 2013 report were not sufficiently addressed in **Plan Melbourne 2014**. It identifies the need to put climate change front and centre and to highlight it as a significant pressure on Melbourne’s development. Reducing the heat island effect and ensuring Melbourne’s infrastructure and communities can withstand climate change impacts and strengthening actions to reduce greenhouse gas emissions are also a focus.

The Victorian Government has committed to a whole-of-government approach to climate change mitigation and adaptation. **Plan Melbourne 2016** and the planning system have a role in this.

¹⁸ It refers to city structure driving sustainability; the importance of habitat protection and restoration; the importance of food production; the need to reduce noise and protect air quality for human health, whole-of-water cycle management; water and sewerage infrastructure protection; reducing energy consumption, managing land contamination and planning for better waste management amongst others.

6.1 CHALLENGES AND OPPORTUNITIES

Providing pathways for better integrating climate change planning and responses into land use planning and the natural and built environment is a clear challenge for the planning system and the **Plan Melbourne** refresh.

The Victorian Government is committed to playing a stronger role in helping communities, businesses and government reduce greenhouse gas emissions and respond to climate change impacts. Previous consultation has shown that Victorians want a greater understanding of climate change impacts and how they can reduce their exposure. They believe more should be done in Victoria to tackle climate change. Acting on climate change represents significant challenges but also opportunities for Victoria to:

- Better protect and enhance the health and wellbeing of Victorians, particularly vulnerable Victorians
- Create new jobs, grow and modernise our economy
- Reduce air pollution
- Better protect our natural environment
- Ensure our communities, cities and towns remain great places to live as our climate changes.

Even if we act quickly to reduce greenhouse gas emissions, we will need to adapt and build resilience to climate change impacts because of emissions already in the atmosphere.

While we contribute a relatively small amount of total global greenhouse gas emissions, we are amongst the highest emitters per person in the developed world.¹⁹ The government is committed to implementing measures to reduce greenhouse gas emissions and harness opportunities that support jobs growth as part of the transition to a more sustainable economy.

Taking action to address climate change is an important environmental justice and inclusion issue. Vulnerable members of the community are less resilient to climate change impacts such as extreme heat events, and this vulnerability is likely to increase. The cost of climate change mitigation and adaptation should be shared equitably across the community.

Climate change science indicates more frequent and severe events in the future. Future generations will face greater threats to their wellbeing without significant action now.

Opportunities to address climate change can generate new jobs in emerging industries (such as renewable energy and energy efficiency), improve our health (better air quality, less exposure to heatwaves) and create a more liveable city (a greener more attractive cityscape). Through early action we have the opportunity to realise these multiple benefits and avoid the significant and escalating costs of inaction.

Directions contained in **Plan Melbourne 2014**, and options canvassed in this discussion paper will also help to build the resilience of our natural capital in a time of climate change. Natural capital refers to our natural assets, such as our forests and waterways, which provide us with ecosystem services, such as clean water and air. They also support the economy providing opportunities for sectors such as the tourism industry.

¹⁹ See International Energy Agency (2014) CO₂ emissions from fuel combustion highlights. Paris: OECD/IEA. Retrieved from: <https://www.iea.org/publications/freepublications/publication/CO2EmissionsFromFuelCombustionHighlights2014.pdf> (pp. 84-85).

Climate change impacts

Victoria is particularly susceptible to the effects of climate change. The CSIRO and the Bureau of Meteorology have projected increases in temperatures and changing patterns of rainfall and more extreme weather events such as drought and bushfires, heatwaves, flooding and increased coastal inundation.²⁰

Without effective action, climate change poses increasing risks for public safety and health, jobs, infrastructure, industry, agriculture, tourism, and our natural environment.

High level impacts include:

Economic impacts

Between 2003 and 2013, the Victorian Government has spent over \$4 billion on response and recovery to climate-related events such as bushfire, flood and drought. The Garnaut Review found the costs of unmitigated climate change are expected to reduce Victoria's Gross State Product by approximately 1 per cent by 2025, 2.2 per cent by 2050 and 4 per cent by 2100.²¹

Health impacts

Climate change will likely affect air quality, drinking water, food and housing. Rising temperatures and more extreme heat days will increase the risk for people with cardiovascular and respiratory disease, leading to a higher death rate, particularly among vulnerable groups such as the elderly. Changes to rainfall patterns will increase the frequency and severity of drought, increasing the costs of fresh food. More droughts, floods and bushfires will also impact mental health by increasing economic insecurity and stress and anxiety levels.

Biodiversity impacts

Ecosystems are particularly vulnerable to climate change, especially those with limited habitat ranges and capacity to migrate. DELWP research into 42 fauna species in south-eastern Australia indicated 41 of these species are likely to suffer reduced habitat from climate change impacts.²² More than half are predicted to lose 90–100 per cent of their range if temperatures increase an average 3°C.

²⁰ Bureau of Meteorology (2014), *State of the Climate 2014*. Retrieved from: <http://www.bom.gov.au/state-of-the-climate/>

²¹ *The Garnaut Review (2008) Australia in the Global Response to Climate Change*. Economic Modelling Technical Paper 5, Modelling the costs of unmitigated climate change Canberra: Commonwealth of Australia.

²² State Government Victoria, *Climate change in Victoria*. Retrieved from: <http://www.climatechange.vic.gov.au/climate-science-and-data/victorian-adaptation-and-sustainability-partnership/impacts-of-climate-change#heading-73465>

Specific impacts of climate change-driven events will likely include:

Heatwaves

Heatwaves already significantly impact human health (through increased rates of morbidity), the lifespan and operation of critical infrastructure and the environment. Climate change is projected to increase their number and severity. The January 2009 heatwave caused 374 deaths in Victoria.²³ CSIRO and Bureau of Meteorology predict the number of days over 35°C in Melbourne per annum may increase from an average of 11 days (from 1981 to 2010) to 13 days by 2030.²⁴

Bushfires

Changes in climate such as less average rainfall and higher average temperatures by 2030 will likely increase the number of severe fire danger days in Victoria by 20 per cent.²⁵ This will likely see more large and uncontrollable ‘bushfires’ and more unpredictable fire behaviour.

Drought

The frequency of drought will increase with reduced runoff, stream flows, water storage levels and ground water recharge. Natural systems can tolerate drought but more frequent longer droughts will severely impact ecosystems. Drought has significant economic and social impacts.

Coastal inundation

Even moderate sea-level rises and more frequent extreme weather events such as storm surges will increase coastal inundation and erosion.²⁶ Potential impacts include the loss of beaches and coastal land, damage to infrastructure and property, loss of habitat and biodiversity, and negative impacts on liveability and amenity.²⁷ Sea level rise in Victoria has been measured at 2.4–2.8mm/year since 1911; and the planning system requires planning to consider sea level rise of 0.8m by 2100.²⁸

Flooding

Despite overall warmer and drier conditions, climate change is anticipated to lead to more intense rainfall and flood events. This has significant implications for the design of stormwater infrastructure. As the city develops with more hard surfaces the effects of flooding are magnified.

These risks all pose challenges for land use planning and the urban development process. As part of the development of the next **Climate Change Adaptation Plan**, the Victorian Government is updating climate change science relevant to Victoria. This will outline changes in climate across each region, potential impacts on key industries, and how Victorians can, and are, adapting.

Victoria’s current legislative and policy framework for climate change

Victoria has an evolving legislative and policy framework to address climate change. This work is ongoing and the **Plan Melbourne** refresh forms part of this process. Table 3 lists legislation, policy and plans that relate partly or solely to climate change.

23 Victorian Department of Human Services (2009) Heatwave in Victoria: an Assessment of Health Impacts. Melbourne: State of Victoria.

24 Grose, M. *et al* (2015) ‘Southern Slopes Cluster Report’ in, Ekström, M. *et al* (eds). **Climate Change in Australia Projections for Australia’s Natural Resource Management Regions**: Cluster Reports, CSIRO and Bureau of Meteorology, Australia.

25 Grose, M. *et al* (2015) ‘Southern Slopes Cluster Report’ in, Ekström, M. *et al* (eds). **Climate Change in Australia Projections for Australia’s Natural Resource Management Regions**: Cluster Reports, CSIRO and Bureau of Meteorology, Australia, page 122.

26 Grose, M. *et al* (2015) ‘Southern Slopes Cluster Report’ in, Ekström, M. *et al* (eds). **Climate Change in Australia Projections for Australia’s Natural Resource Management Regions**: Cluster Reports, CSIRO and Bureau of Meteorology, Australia, page 122.

27 Victorian Environmental Assessment Council (2011), Metropolitan Melbourne Investigation, Final report. Melbourne: State Government Victoria. Retrieved from: <http://www.veac.vic.gov.au/documents/VEAC152-MMI-Final-Report-FINAL-low-res.pdf>

28 Victorian Coastal Council (2014) **Victorian Coastal Strategy 2014**. Melbourne: The State of Victoria Department of Environment and Primary Industries. Retrieved from: www.vcc.vic.gov.au.

Table 3 Legislation, policy and plans relating to climate change

Legislation/policy	Description	Status
Climate Change Act 2010	Supports consideration of climate change in government decision-making.	Currently being reviewed by an Independent Panel with a focus on identifying options to strengthen the Act to provide a robust foundation for Victorian action on climate change.
Climate Change Adaptation Plan	Supports adaptation efforts. Plan Melbourne 2016 will support implementation of the next Plan, including managing risks to public assets and services.	The Victorian Government is currently developing a new plan, with consultation expected to begin in early 2016.
Planning and Environment Act 1987	Contains objectives for planning including environmental protection and sustainability Planning schemes prepared under the Act by local government contain provisions that contribute to addressing climate change.	
Victoria Planning Provisions	Clause 13.01: Climate Change Impacts Objective to plan for and manage the potential coastal impacts of climate change. Clause 11: Settlement Identifies climate change as part of regional strategies but not metropolitan strategies. Clause 11.05-4 States that in responding to the impacts of climate change and natural hazards and promoting community safety by: <ul style="list-style-type: none"> • Siting and designing new dwellings, subdivisions and other development to minimise risk to life, property, the natural environment and community infrastructure from natural hazards, such as bushfire and flood. • Developing adaptation response strategies for existing settlements in hazardous and high-risk areas to accommodate change over time. • Encouraging reduced energy and water consumption through environmentally sensitive subdivision and building design. 	
Victorian Energy Efficiency Target Act 2007	Commonly called the Energy Saver Incentive, this Act seeks to make energy efficiency improvements more affordable, contribute to reducing greenhouse gases and encourage investment, employment and innovation in industries that supply energy-efficient goods and services.	
Renewable Energy Action Plan	The Action Plan will seek to increase renewable energy jobs and contribute to reducing greenhouse gas emissions by increasing the amount of renewable energy generated in Victoria.	Currently being developed.
Energy Efficiency and Productivity Strategy	The Strategy will establish a tangible work program aimed at improving energy affordability, creating jobs and delivering a sustainable economy in Victoria.	To be released later this year.
Victorian Coastal Strategy 2014	The Strategy is being developed with input from a variety of stakeholder groups including, manufacturers, energy efficiency businesses, the building and property sectors and local government.	
Revised Draft Victorian Floodplain Management Strategy	The Strategy aims to clarify the roles and accountabilities of agencies and communities in floodplain management. It enables the better understanding and management of flood risks through catchment management and planning processes, and set priorities for future investment in flood mitigation measures.	Released in June 2015 and expected to be finalised by the end of 2015.
Catchment and Land Protection Act 1994	Establishes the framework for the integrated management and protection of catchments and seeks to encourage community participation in the management of land, water and biodiversity resources. Victoria's 10 catchment regions, including Port Phillip and Westernport, are managed by a catchment management authority which has responsibility to prepare a regional catchment strategy in partnership with communities and stakeholders.	
State Water Plan	Will set out the government's vision and policy directions for water. Development of the updated State Water Plan will focus on key themes, including preparedness for drought and climate change and improved environmental outcomes and healthy waterways.	To be released in 2016.

6.2 CITY STRUCTURE

Plan Melbourne 2014 recognised the role of city structure to support sustainability and contribute to greenhouse gas reductions. The polycentric city and 20-minute neighbourhoods are the land use planning building blocks for addressing climate change and building a more sustainable city. They encourage local living, walking and active transport over car travel, promote the location of jobs closer to home, lead to more connected social relationships and build local character and identity.

It is widely acknowledged that transport using fossil fuels is a major contributor to greenhouse gas emissions and climate change. A more sustainable polycentric city model that contains urban sprawl and the need to travel long distance will help minimise the city's carbon footprint. This will also help prepare for possible future energy 'shocks' and result in a city better equipped to manage climate change impacts.

Focusing growth in key urban renewal areas and activity centres will also reduce the number of people living in areas at risk from increased hazardous events such as bushfires. Actions to make our city greener also maintain the liveability of Melbourne as it grows and helps provide shade and cooler havens during heatwaves. The **Plan Melbourne** refresh process will place greater emphasis on how the links and interconnections between these planning strategies support sustainability and the reduction of greenhouse gas emissions.

6.3 STRATEGIC ENVIRONMENTAL PRINCIPLES

OPTIONS FOR DISCUSSION

- 46 Introduce the Strategic Environmental Principles in **Plan Melbourne 2016** to guide implementation of environment, climate change and water initiatives.

These overarching environmental principles will help facilitate sustainability actions to address pressures such as population growth, climate change and changing community expectations. They could be introduced into **Plan Melbourne 2016** to guide planning authorities in developing and amending planning schemes so they are meeting sustainability outcomes. The proposed principles are outlined in **Box 3**.

These principles are not intended to replace or supersede **Plan Melbourne 2014's** high-level principles but will provide more detailed guidance for consideration of environmental and sustainability issues in Melbourne and its peri-urban area, perhaps through a new Direction in **Plan Melbourne 2016**.

Box 3 Strategic environmental principles

<p>Promote a metropolitan structure that minimises greenhouse gas emissions and other air pollutants</p>	<p>Evolving Melbourne into a ‘polycentric city’ will help focus the location of employment, services and higher density living close to transport access points and nodes, to reduce greenhouse gas emissions and travel times. The 20-minute neighbourhood will also contribute to minimising greenhouse gas emissions by meeting everyday (non-work) needs locally, primarily within a 20-minute walk.</p>
<p>Identify and respond to natural and climate change hazards in making decisions about future urban development</p>	<p>We will apply consistent hazard management principles that systematically incorporate consideration of latest climate change information in urban planning processes.</p> <p>Appropriate planning and building requirements will be applied based on identified hazards so that new development and redevelopment across exposed parts of Melbourne meets appropriate design responses to protect life and property.</p>
<p>Optimise water and energy efficiency, and waste minimisation and recovery through the planning system to help achieve a more sustainable city</p>	<p>Precinct planning and urban development processes will be identified to improve opportunities for resource efficiency and to support waste minimisation and recovery, and retention of water in the landscape.</p> <p>Recycled stormwater and treated wastewater will be increasingly used to support productive landscapes. Best available technology is utilised in water recycling and water sensitive urban design to support greener suburbs and cleaner waterways.</p>
<p>Enhance the community’s access to nature across our urban areas, increase recognition of our natural capital, better protect state significant biodiversity and maintain the productive agriculture and landscapes that make Melbourne distinctive</p>	<p>In the face of population growth and climate change, the community’s access to the natural environment will be improved through greater attention to enhancing natural values across neighbourhoods and waterways, and better protection of high priority areas with state significant biodiversity. Greater emphasis will also be placed on the value of natural resource assets such as waterways, productive agricultural land and significant landscape areas that give Melbourne and its surrounds its distinctive character and liveability.</p>
<p>Green the city to better prepare for higher temperatures and heatwaves</p>	<p>Through the planning system, identify opportunities to reduce the impacts of heatwaves across urban areas through water sensitive urban design, greening strategies, and urban development standards that increase soil moisture and promote selection of ‘cool’ surface materials to minimise heat absorption.</p>
<p>Use the planning system to better recognise and support healthy catchments, waterways and bays</p>	<p>Apply approaches, including improved design standards for urban development to retain water in landscapes and protect waterway flow regimes and water quality by reducing stormwater volume, peak flows and contaminated run-off into our bay, rivers and streams.</p> <p>Use recycled stormwater and wastewater to support improved waterway baseflows through irrigation, infiltration and the greening of Melbourne, helping every suburb become a leafy suburb.</p>
<p>Sustainable urban development requires effective coordinating planning and response action across government</p>	<p>Strategic planning processes will be effectively coordinated across government to help apply an integrated approach to addressing sustainability and climate change challenges while supporting economic and social wellbeing.</p>
<p>To support vulnerable or disadvantaged communities, environmental justice principles of equity and inclusion should guide land planning decision makers</p>	<p>Victoria’s most vulnerable people and communities are often disproportionately affected by environmental issues and are likely to be the most severely impacted by climate change. Vulnerable groups such as the elderly, the chronically ill and low-income households, have low adaptive capacity, and are more exposed to environmental risk. They are also more likely to be affected by the economic and social impacts of climate change including rising food prices and increased demand for essential services.</p>
<p>Achieve sustainable outcomes by empowering the community through meaningful involvement in decision-making and access to useful information</p>	<p>The community needs to be thoroughly informed about climate change impacts and environmental risks, and how the planning processes can help us to achieve sustainable outcomes. To ensure their needs are fairly represented, it is important that the community, and particularly vulnerable groups, is involved meaningfully in decision-making processes that affect them.</p> <p>Work with relevant stakeholders to develop effective communication tools and guidance material to keep the community informed.</p> <p>Work with relevant stakeholders to support and facilitate effective community involvement in decision-making processes. This will incorporate meaningful involvement from vulnerable and disadvantaged groups.</p>

6.4 MELBOURNE A RESILIENT CITY PREPARED FOR CLIMATE CHANGE

The MAC (2015) report recommends we **identify at risk areas and reduce their vulnerability** and update the planning system to adapt to the risks of extreme climate events and hazards. The ways the land use planning system could make Melbourne a more resilient and environmentally sustainable city are suggested below with the hazards associated with climate change in mind.

To assist in managing these climate change impacts, Victorians will need to adapt. Adapting to climate change means taking action to manage or reduce the consequences of a hotter, drier and a more extreme climate.

Our city and state will also need to become more resilient. Resilience to climate change risks requires preparedness (such as avoiding risk entirely or building in flexibility to adapt), response and recovery across all levels of government and is not solely the domain of the land use planning system. Most of these measures have significant co-benefits, and support improvements in the liveability and attractiveness of Melbourne.

Protection of our natural assets such as waterway corridors and open space networks will help connect people with nature and lead to a healthier community in the face of climate change and increased urban density.

To further support adaptation outcomes, the MAC suggests reinstating MAC 2013 Direction 5.1: **Reduce the consequences of extreme climate events and related environmental risks**. Under this Direction the MAC suggests including initiatives focused on:

- Identifying 'at risk' areas and reduce their vulnerability
- Ensuring settlement planning in growth and peri-urban areas responds to natural hazards
- Cooling Melbourne by creating more green spaces, 'greening our buildings', roads and open space, and planting urban forests.

The Council of Australian Governments recognises that long-term increased resilience requires sustained behavioural change.²⁹ For governments, business, communities and individuals to become more resilient to climate change impacts, a clearer understanding of the risks and liabilities, and what to do about them is needed, particularly at the community level.

The Victorian Government, through **Plan Melbourne 2016** and other policy work, could support planning tools and policies to assist decision-makers to make consistent and robust decisions regarding climate change hazards. Understanding what level of climate change risk and impact is acceptable to the community is critical.

²⁹ <https://www.coag.gov.au/node/81>

Better information and guidance for climate hazards

OPTIONS FOR DISCUSSION

- 47 In consultation with land and emergency management authorities, review policy and hazard management planning tools (such as overlays) to ensure the planning system responds to climate change challenges.
- 48 Update hazard mapping based on the best available climate change science and review risk management actions to promote resilience and avoid unacceptable risks.
- 49 Update the legislative and policy framework so the best available climate change science and data at regional and local spatial scales is periodically incorporated into the planning system.

One action under Recommendation 51 of the MAC (2015) report is: **Ensure settlement planning in growth areas and peri-urban regions responds to natural hazards**. The 2013 MAC report proposed updating the planning system to identify extreme risk locations as part of all rezoning and strategic planning, and ensuring appropriate development in high hazard areas. **Plan Melbourne 2016** will ensure that links to the planning system deliver a more resilient city. This will require different approaches to current responses based on historic patterns of events.

Victoria has a mix of land use planning legislation and policies and statutory tools that deal with climate change and risk. The principles of sustainable development and protecting natural resources are incorporated in the objectives at s. 4 of the *Planning and Environment Act 1987*. One area where planning does address these risks is stipulated in the Victoria Planning Provisions (see Victoria's current legislation and policy). *Victoria's Climate Change Act 2010* also provides important principles to inform decision-makers.

Land use planning processes should already adopt a best practice environmental management and risk management approach which aims to avoid or minimise environmental degradation and hazards. Planning should identify and manage the potential for the environment, and environmental changes to impact our economic, environmental or social wellbeing. In addition, a number of local governments have prepared local planning policies around sustainability and the environment.

There are also statutory tools such as zones and overlays which can be used to advance sustainability outcomes and manage the risks and hazards of climate change. For example there are specific zones to manage risk such as the Urban Floodway Zone which prevents sensitive land use and development (such as houses) in areas which convey stormwater and floods during high rainfall events.

Planning schemes also have a broad range of overlays so that development is properly assessed to make sure it is not subject to, or causes, significant environmental risk. Examples of relevant overlays include the Erosion Management Overlay, the Bushfire Management Overlay, the Flood Overlay, the Land Subject to Inundation Overlay, the Special Building Overlay, the Airport Environs Overlay and the Environment Audit Overlays (for potentially contaminated sites).

When combined with higher-level strategic planning such as township or urban structure planning, regional strategies and issue specific plans, these provide a state-wide approach to risk management and a flexible but powerful framework for addressing climate change hazards and risks.

To position Melbourne to effectively respond to a changing climate it is vital that existing planning standards and tools are reviewed and updated regularly to better inform decision-making by planning authorities, infrastructure providers and the urban development industry.

Many government agencies have specific responsibilities for risks and hazards outside the land use planning system. These agencies will help define what information (such as up-to-date hazard mapping and best practice standards) need to be applied as part of the planning process.

Local government also has significant experience and skills in identifying and working with hazards in their local areas. Continued engagement to ensure the planning system responds to its needs in the face of climate change is critical.

One way of responding is to map the hazard and apply relevant tools and guidance. This requires accurate mapping of the hazard (such as bushfire risk or land subject to inundation) and making sure the right tools exist in the planning toolbox. The MAC (2015) report specifically recommends hazard mapping and this option will need to be considered in the context of resources required. We need to build upon previous and current work and **Plan Melbourne 2016** can help strengthen the requirements.

Improving hazard assessment within planning

OPTIONS FOR DISCUSSION

50 Incorporate natural hazard management criteria into Victorian planning schemes to improve planning in areas exposed to climate change and environmental risks.

Integrated hazard management planning is essential to improving the capacity to respond to future risks. Risks can be reduced but not all risks can be eliminated. Whether for flood, fire or the impact of extreme heat events it is not physically feasible to protect all properties across greater Melbourne from large emergency events.

Table 4 sets out Draft Hazard Management Criteria based upon the hazard management principles of the Council of Australian Governments and relevant Victorian strategies and policy. Presented here for discussion, these criteria could be applied through land use planning, such as being considered in state or local policy, to ensure all natural hazards are systematically assessed and managed.

It is important that planning identifies some overarching criteria to mitigate natural hazards. One way **Plan Melbourne 2016** could tackle identification of hazards and implementation of risk management strategies to reduce climate change impacts on communities is by ensuring high-risk areas are identified and that risk mitigation measures are appropriately implemented.

Such criteria are integral to considering hazards and their risks in our planning for a resilient and liveable city into the future.

Table 4 Draft Hazard Management Criteria

Draft Hazard Management Criteria	<ul style="list-style-type: none"> • Identify all relevant hazards • Prioritise the protection of human life • Don't create circumstances that place people in harm's way • Risk avoidance and risk reduction are fundamental aims of an integrated land use planning response • Apply the hazard response hierarchy to planning – avoid, manage, resist, respond, react • Incorporate consideration of increased risks as a consequence of climate change where authoritative guidance is available • Use the planning system to help mitigate natural hazard risks through strategic planning and appropriate development performance measures • Ensure an integrated and complementary approach between the planning and building regulatory systems • Adopt a consistent state-wide approach to mitigating risk that informs fit-for-purpose local solutions (mapping hazards, setting the right rules in place)
Hazard response hierarchy	<p>Avoid Avoid the hazard (not locating vulnerable communities in high hazard areas)</p> <p>Manage Eliminate or reduce the impact of the hazard via mitigation, (e.g. fuel reduction, seawalls/infrastructure)</p> <p>Resist Where hazards can be effectively managed, enhance the resilience of developments to match the hazard, (e.g. via overlays, permit requirements/triggers)</p> <p>Respond Ensuring emergency response capability</p> <p>React Personal emergency responses including education and individual emergency plans</p>

Climate change and water

A key Victorian Government priority is to develop the State Water Plan. This high-level plan will set out the government's vision and policy directions for water with the priority of ensuring water security by managing all aspects of the water cycle. Development of the updated State Water Plan will focus on key themes, including preparedness for drought and climate change and improved environmental outcomes and healthy waterways.

As part of the State Water Plan, the Water Planning Framework is being updated to bring together key stakeholders to collaborate in the development of plans to manage all aspects of the water cycle to deliver:

- Affordable, efficient and reliable water and sanitation and stormwater management services
- Communities resilient to flood, drought and extreme heat events
- Communities able to experience the benefits of access to healthy catchments, waterways and bays.

The Water Planning Framework will also provide for application of the most up-to-date climate science relating to water. Any planning systems recommendations arising from this process will be incorporated as necessary.

Key outputs of the State Water Plan are expected to include new approaches to support water retention in landscapes and protect flow regimes and water quality in waterways. Irrigation and infiltration with recycled water and stormwater will also contribute to protecting waterway baseflows during drought. These alternative water sources can support productive agricultural landscapes and the greening of Melbourne.

Infrastructure resilience

OPTIONS FOR DISCUSSION

- 51 Investigate consideration of climate change risks in infrastructure planning in the land use planning system, including consideration of an 'infrastructure resilience test'.

The Victorian Government has recently amended the *Emergency Management Act 2013* to help build resilience of Victorian critical infrastructure. Supporting this change is the **Critical Infrastructure Resilience Strategy** which details the vision, principles and strategic priorities for the new arrangements. The strategy focuses on resilience of established infrastructure, but can also be applied to consideration of new infrastructure. **Plan Melbourne 2016** can support the strategy's implementation by encouraging consideration of climate change hazards and impacts on infrastructure within the planning system, and associated referral and consultation processes.

The MAC (2015) report suggests an infrastructure resilience assessment test is developed for new major capital works which is subject to modelling that indicates (through siting, design, specifications and construction) the infrastructure will withstand a range of major shocks and/or likely climate change impacts.

The extent to which climate change hazards are presently considered in the design of new infrastructure is unclear, but it is known that some capital works (for example new boat harbours) include climate change resilience as a key design element. However, given the scale of capital investment made in new projects, the differing level of risks and their often long life-span it is worth considering whether **Plan Melbourne 2016** can support a more consistent consideration of the issue. Clauses 18 (transport) and 19 (Infrastructure) of the SPPF would appear to be an area where changes could be made to include consideration of infrastructure resilience. A second area for investigation could be to require planning authorities to apply the new Australian Standard '**Climate change adaptation for settlements and infrastructure – A risk based approach**'. This could provide a common approach to assessing climate change risk across both levels of government in Victoria.

6.5 NATURAL HABITATS

OPTIONS FOR DISCUSSION

52 Strengthen high-priority habitat corridors throughout Melbourne and its peri-urban areas to improve long-term health of key flora and fauna habitats.

The MAC (2015) report identifies that urban development is causing the loss and endangerment of native species and that this is avoidable if biodiversity is considered when designing new suburbs. Melbourne prides itself on its parks, waterways, natural features and open spaces. Our parks and green spaces make an important contribution to individual and community health, education, and play an important role in the city's economy and liveability.

The protection and restoration of important habitats associated with these parks and reserves is vital to a healthy, resilient and sustainable city in a time of climate change for current and future generations.

Our planning system already provides a suite of tools for protecting native plants and animals.

Our planning system also requires decision-making considers impacts of land use and development on Victoria's high-value biodiversity and protects parks and reserves with appropriate zoning and controls. Recommended actions by the MAC have mostly been implemented (or are underway) as part of the Melbourne Strategic Assessment. Amendment VC68 gave effect to key aspects of the Victorian Government's urban development program, including expanding the urban growth boundary, reserving land for the Regional Rail Link and outer Melbourne Ring Road and establishing grassland reserves in Melbourne's west.

The government will also consider biodiversity outcomes and the threat of climate change in the development of a new Victorian Biodiversity Strategy that covers the whole of Victoria. Planning will support implementation of that Strategy to strengthen habitat corridors throughout Melbourne and its peri-urban areas. Strengthening habitat corridors to improve key flora and fauna habitats and protect biodiversity will be important for climate change resilience.

Maintaining and enhancing natural areas in Melbourne suburbs is important for biodiversity, amenity and for their contribution to greening and cooling the city.

6.6 COOLING A HOT CITY

CSIRO and Bureau of Meteorology future climate projections predict the number of days over 35°C in Melbourne may increase from an average of 11 days (from 1981 to 2010) to 13 days by 2030 and 16 days by 2090.³⁰ Mean, daily maximum and daily minimum temperatures are also projected to increase.³¹ These conditions will create a hotter and drier city more susceptible to infrastructure failure and economic disruption and increase the risk of severe health impacts to the most vulnerable members of our society, such as the elderly, children and those with chronic diseases.

In addition to temperature rises and greater frequency of heatwaves from climate change, increasing urbanisation of Melbourne and its surrounds is already contributing to warmer conditions than the surrounding land due to the ‘urban heat island’ effect. Illustrated in Figure 6, the urban heat island effect is caused by replacing vegetated areas with buildings, roads and other impervious surfaces as a city expands and develops. These conditions reduce evaporative cooling, heat the metropolitan environment due to the slow release of heat overnight, and confine hot air due from ‘urban canyons’ between buildings. These conditions also contribute to greater runoff of pollutants into our waterways (because of more surfaces are impervious) and increase natural environment pressures. The MAC (2013) report identified the urban heat island effect as a key issue for Melbourne and highlights this challenge again in its (2015) report.

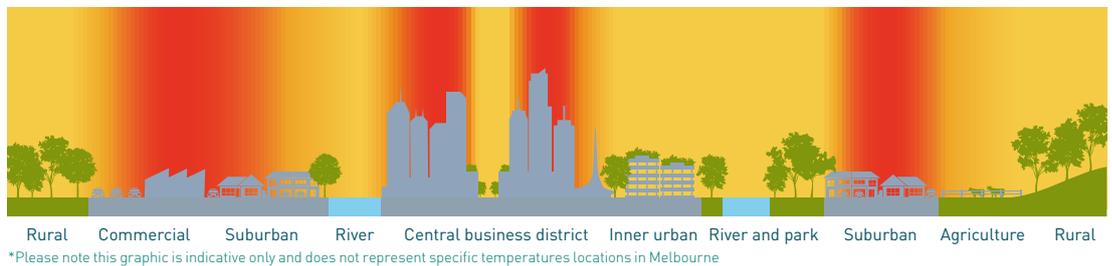


Figure 6
Urban Heat
Island effect

Plan Melbourne 2016 can help to tackle the urban heat island effect in various ways that also generate other benefits such as improved liveability. Cooling the city can involve:

- Urban greening by planting more vegetation to create more shady areas, greater transpiration and cooling of hard surfaces
- Greening buildings to cool internal and external environments, increasing the use of appropriate materials to cool hard surfaces and permeable surfaces to absorb water and heat.

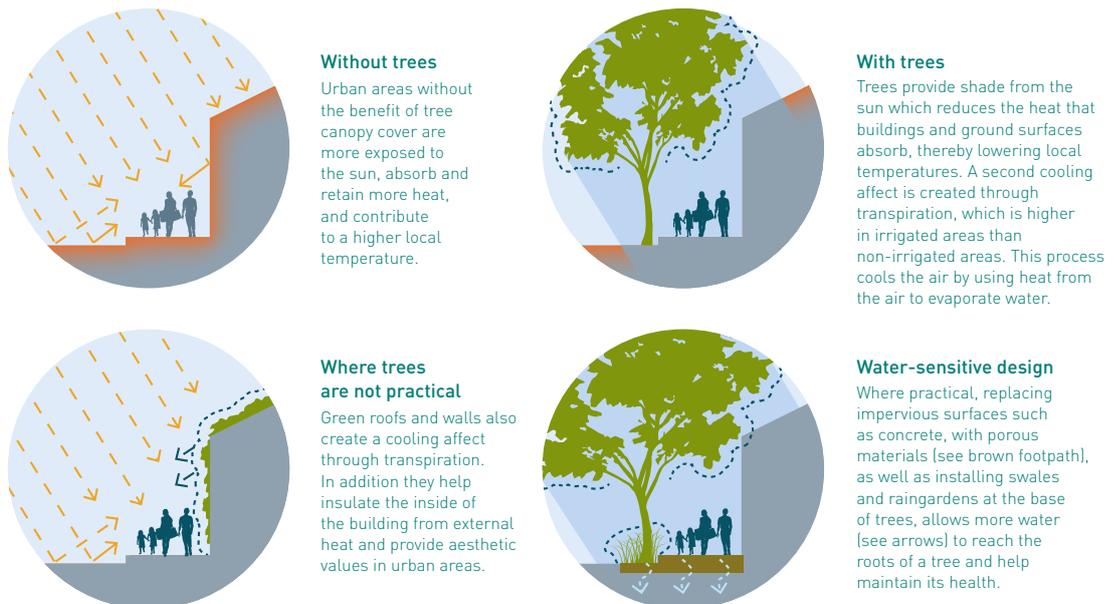


Figure 7
Urban greening
approaches

*Please note this graphic is indicative only and does not represent specific temperatures locations in Melbourne

30 Grose, M. *et al* (2015) ‘Southern Slopes Cluster Report’ in, Ekström, M. *et al* (eds). **Climate Change in Australia Projections for Australia’s Natural Resource Management Regions: Cluster Reports**, CSIRO and Bureau of Meteorology, Australia.

31 Norton, B. *et al* (2014) **Planning for a cooler future: Green Infrastructure to reduce urban heat**.

Planting more vegetation to cool our city

OPTIONS FOR DISCUSSION

53 Adopt strategies to encourage the:

- Increase of tree canopy, vegetated ground cover and permeable surfaces throughout Melbourne
- Use of Water Sensitive Urban Design and irrigation with various water sources to cool the city by providing water features, supporting trees and vegetation.

Urban greening involves increasing vegetation cover in a city with trees and ground cover. More vegetation also helps trap water in soil and increases transpiration. More shading and higher soil moisture creates ‘microclimates’ which help reduce temperatures and heat stress on people and the environment.

In addition to cooling our built environment through shading and greater transpiration, urban greening has amenity benefits and supports urban biodiversity. Water Sensitive Urban Design will be key to supporting the greening of the city by maximising the alternative water use in vegetated areas.

One approach to cool the city is the City of Melbourne Urban Forest Strategy.³² This sets a range of targets to increase the city’s tree canopy and sets out actions to achieve this, including increasing canopy cover to 40 per cent by 2040 and ensuring 90 per cent of its trees are healthy by 2040. Actions to achieve this include:

- Identifying areas most in need of planting programs and which vegetation and species types are most appropriate
- Improving tree health through more appropriate watering regimes, mulching and soil preparation
- Ensuring adequate high quality open space areas in greenfield developments
- Involving the community in greening landscapes.

The City of Melbourne, the Victorian Government and the 2020 Vision have also recently produced the guide to ‘How to Grow an Urban Forest’ to help local governments create an urban forest.³³ This guide helps fill an information gap in how local governments can green their local area.

Greening the West is a regional initiative that aims to use urban greening to enrich communities in Melbourne’s west. City West Water facilitates the program on behalf of a committee comprising representatives from local government, water corporations, Victorian Government agencies, industry and the community.

Greening the West received the 2014 Victorian Health Promotion Foundation ‘Research into Action’ award in recognition for its innovative focus on urban greening to promote community health. The Australian Government provided \$5 million of funding to the Greening the West partners to plant one million trees in Melbourne’s west over the next two years.

In the draft **Plan Melbourne 2014**, the MAC suggested developing tree canopy targets for the city to reduce the heat island effect over time. The Victorian Government could partner with metropolitan local governments to achieve these as aspirational targets.

Plan Melbourne 2016 can include strategies to support greening of the city. Structure planning, local policies and overlays (such as Design and Development Overlays and Development Plan Overlays) can be used to promote more vegetation cover and cool hard surfaces.

³² City of Melbourne (2014), **Melbourne’s Urban Forest Strategy – making a great city greener**.

Retrieved from: <https://www.melbourne.vic.gov.au/Sustainability/UrbanForest/Pages/About.aspx>

³³ **2020 Vision, 20% more green space by 2020**. Retrieved from: <http://2020vision.com.au/>

Greening buildings and surfaces

OPTIONS FOR DISCUSSION

- 54 Introduce strategies to encourage the uptake of green roofs, facades and walls, as appropriate materials used for pavements and buildings with low heat-absorption properties.

Cool surfaces such as walls, roofs and pavements come in a variety of different forms but include the use of materials and vegetation to reflect heat from heat-absorbing surfaces. Cooler building surfaces, particularly including 'green' roofs, walls and facades can generate multiple benefits including:

- Lower temperatures surrounding a building
- Better thermal performance of a building (which can deliver energy cost savings)
- More efficient use of rainwater and storm water benefits
- Increased property values
- Increased aesthetic and amenity values
- New industries and jobs.

Victoria has seen an increase in efforts to green our buildings. A recent project supported by the Victorian Government and four local governments (the cities of Melbourne, Port Phillip, Yarra and Stonnington) drew on advice from industry experts and academic researchers to develop the **Growing Green Guide**.³⁴ This explains how to create high-quality green roofs, walls and facades. While this will help increase the number of green roofs, facades and walls across Melbourne, further work is needed to encourage implementation. Suggestions for further improvement include addressing:

- Market development barriers such as insufficient demand
- Research gaps relating to which plants and substrates (soil that plants grow in) achieve the best results.

³⁴ Department of Environment and Primary Industries (2014) Growing Green Guide. Melbourne: State of Victoria. Retrieved from: www.growinggreenguide.org

6.7 SUPPORTING RENEWABLE ENERGY THROUGH PRECINCT SCALE PLANNING

OPTIONS FOR DISCUSSION

- 55 Seek lead partners in research, property investment or government to facilitate innovative demonstration projects in greenfield and urban renewal precincts.
- 56A Investigate opportunities in the land use planning system, such as strong supporting planning policy, to facilitate the increased uptake of renewable and low-emission energy in Melbourne and its peri-urban areas.
- 56B Strengthen the structure planning process to facilitate future renewable and low emission energy generation technologies in greenfield and urban renewal precincts.
- 56C Strengthen the structure planning process to require consideration of the costs and benefits of renewable or low-emission energy options across a precinct.

The development of new and renewal of existing urban precincts provides an opportunity to reduce greenhouse gas emissions by encouraging low-emission and renewable energy use and ensuring the future urban structure supports local living, walking and active transport over car travel.

The most practical forms of low-cost, renewable and low emission technologies in Melbourne are likely to involve solar power, although other technologies may become viable in future (such as ground source heat pumps).³⁵ While forms of low emission energy, such as cogeneration have been a cost-effective option in the past, rising fuel costs may impact this in the future.³⁶

Over the last decade Victoria has seen a large increase in households using solar photovoltaic and solar hot water systems. As of 2014, a total of capacity 708.10 (MW) of solar photovoltaics were installed in Victoria.³⁷ A large proportion of these are in 'new suburbs' such as Hoppers Crossing, Werribee/Point Cook, Caroline Springs and Craigieburn. A range of Australian, Victorian and local government policies have supported solar panel use. Rapid advances in battery technology and pricing at the household or small-area scale will also likely disrupt traditional centralised grid power and assist uptake of household generation.

Through the Precinct Structure Planning (PSP) process master plans are prepared that determine the layout of roads, location of schools and open space and connections to transport amongst other things. A variety of different stakeholders are involved in this process, which offers opportunity to encourage renewable and low-emission energy options during design of a master plan. This process could be strengthened to more effectively identify opportunities and/or locations in a precinct where the roll-out of distributed generation would be cost effective. This could involve identification of areas where distributed generation infrastructure could be installed in the future. Alternatively, the government could partner with interested stakeholders to further help demonstrate the benefits of renewable and low emission technologies.

As part of the Victorian Government Renewable Energy Roadmap, the government has committed to investigating the viability of different purchasing and leasing arrangements to support innovative distributed energy business models. This could involve leasing arrangement for solar panels, or third party contract models, such as those used under Environment Upgrade Agreements (EUAs) by local councils.³⁸

35 <http://edg.com.au/about/>

36 Cogeneration is the use of gas (such as natural gas) to produce low greenhouse gas intensive electricity (when compared with other fuel sources such as coal) and heating and cooling.

37 Clean Energy Council (2014), *Clean Energy Australia Report 2014*. Melbourne, p. 44.

38 For further explanation of EUAs see <http://www.energyandresources.vic.gov.au/energy/environment-and-community/energy-efficiency/environmental-upgrade-agreements/environmental-upgrade-agreements-frequently-asked-questions>

The roll-out of distributed energy business models could be attractive to customers in new precincts as a way to finance, at low up-front cost, renewable energy technologies when purchasing a new property. This could be packaged with energy efficiency options to increase the sustainability of development. The structure planning process could support consideration of these opportunities.

There have also been suggestions the planning permit process for distributed generation projects is time consuming and lacks the necessary degree of certainty for a proponent to proceed past the concept stage. These concerns may apply to any large industrial-type facility, but the broader benefits of facilitating renewables may be worthwhile.³⁹

6.8 ENVIRONMENTALLY SUSTAINABLE DESIGN

OPTIONS FOR DISCUSSION

57 Support a Victorian Government integrated planning and building approach to strengthen Environmentally Sustainable Design, including consideration of costs and benefits.

Extensive research demonstrates significant potential to deliver climate change, water and environmental outcomes through better building design. Commonly known as Environmentally Sustainable Design (ESD), the planning and the building systems can help deliver cost-effective environmental outcomes and a lower cost of living, over the lifetime of a building.

The planning system can encourage more energy-efficient buildings by orientating the building and internal layout in a way that maximises shade in summer and sun in winter and encourages early consideration of sustainability in the planning, design and building process. This helps reduce energy used for heating, cooling, lighting and thus greenhouse gas emissions. In addition to regulations, incentives associated with the planning system could help motivate sustainable development (such as building in trade-offs for energy efficient design and faster approval times).

The building system, through the National Construction Code (NCC) sets minimum standards for elements of a building (such as insulation and window glazing) that help reduce energy consumption. To deliver better water outcomes, the Victorian planning system (such as through the ResCode provisions in Cl. 55.03-4) establishes minimum requirements for permeable surfaces around buildings to reduce stormwater run-off.

The costs and benefits of ESD will vary depending on the type of building, and in some cases are shared across multiple groups. Improved building standards delivers financial benefits to building owners and tenants, while requirements for water retention systems reduces water consumption and pressure on waterways during floods. While ESD benefits typically accumulate over the life of a building (up to 50 years or more) they can add up-front design and construction costs. However, these costs are typically recouped over the life time of the building.

Recent consultation for the government's **Energy Efficiency and Productivity Statement** found strong support amongst stakeholders for it to take the lead in fixing compliance and strengthening building standards in the NCC over time. There is also support for incorporating greater energy efficiency and sustainability principles in the planning system. Principles should be sector-specific (such as apartments and precincts), applied at the Masterplan level and cross-referenced with the NCC. A similar approach has been in place in New South Wales since 2004. The Building Sustainability Index (BASIX) tool integrates planning and building requirements to achieve water and greenhouse gas reductions for residential developments. It is among a range of approaches that may be worth consideration in Victoria if practical, administratively feasible and cost effective for government, proponents and prospective home owners.⁴⁰

39 For example, a generally facilitative framework for Wind Energy Facilities is provided through the **Policy and Planning Guidelines for WEF** 2015.

40 NSW Government, Building Sustainability Index. Retrieved from: <http://www.basix.nsw.gov.au/basixcms/about-basix.html>