



CLIMATE CHANGE

ADAPTATION STRATEGY

2016-2020

*An integrated approach to managing
climate change at Wyndham City*

Executive Summary

The climate has changed and more change is expected. In response Wyndham has undertaken actions to reduce our emissions alongside action to mitigate the risk of a changing climate. While Wyndham is doing a lot already, the Climate Change Adaptation Strategy seeks to formalise our response and ensure we are systematically considering climate change in the work we do.

To achieve these aims, we have designed a number projects through which we can learn about the most effective ways to adapt. We will embed actions and responses into our council processes, policies and planning scheme that are built on the evidence collected.

We have determined our adaptation priorities through a rigorous climate change risk assessment (for more details see Appendix C). Actions included in this Strategy respond to identified climate risk priorities but also seek to build resilience within our municipality. Actions lie within key themes of:

1. Managing water use and urban heat reduction
2. Empowering a resilient community
3. Protecting our biodiversity
4. Building climate resilient infrastructure
 - Managing council assets: Buildings, drains and roads
 - Influencing growth
5. Establishing adaptation excellence

There are 14 actions that lie across the five themes, and actions generally fall into a number of categories such as:

- Trialling technologies and methods to reduce the impacts of urban heat.
- Engaging with the community and understand their capacity to adapt and tailor our responses accordingly (utilising Wyndham's district planning model).
- Building our knowledge of climate projections, impacts of climate change and the effectiveness of adaptation actions.
- Embedding climate change considerations into various processes and policies.

Acknowledgements

This plan was developed by Wyndham City Council's Environment & Sustainability Department in collaboration with all Council Directorates. For further information contact Wyndham City Council on (03) 9742 0777 www.wyndham.vic.gov.au/

Wyndham City Council acknowledges the traditional owners and custodians of Wyndham, the Wathaurung, Bunurong and Boon Wurrung peoples of the Kulin Nation.

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1. Wyndham responding through adaptation

While governments, including Wyndham, businesses and communities seek to reduce the amount of greenhouse gases they emit into the air, a certain level of climate change is already locked in. Therefore, Wyndham is taking action both to reduce our contribution to climate change, and to prepare for the climate change we are likely to experience.

This Strategy formalises our approach to managing the impacts of a changing climate, otherwise known as adaptation.

1.1 Reducing Emissions

Wyndham tracks and reduces our greenhouse gas emissions. We have received a gold standard award from Planet Footprint for our tracking of greenhouse gas emissions from fuel, gas and electricity usage. We have also completed a Large Scale Solar Feasibility study (2014-15), with installations to occur in 2015-16. Through the Lighting the West project, we will save over 4,000 tonnes in annual greenhouse emissions by replacing 11,000 residential street lights.

1.2 Adaptation

Wyndham is already beginning to adapt to a changing climate through a number of actions such as our emergency management response and our participation in Greening the West. This Strategy sets our future work program for our response to a changing climate over the longer term.

What is adaptation

Adaptation is the term used to outline the response of council, communities and other organisations to manage the risks of climate change.

Adaptation aims to enable our people, businesses, infrastructure and environment to cope with an increasingly variable and volatile climate.

Adaptation is a process of change through which Wyndham will seek to become better prepared for a changed climate.

Given the potential broad-ranging impacts of climate change in our municipality, adaptation across the Council, other organisations and the community is essential.

Best practice adaptation

The impacts of climate change are uncertain – uncertain in how the climate will change, and uncertain in how these changes will impact our society. Therefore, adaptation must be effective under a range of climate scenarios and associated futures.

Best practice adaptation should:

- Remain viable under the widest range of likely climate futures.
- Increase flexibility and preserve future response options (where possible).
- Build resilience and redundancy into physical, organisational and social systems.
- Enhance existing social, economic and environmental values.
- Encourage learning.
- Be done in partnership with the community and other organisations.

We seek to follow these principles in our adaptation planning.

1.3 Council adaptation policy statement

Climate change is real and is expected to have significant impacts on Wyndham – our community and our organisation.

Wyndham will take a flexible approach to adaptation planning to manage the uncertainty associated with changes to the climate. Our aim is to build the resilience of our community and ensure that we can continue to meet our mission to:

“serve the best interests of the community by providing quality services; managing growth; and supporting residents to lead healthy, safe, vibrant and productive lives, while protecting our local environment.”

To inform our response, Wyndham relies on peer reviewed science from the CSIRO¹, BoM², and the IPCC.³ Projections from these sources suggest that temperatures will increase, along with the intensity of rainfall and storm events and the incidence of drought conditions. Average annual rainfall may decline and sea levels are likely to rise.

Where available, Wyndham also uses state and regional specific information, to provide more detail into how the local climate might change. Where local information is used we will look for published and peer reviewed scientific data, government reports or guidelines, or data used by government authorities in decision making.

We acknowledge our role in managing some of the impacts of climate change, however, the most effective climate change adaptation requires a shared response from all levels of government, stakeholders and community.⁴

1.4 Strategy objectives

Wyndham is already adapting. This Strategy aims to better coordinate and enhance the outcomes of these activities across Council functions.

The implementation of the Adaptation Strategy and Action Plan will:

- Support the actions Wyndham is already undertaking in relation to key climate risks.
- Identify and implement additional actions required to manage priority climate risks.
- Integrate climate change considerations into council policies and systems.
- Create a culture within council where the organisation understands climate change, the need and how to address it in council business.
- Foster community understanding and leadership around climate change impacts.
- Build on existing and develop new stakeholder relationships, to establish a clear understanding of roles and responsibilities in relation to climate risks.
- Monitor and evaluate climate change risks and effectiveness of actions taken.

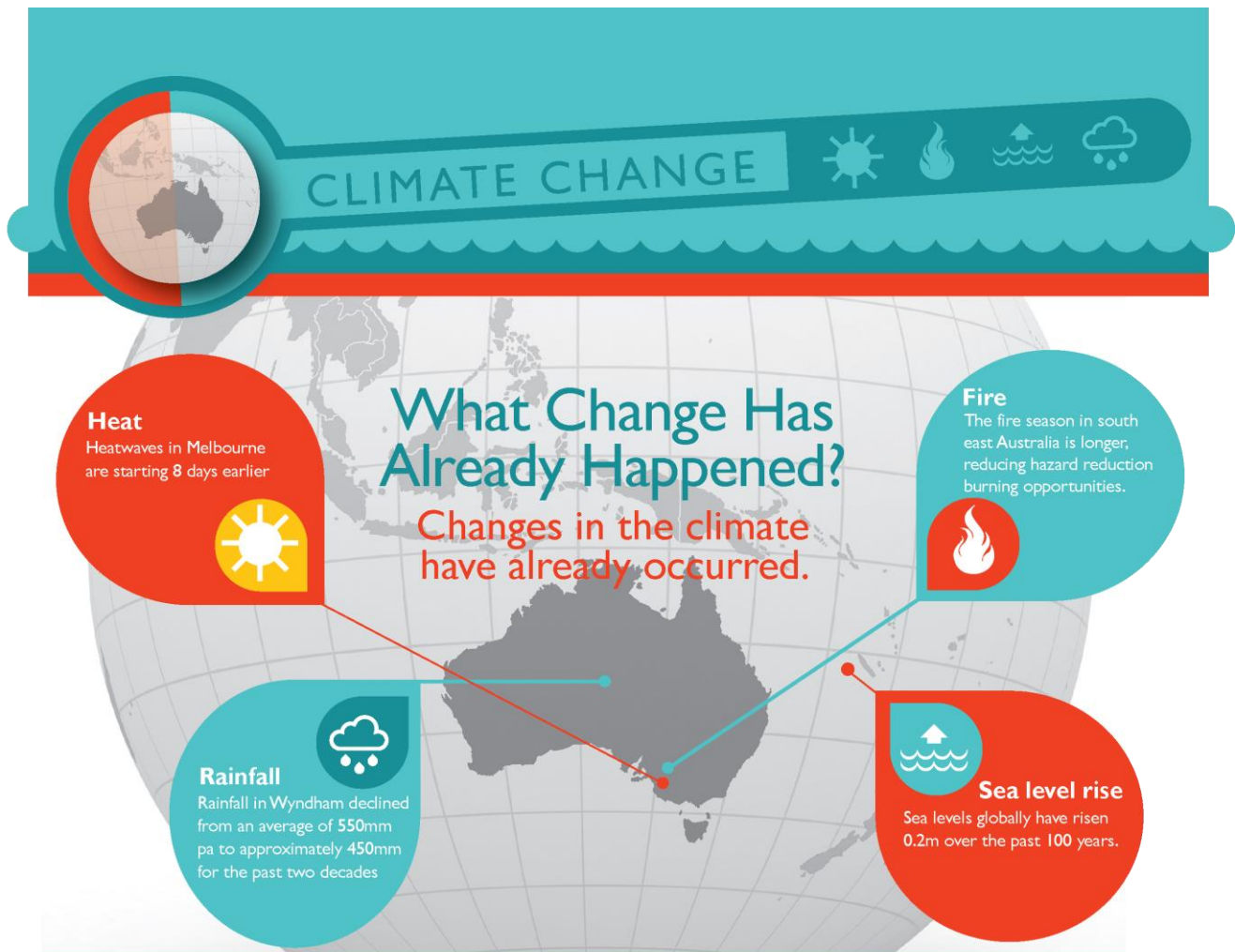
¹ Commonwealth Science and Industrial Research Organisation

² The Bureau of Meteorology

³ Intergovernmental Panel on Climate Change

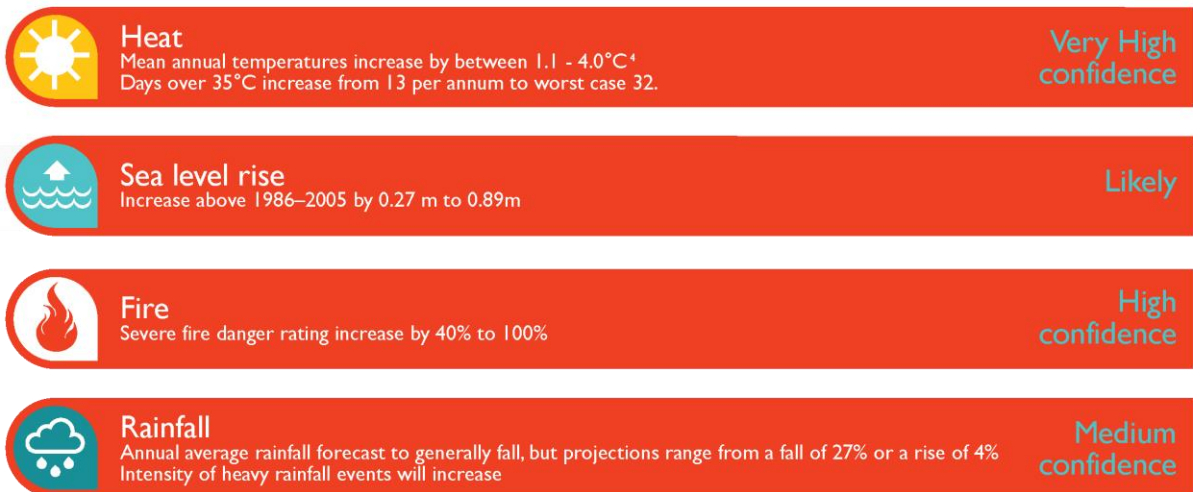
⁴ Appendix B outlines key projects and actions that other government agencies are taking.

2. What is climate change



What Change May Happen?

Using global climate models¹, the CSIRO² and BoM³ forecast that more change is to come.



¹Climate models are used to predict how Earth's climate will change. The models are programmed to simulate past climate as accurately as possible to give scientists confidence in a climate model's ability to predict the future.

²Commonwealth Science and Industrial Research Organisation ³Bureau of Meteorology

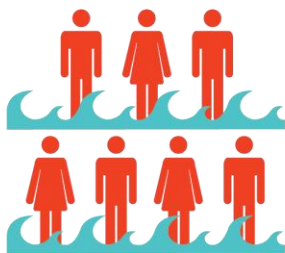
⁴Variation exist between the different Representative Concentration Pathways (RCP), for example, for average annual mean temperature, for RCP 4.5 temperature is forecast to increase between 1.1 to 2.0 °C, or for RCP 8.5

WHAT DOES THIS MEANS FOR THE WORLD

While some of these changes seem small, slight changes in the earth's temperature could lead to big impacts. Global changes that could be seen in the 2080s, under an IPCC high emissions scenario include:



Global temperature increases by upto 3.7°C



7 times as many people are expected to be exposed to 1 in 100 year flood events



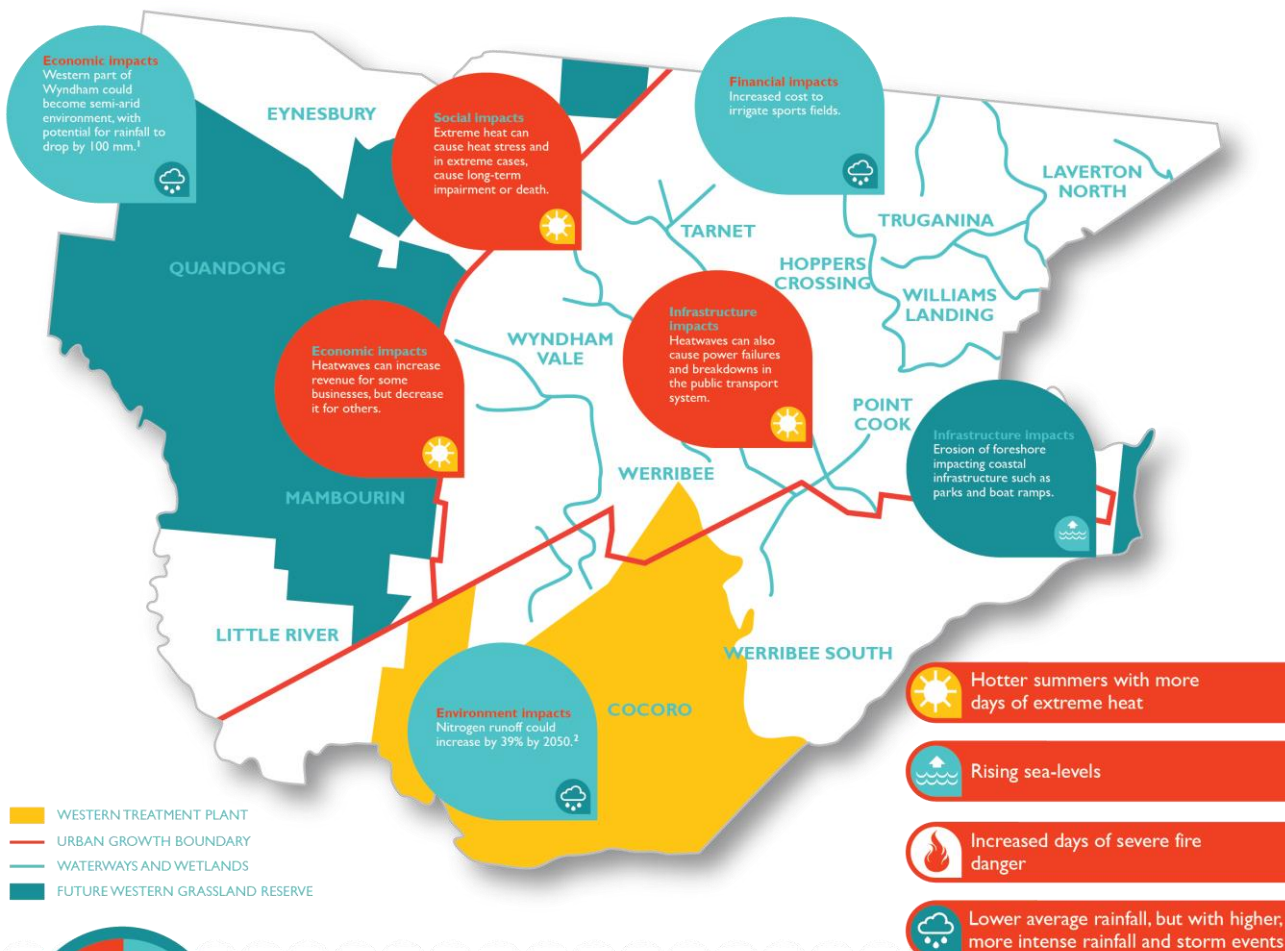
Many plant and animal species will decrease by more than 50 percent



Agricultural production and food security could be impacted on a large scale

REFERENCE: WORLD RESEARCH INSTITUTE

WHAT DOES THIS MEANS FOR THE WYNDHAM



¹ Work completed for DELWP 2015
² Ibid

3. The context for action

3.1 Wyndham policies

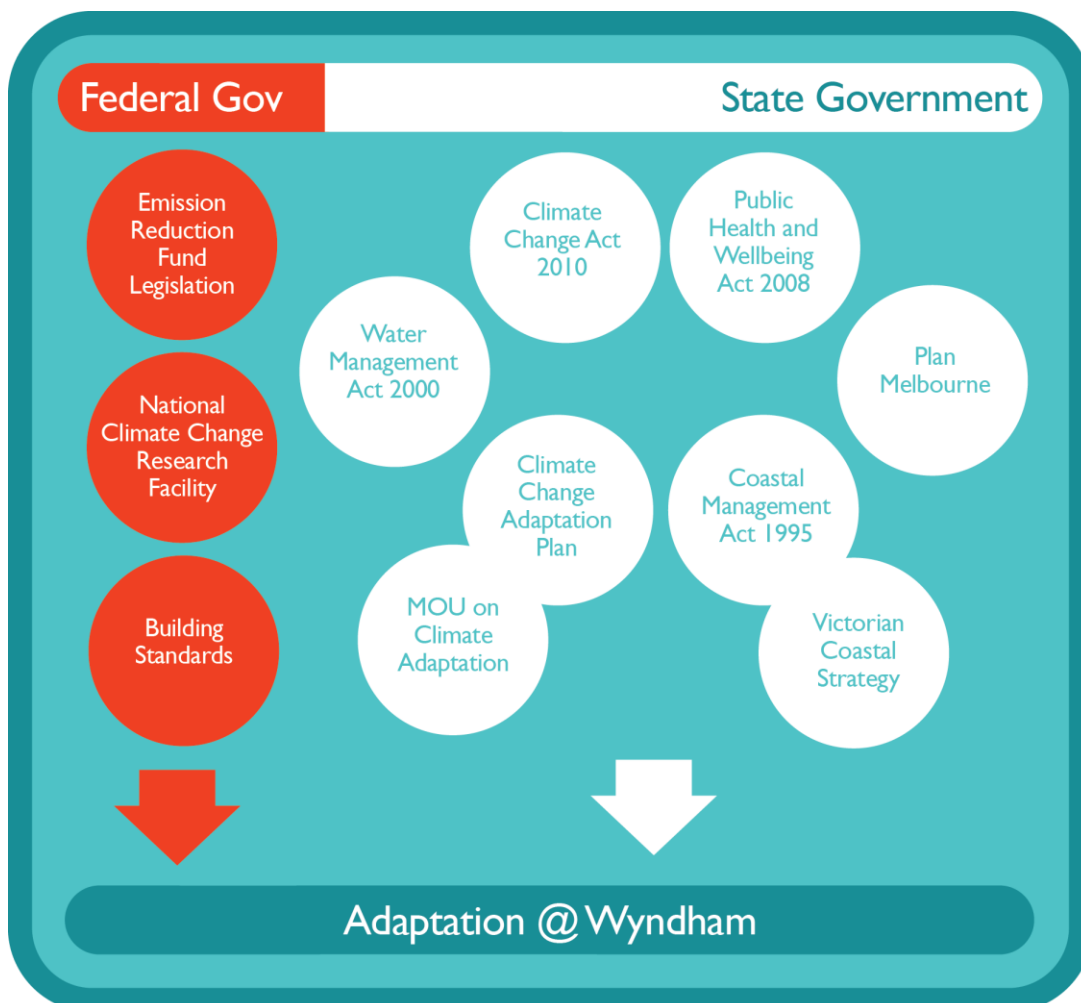
Climate change will affect most areas of council operations and functions. In recognition of this, it is important that relevant strategies and plans consider climate change and respond in an appropriate way. At Wyndham there are a number of strategies that already consider climate change and include adaptation action (see strategies included in diagram 1).

The Adaptation Strategy seeks to support the inclusion of climate change considerations in other relevant plans as they are best placed to respond.



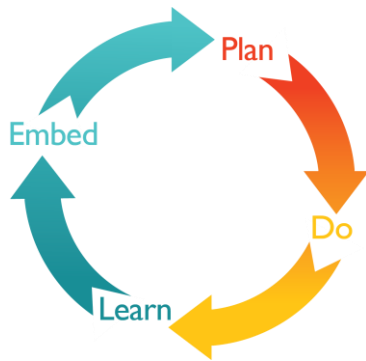
3.2 External policies

Council action to manage climate risks is also influenced by state and federal government policy.



4. Adaptation priorities

Wyndham is already doing a lot in responding to climate change, and all additional actions have been designed to support existing activities and make our climate change response more explicit.



To achieve these aims, we have designed a number of projects through which we can implement (do) and learn about what works and what does not. Then we can embed actions and responses into our council process, policies, and planning schemes that are built on the evidence collected.

We have determined our adaptation priorities through a rigorous process of identifying our climate change risks (rated based on climate projections for 2030), mapping our current controls and then identifying gaps and potential actions to build our understanding, governance and action. See Appendix C for more details of the risk assessment and process followed.

Identified actions respond to identified climate risk priorities and also seek to build resilience within our municipality. Actions lie within key themes of:

1. Managing water use and urban heat reduction
2. Empowering a resilient community
3. Protecting our biodiversity
4. Building climate resilient infrastructure
 - Managing council assets: Buildings, drains and roads
 - Influencing growth
5. Establishing adaptation excellence

The context of each theme, relevant risks, current and new actions are all outlined below for each theme. Appendix A shows detailed actions, responsibilities and timeframes.

4.1 Balancing water use and urban heat reduction

Context

Water use and urban heat are two important, countervailing climate change issues. Average annual rainfall in Wyndham is expected to decline, however, the intensity of rainfall events is forecast to increase. At the same time, temperatures – averages and extremes – are expected to increase.

With these changes, there will be increased pressure on our water supplies, but also from our community to protect the quality of our open spaces. Often the solution to urban heat is seen to be trees and using water in the landscape. However, in light of changes in rainfall, any commitments to cool urban environments with the use of water and tree plantings must be balanced with understanding how the water will be sourced and supplied.

Our open space environments are vital to maintain the current city, coast, country feel that is important to our community. However, the benefits of the use of water must be greater than the costs to justify the increased in use.

Relevant risks

Climate change results in:

- Declining water availability
- Extreme weather events occur more frequently
- Increased negative impact on Wyndham's vulnerable people

What we are already doing

Wyndham is doing a lot already to manage its water use and to grow green streets and open spaces.

Automated irrigation system

Through the Water Action Plan, we committed to improving our water use efficiency. As part of this, we are installing an automated irrigation system.

The goal of replacing irrigation control systems for Wyndham is to:

- Improve water efficiency by at least 10%
- Reduce labour costs for managing irrigation systems by 30%
- Improve turf management

Through the new system, we will also be able to collect weather data from five sites within the municipality. This system will help Wyndham build the resilience of parks management and water use, assisting us to prepare for any changes in climate. The new system should be installed by the end of 2015.

Increasing our tree planting

Each year approximately 7,250 trees are planted within Wyndham City. Through the assistance from the Greening the West program, led by LeadWest and City West Water, this will increase to 20,000 over 2015-2017.

Wyndham also has a Tree Policy and is working on strategies and action plans to deliver on the Tree Policy.

Trees can contribute to urban cooling but can also encourage us to get out and enjoy the outdoors.

New Adaptation Actions

These actions seek to build on the work that Wyndham is already doing, in particular the Water Action Plan. These actions seek to build the evidence base and knowledge of the implementation of various technologies and solutions within the Wyndham area.

| Action | Completion timing |
|--|-------------------|
| 1. Trial urban heat mitigating actions within a council built carpark Investigation of potential sites to occur in 2015-16 with trial to potentially occur in 2016-17. Options include: <ul style="list-style-type: none"> • Lighter colour and/or permeable pavements (focus) • Use of trees for shading. | June 2018 |
| 2. Investigate benefits of urban cooling strategies We will assess the urban cooling benefits of irrigation in passive open space. | June 2016 |
| 3. Develop a baseline of the tree canopy coverage in Wyndham This will build our understanding of current tree canopy coverage and inform future tree planting works. | June 2017 |
| 4. Partner with government and other agencies on a regional approach to mitigate climate change Specific programs include the Greening The West initiative | Ongoing |

4.2 Empowering a resilient community

Context

Climate risks relating to the vulnerable are ranked highly because of the potentially deadly impacts of heatwaves on the elderly and sick. Research has found that people more likely to be vulnerable to climate change include those that live alone, have difficult socio-economic circumstances, come from racial or ethnic groups, or those in aged care facilities.⁵ Within Wyndham, it is thought that the interaction of age, illness and income will be a strong determinant of vulnerability to climate change.

While the impacts on the vulnerable can be high, there are also impacts on the general population from increases in extreme weather events. Heatwaves can impede people's ability to sleep and floods may restrict mobility.

While there are vulnerabilities within Wyndham, there are also community strengths that contribute to our community's resilience. The Wyndham community is very neighbourly, with residents loving Wyndham for its small country town feel. This will contribute to our resilience to changes in climate.

Relevant risks

Climate change results in:

- Inability to maintain mobility across the municipality
- Wyndham's economy and businesses deteriorate
- Extreme weather events occur more frequently
- Increased negative impact on Wyndham's vulnerable people

What we are already doing

Wyndham has expanded its emergency management response, focusing on increasing the organisation's preparedness for emergency events and disseminating emergency information from Emergency Management Victoria to our local community. Our emergency management seeks to build on the strong community development work action we are already facilitating.



Building community resilience

In early 2015 the Western Areas Resilience Project, a partnership project between the cities of Wyndham and Melton, linked into Wyndham City's existing Building Blocks Community Leadership Program. A 10-week all-hazards Emergency Ready Community leadership program was run, targeted towards new and emerging leaders.

The program built the participants' capacity to design and implement resilience projects that better-enabled their own communities to prevent, plan for, respond to and recover from emergency events. Ten community-led emergency readiness projects targeting diverse audiences, including Chinese, Karenni, Hindi and Punjabi speaking communities, as well as seniors and children's groups were developed by the newly trained leaders.

District planning processes

Wyndham has also completed a significant community engagement process to develop a vision for Wyndham 2040. Flowing from this process, Wyndham has established District Plans and Advisory Committees, to implement a place-based approach to planning and reporting on council and community's work.

District priorities and actions have been identified and will be led by council and community representatives. Building local connections will enhance the resilience of our local communities.

⁵ Loughnan et al, 2013

http://www.nccarf.edu.au/sites/default/files/attached_files_publications/Loughnan_2013_Spatial_vulnerability_analysis.pdf

New adaptation actions

Managing the potential impacts of climate change requires a collaborative approach, not only with other government authorities, but importantly with our community. We need to understand the current levels of capacity to deal with immediate risks such as heatwaves, but also promote capacity so that our community can build self-reliance, strengthening our community.

| Action | Completion timing |
|--|-------------------|
| <p>5. Engaging with our community on climate change</p> <p>Leveraging Wyndham's district planning model, we will facilitate a two way conversation to:</p> <ul style="list-style-type: none"> • Build the capacity of our community to understand the potential range of impacts likely under climate change. • Build our understanding of how our community is already adapting. | June 2017 |
| <p>6. Further embed climate change considerations in the revised Municipal Health, Wellbeing and Safety Plan</p> <p>While already considering climate change, the consideration of climate change can be improved leveraging the information collected through the community engagement action.</p> <p>This will also assist our Community Planning and Development Department to build their understanding of climate change and its implications for the Wyndham community.</p> | December 2017 |
| <p>7. Improve the targeting of communication with the community before, during and after emergency events</p> <p>Leveraging the information gathered through community engagement, we will seek to improve how we communicate with our community on climate change.</p> | June 2020 |

4.3 Protecting our biodiversity

Context

Wyndham's biodiversity has evolved over millions of years and is a significant asset. Wyndham has a vast array of valuable and irreplaceable land, freshwater and marine ecosystems. These include critically endangered natural temperate grasslands of the Victorian Volcanic Plains, nationally significant seasonal herbaceous wetlands, river woodlands and coastal estuaries within and adjoining the internationally significant Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Wetland.

It is this natural environment that many of our residents value.

Wyndham's biodiversity and natural vegetation is experiencing change. For example, altered hydrology in the municipality has changed the local vegetation. Salt is accumulating in some low lying areas of the municipality and as a result some areas of grassland or floodplains are changing to saltmarsh. Furthermore, Wyndham's 27.4 km of coastline (mostly undeveloped), is at risk from sea level rise. This will impact coastal habitats along with the other values of beaches in some locations.

Relevant risks

- Loss of natural habitat and biodiversity is compounded by changes in the climate.

What are we doing already

Current conservation efforts of Wyndham seek to:

- Protect, enhance, manage, maintain and monitor natural biodiversity and habitat including planning for a changing climate
- Increase habitat connectivity and prevent fragmentation
- Develop partnerships and pro-active promotions and activities with key stakeholders
- Advocate for increased protection of Wyndham's natural environmental assets.

A key action to protect Wyndham's biodiversity under climate change is to provide space for flora and fauna species to move and adjust to changing local conditions. Recent actions to expand recreational opportunities along our waterway reserves result in more space for our biodiversity to adapt to changes in rainfall.

The current approach implements adaptive management practices. Actions include:

- Wyndham City Biodiversity Policy, sets the policy and action within this area, around the principles of enhance, plan, educate, partner, monitor, learn and adapt.
- Conservation activities respond to changes in the environment and seek to improve the efficiency of plantings through strategic seeding, improved site preparation and planting in May-June.
- Weed management is completed by priority (1) new weeds and declared pest plants, (2) transforming ecosystem weeds, and (3) others actions.
- Monitoring of revegetation work, including success rates resulting in applying adaptive management.
- Council's Health of the Werribee River report outlines a number of actions to improve the health of the Werribee River.
- Participating in development of the Association of Bayside Municipalities regional Coastal Adaptation Plan

Wyndham also works closely with the Country Fire Authority to ensure that fire risks arising from native vegetation (for example the Western Grasslands) is managed.

New adaptation actions

To support the ability of Wyndham's natural environment to prosper under climate change, Wyndham commits to undertaking a number of activities.

| Action | Completion timing |
|---|-------------------|
| 8. Build a series of biodiversity corridors for flora and fauna to migrate and to reconnect fragmented habitats. | June 2017 |
| This will be planned for through the Urban Habitat Corridor Plan (June 2017) | |
| 9. Council vegetation corridor mapping exercise and draft rolling program for vegetation enhancement | June 2016 |

4.4 Building climate resilient infrastructure

To build resilient communities, council must first demonstrate leadership in its delivery of council infrastructure (Managing council assets), then seek to encourage developers to respond to a changing climate (Influencing growth).

4.4.1 Managing Council assets

It is important that we start to understand how our assets are responding to changes in the climate and how they might respond in future. Roads, drains and buildings are key assets that we must future proof.

| Drains | Roads | Buildings |
|---|--|---|
| Context | | |
| <p>In terms of capacity, unlike some councils in older parts of Melbourne, sections of Wyndham's drainage system are newer and meet the more recent design standards.</p> <p>However, with increasing urbanisation, we will have increased hard surfaces potentially increasing stormwater pollutant runoff.</p> | <p>Wyndham has clay soils that in the past have meant that our roads deteriorated more quickly. In response, we have modified our construction methods using deeper road pavements and advanced technologies.</p> | <p>Wyndham is building infrastructure to support one of the fastest growing populations in Australia. Therefore our focus is on building future ready buildings.</p> <p>We will improve our building stock through the implementation of the Environmentally Sustainable Development (ESD) Framework. This will start to not only build more sustainable buildings but also more resilient buildings.</p> |
| Relevant risks | | |
| <p>Wyndham City Council drainage assets fail to meet appropriate requirements due to climate change impacts in 2030.</p> | <p>Higher deterioration of roads due to climate change impacts in 2030.</p> | <p>Council buildings are damaged or experience increased deterioration due to impacts from climate change in 2030.</p> |
| What is we are already doing | | |
| <ul style="list-style-type: none"> • Stormwater management plan • Clean drains on regular basis to manage small floods • Treatment of stormwater via grated pits and gross pollutant traps. • Retarding systems to slow the flow of water into drainage systems in greenfield development | <ul style="list-style-type: none"> • Active maintenance and reconstruction program • Installation of subsurface drainage • Street sweeping • Road condition assessments • Drain cleaning • Install capping layer to retain moisture in soil below pavement. • Monitoring of best practice roads construction. | <ul style="list-style-type: none"> • Implementation of ESD framework • Preventative maintenance program • Establishing Asset Management Information System (AIMS). |

4.4.2 Influencing our growth – private assets

Context

Wyndham is a high growth council. Over 2013-14, Wyndham grew to 199,715 people representing a 5.6% annual growth rate.⁶ As one of the fastest growing areas in Australia, Wyndham is projected to exceed 384,000 by 2036. Today the principal areas of population are Werribee and Hoppers Crossing, tomorrow these areas will likely lie in Tarneit, Point Cook, Truganina and Wyndham Vale.

Within this context, it is important that the communities that we are building will be resilient into the future. To influence our growth Wyndham must work internally and with external stakeholders to incorporate the right actions into the planning and delivery of our communities.

Relevant risks

Climate change results in:

- Inability to maintain mobility across the municipality
- Wyndham's economy and businesses deteriorate
- Extreme weather events occur more frequently
- Increased negative impact on Wyndham's vulnerable people
- Decreased availability of water for council use

What we are already doing

Climate change responses are built into our management of growth. Various planning documents across council seek to provide sustainable living to our residents.

- Wyndham's Municipal Strategic Statement includes a number of objectives around managing the impacts of climate change such as heatwaves, management of flood plains, fires and heat island effect.
- The Housing and Neighbourhood Character Strategy also includes commitments to: (1) include the Sustainable Design Assessment in the Planning Process (SDAPP), (2) to encourage developers to implement Green Star Communities, and (3) various actions to protect and grow trees on road verges.

In addition, a number of developers are trialling various methods to increase tree plantings in Wyndham developments, or implementing Green Star Communities aimed at holistically improving sustainability performance of community and precinct wide developments.

- The Harpley Estate is involved in a pilot aimed at developing standards for where each residences' connection to services is located, in an aim to increase the room for trees to be planted.
- Lincoln Heath South, was the first development in Wyndham to register their development as a Green Star Communities project.

Other government agencies are also responding. The Planning Scheme includes a requirement that all greenfield developments must plan for 0.8 metres of sea level rise. The Metropolitan Planning Authority also has urban heat mitigation as a driver in their Open Space Strategy.

⁶ Regional Population Growth, Australia, 2013-14, cat. no. 3218.0

New adaptation actions

These actions aim to assist us to build more resilient infrastructure and communities. The actions are focused on council assets. However, through our trial projects, we are seeking to learn about what works and what does not, which can then inform our work with developers and how they can incorporate resilience into their developments.

| Action | Completion timing |
|--|-------------------|
| 10. Investigate top priority buildings for opportunities and plan for increase tree plantings around buildings | June 2020 |
| 11. Completion of an Integrated Water Management Plan | December 2016 |
| 12. Develop baseline and monitor climate impacts on road maintenance requirements | June 2020 |
| 13. Develop baseline and monitor climate impacts on council buildings | June 2018 |

4.5 Adaptation excellence

Context

Wyndham is seeking to build an innovative, learning approach to respond to climate change risks. To do this, we must undertake adaptation in a systematic way, and learn from the work we do. Therefore integrating climate considerations into our everyday practices is essential, as is our commitment and delivery of monitoring of climate change impacts and the effectiveness of actions. Any new information must be integrated back into our council processes.

Relevant risks

Climate change results in:

- Inability to maintain mobility across the municipality
- Wyndham's economy and businesses deteriorate
- Extreme weather events occur more frequently
- Increased negative impact on Wyndham's vulnerable people
- Decreased availability of water for council use

What we are doing already

Climate change considerations are already incorporated into many key policies, strategies, and plans.

Risk Management System

Climate change risks are incorporated into our risk system in two ways.

Climate change is a driver of the strategic risk of a disaster event occurring within the Municipality.

All 9 prioritised climate change risks are included in a climate change project risk register. This risk register will manage the implementation of this Strategy, with regular reporting required on all actions assigned to each prioritised climate risk.

Water Action Plan

The Plan's vision is to improve the resilience of Council's operations to drought and climate change through improved water use efficiency and use of alternative water sources.

The Water Action Plan outlines a number of actions that Wyndham will undertake to improve the efficiency of water use and increase the use of alternative water supplies across Council.

The Western Alliance for Greenhouse Action (WAGA) 'How well are we adapting?' Project

Wyndham is also involved in the *WAGA How well are we adapting? project*. The project is developing a regional monitoring and evaluation framework to understand climate vulnerabilities and the effectiveness of actions. As part of this, Wyndham is collating indicators across our community development, emergency management response and open space operational areas.

New adaptation actions

Many of the actions listed through-out the strategy have been designed to feed into actions to integrate climate change into our everyday work practices and build our knowledge and understanding of how best to respond. The actions below will seek to capture much of the learning and feed into relevant process change.

| Action | Completion timing |
|---|-------------------|
| <p>14. Integrate climate considerations into policy and strategy development processes</p> <p>Currently, Wyndham is undertaking an extensive review to improve various processes across the Council. Where appropriate, climate change considerations will be included in relevant processes.</p> <p>Priority processes include:</p> <ul style="list-style-type: none"> • Development of strategies and policies • Performance monitoring systems (data management) • Development of budget bids. | Ongoing |
| <p>15. Monitoring climate change and adaptation actions effectiveness</p> <p>This action will:</p> <ul style="list-style-type: none"> • Implement the WAGA regional framework • Investigate and develop measures of cooling benefits from increased tree planting. | Ongoing |
| <p>16. Undertake regular knowledge sharing sessions with staff</p> <p>These sessions will include report back on:</p> <ul style="list-style-type: none"> • Outcomes of the adaptation actions • Any updates in climate projections • Any relevant research undertaken. | Ongoing |

Appendix A: Action Plan

| Action | Relevant risks | Relevant departments | Implementation timing | | | | Resourcing |
|--|---|---|-----------------------|---------|---------|---|------------|
| | | | 2016-17 | 2017-18 | 2018-19 | 2019-2020 | |
| Balancing water and urban heat | | | | | | | |
| <p>1. Trial urban heat mitigating actions within a council built carpark</p> <ul style="list-style-type: none">Investigation of potential sites to occur in 2015-16 with trial to potentially occur in 2016-17Options include:<ul style="list-style-type: none">Lighter colour and/or permeable pavements (focus)Use of trees for shading. <p>Linkage: Recommendation from Liveability and the Vegetated Urban Environment Report (DELWP, 2015)</p> <p>Benefit: Learning about heat mitigating actions costs and benefits in car parks. Can inform future council carparks and seek to influence commercial carparks.</p> | <p>Climate change results in:</p> <ul style="list-style-type: none">Extreme weather events occur more frequentlyIncreased negative impact on Wyndham’s vulnerable peopleDecreased availability of water for council use | <ul style="list-style-type: none">Urban Spaces and Civil Works (Lead)Environment and Sustainability (Lead)Facilities and RecreationAsset Management and MaintenanceOpen Space | | | | <p>Cost:</p> <ul style="list-style-type: none">Potentially \$20,000 for option investigation (if required over and above internal knowledge)Capital costs subject to capital works process <p>Funding options:</p> <ul style="list-style-type: none">Existing recurrent funding for options analysisCapital works funding for business case developmentActual works reliant on capital works fundingGrant funding to be explored. <p>Mix of capital and operational funding</p> | |

| | | | | |
|--|---|--|--|--|
| <p>2. Investigate benefits of urban cooling strategies</p> <ul style="list-style-type: none"> Partnering with an academic institution, we will assess the urban cooling benefits of irrigation in passive open space and trees in a carpark. Could seek to use Wyndham volunteers to assist in survey completion. To be completed in summer of 2015-16 <p>Linkage: Building on information gathered through Liveability and the Vegetated Urban Environment Report (DELWP, 2015), Greening the West</p> <p>Benefit: Learning about heat implications of irrigation, trees and understanding community usage changes.</p> | <p>Climate change results in:</p> <ul style="list-style-type: none"> Extreme weather events occur more frequently Increased negative impact on Wyndham's vulnerable people Decreased availability of water for council use | <ul style="list-style-type: none"> Environment and Sustainability (Lead) Open Space Community Development and Planning <p>Interested stakeholders:</p> <ul style="list-style-type: none"> Urban Spaces and Civil Works Statutory Planning | | <p>Cost:</p> <ul style="list-style-type: none"> Heat investigation with university \$5,000 - \$10,000 Plus council staff time <p>Funding:</p> <ul style="list-style-type: none"> Existing Recurrent |
| <p>3. Develop a baseline of the tree canopy coverage in Wyndham</p> <p>This will build our understanding of current tree canopy coverage and inform future tree planting works.</p> <p>Linkage: WAGA 'How well are we adapting?' project and Wyndham Tree policy</p> <p>Benefit: Providing a baseline for tree canopy cover in Wyndham, excluding parts of the municipality that are farm and grassland.</p> | <p>June 2017</p> | <ul style="list-style-type: none"> Open space Environment and Sustainability | | <p>Cost:</p> <ul style="list-style-type: none"> Tree canopy mapping \$10,000 <p>Funding:</p> <ul style="list-style-type: none"> Existing Recurrent |
| <p>4. Partner with government and other agencies on a regional approach to mitigate climate change</p> <p>Specific programs include the Greening The West initiative</p> | <p>Ongoing</p> | <ul style="list-style-type: none"> Environment and Sustainability (lead) Open Space (lead) | | <p>Cost:</p> <ul style="list-style-type: none"> Council staff time <p>Funding:</p> <ul style="list-style-type: none"> Existing Recurrent |

Empowering a resilient community

5. Engaging with our community on climate change

Leveraging Wyndham's district planning model, we will facilitate a two way conversation to:

- Build the capacity of our community to understand the potential range of impacts likely under climate change.
- Build our understanding of how our community is already adapting.

Scope to be developed in early 2016.

Engagement plan.

Linkage: District Planning

Benefit: Understanding our communities concerns and knowledge of climate change to inform our future work and building the capacity of our community.

Climate change results in:

- Extreme weather events occur more frequently
- Increased negative impact on Wyndham's vulnerable people

- Community Development and Planning (Lead)
- Environment and Sustainability (Lead)
- Age and Disability

Interested stakeholders:

- Transport planning
- Risk and Compliance

Resourcing requirements are dependent on scoping.

Cost could include:

- Staff time
- Community engagement materials \$10,000 (indicative)

Funding

- Existing Recurrent

With potential for additional funding sought through grant applications.

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| <p>6. Further embed climate change considerations in the revised Municipal Health, Wellbeing and Safety Plan</p> <ul style="list-style-type: none"> While already considering climate change, the consideration of climate change can be improved leveraging the information collected through the community engagement action. Environment and Sustainability will work with Community Planning and Development to understand the implications of climate change for the Wyndham community. This action will leverage learnings gathered through the community engagement action. Work to occur across the 2016-17 financial year. <p>Linkage: Climate change consideration legislated requirement of Municipal Health and Wellbeing Plans.</p> <p>Benefit: Community and staff understand potential implications of climate change and MHWS Plan responds proactively to potential climate risks.</p> | <p>Climate change results in:</p> <ul style="list-style-type: none"> Extreme weather events occur more frequently Increased negative impact on Wyndham's vulnerable people | <ul style="list-style-type: none"> Community Development and Planning (lead) Environment and Sustainability (lead) | | <p>Cost include:</p> <ul style="list-style-type: none"> Staff time <p>Funding:</p> <ul style="list-style-type: none"> Existing Recurrent |
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| <p>7. Improve the targeting of communication with the community during emergency events</p> <p>Leveraging the information gathered through community engagement, we will seek to improve how we communicate with our community.</p> <p>Linkage: Emergency management work</p> <p>Benefit: Better targeted communication</p> | <p>Climate change results in:</p> <ul style="list-style-type: none"> • Extreme weather events occur more frequently • Increased negative impact on Wyndham's vulnerable people | <ul style="list-style-type: none"> • Risk and Compliance Community (lead) • Development and Planning • Environment and Sustainability | | <p>Cost could include:</p> <ul style="list-style-type: none"> • Staff time • Advertising materials <p>Funding</p> <ul style="list-style-type: none"> • Existing Recurrent |
| Protecting our biodiversity | | | | |
| <p>8. Build a series of biodiversity corridors for flora and fauna to migrate and to reconnect fragmented habitats.</p> <ul style="list-style-type: none"> • This will be planned for through the Urban Habitat Corridor Plan (June 2017) • The implementation of the Plan will be annually staged. <p>Linkage: Will be implemented through the development of the Urban Habitat Corridor Plan.</p> <p>Benefits: Provide space for biodiversity to adapt to a changing climate.</p> | <ul style="list-style-type: none"> • Loss of natural habitat and biodiversity due to climatic changes | <ul style="list-style-type: none"> • Environment and Sustainability (lead) • Open Space | | <p>Funding:</p> <ul style="list-style-type: none"> • Existing Recurrent |

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| <p>9. Council vegetation corridor mapping exercise and draft rolling program for vegetation enhancement</p> <p>This is a separate project to operational mapping undertaken by the Conservation team.</p> <p>Linkage: Will inform all Wyndham's conservation work</p> <p>Benefits: Provide understanding of vegetation extent and inform prioritisation of works</p> | <ul style="list-style-type: none"> Loss of natural habitat and biodiversity due to climatic changes | <ul style="list-style-type: none"> Environment and Sustainability (lead) Open Space | | <p>Funding:</p> <ul style="list-style-type: none"> Existing Recurrent |
| Building climate resilient communities | | | | |
| <p>10. Investigate top priority buildings for opportunities to and plan for increase tree plantings around buildings</p> <p>Linkage: ESD Framework</p> <p>Benefit: Understanding benefits of trees in managing heat loads for building users.</p> | <p>Climate change results in:</p> <ul style="list-style-type: none"> Extreme weather events occur more frequently Increased negative impact on Wyndham's vulnerable people Council buildings are damaged or experience increased deterioration. | <ul style="list-style-type: none"> Environment and Sustainability (lead) Open Space Facilities and Recreation Urban Spaces and Civil Works | | <p>Cost:</p> <ul style="list-style-type: none"> Consultants fees for review - \$20,000-\$50,000 Implementation costs subject to review outcomes. <p>Funding:</p> <ul style="list-style-type: none"> Existing Recurrent funding for options analysis Implementation costs subject to review outcomes. Grant funding possible. |
| <p>11. Completion of an Integrated Water Management Plan</p> <p>Linkage: Stormwater Management Plan and Water Action Plan</p> <p>Benefit: Continue to build our understanding of water management requirements and opportunities across the municipality, assisting us to manage floods and maximise the benefit of water use.</p> | <p>Climate change results in:</p> <ul style="list-style-type: none"> Decreased availability of water for council use Drainage assets fail to meet appropriate requirements | <ul style="list-style-type: none"> Urban Spaces and Civil Works (Lead) Environment and Sustainability (Lead) | | <p>Cost:</p> <ul style="list-style-type: none"> Consultant fees <p>Reliant on recurrent funding and state government grant funding</p> |

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| <p>12. Develop baseline and monitor climate impacts on road maintenance requirements</p> <ul style="list-style-type: none"> Need to understand the different ways our roads might be affected by climate change – i.e. roads with clay soils <p>Linkage: WAGA Adaptation Monitoring project</p> <p>Benefit: Start the baseline to assist us to understand future climate change impacts</p> | <ul style="list-style-type: none"> Higher deterioration of roads due to climate change impacts in 2030. | <ul style="list-style-type: none"> Asset management and maintenance Environment and Sustainability (Lead) Urban Spaces and Civil Works | | <p>Cost include:</p> <ul style="list-style-type: none"> Staff time <p>Funding:</p> <ul style="list-style-type: none"> Existing Recurrent |
| <p>13. Develop baseline and monitor climate impacts on council buildings</p> <ul style="list-style-type: none"> To align with rollout of the Asset Management Database (June 2018) <p>Linkage: WAGA Adaptation Monitoring project</p> <p>Benefit: Start the baseline to assist us to understand future climate change impacts</p> | <ul style="list-style-type: none"> Council buildings are damaged or experience increased deterioration due to climate change in 2030. | <ul style="list-style-type: none"> Facilities and Recreations Environment and Sustainability (Lead) | | <p>Cost include:</p> <ul style="list-style-type: none"> Staff time <p>Funding:</p> <ul style="list-style-type: none"> Existing Recurrent |
| <p>Adaptation excellence</p> | | | | |
| <p>14. Integrate climate considerations into policy, strategy development process</p> <p>Currently, Wyndham is undertaking an extensive process to improve various processes across the Council. Where appropriate, climate change considerations will be included in relevant processes. Priority processes include:</p> <ul style="list-style-type: none"> Development of strategies and policies Development of budget bids. <p>Linkage: Organisation Improvement Project</p> <p>Benefit: To systematically consider climate change in all relevant new decisions</p> | <p>All risks</p> | <ul style="list-style-type: none"> Environment and Sustainability | | <p>Cost include:</p> <ul style="list-style-type: none"> Staff time <p>Funding:</p> <ul style="list-style-type: none"> Existing Recurrent |

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|---|-----------|--|--|--|--|
| <p>15. Monitoring climate change and adaptation actions effectiveness</p> <ul style="list-style-type: none"> Implementation of WAGA regional framework Monitor climate impacts on road maintenance requirements Monitor climate impacts on building maintenance requirements Investigate and develop measure of cooling impacts from increased tree planting. <p>Linkage: WAGA Adaptation Monitoring project</p> <p>Benefit: Develop a baseline to assist us to understand future climate change impacts</p> | All risks | <ul style="list-style-type: none"> Environment and Sustainability | | | <p>Cost include:</p> <ul style="list-style-type: none"> Staff time <p>Funding:</p> <ul style="list-style-type: none"> Existing Recurrent |
| <p>16. Undertake regular knowledge sharing sessions with staff</p> <p>These sessions will include report back on:</p> <ul style="list-style-type: none"> Outcomes of the adaptation actions Any updates in climate projections Any relevant research undertaken. <p>Linkage: Organisation Improvement Project</p> <p>Benefit: To ensure that learnings from all adaptation projects are shared with staff, to assist to build a culture of understanding and proactively responding to climate change</p> | All risks | <ul style="list-style-type: none"> Environment and Sustainability | | | <p>Cost include:</p> <ul style="list-style-type: none"> Staff time <p>Funding:</p> <ul style="list-style-type: none"> Existing Recurrent |

Appendix B: Government stakeholders

Given the diverse and cross cutting nature of the potential climate change impacts, Wyndham is working collaboratively with other government and non-governmental stakeholders to manage climate risks and build the region's capacity to adapt. This table provides examples of what government agencies and regional bodies are doing to respond to climate change. It is not exhaustive and represents key projects at the end of 2015.

| Regional work <i>Seeking to deliver stronger outcomes through regional collaboration</i> | Government agencies and work <i>Often the State Government sets policies, regulation and manages state significant infrastructure, which lies within Wyndham's municipality or that Wyndham relies upon.</i> |
|---|--|
| Western Alliance for Greenhouse Action – How well are we adapting and regional Adaptation Plan. The project is currently working on a regional monitoring and evaluation framework for the eight councils in Melbourne's west to monitor climate vulnerabilities and adaptation responses. | The Dept of Environment, Land, Water and Planning DELWP manages the implementation of the Climate Change Act and influences the adaptation work of the State Government. They are currently reviewing the Climate Change Act and updating the State's Adaptation Plan. |
| The Association of Bayside Municipalities (ABM) The ABM is a regional grouping of all councils with management responsibilities of Port Phillip Bay. With many regional challenges and priorities associated with the management of the Bay, Wyndham is seeking to address these through this regional collaboration. | City West Water City West Water (CWW) are currently Leading Greening the West, a program aimed at increasing tree planting in Melbourne's west to manage increasing issues of urban heat. CWW are also involved in other projects investigating how to use recycled water to improve greening outcomes and providing higher quality recycled water to enable this to occur. |
| Resilient Melbourne An ambitious project funded by the Rockefeller Foundation, working with all Melbourne councils, to provide a vision and action aimed at building a resilient Melbourne. | Melbourne Water Melbourne Water have many overlapping and complementary roles and responsibilities with Wyndham. Responsibilities include integrated regional water planning and waterway management in combination with CWW, DWELP and others. |
| Metropolitan Planning Authority Setting much of the policy shaping Wyndham's growing suburbs, the MPA has commitments to manage urban heat within new suburbs. | VicRoads Having just completed a climate risk assessment, VicRoads is now establishing monitoring systems, to understand how roads may respond to a changing climate. |

Appendix C: Priority risks and our process

Priority risks

For the climate change risk assessment, we focused on risks facing our council and our community. Table 1 outlines the top 9 priority risks, with their risk ratings. The risk timeframe outlines how immediate the risk is and has informed our response. Risks associated with heatwaves are more immediate than risk associated with changes in rainfall patterns and/or sea level rise. Each risk roughly overlaps with key themes of the Strategy.

| Climate variable | Risk rating | Target risk | Risk timeframe | Adaptation strategy themes |
|---|-------------|-------------|------------------|----------------------------|
| Inability to maintain mobility across the municipality* | Medium | Medium | Immediate-Medium | Community resilience |
| Wyndham's economy and businesses deteriorate* | Medium | Medium | Medium | |
| Extreme weather events occur more frequently | Extreme | High | Immediate | |
| Increased negative impact on Wyndham's vulnerable people | High | High | Immediate | |
| Decreased availability of water for council use | High | High | Medium | Building resilience |
| Higher deterioration of roads | Medium | Medium | Medium-Longer | |
| Council buildings are damaged or experience increased deterioration | Medium | Medium | Medium-Longer | |
| Drainage assets fail to meet appropriate requirements | Medium | Medium | Medium | |
| Loss of natural habitat and biodiversity | Medium | Low | Immediate | Biodiversity |

Table 1: Wyndham's priority climate change risks

Our process

The first stage of the risk assessment process:

- Collated an extensive list of over 100 climate change risks relevant to Wyndham. List based on WAGA risk assessment, internal engagement with 14 staff, and external engagement with 13 stakeholders.
- Refined list to 34 risks, through a process of identifying the key risks at the asset class or key risk category, where possible.
- Wyndham staff workshop was held to rank the risks. The workshop included representation from 15 departments, particularly manager level (27 attendees in total).
- Expanding on the ISO 31000: 2009 Australian risk management standard, the ranking process used the following criteria:
 - Extent of damage

- Persistence
- Broader social impact
- Financial
- Quality adjusted life years
- A secondary filter criterion of council responsibility was also scored, but not included in ranking.
- A group discussion during the workshop was used to identify the groups view on the perceived top 10 risks prior to analysis of the ranked scores.
- After the workshop, the risk scores were normalised for each of the five groups to adjust for each tables' risk appetite, prior to adding the scores together to collate the scoring and understand the top 10 risks.

The second phase focused on integrating the top priority risks into Wyndham's risk system. The ten risks were evaluated using Wyndham's new risk matrices, with the scoring based on the projected climate in 2030. The inherent and residual risks were rated, and a thorough review of current controls was undertaken. Through this process, the ten risks were merged to become nine.

Through this process, a number of key areas were found to have actions already in place. These are outlined in table 2 below.

| Area of action | Wyndham's existing controls |
|-----------------------------------|---|
| Water management | The Water Action Plan in 2014 and the Stormwater Management Plan respond to climate change and water management. |
| Buildings and sustainability | The implementation of the Environmentally Sustainable Design Framework will build the resilience Wyndham's buildings to climate change. |
| Emergency management | There is a strong push from Emergency Management Victoria (EMV) to consider the implications of climate change within emergency management frameworks. Wyndham has also expanded its emergency management team, providing resources to increase emergency preparation work internal with council and staff and with our community. |
| Coasts | The Association of Bayside Municipalities (ABM) is currently developing an Adaptation Plan for Port Phillip Bay. This will provide Wyndham with more details of the potential impacts of sea level rise and potential action that could be taken on our coast. |
| Building local economy resilience | Resilience Melbourne is currently developing an action plan to build the resilience of Melbourne. Theme 3 aims to build the resilience of Melbourne's economy to withstand future shocks. This will provide detail on how to increase the resilience of our local economy. |
| Greening Wyndham | Wyndham has a commitment to increase the number of trees within the municipality. Greening the West is assisting us to increase this number more. This will be enhanced by the development of Wyndham's Tree Strategy.. |

Table 2: Existing controls for priority climate risks

Adaptation Strategy development included:

- Objective setting discussions with staff, and Strategy objectives were endorsed by Executive.
- Development of risk context worksheets, capturing relevant information about the risk, current controls, and actions other councils have tried to mitigate the risk.
- Focus groups for each priority risk to identify adaptation actions to respond to the risk.
- Cross-council workshop was undertaken to prioritise actions.
- The following criteria were used (scores of high, medium and low given to each criteria):
 - Effective: Is the proposed action likely to meet the primary objective? Will it result in perverse outcomes in the longer term (e.g. maladaptation)?
 - Flexible & robust: Can the option be adjusted? Does it allow for incremental implementation? Does it enable alternative/additional options to be implemented in the future? Does the action yield benefits under a wide range of climate futures?
 - Proportional: Are the costs of the action likely to be in proportion to the expected benefits? Estimates of size rather than precise figures are required at this stage.
 - Achievability: Is the action able to be completed within the four years of the strategy? Yes/No
- Individual meetings were then arranged to refine prioritised action.