



Hobsons Bay
CITY COUNCIL

Climate Change Adaptation Plan

2013 - 2018



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Executive Summary

In recent decades Australia has experienced observable climatic changes including an increase in average temperatures and the frequency of hot nights, extended periods of reduced rainfall and sea level rise. Hobsons Bay City Council (the Council) has acknowledged the importance of preparing for the inevitable impacts of climate change.

In alignment with its strategic objectives for environmental sustainability, the Council has undertaken a risk assessment and developed a Climate Change Adaptation Plan (the Plan).

This Plan incorporates existing work the Council is already undertaking, including:

- > community engagement activities regarding climate change impacts;
- > adaptation plans developed for specific issues such as heat waves; and
- > efforts to improve environmental sustainability, which will also increase climate change resilience.

The Plan includes a background, technical analysis, risk assessment, strategies and actions to assist the Council in preparing for climate change. It also provides an initial assessment of the resources required for preparing for the challenges of climate change by outlining the activities and plans that the Council will implement to meet the challenges associated with climate change impacts.

Strategic policy context

The impacts of climate change will be diverse, affecting people, infrastructure and the environment. The Council already has a number of strategies and policies in place which, with further consideration, could be supportive of, and integrate with, the Council's Climate Change Adaptation Plan. The effectiveness of this Plan is dependent on the integration of the identified actions into existing strategies and programs. Figure 1 shows the hierarchy of the Council's strategic plans and policies relevant to this Plan. As the Climate Change Adaptation Plan is a risk management response document, it is included under Governance Policies.



Figure 1: Hierarchy of the Council's Strategic Plans and Policies.

Executive Summary

Identifying Risks

The climate change risk assessment identified and rated risks based on the most recent and applicable climate change projections available for 2030 and 2070, which indicate that Hobsons Bay is likely to experience:

- > an increase in average temperatures and in the number of very hot days;
- > a reduction in average annual rainfall and an increase in the number of dry days;
- > an increase in the frequency and intensity of storm events; and
- > sea level rise and an increase in the frequency and intensity of storm surge events.

38 risks were identified across the Council's five divisions (Works & Assets, Planning & Environment, Community Services, Business & Finance and Organisation Development). Risks were rated using the Council's risk management framework and were prioritised to assist adaptation planning. The climate change risks identified will be included in the Council's risk register.

The majority of risks identified relate to:

- > financial impacts, including increasing costs to the Council such as those arising from increasing demand on maintenance services or loss of revenue (eight risks, including five high risks in 2030);
- > increased legal liability to the Council such as those that would arise if the Council were to approve development in areas of future risk of flooding (seven risks, including four high risks in 2030);
- > disruption to the Council service delivery, including an increase in demand on emergency services, open space maintenance and health care services (five risks, four high risks in 2030); and
- > access to and the condition of open space in Hobsons Bay, including parks and recreation areas (five risks, including three high risks at 2030).

The most significant and most immediate risks identified by the Council are:

- > Flooding from sea level rise, storm surge and the increased intensity of storm events. The Council needs more detailed flood mapping information to manage this risk;

- > Increased demand on maintenance services as climate conditions change; and
- > Increased demand on the Council's emergency management services as climate conditions change.

This plan is a key tool in informing the budget process to ensure that these risks are managed with the adequate amount of resources.

This Plan focuses on addressing risks identified as 'high' in 2030.

Taking Action

An effective response to the impacts of climate change requires both mitigation and adaptation initiatives.

The Council is already mitigating the effects of climate change, as outlined in the *Greenhouse Gas Action Plan 2008-2013*.

To identify climate change risks, six workshops were held with the Council's representatives to utilise their local knowledge and to seek their commitment to address climate change risks in the Council's strategic, operational and capital programs. Initial input from the community was drawn from previous consultation on the topic of climate change, and from a workshop with the Sustainability Environment Advisory Group (SEAG) (Appendix B).

This process identified a wide range of potential adaptation actions that the Council could implement. These actions were supplemented by research into adaptation measures undertaken by other municipalities and businesses.

The Council's adaptation actions will involve all sections of the Council and require collaboration with external stakeholders, including residents and businesses, emergency service agencies, neighbouring councils and state government. The Plan identifies existing strategies and Council plans to integrate climate change adaptation actions.

This strategy identifies 38 adaptation actions tailored to address the 19 risks rated high in 2030. The proposed actions address the following broad areas:

- > The climate resilience of essential infrastructure;
- > The long term protection and enhancement of public open space;
- > Water and energy security and other sustainable design issues;

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- > Community resilience to increased extreme events; and
- > The management of coastal assets at risk from flooding.

The 38 adaptation actions are grouped into three implementation timeframes: within the next 2 years, within the next 3 to 7 years and longer term (i.e. 7 years and beyond). All adaptation actions and their designated timeframes may be affected by some factors outside the Council's control and may require further investigation (e.g. funding related factors). The Council's climate change risks will change over time. To ensure that the Council's adaptation responses and approaches remain effective and relevant to local priorities and climate conditions, the Plan will be reviewed and updated. Future reviews will re-assess the Council's risk profile in consideration of changes to climate change information, policy and the Council assets and activities. Reviews will also consider new opportunities that may arise as a result of the changing climate or policy environment.

Adopting this Climate Change Adaptation Plan will be a significant step towards building the resilience of the Council and the Hobsons Bay community.

Resourcing

This plan is a long term strategy that outlines how the Council will build resilience to the impacts of climate change. The Council recognises the importance of providing long term financial plans that ensures the objectives of its strategies are met, not just within a four year period, but with regard to future generations.

The Council has determined that it will use a planning framework that integrates planning from a strategy level through to service delivery to set its annual rate base. The Council must raise revenue each year that is sufficient for the purpose of good governance, administration, and to provide for appropriate goods and services for the community. The demand on the goods and services Council provide will alter as a result of climate change. This plan will be used to inform future budgetary decisions.



1

Introduction

1.1 Background

There is increasing scientific evidence that some degree of climate change is now inevitable and that changes have already begun to occur. Preparing for these changes – adapting to climate change – is a necessary and complementary strategy to reducing greenhouse gas emissions. Adaptation is a general term used to describe the range of actions that can be taken to reduce vulnerability or increase resilience to climate change impacts.

Early planning for climate change will help reduce impacts, but also provide greater opportunities. For example, longer summers will increase tourism potential for our beaches. Early actions are also expected to be more cost-effective – delaying action to reduce vulnerability to climate change risks may increase both costs and risks. For example, managing risks from sea level rise may be more cost effective if adaptation activities and decisions are planned over the longer term.

Hobsons Bay City Council (the Council) is proactive in addressing environmental issues, as evidenced by the vision in the *Hobsons Bay Environment Strategy 2006-2010*, the *Greenhouse Action Plan 2008-2013* and the *Water Action Plan 2009-2014*. Since 2007, the Council has actively reduced greenhouse gas emissions from its own operations and helped reduce community emissions.

The Council is also working closely with the Western Alliance for Greenhouse Action (WAGA) to work collaboratively with neighbouring municipalities. In March 2011, WAGA completed a Climate Change Risk Assessment for the region to help councils understand climate change implications on local government operations, assets and activities.

WAGA's work highlighted potential regional climate change risks. The Council identified further value in understanding specific climate change risks for the Hobsons Bay municipality. A tailored appreciation of climate change risks will assist the Council to develop, own and implement practical adaptation responses to climate change risks.

Managing climate change risks is important to help achieve the Council's vision for a vibrant and sustainable community now and into the future. Planning for climate change is important for the long term future of assets and infrastructure to support the Hobsons Bay community.

1.2 Purpose of this plan

To help meet the Council's vision for a vibrant and sustainable community, for all in the face of climate change, the Council is seeking to:

- > increase the resilience of the Council's infrastructure, programs and services to anticipated climate change impacts;
- > promote and facilitate the incorporation of climate change information into all relevant Council activities;
- > improve awareness, knowledge and skills of the Council's staff and the community; and
- > enhance opportunities for adaptation coordination and cooperation through the development of networks and partnerships.

The purpose of this Climate Change Adaptation Plan (the Plan) is to:

- > provide an overarching document that clearly articulates the Council's role and proactive approach for preparing for the impacts of climate change;
- > identify practical actions that the Council is proposing to take to prepare for identified climate risks; and
- > provide a vehicle to seek community feedback on the Council's commitment to climate change adaptation.

Stakeholder engagement is an important principle in the planning and decision making process of local government. The Council believes that quality consultation and engagement are essential foundations of good governance. With effective



1 Introduction

dialogue and increased stakeholder involvement, the Council will be better positioned to make informed decisions about climate change issues that affect the local community.

Earlier consultation in 2011 indicated that the community believes climate change is happening (Hobsons Bay City Council, 2011). The Council has a responsibility to lead by example and preparing this Plan is an essential first step in developing a strategic and practical approach to preparing for climate change.

This Plan focuses on addressing risks specific to the Council and identifies priority opportunities to integrate adaptation action into existing Council processes and activities. The Plan is designed to reflect the Council's approach to responsible government as well as managing the City's assets and infrastructure for future generations.

Planning for a changing climate now can help reduce risk and identify benefits in both the short and long term. By taking a risk-based approach, the Council can help reduce or avoid the negative impacts of climate change and best manage the uncertainty associated with climate change.

The Plan is focussed on the Council's sphere of operational control and is not designed to be a plan for how the Hobsons Bay community should take action. However, the Plan acknowledges that the community, and other levels of government, will need to be engaged in building the municipality's resilience to climate change impacts.

1.3 The policy environment

While legislation exists for greenhouse gas management and reporting, there is no national legislation specific to climate change adaptation.

In Victoria, the *Climate Change Act 2010* requires the Minister for Environment and Climate Change to develop a climate change adaptation plan for Victoria by early 2013, and review the plan every four years. Under this Act, local governments must also consider climate change during the preparation of a Municipal Public Health and Wellbeing Plan (MPHWP), a requirement under the *Public Health and Wellbeing Act 2008*.

Other relevant state policies include the Victorian Coastal Strategy (2008) which is referenced in the State Planning Policy Framework, identifying the need to "...plan for sea-level rise of not less than 0.8 metres by 2100, and allow for the combined effects of tides, storm surges, coastal processes and local conditions such as topography and geology when assessing risks and impacts associated with climate change" (Victorian Coastal Council, 2008, p. 38). In 2012, an amendment was added for development proposals in existing settlements and urban-zoned areas that allows new developments in close proximity to existing settlements to allow for 0.2 metres over current 1 in 100 year flood levels by 2040 (DPCD, 2012).

At a local level, the Council has acknowledged the need to address the challenges of climate change in the *Hobsons Bay City Council Plan 2009-2013*. In this plan, the Council has identified seven strategic focus areas for the municipality relating to:

- > civic leadership;
- > community well-being;
- > environmental sustainability;
- > liveability;
- > economic sustainability;
- > arts, recreation and culture; and
- > infrastructure and transport.

Given the diverse nature of the impacts of climate change, the Council has considered climate change risks across all of these objectives.

In the Council's 2011 Annual Report, *Key Strategic Objective 3: Environmental Sustainability*, climate adaptation planning is noted as a key action to achieve the Council's objective of reducing the Council's net greenhouse gas emissions to zero by 2020 and assist the local community achieve zero net emissions by 2030 (HBCC, 2011). While the Council's *Greenhouse Action Plan 2008-2013* focuses on how it will achieve its net zero emissions objectives, this adaptation plan provides a set of actions to assist the Council and the municipality build resilience to the impacts of climate change.

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1.4 Why Hobsons Bay needs to adapt

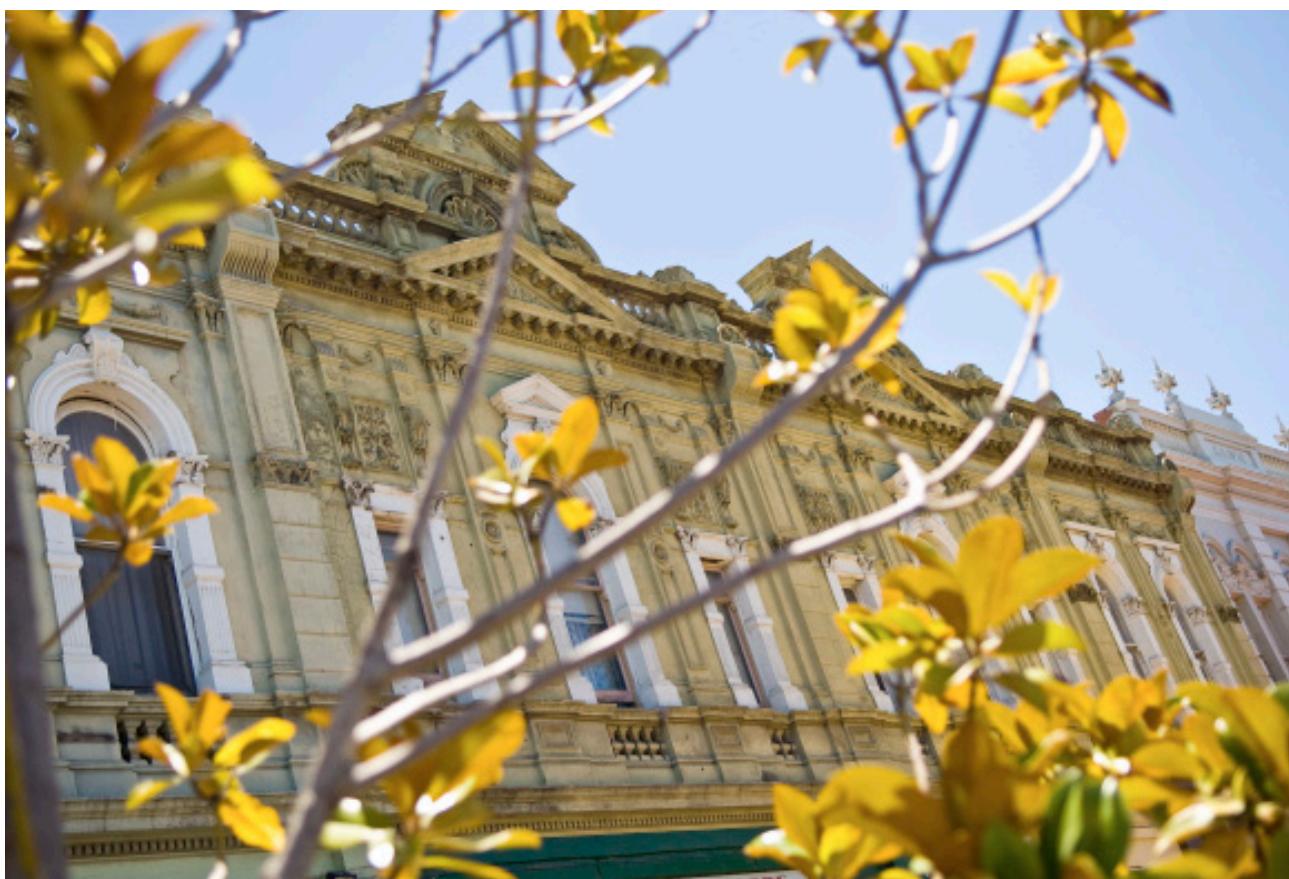
In recent decades, Australia has experienced observed climatic changes including increased average temperatures, an increase in record hot days and a decrease in rainfall in southwest and southeast regions. The State of the Climate 2012 report by the Bureau of Meteorology (BoM) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) notes that these long-term climate trends are continuing as a result of increases in global greenhouse gas concentrations. Scientific consensus indicates that even with cuts to global greenhouse gas emissions, climate change will continue to occur for many decades.

Climate change is expected to lead to higher average temperatures, sea level rise, changes in rainfall patterns and changes in the frequency and intensity of extreme events such as heatwaves, flooding and droughts. Hobsons Bay was identified as one of four local government areas in Victoria that have the

"greatest level of risk... [of] inundation from a sea level rise of 1.1 metres and storm tide associated with a 1-in-100 year storm" (DCCEE, 2009, p.5).

The WAGA Climate Change Risk Assessment identified that climate change has already affected communities and infrastructure in the region as a result of:

- > damage, and reduced access, to sporting fields and reduced amenity in public green space due to extreme heat and prolonged drought;
- > damage to drainage systems due to lack of rain, extended drought and increased intensity of rainfall events; and
- > localised flooding from extreme rainfall events, causing flash flooding and damage to infrastructure.



2

Climate Change and Hobsons Bay

2.1 Municipal profile

The impacts of climate change will be local and dependent on factors relating to location, current conditions, demographic profile and other aspects which make Hobsons Bay unique. This municipal snapshot is focussed on describing some key aspects of the Hobsons Bay community which help identify potential climate change risks.

Hobsons Bay is located approximately 13 km south west of central Melbourne and is home to more than 88,000 residents, living in Altona, Altona Meadows, Brooklyn, Laverton, Seabrook, Newport, Spotswood and Williamstown (Figure 2).

The municipality is made up of diverse businesses including petrochemical and petroleum refinery industries, ship building, automobile manufacturing, glass manufacturing, power generation, transport, rail maintenance and storage sectors (Hobsons Bay Planning Scheme section, 21.2).

Located along the shores of Port Phillip Bay, the municipality includes 24 kilometres of beaches and foreshore areas which support a diverse mix of biological habitats unique for its proximity to Melbourne. These include the Cheetham Wetlands Coastal Park, Williamstown Wetlands and Foreshore, Altona Bay Foreshore, Kororoit Creek, Truganina Drainage Basin and swamp, Greenwich Bay,



Figure 2 Population density of Hobsons Bay municipality in 2006 (average number of people per hectare including overseas visitors) (ABS 2012c).

2 Climate Change and Hobsons Bay

Laverton North Grasslands Reserve, Western (Basalt) Plains Grassland, The Cherry Creek Wetlands and Cherry Lake (Hobsons Bay Planning Scheme, section 22.02).

2.2 Regional and local climate change projections

Climate change information for Hobsons Bay is available from the Bureau of Meteorology (BOM) and CSIRO. This information is based on global

greenhouse gas emissions scenarios and models used in the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (2007).

With climate change, Hobsons Bay is expected to be warmer and drier in the future, facing increasingly variable weather, particularly with regards to rainfall. In addition, sea levels will be higher, increasing the height of storm surge along its coastline.

A summary of climate change projections for 2030 and 2070 for the Hobsons Bay area is provided in Table 1.

Climate variable	Summary of change	Snapshot of anticipated changes
Temperature	Increase in average annual temperatures with noticeable changes in the number of hot days	> Under a high emissions scenario ¹ , annual average temperature is expected to be between 0.7 to 1.5°C warmer in 2030 > By 2070, average annual temperature are expected to be between 1.5 to 3.0°C warmer under a medium emissions scenario or between 3.2 to 5.8°C warmer under the high emissions scenario > The number of days over 30°C each year is expected to increase from 30 to 34 by 2030 and up to 49 by 2070 ² . > The number of days over 35°C each year is expected to increase from 9 to 11 by 2030 and up to 20 by 2070 under a high scenario > The number of days over 40°C each year could double by 2030 and increase to up to 5 days by 2070
Sea level rise	Rise in sea level and storm surge	> By 2030 sea levels are expected to be between 5 to 10 cm higher > By 2070 sea levels are expected to be between 20 to 50 cm higher > Storm surge, which is currently around 1.1m will increase to 1.3m by 2030 and up to 1.6m by 2070 ⁴
Rainfall	Increase in rainfall intensity Decrease in average annual rainfall	> While conditions are expected to be drier, when it does rain, rainfall intensity is expected to increase > Currently average annual rainfall is 543mm per year. Under a high emissions scenario this could decrease by up to 38%.
Extreme events	Change in extreme events	> Extreme wind speeds may change by -2 to +1% by 2030 under a medium emissions scenario > By 2070 extreme wind speeds may change by -2 to +2.5% under a medium emissions scenario or -6 to +5% under a high emissions scenario

¹ The IPCC commissioned a range of global greenhouse gas emissions scenarios that can be used in Global Climate Models. The emissions scenarios, which project emissions growth from 1990 to the end of this century, consider a range of assumptions about demographic change, economic growth and technological developments which are likely to influence future emissions.

² There are no specific extreme temperature projections available for Hobsons Bay. The closest location to Hobsons Bay for which extreme temperature projections are available is Melbourne (DSE, 2008).

³ Adjusted IPCC Fourth Assessment Report projections of sea level risk based on 1990 sea level heights using A1FI scenario (Hunter, 2009).

⁴ Based on a 1 in 100 year storm surge tide height return levels for Williamstown under current climate conditions incorporating sea level rise projections.

2 Climate Change and Hobsons Bay

2.3 Challenges and opportunities

Since 2007, Hobsons Bay City Council has been actively working to reduce its own and its community's greenhouse gas emissions. The Council is aiming to reduce emissions from its own operations to zero net by 2020. To meet this target, the Council is working to improve energy efficiency across all of its buildings and public lighting, investing in renewable energy and providing information and opportunities to help the community save energy.

Adaptation refers to taking actions that respond to climate change impacts, reducing associated risks or taking advantage of opportunities. Examples of adaptation actions include:

- > adopting climate sensitive building design in new Council buildings that consider cooling requirements in a warmer climate;
- > use of storm water harvesting for non-potable purposes such toilet flushing in public buildings;
- > selection of drought tolerant species for the Council's gardens; and
- > reviewing emergency management plans such as heatwave strategies to ensure that they will continue to be effective under potential climate change conditions.

Adaptation actions can often contribute to other social, environmental and economic goals. Examples include supporting aging populations, reducing other environmental threats to improve the resilience of biodiversity and reducing unexpected costs arising from extreme weather events.

The Australian Government's position paper *Adapting to Climate Change in Australia* (2010), aims to differentiate the roles and responsibilities Commonwealth, state, territory and local governments play in managing climate change impacts. In this paper, state, territory and local governments are expected to have a more direct role in adaptation planning associated with the delivery of particular services and the management of infrastructure assets.

To understand how local governments can effectively do this, the Municipal Association of Victoria (MAV) analysed the needs and challenges relating to local government adaptation planning in a report titled: *Supporting Victorian Local Government Climate Change Adaptation Planning: Issues, Barriers and Opportunities* (2010). The report concluded that there are four principles that constitute good practice in planning for climate change adaptation:

- > reflection of good practice strategic planning;
- > inclusion of ways to deal with uncertainty;
- > consideration of information about a community or organisation and building in processes to review and update the plan as new information becomes available; and
- > embedding adaptation into existing frameworks and council plans.



3

Climate Change Risks

This section describes the process used to identify the Council's climate change risks, presents the key risks facing the Council for 2030, and identifies what the Council is already doing to manage and mitigate the effects of climate change.

3.1 Identifying climate change risks

The risk assessment process for this study was guided by the ISO 31000:2009 Risk Management

– Principles and Guidelines (illustrated in Figure 3) and was consistent with the Council's current risk management framework. To provide further information, the draft *Australian Standard for Climate Change Adaptation for Settlements and Infrastructure* (DR AS 5334) was also used to inform the process. The risk process of DR AS 5334 is consistent with the risk principles of ISO 31000.

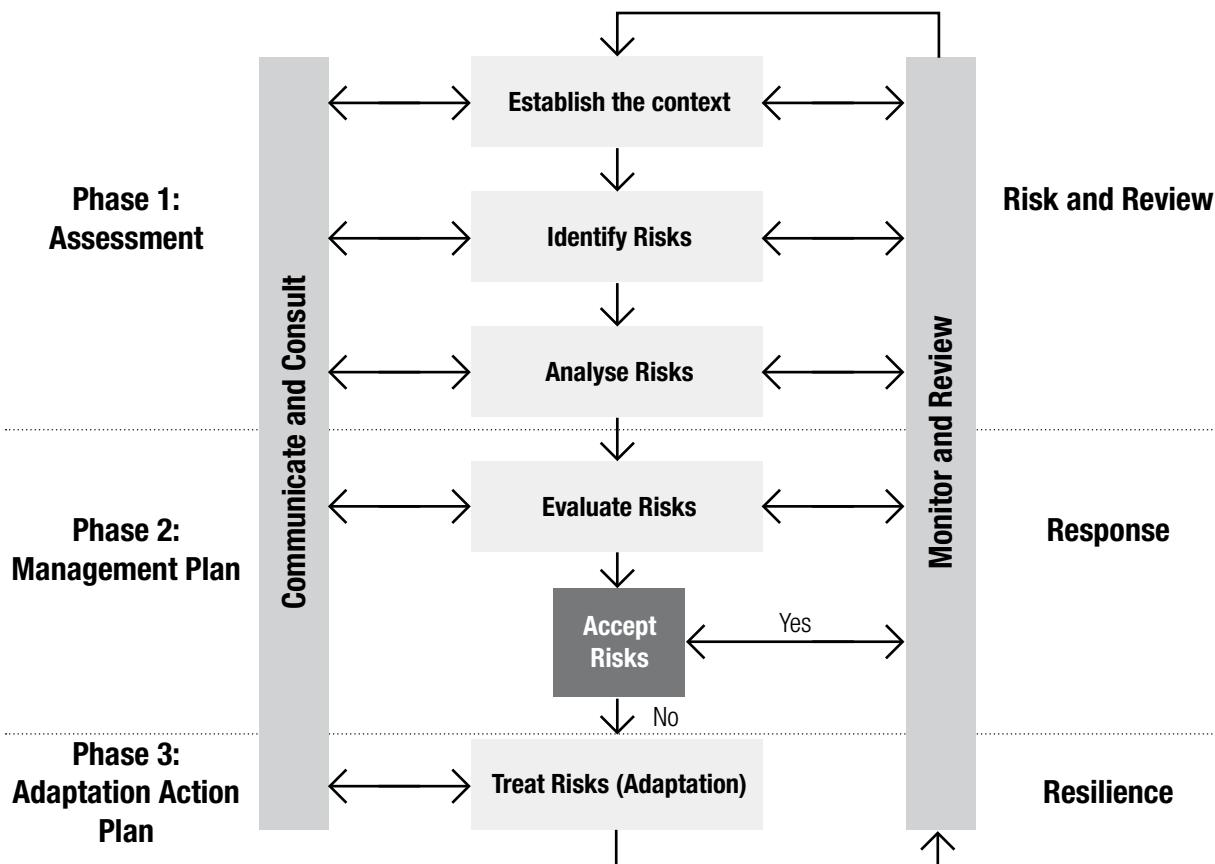


Figure 3 A summary of the standard risk assessment process⁵.

⁵ Adapted from DR AS 5220

3 Climate Change Risks

Summary of the Council's risk assessment process:

- > *Risk Assessment* - Once the assessment boundaries and climate change scenarios were confirmed, risks from the WAGA Climate Change Risk Assessment were reviewed and expanded to address specific risks to the Council. Local risks were identified and analysed using the Council's risk management framework through a series of workshops with the Council staff;
- > *Management Plan* - As part of the workshops with the Council staff, risks were evaluated and ranked to determine the priority risks that are the focus of this Plan; and

> *Adaptation Action Plan* - In this final phase, adaptation options for priority risks were identified and incorporated into this Plan.

Climate change risk is analysed as a function of the consequences associated with the risk occurring, the likelihood of the risk occurring, and the effectiveness of the control systems in place to address the risks. Table 2 provides a description of the consequence levels (rated from "low" to "catastrophic"), across twelve categories including environment, business, safety, financial, infrastructure and operations. Table 2 also provides the likelihood descriptions of recurrent risks and single events. More detail about the risk assessment process is provided in Appendix A.

Table 2 Description of consequence and likelihood categories from Hobsons Bay City Council's risk management framework, used to evaluate climate change risks.

Impact Classification (Consequences)						
	Environment & Public Health	Financial Loss	OH&S/ Public Liability	Other	Professional Indemnity	Property & Infrastructure
Catastrophic 1	Fatalities occur; extensive release off-site;	Extensive financial loss > \$5M	Fatalities or extensive long term injury	A disaster with extensive impact across the organisation	Extensive litigation with possible class action	Disaster with extensive loss and long term consequences
Major 2	Major environmental impact; release spreading off-site	Major financial loss \$1M - \$5M	Serious long term injury	A critical event which has long term implications	Major complaint with litigation	Critical loss requiring replacement of property
Moderate 3	Significant environmental impact; release contained on site	Significant financial loss \$100K - \$1M	Significant injury involving medical treatment or hospitalisation	Significant event which has medium term implications	Significant complaint involving statutory authority or investigation	Significant loss with temporary disruption of services
Minor 4	Minor environmental impact; on-site release immediately controlled	Minor financial loss \$20K - \$50K	Minor medical treatment with or without potential for lost time	Minor event, the impact of which can be absorbed with specific management	Contained complaint or action with short term significance	Minor loss with limited downtime
Low 5	Minimal environmental impact; isolated release only	Negligible financial loss < \$20K	First Aid only required	Isolated event, the impact of which can be absorbed during operations	Isolated, internal or minimal complaint	Isolated or minimal loss

3 Climate Change Risks

	Reputation	Natural Hazards	Information Technology	Political & Governance	Industrial Relations	Contractual & Legal
Catastrophic 1	N/A	Extensive physical or environmental impact extending off site	N/A	N/A	N/A	Extensive fines and litigation with possible class action
Major 2	Extensive public outcry; potential national media attention	Major physical or environmental impact	Extensive and total loss of functions across organisation	Extensive breach involving multiple individuals	N/A	Major breach with fines and litigation
Moderate 3	Serious public or media outcry, broad media attention	Significant physical or environmental impact	Loss of critical functions across multiple council areas	Major breach with formal enquiry	Extensive impact on organisational performance	Serious breach involving statutory authority or investigation
Minor 4	Significant public criticism with or without media attention	Minor physical or environmental impact	Significant downtime or outage in multiple areas of council	Serious breach involving statutory authority or investigation	Significant impact on staff morale or performance	Contained non-compliance or breach
Low 5	Heightened local community concern or criticism	Minimal physical or environmental impact	Minor downtime or outage in single area of organisation	Contained non-compliance or breach with short term significance	Contained impact on staff morale or performance	Isolated non-compliance or breach

A	Almost certain	The event is expected to occur in the coming year
B	Likely	The event will probably occur at least once during the year ahead
C	Possible	The event may occur at least once during the next two (2) years
D	Unlikely	The event may occur at some time
E	Rare	The event may occur only in exceptional circumstances

Impact/Consequence					
Likelihood	Low	Minor	Moderate	Major	Catastrophic
Almost Certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	High	High	High
Unlikely	Low	Low	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High

Priorisation of Risks	
Extreme	Will be managed by CMT with oversight by and reporting to the CEO and Council via the Audit Committee
High	Will be managed by Business Unit Managers with oversight by and reporting to relevant Directors and/or CMT and Council via the Audit Committee
Moderate	Will be managed by Coordinators, Supervisors and Team Leaders, with oversight by, and reporting to Business Unit Managers
Low	Will be managed through operational procedures with reporting as part of general Business Unit procedures

3 Climate Change Risks

3.2 Climate change risks for Hobsons Bay

A total of 38 risks relating to climate change were identified across the Council's five divisions, with some risks relating to more than one division:

- > Works and Assets (21 risks);
- > Planning and Environment (6 risks);
- > Community Services (7 risks);
- > Business and Finance (5 risks); and
- > Organisation Development (7 risks).

Four primary climate hazards relevant to the Council were identified based on available climate change information:

- > Drought (extended periods of decreased rainfall and increased average temperatures);
- > Flood (as a result of sea level rise, associated increases in storm surge and catchment flooding as a result of extreme rainfall);
- > Storm (extreme rainfall and increased intensity of storm events); and
- > Heat (including hot days and heat waves).

The majority of identified risks were related to combinations of these climate hazards occurring either simultaneously or separately, and some risks were related to all four climate hazards occurring. A summary of these hazards is presented in Figure 4.

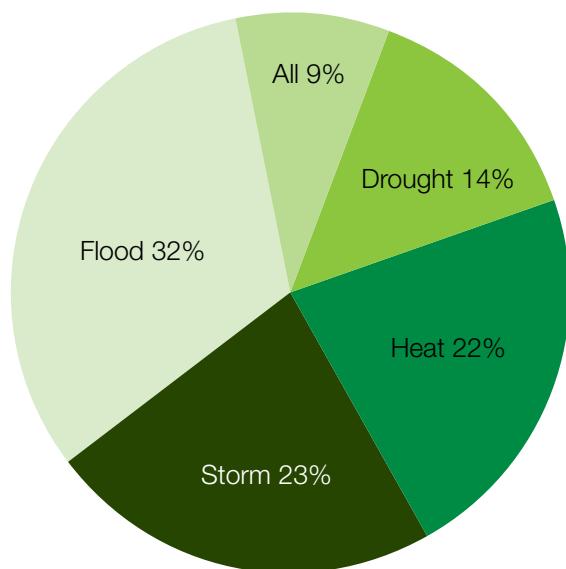


Figure 4 Breakdown of the Hobson Bay climate change risk profile according to climate hazards.

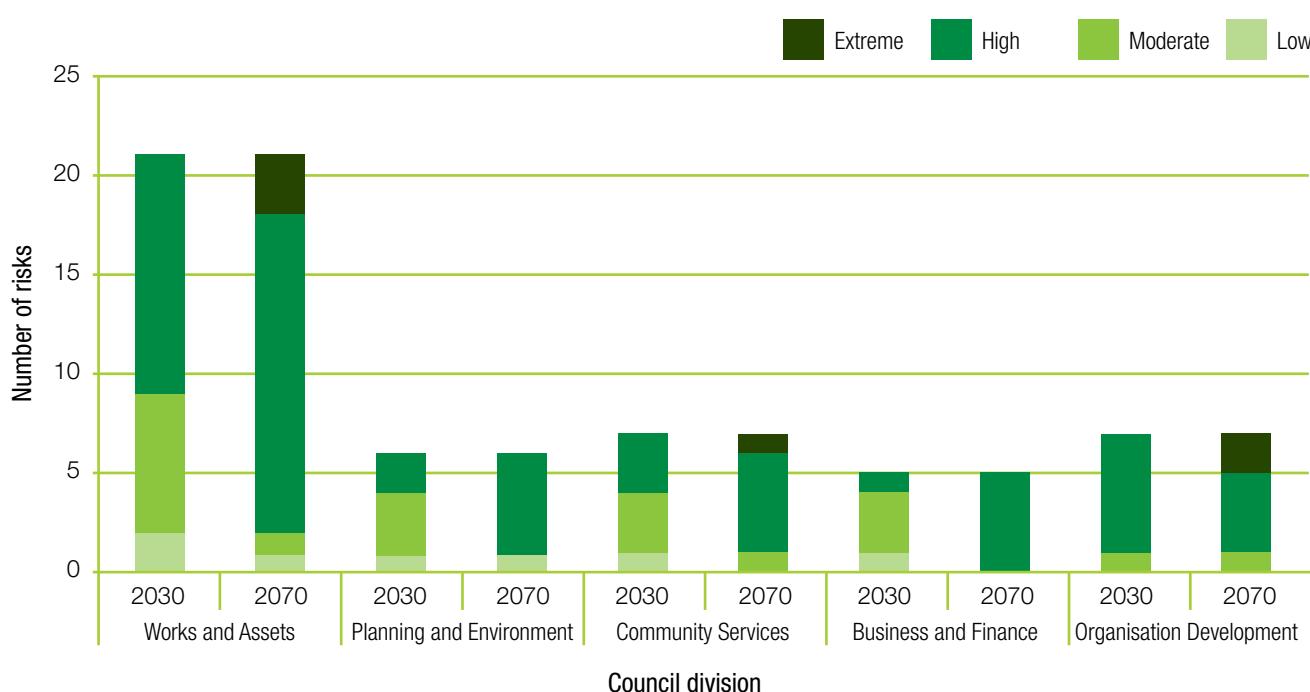


Figure 5 Hobson Bay City Council's climate change risk profile at 2030 and 2070.

3 Climate Change Risks

Figure 5 illustrates the Council's risk profile for each division and the change in ratings between 2030 and 2070. It has been assumed that the risk rating will be either equal or greater in 2070 than its rating in 2030. Risks shared between different divisions have been included in all relevant divisions.

Of the 38 identified risks, the risk ratings of 18 are not expected to change between 2030 and 2070. 15 of these are high risks, one a moderate risk and two are low risks. Despite no change in their risk rating, the likelihood of 13 of these risks is expected to increase e.g. from moderate and possible to moderate and likely, both result in a medium risk. Two risks have a greater consequence in 2070 compared to 2030 while their risk rating remains constant. The three risks which do not have any risk rating change will have reached their threshold of the degree of impact (consequence)⁶.

Of the remaining 20 risks:

- > 4 risks increase from high to extreme between 2030 and 2070;
- > 12 risks increase from moderate to high between 2030 and 2070;

- > 1 risk increases from moderate to extreme between 2030 and 2070;
- > 1 risk increases from low to high between 2030 and 2070; and
- > 2 risks increase from low to moderate between 2030 and 2070.

In reviewing the risks, ten themes were identified (Table 3). The themes provide another way to consider or communicate the Council's risk profile.

The majority of risks identified relate to:

- > financial impacts to the Council (8 risks, including 5 high risks at 2030);
- > increased liability to the Council (7 risks, including 4 high risks at 2030);
- > disruption to the Council service delivery (5 risks, including 4 high risks at 2030); and
- > access and condition of the Council's open spaces, including parks and recreation areas (5 risks, including 3 high risks at 2030).

Theme Summary	Theme Description
Financial Impacts	Financial impacts, including increasing costs to the Council or the loss of revenue.
Open Space	Reduced viability of, or access to, public open space (including coastal assets, recreational or sports grounds).
Property Damage	Increased property damage.
Health	Health impacts to the Council's staff or the community.
Service Disruption	Disruption to the ability to deliver council services.
Drainage and flood risk	Reduced effectiveness, or failure, of drainage assets.
Service Demand	Increased demand on the Council services.
Community Discontent	Community discontent and loss of the Council reputation.
Biodiversity	Impacts to biodiversity and natural assets.
Liability	Increase in potential the Council liability.

Table 3 Hobsons Bay City Council climate change risk themes.

⁶ In the risk related to the reduced use of recreational spaces due to extreme weather, it is assumed that disruptions will only be temporary and the level of consequence will not increase beyond moderate even if extreme weather events increase. The likelihood of this occurring at 2030 is considered likely, but it is not expected to be almost certain that these consequences would occur every year by 2070.

The remaining two risks are focussed on Council having adequate skills and capacity to be able to deal with extreme events. It is assumed that the likelihood of this risk will not increase above possible or increase in consequence above moderate just because the extreme climatic events increase in magnitude, as the risk is focused on internal capacity being adequate to deal with extreme events. The skills to respond to extreme climatic events will be developed through experience and understanding of processes to enable effective response independently of the scale of the climate hazard.

3 Climate Change Risks

3.3 Key climate change risks for 2030

To effectively develop a strategy that responds to the Council's priority risks, the risks rated high in 2030 are the primary focus of adaptation planning. Table 5 presents the 19 priority risks. These risks relate to drainage and flooding, financial impacts, liability, open space, service demand and service disruption.

Based on current climate change projections for 2030, no extreme risks for Hobsons Bay City Council were identified.

Code	Council Division
BF	Business and Finance
CS	Community Services
EM	Emergency Management
OD	Organisation Development
PE	Planning & Environment
WA	Works and Assets

Table 4 Key for Council Divisions as included in the risk references (in Table 5).

Risk Reference ⁷	Risk Description	Council Division
WA1 & WA17	Drier conditions increase surface hardness of sports grounds while wetter conditions increase slipperiness of the ground, resulting in increased risk of injury and potential Council liability.	Works & Assets
WA2	Temporary or permanent disruption of access to public open space during flood and storm events.	Works & Assets
WA3 & CS5	Increased costs from the need to relocate the Council's and community infrastructure and services away from the foreshore.	Works & Assets, Community Services
WA4	Damage to coastal assets (including boat ramps, playground equipment etc.) from increased flooding due to sea level rise, coastal erosion and storms.	Works & Assets
WA5	Reduced use of the Council's recreation facilities by community, leading to reputational and financial risks.	Works & Assets
WA8 & CS4	Inability of current building design requirements for the Council's buildings and assets to cope with projected future climate conditions in 20 to 50 years especially those catering for at risk segments of the community (elderly, children etc.).	Works & Assets, Community Services
WA11	Increased maintenance and renewal of plant and materials at the Council facilities due to increased harsher climatic conditions and longer running time.	Works & Assets
WA12	Increase in maintenance costs associated with damage to assets and infrastructure (e.g. buildings and roads) from ground movement caused by extreme rainfall events following extended periods of drought.	Works & Assets

⁷ The risk reference is for internal Council purposes only and is used to help identify the corresponding adaptation actions listed in Table 7 for each risk.

3 Climate Change Risks

Risk Reference ⁷	Risk Description	Council Division
WA13	Declining precipitation and extended drought periods cause reduced drain flushing events, leading to drain blockages and flooding during extreme rainfall events.	Works & Assets
WA16	Increased rates of tree root growth and ground subsidence leading to damage of physical infrastructure including drainage assets, reducing the capacity of the stormwater system.	Works & Assets
WA19a	Increased number of hazard trees as a result of drought which increase health and safety risks for staff and the community.	Works & Assets
WA20	Reductions in water availability for watering parks, gardens and sports grounds as a result of increasing water restrictions and reduced water harvesting.	Works & Assets
OD1 & PE1 & PE2 & PE3	Potential liability issues for the Council if land uses are approved in areas at risk of future flooding.	Organisation Development, Planning & Environment
OD2	Inability of staff to get to or undertake work as a result of extreme weather conditions.	Organisation Development
OD2a	Increased risks to the Council staff health and safety as a result of extreme weather conditions.	Organisation Development
OD3 & PE4	The Council's services unable to cope with climate change impacts due to inadequate resources and shortages of appropriately skilled staff.	Organisation Development, Planning & Environment
OD4	Inability to insure the Council's assets due to changes in climate.	Organisation Development
OD6 & EM4	Increased requirement to release Council staff from normal duties to assist with emergency response and recovery due to climate change.	Organisation Development
CS1, BF1 & EM1	Increased heat impacts on at risk members of the community (e.g. elderly, sick, young and economically disadvantaged) requiring greater levels of Council support.	Community Services, Business & Finance, Emergency Management

Table 5 Summary of priority climate change risks for Hobsons Bay City Council (those rated high in 2030).

3 Climate Change Risks

3.4 Existing actions to reduce risk

Adapting and responding to the impacts of climate change is not new to the Council, as adaptation initiatives and actions are already embedded within the Council's plans and strategies. Most of these activities or control measures are driven by the need to:

- > manage other environmental sustainability objectives including water conservation at recreational facilities;
- > manage risks to assets and property owned or managed by the Council;
- > provide emergency assistance to the community;
- > reduce greenhouse gas emissions from both the Council and the community; and
- > address environmental sustainable design (ESD) requirements for new buildings, retrofits and upgrades.

However, they do also serve in assisting the Council to adapt to changing climatic conditions and prepare for climate related risks. This strategy is intended to build on and progress the adaptation work that has already been done by the Council. The following initiatives are some examples of the Council's existing controls to manage and mitigate high climate change risks:

- > processes for the management of sporting fields e.g. condition rating system, investigation of alternative playing surfaces, closure of grounds during adverse conditions etc.;
- > the Council's processes for minor renovations and improvements of buildings;
- > public liability insurance;
- > the *Water Plan 2009-2014* which includes actions to reduce potable water use for watering parks and sporting fields;
- > management and action plans covering a range of environmental impact areas including assets, open spaces, play spaces, street trees, business, risk and greenhouse gas mitigation;
- > construction of sea walls/rock revetments to protect coastal assets;
- > *Sustainable Design in the Council's Facilities Strategy and Policy* for new buildings; and
- > learning and development programs for the Council staff.

These existing actions were considered in analysing the risks to determine the risk rating (residual risk) and adaptation actions.



4

Adaptation Planning



The Council's Climate Change Adaptation Plan focuses on the Council's highest priority risks in 2030.

This section presents the goals, guiding principles and adaptation actions that the Council intends to take to help build the resilience of the Council and the Hobsons Bay community to the impacts of climate change. These are additional actions for the Council to implement to address the climate change risks identified in Section 3. The actions are categorised according to their relative priority and the timeframes within which implementation should occur.

4.1 Guiding principles for adaptation action

Adaptation measures must be fit for purpose (UKCIP 2011) and there are principles of good adaptation to help inform the selection process. The following are some guiding principles used to help decision-making and management of climate change risks for the Council:

- > use of best available climate science;
- > prioritisation of actions that will help manage the highest risks and which provide co-benefits to the Council's broader strategic objectives;
- > integration of adaptation action into the Council's existing activities, policies and strategies;
- > maintenance of the Council's strong networks with other governments including the Western Alliance for Greenhouse Action and state government; and
- > ensuring adaptation actions are flexible and low-regret.

4.2 Priority areas for adaptation

The adaptation priority areas identified for the Council are:

> **Council and community infrastructure.**

The projected changes in sea level, storm surge and extreme rainfall are likely to put pressure on the Council and community infrastructure and assets. Enhanced climate conditions will stress or exceed air-conditioning plant specifications, increase deterioration rates of building materials, affect foundations and footings and exceed storm water drainage capacity. This can potentially lead to more maintenance and renewal of the Council's facilities;

> **Council operations.** Extreme weather events as a result of climate change can disrupt transport, electricity and telecommunication networks putting pressure on the Council's services and insurances;

> **Human health and vulnerable communities.**

Changes to temperature and extreme heat days are likely to affect the distribution and severity of public health related risks. The impacts may not be evenly distributed and some communities such as the elderly, sick, young or economically disadvantaged are likely to be more affected than others;

> **Land use planning.** Responsibility for land use planning is shared between state and local governments. However, if state government provides insufficient, or delayed, sea level rise advice to the Council regarding planning for climate change, the Council's responsibilities and exposure to liability may increase; and

> **Public recreational/open spaces and services.**

Climate change is expected to change rainfall patterns and increase temperatures, deteriorating sports grounds as a result of flooding, ground compaction and loss of vegetation.

4 Adaptation Planning

4.3 Priority setting criteria for individual actions

A range of adaptation actions were identified to address high climate change risks for the Council in 2030. To prioritise the identified adaptation actions, each action was evaluated against the following four criteria:

- > **'Win-win'**: The extent to which the action would benefit multiple Council operations or asset types or respond to multiple climate change risks. For example, engaging contractors and volunteers to provide extra resources during and following extreme weather events addresses multiple climate change risks associated with clean-up backlogs, health risks to the vulnerable and resourcing pressures for the Council. All adaptation actions for the Council were considered to have multiple beneficiaries;
- > **'No regrets'**: The extent to which the action would provide opportunities or benefits regardless of the degree of climate change that occurs. For example, selecting drought tolerant plants for parks and gardens reduces watering costs at the same time as increasing their resilience to reduced rainfall. Adaptation actions that provided benefits regardless of climate change were ranked higher than adaptation actions with benefits dependant on the extent of climate change;
- > **'Cost-effectiveness'**: The extent to which the action's costs could be justified considering its benefits and the ease with which it can be implemented. For example, developing a community climate change communication and engagement strategy is considered to be cost effective given the extensive benefits that would arise following the dissemination of information and engagement of the community at all levels. Adaptation actions considered good value for money were rated higher; and
- > **'Preparatory or foundation tasks'**: The extent to which other adaptation actions rely on a given task being completed first. For example, a foundation task might be to ensure that existing the Council staff and volunteers have appropriate training and knowledge to respond to extreme weather events.

Adaptation actions that were preparatory or foundation tasks were considered to be more time critical (i.e. requiring implementation within two years). These actions were prioritised above tasks that were a continuation of an existing the Council program or strategy.

Adaptation actions which met all four evaluation criteria were identified as the priority actions for the Council to adapt to climate change risks. These priority adaptation actions are presented in Table 7 within the two year implementation timeframe.

4.3.1 Classification of budgetary implications

The prioritised adaptation actions were then classified into indicative cost categories to demonstrate their budgetary implications for the Council. The indicative cost ranges are presented in Table 6. The estimates do not include the cost of the Council's staff time. These costs are approximated and should only be used indicatively.

Indicative Cost	Classification
\$0 – \$20,000	low cost
\$20,001 – \$100,000	medium cost
\$100,000 +	high cost

Table 6 Classification of cost indicators for adaptation actions.

This classification is intended only as an indicative guide. The actions outlined in this strategy should be reviewed on an annual basis and a more detailed costing should be prepared by the Council for those considered a priority for implementation.

4.4 Adaptation actions

4.4.1 Adaptation actions to be completed within the next two years

A total of 18 adaptation actions meet the criteria for implementation within the next two years. The proposed actions include a range of activities spanning education and communication initiatives, updating the Council's existing management plans and programs, updating planning overlays, and improving capital works processes for the Council's assets.

4 Adaptation Planning

Key examples include:

- > Review and update the Asset Management Plan for buildings to take climate change impacts into consideration (including structural and mechanical services);
- > Undertake a detailed coastal vulnerability assessment to identify locations most vulnerable to sea level rise, storm surge inundation and erosion and develop a long term plan for management that considers avoiding (e.g. setbacks from the coast), adapting (e.g. raising building and infrastructure heights), defending (e.g. beach stabilisation, re-nourishment, restoration, groynes), and retreating (e.g. purchasing land to move development back from the shoreline); and
- > Improve, promote and support sharing of information around 'at risk' members of the community.

4.4.2 Adaptation actions to be completed in three to seven years

A total of 14 adaptation actions were identified for implementation in three to seven years. These adaptation actions partially met the prioritisation criteria. Actions include incorporation of adaptation in sports ground management, management of water use for parks and recreation, as well as staff training and working conditions.

Key examples include:

- > Review the Council's current policies relating to the maintenance of sports grounds and play areas during extreme, dry weather (focusing on surface hardness and potential risk of injury);
- > Develop an alternative venue strategy for temporary disruptions (which are incorporated into user agreements); and
- > Investigate whether the Council has a staff policy or ability to change work rosters according to extreme weather conditions.

4.4.3 Adaptation actions to be completed beyond seven years

Seven adaptation actions were identified for implementation beyond seven years. These are actions that were less time critical than those mentioned in Sections 4.4.1 and 4.4.2.

Key examples include:

- > Investigate / identify and secure alternative sites for relocation of coastal assets;
- > Build a business case for a more frequent maintenance and inspection regime for stormwater and drainage networks; and
- > Continue to work with insurers and brokers on the adequacy of insurance policies - based on detailed analysis of climate change threats.

A summary of the prioritised adaptation actions by timeframe (within two years, three to seven years and beyond seven years) along with their corresponding risks, responsible department and budgetary implications are presented in Table 7. Where an adaptation action responds to more than one risk (regardless of its rating), the risk reference number has also been noted.



4 Adaptation Planning

Adaptation Action	Risk Reference	Climate Hazard	Council Division Responsible	Supporting Division	Indicative Budget Implication
Within 2 years					
Increase membership and involvement in advocacy groups to facilitate the Council's climate adaptation efforts.	All	All	All	All	low cost
Provide increased education and communication with sporting clubs and the community on climate change hazards.	WA1 & WA17, WA5	All	Works & Assets	Organisation Development	low cost
Review and update the Asset Management Plan for buildings to take climate change impacts into consideration (including structural, mechanical and electrical services).	WA8 & CS4, WA11 OD4, OD6 & EM4	All	Works & Assets	Business & Finance	medium cost
Undertake a detailed coastal vulnerability assessment to identify locations most vulnerable to sea level rise, storm surge inundation and erosion and develop a long term management plan that considers avoiding (e.g. setbacks from the coast), adapting (e.g. raising building and infrastructure heights), defending (e.g. beach stabilisation, nourishment, restoration, groynes), and retreating (e.g. purchasing land to move development back from the shoreline). This may be undertaken with other stakeholders, including state government and the Association of Bayside Municipalities.	WA2, WA3 & CS5, WA9, WA10, WA21, OD1 & PE1 & PE2 &PE3, OD3 & PE4,WA4	Flood, storm	Works & Assets		high cost
Incorporate potential climate change impacts into the normal review of licences and leases for the Council's assets/services.	WA1,WA3 & CS5, WA4	All	Works & Assets		low cost
Undertake (or obtain data from the state or national government if available) detailed analysis of future water and energy price trends so that they can be incorporated into future budget projections.	WA8 & CS4	Drought, heat	Works & Assets	All	medium cost

4 Adaptation Planning

Adaptation Action	Risk Reference	Climate Hazard	Council Division Responsible	Supporting Division	Indicative Budget Implication
Within 2 years					
Active review of new technologies / best practice for replacement plant and materials at the Council's facilities to ensure they are best able to cope with extreme weather conditions.	WA11	All	Works & Assets		low cost
Review, and where appropriate, increase resources for the resurfacing of Council-owned roads.	WA12	Drought, flood	Works & Assets	Organisation Development	medium cost
Review and incorporate climate change risks into the Street Tree Asset Management Plan (STAMP).	WA19a, WA19	All	Works & Assets		low cost
Integrate best available climate change projections and consideration into capital works projects / planning and design to help manage insured risks.	OD4	All	Works & Assets	Business & Finance	low cost
Review and update existing planning overlays including Land Subject to Inundation Overlay (LSIO), Special Building Overlays (SBO) and Flood Overlays to take into account future flood conditions.	OD1 & PE1 & PE2 & PE3	Flood, storms	Planning & Environment		low cost
Further examine the Council's legal liabilities of flood-related climate change.	OD1 & PE1 & PE2 & PE3	Flood, storms	Planning & Environment	Organisation Development	medium cost
Review, update and implement the Business Continuity Plan (BCP) to ensure the Council has capacity during extreme events.	OD2, OD6 & EM4	Flood, heat, storms	Organisation Development	All of Council	low cost
Increase awareness and education of the 'heat list' to vulnerable members of the community.	CS1, BF1 & EM1	Heat	Community Services		low cost
Review Heat Health Plan to include communication measures with the economically disadvantaged.	CS1, BF1 & EM1	Heat	Community Services	Business & Finance	low cost

4 Adaptation Planning

Adaptation Action	Risk Reference	Climate Hazard	Council Division Responsible	Supporting Division	Indicative Budget Implication
Within 2 years					
Improve, promote and support sharing of information around 'at risk' members of the community with service providers and the state government.	CS1, BF1 & EM1	Heat	Community Services	Business & Finance	low cost
Increase public awareness, community education, and neighbour caring during extreme events to increase community resilience.	CS1, BF1 & EM1	Heat, flood, storms	Community Services	Organisation Development	low cost
Within the next 3 to 7 years					
Review current Council policies relating to the maintenance of sports ground and play areas during extreme, dry weather (focusing on surface hardness and potential risk or injury).	WA1 & WA17	Drought, heat, storms	Works & Assets		low cost
Review and extend the Council's <i>Water Action Plan 2009-2014</i> to include sports grounds.	WA1 & WA17	Drought, heat, storms	Works & Assets		low cost
Incorporate climate change risk into the review of Asset Management Plans.	WA3 & CS5	Flood, storms	Works & Assets		low cost
Review Community Services Infrastructure Plan to assess the need to consider sea level rise and storm surge impacts on community facilities.	WA3 & CS5	Flood, storms	Works & Assets	Community Services	low cost
Develop an alternative venue strategy for temporary disruptions (which are incorporated into user agreements).	WA5	Drought, flood, storms	Works & Assets		medium cost
Incorporate new proven technology into the Council's buildings (e.g. air-conditioning).	WA8 & CS4	All	Works & Assets		medium cost
Employ CCTV pipe condition assessment program as part of the Asset Management Plan for the drainage network.	WA16	Drought	Works & Assets		medium cost
Increase intervention levels to remove identified hazard trees.	WA19	All	Works & Assets		low cost

4 Adaptation Planning

Adaptation Action	Risk Reference	Climate Hazard	Council Division Responsible	Supporting Division	Indicative Budget Implication
Within the next 3 to 7 years					
Where appropriate, consider drought tolerant species for planting and revegetation of Council-managed open spaces and recreation grounds.	WA20	Drought	Works & Assets		low cost
Develop a central water irrigation and monitoring control system.	WA20	Drought	Works & Assets		medium cost
Advocate for (and where possible undertake in concert with regional partners) comprehensive, scenario-based, coastal vulnerability assessments which include sea level rise, coastal processes, erosion mapping, hazard and risk assessment for the entire Port Phillip Bay.	PE1, PE2, PE3, & OD1	Floods, storms	Planning & Environment	Organisation Development	low cost
Investigate alternative forms of planning controls (e.g. design and development overlays).	PE1, PE2, PE3, & OD1	Flood, storms	Organisation Development	Planning & Environment	low cost
Investigate whether the Council has a staff policy or ability to change work rosters according to extreme weather conditions.	OD2	Flood, heat, storms	Organisation Development		low cost
Review and update existing Safe Work guidelines, procedures and training for the Council's staff to take into account additional and/or new risks arising from climate change.	OD2 & OD2a	Flood, heat, storms	Organisation Development		low cost
Beyond 7 years					
Investigate, identify and secure alternative sites for relocation of coastal assets.	WA3 & CS5	Flood	Works & Assets	Business & Finance	low cost
Ensure climate change consideration is applied to the planning and management of all new, and replacements of existing, foreshore infrastructure and assets.	WA3 & CS5	Flood, storms	Works & Assets		low cost

4 Adaptation Planning

Adaptation Action	Risk Reference	Climate Hazard	Council Division Responsible	Supporting Division	Indicative Budget Implication
Beyond 7 years					
Review funding requirements for major repairs and maintenance works in light of changing climatic conditions.	WA13	Drought, flood	Works & Assets		low cost
Build a business case for a more frequent maintenance and inspection regime for stormwater and drainage networks.	WA13 & WA16	Drought, flood	Works & Assets		low cost
Continue to work with insurers and brokers on the adequacy of insurance policies based on detailed analysis of climate change risks.	OD4	Flood, storms	Organisation Development	Planning & Environment	low cost
Increase the use and/or purchase of smart water meters for the Council facilities.	WA20	Drought	Works & Assets		medium cost
Raise coastal retaining structures in the next 10-20 years.	WA3 & CS5	Flood	Works & Assets	Planning & Environment	high cost

Table 7 Prioritised adaptation actions for Hobsons Bay City Council.

4.5 Resourcing

This plan is a long term strategy that outlines how the Council will build resilience to the impacts of climate change. The Council recognises the importance of providing long term financial plans that ensures the objectives of its strategies are met, not just within a four year period, but with regard to future generations.

The Council has determined that it will use a planning framework that integrates planning from a strategy level through to service delivery to set its annual rate base. The Council must raise revenue each year that is sufficient for the purpose of good governance, administration, and to provide for appropriate goods and services for the community. This strategy recognises that the demand on the goods and services Council provide will alter as a result of climate change. This plan will be used to inform future budgetary decisions.

5

Implementation, Monitoring and Review

The risks posed by climate change have the potential to impact on the service delivery of every Council department. As such it is important for every Council department to work together to ensure that these risks are managed effectively.

The risks identified in this plan will be managed through the Council's risk management system and will be reviewed at least once every twelve months. Each risk will be assigned to the team that is primarily

responsible for managing it. A cross directorate team will be established to monitor the Council's progress on the delivery of the adaptation actions. The cross directorate team will be supported by the Governance team, who will provide risk management advice, and the Sustainability team, who will provide advice on the latest climate science. The Council's Corporate Management Team and CEO will be ultimately responsible for ensuring the strategy is delivered.

Figure 6 shows the details of the governance structure.

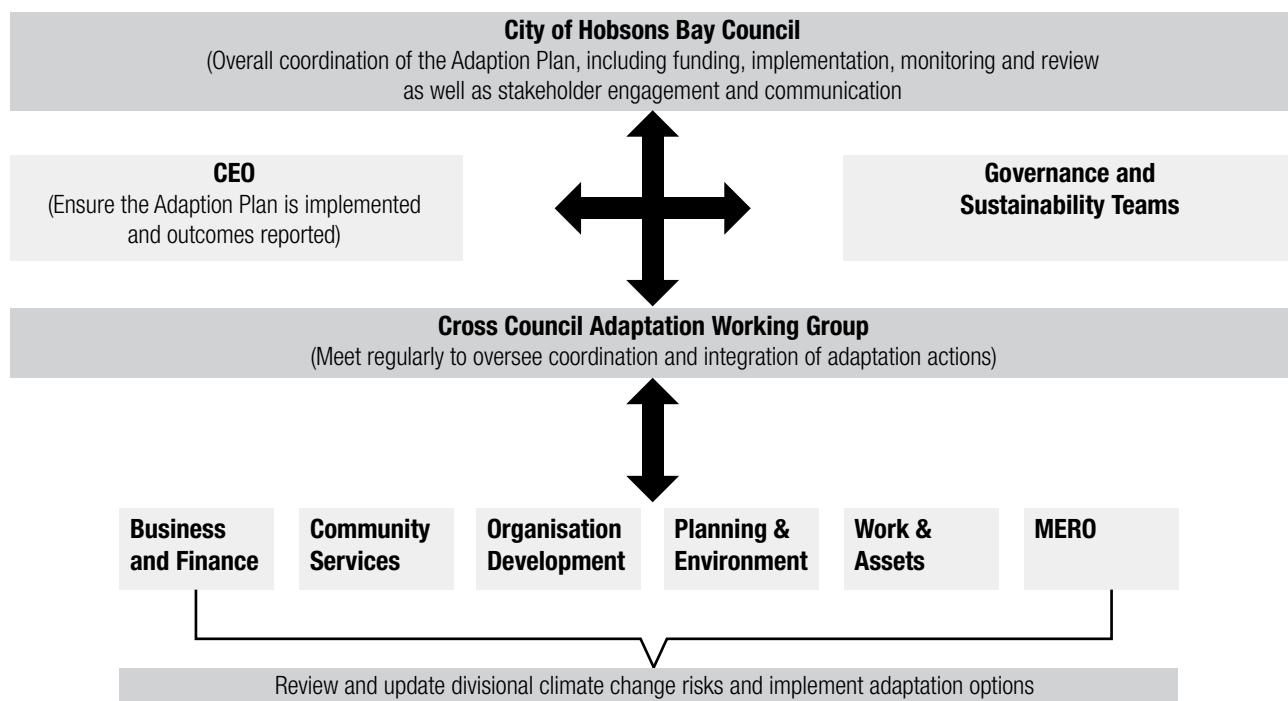


Figure 6 Summary of roles and responsibilities within the Council for the Climate Change Adaptation Plan.

5 Implementation, Monitoring and Review

5.1 Monitoring and review

This plan is a living document and will continue to be revised as climate change risks and associated opportunities change over time. As this is the first adaptation plan for the Council, many of the proposed actions focus on improving our understanding of climate risks and integrating climate change into existing activities.

To ensure that the Council's adaptation responses and approaches remain valid and relevant to local priorities and climatic conditions, the Plan will be reviewed and updated every five years. The risks identified in this plan will be reviewed every 12 months, as per the Council's standard risk management practices.

Reviews will re-assess the Council's risk profile in consideration of changes to climate change information, policy or the Council's assets and activities. Consideration will also be given to the potential opportunities and benefits that may arise as a result of the changing climate and policy environment (e.g. new funding sources, opportunities for the development of renewable energy or green business precincts). Reviews will also monitor the implementation of adaptation actions.

Regular and ongoing reporting of the Council's climate change adaptation performance is critical to inform decision making and motivate changes in behaviour. To ensure that decision-makers, staff and the community are aware of the Council's progress in

implementing the adaptation actions outlined in this strategy, internal reporting will be undertaken once a quarter and external reporting will be undertaken annually. The relevant actions within the strategy will be considered as part of the Council's annual budget process. Reporting will cover changes in risks, opportunities, the implementation of actions and challenges that have arisen in the interim.

5.2 Climate change indicators

Climate change indicators will form an important part of the monitoring and review process. Effective indicators will enable decision-makers to track climate impacts on key service areas. Effective indicators will need to show long term trends of the impact of climate events on key service areas. They will need to be measurable, and specific to the Council's operations. They are not intended to double up on work done by other agencies (for example weather data collected by the Bureau of Meteorology).

The Council proposes to develop indicators around each of the identified key risk themes. These indicators are not intended to track implementation of specific adaptation measures but rather assist the Council in tracking the impacts of climate change and the Council's and community's resilience to these impacts.

Appendix E details the Council's proposed list of adaptation indicators.

6

Conclusion

Climate change is expected to exacerbate many existing weather-related risks to both the Council and the Hobsons Bay community as well as create new risks.

This Plan has utilised the best available climate change science to undertake a robust risk assessment to pre-emptively identify risks to the Council's assets and services, and identify adaptation actions. These adaptation actions will help maintain or enhance the resilience of the Hobsons Bay community. Adaptation actions identified in this Plan include measures to maintain essential infrastructure

and public open space, support continued water and energy efficiency in the Council operations, prepare for extreme weather events and prepare coastal assets at risk from flooding.

The Council's climate change risks will change over time – both in response to further climate change but also as a result of other factors such as demographic change, community needs and technological developments. Regular monitoring of the Plan and the development of indicators will help ensure that the Council's adaptation responses remain effective and relevant to local priorities and climate conditions.



7

Key Terms

7.1 Glossary

Adaptation: Adjustment in natural or human systems in response to actual or expected climatic changes or their effects. Adaptation can be carried out in response to or in anticipation of changes in climatic conditions. It entails a process by which measures and behaviours to prevent, moderate, cope with and take advantage of the consequences of climate events are planned, enhanced, developed and implemented.

Adaptive capacity: The ability of individuals, organisations, the environment or other systems to adjust to changes in climate, including climate variability and extremes, prevent or moderate potential impacts or take advantage of opportunities. For people and communities, factors influencing adaptive capacity include financial, technological and information resources, support networks and organisational arrangements.

Climate change risk: A combined function of the probability of a hazard (an event with the potential to cause harm, e.g. floods, droughts) occurring and the magnitude or severity of its potential consequences (injury, damage, loss of habitat etc.).

Drought: A prolonged, abnormally dry period (months or years) when there is not enough water for users' normal needs. For the purposes of this Plan, drought has also been used to identify potential impacts associated with longer-term reductions in average rainfall.

Maladaptation: Actions taken to prepare for or respond to climate change that increase the social costs of climate change and inequity (where the costs of adaptation and climate change are borne disproportionately by particular groups in society).

Resilience (to climate change): When referring to natural systems, the amount of change a system can undergo without changing state. If referring to human systems, see adaptive capacity.

Risk assessment: The process to prioritise climate change risks, focusing on the potential likelihood and consequences of an impact.

Vulnerability: The degree to which a system is susceptible to, or unable to cope with, a particular climate change impact. It is a function of the character, magnitude and rate of climate variation to which a system is exposed; its sensitivity and its adaptive capacity.

7.2 Acronyms

ABS –	Australian Bureau of Statistics
BF –	Business and Finance Division of Hobsons Bay City Council
BoM –	Bureau of Meteorology
CS –	Community Services Division of Hobsons Bay City Council
CSIRO –	Commonwealth Scientific and Industrial Research Organisation
DCCEE –	Commonwealth Department of Climate Change and Energy Efficiency
DPCD –	Victorian Department of Planning and Community Development
DSE –	Victoria Department of Sustainability and Environment
EM –	Emergency Management
ESD –	Environmentally sustainable design
HBCC –	Hobsons Bay City Council
IPCC –	Intergovernmental Panel on Climate Change
ISO –	International Organisation for Standardisation
MAV –	Municipal Association of Victoria
MERO –	Municipal Emergency Resource Officer (MERO)
MPHWP –	Municipal Public Health and Wellbeing Plan
OD –	Organisation Development Division of Hobsons Bay City Council
PE –	Planning and Environment Division of Hobsons Bay City Council
SLR –	Sea level rise
UKCIP –	United Kingdom Climate Impacts Program
WA –	Works and Assets Division of Hobsons Bay City Council
WAGA –	Western Alliance for Greenhouse Action

8

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- Victorian Coastal Council (VCC) (2008), *Victorian Coastal Strategy*, Victorian Government, Melbourne. www.vcc.vic.gov.au

Appendix A: Project Methodology

The Council undertook the following approach for this project:

- > Preparation of an Issues and Directions Paper to inform internal Council stakeholders of the potential climatic changes and implications for the Hobsons Bay region. This included a review of the WAGA Climate Change Risk Assessment (2011) to expand on the regional risks identified and a review of the Council's strategies to determine how risk management can be integrated into existing procedures and policies;
 - > Identification of priority risks and adaptation options for the Council. During this step, the Steering Group was engaged to confirm adaptation priorities, existing policies and strategies in place and the applicability of the WAGA Adaptation Roadmap; and
 - > A Risk and Adaptation workshop was held with the Council representatives to provide an overview of climate change impacts on Council services, obtain early engagement and ownership by the staff and ensure all risks are identified and rated used the Council's existing risk management framework.
- The workshop also identified, evaluated and prioritised adaptation options for the Council. More detailed workshops were undertaken with representatives from each The Council's division to further clarify risks, existing controls and potential adaptation options.
- > The findings and outcomes from these project stages were synthesised to develop this Plan.

Project Limitations

There are uncertainties associated with analysing the past climate and developing climate change projections. These projections are rarely available at a municipality level. Uncertainty should not prevent action in terms of assessing and managing risks. To inform the risk assessment and adaptation planning process, current, locally relevant and publicly available climate change projections produced by CSIRO and BoM have been used.



Appendix B: Summary of Sustainable Environment Advisory Group (SEAG) Feedback

Appendix B Summary of SEAG Feedback

On the 19th of June 2012, a two hour workshop was held with the Council's Sustainable Energy Advisory Group (SEAG) to identify risks arising

from climate change for Hobsons Bay, potential adaptation options, and climate change indicators for the community.

The following information (Tables 8 and 9 and Figure 7) were captured from this workshop.

Climate variable	Comments
Heat	<ul style="list-style-type: none">> Increased heat stress on vulnerable members of the community including those in public housing, nursing homes and retirement villages> Increased demand on HVAC services from an ageing community and impacts on GHG mitigation efforts
Flooding	<ul style="list-style-type: none">> Polluted outflow from flooding of heavy industry sites and the Laverton waste water treatment> Incursion of pollution into groundwater during flood events> Economic damage and social impacts arising from flooding of industrial areas> Electricity sub-station flooding leading to local power disruptions. Impacts on local businesses (such as food losses)> Impact on local Ramsar wetlands> Increased tourism potential from wetland flooding> Increased flooding in Kororoit Creek and permanent inundation of roads> Flooding along the Strand reducing property values and affecting the cost or availability of insurance.> Impacts on tourism resulting from flooding of the Strand and Science Works> Communities disconnected during flood events> Storm surge and flooding of esplanade properties and underground garages> Limits to existing Cherry Lake retarding basin and drainage to the bay> Newport- Melbourne Road - flooding at railway overpass> Failure of pipelines or leakages of pipes carrying hydrocarbons , e.g. the Mobile spill in 2006 at Newport
Storms	<ul style="list-style-type: none">> Disruptions to public transport> Damage to trees> Impacts to those communities that do not have storm water drains/sewerage> Weather risks such as lightening to petrochemical industry and storage of hydrocarbons> Loss of coastal areas and habitats from erosion> Damage to the Williamstown Botanic Gardens from high wind events (especially beech trees), reducing visitor numbers
Other	<ul style="list-style-type: none">> Health stress and new disease outbreaks/threats

Table 8 Summary of risks identified by SEAG.

Appendix B: Summary of Sustainable Environment Advisory Group (SEAG) Feedback

Climate variable	Action or idea
Heat	<ul style="list-style-type: none"> > Improve building standards for new homes to protect against heat stress > Offer an insulation program for residents at risk of heat stress > Introduce measures to reduce urban heat island effects, including green space, water, sensitive urban design and reflective road surfaces > Provide community respite centres for the elderly on days over 35°C
Flooding	<ul style="list-style-type: none"> > Raise roads and train lines that will be subject to regular or permanent inundation > Identify alternative road and rail access routes for flood events > Advocate to state government for better flood planning and preparation > Re-consider planning approvals for underground garages > Review management of rainwater tank levels to help provide surge capacity by draining prior to heavy rain events > Map land contours to develop natural drainage areas (swamps) for runoff > The Council to consider adopting water transport devices > Increase planting of coastal habitats further inland > Limit street drainage capacity > Implement alternative energy sources to alleviate the impact of potential power outages > Increased monitoring of ground water for pollutants > Increase cleaning schedule of drains > Identify safe locations in emergency situations for the community
General	<ul style="list-style-type: none"> > Review current planning and building codes and modify if required to anticipate climate change > Review medical information available to better understand potential health impacts from climate change > Set up collaborative arrangements with other councils to manage emergency situations, including staff, resources temporary relocation of residents > Plan for emergency responses for at risk populations (such as the elderly)

Table 9 Adaptation response actions and ideas suggested by SEAG.

Appendix B: Summary of Sustainable Environment Advisory Group (SEAG) Feedback

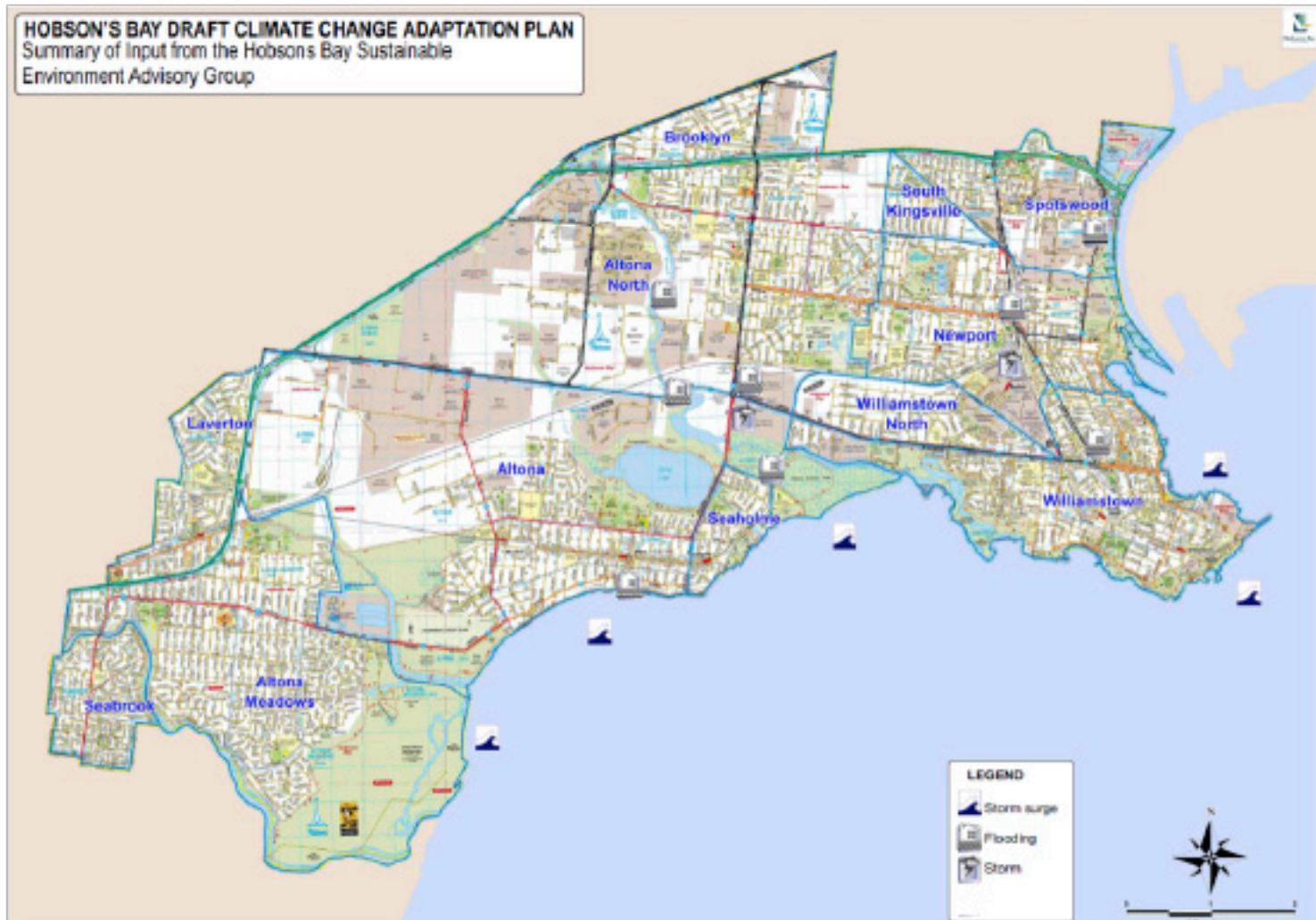


Figure 7 Areas of climate change risk in Hobsons Bay identified by SEAG.

Appendix C: Summary of Initial Community Feedback

Appendix C Summary of Initial Community Feedback

The need to engage with the community early in the development of the Climate Change Adaptation Plan was identified in the Stakeholder Engagement Plan. The engagement plan identified Facebook as a primary tool for community consultation. The community were also provided with the option of providing input via the adaptationplan@hobsonsbay.vic.gov.au email address. In addition, a small number of Friends-of group members were identified as

not having access to the internet and were sent community survey in the post.

The initial consultation was held during the period 25th June to the 22nd July 2012.

Who provided input

A total of 25 residents and community groups provided input into the development of the Climate Change Adaptation Plan. Transition Hobsons Bay and the Australian Greens (Vic) Hobsons Bay Branch provided submissions, while the remainder of responses were received from individuals.

Number	Support for the development of the plan
24	Support the development of an adaptation plan
1	Oppose the development of an adaptation plan

Table 10 Summary of public submissions to the initial consultation.

Number	Method of providing feedback
19	Provided comments via Facebook
4	Provided comments via the survey
2	Emailed submissions

Table 11 Method used to provide input.

Key messages

A number of key messages came up repeatedly throughout the consultation period. These messages were:

- > The Council should play a role in helping the community to become resilient to the impacts of climate change;
- > The Council should provide information about areas that will be impacted by sea level rise and should prevent future development in these areas;

- > Current flooding issues make many Council roads impassable. Council should plan for current and future flooding; and
- > The Council should provide support to vulnerable members of the community who are likely to be impacted by heat stress.

A summary of the results of community feedback is provided in Table 12.

Appendix C: Summary of Initial Community Feedback

Issue	Comment
Flooding	> Current flooding issues make many Council roads impassable. The Council should plan for current and future flooding
Heat	> The Council should increase and promote green spaces to cool urban areas > The Council should provide drinking fountains, seats and shade around key areas e.g. bus stops and shopping centres > The Council should provide heat refuges and air conditioned spaces for vulnerable members of the community > New homes should be built to 6 star ratings
Education	> The Council should provide information and education and incentives to enable individuals to become resilient to climate change > The Council should play a role in linking people with products or services that will assist the community to become resilient to climate change
Advocacy	> The Council should advocate for further research and further action on climate change
Food security	> The Council should assist the community to become resilient to climate change and peak oil food security issues by assisting the community to develop their knowledge of how to grow food locally > The Council should encourage the supply of locally grown produce within the municipality > The Council's My Smart gardens program is an important program to help address food security
Sea level rise	> The Council should investigate and plan for the impacts of sea level rise > The Council should develop strategies to prevent development in areas that will be impacted by sea level rise and encourage development on high ground > The Council should manage Coastal erosion
Transport	> The Council should increase the number of bike paths, bike parking facilities and alternative sources of transport within the municipality
Mitigation	> The Council should become self-sufficient in solar
Peak Oil	> The Council should develop a strategy to manage peak oil
Droughts	> The Council should plan for droughts
Risk register	> The Council should use a risk management approach to manage impacts of climate change. These should be included in the Council's risk register

Appendix C: Summary of Initial Community Feedback

Issue	Comment
Continue current work	> The Council should continue to meet objectives in current Council strategies including: <ul style="list-style-type: none">- Continue stormwater harvesting- Manage drainage – with long term rainfall forecasts- Reduce greenhouse gas emissions- Manage environmental data- Look after street trees and continue the My Smart Garden program
General support	> Great to hear the Council is doing this
General objections	> Climate change is a myth and the Council should not develop an Adaptation Plan

Table 12 Results of community feedback.



Appendix D: Key Climate Change Risks for 2070

The Council's priority climate change risks for 2070 are presented in Table 13. These risks were rated extreme or high in 2070.

Risk Reference	Risk Description	Council Division
Extreme risks		
WA3 & CS5	Increased costs from the need to relocate the Council and community infrastructure and services away from the foreshore	Works & Assets, Community Services
WA4	Damage to coastal assets (including boat ramps, playground equipment etc.) from increased flooding due to sea level rise, coastal erosion and storms	Works & Assets
WA9	Loss of capacity of drainage assets due to sea level rise and increased storm surge altering end of pipe pressure	Works & Assets
OD2a	Increased risks to the Council staff health and safety as a result of extreme weather conditions	Organisation Development
OD6 & EM4	Increased requirement to release the Council staff from normal duties to assist with emergency response and recovery due to climate change	Organisation Development
High risks		
WA1 & WA17	Drier conditions increase surface hardness of sports grounds / wetter conditions increase slipperiness of the ground, resulting in increased risk of injury and potential Council liability	Works & Assets
WA2	Temporary or permanent disruption of access to public open space during flood and storm events	Works & Assets
WA5	Reduced use of The Council's recreation facilities by community, leading to reputational and financial risks	Works & Assets
WA7	Loss of coastal amenity due to enhanced erosion of beaches from sea level rise and storms	Works & Assets
WA8 & CS4	Inability of current building design requirements for the Council buildings and assets to cope with projected future climate conditions in 20 to 50 years especially those catering for at risk segments of the community (elderly, children etc.)	Works & Assets, Community Services

Appendix D: Key Climate Change Risks for 2070

Risk Reference	Risk Description	Council Division
High risks		
WA10	Extreme rainfall exceeds the coping capacity of stormwater infrastructure leading to flash flooding causing local property damage	Works & Assets
WA11	Increased maintenance and renewal of plant and materials at the Council facilities due to increased harsher climatic conditions and longer running time	Works & Assets

Table 13 Summary of longer term priority climate change risks to Hobsons Bay City Council (those rated extreme or high in 2070).



Appendix E: Suggested Climate Change Indicators

The following indicators around each identified key risk theme were developed by the Council. Indicators have been divided into two categories:

- > impacts of extreme weather and climate change on the Council services and operations (Table 8); and
- > adaptive capacity of the community (Table 9).

Theme	Description	Proposed indicators	Responsible department
Financial impacts	Financial impacts, including increasing costs to the Council or loss of revenue	> Demand on the Council's finances	Finance
Open space	Reduced viability of or access to public open space (including coastal assets, recreational or sports grounds)	> Reduction in the number and type of recreational assets > Decrease in the community's ability to access open space and the foreshore > Net loss of open space	Recreation with support from City Strategy and Parks
Property damage	Increased property damage	> Increase in climate related damage to the Council's assets	Works and Assets
Health	Weather related injuries to the Council's staff	> Changes in the long term frequency of staff injuries	Governance and Communications
Service demand and disruption	Disruption to the ability to deliver council services	> Staff availability > Power failures (or inability for heating and cooling systems to cope with extreme conditions) > Long term increase in the number of times the MERO services are activated	Human Resources
Drainage and flood risk	Reduced effectiveness, or failure, of drainage assets	> Changes in the number of homes flooded, recreational and foreshore assets and infrastructure flooded or damaged.	Works and Assets
Community discontent	Community discontent and loss of the Council's reputation	> Long term increase in the number of complaints made to the Council	Customer Service
Biodiversity	Impacts to biodiversity and natural assets	> Increase in tree loss > Changes in species diversity	Parks
Liability	Increase in potential liability for the Council	> Increase in the number of cases of planning litigation against the Council	Governance and Communications

Table 14 Indicators for measuring the impacts of climate change and extreme weather on the Council services.

Appendix E: Suggested Climate Change Indicators

Theme	Description	Proposed indicators	Responsible department
Knowledge	Community knowledge of and feeling of control in their ability to manage changes in climate	<ul style="list-style-type: none"> > Community knowledge of how to respond to changed climatic conditions > Community knowledge of how to respond to extreme weather events > Community has the capacity to respond. 	City Strategy
Heat	The community's ability to adapt to increasing temperatures	<ul style="list-style-type: none"> > Number of homes that residents can comfortably ride out a heatwave in 	City Strategy

Table 15 Indicators for monitoring the adaptive capacity of the community to climate change.

