

# Impacts of Climate Change on Settlements in the Western Port Region

## Climate Change Risks and Adaptation

October 2008



**Broadleaf**

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## EXECUTIVE SUMMARY

1. Climate change is emerging as a vital issue for Australian communities. Even with international action to reduce greenhouse gas emissions, the global climate is projected to undergo significant change in the 21st century.
2. It is important that the impacts of climate change are addressed at regional and local levels since local attributes, including socio-economic characteristics and the physical environment, will significantly determine the extent of the risks and opportunities as well as the nature of community responses.
3. The *Western Port Climate Change Integrated Assessment* is a two year study examining climate change impacts on the built environment and communities of the Western Port region<sup>1</sup> and local adaptation responses to those impacts.
4. The study has four major phases:
  - i. regional climate changes and biophysical impacts;
  - ii. socio-economic and infrastructure impacts;
  - iii. risk assessment; and
  - iv. adaptation response.

This report documents the risk assessment and adaptation phases of the study.

### **Risk Assessments**

5. The report *Impacts of Climate Change on Settlements in the Western Port region: People, Property and Places* indicates that climate change could pose significant risks to settlements and communities in the Western Port region. To identify the nature of those risks and assess their relative importance, risk assessments were undertaken with each of the five member Councils of the Western Port Greenhouse Alliance.
6. The centrepiece of each risk assessment was a full day workshop at which the risks were identified, analysed and evaluated. Outputs from the risk assessments were then detailed in a series of reports to each of the five Councils.
7. Risks were assessed across the full range of potential impacts of climate change to the Western Port region. Well over 200 climate change risks were identified and rated by the five Councils combined. Of those risks, more than 50 percent are linked almost equally to two major categories of impact – ‘coastal inundation’ and ‘flooding due to intense rainfall’. A further 42 percent of risks are associated with changes projected for ‘bushfires’, ‘average and extreme temperatures’ and ‘average rainfall’. ‘Concurrent trends and other’<sup>2</sup> was the remaining source of risks.
8. There is significant commonality between the five Councils with regards to risks identified, but also substantial differences. Differences reflect differing

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<sup>1</sup> The region covers the local government areas of Bass Coast, Casey, Cardinia, Frankston and Mornington Peninsula Shire.

<sup>2</sup> ‘Concurrent trends’ refers to demographic, social and economic trends that are occurring in the region and which may be affected by climate change. ‘Other’ relates to risks that cut across a number of categories of impact.

circumstances of the municipalities, both in terms of the potential impacts of climate change and also the circumstances of local councils and communities.

9. In all risk categories there are, at most, only a few risks that are rated 'extreme' in the current period. This outcome most likely reflects participants' judgement that most climate related impacts are manageable in the short term (next five years) with existing controls.
10. There is a trend however, towards a significant increase in the number of high and extreme risks in the medium term (to 2030) and long term (to 2070). The trend is apparent for all Councils and for all categories of risk but is particularly strong in relation to risks associated with coastal inundation – for example, 43% of the long terms risks associated with coastal inundation are rated as extreme and a further 36% are rated as high.
11. This trend suggests, for many risks, that Councils recognise existing controls will not be adequate should long term climate change projections eventuate and that effective adaptation strategies are needed over the longer term to deal with many of the risks.
12. From the full register of risks a small number of 'priority risks' were selected for treatment analysis in the adaptation phase of the project. The priority risks are set out in Table A.
13. The principal criterion for selecting the priority risks is that each risk had been rated as 'moderate', 'high' or 'extreme' in the short and medium terms and as 'high' or 'extreme' in the long term by a majority of Western Port region councils.
14. Of the ten priority risks, only the first seven listed in Table A were carried forward into the adaptation phase of the project.

**Table A: Priority Climate Change Risks, Western Port Region**

Risk	Risk description	Climate variable(s)
1	Uncertainty over or lack of planning controls in areas affected by coastal inundation and/or flooding	Sea level rise / intense rainfall
2	Loss or degradation of beaches and foreshore areas	Sea level rise / intense rainfall
3	Flooding of essential public infrastructure in low lying areas	Sea level rise / intense rainfall
4	Loss of road access due to coastal inundation and/or flooding	Sea level rise / intense rainfall
5	Increased flash flooding due to drainage system being overwhelmed	Intense rainfall
6	Increase in frequency or intensity of wildfires	Fire weather
7	Increased community anxiety about climate change and loss of wellbeing, especially amongst vulnerable groups	Various
8	Loss of use of sports grounds and other recreational areas	Temperature / average rainfall
9	Loss of biodiversity, especially coastal and freshwater biodiversity	Various
10	Health impacts of extreme temperatures	Temperature

### **Adaptation**

15. Treatment of identified risks is an essential step in the risk management process. In climate change parlance, the treatment of risks is generally referred to as ‘adaptation’. Climate change adaptation can be defined as ‘*actions in response to actual or projected climate change impacts that lead to a reduction in risks or realisation of benefits*’. Adaptation represents a planned, active response to climate change.
16. When considering adaptation to the impacts of climate change in the Western Port region the project team focussed on two main objectives:
  - to ensure that adaptation options for the priority risks were identified and assessed; and
  - to develop an approach to climate change adaptation that has the potential to be applied more generally.
17. The method applied to identifying and assessing adaptation measures for priority risks was, like the risk assessments, centred on a series of workshops.
18. In total, almost 70 people from stakeholder organisations, including WPGA Councils, state government departments and agencies, utilities and other organisations, participated in one or more of the workshops to:

- identify adaptation measures relevant to each risk;
- undertake a preliminary assessment of measures against a range of criteria; and
- make recommendations on carrying forward 'preferred' measures.

#### **Planning and infrastructure responses to coastal and inland flooding**

19. Priority risks 1 to 5 (Table A) were addressed concurrently by sub-groups in a workshop examining *Planning and Infrastructure Responses to Coastal and Inland Flooding*. In total, well over 100 adaptation options relevant to coastal inundation and inland flooding risks were identified and assessed by the groups.
20. Many of the 19 'preferred measures' recommended by workshop participants have a planning and legislative focus. This indicates a perception amongst participants that key planning policies, supporting legislation and decision-making processes have not kept pace with emerging understanding of climate change, particularly with respect to coastal impacts.
21. Research and community and stakeholder education are the other main categories of measures proposed by the coastal workshop groups.

#### **Responding to increased frequency and intensity of wildfires**

22. Priority risk 6 was addressed in a workshop examining *Responses to Increased Frequency and Intensity of Wildfires*. Three major aspects of wildfire management were considered by three sub-groups in the workshop:
  - wildfire prevention;
  - wildfire preparation and response, including emergency management; and
  - recovery.
23. Unlike those in the 'coastal' and 'communities' workshops, groups in this workshop focussed on assessing the adequacy of **current** policies and measures (in the context of climate change), recognising that management responses to wildfire in the Western Port region are already well developed.
24. In total, over 20 policy and program areas were assessed by workshop participants, resulting in 14 recommendations to governments and agencies aimed at improving wildfire prevention, response and recovery in the Western Port region and in Victoria more widely.
25. Many if not most of the recommendations have merit regardless of the climate change issue, i.e. they are 'no-regrets' measures.
26. Particular focus in the recommendations of all groups is given to improving inter-agency co-ordination and information, education and training.

#### **Communities dealing with climate change**

27. Priority risk 7 was addressed in a workshop examining *Communities Dealing with Climate Change*. Three major aspects of the issue were considered by three sub-groups in the workshop:
  - general community anxiety and uncertainty about climate change and the impacts of climate change;

- loss of community wellbeing due to climate change and the impacts of climate change (with a particular focus on vulnerable groups); and
  - increased pressure on volunteer organisations associated with greater frequency and/or intensity of climate related natural hazards.
28. In total, over 30 policy and program areas were assessed by workshop participants, resulting in 12 recommendations to governments and agencies. Recommendations can be grouped into three broad areas:
- coordinated and targeted climate change communications;
  - focussed policy and planning measures to assist vulnerable groups to deal with climate change; and
  - increased recruitment, support and recognition of volunteers and volunteer organisations.
29. There is a particular focus in the recommendations on improving information flows on climate change to the community, especially to vulnerable groups.
30. As with recommendations from the ‘wildfires’ workshop, many of the recommendations of the ‘communities’ workshop have merit regardless of the climate change issue, i.e. they are ‘no-regrets’ measures.

### **Conclusions and next steps**

31. The adaptation phase of this project resulted in over 150 policies and measures being identified and considered – against just seven climate change risks. This outcome indicates how enormous is the task involved in identifying and assessing adaptation measures for all potential impacts and risks of climate change and points to the critical importance (in terms of resources and efficiency) of prioritising climate change risks and adaptation response.
32. A number of other generic issues have emerged from the adaptation phase of the project which point to major factors to consider when carrying forward the project outputs. These include:
- the need for a **whole of government approach** to climate change adaptation, with effective coordination between the three tiers of government;
  - the need to deal with **resource constraints** likely to be encountered when implementing climate change adaptation policies and programs, especially at the local government level; and
  - the importance of fully **engaging communities** in all aspects of the climate change issue.



## **1. INTRODUCTION**

### **1.1. The Western Port integrated assessment project**

Climate change is emerging as a vital issue for Australian communities. Even with international action to reduce greenhouse gas emissions, the global climate is projected to undergo significant change in the 21st century, with the potential to create many risks as well as opportunities. It is important that the impacts of climate change are addressed at regional and local levels, since local attributes including socio-economic characteristics and the physical environment will significantly determine the extent of the risks and opportunities, as well as the nature of community responses.

*Impacts of Climate Change on Human Settlements in the Western Port Region: An Integrated Assessment* (referred to hereafter as the *Western Port Climate Change Integrated Assessment*) is a two year project examining climate change impacts on the region's built environment and communities as well as local adaptation responses to those impacts. The project was funded by the Australian Government Department of Climate Change through its Human Settlements sub-programme and the Department of Sustainability and Environment (Victoria) and co-managed by Marsden Jacob Associates and the Western Port Greenhouse Alliance.

The project builds on and extends *The Climate Change Impacts and Adaptation in Western Port* scoping study, initiated in 2005 by the WPGA and funded by the Victorian Department of Sustainability and Environment.<sup>3</sup>

The *Western Port Climate Change Integrated Assessment* is one of a small number of climate change 'integrated assessment' projects recently undertaken in Australia. Notwithstanding a growing body of international climate change adaptation and integrated assessment literature, there is currently no widely accepted definition of an integrated assessment.

For the purpose of this project, we have defined integrated assessment of climate change to mean:

*a study that integrates biophysical, social and economic understanding of the climate change issue with effective community decision-making.*

Given this definition, the primary objective of the *Western Port Climate Change Integrated Assessment* is to improve understanding of the scientific, economic and social impacts of climate change in the Western Region in order to:

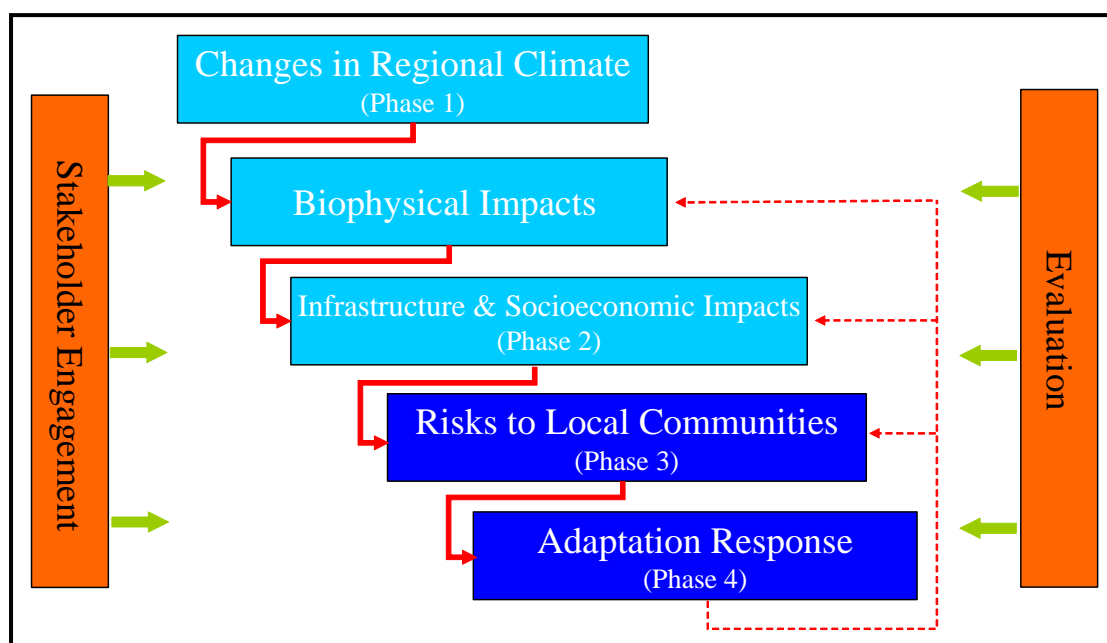
- enhance the capacity and knowledge of local governments and other decision-makers in the region to prepare for and adapt to climate change; and
- develop an approach to climate change assessment and adaptation that has transferability to other regions in Australia.

The *Western Port Climate Change Integrated Assessment* project consists of four major phases (Figure 1).

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<sup>3</sup> Outputs of the scoping study can be sourced at: <http://www.wpga.org.au/>

**Figure 1: Major phases of the Western Port climate change project**



1. The first phase entailed projecting changes to key climate drivers and associated biophysical impacts in the region. Changes examined include extreme sea level, extreme winds and average and extreme rainfall, as well as average temperature, humidity, solar radiation and fire weather. Outputs of this phase are provided in three technical reports.<sup>4</sup>
2. The second phase, involved an examination of the nature and extent of potential impacts to the region's built environment and an assessment of the social and economic implications of the impacts and the vulnerability of different localities and groups. Outputs of this phase are detailed in an impacts report.<sup>5</sup>
3. The third phase entailed identifying and prioritising risks to local governments associated with the impacts. A series of risk assessments were undertaken with each of the region's local councils.
4. In the final phase, adaptation options and barriers to effective response to the high priority risks were explored with local councils, state government and other key regional decision makers.

Stakeholder engagement and project evaluation were important aspects of all project phases.

This report discusses outcomes from Phases 3 and 4 of the project.

<sup>4</sup> The technical reports are: Abbs and Rafter (2008); Macadam and Ricketts (2008); and McInnes et al. (2008).

<sup>5</sup> Kinrade and Preston (2008).

## **1.2. Scope and structure of this report**

The Western Port Climate Change Integrated Assessment project, and by implication this report, focuses on the impacts of climate change on human settlements in the Western Port region of Victoria. The region covers the local government areas of Bass Coast, Casey, Cardinia, Frankston and Mornington Peninsula Shire. It includes Western Port, as well as the south eastern section of Port Phillip from Seaford and Frankston through to Point Nepean. A detailed description of the region, including its climate, topography, people and economy can be found in the climate change impacts report (Kinrade and Preston, 2008), which is a companion document to this report.

A major focus of the Western Port Climate Change Integrated Assessment project is on building the capacity of **local governments** to respond to the impacts of climate change. For that reason, the risk assessments undertaken for Phase 3 of the project were conducted with the five local councils that have primary responsibility for local planning, management and service delivery in the region. In examining adaptation responses to the impacts of climate change though (Phase 4), it is recognised that local councils alone cannot deliver the policy and program measures that will be needed to achieve effective regional response to the impacts of climate change. For that reason, other regional and state government agencies were engaged in Phase 4 of the project.

This report is presented in three main parts:

- **Chapter 2** provides a summary of the process and outcomes of Phase 3 of the project - the climate change risk assessments undertaken with each of the five member councils of the Western Port Greenhouse Alliance. Through the risk assessments, 10 'priority risks' were identified for further consideration in Phase 4.
- **Chapter 3** discusses Phase 4 of the project – adaptation response. In Phase 4, a series of workshops were held with regional stakeholders including local council representatives, state government departments and other agencies to identify and assess options for dealing with a number of the priority risks identified through Phase 3.
- **Chapter 4** presents conclusions based on the analysis undertaken in Phases 3 and 4 of the project, including recommendations for future directions on adapting to the impacts of climate change, regionally and nationally.

## 2. RISK ASSESSMENTS

### 2.1. Introduction

#### 2.1.1. Rationale for the risk assessments

The report *Impacts of Climate Change on Settlements in the Western Port region: People, Property and Places*<sup>6</sup> indicates that climate change could pose significant risks to settlements and communities in the Western Port region. To identify the nature of those risks and assess their relative importance, risk assessments were undertaken with each of the five local council members of the Western Port Greenhouse Alliance:

- Bass Coast Shire Council;
- Cardinia Shire Council;
- City of Casey;
- Frankston City Council; and
- Mornington Peninsula Shire Council.

To understand the rationale for selecting councils to undertake the risk assessments, it is important to pose the question ‘who is it in this study are we most concerned about when considering the risks of climate change in the Western Port region?’ The answer to this question is ‘local communities’. Given this, local councils, as the level of government closest to local communities and as the primary providers of local infrastructure and services, were judged to be the agencies best able to identify and prioritise risks to local communities from climate change.

#### 2.1.2. Approach

Five risk assessments were undertaken in February and March 2008, one with each of the councils. The risk assessments followed the approach set out in the Department of Climate Change guide “Climate Change Impacts and Risk Management” (Broadleaf Capital International & Marsden Jacob Associates, 2006), which is based on the Standard AS/NZS4360:2004, Risk Management. The main steps of the Standard process are illustrated in Figure 2 and are discussed in more detail in Appendix 1. In summary, the approach used was as follows:

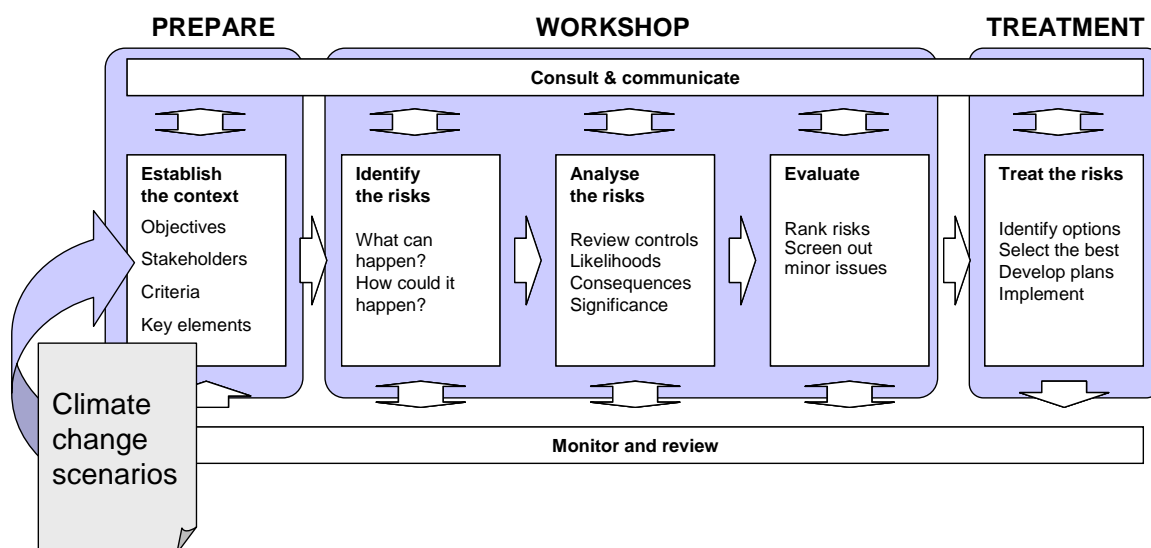
- The centrepiece of each risk assessment was a full day workshop at which the risks were identified, analysed and evaluated. Ten to fifteen council representatives participated at each workshop. The representatives were selected on the basis that, collectively, they have a good understanding of the roles and functions of their council and of issues pertinent to local communities.
- Prior to the workshop, preparatory work was undertaken to ‘establish the context’ for the risk assessment – determine the objectives, key elements and stakeholders for the assessment - and set the criteria for assessing the consequences and likelihood of identified risks.

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<sup>6</sup> Completed for Phase 2 of the Western Port Integrated Assessment Project.

- Following the workshop a report was produced that sets out a register of risks (each with a priority rating), a discussion of the risks and an outline of steps that the council should take in order begin treating the risks.

**Figure 2: Climate Change Risk Assessment Process Steps**



It is important to note that risk treatments were not implemented as part of the project. However, treatments were identified and assessed for a small group of ‘priority risks’ as part of the adaptation phase of the project (see sections 2.2 and 3 below).

## 2.2. Results

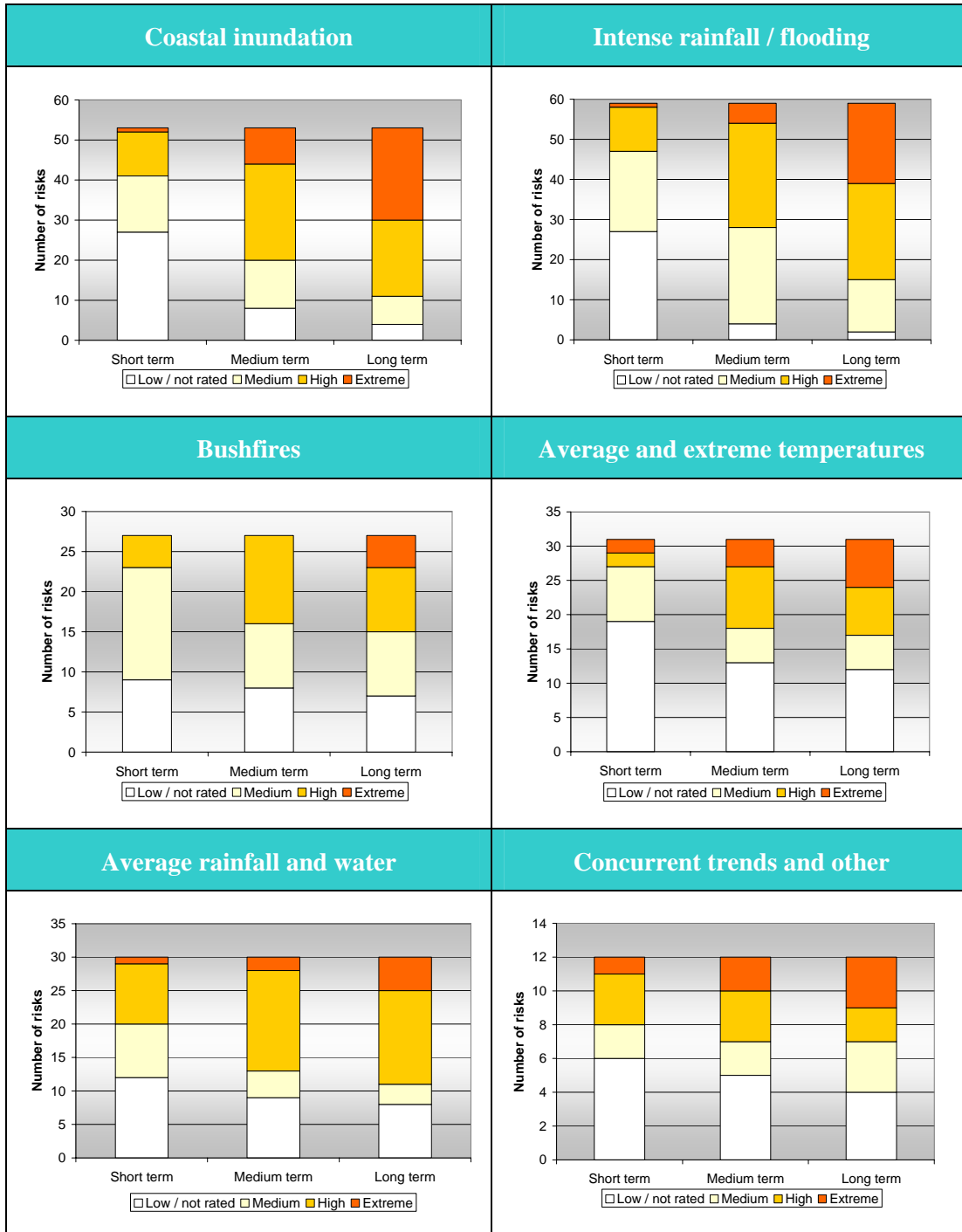
### 2.2.1. Overview

The risk assessment reports which detail all of the climate change risks and their priority ratings are held by each of the five councils. The risk registers and associated analyses contained in the reports are confidential information and therefore are not reproduced here. However, a number of general points can be made about the results of the risk assessments.

- Risks were assessed across the full range of potential impacts of climate change to the Western Port region, covering:
  - coastal inundation;
  - extreme rainfall and inland flooding;
  - bushfire;
  - average and extreme temperatures;
  - average rainfall; and
  - concurrent trends and other.
- Well over 200 climate change risks were identified and rated by the five councils combined. Of those risks, more than 50 percent are linked roughly equally to two major categories of impact – ‘coastal inundation’ and ‘flooding due to intense rainfall’ (see

Figure 3). A further 42 percent of risks are associated with changes projected for ‘bushfires’, ‘average and extreme temperatures’ and ‘average rainfall’. ‘Concurrent trends and other’<sup>7</sup> was the remaining source of risks.

**Figure 3: Summary of Climate Change Risks Identified by Councils**



<sup>7</sup> ‘Concurrent trends’ refers to demographic, social and economic trends that are occurring in the region and which may be affected by climate change. ‘Other’ relates to risks that cut across a number of categories of impact.

- There was significant commonality between the five Councils with regards to risks identified, but also substantial differences. Differences reflect differing circumstances of the municipalities, both in terms of the potential impacts of climate change and also the circumstances of local councils and communities (e.g. social and physical environments, controls currently in place). Substantial numbers of risks associated with coastal inundation were identified by each of Mornington Peninsula and Bass Coast Shires and the City of Casey, for example, but few by the Shire of Cardinia. On the other hand, the Shire of Cardinia identified a relatively large number of risks associated with projected changes to fire weather conditions. Similarly, Cardinia, Frankston City and Casey identified significant numbers of risks associated with extreme rainfall and inland flooding.
- Equally important are similarities and differences in the risk categories in terms of ratings and trends over time.
- As indicated in Figure 3, in all risk categories there are, at most, a few risks that are rated 'extreme' in the short term (over the next five years). This outcome most likely reflects participants' judgement that:
  - the frequency or intensity climate-related hazards are unlikely to worsen appreciably in the immediate future; and/or
  - most climate related impacts are manageable in the short term with existing controls.

The few risks that are rated extreme in the short term fall into one of two categories:

- the issue is already posing significant problems for councils or local communities, at least in part due to climate-related hazards (e.g. some biodiversity and water-related issues); or
  - the risk stems from a recognition that effective response to some longer term climate change impacts will require measures to be implemented in the short term (e.g. responses to some risks associated with coastal inundation, flooding and concurrent trends).
- There is a trend towards a significant increase in the number of high and extreme risks in the medium term (to 2030) and long terms (to 2070). The trend is apparent for all councils and for all categories of risk but is particularly strong in relation to risks associated with coastal inundation – for example, 43% of the long terms risks associated with coastal inundation are rated as extreme and a further 36% are rated as high.
  - This trend suggests, for many risks, that councils recognise existing controls will not be adequate should long term climate change projections eventuate. It further suggests, especially in relation to risks requiring planned responses extending over long planning horizons, that effective adaptation strategies are needed over the longer term to deal with many of the identified risks.

### **2.2.2. Priority risks**

As previously noted, over 200 risks were identified through the risk assessments undertaken with the five Western Port region councils. While councils and other agencies will need to develop effective treatments for all risks, particularly those rated 'high' and 'extreme', the scope of the Western Port Integrated Assessment project did not allow for treatment measures to be considered for all risks. Instead, a small number of 'priority risks' were selected for

treatment analysis in the adaptation phase of the project (see section 3). The priority risks are set out in Table 1.

**Table 1: Priority Climate Change Risks, Western Port Region**

Risk	Risk description	Climate variable(s)
1	Uncertainty over or lack of planning controls in areas affected by coastal inundation and/or flooding	Sea level rise / intense rainfall
2	Loss or degradation of beaches and foreshore areas	Sea level rise / intense rainfall
3	Flooding of essential public infrastructure in low lying areas	Sea level rise / intense rainfall
4	Loss of road access due to coastal inundation and/or flooding	Sea level rise / intense rainfall
5	Increased flash flooding due to drainage system being overwhelmed	Intense rainfall
6	Increase in frequency or intensity of wildfires	Fire weather
7	Increased community anxiety about climate change and loss of wellbeing, especially amongst vulnerable groups	Various
8	Loss of use of sports grounds and other recreational areas	Temperature / average rainfall
9	Loss of biodiversity, especially coastal and freshwater biodiversity	Various
10	Health impacts of extreme temperatures	Temperature

The priority risks were identified by the project team and reference panel, criteria for selection of the risks being as follows:

- individually, each risk had been rated as ‘moderate’, ‘high’ or ‘extreme’ in the short and medium terms and as ‘high’ or ‘extreme’ in the long term by at least three Western Port region councils;
- measures to treat each risk are likely to require significant input from other (non-council) agencies;
- collectively, the selected risks cut across a range of council and agency functions including: land use planning; strategic planning; infrastructure provision and maintenance; community services provision; and emergency management.

The second and third criteria were applied on the assumption that effective response to many of the risks of climate change are likely to require a coordinated approach across a range of government departments and agencies, as well as the participation of other non-government organisations.

The priority risks in Table 1 meet all of these criteria. The fact that they are on the list means that a majority of Western Port councils identified them as risks (although not necessarily using exactly the same wording) and gave them a high risk rating in their risk assessments. For this reason alone, the priority risks can be regarded as the highest priority issues in terms of a **regional** adaptation response to climate change impacts.<sup>8</sup> The fact that the risks also meet the other two criteria suggests that their effective treatment will require a co-ordinated, consistent and multi-faceted response from different levels of government and a range of agencies and organisations. The nature of that response, including recommended policies and measures, is discussed in sections 3.3 to 3.5.

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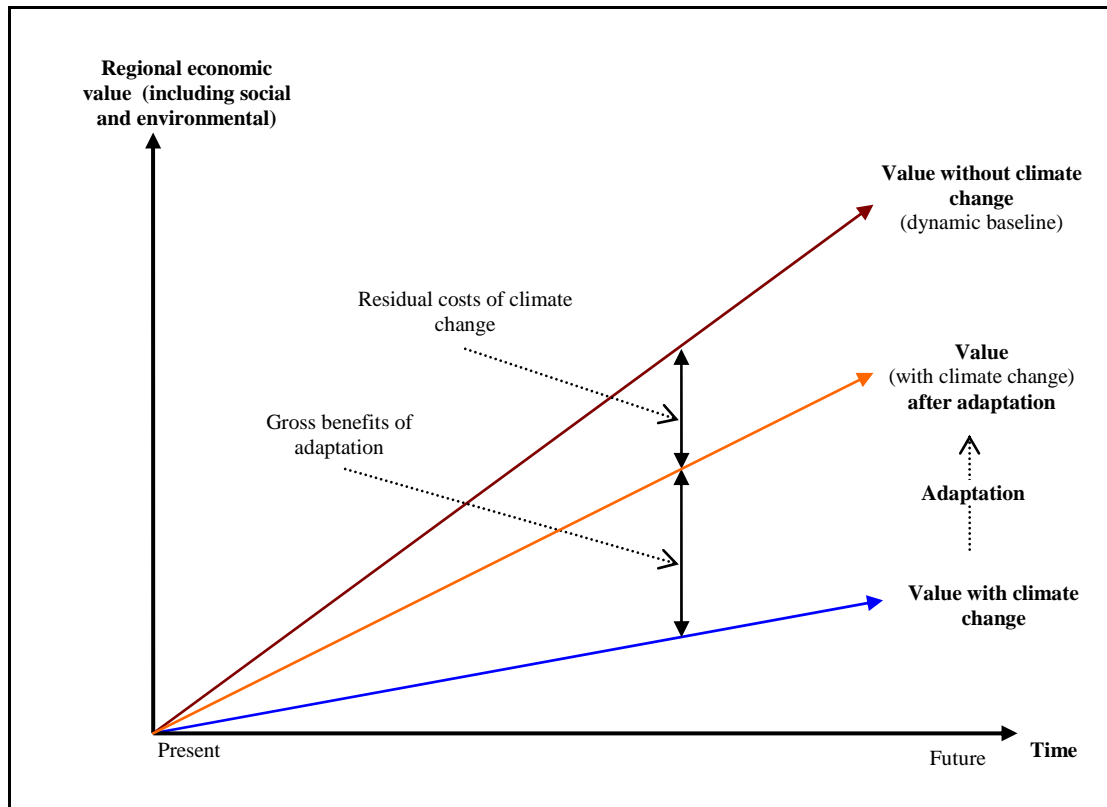
<sup>8</sup> It is important though that other climate change risks, especially those rated highly by individual councils, be effectively addressed at the local level.

### 3. ADAPTATION

#### 3.1. Introduction

Treatment of identified risks is an essential step in the risk management process. In climate change parlance, the treatment of risks is generally referred to as ‘adaptation’. Climate change adaptation can be defined as ‘actions in response to actual or projected climate change impacts that lead to a reduction in risks or realisation of benefits’. Adaptation represents a planned, active response to climate change and, as such, can be distinguished from reactive, ex-post adjustments to climate change impacts. As noted in the Stern review on the economics of climate change “... adaptation is crucial to deal with the unavoidable impacts of climate change to which the world is already committed” (Stern, 2006, p.404). The value and importance of adaptation lies in the fact that adaptation response measures have the potential to greatly reduce the costs of climate change impacts provided the response measures are carefully considered and implemented. This is illustrated in Figure 4.

**Figure 4: Illustration of the Benefits of Adaptation to Climate Change Impacts**



When considering adaptation to the impacts of climate change in the Western Port region the project team focussed on two main objectives:

1. to ensure that adaptation options for key risks were identified and assessed – initial steps in a longer term process of adapting to the impacts of climate change in the region; and
2. to develop an approach to climate change adaptation that can potentially be applied more generally – to other climate change risks in the region or elsewhere in Australia.

With those two objectives in mind:

- a framework method for identifying, assessing and moving forward climate change adaptation was developed; and
- a small number of priority risks were selected for consideration in the adaptation phase of the Western Port Integrated Assessment project (see section 2.2.2).

The ‘adaptation response method’ is discussed in section 3.2. Results of the framework’s application to the priority risks are then discussed in section 3.3.

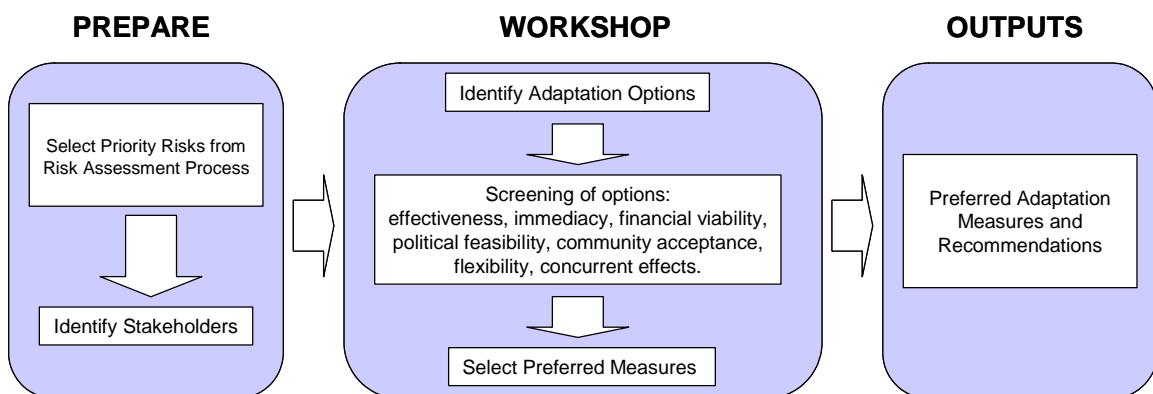
### 3.2. Adaptation response method

Climate change adaptation is a new and emerging field. Thus a definitive method or methods for dealing with the risks of climate change have yet to emerge. Nevertheless, in developing the adaptation response method outlined in this section, we have drawn upon a range of climate change risk, vulnerability and adaptation literature, as well as literature and methods relevant to decision-making in the face of uncertainty (e.g. Alberinia et al., 2006; Dwyer et al., 2004; Penning-Rowsell et al., 2006; Smit and Wandel, 2006; Willows and Connell, 2003).

The method entailed five main steps, centring on a series of stakeholder workshops – an approach that is consistent with the project focus of stakeholder participation. Steps 1 and 2 were undertaken prior to the adaptation workshops (although still involved the participation of major stakeholders), while steps 3, 4 and 5 were undertaken concurrently in a series of workshops involving participants identified in step 2.

The steps are outlined in Figure 5 and discussed in more detail below.

Figure 5: Climate Change Adaptation Process Steps



### 3.2.1. Pre-workshop steps

#### Step 1 – Priority risks and workshop selection

As discussed in 2.2.2 and detailed in Table 1, a series of ‘priority’ risks were identified for the Western Port region. These were drawn from the risk registers compiled through the five risk assessments undertaken by the WPGA councils. The criteria used for selecting the priority risks are also detailed in section 2.2.2.<sup>9</sup>

Of the ten priority risks, only the first seven listed in Table 1 were carried forward into the adaptation phase of the project. The reasons for not carrying forward the other three risks are as follows:

- *Loss of use of sports grounds and other recreational areas* (priority risk 8). As a consequence of responses to the current drought, member councils have in train a range of alternative water supply and demand management measures (e.g. water recycling), which they believe (in the main) will significantly mitigate this risk in the future.
- *Loss of biodiversity, especially coastal and freshwater biodiversity* (priority risk 9). This risk is outside of the project scope. However, we note that major international and national studies that have reviewed the full range of potential impacts of climate change (e.g. CSIRO and BoM, 2007; IPCC, 2007) point to the extreme vulnerability of many ecosystems to climate change, especially if (as in the case of coastal and freshwater ecosystems) they already are subject major disruptions. We note also that a scoping study of the impacts of climate change in the Western Port region, completed in 2006, identified ‘coastal and marine biodiversity and habitats’ as a priority cross-sectoral issue.<sup>10</sup> This information highlights the need for a detailed assessment of the impacts of climate change on coastal, marine and freshwater biodiversity in the Western Port region and of associated work on risks and adaptation.
- *Health impacts of extreme temperatures* (priority risk 10). The WPGA has already instigated a Heat Wave strategy which aims to develop policies and measures to deal with this risk.

Of the seven remaining priority risks, it was determined by the project team and reference panel that:

- Priority risks 1 to 5 would be addressed concurrently in a workshop examining *Planning and Infrastructure Responses to Coastal and Inland Flooding* – the rationale for this being that there are common elements and stakeholders involved in all five risks.
- Priority risk 6 would be addressed in a workshop examining *Responses to Increased Frequency and Intensity of Wildfires*; and
- Priority risk 7 would be addressed in a workshop examining *Communities Dealing with Climate Change*.

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<sup>9</sup> Those criteria are not immutable and it can be anticipated that alternative criteria for priority risk selection will be used in some circumstances. However, a high risk rating (extreme or high) is likely always to be a primary consideration when selecting risks for adaptation response assessment.

<sup>10</sup> See <http://www.wpga.org.au/uploads/projects/11/Adapting.pdf>

## **Step 2 – Identification of participants**

Because local adaptation to impacts of climate change will hinge on a range of decision-making authorities, the involvement of a wide range of agencies and other organisations was viewed as being critical to the adaptation process. In consultation with reference group members, each priority risk selected in step 1 was scrutinised and the local councils, state government departments and agencies, utilities and other organisations relevant to adaptation response were identified. Through that process, a list of potential adaptation workshop participants was drawn up. A full list of participants who attended one of the three adaptation workshops is set out in Appendix 2.

### **3.2.2. Workshop steps<sup>11</sup>**

#### **Step 3 – Identification of adaptation options**

Step 3 entailed identifying adaptation options (policies, programs and measures) against each priority risk. This was done through a brainstorming exercise by workshop participants. The aim of the exercise was to identify as many options or combinations of options as possible relevant to treating the relevant risk. Workshop participants were instructed to think widely, considering all possible types of measures as indicated in Table 2.

#### **Step 4 – options screening**

In this step a screening process was applied to the adaptation options identified in Step 1 by workshop participants. The purpose of the screening was to determine a smaller list of options warranting more detailed assessment. A ‘multi-criteria analysis’ type approach was used for the screening process, with each option being assessed against a number of criteria as listed in Table 3.

#### **Step 5 – Preferred options: next steps**

In step 5, further assessment of preferred treatment options was undertaken. The assessment consisted of the following tasks:

- identifying barriers or constraints to implementing the preferred options;
- identifying what steps should be undertaken to overcome those barriers (e.g. further research, changes to decision making processes etc);
- nominating agencies relevant to continuing the assessment;
- recommendations on ways forward.

### **3.2.3. Workshop outputs**

Output from each of the workshops included:

- a full list of potential adaptation options for each risk assessed;
- an analysis and ranking of the options against a set of criteria;
- a list of ‘preferred’ adaptation options;

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<sup>11</sup> Note the steps implemented in Workshop 2 (responding to increased frequency and intensity of wildfires) were slightly different to those outlined in this section. These differences are discussed in section 3.4.1.

- a qualitative assessment of each of the preferred options; and
- recommendations to governments and agencies on ways forward.

Complete outputs from the three adaptation workshops are detailed in Appendix 3. A summary and analysis of key workshop outputs are discussed in the following sections.

**Table 2: Climate Change Risk Adaptation Types**

Treatment type	Description and examples
<b>Spread/displace risk</b>	Insurance and diversification strategies: <ul style="list-style-type: none"> <li>- Use of insurance products to off-lay the risk</li> <li>- Risks shared between different agencies / entities</li> <li>- Geographical diversification (e.g. of raw materials)</li> </ul>
<b>Structural and technological</b>	Prevent effects through engineering solutions and changed practices: <ul style="list-style-type: none"> <li>- Implement energy / water demand management measures</li> <li>- Scale up infrastructure protection measures</li> <li>- Change design of infrastructure – increase resilience</li> </ul>
<b>Planning/regulatory</b>	Prevent or mitigate effects through revised regulations and planning frameworks: <ul style="list-style-type: none"> <li>- Adopt integrated planning approaches</li> <li>- Amend local planning schemes</li> <li>- Amend building design standards</li> <li>- Place new infrastructure away from high risk areas</li> </ul>
<b>Internal procedures</b>	Revise internal practices at an organisational level: <ul style="list-style-type: none"> <li>- Environmental management</li> <li>- Quality management</li> <li>- Improve contingency and disaster planning</li> <li>- Lengthen strategic planning horizons (from say 5-10 years to 20-30 years)</li> </ul>
<b>Research</b>	Improve understanding of relationship between climate change and risk: <ul style="list-style-type: none"> <li>- Improve knowledge of relationship between past and potential future variations in climate and performance of economic, social and environmental systems</li> <li>- Improve understanding of the relationship between changes to frequency and magnitude of extreme events and critical thresholds</li> <li>- Research efforts to improve understanding of adaptation options</li> </ul>
<b>Education, behavioural</b>	<ul style="list-style-type: none"> <li>- Inform community about climate change risks and adaptation measures</li> <li>- Educate community about behaviour changes</li> </ul>

**Table 3: Screening Criteria for Adaptation Options**

Criterion	Description
<b>Effectiveness</b>	<ul style="list-style-type: none"> <li>▪ Policy or measure achieves a significant reduction in vulnerability and risk, either directly or indirectly through significant expansion of knowledge and/or adaptive capacity.</li> </ul>
<b>Immediacy</b>	<ul style="list-style-type: none"> <li>▪ Policy or measure provides benefits over the near-term.</li> <li>▪ If policy or measure does not provide near-term benefits, other justifications exist for proceeding with near-term implementation (e.g., planning or management decisions are being made at present that will have long-term implications in the context of climate change, making near-term adaptation necessary to ensure long-term efficacy).</li> </ul>
<b>Financial viability</b>	<ul style="list-style-type: none"> <li>▪ Costs of adaptation policy or measure are not prohibitive.</li> <li>▪ Costs that exceed normal budgetary allocations can be covered through revenue expansion schemes (e.g. rates or levies) or cost-sharing with other levels of government or public/private partnerships.</li> </ul>
<b>Political feasibility</b>	<ul style="list-style-type: none"> <li>▪ Adaptation policy or measure is within the scope of council's responsibility or sphere of influence (although cooperation with other agencies, levels of government may be necessary).</li> <li>▪ Adaptation is acceptable to (and even desired by) council staff and councillors.</li> <li>▪ Adaptation does not usurp/conflict with other policy priorities.</li> </ul>
<b>Community acceptance</b>	<ul style="list-style-type: none"> <li>▪ Adaptation policy or measure is not opposed by a significant fraction of the community (or efforts by council to educate and engage with community can adequately address opposition).</li> <li>▪ Adaptation policy or measure does not unduly infringe upon the rights of residents or businesses.</li> </ul>
<b>Flexibility</b>	<ul style="list-style-type: none"> <li>▪ Adaptation policy or measure should be consistent with the principles of adaptive management, that is:                             <ul style="list-style-type: none"> <li>- it is flexible to new information about climate change, other drivers and the effectiveness of the policy or measure; and</li> <li>- it allows for incremental changes to be made over time.</li> </ul> </li> <li>▪ It should not make it more difficult for decision-makers to manage climate change risks in the future.</li> </ul>
<b>Concurrent effects</b>	<ul style="list-style-type: none"> <li>▪ Adaptation should seek to avoid negative environmental, social or other unintended consequences.</li> <li>▪ Adaptation measures offering win-win outcomes (i.e. additional environmental and /or social benefits beyond reducing the identified climate change-related risk) are desirable.</li> </ul>

### **3.3. Planning and infrastructure responses to coastal and inland flooding**

#### **3.3.1. Approach**

The 'Planning and Infrastructure Responses to Coastal and Inland Flooding' workshop was conducted over a full day on 17 May, 2008 at the City of Casey. Approximately 40 people participated in the workshop including representatives of the five member councils of the WPGA, various state government departments and agencies and utilities (see Appendix 2 for a list of participants).

Five priority climate change risks were considered in the workshop session. The five risks – risks 1 to 5 in Table 1 – were considered in four workshop sub-groups:

- Risks 1, 2 and 5 were considered separately in three different sub-groups.
- Risks 3 and 4 were considered jointly by the one sub-group, there being substantial overlap in the relevant issues and stakeholders between the two risks.

Within each sub-group, workshop steps were implemented as set out in 3.2.2. However, whole group sessions were woven into the proceedings to allow feedback and interaction between the sub-groups. The following sections (3.3.2 to 3.3.5) summarise in tabular format the major issues and outputs from the four workshop sub-groups. Analysis of outcomes from the workshop is set out in section 3.3.6.

### 3.3.2. Uncertainty over or lack of planning controls in areas affected by coastal inundation or flooding

#### Uncertainty over planning controls in areas affected by coastal inundation or flooding

##### Issue

At present, local councils in the Western Port region face a great deal of uncertainty over the application of planning approval processes to developments in areas affected (or potentially affected) by coastal inundation and inland flooding. Uncertainty stems from a number of factors, notably:

- absence of clear directions in relevant legislation and planning schemes on how exposed areas should be treated in approval processes;
- lack of high resolution data enabling areas exposed to future inundation to be pinpointed (i.e. ‘lines on maps’); and
- gaps in existing flood mapping and uncertainty over who bears responsibility for filling those gaps.

##### Adaptation measures

Almost 30 adaptation measures were identified in relation to this issue and reviewed against the screening criteria (see Table 3). Unsurprisingly given the nature of the issue, legislative and planning reform is the principal focus of many of the measures. Other measures considered include community education, improved emergency services planning, decision maker capacity building and research.

##### Group recommendations

A number of the adaptation measures rated highly against the screening criteria. Recommendations on six of the ‘preferred measures’ are as follows.

1. **Climate change legislation** should be developed and enacted by the state government to provide clear directions on dealing with climate change in planning and approvals processes. Existing state planning legislation should also be reviewed and amended as necessary. The legislation reform package will require active participation of state government departments and agencies, as well as local government, federal government, water authorities, CMAs and the Central Coastal Board.<sup>12</sup>
2. **Local planning schemes** should be amended to include specific provisions on the treatment of sea level rise and storm surge projections in relation to land protection, use, and development. Amendments are required to overlays and zones and ‘buyer beware’ conditions must also be added. Provisions need to be supported with robust science and tools (e.g. GIS).
3. **Extensive consultation** with stakeholders and the community is required before decisions are made on legislative and planning scheme changes.
4. **Multi-disciplinary research and data collection**, funded by federal and state governments, is required to support planning and infrastructure decision making in coastal areas. The ‘Future Coasts’ coastal vulnerability assessment currently being completed by DSE Victoria should fill some data gaps. Once it has been completed, councils in the Western Port region should compile and prioritise a list of further research needs.
5. **Capacity building** measures are needed to improve decision makers’ understanding of regional climate changes (ranges and uncertainties) and to ensure a consistent and transparent approach to the treatment of climate change by local government, state government, VCAT and the judiciary.
6. A **communications strategy** should be developed by WPGA councils to educate local residents, developers and the media about climate change and coastal issues in the region. The strategy needs to draw upon best available data, provide information on what is known and uncertainties and be presented in a way that is consistent, whilst avoiding scaremongering.

<sup>12</sup> It is noted that a review of the Victorian *Planning and Environment Act 1987* is currently in train. The review provides an opportunity for at least part of this recommendation to be acted upon.

### 3.3.3. Loss or degradation of beaches and foreshore areas

#### Loss or degradation of beaches and foreshore areas

##### Issue

Many if not most beaches and foreshore areas in the Western Port region are vulnerable to sea level rise and increased frequency and intensity of storm surges. Potential physical impacts include more intense erosion of beaches and backing dunes, temporary inundation and degradation of foreshore areas and recession of the coastline. Social, environmental and economic consequences of impacts include loss of biodiversity, cultural heritage and wellbeing and reduced leisure and recreational opportunities, which in turn impact on tourism. At present, management responsibility for these areas is split between councils, local committees of management and state agencies (including Parks Victoria and DSE).

##### Adaptation measures

More than 25 adaptation measures were identified in relation to this issue and reviewed against the screening criteria. Measures identified cut across most types of adaptation (as outlined in Table 2). They include changes to coastal land management, coastal engineering works, education (targeting community attitudes and response), coastal planning, research and data sharing and legislative reform.

##### Group recommendations

A number of the adaptation measures rated strongly against the screening criteria. Recommendations on six of the 'preferred measures' are as follows.

7. **Coastal crown lands** in Victoria (currently 97% of the coastline) should be retained in public ownership. This requires a collaborative approach from the three tiers of government for whole of state coastal policy development, including coordinated planning, legislation and funding.
8. **Coastal land management responsibility and authority** should be reviewed with the aims of achieving integrated coastal planning and management in Victoria and improving coastal decision-making. These aims are best achieved through the creation of a single coastal planning and management agency. Establishing the agency will require careful planning from a range of existing agencies and once established will need to be adequately resourced.
9. **Engineering solutions to protect key coastal assets** may need to be implemented. To that end, it is proposed that cross-sectoral/agency partnerships be developed to fund studies and programs into innovative engineering solutions to coastal asset protection and to share information and knowledge on possible solutions.
10. **Beaches and foreshore areas** throughout the Western Port region should be rated and prioritised for protection using a triple-bottom-line approach. The ratings study will require support and input from DSE, Parks Victoria, Coastal Boards and Councils.
11. Additional, detailed **coastal modelling** should be undertaken to identify localities most vulnerable to sea level rise, storm surges and inundation – now, in 2030 and 2070. The modelling needs to integrate storm surge modelling with concurrent extreme rainfall events, high-resolution digital elevation data sets and coastal erosion based upon coastal geomorphology.<sup>13</sup>
12. A **community education program** should be initiated to inform the community and relevant agencies about the risks and uncertainties of climate change to the coastal zone in the Western Port region. The program ideally will encompass a communications 'tool kit', information in land information certificates and a media strategy. The program needs to prepare the community for gradual or sudden change. The WPGA is an ideal vehicle for initiating the program.

<sup>13</sup> Note a similar set of recommendations is in the study report 'People, Property and Places'. The 'Future Coasts' vulnerability assessment being completed by DSE should meet some of the objectives of this recommendation.

### 3.3.4. Flooding of roads and other public infrastructure in low lying areas

Flooding of roads and other public infrastructure in low lying areas
<p><b>Issue</b></p> <p>The Western Port Integrated Assessment report ‘People, Property and Places’ has identified key public infrastructure that is exposed to flooding in low-lying coastal and inland areas of the Western Port region. Exposed infrastructure includes major roads, other transport infrastructure, water, wastewater and drainage assets, electricity and telecommunications infrastructure and some medical, education and local government facilities. Sea level storm surge and extreme rainfall projections for the region indicate that flooding of relevant areas could increase in frequency or intensity in the future.</p>
<p><b>Adaptation measures</b></p> <p>Approximately 30 adaptation measures were identified in relation to this issue and reviewed against the screening criteria. Measures identified cut across many adaptation types (as outlined in Table 2), with particular emphasis being given to land use and coastal planning mechanisms, enhanced analytical tools, decision making processes and information pertaining to asset management and asset protection measures.</p>
<p><b>Group recommendations</b></p> <p>A number of the adaptation measures rated highly against the screening criteria. Recommendations in relation to four of the ‘preferred measures’ are as follows.</p> <ol style="list-style-type: none"> <li>13. An <b>analytical tool for ranking of public infrastructure treatment options</b> is proposed. It is recommended that the tool includes a cost benefit analysis module, incorporate ‘at risk communities’ and ‘road functional’ hierarchies and be integrated with existing CIB (Council for Research and Innovation in Building and Construction) models. The tool should be discussed at forthcoming ALGA, engineering and planning forums.</li> <li>14. <b>Reviews of council and agency asset management plans</b> are recommended, having regard to climate change impacts. The reviews should include consideration of assumptions about asset life cycles and rates of depreciation. The reviews will help practitioners understand that, although services provided by relevant infrastructure need to be maintained, some assets will need to be written off with depreciation being fully funded. Technical and financial modelling groups should be established within each agency to conduct the reviews, with assistance being sought from IPWEA (Institute of Public Works Engineering) and other professional bodies.</li> <li>15. <b>Planning schemes and coastal management plans</b> should be reviewed to clarify and address existing uncertainties regarding the treatment of climate change impacts. As part of the review, erosion management overlays should be applied over a five year period to all at-risk low-lying areas to ensure that climate change risks are considered in development assessments.</li> <li>16. An <b>information program</b> should be developed and implemented on an ongoing basis to educate and inform the community of the risks posed by climate change to infrastructure and assets and of the management and planning options to deal with those risks.</li> </ol>

### 3.3.5. Increased flash flooding due to drainage system being overwhelmed

#### Increased flash flooding due to drainage system being overwhelmed

##### Issue

Drainage systems (combined underground and surface) in the Western Port region and elsewhere are generally designed to cater for 100 year ARI (annual return interval) flood flows, with the underground component being designed for a five year ARI. Rainfall projections for the region indicate that the intensity of extreme rainfall events could increase by as much as 30 percent by 2030 and 70 percent by 2070. This will increase peak flows and runoff, reducing drainage system performance and leading in turn to greater frequency or severity of flash flooding. This trend is already apparent in parts of the region due to increased density of developments. Refurbishment of existing drainage systems to increase their capacity is likely to be prohibitively expensive.

##### Adaptation measures

Approximately 25 adaptation measures were identified in relation to this issue and reviewed against the screening criteria. Measures identified cut across most adaptation types (as outlined in Table 2), with particular emphasis being given to alternative stormwater management options, improved flood mapping and data collection, clarifying and improving stormwater and emergency management responsibilities and information and changes in drainage infrastructure design standards.

##### Group recommendations

A number of the adaptation measures rated highly against the screening criteria. Recommendations in relation to three of the 'preferred measures' are as follows.

17. **Responsibility for local stormwater management** needs to be clearly defined and established in legislation. At present, there is a lack of clarity on this question, with management responsibility being shared between local councils, Melbourne Water, other water authorities, CMAs and DSE. It is recommended that DSE become the 'champion' for driving this legislative reform, with strong input being provided by other stakeholder agencies.
18. **Local stormwater levels and inundation mapping** is required across the Western Port region and other parts of Victoria taking into account intense rainfall projections under climate change scenarios. Preference should be given to a single agency (e.g. DSE or Melbourne Water) having responsibility for the task and acting as custodian for all relevant inundation and property data. Revenue mechanisms to fund the inundation mapping may need to be sought.
19. **Research into drainage design, peak flows and runoff** should be undertaken, with drainage design guidelines being revised to take account of changes to extreme rainfall intensity projected under climate change. A coordinating agency needs to take responsibility for the research at the state level (e.g. DSE).

### **3.3.6. Analysis**

In total, well over 100 adaptation options relevant to coastal inundation and inland flooding risks were identified and assessed by workshop participants (see Appendix 3.1). The range of options considered reflects the complexity and diversity of potential impacts of climate change on coastal inundation and flooding.

Of the 19 ‘preferred measures’ recommended by workshop groups (see sections 3.3.2 to 3.3.5), many have a planning and legislative focus. This indicates a perception amongst workshop participants that key planning policies, supporting legislation and decision-making processes have not kept pace with emerging understanding of economic, social and environmental implications of climate change, particularly with respect to coastal impacts.

There are also a number of recommendations with a research focus. This suggests a desire by decision-making agencies to improve the quality of information prior to committing to other, more definitive, policies and measures. Nevertheless, a strong sentiment also came through from workshop participants that imperfect information should not be used as a justification for avoiding decision-making on issues relevant to coastal impacts of climate change.

Community and stakeholder education programs are the other major category of measures proposed. As discussed later in this report, a major theme that has emerged through the course of the Western Port Integrated Assessment project, one that was reinforced in the adaptation phase, is the need for communities in the Western Port region (and elsewhere in Victoria and Australia) to be better informed about the potential impacts of climate change, what is known and what is uncertain and the range of measures that are being considered (and in some cases already being initiated) to respond to climate change in the region.

## **3.4. Responding to increased frequency and intensity of wildfires**

### **3.4.1. Approach**

The workshop ‘Responding to Increased Frequency and Intensity of Wildfires’ was conducted over a half day on 6 June, 2008 at the City of Casey. Approximately 20 people participated in the workshop, including representatives of four of the five member councils of the WPGA, various state government departments and agencies and emergency management organisations (see Appendix 2 for a list of participants).

Only one priority climate change risk ‘increase in frequency or intensity of wildfires’ (see Table 1) was considered in the workshop session. However, the generic nature of this risk meant that it was useful to break down the issue into three major aspects, which were considered separately in three different sub-groups:

- wildfire prevention;
- wildfire preparation and response, including emergency management; and
- recovery.

Within each sub-group, workshop steps were implemented as set out in 3.2.2 - with one key difference. Unlike other priority risks considered in the adaptation phase of this project (see sections 3.3 and 3.5) response measures to wildfire hazards are assumed to be well developed already in the region. For example:

- WPGA member Councils all have Municipal Fire Prevention Plans, operate Emergency Management Planning Committees and have a co-ordinating role in Municipal Fire Prevention Committees (MFPC);
- the Country Fire Authority (CFA), as well as having a regional office and numerous local brigades, provides policy, planning, standards for training and best practice advice in Municipal Fire Prevention. The CFA is also represented on the region's Municipal Fire Prevention Committees and carries the audit responsibility for Municipal Fire Prevention Plans; and
- the Department of Sustainability and Environment (DSE) has fire management responsibility for public lands in the region and has in place a Fire Protection Plan for the East Port Phillip fire district which includes all of the Western Port region.

Because of this situation, steps 3 and 4 of the workshop (see section 3.2.2), rather than being focussed on identifying and assessing new adaptation measures, were focussed on identifying and assessing the adequacy of existing policies and programs. Thus the criteria used to assess these programs were slightly different to those previously discussed. The alternative criteria used in the 'wildfires response' workshop are outlined in Table 4 below.

**Table 4: Criteria for Assessing Existing Wildfire Policies and Programs**

Criterion	Description
<b>Effectiveness</b>	<ul style="list-style-type: none"> <li>▪ Is the existing measure, program or strategy likely to be fully effective in meeting its stated objective in the face of increased bushfire frequency or intensity?</li> </ul>
<b>Resources / funding</b>	<ul style="list-style-type: none"> <li>▪ Is the program adequately resourced / funded to meet the challenge of increased frequency or intensity of wildfires?</li> </ul>
<b>Roles, responsibilities and communications</b>	<ul style="list-style-type: none"> <li>▪ Are existing roles and responsibilities and channels of communication clearly defined in relation to the program or measure?</li> </ul>
<b>Flexibility</b>	<ul style="list-style-type: none"> <li>▪ Can the program be readily scaled up or down depending on need?</li> <li>▪ Is the program flexible to new information about climate change and other drivers of wildfire?</li> </ul>
<b>Political feasibility and community acceptance</b>	<ul style="list-style-type: none"> <li>▪ Would a significant scaling up / strengthening of the program or measure be politically feasible?</li> <li>▪ Would it be likely to have broad community support?</li> </ul>
<b>Concurrent effects</b>	<ul style="list-style-type: none"> <li>▪ Would other benefits (other than improved wildfire management) flow from a significant scaling up or strengthening of the program?</li> </ul>

Similarly, once policies and programs had been identified and assessed, the focus in the recommendations step of the exercise (step 5) was on ways forward to build on existing programs.

The following sections (3.4.2 to 3.4.4) summarise in tabular format the major issues and outputs from the four workshop sub-groups. Analysis of outcomes from the workshop is set out in section 3.4.5.

### 3.4.2. Wildfire prevention

#### Responding to increased frequency and intensity of wildfires – wildfire prevention

##### Issue

Over the past two decades or more a great deal of effort has been put into wildfire prevention in the Western Port region, as elsewhere in Victoria. A wide range of agencies and organisations have been involved in this effort. As discussed in Chapter 5 of the report 'People, Property and Places', there is no apparent trend in lives lost and properties destroyed in the region by bushfires over the past century despite a significant increase in the number of people and properties exposed to wildfires. This outcome can almost certainly be put down to improvements in wildfire prevention and management (see following section), especially in recent decades. An increase in extreme fire weather conditions projected for the region could increase the frequency and intensity of wildfires in the future unless further improvements are made to wildfire prevention policies and programs.

##### Existing policies and programs

Eight major policy and program areas were examined in relation to this issue and reviewed against the screening criteria. The policies examined were:

- fire prevention mapping (identification of fire prone areas);
- fire management planning (risk reduction in fire prone areas);
- integrated fire management planning (cross-agency management and risk reduction);
- planning enforcement (enforcement of fire prevention measures on private property);
- prescribed burns (reduction of fuel loads on public lands by DSE);
- restructure and acquisition areas (development controls in highest fire prone areas); and
- community education (risk awareness raising and resilience building of vulnerable communities).

##### Group recommendations

A review by workshop participants of current wildfire prevention policies and programs in the context of climate change resulted in the following recommendations being proposed.

1. **Co-ordination and communications between agencies** involved in wildfire prevention needs to be improved. Despite progress in this area, including the establishment of Municipal Fire Prevention Committees for example, the general view of workshop participants is that partnering and relationships between agencies can and should be further improved. All relevant agencies need to be involved including DSE, OESC, DPCD, Councils, CFA and MFB.
2. **Integrated fire management plans (IFMPs)** should be implemented throughout the region. The implementation of these plans will ensure consistency of fire management practices and standards between agencies. All relevant agencies will need to be involved, with adequate funding for development and implementation of the plans provided at the state level.
3. **Strategic resource planning** to identify equitable funding and other resource needs for prevention, preparedness, response and recovery, needs to be undertaken to complement IFMPs and other fire management strategies.
4. **Uncertainties and inconsistencies between wildfire management and native vegetation management** need to be removed. This will require a clear process to resolve native vegetation and wildfire management objectives including through amendments to the Victorian Planning Provisions (VPP) and reconciliation of Wildfire Management Overlays (WMO) and the National Vegetation Framework (NVF).
5. **Greater community ownership of wildfire management** should be encouraged, recognising that local communities are key players in the issue. Specific measures to achieve this objective should be examined including insurance subsidies to property owners who initiate prevention and response plans and a community / property owner grants program.

### 3.4.3. Wildfire preparation and response

#### Responding to increased frequency and intensity of wildfires – preparation and response

##### Issue

A great deal of effort has been put into wildfire response in Victoria, including in the Western Port region. Response measures (in conjunction with wildfire prevention measures) have contributed greatly to minimising the loss of lives and property to bushfires in the region. However, an increase in extreme fire weather conditions projected for the region could increase the frequency and intensity of wildfires in the future unless further improvements are made to wildfire response policies and programs.

##### Existing policies and programs

Five major policy and program areas were examined in relation to this issue and reviewed against the screening criteria. The programs examined were:

- inter- and intra-agency communication (to achieve co-ordination of response);
- ground and air resources (to achieve timely and appropriate fire response and intelligence);
- community information (public health and safety);
- information technology (field intelligence, command structure, networked communities); and
- response preparedness (training, rosters, contact lists, Incident Control Centres, Municipal Emergency Coordination Centres).

##### Group recommendations

A review by workshop participants of current wildfire response programs and measures in the context of climate change resulted in the following recommendations being proposed.

6. A **coordinated network of information technology (IT) solutions** should be developed to assist wildfire response across relevant agencies such as DSE, OESC, MAV, Councils, CFA, SES and EPA. The IT solutions package will require compatibility of local area networks (LANs) as well as high levels of security and information privacy.
7. An **inter-agency communications strategy** is proposed to formalise existing networks into a structured communications process. The strategy should define agency information and communications roles, include protocols (e.g. on smoke management, public health, water quality) and involve a capability analysis and communications training.
8. Alternative **funding/resourcing models** should be considered for funding of wildfire management programs, with the aim of extending funding cycles. Extending financial planning horizons will assist strategic planning of wildfire response and help integration of agency response. The Department of Treasury and Finance will need to work closely with relevant agencies such as DSE, CFA and OESC.
9. A **national accreditation scheme for wildfire training** is proposed. The purpose of the scheme is to achieve consistency in wildfire training between states and agencies and to drive cultural change. The accreditation scheme should include a range of modules covering different aspects of wildfire management. Relevant training and research bodies such as TAFE and CRCs should work with fire and emergency management agencies and the Australasian Fire Authorities Council (AFAC) on the issue.
10. A **co-ordinated community information strategy** on wildfire response is required to overcome current disconnections between some aspects of community wildfire information programs. Development of the strategy will require dialogue between all relevant agencies at the state level. An important part of the strategy will be to ensure that key messages are agreed between agencies and conveyed to the community at the start of each fire season.

### 3.4.4. Recovery

#### Responding to increased frequency and intensity of wildfires – recovery

##### Issue

Providing emergency relief and rebuilding local communities are vital aspects of responses to major natural disasters such as bushfires. Numerous agencies and non-government organisations (NGOs) are involved in recovery efforts, but local councils have an especially important role in terms of co-ordinating relief and recovery at the municipal level. The prospect of an increase in the frequency or severity of bushfires and other natural hazards in the Western Port region under climate change scenarios focuses attention on the capacity of councils, NGOs and local communities to meet ongoing recovery demands in the future.

##### Existing policies and programs

Eight major policy and program areas were examined in relation to this issue and reviewed against the screening criteria. The programs examined were:

- emergency recovery plans (procedures and resource information);
- inter-agency fire management planning (co-ordination of fire management including recovery);
- CALM (Casey Alert Location Manager – a GIS based pilot program that has potential for wider application);
- funding (adequacy of funding for recovery works and emergency / hardship needs);
- research and monitoring (learning from recovery experience);
- succession planning (to ensure continuity of service, especially at the municipal level);
- recovery exercises (to test and enhance capacity); and
- post event checklist (new measure being developed by OESC to target assistance).

##### Group recommendations

A review by workshop participants of current wildfire recovery programs and measures in the context of climate change resulted in the following recommendations being proposed.

11. The **critical role of municipal recovery managers** in coordinating local response to bushfires and other natural disasters needs to be better recognised at the state and local government levels. This can be achieved by: legislating the role of a municipal emergency recovery manager in relevant state legislation; providing adequate resources at the state level; instigating a training program and guidelines for the role including succession planning; and incorporating the role in emergency management plans.
12. **Management responsibility for relief centres** should be more clearly defined by Councils and DHS to ensure better co-ordination of relief centres between Councils. Guidelines on management of relief centres and lists of available trained facility managers also need to be drawn up.
13. **Research into effectiveness of recovery efforts** is recommended with the objective of improving information and knowledge-sharing on recovery, especially at the municipal level. A recovery ‘toolkit’ for municipalities would be a valuable output of the research. Emergency Management Australia will have an important role in funding the research, with key input to come from local government, state agencies and CRCs.
14. Current **community information programs** should be evaluated and redesigned to achieve more effective preparedness and recovery of communities to bushfires. ‘Recovery’ should be integrated into the information programs. Current programs, such as ‘Fire Ready Victoria’, have made valuable gains in educating the community about fire risks and preparedness, but many people in at high fire risk area remain complacent and underprepared.

### **3.4.5. Analysis**

In total, over 20 policy and program areas were assessed by workshop participants, resulting in 14 recommendations to governments and agencies aimed at improving wildfire prevention, response and recovery in the Western Port region and in Victoria more widely.

Only a few of the recommendations could be said to relate directly to the risk of ‘increased frequency and intensity of wildfires’ due to climate change, in that many if not most of the recommendations have merit regardless of the climate change issue, i.e. they are ‘no-regrets’ measures. In one respect, this outcome is to be expected, given that workshop participants were asked to review existing policies and programs. More importantly in the context of climate change adaptation, the approach by the workshop groups of focusing on ‘no-regrets’ measures fits comfortably with established principles relating to ‘good practice climate change adaptation’ (see for example, Willows & Connell, 2005). Thus the process of assessing ‘increased intensity and frequency of wildfires’ due to climate change has provided an important catalyst for considering changes and improvements to existing approaches to wildfire prevention, management and recovery.

There is significant overlap in the recommendations of the three sub-groups, with particular focus in all groups being given to improving inter-agency co-ordination and information, education and training. The overlap in responses recommended by the three sub-groups points to the nature of the issues being considered – effective wildfire management requires an integrated approach and as the groups noted themselves on a number of occasions, it is not always appropriate or easy to separate out prevention, response and recovery. Encouragingly therefore, the overlap in recommendations of the three sub-groups points also to consistency in their thinking.

## **3.5. Communities dealing with climate change**

### **3.5.1. Approach**

The ‘Communities Dealing with Climate Change’ workshop was undertaken on Friday 6<sup>th</sup> June. Approximately 20 representatives from four of the five WPGA member councils, state government agencies, departments and utilities attended and participated in the half day session.

The workshop participants were divided into three sub-groups to consider three aspects relating to communities dealing with climate change (risk 7 in Table 1):

- general community anxiety and uncertainty about climate change and the impacts of climate change;
- loss of community wellbeing due to climate change and the impacts of climate change (with a particular focus on vulnerable groups); and
- increased pressure on volunteer organisations associated with greater frequency and/or intensity of climate related natural hazards.

Within each sub-group, workshop steps were implemented as set out in 3.2.2. Whole group sessions were woven into the proceedings to allow feedback and interaction between the sub-groups. The following sections (3.5.2 to 3.5.5) summarise in tabular format the major issues and outputs from the three workshop sub-groups. Analysis of outcomes from the workshop is set out in section 3.5.5.

### 3.5.2. General community anxiety about climate change

#### General community anxiety about climate change

##### Issue

General community anxiety about climate change results primarily from shortcomings with the availability and quality of climate change information (too limited, too much, too many sources, difficult to interpret, credibility of sources, etc), combined with general uncertainty surrounding an individual's ability to cope when the need arises, and the inadequacy of government responses in addressing the issue. Complexity of the issue is compounded even more by the diversity of our communities.

##### Adaptation measures

Twelve adaptation measures were identified in relation to this issue and reviewed against the screening criteria (see Table 3). Discussions largely centred on improving the information and messages relating to climate change that are provided to the community. In particular, a trusted central authority to disperse common and relevant messages was seen as essential to enhance understanding and empowerment within the community. A logical approach to reducing community anxiety was set out and included the sequential steps:

- research into community needs;
- development of communications package; and
- empowering community and government leaders.

##### Group recommendations

A number of the adaptation measures rated highly against the screening criteria. Recommendations on three of the 'preferred measures' are as follows.

1. **Research** should be undertaken to help clarify: the current level of understanding and acceptance within the community on climate change and, what information they require and how and from whom they want to hear it from. It is proposed that a central State Government department such as Department of Planning and Community Development (DPCD) takes the lead in this. This research should be undertaken prior to the development of a communications package to ensure the community is engaged and the results appropriate.
2. **Development of a communications package** will be a vital tool in overcoming some of the community anxiety relating to climate change. It is important that this package does not duplicate existing work but brings together the efforts of various agencies already working in the area. This research should be undertaken on a 'whole of government' basis and acknowledge all agencies and governments currently working in the area. DPCD is again seen as an appropriate lead agency.
3. Following development of the communications package, **delivery of information** should be undertaken by a wide range of agencies with a role in the community (as outlined above). Funding should be pooled within State Government and programs should not replicate existing community programs and efforts. Importantly, any programs that are established should focus on 'train the trainer' for maximum effect and cost-benefit.

### 3.5.3. Loss of community wellbeing due to climate change

#### Loss of community wellbeing relating to climate change

##### Issue

Loss of wellbeing due to climate change is principally concerned with individuals or groups in the community who are most vulnerable to the impacts of climate. Individuals or groups within the community can be classified as being particularly vulnerable to climate change based broadly on their:

- socio-economic status (e.g. low income);
- age and level of mobility (e.g. infants, elderly and people with disabilities);
- proximity to physical threats that are likely to be impacted by climate change;
- lack of access to assistance or services; and
- inability to access relevant information.

It is these groups who will be at greatest risk from climate change events, but may in fact be the most difficult to assist with preparation.

##### Adaptation measures

Seven adaptation measures were identified in relation to this issue and reviewed against the screening criteria (see Table 3). A further 13 measures were identified and noted. Of those that were further screened, most were seen to be feasible and could be undertaken immediately. Adaptation measures once again were centred on providing more targeted information to vulnerable communities. Other measures considered include: improvement of support services; better planning of vital infrastructure; cross sectoral coordination and policy improvements.

##### Group recommendations

A number of the adaptation measures rated highly against the screening criteria. Recommendations on these measures are as follows.

4. **Research** should be undertaken to enhance communications on climate change to vulnerable groups. A lead organisation should be established at a national level to coordinate the research. A long list of agencies including government departments, community and welfare groups and research institutions are relevant to this recommendation and therefore a coordinated effort is required.
5. **Education and information programs** should be undertaken in a coordinated and strategic manner. It is important that the messages are tailored and made easily accessible to vulnerable groups. Non-traditional communications programs should be investigated, for example via sporting clubs.
6. **Planning of residential areas** in close proximity to community hubs should be improved to increase access to climate change information and relevant services by vulnerable groups.
7. **Support services and assistance measures** for vulnerable groups in coastal communities should be identified and assessed.

### 3.5.4. Increased pressures on volunteer organisations

#### Increased pressures on volunteer organisations

##### Issue

Pressures on volunteer organisations already exist and are likely to be further complicated by more frequent and extreme weather events projected under climate change scenarios. More specifically, organisations are likely to face issues to do with volunteer fatigue, increased training requirements, family and business continuity during prolonged events, access to adequate skill and infrastructure and increased legislative and insurance risks.

##### Adaptation measures

A total of 16 adaptation measures were identified in relation to this issue and reviewed against the screening criteria (see Table 3). Each of the measures fits within one of the three categories briefly described below:

- **Support and protect volunteers** including while away from work, insurance and income protection, recognition and access to support services.
- **Support volunteer organisations** through promotion and recruitment of more volunteers, increased access to skills development, training and infrastructure to carry out their role.
- **Coordination of volunteer resources** especially by ensuring that training is consistent across regions and that skills and resources of volunteer organisations are registered.

##### Group recommendations

A number of the adaptation measures rated highly against the screening criteria. Recommendations on four of the 'preferred measures' are as follows.

8. **Critical incident support for volunteers** should be developed and enacted to ensure volunteers are supported during difficult times and are capable of continuing their service. The support should include support services for stress as well as recognition of efforts, which may also serve as communications for continuing volunteer uptake. Support services should be built in to existing roles (mentors/leaders) and systems (debrief). The primary agencies likely to be involved include the Department of Human Services (DHS) and Department of Planning and Community Development (DPCD).
9. **Manage the overuse and over commitment of volunteers.** Managing volunteers' time and commitment should be the role of each volunteer organisation. However, agencies such as DHS and DPCD should be responsible for equipping them with the resources and managerial skills to ensure that this does not occur.
10. **Resources and infrastructure to support volunteers** will allow volunteer organisations to better respond to events. Long term infrastructure planning, which includes volunteer support and maintenance, is recommended, as well as including volunteer support in existing emergency management planning.
11. **Training of volunteers and volunteer leaders** should be increased using existing forums and structures to enhance response skills of volunteer personnel. All agencies involved in emergency response should be involved to ensure it remains an issue of shared responsibility.

### **3.5.5. Analysis**

In total, over 30 policy and program areas were assessed by workshop participants, resulting in 12 recommendations to governments and agencies. Recommendations can be grouped into three broad areas:

- coordinated and targeted climate change communications;
- focussed policy and planning measures to assist vulnerable groups to deal with climate change; and
- increased recruitment, support and recognition of volunteers and volunteer organisations.

These groupings reflect the diversity of topics discussed in the community workshop.

There is a particular focus in the recommendations on improving information flows on climate change to the community, especially to vulnerable groups. While climate change information is widely distributed and promoted by governments, and agencies, a coordinated approach to communications is essential for building trust and learning within the community. Communications should be targeted to ensure that they are efficient and effective. Non-traditional methods of engagement investigated.

Recommendations relating to volunteer capacity to deal with climate change events appear to focus on solutions to existing problems to do with retaining volunteers and ensuring that there are adequate resources within the voluntary sector to respond to community needs. As such, these recommendations can be considered ‘no-regrets’ measures and, arguably, there is a case for governments and agencies to actively pursue these measures irrespective of the climate change issue.

## **4. CONCLUSIONS AND NEXT STEPS**

### **4.1. Risk assessment and adaptation – a recap**

As previously noted, well over 200 climate change risks were identified through the course of the risk assessment phase of the Western Port integrated assessment project that was undertaken with the five WPGA Councils. Of those 200 risks, only seven were carried forward for consideration in the adaptation phase of the project. That phase in turn, resulted in over 150 policies and measures being identified and considered. This outcome indicates the magnitude of the task involved in identifying and assessing adaptation measures for all potential impacts and risks of climate change and points to the critical importance (in terms of resources and efficiency) of prioritising climate change risks and adaptation response.

The risks identified and recommendations on adaptation responses described in this report do not necessarily represent the views of the project partners or of the organisations represented by workshop participants. Nevertheless, it can be argued that the workshop participants provide a reasonable cross-section of the government agencies and other policy making organisations that will have a role in responding to the impacts of climate change in the Western Port region and elsewhere in Victoria. Further, the organisations and individuals involved in the risk assessment and adaptation phases have given considerable thought to the issue of climate change impacts over the two year life of the project and therefore are well placed to provide insights into policies and programs that need to be implemented as part of the next stage of responding to the impacts of climate change in the Western Port region

A number of other generic issues have emerged from the adaptation phase of the project which point to major factors to consider when carrying forward the project outputs. These issues are discussed in the following sections.

### **4.2. Whole of government and agency approach**

Many, if not most of the recommendations described in the previous sections, although framed in the context of climate change risks and adaptation responses in the Western Port region, have relevance to other parts of Victoria and Australia. This indicates that implementation of the recommendations will, in most cases, require the involvement of all three tiers of government, as will effective response to climate change impacts more generally – a point emphasised in Box 8.13 of the Western Port integrated assessment report ‘People, Property and Places’.

The need for a coordinated approach between the three levels of government and within departments and agencies - to ensure efficiency and effectiveness of response - is also a consistent theme in the recommendations of the adaptation workshops.

### **4.3. Assessing and resourcing policies and programs**

Probably the most significant barrier identified by workshop participants to effective implementation of adaptation response measures is lack of resources or funding. This is a particular concern for local councils which, notwithstanding the importance of a whole of government approach stressed previously, are likely to have responsibility for implementing a significant share of adaptation response measures ‘on the ground’. The potential for resource constraints limits raises two significant points in turn:

- first, as outlined in Figure 4, adaptation responses will in many cases produce net benefits to society, but even the most promising measures are not cost free. This again highlights the importance of prioritising risks and adaptation measures – an approach sought through Phases 3 and 4 of this project. It also highlights the need for further assessment of preferred adaptation measures, especially those likely to involve significant cost; and
- second, as outlined in Box 8.13 of the Western Port integrated assessment report ‘People, Property and Places’, the Federal and State Governments will have important roles as funding providers of adaptation measures at the regional and local levels.

#### **4.4. Community engagement**

Community education is a significant aspect of recommendations pertaining to all risks examined in the adaptation phase of the project, indicating recognition by workshop participants that effective response to the impacts of climate change in the region will not be achieved unless communities are fully engaged in all aspects of the climate change issue. Careful consideration needs to be given to the most appropriate channels through which to achieve this engagement but past experience indicates that engagement of the community by decision makers is best achieved at the local level – through local councils, NGOs and co-ordinating bodies such as the WPGA.

♦ ♦ ♦

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## APPENDIX 1: RISK ASSESSMENT PROCESS

### Risk Assessment Process

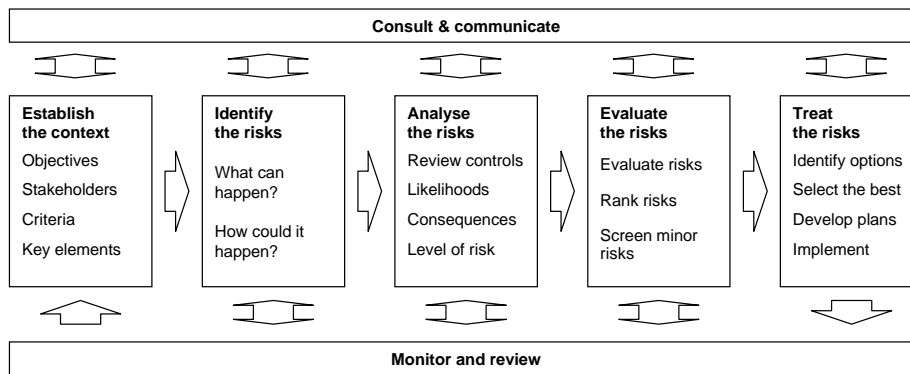
#### Process overview

The risk assessment will follow the approach set out in the Australian Greenhouse Office guide “Climate Change Impacts and Risk Management”. This is based on the Standard AS/NZS4360:2004, Risk Management.



The main stages of the Standard process are illustrated in Figure 5.

**Figure 5: AS/NZS4360 stages**



The process can be summarised very briefly as:

- understanding what is at risk, how risks are to be identified and how they are to be evaluated (establishing the context);
- identifying, analysing and evaluating risks; and,
- developing and implementing treatments and measures to deal with the risks.

The initial pass through the process is usually implemented in three stages, prior to the iterative monitoring and review cycle. Figure 6 illustrates the three initial stages and the inclusion of climate change scenarios in the context of the assessment.

The preparation stage (establishing the context) has been conducted to produce this briefing note. Risk assessment (identifying, analysing and evaluating the risks) will be addressed initially in a workshop.

Treatment will be considered following the workshop and may be accompanied by more detailed investigation of some risks. Treatment is likely to begin with further analysis of the most significant risks and the preparation of plans for practical measures to deal with them.

The overall climate change risk management process and the relationship between initial screening and later detailed analysis, where it is required, are illustrated in Figure 7. The workshop mentioned above represents the top row in Figure 7. The Standard defines risk in terms that allow for both desirable and undesirable outcomes of uncertainty; sometimes

termed threats and opportunities. It is clear that some of the effects of climate change may have beneficial outcomes and the Council will wish to anticipate and exploit these as well as preparing to deal with adverse consequences.

This exercise will concentrate on risks with negative outcomes since:

- the Council’s existing risk management framework is not suited to examining opportunities;
- the participants are more familiar with this interpretation of risk; and,
- threats will, at least initially, attract the most attention when the results of the impact studies are released.

### Workshop process

The main part of the workshop will step through a set of topics, referred to in the Standard as Key Elements, which will provide a structure for the risk identification and analysis.

During the risk workshop we will take each key element in turn, brainstorm risks associated with that element, and then analyse the consequences and likelihoods of those risks. Risks will be recorded in the form illustrated in Figure 8 with a central description linked to a note of what could cause it and what consequences it could have. This has been found to enhance the efficiency of the process and the clarity of the outcome.

Figure 6: Process steps

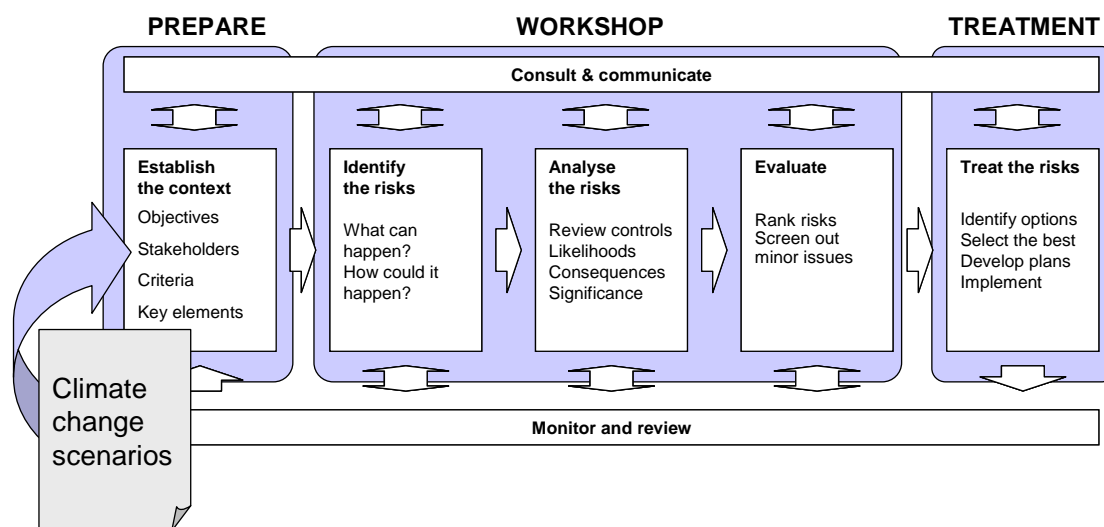
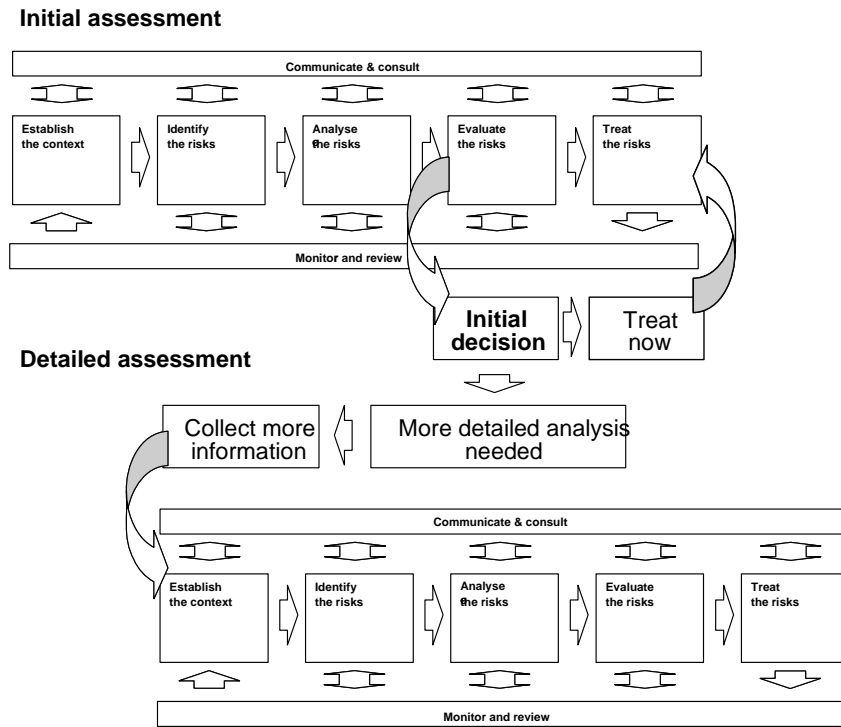
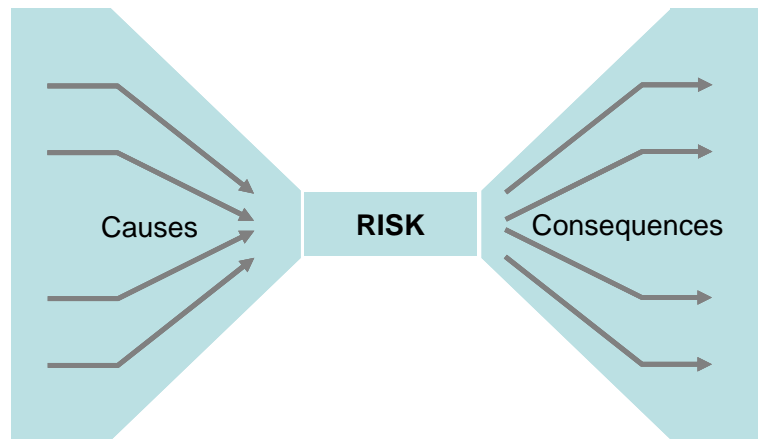


Figure 7: Overall climate change risk management process

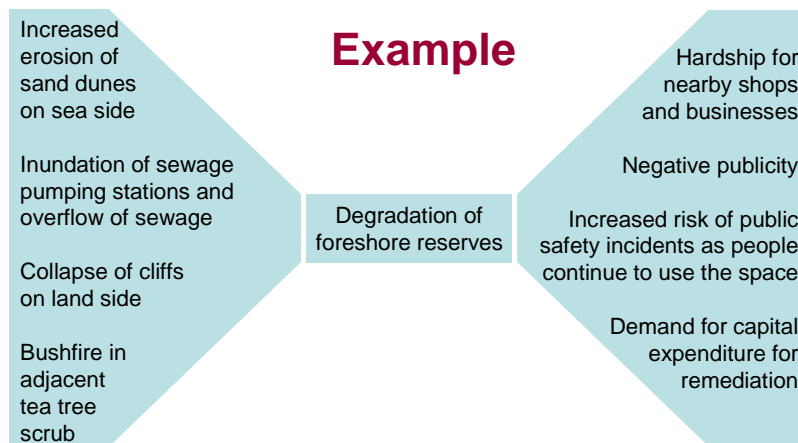


**Figure 8: Risk recording**



A hypothetical example is shown in Figure 9.

**Figure 9: Risk statement**



For each risk, the analysis will consist of the following steps.

- Step 1** – Focus on the short term.
- Step 2** – Note any existing controls that tend to mitigate the risk. These may be factors that tend to reduce the likelihood of a risk occurring or limit its consequences if it does occur.
- Step 3** – Taking account of those controls, assign the risk a consequence rating and a rating for the likelihood of incurring that level of consequence, using the tables in Section 2.4.
- Step 4** – Focus on the medium term.
- Step 5** – Check whether any different controls may be relevant to this time period and record them if necessary.
- Step 6** – Taking account of relevant controls, assign the risk a consequence rating and a rating for the likelihood of incurring that level of consequence.
- Step 7** – Focus on the long term.
- Step 8** – Check whether any different controls may be relevant to this time period and record them if necessary.
- Step 9** – Taking account of relevant controls, assign the risk a consequence rating and a rating for the likelihood of incurring that level of consequence.

The assignment of consequence and likelihood ratings may require reference to the climate change scenarios (section 2.3) - to understand the nature of the consequences that could be faced and likelihood of those occurring - before using the tables to assign a consequence and likelihood rating.

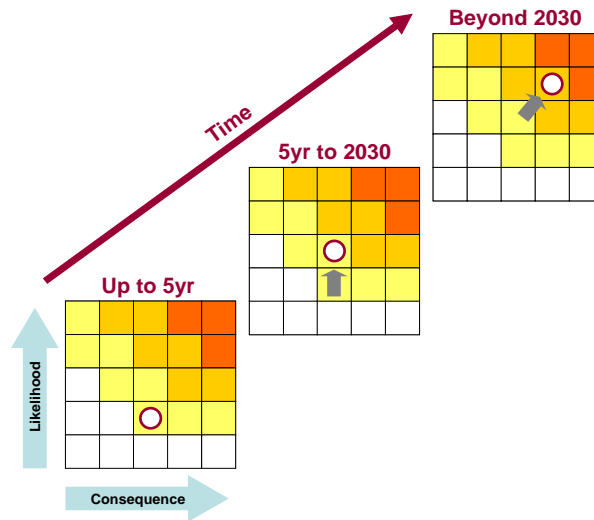
To ensure that we take full account of the emerging nature of climate change risk, we will rate risks at three points in time:

- within the Council’s current planning horizon;
- beyond the Council’s planning horizon to the year 2030, when we have an initial projection of the changes that might arise; and,
- beyond 2030, using the 2070 projection as an indication of long term prospects.

This is illustrated in Figure 10.

It is important to note that risks that will not become serious until beyond 2030 or even towards 2070 might be affected significantly by Council's actions and decisions in the next few years, especially in relation to land use planning and infrastructure provision. Some of these risks might be seen as alerting Council to potential future opportunities and liabilities that should be taken into account in short to medium term decision making in case these decisions have unforeseen implications for the future due to the effects of climate change. While the time scale of some of the risks may appear to be so long that they fall outside the scope of immediate planning processes, in future they might be seen to be linked to decisions made now.

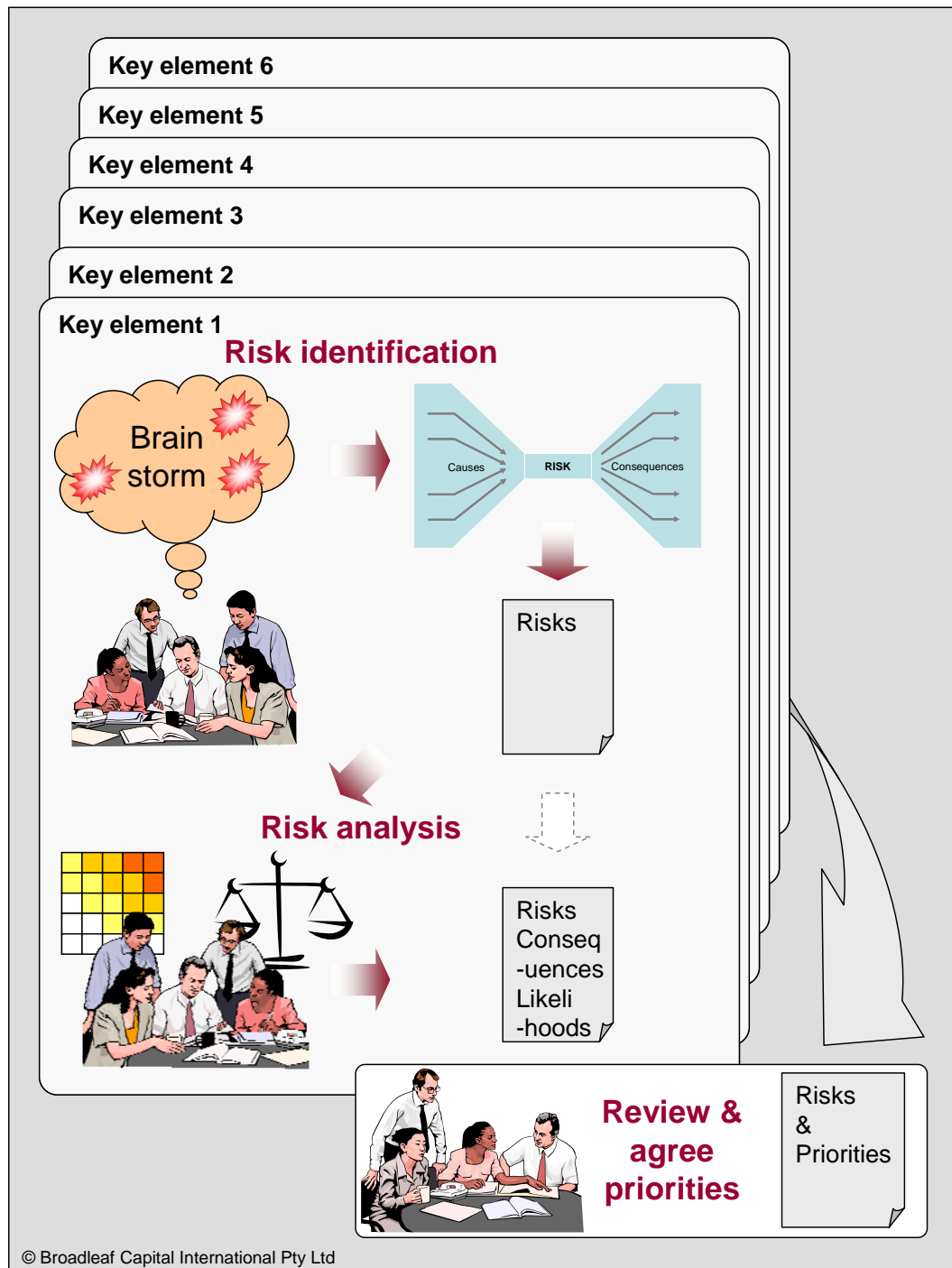
**Figure 10: Rating time periods**



When we have completed all key elements, we will review the risks and confirm the levels of priority that have been assigned. Where necessary, priority scores will be adjusted to reflect the agreed view of the workshop participants.

The workshop process is summarised in Figure 11.

Figure 11: Workshop process



## 5. APPENDIX 2: WORKSHOP PARTICIPANTS

### Risk Assessment Workshops

#### Bass Coast Shire

Name	Role
Stephanie Symes	Economic Development Manager
Jeanette Draper	Social Planner
James Bremner	Local Laws Administrator
Alison Kingston	Risk Management Coordinator
Liz Wright	Community Services Manager
Martin Gill	Strategic Planner
Paul Smith	Environment Manager
Shaun Young	Environmental Project Officer
Derek Hibbert	Environmental/Coastal Officer
Joel Geoghegan	Landcare Project Officer
Fred Mazyrko	Works Engineer
Hannah Duncan-Jones	Planning and Environment Director (part attendance)
Dr Stephen Grey	Broadleaf - Facilitator
Peter Kinrade	MJA - Integrated Assessment Project Manager
Dr Sam Beckett	Broadleaf

#### Cardinia Shire

Name	Role
Ian Stevenson	Manager Environment & Heritage
Janene Vurlow	Environmental Planner
Simone Ryan	Communications Officer
Jim Davine	Manager Sustainable Communities
Graeme Stephenson	Recreation Services Coordinator
Jan Bayliss	Risk Management Officer
Marcelle Bell	Strategic Planner
David Esmore	Coordinator Environmental Health Services
David Stewart	Municipal Fire Prevention Officer
Paul Dickson	Emergency Management Coordinator
Dr Stephen Grey	Broadleaf - Facilitator
Peter Kinrade	MJA - Integrated Assessment Project Manager

## **City of Casey**

<b>Name</b>	<b>Role</b>
Michael Jansen	Team Leader Environment.
David Richardson	Manager Engineering and Environment
Sonia Rappell	Senior Strategic Planner
Robyn Bowen	Manager Arts and Leisure
Ron Chidgey	Community Project Officer
Janette Green	Manager Youth and Community Development
Glenda McMillan	Risk Management Coordinator
Brendan Ball	Community Planner
David Westlake	Environmental Projects Officer
Trevor Griffin	Manager Parks and Reserves
Caroline Bell	Manager Community Safety
Rob Pedder	Manager Organisational Strategy.
Sean La Fontaine	Team Leader Health
Dr Stephen Grey	Broadleaf - Facilitator
Peter Kinrade	MJA - Integrated Assessment Project Manager

## **City of Frankston**

<b>Name</b>	<b>Role</b>
Garry Slack	Manager major Projects
Chris Innes	Risk Management Coordinator
Peter Harrison	Manager Aged Services
Liz Daley	Manager Community Projects
Mandy Gatliff	Manager Family Services
Paul Sandells	Manager Parks and Leisure
Libby Anthony	Manager Environment
Michael Craighead	Manager Governance and Customer Relations
Maxine Sando	Marketing Services Manager
Marshall Kelaher	Manager Urban Strategy
Sam Jackson	Economic Development Coordinator
John Williams	Property and Buildings Coordinator / A/Manager Infrastructure
John Eichler	Strategic Planning Coordinator
Ken Poulter	Engineer Development Coordinator
Craig Hinton	Senior Arborist
David Welsh	Team Leader City Works
Sian Jones	Sustainable Resource Officer
Dr Stephen Grey	Broadleaf - Facilitator
Peter Kinrade	MJA - Integrated Assessment Project Manager

## **Mornington Peninsula Shire**

<b>Name</b>	<b>Role</b>
Rolf Freeman	Energy Officer
Barry Pankhurst	Manager Renewable Resources Team
Shane Murphy	Manager Economic Development
John Annear	Manager Infrastructure Maintenance
Grahame Robertson	Fire Prevention Officer
Glen McAliece	Drainage Systems Engineer
Alan Prentice	Team Leader Infrastructure Strategy
Derek Rotter	Team Leader Project Management
Noel Buck	Manger Governance & Corporate Support
Craig Cinquegrana	Acting Director. Infrastructure, Acting Executive Director, Waste Management
Simon Thorning	Team Leader Natural Systems
Tracey Limpens	Strategic Planner – Coasts
Roz Franklin	Scheme Review & Systems, Strategic Planning
Anna Poulos	Corporate Planning & Projects Facilitator
Todd Trimble	Manager Communications
Garrique Pergl	Strategic Planner – Natural Systems
Bruce Douglas	Director, Infrastructure
Dr Stephen Grey	Broadleaf - Facilitator
Peter Kinrade	MJA - Integrated Assessment Project Manager

## Adaptation Workshops

### Planning and infrastructure responses to coastal and inland flooding

John Annear	MPS	Manager Infrastructure Maintenance
Tracey Limpens	MPS	Strategic Planner - Coastal Planning
Bruce Douglas	MPS	Director Sustainable Infrastructure
Glen McAliece	MPS	Drainage Engineer
Barry Pankhurst	MPS	Manager Renewable Resources
Roz Franklin	MPS	Team Leader Scheme and Systems Review
Colin Myers	MPS	
Chris Wallis	MPS	Risk Assessor
Annette Hatten	CCB	
Jack Krohn	DSE	Manager Sustainability Programs
Garth Bradbury	DSE	Public Assets
Nick Ronan	DSE	
Liz Patterson	DSE	Acting Manager Coasts and Alps
Mike Kearney	Melb Water	
Carolyn Tsioulous	Melb Water	Program Manager Climate Change
Ron Chidgey	Casey	
Sonia Rapell	Casey	
Ted Finn	Casey	Team Leader
Michael Jansen	Casey	Team Leader Environment
David Richardson	Casey	Manager Engineering and Environmental Services
Gordon Logan	SouthEast Water	
Jeff Weir	Dolphin Research Institute/ Biosphere Foundation	
Simone Stuckey	ABM	
Catherine Patterson	Bass Coast	Statutory Planner
Sharna Cole	Bass Coast	Assets
Geoff Sawyer	Bass Coast	Infrastructure
Paul Smith	Bass Coast	Environment
Simon Haber	DPCD	Planning, heritage and Urban Design
Ralph Kenyon	Port of Hastings	CEO
Ken Poulter	FCC	Traffic and Drainage Contractor
Libby Anthony	FCC	
Andrea Spiteri	DHS	Manager Emergency Management

### **Responding to increased frequency and intensity of wildfires**

Claire Smith	MPS	Manager Environment Protection
Mark Upton	MPS	Team leader Environmental Health and MRM
Graham Robertson	MPS	Municipal Fire Prevention Officer
Rolf Freeman	MPS	Energy Officer
Sam Hand	MPS	Conservation Officer
Janine Nolan	Casey	Emergency Recovery Officer
Sonia Rappell	Casey	Senior Strategic Planner
Tom Walsh	FCC	Fire Prevention and Water Project Officer
David Stewart	Cardinia	Municipal Fire Prevention Officer
Stephen Sparrow	Cardinia	Manager Community Strengthening
Lyn Denison	EPA	Principal Scientist – Air Quality
Paul Brockhoff	DSE	Port Philip Fire and Emergency Management Officer
Bronwyn Davies	DSE	Sustainability Project Officer
Jack Krohn	DSE	Manager Sustainability Programs
Chris Wyborn	CFA	Acting Manager Community Safety
Therese James	DHS	Emergency Management Officer
Loriana Bethune	OESC	Research

### **Communities dealing with climate change**

Mark D’Agostino	DHS	Regional Public Health Officer
Andrea Spiteri	DHS	Manager Emergency Management
Felicia Micallef	DHS	Emergency Management Officer
Brian Kirkby	DHS	Principal Advisor Sustainability
Claire Smith	MPS	Manager Environment Protection
Mark Upton	MPS	Team leader Environmental Health and MRM
Dennis Prendergast	MPS	Team Leader Recreation and Community Partnerships
Graham Robertson	MPS	Municipal Fire Prevention Officer
Jenny Van Riel	MPS	Manager Aged and Disability Services
Stephen Sparrow	Cardinia	Manager Community Strengthening
Therese James	DHS	Emergency Management Officer
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## APPENDIX 3: ADAPTATION WORKSHOPS OUTPUT

### Planning and infrastructure responses to coastal and inland flooding

#### GROUP 1 – UNCERTAINTY OVER OR LACK OF PLANNING CONTROLS IN AREAS AFFECTED BY COASTAL INUNDATION OR FLOODING

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Review Acts	✓	✓	✓	✓	✓	✓	✓	Main issue will be managing the political feasibility, voice of the minority will be loud – this influences the politicians
	The first step in the process – credibility and importance	Government indicated on the agenda	Not prohibitive	Important for Council – more challenging for politicians	Passive acceptance		Influences whole variety of things, affects development	
Potential climate change bill	✓	✓	✓	✓	✓	✓	✓	
	Depends on the strength of the bill	Green paper drives community awareness	Writing the bill is not prohibitive but the wide scope of the bill may have financial implications	May be some residual political issues out of it			Influences whole variety of things, affects development	
Setting sea level rise statement (benchmark)	✓	✓	✓	?	x	x	x	Could be done on national level then more detail e.g. sea level rise of 'X' metres nationally as a benchmark then more detailed at a state and local level
	It moves the debate around the answer not the range and risk	NB has been done in SA and WA. QLD and NSW under investigation	Most of work has been done		Resistance from landowners affected	Figure is set in stone unless adapted and reviewed regularly	Potential compensation land value issues etc	
Incorporate sea level and storm surge in planning scheme overlays and zones	x	x	✓	?	✓	?	x	Agencies
	Limited – only works for new redevelopment – overlays aren't as effective	Would review VPPs, would need a champion at high level	Flow on effect may be costly, mapping maybe?	Could work off similar processes e.g. SBOs, politicians need to be on board	May face some resistance from those affected though	Need to review time to time	Plenty flow on effect to other legislation	
Gap between planning system and building regulations	✓	✓	✓	✓	✓	✓	✓	
		Ongoing issue – has been identified for ages		Hasn't been seen as a priority – need consistent support		No major issues		

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Flood modelling including climate change	✓	✓	✓	✓	✓	✓	✓	
		Focus on Western Port area with applicability						
Re-engineering our thoughts on being more risk averse	✓	x ?	✓	✓	✓	✓	✓	
	If policy is implemented	Changing a mindset can take a while – not a barrier	Evidence helps					
Capacity building for decision makers	✓	x ?	✓	✓	✓	✓	✓	
		Could take a while	Not cost prohibitive					
Third party appeal rights in planning decisions based on referral authority	✓	✓	✓	?	?	x	x	
	Potentially for the authority – more objective and science required	Could be quickly depending on political feasibility	Has cost associated with VCAT	Natural justice – loss of rights for people	Community in general ok but developers not		Legal implication	
Emergency services planning	✓	✓	✓	✓	✓	✓	✓	
Short term blanket freeboard	✓	✓	?	✓	✓	✓		
	Depends on spatial parameter		Would add cost to building industry in the short term					
Better ways of expressing impacts to community	✓	x	✓	✓	✓	✓	✓	
		Long term mindset		Messages must be strategic – not dooms day			Helps other things happen	
Scenario planning – protect, retreat, accommodate, avoid existing issues, long term	x	?	x	x	x	✓	?	
	Long term – sets the scene for short term	Long term implications – short term scenario planning	Cost would be high depending on scenario	Potential too hard basket – hard to recognise and accept effort	Reality is harsh	Can adopt scenario planning as required	Compensation, cost sharing etc	
Carbon report / offsets for planning approvals (similar for native vegetation)	x	?	x	x	✓	✓	✓	
	Start small, grow big	Medium term	Money to community but good for environment	HIA and other agencies to be convinced with time				

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Undertake studies – coastal vulnerability, costing of engineering practices, terrain and water modelling	✓	x	✓	✓	✓	✓	✓	
			All government				With community engagement	
Crown land (providing sufficient reserves for public use, biodiversity and risk management)	✓	x	x	✓ x	✓ x	✓	✓	
			Other than key priority areas					
State policy (VPP), involves update of Victorian State Policy / Coastal Strategy	✓	✓	✓	✓	✓	✓	✓	
			Depends upon engineering and acquisition options				Follow up implementation	
LSIO, FO, SBO (including changed provision and practice role)	✓	✓	✓	✓	✓	✓	✓	New schedule options with objectives e.g. possible areas requiring temporary buildings only – Byron Bay example
							Education program (pre and post over by)	
DDO, RO (and practice role)	✓	✓ x	✓	?	x	✓	✓	DDO schedule – model schedule that can be adopted by all rather than re-inventing the wheel each time
		Need for evidence to support					No planning blight	
Funding to gain evidence to support DCP (or State levy)	✓	x	x	✓	x	x	?	
	Capital works maintenance		Depends on Council contribution, circumstances			Flexible to impose, flexible to change	May need to be supplemented by grants / rates revenue	
Special change schemes	✓	x	x	✓	x	x	?	
MSS changes	✓	x	✓	✓	✓	✓	✓	
		Lack of state framework		Could blow up depending on situations and content			Preferably with concurrent overlay implementation	
Develop or amend state climate change legislation – legislative change to allow ambulatory crown land	✓	x	✓	✓ ?	✓	✓	✓	Separate Act, amend existing Acts, or combination of both

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Boundaries to match zoning boundaries – need to generate a new revenue stream to fund infrastructure etc								
Organisational adjustment – development of lead agency? Advocacy and coordination?	✓	x	✓	✓	✓	✓	✓	
			Dependent on resourcing and funding					
Risk management – better emergency management and recovery plans	✓	x	x	✓	✓ ✓	✓	✓	
		Potential?	Potential – better resourcing					
Drainage approvals – new legislation, connected with building regulations	✓	x	✓	✓	✓	✓	✓	
					Engage with building development community			
Education	✓	✓	✓	✓	✓	✓	✓	

GROUP 2 – LOSS OR DEGRADATION OF BEACHES AND FORESHORE AREAS

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Change community attitudes	x	x	x	✓	✓	✓	✓	Community has to be taught that change is certain, incremental – need stronger leadership
	Can change attitude as to what they do in case of an emergency	Generational	Take funding and resources		Community wants information but has to change behaviour	Different times to different groups and different scale	Strengthens relationship with the community	
Provide leadership (State, Federal, Local government)	✓	✓	✓	✓	✓	✓	✓	Needs collaborative approaches and decision making
	Needs whole of government approach	Today	Beware cost shifting			Might be institutional, inflexible to be overcome	Strengthen relationship and decision making	
Review coastal land management responsibility outcomes	✓	✓	✓	?	✓	x	✓	
		Two years	Cost shifting	Some positive feedback from committees of management			Better management and consistency	
Streamline approach processes to get urgent works done	✓	✓	✓	?	✓	✓	✓	
				State says checks and balances				
Community education of risks, what to do in the event	✓	✓	✓	✓	✓	✓	✓	Fire response
Create inland opportunities for recreation	✓	✓	✓	✓	✓	✓	✓	Not going to solve by itself - complementary response
	Minor impact as people still want coastal experiences	Medium to long depending on action undertaken i.e. improve fire paths	Possible depending on scale and operation i.e. charging		Residents happy for recreation	Can be applied at different scales	Complementary to coastal preservation	
Increase quality and quantity of foreshore vegetation	✓	✓ x	x	✓	✓ x	✓	✓	Community engagement needs to be done, cheapest option but not necessarily the most effective
	Best way to stop erosion and improves biodiversity	Already underway, takes time with drought	Cheapest option but large amount will be required	Most Councils support	Various views are an issue		Biodiversity should be done with other measures	
Increase quality and quantity of built foreshore protection infrastructure	?	x	x	✓	✓	x	x	Needs prioritisation of values to be protected, costly and need to be prepared to live with negative effects that are trade-offs
	Variable results, must be done with understanding effects over time	Needs detailed coastal studies, decision making on values to be protected	Expensive and ongoing maintenance		Community approves of coastal protection	Inflexibility in decision but once in, stuck with it	Need to be prepared for trade off of negative effects	

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Identify a line to retreat to	✓	x	x	x	x	x	✓	Need an emergency (i.e. houses washing away) before community is prepared to accept this option
	Provides a buffer	Study data available over decade and education of community	Costly				Improves coastal buffer and could improve vegetation and biodiversity	
Better engineering knowledge of methods to protect with minimal impact	✓	✓	✓	✓	✓	✓	✓	A number of agencies and jurisdictions and research institutes could be involved, necessary and achievable
	Provides data on what works, where and when to apply	1-5 years study					Increase knowledge and information sharing, opportunity for research doctorates	
Understand implications to buy e.g. what will happen to sand moved around by storm surge floods								
More data on beaches / cliffs – which or what will erode first?	✓	✓	✓	✓	✓	✓	✓	
		Future coast study underway, needs more detailed understanding of local coastal processes	Costly if we don't start paying for research				Data sharing	
Data on sea water inundation into creeks, waterways and ground water								
Legislative reform – rezone, buyback, levy requirements for protection, development levies, tax on CO2 emitting companies								
Different rating structure / system / levy to fund works for public land protection management								
Additional detailed modelling for areas at risk now, 2030 and 2070								

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Research on "rates" of change on vegetation loss, assets impacted and coastline change (sand assets)								
Data sharing between agencies on same dataset – base – scale								
Rating / prioritising all beaches / coastal areas using triple bottom line – economic, environmental, social, recreational, private	✓	✓	✓	x	x	✓	✓	Needs transparent decision making process, communities could be competing to keep their coastal area protected, need State-wide priorities and needs partnership in decision making with State and Local governments – next coastal strategy
Identification of methods to protect with best practice guidelines, engineering approvals etc								
Sunset clause on coastal land use (crown and private land)	✓	✓	x	✓ x	x	✓	✓	Would have to decide on compensation payments or accreditation, inconsistencies in applicants
	Lease agreements contain sunset clauses and policy decisions	3-10 years	Loss of income and property values but might be cheapest option in long run	Yes if crown land only, no if includes private property		Depends on locations	Community education required	
Push "development" inland away from the coast, more "tree change" not "sea change"	✓	x ✓	✓	✓	✓	✓	✓	An adaptation coastal green wedge "sand wedge"
	If state government supports with Melbourne 2030	No if long term plan and needs cultural change – yes if state policy	Business as usual, but different locations		If inundation overlay and control over coastal development	Provides a variety of options and timelines	Win-win, whole of government approach, reduces coastal pressure	
Increase setbacks, buffer from high water mark								
Plan for gradual and also sudden change	✓	✓	✓	✓	✓	✓	✓	
		1-5 years required for emergency planning					Preparedness community, education and emergency planning	

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Partner with other agencies to monitor impacts e.g. insurance companies, port authorities, fishing clubs etc	✓	✓	✓	✓	?	✓	✓	
					Privacy information insurance companies	Gives information for decisions	Data sharing and more accurate data and strengthens partnerships	
State government legislation on coastal reserve retention versus private property	✓	x	x	x	x	x	✓	Community anxiety is high and unlikely to happen until worst case scenario and catastrophic event
		Takes legislation and political will power				Not flexible as to geography of coast	Biodiversity – maintains public ownership and accessibility	
Buy back private land at risk to add to coastal reserve								

GROUP 3 – FLOODING OF ESSENTIAL PUBLIC INFRASTRUCTURE IN LOW LYING AREAS AND LOSS OF ROAD ACCESS DUE TO COASTAL INUNDATION AND / OR FLOODING

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Road access to levy banks consider life cycle management options for roads servicing at risk areas	✓	x	✓	✓	?	x	✓	
							Would affect other infrastructure	
Road access – at risk road assets, detailed survey of there	✓	✓	✓	✓	✓	✓	✓	
Identify road function hierarchy, service life	✓	✓	✓	✓	✓	✓	✓	Review in regard to climate change
Planning and risk needs to identify water / sewer assets, primary / secondary (all services)	✓	✓	✓	✓	✓	✓	✓	
							Consequent management obligations	
Develop an analytical tool to assist ranking of treatment options	✓	✓	✓	x	x	✓	✓	Remember personal values
				Will produce political risks and costs	This will have to be managed carefully		Will limit increased development options	
Flood barrier / tide barrier protection of Port Phillip Bay	✓	x	?	✓	x	✓	✓	Could use an energy generator, could provide access across the bay
	May also be considered					Flexible in scale and location	Shipping	
Identify key road assets that can function as levy protection								
Localised storm surge barriers / buffers								
Build roads (key) to withstand inundation effects	✓	✓	✓	✓	✓	x	✓	Key access roads that cannot be relocated (e.g. Point Nepean Road), could be an interim investment which alternatives are explored
		Localised action						
Sewer – install pressure systems								

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
At risk areas will (to a degree) be refurbished during the planning period, consider designs that raise houses / buildings above flood level	✓	✓	✓	✓	✓	✓	✓	Some measures already exist, may not be possible on some existing high-value areas, progressive protection measures in building standards to be introduced
Cost / benefits model to help decide – relocate / rebuild options for community and private assets	✓	✓	✓	✓	Assuming community is properly engaged in the decision process	✓	✓	Do we allow ongoing development or do we start to plan to bring the land now?
Levy and pumping protection for low lying land	✓	✓	✓	✓	✓	✓	✓	Can you build on land? Do we need to pump?
Create wetland storage basins to protect storm surge risk properties	✓	✓	✓	✓	✓	✓	✓	Consider upstream
	Linked effect due to design capacity					Linked need to have access	Environment benefits from wetland design	
Identify locations suited to redevelopment and methodology for implementation of relocation actions	✓	x	x	x	x	✓	✓	No net gain in urban area, zoning offsets for localities that have to be moved, last resort, sea spray is currently leading this threat
			Short term versus long term	Have difficulty with gaining acceptance	Will be problematic		Yes, it will affect land values in risk areas and alternative area	
Identify and purchase land at risk or provide financial measures to assist with relocation of public and private assets	✓	x	x	x	x	x		Redefine probity rules for property handed on to successive generations – review value of inheritance but not allow next generation to actually own and use the land
		This would be a medium to long term option						
Revert coastal land to crown buffer – increase buffer width	✓	x	x	x	x	✓		Net gain provision should apply to all land – government land should not be exempt, salt mesh land should be, possible cure of cove bonds
			Serious financial implication	Hard to accept	Not when freehold is involved	Need to clarify		

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Prevent major investment in "at risk" land areas, progressively develop and implement local methods to make change	✓	x	x	x	x	✓		
			Serious financial implication	Hard to accept	Not when freehold is involved	Need to clarify		
Plans should positively address climate change impacts in determining asset life cycle management options	✓	✓	✓	✓	✓	✓	✓	
Revise coastal management plans to address climate change impacts	✓	✓	✓	✓	✓	✓	✓	Currently underway, needs to address the issues of sustainable funding services, should look at private land developments which can then fund the increased protection infrastructure for the at risk land
Consider installing warning signs / barriers to road assets which are routinely / periodically subject to inundation	✓	✓	✓	✓ ?	✓ ?	✓	✓	This could be seen as a "cheap fix" and seen to be avoidance of a responsibility to effectively treat the cause of the problem or find an effective solution
Educate residents in at risk areas to understand options and manage treatment options / costs scheme to build levees etc	✓	✓	✓	?	?	✓		Retain third party appeal for discretionary work, would need to know what option treatments are feasible before going public, legislation should be reinstated – no third party appeal
	Local government has a lost of experience to do this		Would be designed to raise financial capacity	There will be resistance	Problematic			
In an area – does community want to stay? How is this determined? Who should pay?								
Waterproof all underground infrastructure – Telstra, AGL, gas etc, engage in discussions between agencies	✓	✓	✓	✓	✓	✓		Urgent need
		Should start now			To ensure continuity of service			
Implement (EMOs) in at risk areas to forge aspects of climate change risks to be assessed and considered in DAS	✓	✓	✓	✓ ?	✓ ?	✓		Must happen!
	Planning scheme review						Will effect land values	

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Engage with the civil construction industry to join with Western Port Greenhouse Alliance to better identify and protect land developments	✓	✓	✓	✓	✓	✓	✓	Start today
Substantial community engagement / education program on climate change impacts	✓	✓	✓	✓	✓	✓	✓	Will need to carefully manage community expectation about priorities and who is responsible for action
					Build this			
Review asset life cycle assumptions and depreciation provisions								
Review "sea change" episodes dealing with the bridge replacement	✓	✓	✓	✓	✓	✓	✓	Is a great case study of community perceptions and management, not sure they got it right!

GROUP 4 – INCREASED FLASH FLOODING DUE TO DRAINAGE SYSTEM BEING OVERWHELMED

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Define responsibilities for local stormwater management	✓✓ Essential	High	Actual work on responsibility low, but outcome could be costly for RA	Positive	Ambivalent	N/A	Win / win outcomes	Flood level information for development, responsibility for needs classification, 60 hectare role for A28
Flood warning system (web based)	✓✓✓	High	Very affordable at regional level (estimated \$11M?) More costly at local level	Positive	Positive and welcome	Highly flexible		Flood warning systems, web based, radar based
Mapping for stormwater levels inundation at local levels	✓✓✓ Essential, high	Now	At local level quite costly - \$50K / catchment	Positive, supported by local government	Subject to community education level	Totally flexible once models built		Robust drainage schemes required to levies, mapping / modelling
More retention at local level	Variable	Progressive (time based)	Increased high capital cost	Accepted generally, developers not necessarily supportive	Ambivalent	High		Infill development a problem
Infiltration of stormwater for use on site	Variable into future (ongoing maintenance)	Progressive (time based)	Initial cost viable, ongoing periodic maintenance and costs a problem	Good	Moderate to low (ongoing maintenance an issue)	High		Gardens, WSUD
Education program for community understanding/ knowledge	✓✓ Highly	Medium (need to start with general information)	High	High	High	High		
Emergency response planning	Invaluable	Progressive	Progressive	High	High to moderate	High		

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Critical infrastructure refurbishment	Highly	First step in ongoing process	Progressive and potentially very high	Yes	High	Moderate		Hydraulic analysis
Funding sources (levies, schemes, grants)	If funds received, very effective results	Needs to vamp up	Low	Low	Low	High		
Use of vegetation (e.g. trees) for use of stormwater runoff	Moderate	Roll out progressively	\$100 per development	Moderate	Moderate	High		
Buyer "be aware" policy	Low	Not feasible	Not feasible	Not feasible	Not feasible	Not feasible	Not feasible	
State incentive for property owners to do things to their house / property (equivalent of 5 star rating but for stormwater)	Progressively improving	Could be done now	Viable	Low	Moderate	Yes		Refund of stamp duty for those who achieve "5 stars"
Aquifer recharge	In some areas, potentially very effective	Moderate	Expensive therefore financial viability low	Moderate to high	Positive	Low		
Adaptive infrastructure renewal program	High	Long term, ongoing	Part of asset renewal programs but with different outcomes	High	Positive with education	Adaptive		Renewal of infrastructure allow for reuse of water (e.g. local park)
Research on impacts / events we should be designing for	Highly effective	Urgent	High	Very good	Very good	Moderate		
Construction standards need to be effective to "better manage" runoff	Highly effective	Now	High	Very good	Very good	Good		
Neighbourhood groups set aside for infiltration	Highly effective	Long term, ongoing	High cost, but may be viable compared to other options	?	Acquisition of property – no, but resultant reserve – yes	Limited		Established areas (may require sustainable land acquisition)
Living roofs	?	?	?	?	?	?	?	

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Provision of protective infrastructure (e.g. levee banks, over land flow paths)	Low to high depending on case in question	Medium term to ongoing	Variable	OK	OK	Allows for flexibility		May require land acquisition (purchase, redevelopment, scale), buildings, other infrastructure
Nation wide standards / approaches (or state wide)	High	Urgent, but expect will take a number of years	Reasonable (low)	Acceptable (moderate)	Ambivalent	Highly		
Insurance policies encourage property owners to adapt	High	Medium	Feasible	High	Yes	Moderate		Premiums down to reward property owners who take action
Insurance policies have drainage levy to fund response	Very effective	Medium	Yes	?	Low	Moderate		(MFB model)
Educate building inspectors / surveyors								Should be part of broader "industry" education / training program

## Responding to increased frequency and intensity of wildfires

### GROUP 1 - WILDFIRE PREVENTION

Adaptation Option	Objective(s)	Screening criteria						Discussion notes
		Effectiveness	Resources / Funding	Roles & Responsibility	Flexibility	Political feasibility / community acceptance	Concurrent effects	
Fire prevention mapping	Identify WMO areas prone to wildfire, identify and regulate buildings and structures within areas - BPA	✓	x	✓				Requires government to enforce adaptation, requires clear reconciliation between NVF, WMO and ESO understanding of net community benefits
		Where applied it is effective	Councils and referral authorities not resourced to manage applications	Roles are clear but conflicts exist between fire management and native vegetation management i.e. NVF and WMO	Based on science of FDI 100, applies to new development and extension only	Biodiversity interests complete with widespread acceptance, competing issues between NVF and WMO	Strengthening relationships with Council and referral authorities, added complexities on developers	
Fire management planning	Identify bushland areas prone to wildfire and implement strategies to reduce risk	✓	x					Responsibility of Council to be accountable to rate payers, implementing standards for fire management across agencies to ensure consistencies
		Process effective	Funding available to plan but not to implement	Differences in land management between agencies	Flexible however constrained by available time for burning	Community passionate and vocal about expectations, divisive multiple interests from community	Adverse effect on biodiversity	
Community education	Raise awareness of risk and sustain self-reliant, resilient communities	✓	x					
		Programs effective, problems gaining acceptance and interest amongst communities	Under resourced	Internally well defined across agencies, sector and community need to understand roles	Definitely flexible	Engaged community is acceptable	Community strengthening and development	
Integrated fire management planning	All agency approach to manage and reduce risk	✓	x	x	✓			
		To be determined	Not sufficient	No	Unsure of flexibility, good intent	Accepted and feasible	Improved agency communicated and accepted by community	

Adaptation Option	Objective(s)	Screening criteria						Discussion notes
		Effectiveness	Resources / Funding	Roles & Responsibility	Flexibility	Political feasibility / community acceptance	Concurrent effects	
Planning enforcement	Maintain residential properties to reduce properties likelihood susceptibility of fire e.g. vegetation containment	✓	x	✓				CFA planning lawyer suggests there is responsibility however head offices disagree, Councils are not well enough resourced to implement resource, to implement heavy media campaigns
		Relatively effective (measure) except under funding and requires education	Under resourced	Well defined except for specific "handballed" issues – Council responsibility?	Dependent on resources, not much flexibility to change laws	Split community, community not being enforced, accepting those that development don't accept	Community education, other benefit, non-compliance	
Multiple programs – community education (CFA, DSE, RMIT)	Promotion of resilient communities identifying vulnerability (RMIT), DSE – working with vulnerable communities, CFA – working with vulnerable communities	?	x	x	✓		✓	Action research
		Not yet proven, new strategy	Under resourced bushfire, CRC loses funding this year, resources up to agencies	Cross over between agencies roles are blurred (non-operation legal strategy), internal ok	Very flexible (dependent on resources)	Dependent on community	Positive agency awareness of all issues	
Prescribed burns (DSE)	Reducing fuel content to reduce bushfire prone land	✓	x	✓	x	x ?	✓	Climate change and drought – ability to be strategic more difficult
		Process effective (actual prescribed burns questionable)		Well defined (not necessarily to the community)	Not – however must become more so in the future – constrained operation	Vocal population stating don't however support in the community	Raises awareness in the community	
Regulatory legislation	Issuing notices (burns notices etc)	✓	x	✓	✓	✓	✓	
		Relatively effective	Under resourced	Well defined	Dependent on resources, not much flexibility to change	Split community, compliance	Community education	
Restructure areas and acquisition areas	Avoid development in the highest fire prone areas	✓	x	✓	✓	x		Seen as necessary to pin point most fire prone areas and avoid development in those areas
		Effective if appropriately applied and funded	Has not had injection of funding for decades	State backed program	Subject to planning scheme amendments	Reducing rights for private development but otherwise build home support	Possible increase to public land, requires management	

GROUP 2 – RESPONSE

Adaptation Option	Objective(s)	Screening criteria						Discussion notes
		Effectiveness	Resources / Funding	Roles & Responsibility	Flexibility	Political feasibility / community acceptance	Concurrent effects	
Inter-agency and intra-agency communication	Protection of assets and life, minimise response time, coordination of key messages	x	x	x	✓	✓	✓	Protocols – specific MOUs with each other or develop MOU within a broader forum (i.e. MMPC, IMFMP), requirements of lead agency to develop roles (information pathways) inter-agency and intra-agency
		Information to lead agencies needs to increase, intra communications ok	Opportunities to increase training access to radio communications	Inter – no, intra – generally yes		Especially issues around health and safety	Increased connectivity opportunities for integrations of SES, surf life saving (MEMPC)	
Community information	Public health, public safety	✓	x	x	✓	✓	✓	IT – user friendly for on ground staff, heavy reliance on internet (increase media, regional areas, older generation inability to access internet), identify sectors in the community – ethnic special needs, transitory
		Identification of people of who we communicate to is difficult, smoke management, water quality, essential services, coordination of infrastructure	Increased intra-agency communications and coordination of messages	Increased inter-agency coordination, SILO mentality, place management within agency	Need to identify key contacts / personnel		Flow on to recovery and connectivity of social issues	
Resources on the ground, in the air	Timely and appropriate response, intelligence fire ground information, preparedness levels	✓	✓	✓	✓	✓	✓	Knowledge of other resources in the area that exists, training increased, nation wide accreditation scheme, IMFMP, man power, ability to sustain effort and business continuity (paid versus volunteer), peer support
			Need to increase across agency communications	But still showing SILO mentality	Heavy reliance on volunteers, fatigue management, interstate and international protocols	Quality of resources available	Loss of assets (life, property, environment)	

Adaptation Option	Objective(s)	Screening criteria						Discussion notes
		Effectiveness	Resources / Funding	Roles & Responsibility	Flexibility	Political feasibility / community acceptance	Concurrent effects	
Information technology	Field intelligence, information to command structure, performed and networked communities	x	x	x	✓	x	✓	Security, core business and networked organisations, sensitivity
		Firewall issues (interagency), hardware issues – compatibility, reliance on power	Increased investments in connectivity between agencies i.e. map generation between Shires and DSE	Ability to quantify what the needs are – but this is difficult	Convolutd, limitations, designs of many systems, position not able to go between agencies	Issues around money, existing systems – UU complicated sensitivity of information	Amalgamation between agencies	
Preparedness	Arrangements, rosters, contact lists, MECC, level 3 KCs, training	✓	✓	✓	✓	✓	✓	Communication pathways not captured in structure of agencies – a lot to do with personalities and relationships / networks but only relying on formalised communication schemes can be troublesome, networks very structured processes – needs more work
		Contingent on inter-agency communications	Funding models need assessing	Command structure good, communication needs to improve between key and small agencies	Relies on personalities, can absorb changes in agency structure	Good thing	Flow on to other emergencies – storms, flood, oil spills, infrastructure, whale beachings	

GROUP 3 – RECOVERY

Adaptation Option	Objective(s)	Screening criteria						Discussion notes
		CURRENT			FUTURE			
		Effectiveness	Resources / Funding	Roles, Responsibility & Communication	Flexibility	Political feasibility / community acceptance	Concurrent effects	
DSE (?) and municipal emergency recovery plans (and manuals?)	Provide procedures and contact and resource information for recovery		x	✓	✓	✓	✓	MERO well defined, recovery role not so well defined, long duration of recovery, potential for further events during recovery
		Less effective at recovery than emergency response stage	No – issues at response preparedness and actual response	Yes – but maybe communications need to be more effective	Reviewed three yearly, audited by SES	Generally, but complacency around intervals between incidents	Plan looks at all emergencies not just fire	
Inter-agency fire management plan (including recovery)	Coordination of efforts		✓	x			✓	Program too new for full evaluation yet
		Not fully effective yet	Yes (~\$4M)	Not clear enough yet, especially communications	Unknown	Political will perhaps	If all works will help	
CALM (Casey Alert Location Manager – pilot)	GIS capability							Early days yet
		Not tested yet (will test in 08/09)	Adequate (we think)	Ok at pilot level	Can include infinite layers in theory	Unknown	Could have for other incidents	
Funding (state – ongoing and one off)	Covering recovery works and emergency / hardship needs				✓	?	x	Nature of issue will vary according to nature of demand and competition for resourcing
		Subject to audit? What is “hardship”?	Systems may get in the way of good sense, not enough staff for big episodes	Probably not (but sometimes especially difficult in short order)		Conflicts with other priorities, between potential claimants	May detract funds from other purposes but can be big help in isolated / small communities	
Research and monitoring / evaluation	Progressive / opportunistic learning from actual recovery experience		x					Issue of blame?
		Not enough data / case studies available	Not enough forums etc	Research not systematically communicated (despite event debriefs)	Could scale up subject to resourcing	Possibly subject to responsibility, community yes, support for better understanding	Benefits across other emergencies / community and social services	

Adaptation Option	Objective(s)	Screening criteria						Discussion notes
		CURRENT			FUTURE			
		Effectiveness	Resources / Funding	Roles, Responsibility & Communication	Flexibility	Political feasibility / community acceptance	Concurrent effects	
Succession / redundancy planning	Ensure continuity of service	Patchy, subject to management commitment	Not really a factor (except in training?), issues of back filling reluctance	Not "core function" on longer efforts	Not really	Problem	Better succession planning would reduce adverse impacts on other roles	
Recovery exercises	Test and enhance capacity	Effective when run (usually only at desktop level)	Inadequate to conduct enough exercises	Should be ok	Simulation very difficult at landscape level	✓	Enhance links back to response / identification of key players / networking	Raise profile of recovery as element of fire response
Post event checklist for socio-economic typing (office of emergency services commissioner)	Targeting response to receivers?	Not yet – in development	At development level	Think so	?	?	?	Benefits might include better allocation of recovery resources, fill in training gap
Biodiversity and land system recovery / rehabilitation	Improve rate and extent of vegetation and fauna recovery	Hard to evaluate except in long term	May not be adequately resourced at micro level	May be confusion across public / private land divide	Subject to resourcing	x	Other event benefits e.g. water quality, carbon, erosion control	Likely to be growing issue in high fire frequency / intensity regime

## Communities dealing with climate change

### GROUP 1 - GENERAL COMMUNITY ANXIETY AND UNCERTAINTY ABOUT CLIMATE CHANGE AND THE IMPACTS OF CLIMATE CHANGE

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Development of effective and integrated information package – easy to understand, tailor to certain groups / demographics	✓ If no property used	✓ We have data and some knowledge as to what people want, the information should be effective in allaying anxiety immediately	✓ Partnerships and funding should be available to support this	✓	✓ Easier to understand information will lead to acceptance	✓ Easy to adapt for different groups and can be updated with new information	✓ Will link to other adaptive options – health, money saved etc	Make people feel good and empower people as well as provide options to improve, additional benefits of improved health, must come after research into what, how and from who
Education / engagement – community workshops, schools programs, leadership programs	✓ Direct contact is effective and allows for conversation	✓	✓ Leverage existing programs or train the trainer philosophy to replace the need for funds	✓ x Risks of wrong messages	✓ Need to ensure it is targeted, people want more assistance, not just information	✓✓	✓ Integrate with existing programs, opportunities	Message: starting to change now will avoid costs and big change later, need a change to values systems community building and strengthening i.e. sustainability street
Access to support – assistance (groups set up to demonstrate how to do things i.e. install light globes), grants, resources	✓	✓ Dependent on funding	x Considerable	✓	✓	✓ Small or large scale, free or expensive etc	✓ Other support services offered at same time – a possibility can build trust, information form our householders	Can be provided through existing programs / provider groups e.g. neighbourhood renewal
Integrate both mitigation and adaptation so that there is one message and so they are not conflicting								

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Legislative options								
Leadership by organisations that respect within the community "champions"								
Research – what do people want to hear? Who do they want to hear it from? How do they want to hear it?			x	✓	✓		✓	Don't feel that the ticks and crosses are relevant to research
Empowering leaders – who are the leaders within industry / community / government etc	It is a precursor to effective engagement, is essential in making the next step effective	Action is immediate but the result won't be felt until it is used	Will cost money				Will enhance other adaptive actions, can include other information gathering	
	✓	✓	✓	✓	✓	✓	✓	Needs to be tailored
Reassessment of government priorities i.e. investment in public transport	Learning of the people you respect		Set up as train the trainer to maximise value for money, groups are already set up				Increasing empowering information	
	✓	x	✓	✓ x	✓	✓	✓	
Government assistance for changes to insurance due to climate changes	Would demonstrate leadership and hopefully reduce anxiety	Actions will take time but decision should be made now	Should be comparable, explore public / private opportunities	Who knows	Seeing actions will reduce community anxiety about climate change	Increasing the adaptability of the community, priorities can change i.e. back flip	Priorities mean actions which have big implications	
Government insurance partnership to industry to ensure increases in premiums or loss of insured properties are done in an equal manner								
	✓	x						Maybe there are more effective actions than this one
	Good to know that government is looking at helping us, may increase anxiety between groups in the community	Won't actually stop anything happening, some solutions may cause more problems or anxiety						

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Community utilities and services – community vegetable gardens, community water / electricity supply, decentralisation	✓	x	✓	✓	?	✓		
	People should feel more secure about their future	Medium term could be immediate	Dependent on initiative	Different way of thinking definitely possible	Mixed NIMBY issues, education required, may need community to make the decision	Easier because the infrastructure is smaller	Potential negative effects e.g. NIMBY, costs	

GROUP 2 - LOSS OF COMMUNITY WELLBEING RELATED TO CLIMATE CHANGE AND THE IMPACTS OF CLIMATE CHANGE

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Revise internal practices e.g. integrated emergency management plans, coordinated approach across agencies	✓	x	x	✓	✓	✓	✓	
	Needs considerable buy-in from agencies, work	Time factor, events will impact on priority	Not adequately funded and resourced	Planning promoted by levels of government	Promoted within community, awareness	Mechanisms in place structures and committees	Benefits for all emergencies	
Research – vulnerable groups, agricultural sector, health impacts	✓	✓	✓	✓	✓	✓	✓✓	
	Justified, validates, promotes community acceptance	Promoting barriers	Cost of not doing greater than doing it	Pressure on government	Uncertainty, scientific results, scepticism	Limited by resources	Partners and minimises risk	
Education / information – targeting community groups and individuals, coordinated approach across agencies	✓	✓	✓	✓	✓	✓	✓	
	Range of methods applied to ensure maximum coverage, evaluation measuring limitations	Build on existing programs			Expectation from community to be provided with information – strategy required, marketing technology	Strategies, marketing	Health benefits for community, linking people with support networks	
Community resilience – capacity building, community engagement, empowerment	✓	x	✓	✓	x	✓	✓	
	Targeting community leaders and community groups	Longer term	Using existing structure	Eases pressure	Barriers, lifestyle changes		Better understanding of role of government	
Support services and assistance – financial assistance, equity coastal communities	✓	✓	x	✓	✓	✓	✓	
	Unsustainable reliance on support	Short term challenges for sustainability into long term support services	Conflicting priorities, community services funding allocation		Expectations	At the local level to respond to local needs	Improving access to services	
Planning infrastructure – homes planning, hospitals, roads	✓	x	x	x	x	x	✓	
	Build in programs	Take time to effect	Financial impact on individuals, yes for some that can afford it	Pressure on government to make decision			Longer, cost, bills etc	

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Business sector – incentives for commercial sector	✓	✓	✓	✓	✓	✓	✓	
		Ability to provide	Marketing				Economic development	
Revise internal practices regarding integrated emergency management and recovery response – coordinated approach inter and cross sector								
Research – apply climate science at a local level to understand regional health impacts of climate								
Develop a “whole of issue” approach – includes inter and cross sectoral, invite professionals to think outside the square								
Education / information support structures – tailored to meet individual needs, targeted to places where people go for information								
Identification of vulnerable groups and individuals – research, revise internal practices								
Coordinated education program – explore non-traditional methods e.g. sporting clubs, utilising existing network of Commonwealth / State and Local government and other agencies								
Planning – location of housing near community hubs, planning design which incorporates the needs of vulnerable groups								

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Policy approach – incentives to commercial sector to provide wider range of appropriate options – types of houses, types of air conditioning etc								
Increasing community resilience through capacity building and engaging with communities								
Assistance for “individuals” who are impacted by loss of equity in property due to coastal inundations								
Expand support services for mental health conditions caused or exacerbated by climate related events								
Research and support schemes for agricultural sector								
Behavioural changes – professional sector								

**GROUP 3 – INCREASED PRESSURE ON VOLUNTEER ORGANISATIONS ASSOCIATED WITH GREATER FREQUENCY AND/OR INTENSITY OF CLIMATE RELATED NATURAL HAZARDS**

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Within the volunteer organisation, develop levels of skills needs i.e. leadership etc but not overburden individuals	✓	✓	✓	✓	✓	✓	✓	Free market mechanisms, EBAs
People management		Medium term, robust, accreditation system required	Minimal cost, some training	Astute	Can dove tail into existing volunteer structures (SES, CFA)	Can be difficult as time progresses	Leadership programs, vocational training	
Work into workplace agreements / conditions (EBA etc) that guarantees availability but leaves volunteers businesses economic	✓	x	x	x	✓	x	✓	Free market mechanisms, EBAs
		Legislation change, red tape	Expensive	Who would pay, abuse, accountability		Controls, regulations, consistency, volunteer culture, intent is to support / not compensate		
Transport and accident, death and disability insurance, income protection insurance to protect volunteers								Free market mechanisms, EBAs
Centrelink offsets or rebates to allow more people to volunteer								Free market mechanisms, EBAs
Compile comprehensive list of volunteer organisations with a skills listing, availability and limitations	✓	x	✓	✓	✓	✓	✓	Cultural sensitivities, ownership, big brother
		Logistics of collating data, gaps in data, privacy	Who pays? Who does?		There are sensitivities that need to be considered			
Community program to recruit, promote and support volunteerism to assist for recruitment	✓	✓	✓	✓	✓	✓	✓	Building on what is already there
		Complements what is already there	Already happening, minimum cost		Incorporate into existing EM structures		Demonstrated now	

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Training package that is consistent across volunteer organisations to provide appropriate information regarding skills needed / nature of skills needed	✓	✓	✓	✓	✓	✓	✓	
Emergency volunteer register		Complements what is already there	Already happening, minimum cost		Incorporate into existing EM structures		Demonstrated now	Cultural sensitivities, ownership, big brother
Broaden VCAL type YLP program to expose young people to volunteerism								Building on what is already there
Include recognition and response to critical incident stress to support volunteers	✓	✓	✓	✓	✓	✓	✓	Already happens
Develop and implement strategies to manager overuse and / or over commitment of volunteers	✓	✓	✓	✓	✓	✓	✓	Already happens, maybe magnified and so may be new consideration etc
Resource infrastructure support for volunteers to do their job	✓	✓	✓	✓	✓	✓	✓	More contingencies should be in emergency management planning
Work for the dole, single parent pension obligations should be able to be discharged through volunteer service	✓	✓	x	x	✓	✓	✓	
			Who pays? Who administers?	Working families, disadvantages volunteer culture	Would help foster economic groups	Administration could use existing structures	Community services	

Adaptation Option	Screening criteria							Discussion notes
	Effectiveness	Immediacy	Financial viability	Political feasibility	Community acceptance	Flexibility	Concurrent effects	
Employers supported in the event of staff absent for over long volunteer service	✓	✓	x	x	✓	✓	✓	
	Employers would love it	Could be implemented immediately	Expense – who pays?	Could dictate industry sectors, could be seen as favouritism, subsidising non \$ viable lifestyles e.g. agriculture	Local communities would love it	Flexibility can be built into the program	Community services	
Redirection of the resources on an organisation to allow support of volunteer response e.g. close library or work depot to allow them to be volunteers	✓	✓	x	x	x	x	x	
	Subject to aptitudes	Could work well in short term	Flow on effects in industries – who pays?	Seen as a band-aid, shifting the problem	Flow on effects in local community – who pays?	Not flexible, would require all to volunteer	Flow on negative effects	
Promotion of volunteerism in CALD communities (support, recruitment)	✓	x	x	✓	✓	✓	✓	
	Medium to long term, great opportunities to build synergy	Would take a while	Expensive, minimal returns for outlay	Building social capital	Would work in some communities		Other communities	