



Preparing for Climate Change in the Borough of Queenscliffe

Climate Change Adaptation Action Plan



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Australian Government
**Department of Climate Change
and Energy Efficiency**

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Prepared for
Borough of Queenscliffe

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Executive Summary

As a small coastal council surrounded by water on three sides, the Borough of Queenscliffe ('Council') has recognised its particular vulnerability to heightened climatic risk factors such as storm surge and sea level rise.

Having successfully applied for a grant through the Australian Government's Local Adaptation Pathways Program, Council has initiated the *Preparing for Climate Change in the Borough of Queenscliffe Project* by appointing AECOM to undertake a risk assessment and develop adaptation actions to inform the development of the Climate Change Adaptation Action Plan for Council ('the Plan').

The risk assessment identified and rated risks based on the most recent and applicable climate change projections available for 2030 and for 2070 which indicate:

- an increase in average temperatures and in the number of very hot days
- an increase in the annual number of very high or extreme fire danger days
- a reduction in average annual rainfall and an increase in the number of dry days
- an increase in the frequency and intensity of storm events
- an increase in mean sea level rise and in the magnitude and frequency of storm surge events.

A total of 112 individual risks were identified and rated (as 'Low', 'Medium', 'High' or 'Extreme') for both 2030 and 2070. The process used to identify and rate risks included conducting a risk assessment workshop with relevant Council staff and stakeholders, a community consultation workshop and a subsequent gap analysis exercise carried out by AECOM. Risks were listed and analysed under the following Council operational areas:

- Land Use Planning
- Infrastructure
- Biodiversity and Natural Resource Management
- Open Space
- Community Services and Corporate Governance.

Analysis of the individual risks indicated that Council's Infrastructure operational area has the highest number of risks overall (34), while the Community Services and Corporate Governance operational area has the highest number of 'Extreme' rated risks in both 2030 (15) and 2070 (18) as shown in the Figure a below.

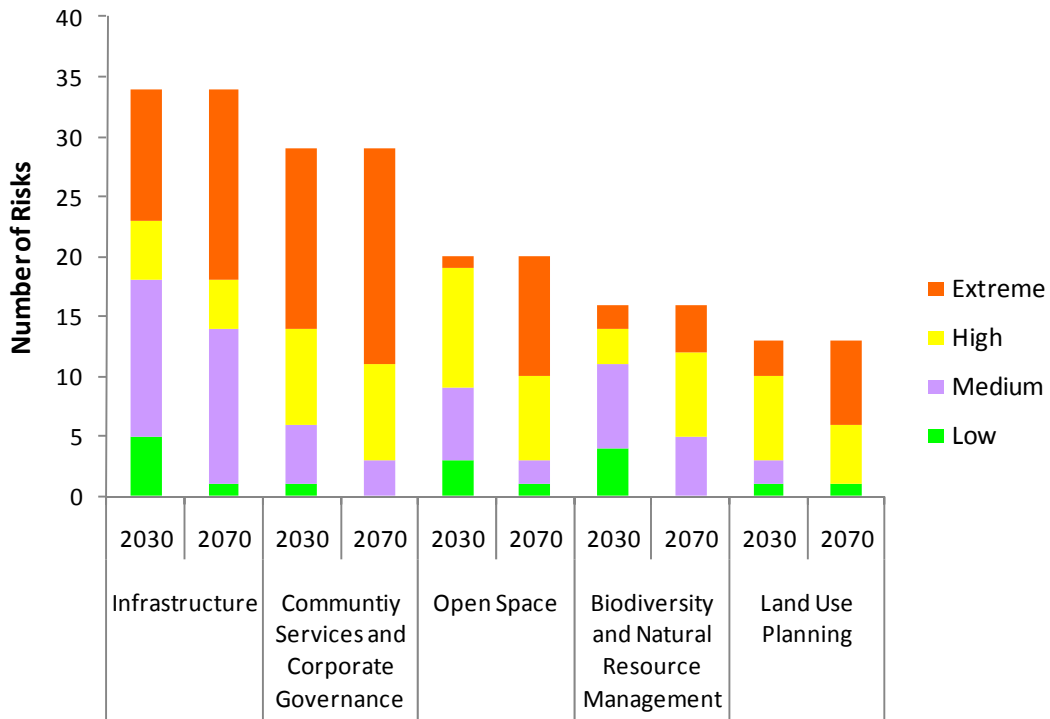


Figure a Total number of individual risks by Council operational area

Based on the risk profile index, an indicative comparison of overall risk exposure, Community Services and Corporate Governance was shown to be the operational area with the highest risk exposure in both the near term and the long term, followed by the Infrastructure operational area as shown in the Figure b below. In each of the five operational areas, the risk profile increases from 2030 to 2070.

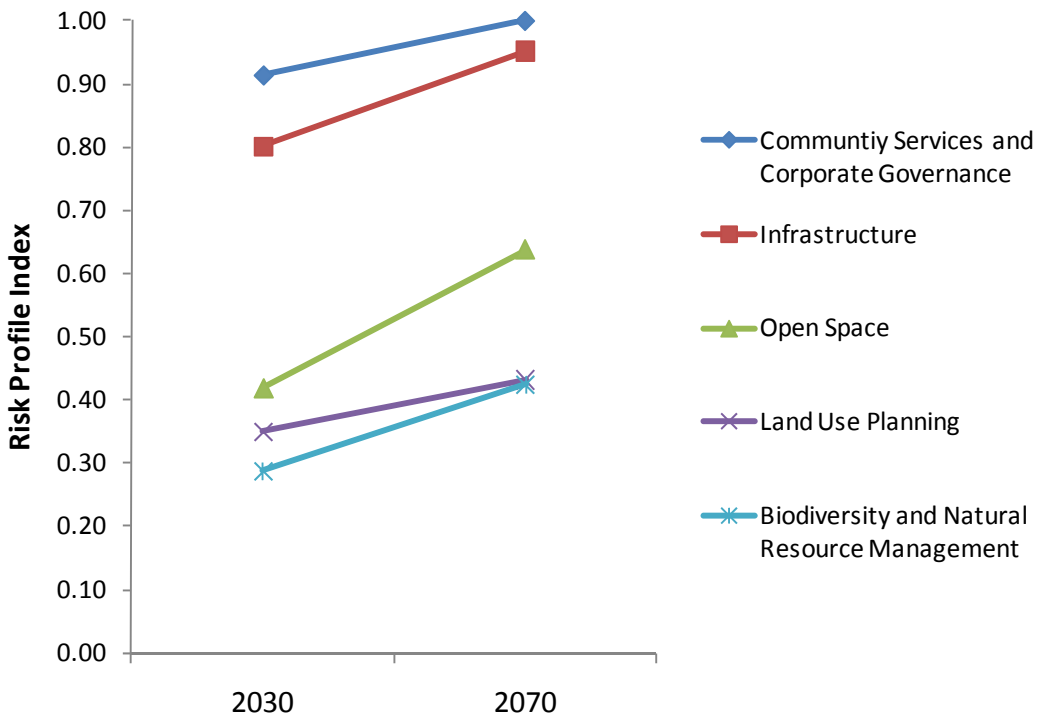


Figure b Risk profile index by Council operational area

The majority of identified climate change risks relate to:

- increased maintenance, expertise, repair, replacement and relocation costs for both built and natural assets
- loss of amenity
- inability to satisfactorily deliver services and meet community demands
- community expectations regarding Council's role in tackling climate change impacts
- human health and safety hazards
- financial impacts related to insurance, rising utility costs, public liability, increased need for Council guidance and services and rate revenue.

To assist with the risk assessment process AECOM grouped the 112 individual risks into 57 'summary risks'. These 57 summary risks were categorised into 45 higher rated risks (those rated 'High' and 'Extreme') and 12 lower rated risks (those rated 'Medium' and 'Low').

On 4 May 2010, AECOM facilitated an adaptation planning workshop with relevant Council staff to review adaptation actions identified by AECOM, add new actions and prioritise the suite of proposed actions. Each proposed action was prioritised using the following criteria:

- 1) 'Win – win': the extent to which the action will benefit multiple council operations or asset types
- 2) 'No regrets': the extent to which the action would be beneficial regardless of the degree of climate change that may occur
- 3) 'Cost Effectiveness': the extent to which the action's costs could be justified considering its benefits.

Consolidation and analysis of the workshop outputs resulted in 36 adaptation actions tailored to address Council's higher rated climate change risks. These 36 adaptation options were grouped within two broad timeframes for implementation – the short term (2010 – 2013) and the long term (2013 – 2017+) based on the evaluation process. It is acknowledged that factors outside the scope of this Project's action evaluation process (for example new funding opportunities) may affect Council's decisions on timeframes for the implementation of specific actions. The proposed actions address the following broad areas:

- Water and energy efficiency and other sustainable design issues.
- The climate resilience of essential infrastructure
- The long term protection and enhancement of public open space
- The protection of local properties and assets from sea level rise
- Community resilience to increased heat and flooding risks
- The protection of at risk coastal and inland habitats
- Weed and pest control and the protection of biodiversity corridors.

The majority of the proposed actions take one of the following forms:

- Providing additional community education (for example regarding heatwave health risks)
- Providing incentives to encourage climate resilient behaviours in the community (for example encourage residential and commercial uptake of rainwater tanks)
- Undertaking further studies (for example flood risk mapping projects and cost benefit analysis)
- Implementing ongoing monitoring programs (for example regarding infrastructure conditions)
- Encourage climate resilient infrastructure (for example through climate change design checklists and staff development plans)
- Closer collaboration with neighbouring councils and the community (for example City of Greater Geelong as well as the community through the community engagement plan).

Council will need to undertake the following steps to ensure successful implementation of this plan:

- Confirm the suitability of the proposed actions.
- Assign specific responsibilities for each action.
- Confirm the prioritisation of actions and a realistic timeline for the implementation.
- Undertake more detailed implementation planning, including resource and budget planning.
- Consider synergies with other internal action plans and strategies, as well as with programs run by external bodies and agencies, to avoid duplication and take advantage of previous and current work.

While the process of climate change scenario identification, risk assessment and adaptation planning undertaken in this Project has been thorough, Council will need to periodically review its climate change risks and responses, as scientific, technological and institutional factors continue to evolve.

1.0 Project Introduction and Background

1.1 Introduction

As a small coastal council surrounded by water on three sides, the Borough of Queenscliffe ('Council') has recognised its particular vulnerability to heightened climatic risk factors such as storm surge and sea level rise. Having successfully applied for a grant through the Australian Government's Local Adaptation Pathways Program (LAPP), Council is in a position to take a leadership role in assessing and proactively addressing its key climate change risks.

Gaining a comprehensive understanding of how climate change will affect Council's risk profile is key to devising a well informed adaptation response aiming to build Council's resilience and reduce its vulnerability. In doing so, Council has appointed AECOM to undertake a climate change risk assessment and develop adaptation actions to inform the development of the Borough of Queenscliffe Adaptation Action Plan.

AECOM has been engaged by Council to deliver the *Preparing for Climate Change in the Borough of Queenscliffe* project ('the Project') and develop a Climate Change Adaptation Action Plan ('the Plan') to assist Council to meet the following objectives:

- Identify and priorities climate change risks posed to Council operations, services and activities
- Identify adaptation actions to improve the resilience of Council
- Identify opportunities to engage with stakeholders and the community on further adaptation efforts.

This Plan outlines the methodology used in the Project, as well as its key outcomes, and is laid out as follows:

- Chapter 1 provides an introduction and outlines the background to the Project
- Chapter 2 outlines regional climate change projections for the Borough of Queenscliffe used to inform the identification of risks
- Chapter 3 details the methodology employed throughout the risk assessment and adaptation planning phases
- Chapter 4 summarizes Council's climate change risk profile which informed the proposed adaptation actions
- Chapter 5 outlines the proposed climate change adaptation actions identified for Council
- Chapter 6 concludes the Plan and makes some recommendations for Council's consideration.

The delivery of the Project consisted of three main phases which were carried out in close collaboration with Council over five months. The first phase of the Project – situational analysis – took place during the start of the year (2010) and included a literature review which was summarised in a Council Background Paper. This paper, presented to Council on 15 February 2010, outlines climate change projections and high level climate change issues of most relevance and importance to the region. The first phase of the project concluded with the Council project introduction workshop which took place on 23 February 2010.

The Council Background Paper informed the second phase of the project which commenced with the risk assessment workshop, held on 23 March 2010, in which Council staff and stakeholders identified, verified, and rated individual climate change risks to Council's operations. A community workshop was held on the evening of 23 March 2010 which explored climate change risk and adaptation options relevant to the Borough of Queenscliffe. The findings from the community workshop were integrated into the overall climate change risk register. Across both workshops a total of 112 individual risks were identified.

AECOM's Borough of Queenscliffe Climate Change Risk Profile report (issued 4 April 2010) concluded the second phase of the project. The risk report analysed the distribution of risks across Council's key operational areas, and summarised the 112 identified individual risks into 57 more generalised 'summary risks'. Of the 57 summary risks, 45 were deemed to be 'higher rated' risks based on ratings recorded at the risk workshop.

The final phase of the Project –developing of climate change adaptation action plan– involved the identification of climate change adaptation actions to address the abovementioned ‘higher rated’ summary risks. A climate change adaptation workshop was held on 4 May 2010 in which Council staff were asked to verify, identify and evaluate a suite of draft climate change adaptation actions proposed by AECOM. A total of 36 actions were identified of which 18 were prioritised as short term actions (to be implemented in the period 2010 – 2013) and 18 considered long term actions (to be implemented in the period 2013- 2017+). It is acknowledged that factors outside the scope of this Project’s action evaluation process (for example new funding opportunities) may affect Council’s decisions on timeframes for implementation of specific actions.

2.0 Climate change and the Borough of Queenscliffe

2.1 Overview

Australia and Victoria have already experienced a range of observable climatic changes.

Climate projections prepared by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in 2007 indicate that the future climate of south-eastern Australia will generally be characterised by:

- Lower average rainfall
- More intense extreme rainfall events
- Higher storm surge events and sea level
- Higher average temperatures
- More frequent occurrence of extreme temperatures
- More frequent extreme fire danger days (CSIRO, 2007).

The majority of climate projections presented in this Plan are drawn from the *Climate Change in the Corangamite Region* report (DSE, 2008a), as the Borough of Queenscliffe is located within this region. Town specific projections for this region are however only available for Lismore and Ballarat, which have hotter and drier climates, and are therefore not representative of the Queenscliffe region. The most relevant town in close proximity to the Borough of Queenscliffe for which town specific climate projections are available is Cape Schanck. Therefore Cape Schanck data has been used for rainfall intensity and extreme temperature projections in this assessment. It should be noted that extreme temperature projections (days over 30, 35 and 40°C) are based on absolute numbers (rather than % change, as is the case with rainfall intensity). As a result, Cape Schanck data only provide an indication of the degree of change in actual extreme temperature days that is occurring in the surrounding areas. Data for Melbourne CBD have also been provided to show the range across the region, in the absence of Borough of Queenscliffe specific data. The approach of using Cape Schanck data for the Borough of Queenscliffe region for rainfall intensity is acceptable as the modelling method used by CSIRO is such that the projections are appropriate on a broader spatial scale due to the high resolution of the grid cells (typically 200-300km).

Where climatic information was not available for the Corangamite region or Cape Schanck, generic data for greater Melbourne or Victoria have been used from the *Climate Change in Victoria* report (DSE, 2008c), as well as the CSIRO *Climate Change in Australia – Technical Report 2007* (CSIRO, 2007). Data for sea level rise and extreme sea levels have been drawn from the CSIRO report '*The effect of climate change on extreme sea levels in Port Phillip Bay*' (CSIRO, 2009a). Data for bushfire projections have been obtained from *Bushfire Weather in Southeast Australia: Recent Trends and Projected Climate Change Impacts* (Lucas *et al.* 2007). The projections for increased high and extreme fire danger days from this report are specifically for Laverton, which was the closest representative site for which suitable data were available. Extreme wind projections are from the *Climate change in southern South Australia and western Victoria* report (CSIRO, 2009b), and runoff projections have been sourced from the *Future Runoff (2030) for Southeast Australia* report (SEACI, 2008).

Where projections are provided for both 'higher emissions' and 'lower emissions' scenarios, this assessment has used the higher emissions scenario. This approach has been used to ensure the risk assessment considers the upper range of risks that Council may be exposed to, while also acknowledging the rate of increasing emissions already observed. This was substantiated by David Karoly, co-author of the IPCC AR4 and professor at the University of Melbourne, who has stated that on a global level, we are already experiencing changes in climate variables that are occurring faster than the highest range and at the upper limit projected in IPCC climate models. The effect of this is that "severe [weather] events and extreme [weather] events are going to increase and, indeed, have already started to do so" (Karoly, 2009). This finding was supported by similar conclusions drawn from other research by Rahmstorf *et al.*, 2007 and Hansen *et al.* 2007.

2.1.1 Climatic Changes for the Borough of Queenscliffe

The climate of the Corangamite region, where the Borough of Queenscliffe is situated, is already changing and ever increasing research warns its impacts are expected to increase over time. During the last decade (1998-2007) average annual temperatures in the Corangamite region were 0.3°C warmer than the 30 year (1961-1990) average (DSE, 2008a). Over this same period, the average number of days over 30°C increased by 3 days per year, and there were also 10 fewer cold nights (with minimum temperatures below 5 °C) (DSE, 2008a). There has been a marked decline in the region's rainfall over the past decade. Between 1998 and 2007 the region's average rainfall was 12% below the 30 year (1961-1990) average (DSE, 2008a).

The Corangamite region's future is expected to be hotter and drier (DSE, 2008a) and an increase in extreme weather events such as heatwaves, storms and flash flooding is likely (CSIRO, 2006). Specific climate change projections relevant for the Borough of Queenscliffe are detailed in Sections 2.1.2 to 2.1.10 below.

2.1.2 Average Temperature

Victoria is expected to warm at a rate slightly faster than the global average (CSIRO, 2007). By 2030, average annual temperatures in the Corangamite region are likely to rise by 0.8°C, with slightly more warming in summer and less warming in winter (see Table 1). By 2070 the Corangamite's average temperatures are expected to increase by around 2.4°C (DSE, 2008a).

In addition to increasing temperatures, the Corangamite region is likely to experience decreases in relative humidity (0.5% decline projected for 2030) and increases in potential evaporation (2% increase projected for 2030) (DSE, 2008a). Table 1 summarises temperature, humidity and evaporation projections for the Corangamite region for 2030 and 2070.

Table 1: Annual and Seasonal changes in climate for the Corangamite region (DSE, 2008a)

Climate variable	Time Period	2030	2070
Average Temperature	Annual	+0.8°C	+2.4°C
	Spring	+0.8°C	+2.5°C
	Summer	+0.8°C	+2.7°C
	Autumn	+0.8°C	+2.4°C
	Winter	+0.6°C	+2.1°C
Relative Humidity	Annual	-0.5%	-1.7%
Potential Evaporation	Annual	+2%	+8%

2.1.3 Extreme Temperature

As the Corangamite region's average temperatures rise, the frequency of hot days in the Borough of Queenscliffe is likely to also increase. There are no specific climate change projections available for the Borough of Queenscliffe. Therefore, to illustrate the range of increases in extreme temperatures in areas surrounding the study area, extreme temperature projections for Cape Schanck and Melbourne CBD have been provided as reference.

Cape Schanck's annual average of days above 30°C may increase from the current 11 days to 14 in 2030 and to 22 days by 2070, while days above 35°C may increase from the current 2 days to 3 days in 2030 and to 6 days by 2070 (as shown in Table 2). In the Melbourne CBD the annual average of days above 30°C may increase from the current 30 days to 34 days in 2030 and to 49 days by 2070, while the number of days above 40°C may increase from the current 1 day to 2 days by 2030 and to 5 days by 2070 (as shown in Table 2). As well as the overall number of hot days increasing, it is expected that the frequency of hot spells (periods of three to five consecutive days with temperatures exceeding 35°C) will also increase.

Night time temperatures in Australia are expected to rise, with warm nights in projected to increase by 15-50% by the end of the 21st century (CSIRO, 2007). These changes in the frequency of hot summer days, hot spells and warm nights is of potential importance to the occurrence of heat stress, and to energy demand for cooling (CSIRO, 2007). Melbourne's heat related deaths in those aged over 65 are expected to rise from the current 289 deaths per annum to 582-604 by 2020 and to 980-1,318 by 2050 (McMichael *et al.*, 2003 in CSIRO, 2006). Heat stress deaths will likely soon exceed the Victorian annual road toll (337 fatalities in 2006) (The Age, 2008).

Table 2: Current and projected days at three temperature thresholds in Cape Schanck (DSE, 2008a)

Timescale	Current	2030	2070
Over 30°C	11	14	22
Over 35°C	2	3	6
Over 40°C	0	0	1

Table 3 Current and projected days at three temperature thresholds in Melbourne CBD (DSE, 2008a)

Timescale	Current	2030	2070
Over 30°C	30	34	49
Over 35°C	9	11	20
Over 40°C	1	2	5

2.1.4 Sea Level Rise

Sea level rise has occurred at a global mean rate of 1.7mm per year for the past century, and more recently at rates estimated near 3.1 ± 0.7 mm per year between 1993 and 2003 (Bindoff *et al.* 2007). Current sea level rise is considered to occur partly due to human-induced climate change which is expected to increase sea levels this century. Increasing temperatures contribute to sea level rise due to the thermal expansion of water and the addition of water to the oceans from the melting of terrestrial ice sheets.

The IPCC's Fourth Assessment Report (AR4) (2007) estimated a sea level rise of 0.19m - 0.59m by 2100. More recent changes to ice sheet melting rates and dynamics will likely raise sea levels beyond current IPCC projections (CSIRO and BoM 2009). Unlike the IPCC third assessment report (TAR), the AR4 does not provide a time series of sea-level projections through the 21st century, but does provide maximum and minimum projections for the decade 2090-2099 (here termed '2095') and for the potential dynamic response of the Greenland and Antarctic Ice Sheets. To estimate a time series of the maximum and minimum IPCC AR4 projections, Hunter (2008) scaled the equivalent TAR projections (from Table II.5 of the IPCC TAR, pp. 824-825). The resulting scaled maximum and minimum values are indicated for 2030, 2070 and 2100 in the table below.

Table 4: Adjusted sea-level rise projections , based on a high emission scenario (Hunter, 2008)

Climate Variable	Baseline (1990)	2030	2070	2100
Sea level rise	0	+48mm - 146mm	+165mm - 471mm	+266mm - 819mm

For the 2100 timeframe, the upper limit of the CSIRO projections used above is consistent with the Victorian Coastal Strategy, which recommends implementing a policy of planning for sea level rise of not less than 0.8 metres by 2100 (Victorian Government, 2008).

2.1.5 Storm Surge

Extreme sea levels in the Port Phillip Bay usually occur as a result of the combination of tides with storm surges associated with weather systems that bring westerly winds to the coast of Southern Australia (CSIRO 2009). Changes in sea levels as a result of climate change are expected to alter the frequency and intensity of storm surge events. Table 5 presents 1 in 100 year storm tide levels at locations within the Borough of Queenscliffe for 2030, 2070 and 2100. The projections incorporate the storm surge and tidal contributions to extreme sea levels, but do not include an assessment of wave runup and wave setup.

Table 5: 1 in 100 year storm surge tide height return levels for Point Lonsdale and Queenscliff based on the sea level rise projections appearing in Table 4. *

Location	Future Climate Scenario	Current Climate	2030	2070	2100
Point Lonsdale	Scenario 1: IPCC 2007 A1FI scenario Hunter (2009) (refer Table 4)	1.41	1.56	1.88	2.23
Queenscliff	Scenario 1: IPCC 2007 A1FI scenario Hunter (2009)	1.23	1.38	1.70	2.05

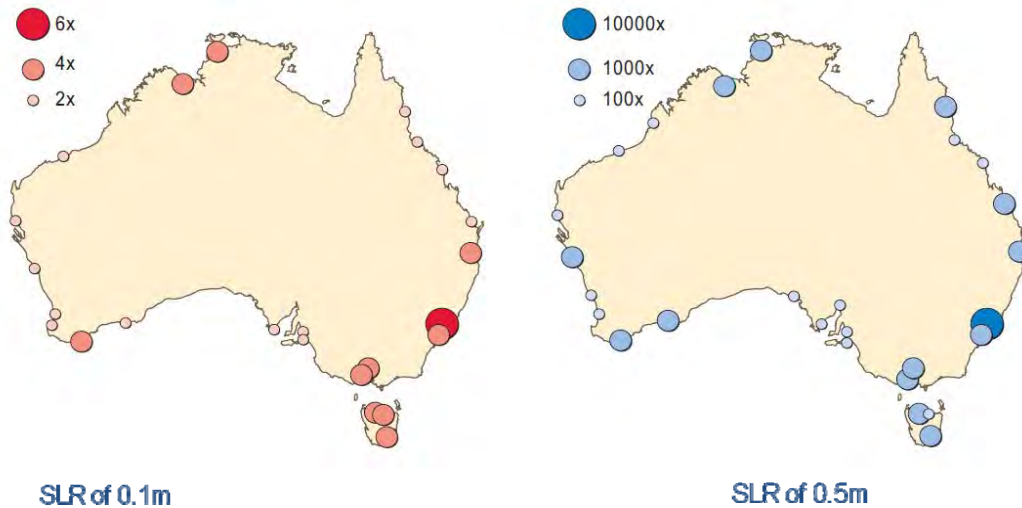
*All values are in metres relative to late 20th Century mean sea level. Higher resolution studies of sections of the coastline using different methodologies may yield different return levels than this study of the whole of Port Phillip Bay (CSIRO 2009).

Inundation layers arising from the 1 in 100 year storm surge tide height return levels for Scenario 1 described in Table 5 are illustrated in Figure 2. Scenarios 3 and 4 (pink and red shading respectively) on the map are based on more extreme sea level rise projections and are greater than those shown in the Victorian Coastal Strategy (Victorian Government, 2008) These higher level projections are not being used as the basis for Council's climate change risk assessment.

As well as the increase in intensity of storm surge events, the frequency of storm surge events is expected to increase as a result of climate change. Figure 1 shows the estimated increase in the frequency of storm surge events (indicated by the diameters of the circles) caused by Sea Level Rises of 0.1m and 0.5m.

With the frequency increase shown in Figure 1 for a sea level rise of of 0.5 metres, storm surge events which currently occur every 10 years in the Borough of Queenscliffe would occur about every 10 days.

Figure 1: Estimated increase in frequency of storm surge events caused by sea level rise (Church et al, 2008)



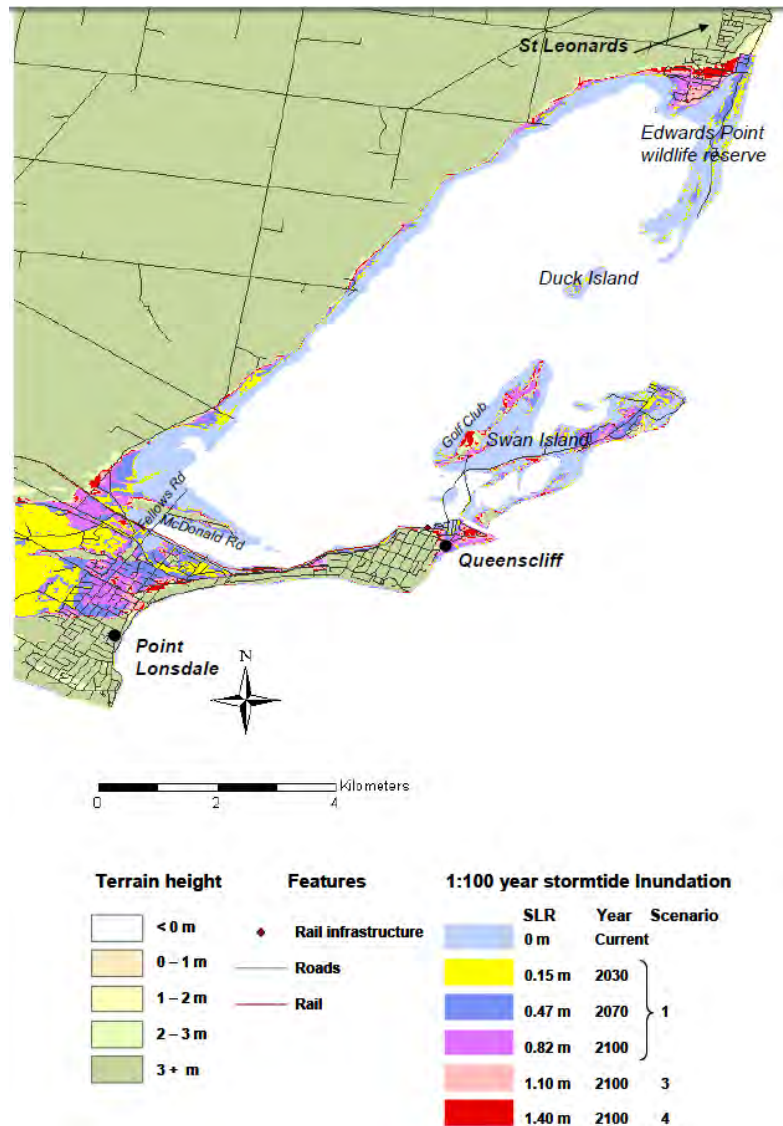


Figure 2 Inundation layers for the current climate and a selection of climate change inundation scenarios for the Queenscliffe region (Source: CSIRO, 2009b).

Figure 2 illustrates that based on Scenario 1, areas north of Point Lonsdale, areas north-west of Queenscliffe and Swan Island are susceptible to inundation from a 1:100 year storm tide event.

2.1.6 Average Rainfall

The Corangamite region is expected to become drier with average annual rainfall decreasing by 4% by 2030 and by 12% by 2070. Most of the projected decrease is expected to occur in Spring (7% by 2030 and 21% by 2070) (DSE, 2008a). The annual number of rainy days in the Borough of Queenscliffe is projected to decrease by 6% by 2030 and by 19% by 2070 (as shown in Table 6).

Table 6: Projected seasonal changes (%) in the number of rainy days for the Borough of Queenscliffe (based on Cape Schanck data) (DSE, 2008)

Season	2030	2070
Annual	-6%	-19%
Spring	-8%	-26%
Summer	-5%	-17%
Autumn	-5%	-16%
Winter	-3%	-11%

2.1.7 Runoff

Reductions in rainfall combined with increased potential evaporation will result in reduced runoff. In a report that modelled rainfall and runoff across the South Eastern Australian Climate Initiative (SEACI) region (which incorporates the Borough of Queenscliffe), mean annual runoff in 2030 was shown to decrease by up to 30% relative to 1990 (refer to Figure 3)).

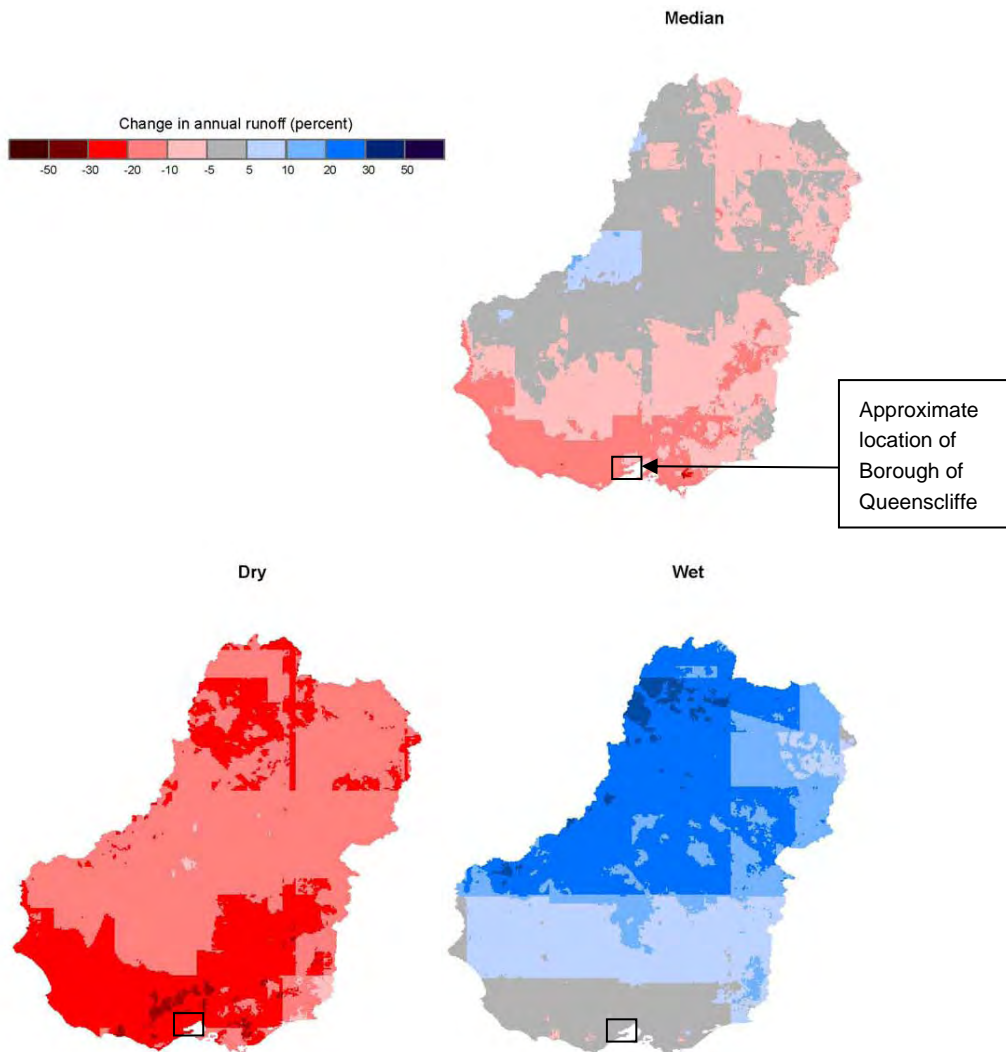


Figure 3: Percentage change in modelled annual runoff across South Eastern Australia (~2030 relative to ~1990) for the median or best estimate and the dry and wet scenarios (SEACI 2008). Approximate location of the Borough of Queenscliffe is marked.

2.1.8 Extreme Rainfall

Even though overall rainfall for Victoria is expected to decrease, extreme rainfall events are projected to increase in the Borough of Queenscliffe by 0.7% by 2030 and by 4.5% by 2070 (DSE, 2008b) (based on Cape Schanck). For example, the intensity of the 1-in 20 year daily-rainfall event may increase by 5 to 70% by the year 2050 in Victoria (Whetton *et al*, 2002). As suggested in the CSIRO Technical Report (CSIRO, 2007), future precipitation regimes will have longer dry spells interrupted by heavier precipitation events, especially in the summer and autumn (CSIRO, 2007).

Changes to extreme events would have the potential to increase erosion and flood frequency with implications for agriculture, forestry, river flow, water quality, insurance risk and the design of bridges, roads, dams and storm water infrastructure (CSIRO, 2007).

2.1.9 Wind Speed

Uncertainty regarding model projections for changes in wind speed is high. While across the country average wind speeds are not projected to increase significantly overall, there is a tendency for increases in most coastal areas. The best estimate projection is for a 2-5%, average wind speed increase, to occur predominantly during the winter (CSIRO, 2007). Projections for the Corangamite region are that annual average wind speeds will not change significantly.

Recent modelling has been undertaken for extreme wind speed (at specific wind speed thresholds) in western Victoria for four different climate models. Three of the four models project no significant increase in extreme wind speed. One of the climate models however projects an increase in extreme wind speeds (CSIRO, 2009).

2.1.10 Bushfires

The CFA advises that the number of fires, and their overall intensity have increased over the last five years (CFA, 2009). In addition, the number of 'very high' fire risk days and total fire ban (TFB) days (those with 'extreme' fire risk), have increased in Victoria during that period. These increases are attributed to a changing climate, specifically to warmer temperatures and reduced rainfall.

Southeast Australia is projected to become hotter and drier in the future, increasing the probability of bushfires occurring in the region. The bushfire season is likely to be extended, and areas previously not considered to be prone to bushfires will be threatened. The "Bushfire Trends in Southeast Australia: Recent Trends and Projected Climate Change Impacts" report (Lucas *et al* 2007) provides projections for Laverton, indicating a likely annual average of 13 - 14 very high or extreme fire risk days by 2020 and 19 – 20 days by 2050, compared to a present average of 11-12 days.

3.0 Methodology

3.1 Situational Analysis

To establish the context of the risk assessment and to facilitate whole of Council support for the overall project, AECOM undertook the steps outlined below.

Literature Review

The AECOM Project Team undertook a comprehensive desktop literature review to establish the context of the risk assessment and begin the process of risk identification. The following literature was reviewed within the specific context of the Borough's boundaries and operations to identify Council's key risk areas:

- climate change impacts information
 - Likely climatic changes in Victoria: IPCC 4AR Chapter 11, CSIRO 'Climate Change in Australia' (2007);
 - DSE regional climate change projections for the Port Phillip and Western Port region (2008);
 - CSIRO Climate change in Australia – Technical Report (Updated July 2009);
 - Impacts of Climate Change on Settlements in the Western Port region – People, Property and Places (2008);
 - Garnaut review: Impacts of Climate Change on Infrastructure in Australia (2008);
 - Australia's Biodiversity and Climate Change (Australian Government) (2009);
 - ICLEI – Local Government Climate Change Adaptation Toolkit (2008);
- Internal Council Information;
 - Climate Change Issues Paper 2009
 - Existing risk framework
 - Selected Council policies and activities such as:
 - Council Plan 2005/06 - 2008/09
 - Council annual reports
 - Asset maps and strategic asset assessments.

Consultation with internal stakeholders took place during this research stage on an as-needs basis to confirm aspects of Council policy, clarify risks and identify possible current management practices.

Council Background Paper

Following the literature review and the initial internal consultation AECOM developed a Council Background Paper to provide key stakeholders, councillors and senior management with background information regarding the context of the project. The background paper also provided an indication of the findings of the initial high level risk identification completed during the literature review and internal consultation processes. Specifically the background paper outlined:

- the project's strategic and organisational goals in the context of the Council's current responsibilities and policy objectives
- the regional climate change scenario to be used in the risk assessment process
- the risk assessment process and framework to be used in the assessment. (see text box 1 for detail on defining climate change risk).

Council project introduction workshop

An internal Council project introduction workshop was held at Council offices with the project reference group, councillors and senior management to facilitate whole of Council support for the overall risk assessment process. The Council Background Paper was provided to all attendees a week prior to the workshop. A key objective of the internal workshop was to formally introduce the project, its scope and objectives as well as to gain support from Council's key decision makers.

Text Box 1: Defining climate change risk

Defining climate change risk

A 'risk' is defined in the Australian/New Zealand Standard for Risk Management as 'the chance of something happening that will have an impact on objectives' (Standards Australia and Standards New Zealand, 2004). An identified climate change risk for a council is therefore a climate-related event or phenomenon which affects Council's objectives, either negatively (in the traditional meaning of risk as a hazard or a loss), or positively (implying a potential opportunity).

Climate change risks do not arise directly from changes in climatic variables per se, but from a causal chain as illustrated in Figure 3-1. A change in a climatic variable can have an array of impacts on areas relevant to Council such as the natural environment, staff well being, the socio-political environment, and the councils' operational and maintenance costs.

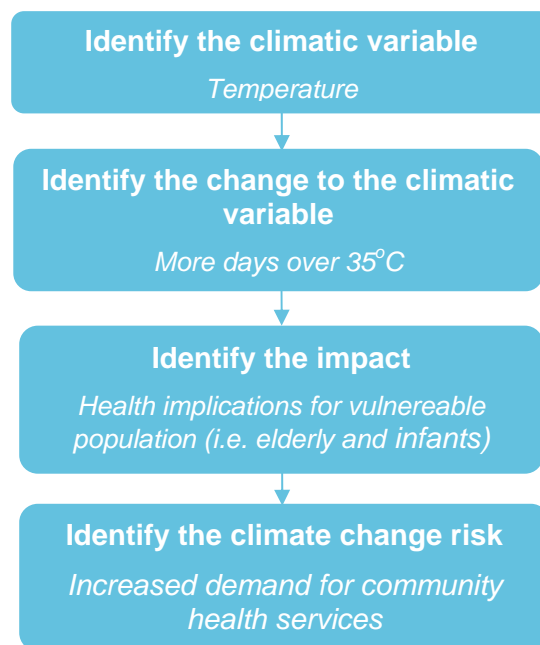


Figure 3-1- An example of the link between climate change, its impacts and the risks they may pose (adapted from Department of Climate Change and Energy Efficiency, 2006).

3.2 The risk assessment workshop

As outlined in the Australian/New Zealand standard for Risk Management AS/NZS4360 (Standards Australia and Standards New Zealand, 2004) assessing a given risk for prioritisation and treatment involves an evaluation of its potential consequences (normally under several consequence categories) as well as an assessment of the likelihood of the risk materialising. Through this evaluation process, the combination of consequence and likelihood scores generates a final rating of the risk such as 'Low', 'Medium', 'High' or 'Extreme' (as illustrated in Figure 3-2).

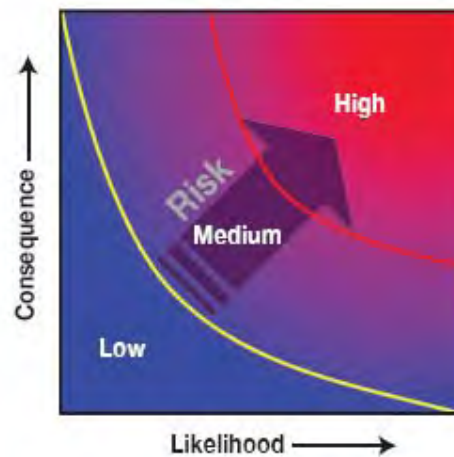


Figure 3-2 - A conceptual risk matrix, demonstrating the relationship between consequence, likelihood and overall risk rating (CSIRO, 2007)

The listing and rating of Council's climate change risks was initially carried out at a risk assessment workshop held on 23 March 2010 and attended by relevant Council staff and stakeholders (see Appendix A for this workshop's attendance list and Appendix B for the workshop's agenda). The process included the following steps:

- Listing of climate change related risks (91 risks were identified). This was done in groups of 3 to 5 people, each addressing risks relevant to the following council operational areas:
 - Land Use Planning
 - Infrastructure
 - Biodiversity and Natural Resource Management (NRM)
 - Open Space
 - Community Services and Corporate Governance.

Risks were listed under the climatic variable they were most related to, and were tagged as follows:

- 'RR' for reduced rainfall and runoff related risks
 - 'ST' for risks related to storms
 - 'H' for increased temperatures (heat) and bushfire related risks
 - 'SLR' for sea level rise and storm surge related risks.
- Existing risk controls were identified, namely policies or strategies that already exist within Council to address the identified risks. These controls were considered in the Project's adaptation planning stage.
 - With consideration of existing controls, all identified risks were rated based on their expected consequence as either 'Insignificant', 'Minor', 'Moderate', 'Major' or 'Catastrophic', for 2030 and for 2070 (see an explanation of these consequence categories in Appendix C). The following consequence categories were available to choose from, as defined in Council's Risk Management Framework:
 - Revenue, Cost or Liability (3rd Party or Business Loss)
 - People (Health & Safety)
 - Environment
 - Social/Cultural/ Heritage
 - Business Interruption or Level of Service Delivery
 - Asset Network Integrity
 - Corporate Image (Probity/Political/Economic)

- The single most significant consequence area was selected for rating under two time horizons, namely 2030 and 2070
- The likelihood of identified risks materialising was then rated as either 'Rare', 'Unlikely', 'Possible', 'Likely' or 'Almost Certain', for 2030 and for 2070 (see an explanation of these categories in Appendix C)
- Based on the combination of the consequence and likelihood ratings, a final risk rating was derived. This was done using the risk matrix (shown in Figure 3-3) featured in Council's Risk Management Framework (Borough of Queenscliffe, 2010).

Likelihood	Consequences				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	H	H	E	E	E
Likely	M	M	H	E	E
Possible	L	M	H	E	E
Unlikely	L	L	M	H	E
Rare	L	L	M	H	H

Figure 3-3 - The risk rating matrix used by Council to rate climate change risks ('L' = Low, 'M' = Medium, 'H' = High, 'E' = Extreme) (Source: Borough of Queenscliffe, 2010).

3.3 Community consultation workshop

A climate change community consultation workshop was facilitated by AECOM on the evening of 23 March 2010 (see Appendix A for a list of participants in this workshop, and Appendix D for the workshop handout). Participants in this workshop were asked to identify climate change risks for Council's operations and for the municipality as a whole, as well as identify potential adaptation options (later used to inform the development of this Plan). Climate change risks and adaptation options identified in this workshop are shown in detail in Appendix E.

To ensure Council continues to gain support and input from the local community it is important that an effective process of engaging the community in adapting to climate change is developed. AECOM have developed a suggested stakeholder and community engagement framework for Council which is detailed in Appendix G. This framework for community engagement in a local government context involves 5 key steps; clarify the scope, plan the approach, get commitment from Council, deliver what is agreed and evaluate and continuously improve. For each step an explanation and list of considerations has been provided in Appendix G.



Figure 4 Participants at the Community Consultation Workshop

3.4 Data compilation and gap analysis

Risk information gathered at the risk assessment workshop was collated by AECOM. The process of data compilation included the following steps:

- The removal of duplicated risks to avoid 'double counting' in the analysis process
- The re-assignment of some risks to a more appropriate operational area
- The splitting of long and complex risk statements into more specific risks.

AECOM carried out a gap analysis, reviewing risks identified at the climate change community consultation workshop (shown in Appendix E) as well as risks identified for other councils in previous AECOM projects to ensure the Borough of Queenscliffe's climate change risk register is as comprehensive as possible. An additional 21 risks were identified and rated (for 2030 and 2070) in this process by AECOM, with ratings subsequently reviewed and approved by Council's project managers. These additional 21 risks and their ratings have been incorporated into their respective operational areas, and a complete list of all risks identified and rated during the risk assessment phase of this project is provided in Appendix F.

The resulting body of risk information (containing a total of 112 individual risks) was analysed by operational area, by climatic variable, and for each time horizon (refer to Chapter 4.0 for detailed data analyses). Summary risks were compiled (a total of 57 across the five operational areas) which summarise the individual risks identified for each operational area, and provide a more comprehensive, clear and concise overview of Council's climate change risk profile. These summary risks include for example;

- Flooding related damage to roads and other assets, including in some places the potential cutting off of important road links (corresponding to individual risks SLR14, SLR15)

- Reduced number of green spaces suitable for community use, resulting in reduced amenity and increased pressure on the remaining viable spaces (corresponding to individual risks: RR15, RR20, RR22, H31).

The summary risks have been grouped into two rating levels: 'Lower Rated' summarising 'Low' and 'Medium' rated individual risks, and 'Higher Rated' summarising 'High' and 'Extreme' rated individual risks (using 2070 ratings). The 'Higher Rated' summary risks provided the focus for the Project's adaptation phase.

To enable a numerical comparison of risk exposure between operational areas, a Risk Profile Index (RPI) was developed by:

- assigning a numerical value to all individual risks according to their risk ratings for both time horizons ('Low' rating = 1, 'Moderate' rating = 2, 'High' rating = 4, 'Extreme' rating = 6)
- adding up those values for all risks within each operational area and time horizon
- normalising the resulting sums to a number between 0 and 1, with values of 1 representing the highest risk profile.

The RPI combines the number of risks with the rating of individual risks and in doing so provides a useful indicative comparison of overall climate change risk exposure levels between the five operational areas across the two time horizons. This has been illustrated in chapter 4.0.

3.5 Climate Change Risk Report

Following the risk assessment workshop, the data compilation and gap analysis, the risks were ranked by AECOM in consultation with Council staff. This ranking exercise identified risks that should continue to be treated with management practices and control measures to remain within Council's risk tolerance threshold, as well as those which require further treatment. Once ranked, all risks were categorised as follows:

- **Low and Medium Risks:** Risks which Council should continue to monitor and review, but which currently don't call for additional risk treatments.
- **High and Extreme:** Risks which will be explicitly addressed in the Adaptation Action Plan, as they require additional treatments.

Based upon the outcomes of this process a climate change risk report was developed. The risk report provided a visual analysis of the Borough of Queenscliffe's climate change risk profile. Risks were broken down by climatic variable and operational area, thereby assisting Council to fully understand its climate change risk profile. The risk management plan clearly identified the highest priority risks (those rated 'high' or 'extreme'), which were focussed on in the Climate Change Adaptation Action Plan.

3.6 Adaptation Planning Workshop

Following the completion of the *Borough of Queenscliffe Climate Change Risks Profile* report, AECOM compiled a list of draft adaptation actions, which together addressed all of the 45 higher rated summary risks.

On 4 May 2010, AECOM facilitated an adaptation planning workshop with relevant Council staff to review the draft actions, evaluate them, add new actions and arrive at a prioritised suite of proposed actions, using a tailored Excel based tool to capture and analyse all inputs.

In the first part of the workshop, participants made modifications to some of AECOM's draft actions, removed a number of them and added several new proposed actions to address relevant summary risks. Using a drop down box, participants were also required to identify lead responsibilities within Council (i.e. specific Council departments) as well as supporting departments (both internal and external). The specific Council departments were selected in line with the organisational structure as detailed in the Borough of Queenscliffe Annual Report 2008 – 2009.

In the second part of the workshop, each proposed action was evaluated using the following three criteria:

- 'Win – win' - the extent to which the action will benefit multiple council operations or asset types

- 'No Regrets' - the extent to which the action would be beneficial regardless of the degree of climate change that ends up occurring
- 'Cost Effectiveness' - the extent to which the action's costs could be justified considering its benefits.

Under each criterion, the Excel based tool enabled a choice between a low score (represented by 1 point) and a high score (represented by 2 points). For each action, the points scored under the three criteria were added up to result in a priority designation as follows:

- Total of 3 points – 'Low' priority
- Total of 4 points – 'Low - Medium' priority
- Total of 5 points – 'Medium - High' priority
- Total of 6 points – 'High' priority.

3.7 Feedback and Finalization of the Climate Change Adaptation Action Plan

Council's feedback on the climate change risk report was combined with the outcomes from the adaptation workshop and prioritisation exercise to produce the draft climate adaptation action plan. The draft adaptation action plan was submitted to Council for review and feedback was received from all levels of Council. Council's feedback was considered and where appropriate integrated into the final climate change adaptation action plan. Once finalised the plan was presented to the Council project reference group and relevant senior managers.

4.0 The Borough of Queenscliffe’s Climate Change Risks Profile

4.1 Summary

In total, 112 risks were identified and rated for both 2030 and 2070, based on the climate change projections shown in Chapter 2.0. The summary of all identified risks provided in Appendix F clearly states whether each risk was identified in the risk assessment workshop, the community consultation workshop, or the subsequent gap analysis process (described in Section 3.4).

4.2 Analysing overall risk ratings

Figure 4-1 compares the number of risks between the five operational areas, as well as the rating distributions in 2030 and 2070 within each of these areas. The Infrastructure area had the highest number of risks overall (34), while the Community Services and Corporate Governance had the highest number of ‘Extreme’ rated risks in both 2030 (15) and 2070 (18).

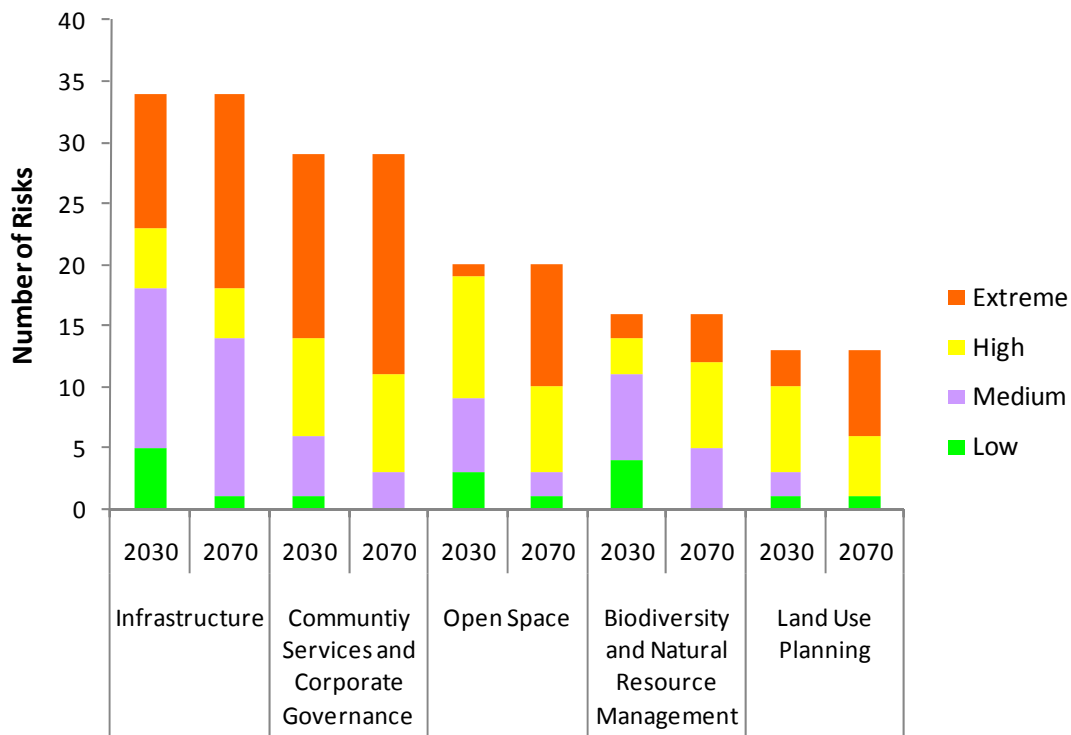


Figure 4-1: A comparison of risk numbers and rating distributions between 2030 and 2070 for each operational area

As shown in Figure 4-2, overall risk exposure rose markedly between 2030 and 2070, with the number of ‘Extreme’ rated risks rising from 33 to 59.

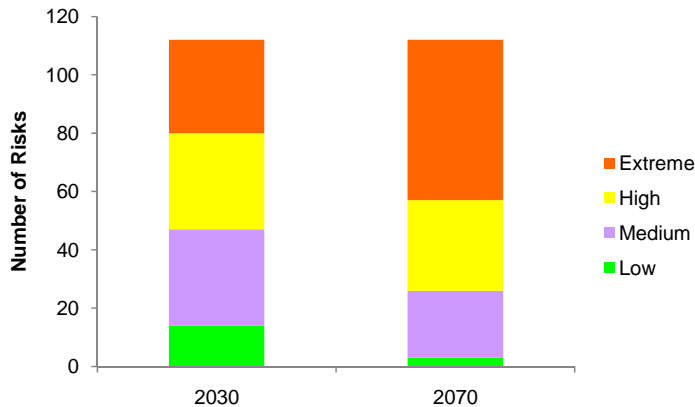


Figure 4-2: A comparison of risk rating distributions between 2030 and 2070

Using Risk Profile Indices (as explained in Section 3.4), Community Services and Corporate Governance was shown to be the operational area with the highest risk exposure in both 2030 and 2070, followed by the Infrastructure area (see Table 4-1 and Figure 4-3). Risk exposure rose between 2030 and 2070 for all operational areas, but did so most sharply in the case of the Open Space area.

Table 4-1 – Risk Profile Indices (RPIs) for all operational areas in both time horizons

Operational Area	RPI in 2030	RPI in 2070
Community Services and Corporate Governance	0.91	1.00
Infrastructure	0.80	0.95
Open Space	0.42	0.64
Land Use Planning	0.35	0.43
Biodiversity and Natural Resource Management	0.29	0.42

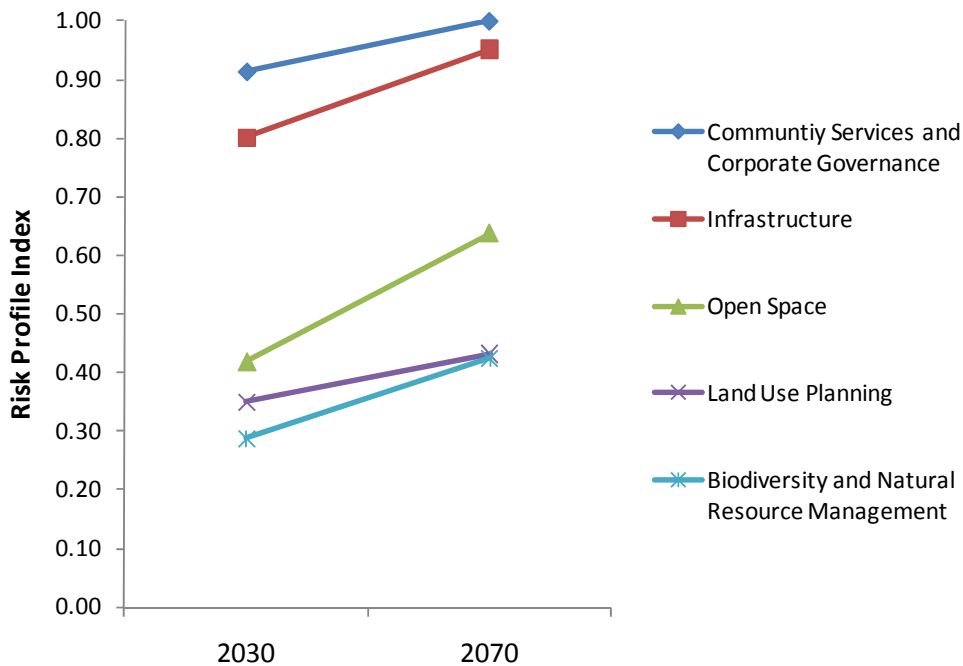


Figure 4-3: Risk Profile Indices (RPI) for all operational areas in both time horizons

Figure 4-4 compares the four climatic variables based on the number of risks they generated across Council's operational areas, and the distribution of risk ratings between 2030 and 2070 within each variable. Sea Level Rise and Storm Surge registered the highest number of risks (38), as well as the highest number of 'Extreme' rated risks in both 2030 (11) and 2070 (20).

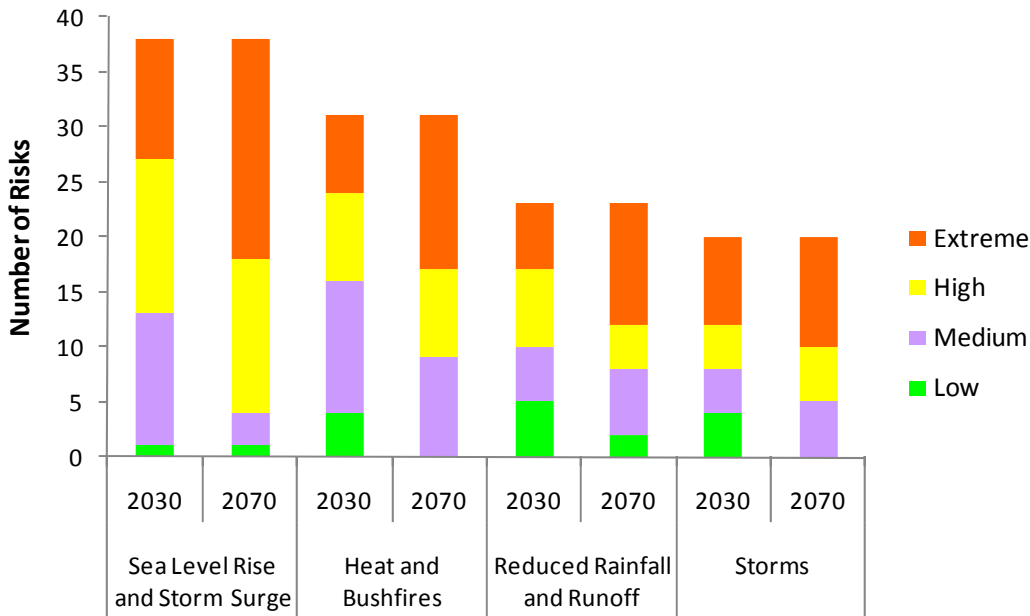


Figure 4-4: Risk severity for the two time horizons for each climatic variable

4.3 Review of risks by operational area

The following sections analyse and summarise the risks identified within each of the five operational areas.

The summary risks listed under each operational area provide a succinct summation of the individual risks identified for that area (refer to section 3.4 for an explanation on the development of summary risks). Tags are provided to identify which individual risks each summary risk corresponds to. Each summary risk is listed once (under the operational area it is deemed most pertinent to), even if it was compiled from individual risks identified across separate operational areas. All individual risks identified in the risk identification process (consisting of the risk assessment workshop, the community consultation workshop and the AECOM gap analysis) are detailed in Appendix F, alongside their risk ratings for both 2030 and 2070 and a tag indicating which climatic variable each of them is most closely linked to, as follows:

- 'RR' for reduced rainfall and runoff related risks
- 'ST' for risks related to storms
- 'H' for increased temperatures (heat) and bushfire related risks
- 'SLR' for sea level rise and storm surge related risks.

As explained in Section 3.4, summary risks have been grouped into two rating levels for prioritisation purposes, with those marked 'Higher Rated' summarising 'High' and 'Extreme' rated individual risks, and those marked 'Lower Rated' summarising 'Low' and 'Medium' rated individual risks (using 2070 ratings).

4.3.1 Land use planning – review of risks



A summary of risks identified for the land use planning operational area is shown in Table 4-2 alongside the tags of the corresponding individual risks (listed in Appendix F).

Table 4-2 – Land Use Planning summary risks

Rating	Summary risks	Corresponding individual risk tags
Higher Rated	Extreme event impacts to private properties where Council is the committee of management	ST18, SLR30
	Requirement for Council to undertake additional planning tasks, prevent litigation and provide guidance and advice regarding water sensitive urban design (for stormwater harvesting), flood mitigation and bushfire protection	RR12, H26, SLR32, SLR29, RR4
	Conflict between Council and developers due to requirement for larger coastal setbacks to protect against long term sea level rise	SLR34
	Increased foreshore reserve widths due to sea level rise resulting in higher reserve maintenance costs for council	SLR33
	Need to introduce new planning provisions for minimum shade levels at new developments	H27
Lower Rated	Conflict between requirement to install sustainable technologies such as water tanks and solar hot water systems and Heritage Overlay requirements	RR13

Figure 4-5 shows the distribution of ratings for the 13 risks identified for the Land Use Planning operational area for 2030 and 2070. By 2070, only one risk is not rated 'High' or 'Extreme'.

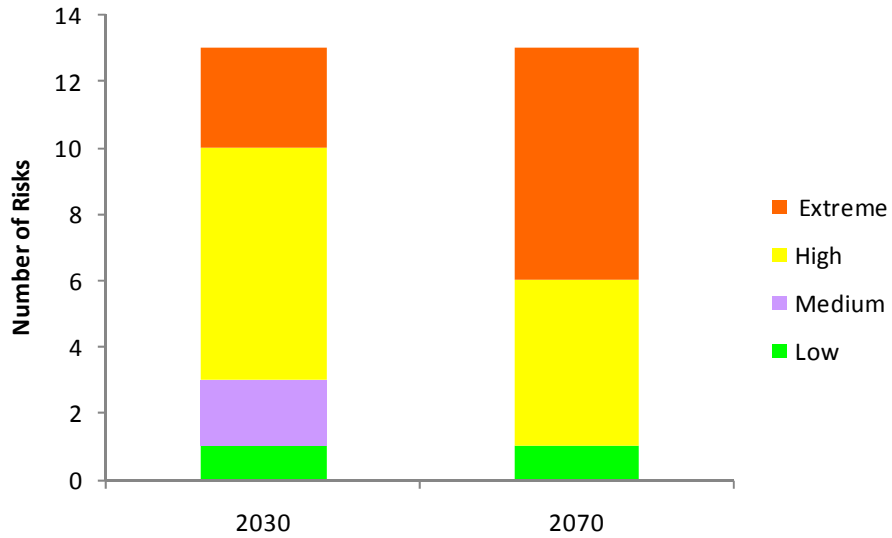


Figure 4-5: Distribution of risk ratings in the land use planning operational area for 2030 and 2070

As shown in Figure 4-6, the Sea Level Rise and Storm Surge climatic variable contributed more than half the risks, with the Heat and Bushfires variable contributing half of the remainder.

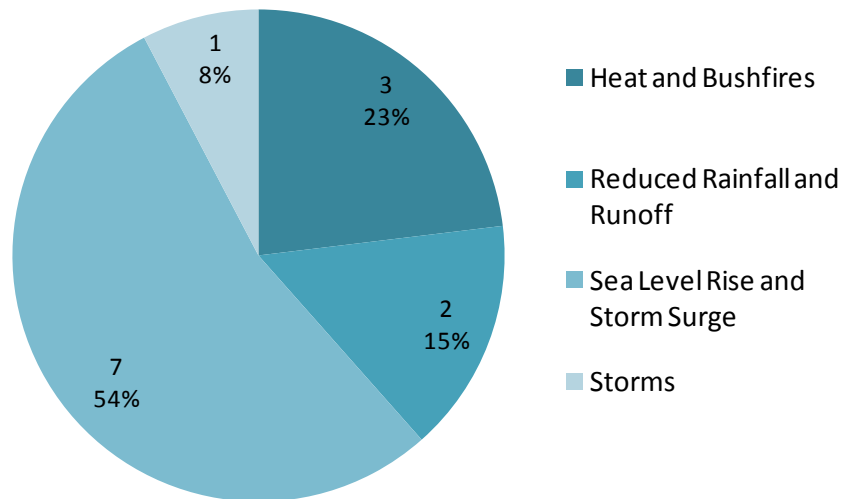


Figure 4-6: Land use planning risks split by contributing climatic variable

4.3.2 Infrastructure - review of risks



A summary of risks identified for the infrastructure operational area is shown in Table 4-3, alongside the tags of the corresponding individual risks (listed in Appendix F).

Table 4-3 – Infrastructure summary risks

Rating	Summary risks	Corresponding individual risk tags
Higher Rated	Damage to coastal, heritage, and other Council owned building assets resulting in increased maintenance / reconstruction costs to Council	RR8, SLR18, SLR25, ST15
	Rise in water table due to sea level rise resulting in reduced effectiveness of soak pit drainage	SLR16
	Damage to/loss of coastal infrastructure (e.g. Point Lonsdale surf lifesaving club beach access ramp and coastal fencing) leading to increased repair, replacement and maintenance costs to Council	SLR17, SLR19
	Increased boat ramp maintenance / repair requirements due to sea level rise and storm surge impacts leading to higher costs to Council	SLR23, SLR20
	Dune breach due to high winds and due instability adversely impacting infrastructure on the land side of dunes	ST11
	Damage to roads, culverts and pavements due to increased temperatures and extreme events resulting in increased repair / relocation costs to Council	ST12
	Flooding related damage to roads and other assets, including in some places the potential cutting off of important road links	SLR14, SLR15
	Sea level rise damage to essential services infrastructure (i.e. water, sewerage, power, gas)	SLR22
	Requirement for additional expertise and resources to address storm related damage to public assets and infrastructure where Council is the committee of management	St13
	Adverse water quality impacts due to inundation related damage to sewer lines and pumping stations	SLR26
	Increased management and clean up costs to Council after damaging extreme events	SLR31, ST17
	Requirement for additional resources and expertise to relocate communities and community assets highly vulnerable to sea level rise impacts	SLR28, SLR11, H31
Lower Rated	Increased Council staff downtime due to extreme events resulting in reduced Council productivity	H24
	Increased road maintenance requirements due to higher visitor numbers in the municipality	H21, H13
	Increased concentration of pollutants in stormwater outfall due to reduced rainfall	RR10
	Impacts on drainage networks and pumps due to lower average flows, higher storm flows, and increased pipe infiltration	RR9, SLR24
	Unavailability of water required for Council's construction works	RR11
	Reduced ability to deliver Council's services due to power outages	SLR27

Figure 4-7 shows the distribution of ratings for the 34 risks identified for the Infrastructure operational area for 2030 and 2070. While in 2030 the majority of risks are rated 'Low' or 'Medium', by 2070, a total of 20 risks are rated 'High' or 'Extreme'.

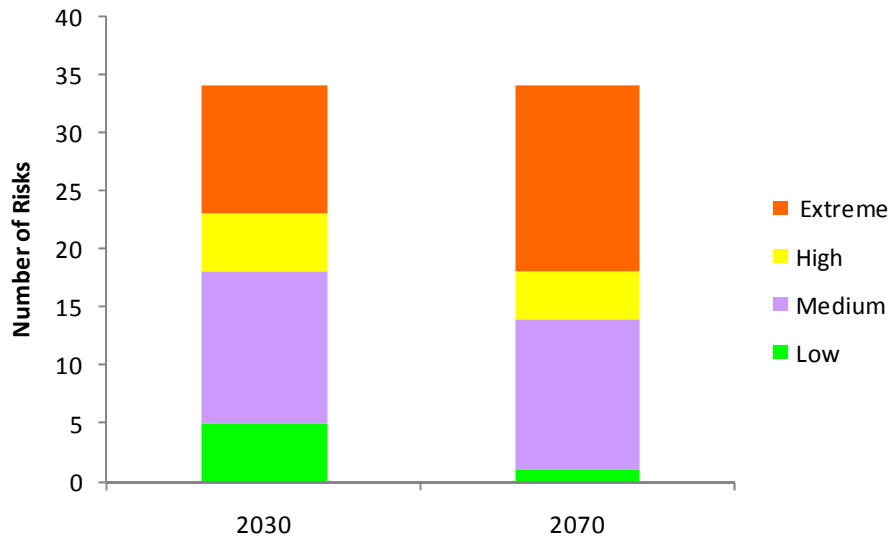


Figure 4-7 - Distribution of risk ratings in the Infrastructure operational area for 2030 and 2070

As shown in Figure 4-8, the Sea Level Rise and Storm Surge climatic variable was the largest single contributor of risks in this area (with 41%), followed by the storms variable (with 23%).

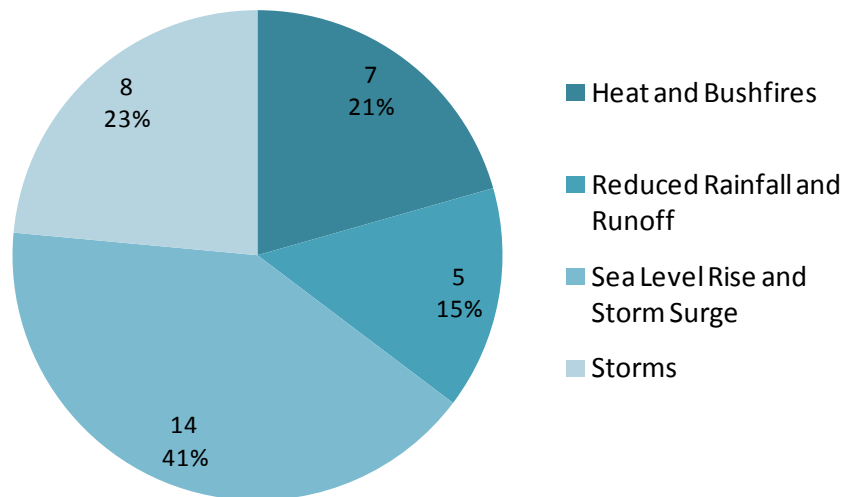


Figure 4-8 – Infrastructure risks split by contributing climatic variable

4.3.3 Biodiversity and Natural Resource Management – review of risks



A summary of risks identified for the Biodiversity and Natural Resource Management operational area is shown in Table 4-4, alongside the tags of the corresponding individual risks (listed in Appendix F).

Table 4-4 – Biodiversity and Natural Resource Management summary risks

Rating	Summary risks	Corresponding individual risk tags
Higher Rated	Damage (e.g. erosion, vegetation removal or degradation) to natural coastal assets and habitats (e.g. dune systems, trees), resulting in increased revegetation/remediation/maintenance costs to Council	SLR5, SLR2, ST1, RR1, H1, H3, H6, H7
	Loss of marine and bird biodiversity	ST2, H4, SLR1
	Reduced water quality due to reduced informal stormwater treatment with decreasing viability of wetlands	SLR4
	Reduced tourism activity due to damage to iconic biodiversity assets (e.g. coastal Moonah woodland and seagrasses)	SLR6
	Compromised fresh water quality due to salt water inundation, including impacts on agricultural uses	SLR3
Lower Rated	Increased prevalence of exotic species due to decline in native species populations and changes in the distribution and prevalence of pest species, resulting in increased species control costs to councils	H5

Figure 4-9 shows the distribution of ratings for the 16 risks identified for the Biodiversity and Natural Resource Management operational area for 2030 and 2070. The proportion of risks rated 'High' and 'Extreme' grows dramatically between 2030 and 2070, and no risks are rated 'Low' by 2070.

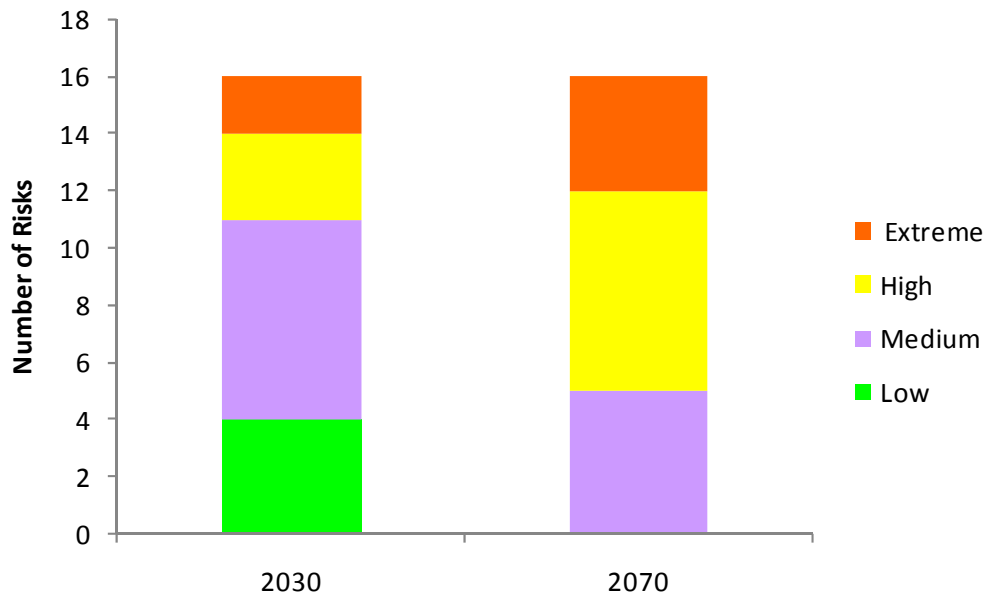


Figure 4-9 - Distribution of risk ratings in the Biodiversity and Natural Resource Management operational area for 2030 and 2070

As shown in Figure 4-10, the Heat and Bushfires climatic variable was the largest single contributor of risks in this operational area (with 44%), and was closely followed by the Sea Level Rise and Storm Surge variable (37%).

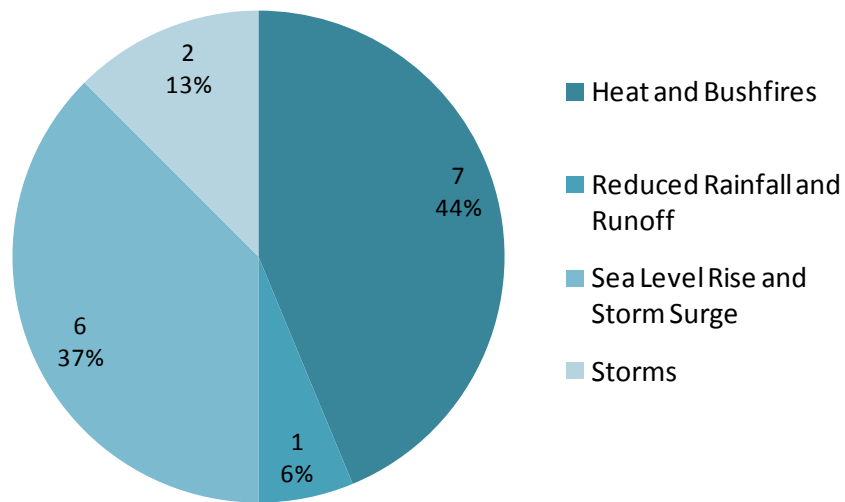


Figure 4-10 - Biodiversity and natural resource management risks split by contributing climatic variable

4.3.4 Open Space - review of risks



A summary of risks identified for the Open Space operational area is shown in Table 4-5, alongside the tags of the corresponding individual risks (listed in Appendix F).

Table 4-5 – Open space summary risks

Rating	Summary risks	Corresponding individual risk tags
Higher Rated	Increased costs to maintain/replace mature trees under stress from reduced rainfall and storms	RR14, ST19, RR16
	Loss of vegetation resulting in reduced amenity and increased clean up costs and revegetation to Council	H28, RR21, RR3
	Reduced number of green spaces suitable for community use, resulting in reduced amenity and increased pressure on the remaining viable spaces	RR15, RR20, RR22, H31
	Higher watering requirements in parks and gardens due to reduced rainfall resulting in higher costs to Council	RR17
	Requirement to introduce low water use landscaping practices to adapt to reduced rainfall, resulting in increased capital and expertise costs to Council	RR17, RR7
	Increased weed control costs to Council due to loss of native vegetation and the resulting increase in weed infestations	RR18, RR19
	Damage to key open spaces (e.g. beaches, Point Lonsdale oval) due to deterioration of protective infrastructure (seawalls, groynes)	SLR35, SLR36, SLR21
	Inability of Council-run infrastructure and services to meet increased community beach and open space demand (e.g. in terms of traffic management, waste management, toilet provision, shading)	H2, H29, H30, H20
	Reduced beach amenity due to sea level rise related erosion and loss of sand	SLR37, SLR38
	Potential Council public liability for storm damage to members of the community during public events (e.g. Seafood Feast, Music Festival), and requirement for additional council monitoring of such events due to increased risk of heat stress	ST20, H17
Lower Rated	Increased public injuries due to harder sporting (e.g. football) grounds	RR23

Figure 4-11 shows the distribution of ratings for the 20 risks identified for the Open Space operational area for 2030 and 2070. The proportion of risks rated 'High' and 'Extreme' grows from 55% to 85% of the total between 2030 and 2070.

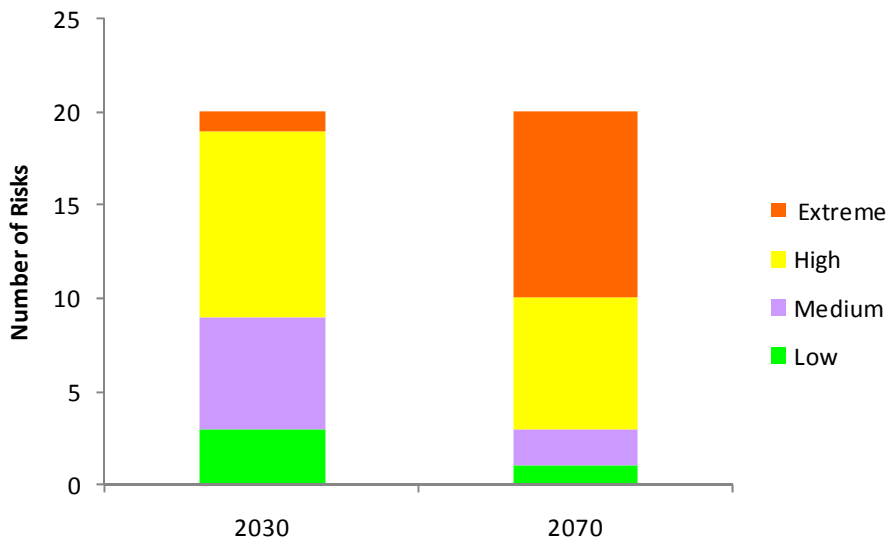


Figure 4-11 - Distribution of risk ratings in the Open Space operational area for 2030 and 2070

As shown in Figure 4-12, the reduced rainfall and runoff climatic variable accounted for half of this area’s risks, with the Heat and Bushfires and Sea Level Rise and Storm Surge variables as equal seconds (with 20% of risks each).

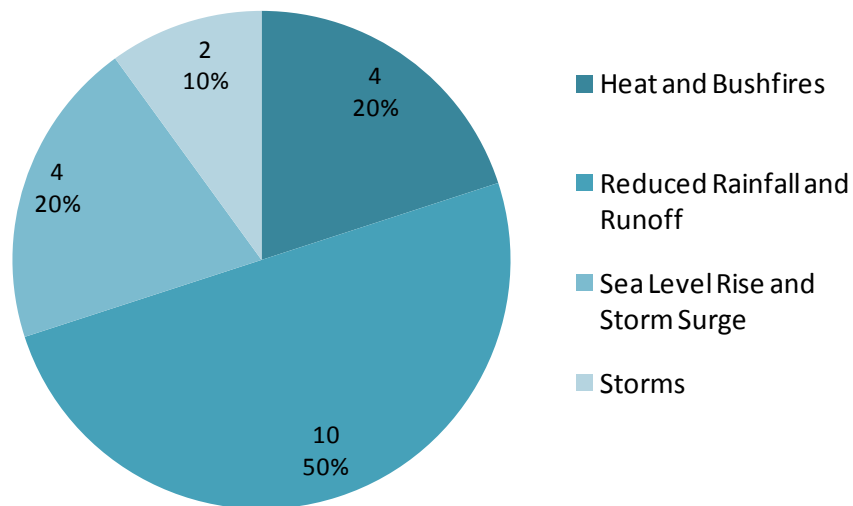


Figure 4-12 – Open space risks split by contributing climatic variable

4.3.5 Community Services and Corporate Governance - review of risks



A summary of risks identified for the Community Services and Corporate Governance operational area is shown in Table 4-6 alongside the tags of the corresponding individual risks (listed in Appendix F).

Table 4-6 - Community Services and Corporate Governance summary risks

Rating	Summary risks	Corresponding individual risk tags
Higher Rated	Increased and potentially unmanageable emergency management workload, requirement to provide emergency shelters (including in Council buildings) and potential inability to staff the Municipal Emergency Control Centre	H25, H10, ST7, RR13, H22, H23
	Health and safety risks to staff due to extreme events (e.g. storms)	H11, ST4, ST5
	Access, communication and service delivery failures due to road inundation, fallen trees and bushfires	H8, H9, SLR10, SLR12, H16, H18, ST10, SLR14, ST16
	Lack of appropriate safe refuges in times of emergency	H14
	Increased pressure on the community and on Council due to increased water restrictions	RR2
	Significant damage to private properties and community expectations that Council should protect them	SLR8
	Increased insurance premiums resulting in increased costs for Council	SLR9, H12
	Increased committee of management responsibilities for parks and camping	ST6
	Reduced Council income due to reduced property values and the resulting reduction in rate revenues	SLR7
	increased demand for community health services due to increased occurrence of dust and pollen related respiratory complaints	RR5
	Additional costs to Council of advocacy and liaison with other levels of government regarding mitigation measures	ST8
	Higher utility costs resulting in increased operating costs for Council	H19
	Increased community demand for 'cooler spaces' resulting in higher capital, running and maintenance costs for Council due to requirement for more shading structures, landscaped areas, water play facilities and lighting for night time activities	H15
Lower Rated	Mechanical breakdowns due to dustier environments	RR6
	Increased community expectations for Council to respond to and act on a range of climate change impacts	SLR13
	Strom damage to Queenscliffe's historic, attractive buildings, resulting in a reduction in its attraction as a tourist destination	ST9

Figure 4-13 shows the distribution of ratings for the 29 risks identified for the Community Services and Corporate Governance operational area for 2030 and 2070. The shift in risk severities between 2030 and 2070 is not as pronounced as it is in other operational areas, as the vast majority of risks (23) are already rated 'High' or 'Extreme' in 2030.

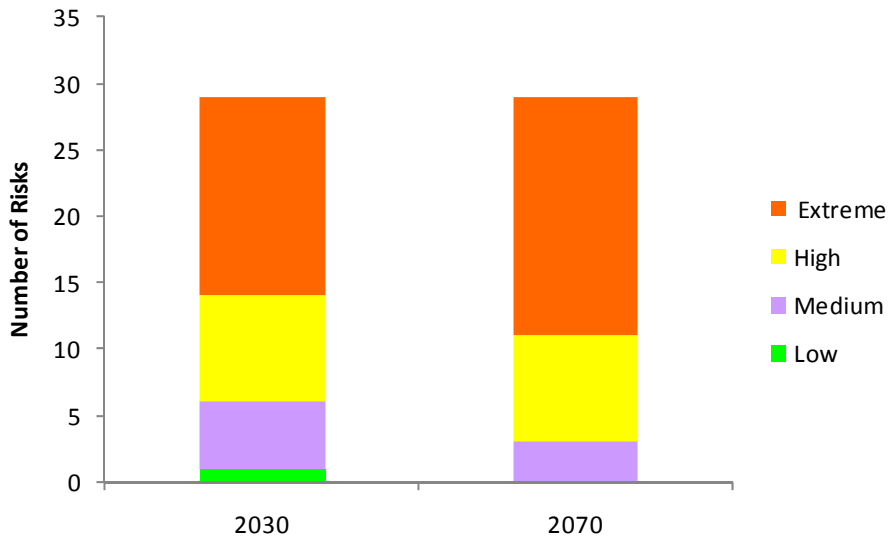


Figure 4-13 - Distribution of risk ratings in the Community Services and Corporate Governance operational area for 2030 and 2070

As shown in Figure 4-14, the Heat and Bushfires variable was the single largest contributor of risks in this area (with 35% of risks), with the Sea Level Rise and Storm Surge and the Storms variables as equal seconds (with 24% of risks each).

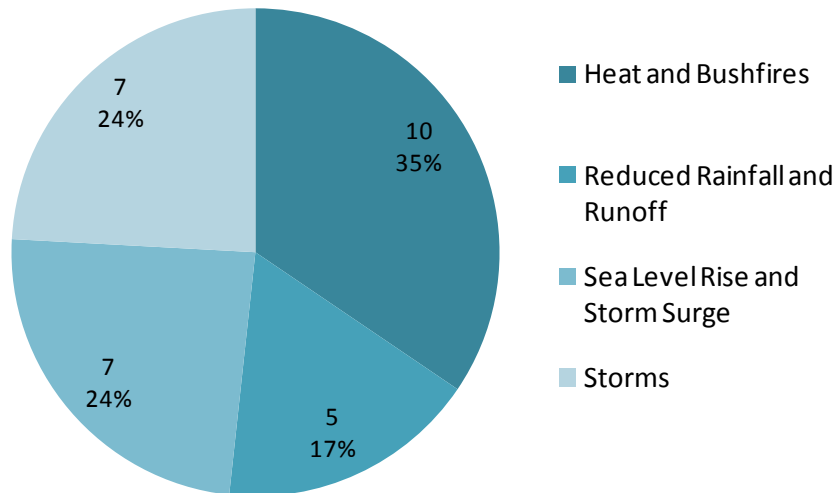


Figure 4-14 – Community services and corporate governance risks split by contributing climatic variable

5.0 Proposed Climate Change Adaptation Actions

Following the process described in detail in Section 3.5, participants in Council's adaptation planning workshop identified and evaluated a variety of proposed climate change adaptation actions under the five operational areas. The consolidation and analysis of workshop outputs has resulted in a total of 36 proposed actions grouped within two broad timeframes – the short term (2010 – 2013) with 18 actions, and the long term (2013 – 2017+) with 18 actions. Figure 3.1 shows the breakdown of proposed actions by operational area and timeframe designation.

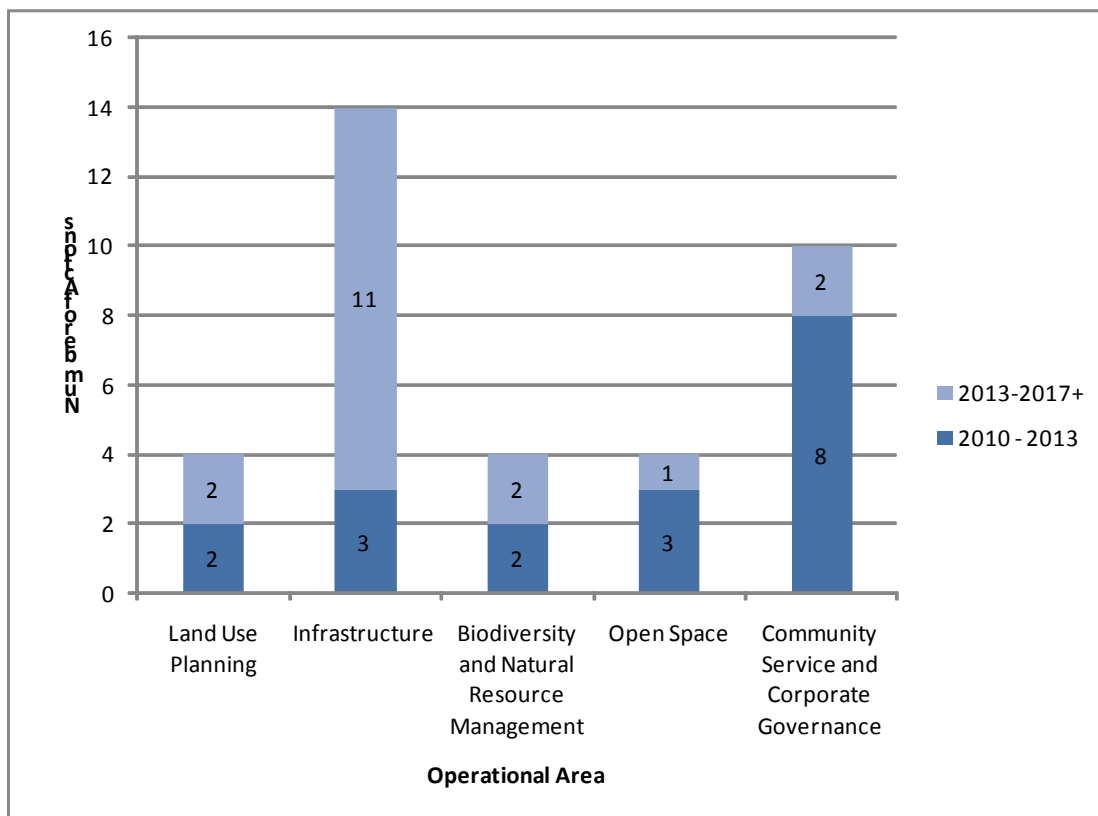


Figure 3 1 - Proposed climate change adaptation actions by operational area and by timeframe designation

In sections 5.1 - 5.5 Council's 36 proposed adaptation actions are listed in tables according to their timeframe designation of 2010-2013 and 2013- 2017+. Additional details shown for each action within the tables are:

- Action ID reference number
- Tags corresponding to the summary risks the action addresses (as listed in Chapter 4.0)
- Lead Council department responsible for the implementation of the action, and
- Supporting entities (internal and external).

The action evaluation process enabled adaptation options to be prioritised into short term (2010-2013) and long term (2013-2017+) options. However, after consultation with Council and the consideration of the feasibility of implementing resources in the short term, a few actions have been re-categorised from short term to long term (eg. Infrastructure 10, 14 and 15).

Importantly, although this Plan aims to assist Council in prioritising climate change adaptation actions, priority designations shown in this chapter only refer to the implementation timeframe rather than the importance of the action. It is acknowledged that factors outside the scope of this Project's action evaluation process (for example new funding opportunities) may affect Council's decisions on timeframes for the implementation of specific actions.

5.1 Land Use Planning



Four actions were identified under the Land Use Planning operational area, of which two could be considered for implementation in the short term 2010 -2013. The actions address issues of water efficiency, sustainable design and the protection of local properties and assets from Sea Level Rise and Storm Surge.

Table 7 lists climate change adaptation actions that could be considered for the short term 2010-2013 for the Land Use Planning operational area.

Table 7 Short term adaptation actions proposed for the Land Use Planning operational area for the 2010-2013 implementation timeframe

Action ID	Action	Risks Addressed	Lead Council Department	Supporting Entities
LUP 1	Identify and communicate external rebate programs for the installation of rainwater tanks (i.e. Barwon Water rebate for installation of tanks)	R37	Statutory Planning	DSE, Sustainability Victoria, Water authorities
LUP 4	Create sustainable and climate-sensitive innovative designs for Council buildings and public open spaces to both demonstrate leadership and increase community awareness of their benefits	R2, R3, R5	Statutory Planning / Projects and Engineering	BoQ Sustainability and Sustainability Victoria

Table 8 lists climate change adaptation actions that could be considered for the long term 2013 – 2017+ for the land use planning operational area.

Table 8 Long term adaptation actions proposed for the Land Use Planning operational area for the 2013- 2017+ implementation timeframe

Action ID	Action	Risk Addressed	Lead Council Department	Supporting Entities
LUP2	Through a detailed coastal vulnerability study, identify locations most vulnerable to sea level rise and storm surge inundation and develop a long term plan for management that considers avoiding (e.g. set backs from the coast), adapting (e.g. raising building and infrastructure heights), defending (e.g. beach stabilisation, nourishment, restoration, groins); and retreat (e.g. purchasing land to move development back from the shoreline)	R1, R3, R4, R6, R7, R8, R9, R11, R12, R13, R14, R16, R17, R18, R22, R29, R31, R33, R38, R39	Statutory Planning / Projects and Engineering	BoQ Public Places and Facilities and DSE Parks Victoria, and DPCD

Action ID	Action	Risk Addressed	Lead Council Department	Supporting Entities
LUP3	Develop a region-specific methodology (agreed with developers, community and government) for appropriate coastal planning, such as setbacks (directions to be provided by Future Coasts and Coastal Climate Change Advisory Committee)	R3, R4, R5	Statutory Planning	Future Coasts and Coastal Climate Change Advisory Committee, DSE, DPCD

5.2 Infrastructure



Fourteen actions were identified under the Infrastructure operational area, of which three could be considered for implementation in the short term 2010 -2013. The majority of actions address issues of climate resilient infrastructure, the identification of flood prone areas and assets and exploring the opportunity for water and energy efficiency. Note that based on consultation with Council and consideration of the feasibility of implementing resources in the short term, Infrastructure adaptation options 10, 14 and 15 were re-categorised from short term to long term.

Table 9 lists climate change adaptation actions that could be considered for the short term 2010-2013 for the Infrastructure operational area.

Table 9 Short term adaptation actions proposed for the Infrastructure operational area for the 2010-2013 implementation timeframe

Action ID	Action	Risks Addressed	Lead Council Department	Supporting Entities
Infra 5	Develop and include in internal business cases a simple climate change checklist to be completed for all new infrastructure and infrastructure upgrade projects to ensure project managers are aware of the projected climatic conditions and their potential implications	R6, R7, R10, R14, R15, R17, R30, R35, R45	Projects and Engineering	DPCD and DSE
Infra 6	Using the asset management system, identify and monitor infrastructure assets at risk due to climate change as part of ongoing condition audits and incorporate into asset condition reports (include mapping and consideration of underground assets)	R6, R7, R8, R9, R10, R12, R14, R15, R16	Projects and Engineering	
Infra 7	Through staff development plans, keep up to date with the latest infrastructure design standards to ensure council is using the most suitable materials and is designing infrastructure that can cope with future climate change	R11, R7	Projects and Engineering	Australian Building Codes Board

Table 10 lists climate change adaptation actions that could be considered for the long term 2013 – 2017+ for the Infrastructure operational area.

Table 10 Long term adaptation actions proposed for the Infrastructure operational area for the 2013- 2017+ implementation timeframe

Action ID	Action	Risk Addressed	Lead Council Department	Supporting Entities
Infra 1	Undertake a cost-benefit analysis to assess the viability of installing rainwater tanks and pumps as well as other large scale options for harvesting stormwater for Council operated assets, buildings and parks	R26, R44	Projects and Engineering	BoQ Sustainability / Water Authority
Infra 2	Investigate options to reuse greywater in all Council owned buildings (particularly focused on facilities with showers) or opportunities for sewer mining	R26, R44	Projects and Engineering	BoQ Sustainability
Infra 3	Carry out a comprehensive energy audit of all Council buildings and develop an energy efficiency strategy	R44	Sustainability / Projects and Engineering	
Infra 4	Undertake a cost benefit analysis to assess the viability of installing renewable energy sources on Council owned land or buildings	R44	Sustainability / Projects and Engineering	
Infra 8	Progressively integrate practical climate change advice and information into the Queenscliffe Municipal Emergency Management Plan to ensure flood prone and storm surge risk areas are identified and managed appropriately	R1, R17, R33, R34, R39, R41	MEMPC	SES Victoria, Life guard association
Infra 10	In collaboration with specialists, conduct a detailed study to identify and prioritise all viable opportunities for the capture and reuse of stormwater, and develop an implementation plan that is linked to the stormwater management plan	R25, R26, R27, R44	Projects and Engineering	Barwon Water
Infra 11	Conduct water audits across council facilities (including open spaces and buildings) to gain a comprehensive understanding of water usage patterns to inform the development of a sustainable water use plan which identifies opportunities for reductions	R26, R44	Projects and Engineering / Public Places and Facilities	BoQ Sustainability
Infra 12	Develop a sustainable water use plan that establishes council water use targets, implement efficiency measures across all existing council operations and assets, and incorporate relevant water use specifications into all new Council tenders	R26, R44	Projects and Engineering	BoQ Sustainability
Infra 14	Investigate areas of greatest risk from flooding due to extreme events and failure of soakage pits drainage and investigate site specific solutions (i.e. evaluate viability of soakage pits in specific areas or require dwellings to buffer storm water runoff through rain water tanks)	R1, R7, R11, R12	Projects and Engineering	
Infra 15	Identify opportunities to divert flood water from high risk areas for beneficial use or protection of community and assets	R1, R6, R8, R9, R12, R13, R17, R35	Projects and Engineering	
Infra 16	Investigate the use of the Sustainable Tools for Environmental Performance Strategy (STEPS) program to encourage the uptake of ecologically sustainable development (ESD) in residential developments	R37, R44, R45	Statutory Planning	BoQ Sustainability, STEPS training providers (Moreland City Council)

5.3 Biodiversity and Natural Resource Management



Four actions were identified under the Biodiversity and Natural Resource Management operational area, of which two could be considered for implementation in the short term 2010 -2013. The majority of actions address issues of biodiversity corridors protection and enhancement, weed and pest control and wetland management.

Table 11 lists climate change adaptation actions that could be considered for the short term 2010-2013 for the Biodiversity and Natural Resource Management operational area.

Table 11 Short term adaptation actions proposed for the Biodiversity and Natural Resource Management operational area for the 2010-2013 implementation timeframe

Action ID	Action	Risks Addressed	Lead Council Department	Supporting Entities
BDNRM 3	Work with appropriate partner agencies to enhance and extend biodiversity corridors throughout the region – prioritising those corridors that are currently at high risk from future climate change	R18, R19, R21	BoQ Sustainability / Public Places and Facilities	DSE / Parks Vic / CCMA/ CoGG / SCSC / G21
BDNRM 4	Monitor and treat stormwater from Council land running into wetlands and investigate the viability of constructing artificial wetlands to facilitate the treatment of stormwater in collaboration with neighbouring councils, Parks Victoria and DSE..	R20	BoQ Sustainability / Projects and Engineering	DSE / CCMA / CoGG / SCSC / G21

Table 12 lists climate change adaptation actions that could be considered for the long term (2013 – 2017+) for the Biodiversity and Natural Resource Management operational area.

Table 12 Long term adaptation actions proposed for the Biodiversity and Natural Resource Management operational area for the '2013- 2017+' implementation timeframe

Action ID	Action	Risks Addressed	Lead Council Department	Supporting Entities
BDNRM 1	Work with relevant agencies to monitor changes in weeds and pests and adjust control and management approaches in response to climatic changes	R28	BoQ Sustainability	DSE / Bellarine Catchment Network / Parks Victoria / CCMA
BDNRM 2	Ensure all foreshore management plans include specific actions and require commitment from external service providers to enhance the long term resilience of biodiversity to projected climatic changes	R19, R21	Public Places and Facilities / BoQ Sustainability	DSE / Parks Victoria / Vic Track

5.4 Open Space



Four actions were identified under the Open Space operational area, of which three could be considered for implementation in the short term 2010 -2013. The majority of actions address issues of water restrictions, heatwave health risks and the long term protection and enhancement of open spaces.

Table 13 lists climate change adaptation actions that could be considered for the short term 2010-2013 for the Open Space operational area.

Table 13 Short term adaptation actions proposed for the open space operational area for the 2010-2013 implementation timeframe

Action ID	Action	Risks Addressed	Lead Council Department	Supporting Entities
OS 1	Revise strategies and service level agreements for public open space to facilitate the uptake of water wise practices (e.g. mulching) and replacement of water intensive landscapes with water wise landscapes (e.g. rock gardens)	R4, R24, R26, R40, R44	Sustainability / Public Places and Facilities	DSE
OS 3	Review community event calendar with consideration to minimise the number of community events that occur in times of high heatwave risk and ensure adequate shading, drinking and medical facilities or services are in place for those events that cannot be rescheduled	R32, R40	Tourism and Community Development	DoH, local event managers
OS 4	Revise tree monitoring practices to ensure mature trees managed by Council are regularly checked for health and potential safety hazards (e.g. shedding limbs due to dry or storm conditions) by qualified specialists	R23	Public Places and Facilities	DSE

Table 14 lists climate change adaptation actions that could be considered for the long term 2013- 2017+ for the Open Space operational area.

Table 14 Long term adaptation actions proposed for the open space operational area for the 2013- 2017+ implementation timeframe

Action ID	Action	Risks Addressed	Lead Council Department	Supporting Entities
OS 2	Prioritise drought tolerant species for planning and revegetation in all council-managed reserves (e.g. street trees, bush revegetation) and progressively replace water intense species with more drought resistant species	R26, R40, R44	Public Places and Facilities	DSE

5.5 Community Services and Corporate Governance



Ten adaptation actions were identified under the Community Services and Corporate Governance operational area, of which eight could be considered for implementation in the short term 2010-2013. Most actions address issues of community resilience to increased heat and flooding, increased collaboration with neighbouring councils and internal and external climate change communications.

Table 15 lists climate change adaptation actions that could be considered for the short term 2010-2013 for the Community Services and Corporate Governance operational area.

Table 15 Short term adaptation actions proposed for the Community Services and Corporate Governance operational area for the 2010– 2013 implementation timeframe

Action ID	Action	Risks Addressed	Lead Council Department	Supporting Entities
CSCG 2	Identify cool recreation spaces (e.g. community centres, libraries) that have the capacity to cater for increased community demand and develop a long term plan to increase the number of these relief areas.	R36, R45	Tourism and Community Development	DoH
CSCG 3	Develop a contingency plan for accessing additional resources (or on-call agency/contractors) to respond to during extreme weather events post event clean up requirements	R33	Projects and Engineering	MEMPC
CSCG 4	Continue to implement the Borough of Queenscliffe's Heatwave Plan to support vulnerable community members during heat waves	R45	Tourism and Community Development / Aged Care and Disability Services	DoH
CSCG 6	Monitor incidences of staff health and safety incidents related to extreme weather events, and revise work practices and safety precautions in response to any increases	R34	OH&S	DoH
CSCG 8	Strengthen the collaboration with neighbouring councils (e.g. Greater Geelong and Surf Coast) in adapting to climate change, as well as explore the feasibility of a shared resource to be responsible for climate change advocacy and liaison with relevant State Government agencies on behalf of the collective councils.	R43	BoQ Sustainability	DSE, CCOG, Surf Coast
CSCG 9	Develop an external climate change communication and education strategy. This strategy would include information about: - likely climate change impacts in BoQ - what can be done to reduce climate change risks - awareness of heatwave health risks, including seasonal campaigns and support	R35, R36, R37, R42, R44	Tourism and Community Development / Aged Care & Disability Services	BoQ Sustainability / community groups
CSCG 10	Raise awareness among Council staff of how climate change is likely to impact their division and build capacity to respond	All risks	Communications & Governance	BoQ Sustainability

Action ID	Action	Risks Addressed	Lead Council Department	Supporting Entities
CSCG 11	Advocate and apply for climate change adaptation funding opportunities where these are available to assist in the implementation of adaptation actions outlined in the action plan.		BoQ Sustainability / and all departments with adaptation actions for which they are the lead	Any relevant state or federal agency

Table 16 lists climate change adaptation actions that could be considered for the long term 2013- 2017+ for the Community Services and Corporate Governance operational area.

Table 16 Long term adaptation actions proposed for the Community Services and Corporate Governance operational area for the 2013- 2017+ implementation timeframe

Action ID	Action	Risks Addressed	Lead Council Department	Supporting Entities
CSCG 1	Implement a program to progressively increase the number of drinking fountains and trees/shading structures in public recreational areas to enhance user comfort during days of extreme heat	R45	Public Places and Facilities	DSE / DPCD
CSCG 5	Ensure council's forward budgeting reflects likely increases in water and energy costs due to climate change, as well as conduct an energy-price risk assessment for the next 5-10 years to inform capital investment decisions (e.g. buildings and vehicles)	R44	Finance	

6.0 Review and Progress reporting

The Borough of Queenscliffe climate change risks will change over time. To ensure that Council's adaptation responses and approach remain valid and relevant to local priorities and climate conditions, the Climate Change Adaptation Action Plan will need to be reviewed and updated.

The Climate Change Adaptation Action Plan should be reviewed in line with the review of the Council Plan. The review should re-assess Council's risk profile in light of changes to climate change information, changes in policy or significant changes in Council's assets and activities. Following this review Council's climate change risk profile may need to be updated to reflect any changes in Council's climate change risks. The review should also monitor the implementation of adaptation options.

Regular and ongoing reporting of Council's climate change adaptation performance is critical to inform decision making and motivate changes in behaviour. To ensure that decision-makers, staff and the community are aware of how Council is tracking against the adaptation actions outlined this plan, reporting should be undertaken internally once a quarter and externally on an annual basis. Table 17 outlines the suggested planned reporting process including the audience, information to be reported, forum, responsibility and timing.

Table 17: Plan for reporting Borough of Queenscliffe climate change adaptation progress.

Audience	Information to be included	Forum	Responsibility	Frequency
Internal				
Sustainability Officer	<ul style="list-style-type: none"> Progress of the adaptation action plan implementation Key challenges and successes 	<ul style="list-style-type: none"> Sustainability meeting 	Sustainability Officer	Monthly
Executive and Senior Managers	<ul style="list-style-type: none"> Implementation Issues Key upcoming actions 	<ul style="list-style-type: none"> Management Team Meeting 	Sustainability Officer	Quarterly
Councillors	<ul style="list-style-type: none"> Implementation issues Key upcoming actions 	<ul style="list-style-type: none"> Council Meeting 	Sustainability Officer	Quarterly
External				
The Borough of Queenscliffe community	<ul style="list-style-type: none"> Summary of actions Priorities for the next year 	<ul style="list-style-type: none"> Council Annual Report 	Sustainability Officer	Annually

7.0 Concluding Remarks

This Borough of Queenscliffe Climate Change Adaptation Action Plan summarises the results of the climate change risk assessment and adaptation planning processes undertaken as part of the *Preparing for climate change in the Borough of Queenscliffe* project. This plan analyses the ratings and distribution of 112 individual risks across Council's five relevant operational areas and highlights the 45 higher rated summary risks for which adaptation actions have been identified.

The majority of Council's identified climate change risks relate to the following issues:

- Increased maintenance, expertise, repair, replacement and relocation costs, for both built and natural assets
- Loss of amenity
- Inability to satisfactorily deliver services and meet community demands
- Community expectations regarding Council's role in tackling climate change impacts
- Human health and safety hazards
- Financial impacts related to rising utility costs, increased need for Council advice, public liability issues and rate revenues.

In summary, this plan outlines 36 proposed adaptation actions tailored to address Council's higher rated climate change risks. These 36 adaptation options were grouped within two broad proposed timeframes for implementation – the short term (2010 – 2013) and the long term (2013 – 2017+). It is important that the adaptation options and their designated timeframes are considered in the context that some factors outside Council's scope may influence the delivery timeframes (i.e. not having the funding available). The proposed actions address the following areas:

- Water and energy efficiency and other sustainable design issues
- The climate resilience of essential infrastructure
- The long term protection and enhancement of public open space
- The protection of local properties and assets from sea level rise
- Community resilience to increased heat and flooding risks
- The protection of at risk coastal and inland habitats
- Weed and pest control and the protection of biodiversity corridors.

The proposed responses involve a range of different activities including community education, collaboration with neighbouring councils, provision of incentives, additional research and changes to Council systems or policies.

The successful implementation of this plan will require Council to undertake the following steps for each action:

- Confirm the suitability of the proposed actions
- Assign specific responsibilities for each action
- Confirm the prioritisation of actions and a realistic timeline for the implementation
- Undertake more detailed implementation planning, including resource and budget planning
- Consider synergies with other internal action plans and strategies, as well as with programs run by external bodies and agencies, to avoid duplication and take advantage of previous and current work.

While the process of climate change scenario identification, risk assessment and adaptation planning undertaken in this Project has been thorough, Council will need to periodically review its climate change risks and responses, as scientific, technological and institutional factors continue to evolve.

Staying up to date on developments in the climate change arena will require regular scientific and other relevant information updates. The information sources listed in Appendix H will assist the Council in keeping up to date with key developments in this field, in the Victorian context as well as nationally and internationally.

8.0 References

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Images – the images used in this report have been either sourced from Council documents and website or have been taken by AECOM staff during visits to the Borough.

Appendix A

Stakeholder and Community Focus Workshop Attendees

Stakeholder and Community Focus Workshop Attendees

Stakeholder workshop Attendees

Cr Helene Butler
Cr David Mitchell
Mr Robert Scott
Mr Ian Carlton
Mr Chirs Fogarty
Mr Ted Beggs
Mr John Henderson
Ms Sam Smith
Ms Sally Chandler- Ford
Mr Mark Osborne
Mr Stuart Hansen
Ms Alli Chaloner
Ms Lisa Schorback
Ms Karen Hose

Organisation

Borough of Queenscliffe
Borough of Queenscliffe
Regional Director Vic Roads
SES Geelong
CEO Bellarine Community health
Queenscliff Coast Guard
Queenscliff Tourist Parks
Borough of Queenscliffe
Parks Victoria Port Phillip Region
Borough of Queenscliffe
Borough of Queenscliffe
Borough of Queenscliffe
Borough of Queenscliffe
Borough of Queenscliffe

Community Focus Workshop Attendees

Mr David Shaw
Ms Joan Kenwood
Mr Bob Fuller
Ms Sue Longmore
Mr David Jennings
Mr Rob Hurley

Mr Graham Christie
Mr Rod Wayth

Nancy Rowlands
Sue Wastervall
Mr Brian Hudson
Mr Les Irving-Dusting
Cr Lloyd Davies
Cr David Mitchell
Sam Smith

Organisation

Point Lonsdale Civic Association
Queenscliff Community Association
Queenscliff Global Warming Group
Bellarine Catchment Network
Queenscliff Senior Citizens
Queenscliff Music Festival
Queenscliff Lonsdale Tourism and Business Ass.
Queenscliff Bowling, Tennis & Croquet Club
Anglican Parish of Queenscliff/ Point Lonsdale
Env and Sust Portfolio Reference Group
St Aloysius Primary School
Maritime Museum
Borough of Queenscliffe
Borough of Queenscliffe
Borough of Queenscliffe

Appendix B

Agenda for Risk Assessment Workshop

Borough of Queenscliffe Risk Assessment Workshop
Tuesday 23 March 2010

Venue

Borough of Queenscliffe

Facilitators

Michael Nolan

Lotte Hoekstra – Fokkink

Jennie Suann

Agenda

Time	Task
11:30am	Introduction and Overview of the Risk Assessment Process (in one big group) <ul style="list-style-type: none"> • 'Why we are here' activity • Project background • Outline of the workshop format (risk and control listing, risk rating, reporting back) • Explanation of the risk and control listing process, including a couple of examples
12:10pm	Risk Listing (in five operational area groups) <ul style="list-style-type: none"> • Splitting into five operational area groups • Listing all climate change risks, by <u>the most relevant</u> climatic variable
1:00pm	Lunch
1:30pm	Control Listing
2:00pm	Consequence and Likelihood Rating (in five operational area groups) <ul style="list-style-type: none"> • Instructions for the consequence and likelihood rating process • For each listed risk, identifying the most affected consequence area and assigning it a rating (between 'Insignificant' to 'Catastrophic') for 2030 and 2070 • For each listed risk, assigning likelihood ratings (from 'Rare' to 'Almost Certain') for 2030 and 2070
3:00pm	Afternoon Tea (facilitator to gather all spreadsheet inputs)
3:20pm	Reporting Back (in one big group) <ul style="list-style-type: none"> • Each operational area group to report back on its highest rated risks, its exposure to different climatic variables, and the process in general, using graphs from Sheet 4
3:50pm	Workshop Summation <ul style="list-style-type: none"> • Next steps in the project and how the risk information will be used
4:00pm	Workshop Close

Appendix C

Queenscliffe - Risk Ranking Criteria

Borough of Queenscliff's Risk Ranking Criteria

Likelihood scales

Likelihood	Probability Description
Almost Certain	<ul style="list-style-type: none">Highly likely to occur within a year, and/or a high level of recorded incidents or strong anecdotal evidence
Likely	<ul style="list-style-type: none">Will probably occur in most circumstances (within 3 yrs)
Possible	<ul style="list-style-type: none">Might occur, some time between 3 to 10 year intervals
Unlikely	<ul style="list-style-type: none">Could occur, sometime within 10 – 20 year
Rare	<ul style="list-style-type: none">Remote chance but may occur in exceptional circumstances > 20 year intervals

Consequence scales

Consequence Matrix								
Risk Score	Risk Rating	Revenue, Cost or Liability <i>(3rd Party or Business Loss)</i>	People <i>(Health & Safety)</i>	Environment	Social/Cultural/ Heritage	Business Interruption or Level of Service Delivery	Asset Network Integrity	Corporate Image <i>(Probity/Political/Economic)</i>
5	Catastrophic	<ul style="list-style-type: none"> Liability cost or business loss to Council > \$250K; Council officer or Councillor gaoled 	<ul style="list-style-type: none"> Multiple loss of life; City wide epidemic. 	<ul style="list-style-type: none"> Serious damage of national significance; Prosecution (cost as per revenue impact); Impact not fully reversible. 	<ul style="list-style-type: none"> Social impacts that impede the ability of the community to function satisfactorily; Considerable irreparable damage to items of cultural/heritage significance 	<ul style="list-style-type: none"> Critical loss of service for a crucial period of time (> 30 days) 	<ul style="list-style-type: none"> Renewal or rehabilitation work required Cost > \$250K 	<ul style="list-style-type: none"> Official Public Investigation; Public/media outrage; International media coverage; Public pressure to curtail operations of the Council; Management changes demanded
4	Major	<ul style="list-style-type: none"> Liability cost or business loss to Council of between \$75K to \$250K; Council officer and/or Councillor with significant fine 	<ul style="list-style-type: none"> Loss of life; Serious health impact on multiple members of public or staff. 	<ul style="list-style-type: none"> Serious damage of State significance; Prosecution likely (cost as per revenue impact); Impact reversible within 10 yrs. 	<ul style="list-style-type: none"> Major ongoing social issues Some irreparable damage to items of cultural/heritage significance 	<ul style="list-style-type: none"> Critical loss of service for up to 1 month (16 – 30 days) 	<ul style="list-style-type: none"> Renewal or rehabilitation work required Cost \$75K to \$250K 	<ul style="list-style-type: none"> Loss of community confidence in Council; Public/media concern; National media coverage; Damage to Council's reputation Council subject to formal inquiry/sanctioned
3	Moderate	<ul style="list-style-type: none"> Liability cost or business loss to Council of \$20K to \$75K; Council personnel fined 	<ul style="list-style-type: none"> Serious health impact on a member of the public; Hospitalisation required 	<ul style="list-style-type: none"> Serious damage of local significance; Prosecution probable (cost as per revenue impact); Impact reversible within 1 yr. 	<ul style="list-style-type: none"> Moderate ongoing social impacts locally Minor irreparable damage to items of cultural/heritage significance, other damage repairable. 	<ul style="list-style-type: none"> Critical service loss not back in agreed time (6 – 15 days) 	<ul style="list-style-type: none"> Renewal or rehabilitation work required Cost \$20K to \$75K 	<ul style="list-style-type: none"> Community discussion and concern; Broad adverse media coverage
2	Minor	<ul style="list-style-type: none"> Liability cost or business loss to Council of \$5K to \$20K 	<ul style="list-style-type: none"> Moderate injury/health impact on staff or public; Medical attention required 	<ul style="list-style-type: none"> Material damage of local significance; Prosecution possible (cost as per revenue impact); Impact reversible within 3 months. 	<ul style="list-style-type: none"> Minor medium-term social impacts locally Minor repairable damage to items of cultural/heritage significance 	<ul style="list-style-type: none"> Brief loss of service for minimum period (3 – 5 days) 	<ul style="list-style-type: none"> Renewal or rehabilitation work required Cost \$5k to \$20k 	<ul style="list-style-type: none"> Minor/isolated concerns raised by members of public, customers, suppliers; Local media adverse report
1	Insignificant	<ul style="list-style-type: none"> Minimal liability cost or business loss to Council < \$5K 	<ul style="list-style-type: none"> Minor First Aid required; Temporary, minor health impact on staff or public. 	<ul style="list-style-type: none"> Minor release of pollutants which does not require notification to third parties Brief, non-hazardous temporary pollution, reversible within a week 	<ul style="list-style-type: none"> Minimal short-term social impacts locally Minimal repairable damage to items of cultural/heritage significance 	<ul style="list-style-type: none"> Business disruption but no loss of service (1 – 2 days) 	<ul style="list-style-type: none"> Renewal or rehabilitation work required Cost of up to \$5k 	<ul style="list-style-type: none"> Event only of interest to individuals; No impact on community; Marginal impact on Council operations; Resolved in day to day management

Appendix D

Preparing for Climate Change in the Borough of Queenscliffe Handout



Preparing for Climate Change in the Borough of Queenscliffe

Introduction

As a small coastal council surrounded by water on three sides, the Borough of Queenscliffe (Council) has recognised its particular vulnerability to the impacts of climate change, such as storm surge and sea level rise.

Council is preparing to take a leadership role in assessing and responding to its key climate change risks. In doing so, it has appointed AECOM to undertake a climate change risk assessment to inform the development of a Climate Change Adaptation Action Plan.

Gaining a comprehensive understanding of how climate change may affect Council's operations, services and assets is crucial to developing a well informed adaptation response that will build Council's and the communities resilience, reducing its vulnerability to potential climate change impacts.

This stakeholder consultation workshop aims to introduce Council's adaptation objectives and seeks to gain support and input from the local community, ensuring their concerns are considered in the response.

This workshop is not a debate about climate change or the Corangamite Catchment Management Authority's Interim Local Floodplain Development Plan – it is about helping the Borough to prepare for potential climate change impacts.

Thank you for working with us to ensure Council's operations, services and assets continue to fulfil the needs of the community.

Stakeholder Consultation Workshop Agenda

7pm	Welcome by facilitator and Council
7.05pm	Introduction to the workshop's scope and objectives
7.20pm	Group activity about the interconnectedness of the issues
7.40pm	Presentation – climate change risks to the Borough of Queenscliffe
7.55pm	Group activity – key risks presented by climate change
8.20pm	Presentation – adaptation options (role of council, community and others)
8.35pm	Group activity – adaptation options
9pm	Closure



The process for the Borough of Queenscliffe's Climate Change Adaptation Plan development



Further Information

The Borough of Queenscliffe is proactively addressing issues outlined Corangamite Catchment Management Authority's Interim Local Floodplain Development Plan. For further information about this and other Council initiatives, go to www.queenscliffe.vic.gov.au.

For further information about climate change go to the Federal Government's web site at www.climatechange.gov.au, or the Victorian Government's web site at www.climatechange.vic.gov.au.

Contact

For further information or enquiries about the Borough of Queenscliffe's Climate Change Adaptation Action Plan, please contact Sam Smith on 03 5258 1377 or email Sam at samantha.smith@queenscliffe.vic.gov.au, or go to Council's website at www.queenscliffe.vic.gov.au.



(Photos supplied by Travel Victoria www.travelvictoria.com.au)

Photography Release Form

Name _____
Address _____
Organisation (if applicable) _____
Email _____
Phone _____

I, _____ agree to allow the Borough of Queenscliffe and AECOM to use photographs of myself for the purposes of advertising, publication, and /or any other commercial or promotional use in whole or in part thereof for an unlimited time and without any further restrictions whatsoever.

I acknowledge that the above release of any photographs of myself shall apply from the date stated below and I also acknowledge that there will be no claim for payment.

Signed by or on behalf of the person/s noted above

Date

Signed on behalf of AECOM

Date

Appendix E

Community Workshops Risks

1.0 Risks and adaptation options identified during the stakeholder workshop

1.1 Group 1, Activity 1- Risk

What are the key climate risks in the BoQ?

- Migratory waders and other migratory birds in Swan Bay- loss of connectivity/Ramsar values. **NRM**
- Biodiversity of swamp marsh intertidal community in Swan Bay- Orange Bellied Parrots. **NRM**
- Existence of Swan & Sand Island- form barrier at mouth of Swan Bay. SLR could change this
- Salt water inundation will compromise fresh water, having implications for biodiversity and supply for upstream agricultural use. **NRM**
- Low lying areas at bottom Lake Victoria compromised by inundation- this will also compromise sewage lines for Ocean Grove and Queenscliffe. **INF**
- All sewer lines and pumping stations in low lying areas- age and seeping out and in due to storm surge and SLR will compromise local potable water. **NRM/INF/CSCG**
- Fresh water supply in low lying areas may be compromised. **CSCG**
- Sea level rise will mean all infrastructure for services residents take for granted will need to change- water, sewerage, power, gas, roads. (biodiversity spreadsheet covers this to some extent) **INF**
- Some areas vulnerable to flooding in both Queenscliffe and Point Lonsdale. Increased council cost for management/cleanup. **LUP**
- Risk of Queenscliffe being cut off and isolated completely in a sea level rise and storm surge event, disabling council to deliver services. **CSCG**
- Natural vegetation along foreshore may be replaced by intertidal species **NRM**
- Invasive pests/insects may benefit from rising temperatures- increase required for council's monitoring and pest management. **NRM**
- Ongoing protection of areas with high biodiversity and conservation areas- connectivity between these areas.
- Densely vegetated areas at Point Lonsdale may cause a fire risk to elderly residents- evacuation during bushfire. **CSCG**
- Planning issues- at risk compared to no risk.
- Insurance issues/risks associated with areas that have been identified as 'at risk', which council will be expected to address. **LUP**
- Resale value of properties is a big issue.
- Financial/economic issue- devaluing properties will lead to reduction of Borough income→reduced ability to provide services and operations. **CSCG**
- Increased extreme events could lead to diminished ability of residents to take part in social activities, resulting in loss of social cohesion. **CSCG**
- Rising water table may compromise the integrity of homes' foundations.
- Council's ability/systems in place to deal with demand for guidance/assistance for planning issues related to flood prone areas.
- Telephone/internet access→infrastructure. **INF**
- Queenscliffe's iconic biodiversity, i.e. coastal moonah woodland could be negatively impacted, which may have negative tourism impacts for council. **NRM**

Are there any recent relevant examples of similar impacts in the BoQ?

- Back beach at Point Lonsdale. Access to beach was undermined → steps left in mid-air.
- Sea wall undermined at Point Lonsdale- needs to be constantly rebuilt and maintained.

[Area is in a bit of a rain shadow and hasn't experienced any major storms in recent years- most come from South West- keeps area cooler].

- Higher high tides at boat ramp caused flooding. When coupled with high rainfall drains back up.
- Higher tides affect promenades.
- Murray Rd has pump in place to pump reclaimed Salt Marsh. Pumps do not manage in high tide and northerly wind. Swales full → run out to Swan Bay. Broken pipes can cause backwash.
- Reduced rainfall caused western area of Swan Bay to dry up.
- Swan Bay is silting up and will remain shallow until sea level rise occurs.
- Reduced depth of Swan Bay from dumping of silt and dredging at mouth has changed recreational use of bay over last 20 years. Incremental change.
- Historically Swan Bay had a recreational focus- recreational fishing and yachting (100+ boats). Is now a marine national park- only 2 areas for recreational fishing.

1.2 Group 1, Activity 2- Adaptation

What are the appropriate adaptation responses?

Action	Who is responsible?
Borough can seek funding to develop the adaptation recommendations (including structural, engineering and hydrological assessment) from this adaptation exercise. Take into consideration habitats at risk.	BoQ
Register with Federal and State authorities/agencies as an interested/affected party in the BoQ as a mainly marine environment → partner with these bodies to achieve outcomes.	BoQ
Link with all other shires (especially City of Greater Geelong) around the bay to achieve consistent outcomes	BoQ
Sea-proof BoQ- sea walls, channelling, pumping etc. Investigation, assessment etc.	BoQ, Federal & State government
Redirect groundwater that seeps upwards and put into pondage	BoQ, Federal & State government
Create flood plains pondage for displaced water, storm surge. Temporary water pondage.	Federal & State government
Water tanks a necessity on all buildings	Owners/government grants
Community education/information to residents. Risks, timelines, broad information. Topics: <ul style="list-style-type: none"> • Risks • Timelines • Likelihood • Options, possibilities • Include properties, habitat • Updated regularly • Inclusive- all have a voice 	BoQ

<ul style="list-style-type: none"> • Current council activities • Legislation- state/federal government • Local legal situation (legislation) • Reassurance- remove fear/anxiety • Reducing individual impacts, i.e. energy, recycling, transport, water use. <p><i>How?</i></p> <ul style="list-style-type: none"> • Newsletters, rate notices, advice to new councillors, advice to prospective buyers, workshops, presentations, internet, school program. • Include all in overall adaptation plan. <p><i>When?</i></p> <ul style="list-style-type: none"> • From next rates notice and to be ongoing until a minimum of 2020. <p><i>Who?</i></p> <ul style="list-style-type: none"> • Ongoing opportunities for community to be involved and provide feedback. • Ongoing opportunities for community to experience key note speakers. 	
Planning decisions around land impacted by flood	BoQ, State government
Plan for reserves for flora/fauna retreat in areas around habitat/salt marshes. Planning overlay in conjunction with City of Geelong.	BoQ, Federal & State government/agencies, COGG
Reducing individual and council impacts, e.g. energy and fuel use, water tanks, solar panels, recycling, public transport, street lighting	All
Inclusion for community groups- opportunities to be involved	All

1.3 Group 2, Activity 1- Risk

What are the key climate risks in the BoQ?

- Erosion of beaches and low-lying areas **NRM**
 - Narrows
 - Non-hard rock/dune areas
 - Current responses- rock wall, planting
 - Impacts at end of sea wall near narrows
- Flooding- road cut off. Road has been build up higher as a response. Rail also a bit higher (Vic Track). **INF**
- Swan Bay- birds that feed on mud flats may be affected. Restricted by sea level rise and movement of habitat.
- Sand Island bird habitat, Lonsdale Lakes. Birds, new proposed development and increased pollution from canal estates- increase in water circulating through system, impacting Swan Bay. **NRM**
- Sewer impacts by sea level and pumping stations. **INF**

- Storm water in low lying areas. Fisherman's Flat and drainage into roadway & pumping doesn't work due to power outage.
- Storm surge and SLR- flooding to
- Climate impacts on animal and plant species via changes in habitat.
- Lower areas in BoQ impacted by sea level affects commercial activity and community size. **CSCG**
- May lose lower parks and public use crown land (i.e. foreshore caravan park).
- Increased temperatures- fire danger (the Narrows & Point Lonsdale).
- Low lying DPI/DSE office laboratories susceptible to SLR and storm surge may be impacted, which would have employment implications. **CSCG**
- Impacts on aquaculture, i.e. mussels. **CSCG**
- Harbour→storm surge has overtopped Bridge St. Future access to wharf and around bay will be impacted (although floating wharf is adaptable). **INF/ CSCG**
- Mosquitoes- breeding habitat? (salty marsh habitat) **NRM/ CSCG**
- Increase in Bairnsdale ulcer via mosquito. **CSCG**
- Elderly people
 - High proportion (1/3 of population is over 60 years old).
 - Heat stress due to more hot days.
 - Significant impact- cooling at night is very bad.

Are there any recent relevant examples of similar impacts in the BoQ?

- Huge floods in 1920s- cut off roads.
- Flood prone
- Mud Island eroding

1.4 Group 2, Activity 2- Adaptation

What are the appropriate adaptation responses?

Action	Who is responsible?
Planting foreshores and dunes (short-term)	Community and schools
Revise planning scheme regarding flooding <ul style="list-style-type: none"> • Consider services to property • Insurance • Title declaration • More overlays • Council should not be held responsible • Little option for retreat • Well-considered response for flow-on impacts 	All levels of government
Statewide approach to Port Phillip Bay flood protection, i.e. flood gate/dyke at entrance to bay.	State government
Sewer adaptation- height?	State government and water authorities
Stormwater systems to capture and reuse water and some treatment. More appropriate water use, i.e. not fresh water in toilet	State government, water authorities and users
Water security- tanks and reuse of water locally	State and federal government incentives, Barwon Water
Roads & infrastructure- raise levels and access	VicRoads and federal government

Power and communications underground in some areas- access to repair and salt-resistant	Power and communications companies
Flexible or relocation housing- adaptable, high functionality. Options→ To rebuild or new houses in risk prone areas.	Council, community, planning
Architects and community demand for relocation style housing.	Council, Deakin & Gordon Universities
Self-sufficiency for food, water, emergency response, community networking	Community, council
Salt-tolerant trees planted in parks etc.	CCMA, DSE, Parks Vic, Council, Community Groups,
Communication across groups, agencies and departments. <ul style="list-style-type: none"> • Understanding roles and responsibilities. • Education. 	Council to facilitate

1.5 Group 3, Activity 1- Risk

What are the key climate risks in the BoQ?

- Fire through Point Lonsdale toward Queenscliffe.
- Low areas flooding causing structural damage.
- Cut-off the neck isolating Queenscliffe. **INF?**
- Rising temperatures causing heat stress on elderly and very young/vulnerable.
- Biodiversity at major risk- i.e. catchments, wetlands (birds/fish), food chain diminishing.
- Heritage overlay
- Increased insurance coverage costs for BoQ. **CSCG**
- Road maintenance.
- Increased expectation for council to respond to and act on climate change (i.e. prioritise/develop/manage and fund action plans). Will test council's ability to meet perceived expectations.

Are there any recent relevant examples of similar impacts in the BoQ?

- Beach access at Point Lonsdale back beach (same issue listed by Group 1).
- Damage to sea wall.
- Need to assess health of trees.
- Tide and stormwater exceeding capacity- recurring flooding to Fisherman's Flats.
- Flooding of Portarlington Rd.

1.6 Group 3, Activity 2- Adaptation

What are the appropriate adaptation responses?

Action	Who is responsible?
National adaptation strategies including principles of: <ul style="list-style-type: none"> • Planning/development • Inundation • Biodiversity- ecological corridors • River systems 	Federal government in cooperation with state governments.
Fire protection strategies <ul style="list-style-type: none"> • Infrastructure/buildings • Review fire risks and develop protection plan • Safe areas • Street strategies • Borough plan and coordinator • Community education • Biodiversity issues 	BoQ CFA SES Community
Heat stress strategy for the aged- define/identify temperature for protective action	BoQ State government departments Community groups
Water sensitive urban design	
Tanks on houses	
Insulation on houses to reduce heat stress	
Solar panels to reduce pressure on peak power loads	
Maintain or increase permeable areas on private property (minimise building coverage of lot)	
Remove barriers to the community achieving these goals	
Reduce use of air conditioning to reduce peak energy use, e.g. encourage fan use.	
Create a plan to retreat from most dangerous areas	
Relocate the community to provide connections in emergencies	
Set aside areas for wetlands to retreat along	

Additional feedback received post workshop:

In the key risks activity, although we noted that rising sea levels in Swan Bay would impact on mudflats, reducing feeding habitat for migratory and other shorebirds, we should also have noted that rising sea levels at Swan Bay may affect intertidal seagrasses which grow on the mudflats. The seagrass meadows of Swan Bay provide extensive nursery areas for juvenile fish and other marine species. Marine and intertidal vegetation communities at Swan Bay, under threat from climate change include seagrass meadows and saltmarsh vegetation. especially if links to coastal wetlands have not been retained or planned for. Planning measures need to ensure the long-term availability of low-lying land connecting to Swan Bay for the migration of intertidal mudflat, saltmarsh and seagrass coastal ecosystems.

We need to also consider potential climate change impacts on shorebird /migratory wader roosting sites which, in the case of most migratory waders, occurs currently in the BoQ, along the Swan Bay/ Swan Island /Sand Island/'ferry to pier' shorelines, above the high water mark in bare, sandy patches.

Consultation and cooperation between both the Borough of Queenscliffe and City of Greater Geelong is essential in the planning for buffer zones for migrating coastal ecosystems, ecosystem connectivity and biodiversity adaptation under the impacts of climate change to enable ecosystem resilience. Residential development or tourist infrastructure must not be permitted within these buffer zones.

Appendix F

Borough of Queenscliffe Climate Change Risks

Risk Assessment Workshop

Risk ID Tag	Risk	Operational Area	Controls	Principal Consequence Category	Consequence 2030	Likelihood 2030	Risk Rating 2030	Consequence 2070	Likelihood 2070	Risk Rating 2070
H1	Localised grass and scrub fires are a higher risk (minimal areas of concern)	Biodiversity and Natural Resource Management	Minimal fire tracks but enough roads existing to allow for breaks and fire brigade access - BoQ has existing fire and emergency management plans and comply with state wide emergency management programs. (Duplication of access tracks from DPI station in Narrows on Swan Bay side into Point Lonsdale is required to provide an alternative access and egress from Queenscliff)	Environment	Moderate	Possible	High	Moderate	Possible	High
H2	Temp rise will mean more use of beach areas and resulting impacts to those beaches. Community may be dissatisfied due to increased use of toilets, bins, car parks. Life guards will be impacted	Biodiversity and Natural Resource Management	Car park capacity may limit usage level. Limit access to visitors arriving on ferries and day trippers from Geelong.	Corporate Image (Probity, Political / Economic)	Moderate	Unlikely	Medium	Moderate	Possible	High
H3	Potential risks to Swan Bay foreshore	Biodiversity and Natural Resource Management		Environment	Minor	Unlikely	Low	Minor	Possible	Medium
H4	Potential risk due to heat to marine life and bird life in and around Borough - Swan Bay	Biodiversity and Natural Resource Management		Environment	Minor	Likely	Medium	Minor	Likely	Medium
H5	Increased temperatures will impact on native species and may allow introduced species to take over. Council will need to ensure these changes are managed, to ensure biodiversity, soil health. Community may be divided by use of alternatives to native species	Biodiversity and Natural Resource Management	BoQ has environmental management plans	Environment	Minor	Possible	Medium	Minor	Possible	Medium
H6	Risk to vegetation, plant life, biodiversity (bushfire issue is higher when coming in from the SW from Point Lonsdale) Coastal vegetation may be impacted - most is down hill from ridges and will regenerate easily. Uphill sides will be more heavily impacted. Dunes stabilised by recent plantings.	Biodiversity and Natural Resource Management		Environment	Minor	Unlikely	Low	Minor	Possible	Medium

Risk ID Tag	Risk	Operational Area	Controls	Principal Consequence Category	Consequence 2030	Likelihood 2030	Risk Rating 2030	Consequence 2070	Likelihood 2070	Risk Rating 2070
H7	Risk to BoQ from fires originating in agricultural areas around Borough	Biodiversity and Natural Resource Management	Minimal fire tracks but enough roads existing to allow for breaks and fire brigade access - BoQ has existing fire and emergency management plans and comply with state wide emergency management programs. (Duplication of access tracks from DPI station in Narrows on Swan Bay side into Point Lonsdale is required to provide an alternative access and egress from Queenscliff)	Environment	Minor	Unlikely	Low	Minor	Possible	Medium
RR1	Survival of vegetation areas could require BoQ to prioritise areas that are of significant value - decisions around what is and isn't maintained	Biodiversity and Natural Resource Management		Revenue, Cost or Liability (3rd Party or Business Loss)	Moderate	Likely	High	Major	Almost Certain	Extreme
SLR1	Ability of animals (e.g. birds from Ramsar areas) to move along with changes to NRM in BoQ. BoQ will need to assess its ability to provide those species with areas of connectivity (in consultation with neighbouring councils and Govt agencies) to allow survival of those species	Biodiversity and Natural Resource Management	Responsibility of DSE and Parks Vic - potential areas	Environment	Minor	Possible	Medium	Major	Likely	Extreme
SLR2	Coastal erosion due to sea level rise and dune destabilisation, resulting in local flora and fauna being compromised - ongoing maintenance by BoQ to minimise impacts	Biodiversity and Natural Resource Management	Coastal Foreshore Management Plan	Asset Network Integrity	Major	Likely	Extreme	Catastrophic	Almost Certain	Extreme
SLR4	Loss of informal stormwater treatment through wetlands along Murray Road	Biodiversity and Natural Resource Management		Environment	Moderate	Unlikely	Medium	Moderate	Possible	High
SLR5	Environmental losses of wetlands and habitats	Biodiversity and Natural Resource Management		Environment	Moderate	Unlikely	Medium	Moderate	Possible	High

Risk ID Tag	Risk	Operational Area	Controls	Principal Consequence Category	Consequence 2030	Likelihood 2030	Risk Rating 2030	Consequence 2070	Likelihood 2070	Risk Rating 2070
ST1	Wind intensity will damage old, and already compromised trees (due to loss of rainfall) and may impact on local fauna species that use that vegetation for refuge. Impact to council will be costs due to clean up and repairs to natural resources and infrastructure. Costs also associated with removal of debris. Costs due to mitigation for ongoing storms	Biodiversity and Natural Resource Management	Tree management strategy	Revenue, Cost or Liability (3rd Party or Business Loss)	Catastrophic	Likely	Extreme	Catastrophic	Almost Certain	Extreme
ST2	Intense storms may result in short term damage to marine life resulting in loss of biodiversity	Biodiversity and Natural Resource Management	Marine National Park Management Plan	Environment	Insignificant	Possible	Low	Moderate	Possible	High
H8	Inability to communicate with community	Community Services and Corporate Governance	Individual emergency management plan	People (Health and Safety)	Major	Almost Certain	Extreme	Major	Almost Certain	Extreme
H9	Inability to access locations due to bushfire	Community Services and Corporate Governance	Individual emergency management plan	People (Health and Safety)	Catastrophic	Almost Certain	Extreme	Catastrophic	Almost Certain	Extreme
H10	Inability to staff Municipal Emergency Control Centre	Community Services and Corporate Governance	Short term only then rely on others	Corporate Image (Probity, Political/Economic)	Major	Almost Certain	Extreme	Major	Almost Certain	Extreme
H11	Staff exposed to extreme condition	Community Services and Corporate Governance	Policies and procedures in place and flexible work hours	People (Health and Safety)	Moderate	Almost Certain	Extreme	Moderate	Almost Certain	Extreme
H12	Increased claims and risk rating increases cost	Community Services and Corporate Governance	Appropriate insurance cover and review process	Revenue, Cost or Liability (3rd Party or Business Loss)	Minor	Likely	Medium	Major	Almost Certain	Extreme
H13	Increased stress on infrastructure	Community Services and Corporate Governance	Routine inspections, third party responsibilities, lease agreements	Asset Network Integrity	Moderate	Likely	High	Moderate	Almost Certain	Extreme

Risk ID Tag	Risk	Operational Area	Controls	Principal Consequence Category	Consequence 2030	Likelihood 2030	Risk Rating 2030	Consequence 2070	Likelihood 2070	Risk Rating 2070
H14	Lack of safe havens	Community Services and Corporate Governance	none	People (Health and Safety)	Catastrophic	Almost Certain	Extreme	Catastrophic	Almost Certain	Extreme
H16	Inability for staff to meet responsibilities	Community Services and Corporate Governance	Policies and procedures in place to provide basic services (emergency management plan and heatwave plan)	People (Health and Safety)	Moderate	Unlikely	Medium	Moderate	Possible	High
RR2	Reduced water supply and increased restrictions	Community Services and Corporate Governance	none	Social/Cultural/Heritage	Major	Possible	Extreme	Major	Almost Certain	Extreme
RR3	Inability to water significant historic trees	Community Services and Corporate Governance	water carted in	Social/Cultural/Heritage	Major	Possible	Extreme	Major	Likely	Extreme
RR4	Requires more local water harvesting	Community Services and Corporate Governance	ESD factors in new buildings	Corporate Image (Probity, Political/Economic)	Major	Almost Certain	Extreme	Major	Almost Certain	Extreme
RR5	Increased dust and pollens > respiratory problems and increased demand on community services	Community Services and Corporate Governance	none	People (Health and Safety)	Moderate	Possible	High	Moderate	Likely	High
RR6	Mechanical problems related to dustier environment	Community Services and Corporate Governance	general maintenance	Asset Network Integrity	Minor	Possible	Medium	Minor	Likely	Medium
SLR7	Rating value of property decreased	Community Services and Corporate Governance	none	Corporate Image (Probity, Political/Economic)	Major	Unlikely	High	Major	Possible	Extreme
SLR8	Perception of council's responsibility to protect private assets	Community Services and Corporate Governance	none	Corporate Image (Probity, Political/Economic)	Major	Almost Certain	Extreme	Major	Almost Certain	Extreme
SLR10	Roads flooded or closed causing inability to move around the Borough to meet community needs	Community Services and Corporate Governance	none	Business Interruption or Level of Service Delivery	Moderate	Possible	High	Moderate	Likely	High

Risk ID Tag	Risk	Operational Area	Controls	Principal Consequence Category	Consequence 2030	Likelihood 2030	Risk Rating 2030	Consequence 2070	Likelihood 2070	Risk Rating 2070
SLR11	Financial cost due to need to relocate community assets	Community Services and Corporate Governance	none	Revenue, Cost or Liability (3rd Party or Business Loss)	Moderate	Unlikely	Medium	Moderate	Possible	High
ST3	High level of public and private property damage	Community Services and Corporate Governance	none	People (Health and Safety)	Major	Likely	Extreme	Major	Almost Certain	Extreme
ST4	Tree damage reducing ability to access properties or safely leave areas	Community Services and Corporate Governance	Use SES and outdoor staff in emergency and monitor tree health ongoing	People (Health and Safety)	Major	Possible	Extreme	Major	Likely	Extreme
ST5	Safety of staff working during these times	Community Services and Corporate Governance	Policies and procedures in place	People (Health and Safety)	Major	Possible	Extreme	Major	Likely	Extreme
ST6	Increased committee of management responsibilities for parks and camping	Community Services and Corporate Governance	Use SES and outdoor staff in emergency and monitor tree health ongoing	Asset Network Integrity	Major	Possible	Extreme	Major	Possible	Extreme
ST8	Additional costs to council of advocacy and interaction with other levels of government on mitigation measures	Community Services and Corporate Governance		Revenue, Cost or Liability (3rd Party or Business Loss)	Minor	Almost Certain	High	Minor	Almost Certain	High
ST9	Damage to historic buildings which from part of the town's attraction as a tourist destination	Community Services and Corporate Governance		Revenue, Cost or Liability (3rd Party or Business Loss)	Minor	Unlikely	Low	Minor	Possible	Medium
H18	Reduced access/escape routes in event of bushfire	Infrastructure	emergency management plans	People (Health and Safety)	Major	Possible	Extreme	Major	Possible	Extreme
H20	Ability for infrastructure in outdoor areas (toilets, rubbish, available shade) to cope with increased demand on severe heat days	Infrastructure	Foreshore asset maintenance plan to keep assets functional	Asset Network Integrity	Moderate	Unlikely	Medium	Moderate	Possible	High
H21	Increase in temp may result in increased visitation to the borough increasing requirements of existing road infrastructure	Infrastructure	planned events have traffic management plans	Social/Cultural/Heritage	Minor	Likely	Medium	Minor	Likely	Medium

Risk ID Tag	Risk	Operational Area	Controls	Principal Consequence Category	Consequence 2030	Likelihood 2030	Risk Rating 2030	Consequence 2070	Likelihood 2070	Risk Rating 2070
H22	Risk of reliance of the community on Council buildings as place of refuge from heat.	Infrastructure	council undertaking development of heatwave plan	People (Health and Safety)	Minor	Possible	Medium	Minor	Likely	Medium
H23	Risk that the existing resource level (plant and equipment) is insufficient to cope with increased demand during bushfire event.	Infrastructure		People (Health and Safety)	Minor	Unlikely	Low	Minor	Possible	Medium
RR9	Reduced rainfall resulting in lower flows in drainage network allowing blockage.	Infrastructure	Maintenance Cleaning	Asset Network Integrity	Minor	Likely	Medium	Minor	Likely	Medium
RR10	Reduced rainfall resulting in increased concentration of pollutants in stormwater outfall	Infrastructure	Gross Pollutant Trap installed at major outfalls	Environment	Minor	Possible	Medium	Minor	Possible	Medium
RR11	Risk of water not being available for construction works	Infrastructure	Storage pipe scour water for later use	Asset Network Integrity	Minor	Unlikely	Low	Minor	Possible	Medium
SLR14	Sea level rise may result in inundation of road links in many areas	Infrastructure	high risk areas identified	Asset Network Integrity	Moderate	Unlikely	Medium	Major	Possible	Extreme
SLR15	Low level flooding due to stormwater unable to drain freely	Infrastructure	planning requirements for new building	Asset Network Integrity	Moderate	Possible	High	Major	Possible	Extreme
SLR16	Sea level rise causing rise in water table resulting in reduced effectiveness of soak pit drainage.	Infrastructure		Asset Network Integrity	Major	Almost Certain	Extreme	Catastrophic	Possible	Extreme
SLR17	Coastal erosion due to sea level rise and dune destabilisation, resulting in infrastructure damage (e.g. pier, groyne) Council will need to increase their capacity to repair and replace, ongoing maintenance.	Infrastructure	Coastal Foreshore Management Plan	Asset Network Integrity	Major	Likely	Extreme	Catastrophic	Almost Certain	Extreme
SLR18	Infrastructure is heritage listed and maintenance is costly. Replacement is not possible due to heritage listings. Council is required to maintain and costs high	Infrastructure	Insurance?	Asset Network Integrity	Catastrophic	Likely	Extreme	Catastrophic	Almost Certain	Extreme
SLR19	Loss of infrastructure (Pt Lonsdale Surf Club Ramp) Queenscliff Lonsdale Yacht Club Rooms	Infrastructure	Reactive. Restore after damage.	Asset Network Integrity	Major	Likely	Extreme	Major	Almost Certain	Extreme
SLR20	Flooding of boatramp facilities	Infrastructure		Asset Network Integrity	Minor	Possible	Medium	Major	Likely	Extreme

Risk ID Tag	Risk	Operational Area	Controls	Principal Consequence Category	Consequence 2030	Likelihood 2030	Risk Rating 2030	Consequence 2070	Likelihood 2070	Risk Rating 2070
SLR21	Increased pressure on protective assets such as seawall /groynes	Infrastructure	Transfer to DSE asset. Boq participation in identifying issues	Asset Network Integrity	Major	Possible	Extreme	Major	Likely	Extreme
SLR24	Increased pipe infiltration causing pumps to operate longer hours	Infrastructure		Asset Network Integrity	Minor	Likely	Medium	Minor	Likely	Medium
SLR25	Foreshore building assets susceptible to damage from tidal surge	Infrastructure	maintenance of sea walls. Maintenance inspection program	Business Interruption or Level of Service Delivery	Insignificant	Likely	Medium	Insignificant	Likely	Medium
SLR27	Power kiosk may be susceptible to flooding and potential power outage effecting council service delivery	Infrastructure	emergency management plans	Business Interruption or Level of Service Delivery	Minor	Rare	Low	Minor	Unlikely	Low
ST10	Inability for council to deliver service following extreme weather events	Infrastructure	emergency management plans	Corporate Image (Probity, Political/Economic)	Major	Rare	High	Major	Likely	Extreme
ST11	High winds may impact on dune stability and integrity and may lead to sand shift. Loss of integrity may lead to dune breach and impact on infrastructure on land side of dunes. Council may be impacted by costs and maintenance requirements	Infrastructure		Asset Network Integrity	Catastrophic	Possible	Extreme	Catastrophic	Almost Certain	Extreme
ST13	Additional expertise and resources required to deal with erosion and storm events and risk to public assets and infrastructure where council is the committee of management for the crown land and foreshore	Infrastructure	Council participation in workshops and sourcing latest knowledge/information on response and best practice.	Revenue, Cost or Liability (3rd Party or Business Loss)	Moderate	Possible	High	Moderate	Likely	High
ST14	Drainage capacity not adequate to cope with increased intensity	Infrastructure		Corporate Image (Probity, Political/Economic)	Minor	Unlikely	Low	Minor	Likely	Medium
ST15	Potential for storm damage to council buildings	Infrastructure	Maintenance inspection program	Business Interruption or Level of Service Delivery	Insignificant	Likely	Medium	Insignificant	Likely	Medium
ST16	Roads at risk of fallen trees cutting access	Infrastructure	Tree maintenance and removal of susceptible trees	Asset Network Integrity	Insignificant	Possible	Low	Insignificant	Likely	Medium

Risk ID Tag	Risk	Operational Area	Controls	Principal Consequence Category	Consequence 2030	Likelihood 2030	Risk Rating 2030	Consequence 2070	Likelihood 2070	Risk Rating 2070
ST17	cost of clean up works following extreme weather events	Infrastructure	Currently included in budget	Revenue, Cost or Liability (3rd Party or Business Loss)	Minor	Possible	Medium	Minor	Likely	Medium
H25	Loss of property and housing in vegetated areas - greater work for council; people displacement; emergency management activities increase; increased community expectations	Land Use Planning	New exemptions for clearance around houses	Social/Cultural/Heritage	Major	Possible	Extreme	Major	Possible	Extreme
H26	Greater burden on local government for heat/bushfire planning	Land Use Planning	Wildfire Management Overlay, Heatwave plan	Corporate Image (Probity, Political/Economic)	Major	Unlikely	High	Major	Almost Certain	Extreme
H27	Planning for shade in new development	Land Use Planning	Wildfire Risk Register, BALs (Building Code)	Revenue, Cost or Liability (3rd Party or Business Loss)	Major	Unlikely	High	Major	Almost Certain	Extreme
RR12	Additional planning for water sensitive urban design to capture water	Land Use Planning		Revenue, Cost or Liability (3rd Party or Business Loss)	Minor	Likely	Medium	Minor	Almost Certain	High
RR13	Conflict with Heritage Overlay and installation of water tanks and solar hot water systems that are visible from the street	Land Use Planning		Social/Cultural/Heritage	Minor	Rare	Low	Minor	Unlikely	Low
SLR28	Additional expertise and resources required for long term relocation of communities at high risk	Land Use Planning	Sea walls on the coast and groynes	Revenue, Cost or Liability (3rd Party or Business Loss)	Catastrophic	Rare	High	Catastrophic	Unlikely	Extreme
SLR29	Additional expertise and resources required for interim planning of new development e.g.. Floor levels, mitigation, dealing with risks of litigation, etc.	Land Use Planning	Referrals to the Corangamite Catchment Management Authority	Revenue, Cost or Liability (3rd Party or Business Loss)	Moderate	Almost Certain	Extreme	Moderate	Almost Certain	Extreme
SLR30	Additional expertise and resources required to deal with erosion and risk to property where council is the committee of management for the crown land and foreshore	Land Use Planning		Revenue, Cost or Liability (3rd Party or Business Loss)	Major	Unlikely	High	Major	Possible	Extreme

Risk ID Tag	Risk	Operational Area	Controls	Principal Consequence Category	Consequence 2030	Likelihood 2030	Risk Rating 2030	Consequence 2070	Likelihood 2070	Risk Rating 2070
St18	Additional expertise and resources required to deal with erosion and storm events and risk to private property where council is the committee of management for the crown land and foreshore	Land Use Planning	Referrals to DSE	Revenue, Cost or Liability (3rd Party or Business Loss)	Moderate	Unlikely	Medium	Moderate	Possible	High
H28	Loss of significant vegetation - amenity, attraction, clean up, revegetation	Open Space	Reactive. Existing vegetation protocols consider species selection	Environment	Major	Unlikely	High	Major	Possible	Extreme
H29	Ability for open spaces (beaches/parks) to cope with increased demand on severe heat days - traffic management, access to exits (The Narrows)	Open Space		People (Health and Safety)	Moderate	Unlikely	Medium	Major	Likely	Extreme
H30	Increased demand on open spaces as refuges in fire incidents - emergency management, recovery	Open Space	Municipal Emergency Man Plan	People (Health and Safety)	Moderate	Unlikely	Medium	Moderate	Possible	High
H31	Evacuation of Council managed camping grounds -	Open Space	EMP's for individual parks	People (Health and Safety)	Moderate	Unlikely	Medium	Moderate	Possible	High
RR14	Stress to mature trees which act as wind breaks, shade, thermal moderation, and cultural identity due to reduced rainfall/runoff. That will require BoQ to replace trees, introduce maintenance program. Aligned maintenance costs due to increased maintenance, storm water harvesting and maintenance options	Open Space	BoQ controls include: a tree management strategy, cliff stabilisation program, dune stabilisation program, coastal process study of Queenscliff foreshore - pier etc (refer Parks Vic - discuss with them), BoQ is to liaise with Parks Victoria to identify historical but relevant environmental studies undertaken as part of the Queenscliff Harbour Planning process around 2000.	Social/Cultural/Heritage	Major	Almost Certain	Extreme	Catastrophic	Almost Certain	Extreme
RR15	Green spaces will be compromised, due to reduced ability to water those areas, resulting in loss of open spaces suitable for community use, resulting in higher impact to available areas.	Open Space	Boq Foreshore management and open space management plans, plus more detailed planning being undertaken currently in collaboration with Parks Vic. Issues with lack of council control over foreshore due to govt agency responsibility	Social/Cultural/Heritage	Moderate	Likely	High	Major	Almost Certain	Extreme
RR16	Ongoing capacity to replace old trees and ability of those trees to respond to climate change resulting in loss of shade etc	Open Space	Tree management strategy	Revenue, Cost or Liability (3rd Party or Business Loss)	Minor	Possible	Medium	Major	Likely	Extreme
RR17	Open space planning will need to accommodate irrigation/low rainfall - additional finance and expertise required	Open Space	Planning for water tanks in new and existing facilities	Revenue, Cost or Liability (3rd Party or Business Loss)	Major	Unlikely	High	Major	Possible	Extreme

Risk ID Tag	Risk	Operational Area	Controls	Principal Consequence Category	Consequence 2030	Likelihood 2030	Risk Rating 2030	Consequence 2070	Likelihood 2070	Risk Rating 2070
RR18	Increased weed infestation and loss of native vegetation - more council resources required to control weeds	Open Space		Revenue, Cost or Liability (3rd Party or Business Loss)	Moderate	Possible	High	Moderate	Almost Certain	Extreme
RR19	Weed infestation associated with climate change - weed management, native revegetation, loss of good habitat	Open Space	Reactive.	Environment	Moderate	Possible	High	Moderate	Likely	High
RR21	Loss of significant vegetation - amenity, attraction, clean up, revegetation	Open Space	Regular review of vegetation protocols	Environment	Minor	Unlikely	Low	Minor	Possible	Medium
RR22	Loss of park amenity (dead grass, shrubs, trees) - watering regimes	Open Space	Regular review of vegetation protocols	Environment	Minor	Unlikely	Low	Minor	Possible	Medium
RR23	Increased injuries due to harder playing surfaces e.g. football	Open Space	Sports clubs do risk assessments prior to games	People (Health and Safety)	Insignificant	Unlikely	Low	Insignificant	Possible	Low
SLR35	Terminal scour at end of seawall	Open Space	Support local enviro group with reveg	Business Interruption or Level of Service Delivery	Catastrophic	Rare	High	Catastrophic	Unlikely	Extreme
SLR36	Breach of seawall at Point Lonsdale oval	Open Space		Business Interruption or Level of Service Delivery	Moderate	Possible	High	Major	Likely	Extreme
SLR37	Erosion beaches, cliffs	Open Space	Reactive. Restore after damage.	Asset Network Integrity	Moderate	Likely	High	Moderate	Likely	High
SLR38	Access to beach through loss of sand in storm events	Open Space	Reactive. Restore after damage.	Social/Cultural/Heritage	Minor	Likely	Medium	Moderate	Likely	High
ST19	Aged trees coping with high wind events - loss of amenity, potential public liability, replacement of old trees	Open Space		Social/Cultural/Heritage	Major	Unlikely	High	Major	Likely	Extreme
ST20	Risk to public during major events e.g. Seafood Feast, Hot Rods, Music Festival - Public liability, emergency response, clean up	Open Space		Revenue, Cost or Liability (3rd Party or Business Loss)	Minor	Possible	Medium	Moderate	Likely	High

Risk ID Tag	Risk	Operational Area	Controls	Principal Consequence Category	Consequence 2030	Likelihood 2030	Risk Rating 2030	Consequence 2070	Likelihood 2070	Risk Rating 2070
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Community Consultation Workshop

Risk ID Tag	Risk	Operational Area	Controls	Principal Consequence Category	Consequence 2030	Likelihood 2030	Risk Rating 2030	Consequence 2070	Likelihood 2070	Risk Rating 2070
SL3	Salt water inundation due to SLR will compromise fresh water - implications for biodiversity as well as supply for upstream agricultural use	Biodiversity and Natural Resource Management			Moderate	Possible	High	Moderate	Likely	High
SLR26	Sewer lines and pumping stations in low lying areas- subject to storm surge and SLR damage - compromise local potable water	Infrastructure			Moderate	Unlikely	Medium	Moderate	Possible	High
SLR22	Sea level rise impacting essential services (water, sewerage, power, gas, roads)	Infrastructure			Moderate	Possible	High	Moderate	Likely	High
SLR31	Increased Council management / cleanup costs for some flood prone areas in Queenscliffe and Point Lonsdale	Land Use Planning			Moderate	Possible	High	Moderate	Likely	High
SLR12	Risk of Queenscliffe being cut off and isolated completely in a sea level rise and storm surge event, disabling council to deliver services	Community Services and Corporate Governance			Major	Rare	High	Major	Unlikely	High
SLR32	Council may not have the ability/systems in place to deal with increased demand for guidance/assistance for planning issues related to flood prone areas	Land Use Planning			Major	Almost Certain	Extreme	Major	Almost Certain	Extreme
SLR6	Queenscliffe iconic biodiversity, i.e. coastal moonah woodland and seagrasses could be negatively impacted, which may have negative tourism impacts for council	Biodiversity and Natural Resource Management			Moderate	Unlikely	Medium	Moderate	Possible	High

Risk ID Tag	Risk	Operational Area	Controls	Principal Consequence Category	Consequence 2030	Likelihood 2030	Risk Rating 2030	Consequence 2070	Likelihood 2070	Risk Rating 2070
SLR9	Increased insurance premiums due to climate change resulting in increased costs for BoQ	Communtiy Services and Corporate Governance			Moderate	Almost Certain	Extreme	Moderate	Almost Certain	Extreme
SLR13	Increased expectation for council to respond to and act on climate change (i.e. prioritise/develop/manage and fund action plans).	Communtiy Services and Corporate Governance			Moderate	Unlikely	Medium	Moderate	Unlikely	Medium

AECOM Gap Analysis

Risk ID Tag	Risk	Operational Area	Controls	Principal Consequence Category	Consequence 2030	Likelihood 2030	Risk Rating 2030	Consequence 2070	Likelihood 2070	Risk Rating 2070
SLR33	Increased foreshore reserve widths due to sea level rise resulting in higher reserve maintenance costs for council	Land Use Planning			Moderate	Likely	High	Moderate	Likely	High
RR20	Loss of public amenity and aesthetic value due to council irrigating fewer open spaces as a result of reduced water availability / increased costs	Open Space			Moderate	Possible	High	Moderate	Possible	High
SLR34	Conflict between council and developers due to requirement fro larger coastal setbacks to protect against long term sea level rise	Land Use Planning			Moderate	Likely	High	Moderate	Likely	High
H19	Higher utility costs due to higher costs or a scarcity resulting in increased operating costs for council	Infrastructure			Moderate	Likely	High	Major	Likely	Extreme
RR7	Requirement to introduce low water use landscaping practices (including synthetic alternatives) to adapt to the changing climate, resulting in increased capital (and potentially maintenance) costs to council	Infrastructure			Major	Likely	Extreme	Major	Likely	Extreme
ST12	Damage to roads, bridges and pavements due to increased temp and extreme events resulting in increased repair / relocation costs to council	Infrastructure			Major	Possible	Extreme	Major	Possible	Extreme

Risk ID Tag	Risk	Operational Area	Controls	Principal Consequence Category	Consequence 2030	Likelihood 2030	Risk Rating 2030	Consequence 2070	Likelihood 2070	Risk Rating 2070
SLR23	Increased beach, marina and boat ramp maintenance / repair requirements due to sea level rise and storm surge impacts leading to higher costs to councils	Infrastructure			Major	Possible	Extreme	Major	Likely	Extreme
H24	Increased council staff downtime due to extreme events resulting in reduced council productivity	Infrastructure			Minor	Possible	Medium	Minor	Possible	Medium
RR8	Damage to heritage buildings (and others) due to climate change (extreme events, reduced rainfall, increased temp) resulting in increased maintenance / reconstruction costs to council	Infrastructure			Major	Possible	Extreme	Major	Possible	Extreme
ST7	Requirement for councils to provide emergency assistance and shelters in case of climate related natural disasters (e.g. flooding, bushfires, storm events), including in council buildings	Community Services and Corporate Governance			Major	Possible	Extreme	Major	Possible	Extreme
H17	Requirement for additional council monitoring of community outdoor events due to increased risk of heat stress	Community Services and Corporate Governance			Moderate	Possible	High	Moderate	Possible	High
H15	Increased community demand for cooler spaces resulting in higher capital, running and maintenance costs for councils due to requirement for more shading structures, landscaped areas, water play facilities and lighting	Community Services and Corporate Governance			Moderate	Likely	High	Moderate	Likely	High

Appendix G

Stakeholder and Community Engagement Framework

Stakeholder and Community Engagement

The recommendations for engaging with stakeholders and the community around climate change adaptation provided by AECOM in this chapter incorporates feedback provided by the community at the 'Preparing for Climate Change in the Borough of Queenscliffe' workshop held in Council's Town Hall in March 2010.

This workshop and the feedback received in it should be recognised and celebrated as the all important first step in the ongoing process of successfully engaging the community in adapting to climate change in Queenscliffe.

To ensure Council continues to gain support and input from the local community, it must provide community members with accurate, timely and accessible information and with ongoing opportunities to be educated, involved and consulted. This type of engagement will build a sense of 'ownership' and commitment to the process. It will also enable the community to make decisions about their individual adaptation responses, providing them with a sense of confidence in their ability to deal with the impacts of climate change, and thus helping to alleviate anxiety.

Figure 1 sets out AECOM's approach to community engagement in a local government context, identifying the steps required to undertake an effective community engagement campaign. For each step an explanation and list of considerations has been provided below.

Figure 1 AECOM's approach to community engagement



Clarify the scope

Establishing a clear scope of work from the beginning of the process is the fundamental first step to achieving a successful outcome. Prior to developing its Community Engagement Plan, Council should consider the following:

- How does Council intend to adapt to potential climate change impacts?
- What does it want to say?
- What are the negotiable and non-negotiable actions and messages?
- What is the allocated budget? Is this sufficient and, if not, where can Council or the community get more funding?

- What components of the adaptation actions (and communication and engagement activities) is Council responsible for? Who is to be responsible for the rest?
- What is the timeframe and how does it fit in with other Council objectives?
- What resources are available (human, financial/ funding/ grants, machinery, office and infrastructure)
- Who will manage the community engagement program?

Plan the approach

A holistic approach to communication, stakeholder relations and community engagement will ensure Council's adaptation objectives are met. To achieve this, consideration must be given to the following:

- Who should be involved? (key stakeholders, government agencies, community groups, residents, tourists, businesses, emergency services, minority groups and utilities)
- How much involvement is required? (i.e. will you inform, consult, involve, collaborate or empower)
- Who will champion the campaign and does Council have 'buy in' from elected members?
- How will Council communicate with stakeholders and the community? (e.g. newsletters, e-newsletters, local media, advertisements, rate notices, advice to new councillors, advice to prospective property buyers, quarterly workshops, focus groups)
- How will Council communicate with hard to reach groups and individuals?
- What are the key messages?
- What is the timeframe for activities?
- What governance is required and who is responsible?
- How will the objectives set out on the Community Engagement Plan be evaluated?
- How will feedback be incorporated to inform ongoing adaptation strategies?
- Who will motivate the community, who are the technical experts and who will provide information for all activities/ outputs?
- What are the risks and issues?
- How will Council continue to build the community's capacity to be involved and responsive?
- How will Council and the community celebrate success?

Get commitment from Council

Communication, stakeholder and community activities cannot take place in a vacuum. To maximise positive outputs it is imperative that the wider Council form part of the overarching engagement process. The following prompts will assist in obtaining Council commitment:

- Do you have commitment from the Mayor, CEO and Councillors?
- Who is the champion at the top level of Council?
- Spread the word about this commitment and ensure these champions are represented at all community events
- Have commitment to the program ratified within the Council's corporate plan, strategic plan, municipal strategic statement and other legislative documents

Deliver what's agreed

With a defined scope, a strategic plan and good internal working relationships it's time to launch into implementation. Build trust with all stakeholders, internal and external, by being honest, keeping messages straight forward and focussed, and be accountable for what you say you will do. Listed below are some suggested approaches to achieve this aim;

- Deliver simple key messages in a consistent, accessible format
- Deliver the objectives set out in the Community Engagement Plan within the timeframes set out in the plan
- Develop a Community Charter outlining how Council intends to engage with the community
- Provide varied opportunities for all stakeholders and community members to be involved
- Celebrate the achievement of milestones
- Listen to the feedback and use this to inform ongoing implementation and engagement.
- Do not promise what may not be possible and keep promises that you have made
- Report on outcomes
- Be honest, open and considerate

Evaluate and continuously improve

To ensure Council is delivering on its targets it must be adaptable and responsive. Evaluation not only helps to audit performance, it provides an opportunity to learn. By continuously reviewing the performance of engagement activities it is possible to strengthen relationships, build awareness, promote accountability and deliver a more efficient output. Consideration should be given to the following questions in developing the evaluation plan;

- How has the community responded to the campaign?
- Has the campaign received negative or positive media feedback?
- Has Council implemented adaptation responses in line with the project's scope? If not what were the barriers?
- Have new opportunities been identified and fed back into the Adaptation Action Plan? Has this been easy to achieve? If not, why, and how can that be addressed?
- What issues and risks have emerged and how have they been responded to?
- Have new priorities emerged?
- Are community members still engaging with the program? If not why and how can this be addressed?
- How will the campaign fit in with the next year's budget and strategic plan?
- How can the campaign deliver better outcomes next time?

With any engagement campaign of this type, the focus is on the community, which will ultimately guide Council in its decision making processes. Listen to them, consider their views, celebrate successes and adapt accordingly.

Appendix H

Climate Change Adaptation Reference Sources

Climate Change Adaptation Reference Sources

International

- The UK Climate Impacts Programme - <http://www.ukcip.org.uk/>
- AdaptNet - <http://www.globalcollab.org/gci/adaptnet>

National

- Adapting to Climate Change in Australia: An Australian Government Position Paper - <http://www.climatechange.gov.au/en/publications/adaptation/position-paper.aspx>
- Climate Change Impacts and Risk Management: A Guide for Business and Government (Department of Climate Change and Energy Efficiency) - <http://www.climatechange.gov.au/community/~media/publications/local-govt/risk-management.ashx>
- Climate Change Science - Faster Change and More Serious Risks - <http://www.climatechange.gov.au/publications/science/faster-change-more-risk.aspx>
- Australian Climate Change Science - A National Framework - <http://www.climatechange.gov.au/publications/science/cc-science-framework.aspx>
- Climate Change in Australia: Technical Report (CSIRO 2007) - <http://www.csiro.au/resources/Climate-Change-Technical-Report-2007.html>
- Climate Change 2007: Impacts, Adaptation and Vulnerability. Intergovernmental Panel on Climate Change Fourth Assessment Report – (IPCC 2007) – <http://www.ipcc.ch/ipccreports/ar4-wg2.htm>
- State of the Climate (CSIRO/BoM 2010) – <http://www.csiro.gov.au/resources/State-of-the-Climate.html>
- Climate Change Risks to Australia's Coasts - <http://www.climatechange.gov.au/publications/coastline/climate-change-risks-to-australias-coasts.aspx>
- Renewable Energy Atlas of Australia - <http://www.environment.gov.au/sustainability/renewable/atlas/index.html>

Victoria

- Victoria's climate change website – adaptation action
<http://www.climatechange.vic.gov.au/Greenhouse/wcmn302.nsf/childdocs/-0A075FE0F68F56D6CA2575C40007BF74?open>
- Climate Communities – Sustainability Victorian
<http://www.sustainability.vic.gov.au/www/html/2864-climate-communities.asp>
- Victoria Future Coasts Program
<http://www.climatechange.vic.gov.au/Greenhouse/wcmn302.nsf/LinkView/6921636738849362CA25750001AF55DA2C8013E5CEDE429CA25766D0016E286>
- Heatwave Plan for Victoria 2009-2010 – Victorian Government
http://www.health.vic.gov.au/environment/downloads/heatwave_plan_vic.pdf
- Flood Safe – Victoria State Emergency Services
<http://www.ses.vic.gov.au/CA256AEA002F0EC7/page/FloodSafe?OpenDocument&1=65-FloodSafe~&2=~&3=~>
- Storm Safe – Victoria State Emergency Services
<http://www.ses.vic.gov.au/CA256AEA002F0EC7/page/StormSafe?OpenDocument&1=67-StormSafe~&2=~&3=~>
- Safety Victoria – Victorian Government
<http://www.safety.vic.gov.au/CA256C5C002964E8/HomePage?ReadForm&1=Home~&2=~&3=~>