

**COASTAL CLIMATE CHANGE
ADVISORY COMMITTEE**

**ISSUES AND OPTIONS PAPER
MAIN REPORT**

FEBRUARY 2010

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Acronyms

AHD	Australian Height Datum
CAP	Coastal Action Plan
CMAs	Catchment Management Authorities
CCMA	Corangamite Catchment Management Authority
CCRP	Climate Change Response Plan
CDZ	Comprehensive Development Zone
CHO	Coastal Hazard Overlay
CHVA	Coastal Hazard Vulnerability Assessment
CMA	Catchment Management Authority
COAG	Council of Australian Governments
CPRS	Carbon Pollution Reduction Scheme
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTZ	Coastal Transition Zone
DCP	NSW Development Control Plan
DDO	Design & Development Overlay
DNRE	Department of Natural Resources and Environment
DPO	Development Plan Overlay
DSE	Department of Sustainability and Environment
EES	Environmental Effects Statement
EMO	Erosion Management Overlay
EPA	Environment Protection Authority
ESD	Ecological Sustainable Development
ESO	Environmental Significance Overlay
GAA	Growth Areas Authority
GCB	Gippsland Coastal Board
GHCMA	Glenelg-Hopkins Catchment Management Authority
ICZM	Integrated Coastal Zone Management
IPCC	Intergovernmental Panel on Climate Change
IPO	Incorporated Plan Overlay
LEP	NSW Local Environmental Plan
LPPF	Local Planning Policy Framework
LSIO	Land Subject to Inundation
MAV	Municipal Association of Victoria
MSS	Municipal Strategic Statement
NRCA	Natural Resource and Catchment Authority
P&E Act	Planning and Environment Act 1987

PAO	Public Acquisition Overlay
PPN	General Planning Practice Note
RCO	Road Closure Overlay
RCS	Regional Catchment Strategy
RFO	Rural Floodway Overlay
RO	Restructure Overlay
SBO	Special Building Overlay
SEPP (NSW)	State Environmental Planning Policy
SEPP (VIC)	State Environment Protection Policy
SMO	Salinity Management Overlay
SPPF	State Planning Policy Framework
VCAT	Victorian Civil and Administrative Tribunal
VCS	Victorian Coastal Strategy
VPELA	Victorian Planning and Environmental Law Association
VPO	Vegetation Protection Overlay
VPP	Victoria Planning Provisions
WGCCW	Working Group on Climate Change and Water

1. Message from the Chairperson

Avoiding dangerous climate change has taken on new urgency in recent years as scientific certainty has increased and the Intergovernmental Panel on Climate Change predictions suggest a global response is needed.

Coastal environments around the world, with their human populations and natural ecosystems, are likely to be some of the most vulnerable as sea level rises and catchment flooding becomes more unpredictable.

Some of these impacts will need to be managed through the land use planning system. Even with our best efforts to avoid and mitigate climate change impacts, adaptation will be needed.

The Committee has been charged with considering how planning on the coast in Victoria currently operates, and whether it can meet our needs into the future as impacts increase in rate and intensity. This is a project complementary to the Victorian Government's flagship coastal program, *Future Coasts* being undertaken by the Department of Sustainability and Environment.

Fundamentally the Committee considers the framework of the Victorian planning system is sound. This is not to suggest that change and refinement will not be needed, but rather that the foundations are already in place to effectively respond to climate change on the coast.

This Issues and Options Paper has been prepared to provide background for the Committee's views at this point in time and as an important input to its development of final recommendations to the Minister for Planning late in 2010. We hope it will help generate new ideas and stimulate debate about how the Victorian planning system may respond to the challenges of climate change on the coast.

You are invited to respond to the Issues and Options Paper. Submissions should be sent to:

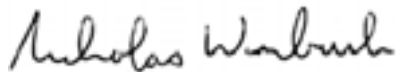
Mail	E-mail
Chairperson Coastal Climate Change Advisory Committee Planning Panels Victoria GPO Box 2392 Melbourne VIC 3001	planning.panels@dpcd.vic.gov.au

Submissions should be received at Planning Panels Victoria by:

Monday 26th April 2010

It is important that submissions are confined to matters covered by the Committee's Terms of Reference (included in Appendix A). The Committee will be organising workshops and hearings to discuss the submissions as necessary.

In addition to this report, the Committee has released a background report for the project commissioned by the Department of Planning and Community Development and prepared by the Victorian Planning and Environmental Law Association. This report focuses on the legal background to property and planning on the coast. This work is not specifically for comment, but the Committee considers it a valuable input to the project and hope it may help be of use in informing submitters and other interested parties in this complex area.



Nick Wimbush
Chairperson
Coastal Climate Change Advisory Committee

2. Executive Summary

The terms of reference of the Coastal Climate Change Advisory Committee (CCCAC) require it to investigate and recommend ways in which Victoria's land-use planning and development controls can best support the Victorian Government's policy for managing the coastal impacts of climate change, as outlined within the Victorian Coastal Strategy (VCS).

Brief summaries of the following chapters of this Issues and Options paper are as follows:

Chapter 3

- The current scientific predictions on the likely effects of climate change on the Victorian coast, including sea level rise, more severe storms and higher storm surges, interactions between inundation from the ocean and catchment-based flooding and coastal erosion.
- Work in progress, particularly through the Victorian Government's *Future Coasts* program (in the Department of Sustainability and Environment), to assess the vulnerability of Victorian coastal areas and settlements to the effects of coastal climate change.

Chapter 4

- The legislative and policy context at the national and state level, including the VCS.
- The strategic basis for change, including the principles of Ecologically Sustainable Development – particularly the precautionary principle – and best practice frameworks for risk management.

Chapter 5

- The existing planning framework, including: the *Planning and Environment Act 1987*; the Victoria Planning Provisions (VPP) hierarchy of state and local planning policy frameworks, zones, overlays and other provisions; the relevant Minister's Direction; the supporting documentation (practice and advisory notes); and recent cases in the Victorian Civil and Administrative Tribunal that interpret the requirements of the Minister's Direction and the practice note in relation to assessment of coastal hazards.

Chapter 6

- The results of the Committee's initial round of consultations with key agencies and organisations (including those identified in the Committee's terms of reference).
- Stakeholders' views on: problems encountered in attempting to address coastal hazards through the planning system; the policy responses they are seeking from government; and some proposals developed by local councils and others for new approaches, including additional or amended 'tools' to be included in the VPP.

Chapter 7

- Legal issues influencing planning for the effects of climate change on the coast, including the status of land gained by accretion or lost from erosion; liability of planning authorities for the results of their decisions; and the use of property titles to communicate hazards.
- Relevant social and economic issues including equity and effects on property values.

Chapter 8

- An assessment of the adequacy of existing VPP tools – and other provisions of the Planning and Environment Act – to address the full range of issues arising from the likely impacts of climate change on the Victorian coast.

The Committee concluded that the State Planning Policy Framework (SPPF) – both in the current format and if restructured as proposed – establishes the key principles and sets out a broad strategic approach for addressing the impacts of coastal climate change. The SPPF provides clear directions concerning decisions on new development but is less effective in helping planning and responsible authorities to identify appropriate adaptation responses for settlements that are already vulnerable to the hazards of coastal climate change.

With regard to the Local Planning Policy Framework (LPPF), the Committee concluded that the Municipal Strategic Statement (MSS) of each coastal planning scheme should include an outline of the specific nature of the coastal climate change hazards that exist in the relevant area. It should also provide a strategic response in terms of priorities for development of adaptation plans. In due course, these policies should be carried through in the application of appropriate zones and overlays.

The Committee identified several current zones that have particular relevance to planning for areas at risk of damage from sea level rise, inundation and coastal erosion. However, many of the zones that apply at present in

vulnerable areas are not appropriate for the longer term, as they imply that intensification of development will be encouraged, when this may not be feasible or desirable. This situation could be exacerbated if overlays that identify constraints on development are applied over residential, business or industrial zones.

Many overlays could potentially be useful to address coastal climate change. For particular types of coast, such as hard cliffs, where the range of issues is narrower, or in currently undeveloped areas, a small number of overlays may adequately identify likely hazards and ensure appropriate future planning and management.

In more complex coastal environments and in developed areas, however, it may be desirable to control use as well as development. None of the overlays identified as relevant has the ability to do this. It is also likely that to deal with the range of potential impacts, a very complex layering of overlays would be required, each with their own objectives and decision guidelines. This would reduce transparency and make the task of responsible authorities more difficult.

Chapter 9

- Consideration of complementary actions that are required or could be taken under other Victorian legislation to supplement the operation of the strategic and statutory planning system under the VPP.

The Committee was advised that many coastal planning schemes have not been updated to include the most recent mapping of areas liable to flooding or to distinguish between active floodways and areas subject to inundation. It concluded updating zones and overlays to reflect this information is the most immediate task, even in advance of attempts to map the effects of coastal inundation from sea level rise (alone or in combination with catchment-based flooding).

The Committee also considers that resolution of the question of which agency should have referral responsibilities for advice on the risks of ocean-based inundation and coastal erosion is a matter of urgency.

The Committee also saw merit in the idea of using a Coastal Action Plan (or equivalent strategic approaches under the proposed new regional catchment and coastal management structure for Victoria) as a vehicle for a regional approach to implementation of the VCS planning benchmark for sea level rise and the outputs of the Future Coasts program.

Chapters 10 & 11

- Consideration of policies and strategies adopted in other Australian states and in overseas countries to address coastal hazards and the potential

effects of climate change, in order to identify key components and mechanisms that have potential for adaptation to the Victorian planning system.

Within Australia, the Committee is particularly attracted to the South Australian system, where detailed policies at state level are used to effectively and clearly express desired outcomes. These policies are implemented in part through the application of a Coastal Conservation Zone or a Coastal Settlement Zone. The latter includes an explicit purpose of protecting development from coastal hazards.

In the international context, key elements common to a number of planning responses to climate change included: adopting a risk management approach; avoiding of further development in vulnerable areas; protecting natural coastal systems at risk; and increasing community understanding of risk from coastal hazards.

New Zealand provided an example of a strongly integrated approach, involving national, regional and local planning strategies and initiatives. This may act as a model for a joint approach in Australia between the Commonwealth, the states and local government. Other interesting mechanisms included: the UK approach of 'making space for water'; a 'rolling easement' concept in Texas in the USA; and a hierarchical zoning system used in New Brunswick in Canada.

Chapter 12

- The Committee's distillation of the principles that should be adopted for responding to coastal climate change through the Victorian planning system can be summarised as:
 - Land use planning needs to be seen as only one of the mechanisms available to address the issues arising from coastal climate change;
 - The land use planning system must deliver a high level of certainty to provide a sound framework for decision making by communities, the private sector and governments;
 - Notwithstanding the need for certainty, the system must also be flexible enough to ensure that timely planning responses can be made to assist adaptation to climate change;
 - Land use decisions on the coast must be made in an integrated manner, considering all interests;
 - Coastal residents across the state should be treated equitably and fairly.

'The Committee concluded that the Victorian planning system is fundamentally sound, although improvements are proposed to address the impacts of coastal

climate change. These should be made in an incremental and evolutionary manner.

In view of the nature of sea level rise and other climate change impacts, the Committee believes that Victoria has time to develop a soundly based and comprehensive approach to adaptation.

It has therefore proposed a staged approach to improving the planning systems' ability to respond to coastal climate change.

In the short term, being the next 12 months, the current uncertainties regarding the need for coastal hazard vulnerability assessments (CHVA) should be clarified. The Committee considers it inequitable that development in some vulnerable areas requires an assessment but similar development in the same area, or in others equally at risk, does not – simply as a result of different permit triggers in planning schemes. The Committee is preparing interim advice to the Minister to help to resolve this issue.

In the next five years, the Committee believes that the focus should be on refining the science as it applies to Victoria – particularly relating to sea level rise and storm surge – and completing detailed vulnerability assessments (at the level of townships or urban areas) along the coast. This will form the basis for preparing strategic adaptation and response plans for each community. A set of improved VPP tools should be developed to communicate risk and begin implementation of the strategic plans.

Later stages will involve implementation of adaptation strategies, including – as appropriate over time and in different areas – protection, accommodation and / or planned retreat.

Chapters 13 - 15

- More detail is provided on the planning content of each stage outlined in the previous Chapter 12.
- Possible new VPP tools include:
 - a 'model local policy' for addressing coastal climate change impacts, for inclusion in the LPPF of planning schemes;
 - a Coastal Hazard Overlay to communicate known or potential risk, utilising the outputs of the Future Coasts program;
 - a new Coastal Zone to control use and development on both private and public land in vulnerable areas;
 - a Coastal Transition Zone to enable planned relocation of areas judged to be unviable in the longer term.

The Committee is seeking feedback from all coastal stakeholders, including community members, about the approaches proposed.

3. Why this Advisory Committee?

3.1 Climate Change in Victoria

Climate change, due to increased greenhouse gas emissions, and its effects pose, one of the most significant challenges for the globe. Coastal Victoria will not be immune from climate change impacts. One significant impact on the coast will be sea level rise due to the thermal expansion of the seas enhanced by extra water volumes resulting from melting glaciers and icecaps. In addition to sea level rise it is predicted that the increase in temperature associated with global warming will change rainfall patterns and increase the frequency and severity of storm events and consequential flooding. These events may further damage coastal areas. Even if global greenhouse gas emissions are abated in the next few decades and global temperatures are stabilised climate change impacts are likely to progress well into the next century. All of these effects in combination will increase the vulnerability of the Victorian coast and create significant hazards to the coastal environment, which will make coastal development and infrastructure located on or close to the coast vulnerable.

3.1.1 Rising Seas

The most recent Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report, 2007¹ states that:

- Global average sea level has risen since 1961 at an average rate of 1.8 millimetres per year. Since 1993 the rate has been 3.1 millimetres per year.

The Victorian Coastal Strategy (VCS)² states that:

Locally, recording stations at Lorne and Stony Point have recorded sea level rises of 2.8 millimetres per year and 2.4 millimetres per year respectively since 1991.

The VCS also states that the IPCC has projected sea level rise of between 0.18–0.59 metres by 2090–2099 with an additional sea level rise due to ice sheet melt in the order of 0.1–0.2 metres.

Interestingly, the Australian Government's report on a first pass national vulnerability assessment of climate change risks to Australia's coast identified

¹ IPCC, (2007) *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Geneva.

² Victorian Coastal Council (2008) *Victorian Coastal Strategy*, Melbourne.

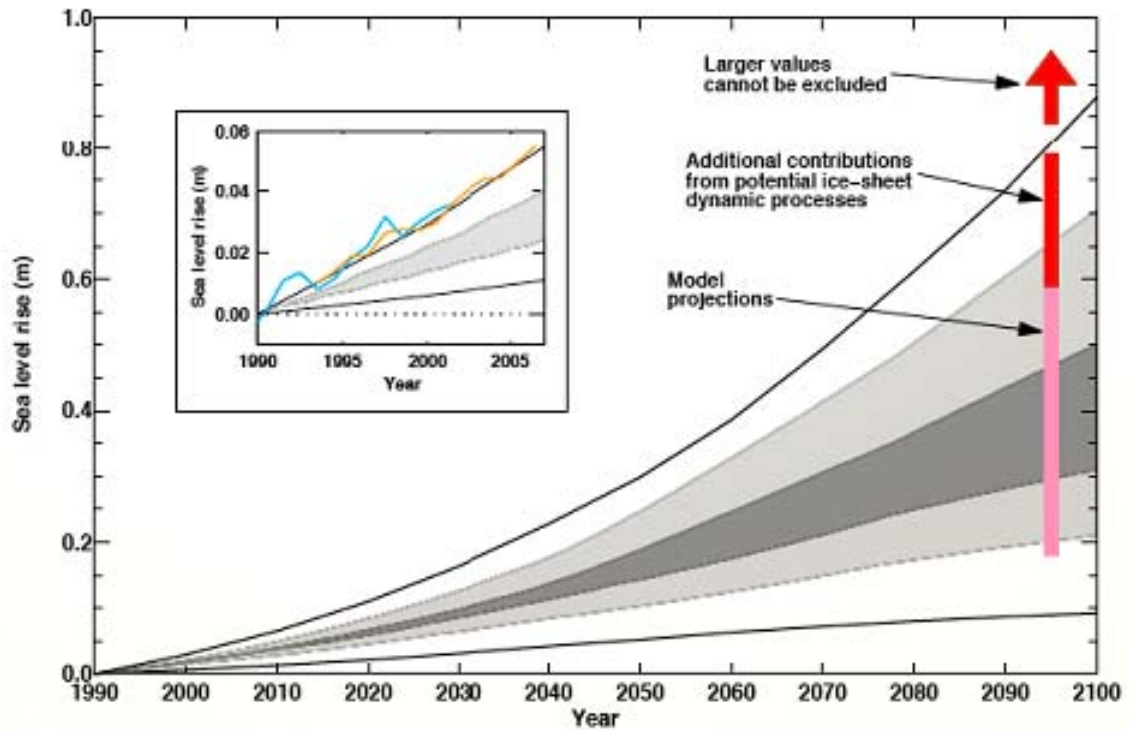
that despite the IPCC's most recent predictions for sea level rise, more recent analysis finds that sea-level rise of up to a metre or more this century is plausible. Sea-level rise projections presented to the March 2009 Climate Change Science Congress in Copenhagen ranged from 0.75 to 1.9 metres by 2100 relative to 1990, with 1.1–1.2 metres the mid-range of the projection. In consideration of the more recent predictions, the first pass national vulnerability assessment selected a sea-level rise value of 1.1 metres by 2100 for its assessment. It was recognised however, that this is a dynamic area of science – sea-level rise projections will change and risk assessments and policies will need to be reviewed and amended over time to reflect new research findings³.

While there is uncertainty about the quantum of the sea level rise, what is understood is that seas will continue to rise, not fall, and the uncertainty relates to how high seas may rise during this century and beyond. Accordingly, the VCS established a policy of planning for sea level rise of not less than 0.8 metres by 2100. Figure 1 shows the range of sea level rise projection to 2100.

A generalised indication of shoreline erosion resulting from sea level rise – particularly applicable to sandy coasts - can be obtained by applying the 'Bruun Rule'. This predicts that 1 cm of mean sea level rise results in 50cm to 100cm of shoreline retreat, depending on local wave conditions and sand dune characteristics (for the 80cm rise in sea level anticipated in the VCS this equates to shoreline retreat of 40 to 80 metres). Hence for every 10cm of sea level rise, shoreline recession of between 5 metres to 10 metres could be expected. The Bruun Rule is a very simplistic method of determining coastal erosion under conditions of elevated water levels, but it is nevertheless a useful indication in the context of this report.

³ Australian Government (2009) *Climate Change Risks to Australia's Coast – A First Pass National Vulnerability Assessment*. Department of Climate Change, Canberra.

Figure 1: Projected sea level rise for the 21st century



Source: Church *et al*, 2008⁴.

The IPCC 2001 projections are indicated by the shaded regions and the curved lines are the upper and lower limits. The IPCC 2007 projections are the bars plotted at 2095. The inset shows sea level observed with satellite altimeters from 1993 to 2006 (orange) and observed with coastal sea-level measurements from 1990 to 2001 (blue). Note: Both sea level increases shown in the inset are rising at the upper limit of the IPCC predictions.

The potential impacts of climate change on the coast and their implications are summarised in Table 1.

⁴ Church J.A., White N.J., Hunter J.R. & Lambreck K. (2008) *Briefing: A post IPCC AR4 Update on Sea Level Rise*. Antarctic Climate & Ecosystems Cooperative Research Centre, Hobart.

Table 1: Climate change induced impacts and implications for coastal areas

Potential climate change effects	Impacts for coastal communities
Sea level rise	Loss of beaches
Coastal erosion	Loss of Crown land Migration of sand dunes, mangroves, saltmarshes and other estuarine wetlands Infrastructure threat or damage Adverse impact on lifestyle or amenity values Loss of habitat and biodiversity loss Salinisation of coastal estuaries, loss of fringing vegetation Declining tourism values (especially iconic beaches) Rising water tables close to the coast Effects of saline water tables on foundations, pipes and wires Loss of, or threat to private property Insurance issues
More frequent and intense storm events	Damage to infrastructure (energy, water, roads, buildings, telecommunications, coastal ports, jetties, seawalls and access)
More intense storm events	Damage to marine and shoreline ecosystems from storm water and agricultural runoff
Decreased rainfall	Increased likelihood of blue-green algal blooms due to sediment and nutrient inputs to water bodies
Flooding and inundation impacts	Water shortages (during drought) and contamination (storm events, inundation, flooding, ground water salinisation or contamination) Agricultural industry impacts – sudden weather events and long-term events (e.g. drought) Tourism impacts (damage to tourism infrastructure, visitor perception of risk) Loss and damage to recreation infrastructure and use Need to ensure public safety. Possible requirement for evacuation capacity Need for enhanced emergency services – volunteers, infrastructure (hospitals, shelters, supplies)

Potential climate change effects	Impacts for coastal communities
Warming sea temperatures	Threats to marine biodiversity (mangroves, saltmarshes, sea grass)
Ocean acidification	Damage to estuaries – biodiversity, tourism and economic values Threat to fisheries and recreational fishing Threats to port functions Damage to reefs
Increased temperatures	Increased bushfire frequency and intensity
Increased humidity	Public health issues, especially for aged community Increased disease vectors (insects) Food spoilage Capacity of health services to respond to heat stress and disease Economic impacts of disease Rural industry readjustments such as changes to agricultural land use i.e. grazing to cropping and vice versa Peak energy demand increases

Source: Adapted from the Victorian Coastal Council, (2008)⁵ and from Gurrán *et al*, (2008)⁶.

3.1.2 Storm Surge

The effects of sea level rise on the coast from sea level rise will be exacerbated by the effects of storm surge arising from increased storm events. The VCS describes and considers storm surge, king tides, sea level rise and other climate change impacts as:

A storm surge is an elevated sea level caused by a low pressure system and intense winds. A storm surge will have maximum impact when combined with a high or king tide. Storm surges are likely to occur more frequently and with greater severity as weather patterns change due to changed wind patterns, rainfall and sea surface temperatures. Impacts to property and infrastructure are already occurring when storms strike, including:

- *Damage to and loss of boats;*
- *Damage to and loss of structures on the foreshore;*

⁵ Victorian Coastal Council (2008) *Victorian Coastal Strategy*, Melbourne.

⁶ Gurrán N., Hamin E. & Norman B. (2008) *Planning for Climate Change: Leading Practice Principles and models for Sea Change Communities in Coastal Australia*. Prepared for the National Sea Change Task Force, Sydney.

- *Entry of water behind sea walls via storm water drains due to breaching of barriers;*
- *Salt water intrusion into fresh water aquifers;*
- *Coastal erosion and accretion; and*
- *Inundation of low-lying areas and damage to coastal vegetation and habitats.*

The combined impact of sea level rise, storm surge and coastal wave processes are shown in Figure 2. The implications of sea level rise effects will be greatest for low lying coastal areas such as Port Phillip and Western Port Bays, estuaries, mangrove and saltmarsh wetlands, beaches and dunes such as the coastal areas in South and East Gippsland. Coastal cliffs may also be vulnerable from increased risk of collapse depending on their geomorphology.

Increased inundation is expected with changes to the frequency and severity of rainfall events in combination with sea level rise and storm surge effects. Inundation events vary in frequency and magnitude. Frequency is measured as average recurrence intervals of events, such as storm tides. For example, a 1-in-100 year storm tide is the storm tide height that is expected to be exceeded on average once every 100 years. Magnitude is expressed as the likelihood of exceeding a given level of tide, surge and flood height. The first pass national vulnerability assessment predicts that with a mid-range sea level rise of 0.5m in the 21st Century, events that now happen every 10 years would happen about every 10 days in 2100⁷.

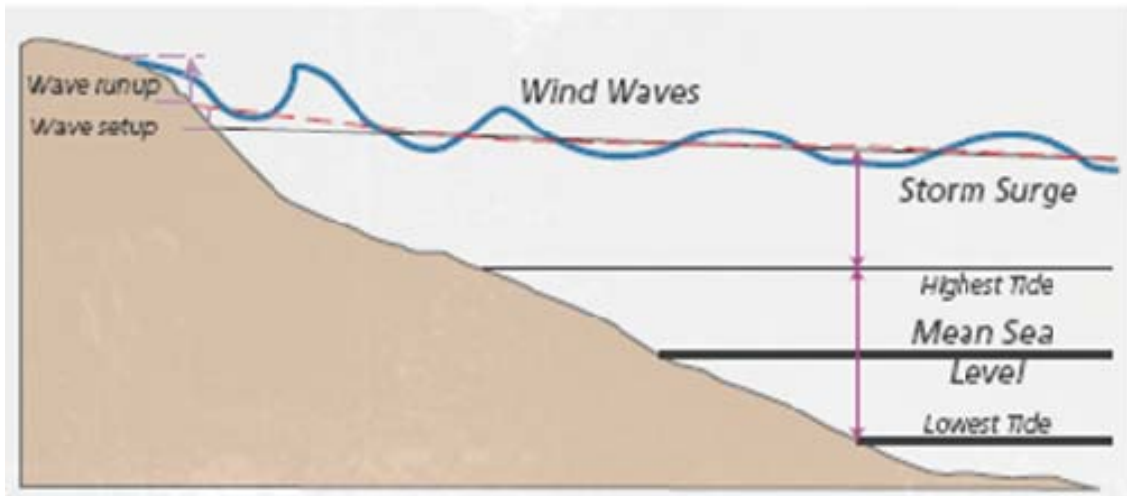
The critical hazards of climate change and sea level rise that specifically impact on coastal areas can be summarised as:

- Increased levels of flooding or inundation from rivers, estuaries or directly from the ocean.
- Overland flow from intense rainfall events, including when the capacity of urban stormwater management systems is exceeded.
- Erosion of the ocean coastline (beaches, cliffs) or the shorelines of bays or estuaries.

Each of these may have different consequences in terms of the impact on built assets and on the health and safety of individuals and communities.

⁷ Australian Government (2009) *Climate Change Risks to Australia's Coast – A First Pass National Vulnerability Assessment*. Department of Climate Change, Canberra.

Figure 2: Impacts of tides, storm surge and wave processes on sea level



Source: Victorian Coastal Council, (2008)⁸

3.1.3 Early Work to Ascertain the Impact of Sea Level Rise across Victoria

In the early 1990's work on identifying the extent of impact of sea level rise on the Victorian coast was undertaken by the Port of Melbourne Authority *et al*, (1993).⁹ This report, called the Victorian Coastal Vulnerability Study. It identified that the following locations would have the potential to suffer significant impacts from sea level rise effects:

- *Sandy Beaches – Middle Park, Brighton, McCrae, Somers, St. Leonards, Swan Island, narrow sections of beach from Aspendale to Carrum, Henty Bay area near Portland, Bridgewater Bay, Port Fairy, Lorne, Grantville and the majority of beaches in the Gippsland Lakes. All structures built on the beach such as yacht clubs, life saving clubs, bathing boxes and boat sheds are at risk from increased wave attack.*
- *Sandy Barriers – Western Treatment Plant at Werribee, Cheetham Salt Works at Werribee, Avalon and Point Henry, Ninety-mile Beach fronting Bunga Arm and Jack Smith Lake, Ewings Morass and low lying sections of the barrier fronting Corner Inlet.*
- *Estuaries – Lake Connewarre, Lower Barwon River, Snowy River, Andersons, Shallow and Sydenham Inlets and Belfast Lough at Port Fairy.*
- *Mudflats – Swan Bay, north-east Corner Inlet and low gradient mudflats in north, west and eastern sections of Western Port Bay.*

⁸ Victorian Coastal Council (2008) *Victorian Coastal Strategy*, Melbourne.

⁹ Port of Melbourne Authority and Environment Protection Authority (1993) *Victorian Coastal Vulnerability Study*. Prepared by the Coastal Investigations Unit, Port Melbourne.

- *Swamplands – Carrum Swamp and low lying sections adjacent to the Gippsland Lakes, especially Lake Wellington and the Mitchell River Silt Jetties.*
- *Cliffs – soft Tertiary sedimentary cliffs at Sandringham, Beaumaris, Torquay to Fairhaven and Warrnambool and the calcarenite cliffs at Portsea to Sorrento and Warrnambool.*

The Victorian Coastal Vulnerability Study concluded that:

In principle, there should be no further development or additions to existing structures in the backshore zone, immediately behind the beach, cliff or saltmarsh. This 'No Development' zone should include the primary dune, cliff tops and the area immediately landward of saltmarshes. This will provide a buffer zone that will absorb greenhouse changes (sea level rise induced changes).

This early work is being reviewed through the Future Coasts program with more detailed assessment and identification of coastal vulnerability and hazards across Victoria, to which consideration should be given in planning responses.

3.1.4 First Pass National Vulnerability Impacts on Victoria

As part of the first pass national vulnerability assessment of climate change risks on Australia's coast, the level of impact on the coast of Victoria was assessed. The conclusions were:

- *Between 27,600 and 44,600 residential buildings in Victoria may be at risk of inundation from a sea-level rise of 1.1 metres and storm tide associated with a 1-in-100 year storm.*
- *The current value of the residential buildings at risk is between \$6.5 billion and \$10.3 billion.*
- *Local government areas (LGA) of Kingston, Hobsons Bay, Greater Geelong, Wellington and Port Phillip collectively represent close to 70 per cent of the residential buildings at risk in Victoria.*
- *There are approximately 4,700 residential buildings located within 110 metres of 'soft' erodible shorelines¹⁰.*

¹⁰ Australian Government (2009) *Climate Change Risks to Australia's Coast – A First Pass National Vulnerability Assessment*. Department of Climate Change, Canberra.

3.1.5 Regional Areas

In regional areas of Victoria there has been some more detailed work on identifying the nature of impacts from climate change induced sea level rise on the coast.

Recent Assessments for Victoria and Port Phillip Bay

CSIRO has undertaken some analysis of the effect of climate change on extreme sea levels along coastal Victoria¹¹ and in Port Phillip Bay¹². The studies modelled the vulnerability to inundation under 1 in 100 year storm tide conditions under both current and future climate conditions (taking into consideration the predicted sea level rise adopted in the VCS). Five regions along the Victorian coast were selected for inundation analysis on the basis that they contained extensive areas of terrain below 2 metres elevation including Portland, Port Fairy, Barwon Heads, Tooradin and Seaspray. Four regions around Port Phillip Bay were also selected being Queenscliff, Point Wilson, Point Cook to St Kilda and Mordialloc to Seaford.

The Victorian study concluded that:

Under current climate conditions, the areas most vulnerable to inundation from a 1 in 100 year storm tide are generally beach front and low-lying wetland and coastal reserve areas, as summarised below:

- *Portland region: Minimal inundation.*
- *Port Fairy region: The banks of the Moyne River and Belfast Lough at Port Fairy and the lower reaches of the Merri River at Warrnambool.*
- *Barwon Heads region: The lower reaches of the Barwon River and low-lying land behind the dune system at Breamlea.*
- *Tooradin region: An extensive area of coastal land extending inland of the South Gippsland Highway between Cardinia Creek and Sawtells Inlet and inland areas to the north of Warneet.*
- *Seaspray region: Lakes Reeve and Denison and the banks of the Merriman Creek.*

Under future climate conditions, changes in the areas most vulnerable to inundation from a 1 in 100 year storm tide can be summarised as follows:

¹¹ McInnes KL Macadam I & O'Grady J (2009) *The Effect of Climate Change on Extreme Sea Levels along Victoria's Coast*. A Project Undertaken for the Department of Sustainability and Environment, Victoria as part of the 'Future Coasts' Program, CSIRO Marine and Atmospheric Research, Melbourne.

¹² McInnes KL O'Grady J & Macadam I (2009) *The Effect of Climate Change on Extreme Sea Levels in Port Phillip Bay*. A Project Undertaken for the Department of Sustainability and Environment, Victoria as part of the 'Future Coasts' Program, CSIRO Marine and Atmospheric Research, Melbourne.

- *Portland region: Minimal additional inundation until after 2070. By 2100, foreshore regions around Portland Harbour and Nuns Beach and the lower reaches of the Surry River, including low-lying terrain extending to the east and west of the river.*
- *Port Fairy region: Minimal additional inundation until after 2030. By 2070, extensive additional area adjacent to Belfast Lough at Port Fairy and the Merri River at Warrnambool. By 2100, additional area at the northeast of Belfast Lough, in Port Fairy township and Kelly Swamp, and if the higher estimates of sea level rise eventuate Lake Pertobe, at Warrnambool.*
- *Barwon Heads region: By 2030, a small additional area along the Barwon River near Geelong and along Thomson Creek. By 2070, parts of Ocean Grove adjacent the Barwon River and low-lying land east of Breamlea. By 2100, if the higher estimates of sea level rise eventuate extensive inundation of the township of Barwon Heads and the region to the west of the township.*
- *Tooradin region: Incrementally more extensive areas north of the South Gippsland Highway as the 21st Century progresses. By 2100, significant additional areas west of Tooradin.*
- *Seaspray region: By 2030 and 2070, incrementally larger parts of the township of Seaspray. By 2100, complete inundation of the township of Seaspray and, if the higher estimates of sea level rise eventuate, extensive inundation of The Honeysuckles¹³.*

The Port Phillip Bay study concluded that:

Under current climate conditions, the areas most vulnerable to inundation from a 1 in 100 year storm tide are generally beach front and low-lying wetland and coastal reserve areas, as summarised below:

- *Queenscliff region: Swan Island, the Edwards Point Wildlife reserve and low-lying terrain at the northern end of the township of Point Lonsdale.*
- *Point Wilson region: Extensive areas of coastal land from Point Lillias to Point Wilson.*
- *Point Cook to St Kilda: The Cheetham Wetlands, the Altona Coastal Park and the Jawbone Conservation Reserve.*
- *Mordialloc to Seaford: The northern part of the Edithvale Wetlands.*

¹³ McInnes KL Macadam I & O'Grady J (2009) *The Effect of Climate Change on Extreme Sea Levels along Victoria's Coast*. A Project Undertaken for the Department of Sustainability and Environment, Victoria as part of the 'Future Coasts' Program, CSIRO Marine and Atmospheric Research, Melbourne.

Under future climate conditions, changes in the areas most vulnerable to inundation from a 1 in 100 year storm tide can be summarised as follows:

- *Queenscliff region: By 2030, areas west of the township of Point Lonsdale and in the northern part of the township. By 2070, larger parts of the north of the township. By 2100, extensive parts of northern Point Lonsdale and southern St Leonards.*
- *Point Wilson region: Incrementally more extensive areas in and around the Werribee Sewerage Farm as the 21st Century progresses.*
- *Point Cook to St Kilda: Minimal additional inundation until after 2030. By 2070, additional parts of the Altona Coastal Park and parts of Elwood. By 2100, extensive parts of Elwood and the RAAF Base at Point Cook and, if the higher estimates of sea level rise eventuate, low-lying parts of Altona, Port Melbourne, South Melbourne, Middle Park and Albert Park.*
- *Mordialloc to Seaford: Minimal additional inundation until after 2030. By 2070, the southern part of the Edithvale-Seaford wetlands and some residential areas on the western side of the wetlands. By 2100, extensive residential areas¹⁴.*

Detailed studies have also been undertaken for Gippsland and Western Port Bay and limited studies have been done for the west coast.

Gippsland Coast

In Gippsland, the Gippsland Coastal Board (GCB) has investigated the effects and implications of sea level rise and storm surge on the coast of the Gippsland Lakes and Corner Inlet.

In Corner Inlet, research undertaken by the CSIRO (McInnes *et al*, 2006)¹⁵ indicated that:

The inundation resulting from sea level extremes is greatest across the islands and northern coastline of the inlet. The inundation in the regions of the towns of Port Franklin, Port Welshpool and Port Albert will increase by between 15% and 30% by 2070 under a high wind speed change, high mean sea level rise scenario.

¹⁴ McInnes KL O'Grady J & Macadam I (2009) *The Effect of Climate Change on Extreme Sea Levels in Port Phillip Bay*. A Project Undertaken for the Department of Sustainability and Environment, Victoria as part of the 'Future Coasts' Program, CSIRO Marine and Atmospheric Research, Melbourne.

¹⁵ McInnes K.L., Macadam I., Hubbert G.D. (2006) *Climate Change in Eastern Victoria Stage 3 Report: The effect of climate change on extreme sea levels in Corner Inlet and the Gippsland Lakes*. A Project Undertaken for the Gippsland Coastal Board, the Antarctic Climate and Ecosystem CRC and the Australian Climate Change Research Program by CSIRO Marine and Atmospheric Research.

For the Gippsland Lakes, the CSIRO report stated that:

The inundation resulting from sea level extremes will be greatest in existing swamp areas and in the vicinity of Lake Reeve, located along the barrier between the Lakes and the open coastline.

The effects of sea level rise and coastal subsidence on physical assets and natural values have also been considered by the GCB¹⁶ for the Gippsland coast from San Remo to Mallacoota. The findings of the report are that:

Adverse climate change impacts are likely to be exacerbated by the effects of subsidence resulting from the extraction of oil, gas and water from the Latrobe Aquifer. Subsidence is predicted to be of the order of 0.5 m by between 2030 and 2060. These effects are expected to be concentrated in the 100 km coastal strip between Port Albert and Loch Sport.

More significantly, the report identifies that:

Dramatic effects from climate change may include the erosion and breaching of coastal dunes and barrier islands that currently protect inlets, estuaries, low-lying plains and wetlands located immediately behind them. Once eroded, and if the breaches remain open, rapid inundation by sea water will follow. Ultimately this can lead to coastal embayments subject to greater tidal variation and increased wave action. This is likely to result in substantially increased erosion and flooding. A sustained breach in a barrier dune complex is most likely to occur following several large storms in rapid succession, so that the eroded beaches, dunes and islands do not have an opportunity to re-form.

Implications of the above for the Gippsland Lakes are a permanent conversion of the ecology of the system from estuarine to marine similar to that of Corner Inlet. It would be expected that increased erosion would occur due to the transition of shoreline vegetation communities from the remaining reed bed species such as the common reed species (*Phragmites australis*) to mangroves (*Avicennia marina*) and saltmarsh communities.

The impacts of coastal erosion and increased inundation have been considered in the GCB report for a number of precincts along the Gippsland coast including low lying natural areas, townships, residential, industrial, commercial and recreational assets and infrastructure. Key townships impacted include Lakes Entrance, Loch Sport, Seaspray, Port Albert, Inverloch and Walkerville.

¹⁶ Gippsland Coastal Board, (2008) Climate change, Sea Level Rise and Coastal Subsidence along the Gippsland Coast. Final Report Phase 2 of the Gippsland Climate Change Study July 2008.

Western Port Bay

In Western Port Bay, the South East Councils' Climate Change Alliance (previously the Western Port Greenhouse Alliance)¹⁷ released a report that has researched the impacts of coastal inundation arising from sea level rise on the region. The report states that:

Sea-level rise in future decades will undoubtedly affect the coastlines of the Western Port region and drive progressive erosion in many locations. The effects of sea-level rise will however be most pronounced during storm events. For example, storm surge inundation simulations for the region, undertaken by CSIRO for this assessment, suggest that a current 1 in 100 year storm surge could become a 1 in 1 to 1 in 4 year storm surge by 2070.

Furthermore, the land area subject to inundation during a 1 in a 100 year storm surge event may increase by 4 to 15% by 2030 and 16 to 63% by 2070.

The fact that only a narrow strip of land is exposed to coastal processes such as storm surge means that the exposure of associated property, populations and infrastructure is inherently constrained. Nevertheless, such inundation would impinge upon over 2,000 individuals, over 1,000 dwellings, and approximately \$780 million in improved property value.

Public infrastructure is also at risk, including major thoroughfares such as the Nepean and South Gippsland Highways, and boating facilities. Beaches, foreshore reserves and coastal wetland areas throughout the region, as well as the amenities they provide, are likely to be affected as well.

In the absence of adaptation measures, the economic and social consequences of impacts to the region's beaches and foreshore areas could be substantial. These include disruptions to the region's tourism industry and a major loss of social, cultural and environmental amenity values.

Areas most at risk include townships on Phillip Island in Bass Coast Shire, coastal townships in the City of Casey including Tooradin and Warneet, and the township of Hastings in Mornington Peninsula Shire.

West Coast

The west coast of Victoria has not had a definitive coast-wide study into the effects and impacts of coastal climate change and sea level rise on the region. The Glenelg Hopkins Catchment Management Authority¹⁸ (GHCMA) undertook a study into the effects of sea level rise on the far south west coast

¹⁷ Kinrade P, Preston B (2008) Impacts of Climate Change on Settlements in the Western Port Region People, Property and Places. Final Report June 2008.

¹⁸ SKM (2005) Climate change and Natural Resource Management Scoping Study - Sea Level Rise, Coasts and Estuaries. Report prepared for the Glenelg Hopkins CMA.

which included the Glenelg and Moyne Shires and the City of Warrnambool. The report developed a preliminary assessment of the vulnerability of the region's coasts and coastal assets to sea level rise. It concluded that:

There are several coastal areas with high to very high vulnerability, including beaches and harbours at Warrnambool, Port Fairy and Portland. The threat of sea level rise will require further action by the appropriate planning authorities. It should be noted that the vulnerability assessment is only preliminary and more detailed and site specific assessments are required to determine the true nature of coastal vulnerability.

On the basis of similar work undertaken by other Australian coastal agencies, consideration should be given to:

- Establishing coastal buffer zones based on short-term storm event, historical erosion and long term sea level rise impacts;*
- Response strategies for coastlines identified as high to very high coastal vulnerability to sea level rise effects; and*
- Ensuring future developments along coastlines identified as low to medium vulnerability account for setback guidelines for sea level rise effects.*

3.1.6 The Natural Coast and Estuaries

The impacts on the natural coast including bays, estuaries, wetlands, dune and beach systems and coastal cliff areas from coastal climate change and sea level rise have not been specifically investigated. However, the impacts on these environments are likely to be as dramatic as those anticipated for urban or rural environments.

The then Australian Greenhouse Office¹⁹ investigated the impacts of climate change induced sea level rise on coastal environments. With respect to beaches and dunes the report found that:

The type of impacts will vary on different types of beaches. For example open coast beaches backed by sand dunes have a natural buffer for responding to sea-level rise and increased erosion. This is not the case for artificially protected metropolitan beaches such as Adelaide where the beach width is maintained by sand replenishment and backed by hard rock protection.

In relation to the beaches in Port Phillip Bay, the report states that:

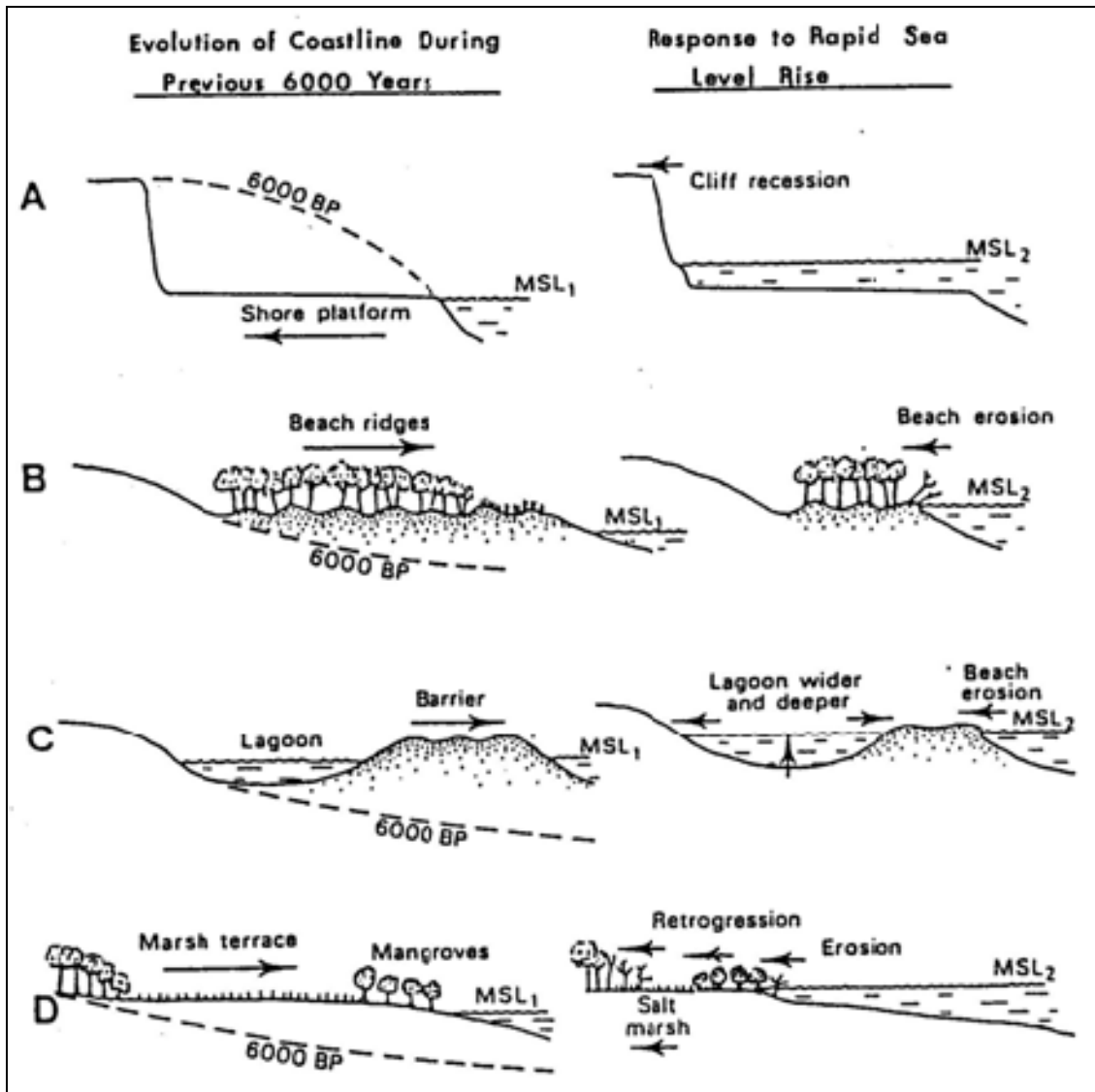
There are many other examples of foreshores where the beach has been isolated from the sand supply, but where even if seawalls had not been

¹⁹ (Editors) Report to the Australian Greenhouse Office, Canberra, Australia. June 2006.

constructed, there still would have been no beach. Much of Port Phillip Bay foreshore falls into this category. The implication is that the beaches were not stable when original land development occurred, but the planners of the day did not have this knowledge. The method of managing this natural erosion issue has been to build seawalls (1930's to 1950's) and undertake the construction of groynes and beach nourishment (1950's to the present). Beach nourishment programs have generally been designed to cope with sea levels at the time they were initiated, with some possible recognition of the possibility of and impact of sea level rise. The bottom line is that most beach nourishment projects will be at risk, on a nationwide scale, as a result of future sea level rise.

Figure 3 illustrates the effect of a mean sea level rise on different coastal environments. An increase in the depth of near-shore waters will result in shore platforms becoming inundated more permanently and allowing waves to directly impact on the cliff base. Coastal cliffs may recede landward as they are undercut and collapse (refer to Figure 3(A)). Larger waves breaking on beach environments will result in more intense erosion and the profile of the beach will recede (Figure 3(B)). Dunes will become more exposed to wave impact and dune vegetation may be lost resulting in potential for dune blowouts and sand movement landward. With beach erosion, low lying wetlands may become flooded increasing in depth and width particularly if breaches occur in outer barrier dunes like those of the Gippsland Lakes (refer to Figure 3(C)). Finally, coastal wetlands such as mangroves and saltmarshes may be flooded more often, eroded and migrate landwards (refer to Figure 3(D)).

Figure 3: Responses of coastal environments to a mean sea level rise



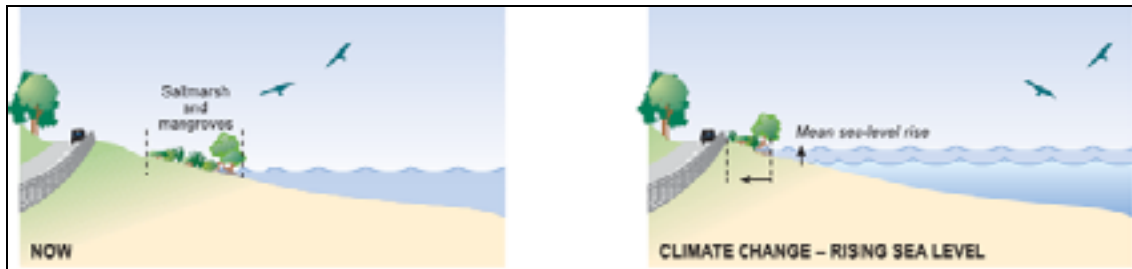
Note: BP = Before Present, MSL = Mean Sea Level. Source: Port of Melbourne Authority et al, 1993²⁰.

The effects of climate change and sea level rise for estuaries and coastal wetlands such as changes in mangroves and saltmarshes can also relate to increased temperatures and increased saltwater penetration up into estuaries resulting in a rise in levels of salinity and tidal inundation. The rates of inundation may be faster than the estuarine and wetland ecology can accommodate. For example, an increase in the rate and area of tidal inundation may be greater than the rates of sedimentation within mangrove and saltmarsh wetlands which forces the vegetation to migrate landwards to avoid drowning. However, if there are obstacles on the landward side of these environments,

²⁰ Port of Melbourne Authority and Environment Protection Authority (1993) Victorian Coastal Vulnerability Study. Prepared by the Coastal Investigations Unit, Port Melbourne.

they may have nowhere to migrate and suffer from what is known as ‘coastal squeeze’. As a result they are lost to the estuary or marine environment and their productivity to the ecosystem including fish nurseries and habitat is also lost and the environment is degraded (Figure 4).

Figure 4: The effect of ‘coastal squeeze’²¹



In addition, extended dry periods may have implications for the health of coastal vegetation and its ability to stabilise dune systems in the face of increased storminess and beach erosion.

With regards to the above, an important issue will be how the conflicting pressures for action can be addressed when resources are limited or stretched between competing demands for planning to adapt to climate change impacts. The implication being that early adaptation in planning decisions will reduce the demand on resources and be more cost efficient.

3.1.7 Other Impacts of Climate Change on the Coast

Sea level rise is not the only impact of climate change on the coast. Temperatures are expected to increase and the effects will include:

- Heat stress for both humans and flora and fauna and associated health issues;
- Reduced rainfall with commensurate dry periods and prolonged and more frequent occurrences of drought and water supply issues;
- Increased fire risk associated with the combined effects of increased temperatures and drier conditions resulting from reduced rainfall;
- Reduced productivity of natural environments and an associated effect on economic values including food production and tourism values; and
- Impacts on water systems including estuaries and increased risk of acidification of oceans.

Impacts on tourism in coastal Victoria may be both positive and negative. Positive benefits may result from a consistently warmer climate that may have

²¹ Australian Government (2009) *Climate Change Risks to Australia's Coast – A First Pass National Vulnerability Assessment*. Department of Climate Change, Canberra.

increased tourism appeal all year round. Negative effects may be as a result of impacts on natural attractions such the effects of a warmer climate on the Penguin Parade at Phillip Island or other cool temperate species that breed and migrate along the Victorian coast.

There may also be impacts on the fishing industry such as the South East demersal fishery which includes a number of commercial species for which inshore estuarine habitats are important nursery areas. Climate change impacts on these habitats resulting from different precipitation patterns and sea-level rise could affect the dependent species. Species at the southern end of their range will be adversely affected by projected increases in ocean temperatures, with little room for further southward migration²².

3.2 The Future Coasts Program

The Future Coasts Program is the main Victorian Government program for investigating likely sea level rise impacts on the coast. It is run by the Department of Sustainability and Environment (DSE) in partnership with the Department of Planning and Community Development (DPCD). The Future Coasts Program is designed to help decision makers, the community and other stakeholders better understand, and plan for, the risks associated with sea level rise along the Victorian coast. The program is producing information about the impacts of sea level rise along the Victorian coast, with a focus on coastal erosion and flooding. This information, along with guidance material, will be available to coastal land managers and decision makers to use when planning for and managing coastal areas.

The Future Coasts Program has three main objectives.

1. Understanding how sea level rise will impact Victoria's coast.

A Victorian Coastal Vulnerability Assessment (VCVA) is being carried out to look at how the combined affects of sea level rise and storms will impact Victoria's coast and help identify the areas with the greatest potential for erosion and inundation (flooding from ocean waters). This information will be used by the Future Coasts Program to develop guidelines, tools and recommendations for coastal planning and policy in Victoria.

The results of the 'second pass' coastal vulnerability assessment – using the detailed digital elevation and bathymetric data produced for Future Coasts, in combination with the Commonwealth Government's information on the

²² Australian Government (2009) *Climate Change Risks to Australia's Coast – A First Pass National Vulnerability Assessment*. Department of Climate Change, Canberra.

erodibility of different types of coastline – will be released in the next few months.

The Future Coasts Program is also supporting a number of detailed local vulnerability assessments, to examine the particular impacts of sea level rise, changed climatic conditions, tides and storm surge on particular localities.

2. Supporting land managers and decision makers.

The Victorian Minister for Planning has amended the State Planning Policy Framework (SPPF) of the Victoria Planning Provisions (VPP) to reflect the recommendations of the VCS which requires land managers and responsible authorities to consider sea level impacts along the coast.

The Future Coasts Program, in partnership with the Municipal Association of Victoria (MAV) is also developing a manual with technical information and a process for conducting vulnerability assessments. The manual will be a guide for land managers and decision makers responsible for planning and managing Victoria's coasts. The manual will ensure that sea level rise information is included in decisions about the coast, improving consistency in the way that coastal erosion and flooding are considered in decisions about coastal areas across Victoria. Tenders have recently been called for preparation of this manual and the project is expected to commence shortly.

3. Responding to the impacts of sea level rise.

Future Coasts is developing an Impacts and Responses Paper, which will convey key impacts, challenges and opportunities for responding to the effects of sea level rise impacts along the coast. Workshops were held with coastal practitioners during 2009 to help develop the paper. The Impacts and Responses Paper is scheduled to be released for public comment in 2010. This will lead to a final report which will describe options for future policy directions and is anticipated to be completed by mid 2010.

3.3 Advisory Committee Discussion and Conclusion

There is significant focus on the coastal impacts of climate change. This is driven primarily by the acceptance of the overwhelming body of science collected in the IPCC Fourth Assessment Report that the human induced impacts of climate change are occurring and need to be mitigated where possible and adapted to where not.

In terms of sea level rise in particular, the measured sea level rise, whilst not rising consistently in all parts of the globe, is rising at the upper end of IPCC projections.

In response, the Australian and Victorian Governments have initiated programs to respond to sea level rise and help prepare coastal communities for its impact. The Future Coasts Program is the leading Victorian assessment response with the work of this planning Advisory Committee to provide detailed input in relation to the Victoria Planning Provisions.

4. Legislative and Policy Context

4.1 Main Legislation

4.1.1 Planning and Environment Act 1987

The objectives of planning in Victoria, as set out in Section 4(1) of the *Planning and Environment Act 1987* include:

- *To provide for the fair, orderly, economic and sustainable use and development of land.*
- *To provide for the protection of natural and man-made resources and the maintenance of ecological processes and genetic diversity.*
- *To secure a pleasant, efficient and safe working, living and recreational environment for all Victorians and visitors to Victoria.*
- *To protect public utilities and other assets and enable the orderly provision and coordination of public utilities and other facilities for the benefit of the community.*
- *To balance the present and future interests of all Victorians.*

The *Planning and Environment (Planning Schemes) Act 1996* amended the *Planning and Environment Act* to recognise a new format for planning schemes in Victoria, which involves both State standard provisions and local provisions. It introduced the Victoria Planning Provisions (VPP) and a requirement for each planning authority to prepare a Municipal Strategic Statement (MSS). These elements are discussed in Chapter 5.

The *Planning and Environment Act* is currently under review.

4.1.2 Coastal Management Act 1995

The purposes of the *Coastal Management Act 1995* are to:

- *establish the Victorian Coastal Council;*
- *provide for the establishment of Regional Coastal Boards;*
- *provide for co-ordinated strategic planning and management for the Victorian coast;*
- *provide for the preparation and implementation of management plans for coastal Crown land; and*

- *provide a co-ordinated approach to approvals for the use and development of coastal Crown land.*

The Act also requires the Victorian Coastal Council (VCC) to prepare the Victorian Coastal Strategy (VCS), the current version of which was released in 2008 and is discussed in Section 4.2.1.

The Coastal Management Act provides a coordinated approach to approvals for the use and development of coastal Crown land in Victoria. Section 3(1) of the Act defines coastal Crown land as:

- *Any land reserved under the Victorian Crown Land (Reserves) Act 1978 for the protection of the coastlines;*
- *Crown land within 200 metres of the high water mark of the coastal waters of Victoria;*
- *Any sea within the limits of Victoria; and*
- *The seabed of the coastal waters and sea of Victoria.*

Section 37 of the Act stipulates that a person must not use or develop coastal Crown land unless they have obtained the written consent of the Minister administering the Act. In deciding whether or not to consent to a use or development under Section 40, the Minister must have regard to:

- *The Victorian Coastal Strategy;*
- *Any Coastal Action Plan applying to the land;*
- *Any recommendation of the Land Conservation Council for land in respect of which notice has been given to the Department of Natural Resources and Environment under Section 10(3) of the Land Conservation Act 1970; and*
- *The purposes to which land was reserved, in the case of land reserved or deemed to be reserved under the Crown Land (Reserves) Act 1978.*

4.1.3 Other Legislation

There are numerous other pieces of State and Commonwealth legislation that regulate coastal land use and development in one form or another. These are listed in Table 2 below. Legislation is Victorian unless otherwise noted.

Table 2: Legislation affecting coastal areas

Legislation	Main operation
<i>Crown Land (Reserves) Act 1978</i>	The principal legislation dealing with the reservation and management of Crown lands in Victoria.
<i>Marine Act 1988</i>	Regulates the registration of vessels and the pollution of State waters from vessels. Provides for the efficient and safe operation of vessels in Victoria.
<i>Heritage Act 1995</i>	Establishes a framework for non Indigenous heritage (places and objects) protection in Victoria.
<i>Aboriginal Heritage Act 2006</i>	Created the Aboriginal Heritage Council of traditional owners who advise on the protection of Aboriginal heritage. Provides for Cultural Heritage Management Plans. Provides for Aboriginal involvement in decision making about cultural heritage.
<i>Environment Protection Act 1970</i>	Establishes the Environment Protection Authority and outlines its powers, duties and responsibilities. Makes provision for the prevention of pollution and the protection of the environment.
<i>Flora and Fauna Guarantee Act 1988</i>	Provides for the conservation and sustainable use of Victoria's flora and fauna.
<i>Property Law Act 1958</i>	Principal piece of legislation dealing with property and conveyancing in Victoria. It includes provisions covering contracts, easements and leases.
<i>Transfer of Land Act 1958</i>	Establishes the public register of title to land, which is maintained by the Registrar of Titles.
<i>Local Government Act 1989</i>	Provides the framework for the establishment and operation of councils.
<i>National Parks Act 1975</i>	Creates national and state parks (terrestrial and marine) in Victoria for the preservation and protection of the natural environment including indigenous flora and fauna and features of scenic or archaeological, ecological, geological, historic or other scientific interest.
<i>Land Act 1958</i>	Regulates the management and disposition of unreserved Crown land.
<i>Water Act 1989</i>	Regulates the use of ground and surface water.
<i>Catchment and Land Protection Act 1994</i>	Establishes the Victorian Catchment Management Council and Catchment Management Authorities for the sustainable management of all Victorian water catchments.
<i>Charter of Human Rights and Responsibilities Act 2006</i>	Sets out basic rights and freedoms of the individual, and the responsibilities that go with them. It includes well known democratic rights such as the right to vote and freedom of expression.
<i>Environment Effects Act 1978</i>	Provides the framework for the environmental impact assessment of major projects.
<i>Environment Protection</i>	Provides for the identification and protection of matters of national

<i>and Biodiversity Conservation Act 1999 (Cth)</i>	environmental significance including species and ecosystems covered by international agreements.
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4.2 Main Policy and Strategies

4.2.1 Victorian Coastal Strategy

The VCS is the State Government’s policy commitment for coastal, estuarine and marine environments in Victoria. It provides a long-term vision for the planning, management and sustainable use of our coast, and the policies and actions Victorians will need to implement over the next five years to help achieve that vision. It is also a framework to assist in the development and implementation of other locally and regionally specific strategies and plans such as management plans, Coastal Action Plans (CAPs), and planning schemes.

The VCS builds on the principles and actions of the last two strategies and identifies and responds to three significant issues affecting Victoria’s coast that require specific attention:

- Climate Change
- Population and Growth
- Marine Ecological Integrity

The purpose of the VCS is to provide:

- *a vision for the planning, management and use of coastal, estuarine and marine environments;*
- *the government’s policy commitment for coastal, estuarine and marine environments;*
- *a framework for the development and implementation of other specific strategies and plans such as Coastal Action Plans, management plans and planning schemes; and*
- *a guide for exercising discretion by decision-makers, where appropriate.*

The VCS gives direction for planning and managing the impacts of activities on and in the marine environment, foreshores (coastal Crown land 200 metres from the high water mark), the coastal hinterland and catchments draining to the coast and estuaries.

Four key principles, to be considered as a hierarchy, that underpin the VCS are:

- protection of significant environmental and cultural values;
- integrated planning and providing direction for the future;
- sustainable use of coastal resources; and

- suitable development that considers the above principles.

CAPs, developed in accordance with the *Coastal Management Act 1995*, provide a mechanism for the implementation of the VCS. CAPs enable the broad principles and priorities identified in the VCS to be further developed and applied at a sub-regional or issue based level. They provide strategic direction for the future management of an area of coast by identifying necessary priorities, actions and outcomes.

CAPs are developed by Regional Coastal Boards in consultation with interested local, regional and state bodies and follow an approval process culminating in consideration by the Minister for Environment and Climate Change.

They:

- enable the broader principles and priorities of the VCS to be further developed and applied at a regional or local level, or for particular issues;
- are consistent with the VCS and play a key role in its implementation;
- take a long term strategic view, clarify directions for future use and identify key actions required to achieve preferred outcomes;
- are developed by or under the guidance of Regional Coastal Boards;
- involve public consultation during preparation.

4.2.2 Regional Catchment Strategies

Regional catchment strategies are important strategic documents for all organisations and people involved in natural resource management in the region, including government agencies and councils, water authorities and Landcare and community groups. Their main focus is the land, water and biodiversity in the region including coastal and marine areas. They provide a framework for effort, an investment guide, a means of integrating policy and an action plan for catchment works.

The guidelines for the preparation of the new regional catchment strategies are still in preparation. It is expected that they will provide advice on how to address issues of climate change, including sea level rise.

4.2.3 Land and Biodiversity White Paper

The State Government's recently released report *Securing Our Natural Future – a white paper for land and biodiversity at a time of climate change* (DSE 2009) has five major goals:

- To safeguard Victoria's land, water and biodiversity by building ecosystem resilience, maintaining ecosystem services and improving connectivity.

- To reform and realign Victorian Government processes and institutions which lead and facilitate the sustainable management of Victoria's land, water and biodiversity.
- To increase market demand for land, water and biodiversity outcomes.
- To encourage all Victorians to work together as responsive and effective stewards of our land, water and biodiversity.
- To restore the ecological processes and resilience that underpin the health of Victoria's land, water and biodiversity.

Amongst other initiatives, the White Paper designates a number of 'flagship' areas throughout the State that will be the focus of investment to maintain and enhance biodiversity and built ecosystem resilience. In the coastal area, these include Discovery Bay to Portland, the Otways, Western Port, Corner Inlet, the Gippsland Lakes and Far East Gippsland.

It also identifies key 'Biolinks', where connectivity of vegetation will be increased to provide corridors for flora and fauna.

In relation to institutional restructuring, the White Paper proposes that the Victorian Catchment Management Council will be merged with the Victorian Coastal Council and the Victorian Environmental Assessment Council, to form a new Victorian Natural Resource and Catchment Council.

Also, at the regional level, groups of catchment management authorities will be combined into larger Natural Resource and Catchment Authorities. In coastal areas, the relevant Regional Coastal Boards will also form part of the merged entities. In Gippsland, this will also include the Gippsland Lakes Taskforce. In addition to updating catchment management strategies to provide a 'catchment to coast' perspective, the new authorities will have the responsibility of providing a regional interpretation of the Victorian Coastal Strategy.

At the regional level, combine groups of catchment management authorities will be combined into larger Natural Resource and Catchment Authorities. In coastal areas, the relevant Regional Coastal Boards will also form part of the merged entities. In Gippsland, this will also include the Gippsland Lakes Taskforce. In addition to updating catchment management strategies to provide a 'catchment to coast' perspective, the new authorities will have the responsibility of providing a regional interpretation of the Victorian Coastal Strategy.

With respect to coastal climate change the White Paper includes the following relevant actions:

- *Develop a research program to increase understanding of how climate change will affect coastal and estuarine ecosystem functions and dependent anthropogenic activities.*

- *Prepare marine habitat condition assessments and establish further condition monitoring systems taking account of climate change and catchment processes by 2012.*
- *Develop a non-statutory management plan for Western Port, modelled on the plan developed for the Gippsland Lakes by 2012.*
- *Prepare vulnerability assessments of key coastal, estuarine and marine habitats and ecosystem processes by 2012.*
- *Develop decision making tools and market based instruments to address climate change impacts on coastal, estuarine and marine ecosystems by 2013.*

4.2.4 Climate Change Green Paper

The Green Paper outlines in detail the risks facing Victoria and the likely impacts of the Commonwealth's proposed Carbon Pollution Reduction Scheme (CPRS). It also considers ways in which Victoria can reduce greenhouse gas emissions, adapt to the impacts of climate change and become a leading low carbon economy.

The Green Paper sets out the challenge of focussing Victorian action across three distinct fronts.

1. Complementing the CPRS to drive emissions abatement in areas of market failure or those sectors not covered by the CPRS.

State Government action to reduce emissions will need to complement (rather than duplicate) national developments such as the implementation of the CPRS. The paper addresses specific opportunities in the areas of energy, transport, the built environment, waste, water, agriculture and in the state's ecosystems.

2. Positioning Victoria to take advantage of the opportunities created by the transition to a carbon constrained economy.

The Government's objective in this area will be to maximise the potential of the "Green Economy" for Victoria - attracting green investments and creating green jobs. The Victorian Government will achieve this primarily by driving innovation and facilitating the development of low carbon industries in the State.

3. Adapting to the impacts of climate change we can no longer avoid.

Victorians will need to adapt to the inevitable changes to the natural environment including more extreme weather events and greater fire risks. The Government will ensure the right mix of policies and tools are available to Victorian businesses, households and communities to understand and prepare

for climate change pressures before they occur. Adapting to the unavoidable impacts of climate change will also require the State to change the way it manages the State's natural resources and the way it delivers public services, in particular health services.

4.2.5 Other Policy and Strategies

There are numerous other policies and strategies affecting the coast. These are listed in Table 3 below.

Table 3: Policy and strategies affecting coastal areas

Policy/Strategy	Main operation
Growing Victoria Together	Growing Victoria Together is a ten-year vision that establishes Government priorities for Victoria.
Melbourne @ 5 Million	Released in December 2008, <i>Melbourne @ 5 million</i> builds upon <i>Melbourne 2030</i> (October 2002) - the long-term plan for Melbourne and the surrounding region.
Coastal Acid Sulfate Soils Strategy	The Strategy was released by the Department of Sustainability and Environment in July 2009 and has the objective of protecting the environment, humans and infrastructure from the impacts of disturbing coastal acid sulfate soils.
Biodiversity Strategy	Victoria's Biodiversity Strategy fulfils commitments in the National Strategy for the Conservation of Biodiversity and requirements under Victoria's <i>Flora and Fauna Guarantee Act 1988</i> . It describes the legal, economic and social framework for Victorians to conserve biodiversity.
Greenhouse Strategy	The <i>Victorian Greenhouse Strategy</i> was released in 2002 and details the actions the Government is taking in response to climate change. In 2005, the Government released the Victorian Greenhouse Strategy Action Plan Update.
Native Vegetation Framework	The Framework was released in 2002. It was developed to implement the objectives of Victoria's Biodiversity Strategy and the National Strategy for the Conservation of Australia's Biological diversity. It is the State Government's strategy to protect, enhance and revegetate Victoria's native vegetation.
Environmental Sustainability Framework	Victoria's Environmental Sustainability Framework was released in 2005. The Framework provides direction for government, business and the community on building environmental considerations into the way Victorians work and live.

4.3 Commonwealth Matters

4.3.1 Inquiry into Climate Change and Environmental Impacts on Coastal Communities (House of Representatives)

In March 2008, the Commonwealth Minister for the Environment, Heritage and the Arts and the Minister for Climate Change and Water, asked the House of Representatives Standing Committee on Climate Change, Water, Environment and the Arts to inquire into and report on *climate change and environmental impacts on coastal communities*.

The terms of reference provided for the committee to inquire into climate change and environmental pressures experienced by Australian coastal areas, having regard to:

- existing policies and programs related to coastal zone management, taking in the catchment-coast-ocean continuum;
- the environmental impacts of coastal population growth and mechanisms to promote sustainable use of coastal resources;
- the impact of climate change on coastal areas and strategies to deal with climate change adaptation, particularly in response to projected sea level rise;
- mechanisms to promote sustainable coastal communities; and
- governance and institutional arrangements for the coastal zone.

The Committee released its report in October 2009. The report made 47 recommendations, including recommending that the Australian Government:

- Commission a study on international coastal zone governance arrangements, policies and programs for addressing coastal climate change impacts, and adaptation strategies. The completed study should be made public.
- Increase its investment in coastal based climate change research in a number of areas and programs focussed on sea level rise projections and extreme sea level events.
- Develop an Intergovernmental Agreement on the Coastal Zone for endorsement by the Council of Australian Governments - a particularly relevant component as far as this Committee's work is concerned which will need to be incorporate into it's analysis. It is to be based on regional strategic coastal planning and landscape scale/ecosystem based coastal zone management principles.
- Ensure that initiatives of the Council of Australian Governments, through the Local Government and Planning Ministers Council, develop state specific climate change planning policies to inform local government and regional planning responses to climate change be included as part of the

action plan under the proposed Intergovernmental Agreement on the Coastal Zone.

- Consider the benefits of establishing a nationally consistent sea level rise planning benchmark and to possibly incorporate it as part of the action plan for the proposed Intergovernmental Agreement on the Coastal Zone.
- Work with the Natural Resource Management Ministerial Council to develop an action plan to, amongst other things, ensure coastal buffers and habitat corridors are included in state and local government management processes and to promote ecosystem based planning and management approaches across jurisdictions.

4.3.2 COAG Climate Change and Water Adaptation Group

In December 2007 the Council of Australian Governments (COAG) established working groups to implement its work agenda on a range of priority issues. The Australian Government Minister for Climate Change and Water chaired the Working Group on Climate Change and Water (WGCCW). Other members of the WGCCW included officials from the states and territories and a representative from the Australian Local Government Association. The WGCCW was asked to provide COAG with proposals to ensure sustainable water use across Australia, as well as on climate change issues.

In August 2009, the Council of Australian Governments (COAG) decided to disband several working groups, including the COAG Working Group on Climate Change and Water, as major reforms had been agreed to. COAG subgroups on water, renewable energy and adaptation continue to function.

4.4 The Strategic Basis for Change

4.4.1 Ecologically Sustainable Development

In 1992 the three tiers of Australian Government signed the Intergovernmental Agreement on the Environment (IGAE)²³. In this landmark cooperative approach it was agreed:

... that ecologically sustainable development should be used by all levels of Government in the assessment of natural resources, land use decisions and approval processes.

The Agreement also recognises that there will be potentially significant impact of greenhouse enhanced climate change on Australia's natural, social and working environment, as well as on the global community and global environments.

²³ <http://www.environment.gov.au/esd/national/igae/index.html>

The four principles that underpin Ecologically Sustainable Development (ESD) are identified in the Agreement as being:

- The precautionary principle;
- Intergenerational equity;
- Conservation of biological diversity and ecological integrity; and
- Improved valuation, pricing and incentive mechanisms.

The ESD concepts and the guiding principles of the IGAE were carried through to the Australian Governments' endorsed National Strategy for Ecological Sustainable Development (1992)²⁴. This Strategy defines ESD as being *development which aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations*. It also commits Australian Governments' to *develop comprehensive coastal zone policies which are consistent with ESD principles, protect and manage the coastline and beaches for the enjoyment of future generations, and ensure that coastal development is balanced, well planned and environmentally sensitive*. It has as one of its objectives to *develop coastal policies, consistent with ESD principles within each jurisdiction*.

The ESD principles of intergenerational equity and conservation of biological diversity are implicit in the objectives of the *Planning and Environment Act 1987* (Section 4(1)) and both the Intergovernmental Agreement and the National Strategy for Ecologically Sustainable Strategy are recognized in the Victoria Planning Provisions as providing a framework for the development of policies and strategies *to encourage sustainable land use and development*.

Further examination of the VPP and the terminology used particularly in Clause 11 firmly establish that ESD principles are to be applied to planning in Victoria. Specific VPP clauses of relevance to the impacts of climate change on the Victorian coast are discussed in more detail, in Chapter 8.

4.4.2 Applying the Precautionary Principle

It was noted in the House of Representatives Standing Committee on Climate Change, Water, Environment and the Arts report, *Managing our coastal zone in a Changing Climate* that the *principles of ESD most relevant to climate change impacts are the precautionary principle and the principle of intergenerational equity*.

Clause 15.08 of the VPP was amended as a result of the VCS, and is aimed at managing coastal hazards and the coastal impacts of climate change in coastal areas. It requires that planning should:

Apply the precautionary principle to planning and management decision-making when considering the risks associated with climate change.

²⁴ <http://www.environment.gov.au/esd/national/nsesd/strategy/index.html>

The Precautionary Principle is defined in the Intergovernmental Agreement on the Environment as:

Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

- (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and*
- (ii) an assessment of the risk-weighted consequences of various options.*

The VCS applied the precautionary principle when it determined that sea level rise of not less than 0.8m by 2100 should be adopted in planning policy.

The precautionary principle has been applied in coastal planning decisions in Victoria and other Australian jurisdictions. Cases, with discussion, where the principle was a key determinant to the outcome are summarised in *Coastal Climate Change Advisory Committee: Reference Group Briefing Report* (VPELA 2010). This report concludes that:

What is clearis that relevant Tribunals and Courts have accepted climate change science and have adopted a precautionary approach when assessing planning applications.²⁵

Application of the precautionary principle along with the principle of intergenerational equity was succinctly summarized by VCAT in the Grip Road, Toora case:

...The precautionary principle requires, amongst other matters, a gauging of the consequences and extent of intergenerational liability arising from a development or proposal and if found to be warranted, appropriate courses of action to be adopted to manage severe or irreversible harm.²⁶

4.4.3 Risk Management Approaches and Frameworks

The application of the precautionary principle, as defined above, requires that decisions be guided by *an assessment of risk -weighed consequences of various options*.

When sufficient information for the potential impacts of sea level rise on a particular development is available assessing the risk may require a suitably qualified expert to undertake a coastal vulnerability assessment, as described in

²⁵ Victorian Planning and Environmental Law Association, 2010, *Coastal Climate Change Advisory Committee: Reference Group Briefing Report*

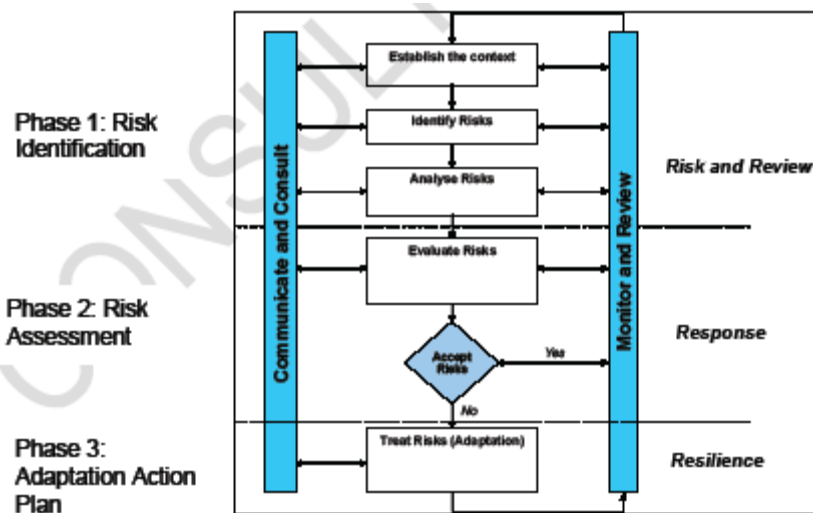
²⁶ *Gippsland Coastal Board v South Gippsland Shire Council* [2008] VCAT 1545 at para 41

the General Practice Note *Managing coastal hazards and the coastal impacts of climate change*, to assist in determining if the development is to proceed.

However when a risk weighted assessment that looks at the impacts of climate change on a broader scale such as a settlement or a region is undertaken the assessment can be complex.

The Australian and New Zealand Standard Risk Management Standard, AS/NZ4360, (and its recent replacement AS/NZ ISO AS/NZS ISO 31000:2009 Risk management - Principles and guidelines) provides guidance on the risk assessment process and provides a suitable framework for assessing risk in complex situations. The process in AS/NZ 4360 is summarised in Figure 5.

Figure 5: Risk management process²⁷



Recent work undertaken by AECOM for the City of Melbourne has applied AS/NZS 4360:2004 to determine the potential climate change risks and implications for the City²⁸. The *Draft Climate Change Adaptation Report: A Risk Assessment and Action Plan: Discussion Paper* looks at a comprehensive range of climate change risks for the years 2010, 2030 and 2070 including sea level rise where a 59cm rise has been used.

In identifying the risks and their implications for the future –phase one and two of the process- some simple questions were posed in workshops and other fora: *What can happen? When and where? How and Why?* The question, *What can be done to avoid or mitigate it?* was used for Phase three.

²⁷ Source: Adapted from AS/NZS 4360:2004, in City of Melbourne (2008) Draft Climate Change Adaptation Report: A Risk Assessment and Action Plan: Discussion Paper.

²⁸ City of Melbourne (2008) Draft Climate Change Adaptation Report: A Risk Assessment and Action Plan: Discussion Paper.

With the phase two risk assessment a risk framework, which is explained in the following figure and is based on a '5+5' combined risk rating index (consequence + likelihood) was used to give a risk weighting to the risks determined in phase one. Using this rating system the main threats in the City of Melbourne in future years are from rising groundwater levels and associated salinity as a consequence of sea level rise - which in turn could damage infrastructure and buildings, as well as cause sewer overflows and stormwater contamination.

Figure 6: Risk assessment framework

LIKELIHOOD	CONSEQUENCES				
	Catastrophic 5	Major 4	Moderate 3	Minor 2	Insignificant 1
Almost certain -5	10	9	8	7	6
Likely -4	9	8	7	6	5
Probable -3	8	7	6	5	4
Unlikely -2	7	6	5	4	3
Rare -1	6	5	4	3	2

Risk Score (From above analysis)		Requirements
9-10	Extreme	<i>Active Management</i> - risks in this quadrant should be of the highest priority to all concerned. These risks are of sufficient likelihood and consequence to be above the risk threshold and have unacceptable level of control.
7-8	High	<i>Control Critical</i> - risks are considered of enough likelihood and consequence to be a concern however have a control measure that is considered effective and vital to its appropriate mitigation.
5-6	Moderate	<i>Periodic Monitoring</i> ; risks in this quadrant generally are unable to have control measures that can suitably minimise the risk and are therefore monitored accordingly to ensure organisational awareness and preparedness.
2-4	Low	<i>No Major Concern</i> - manage through periodic re-evaluation.

Source: Adapted from City of Melbourne (2008) Draft Climate Change Adaptation Report: A Risk Assessment and Action Plan Discussion Paper.

The assessment identifies those potential impacts associated with sea level rise and extreme coastal events, that are rated as an extreme or high risk, and which will require active management.

The report recommends the following actions be undertaken by City of Melbourne to adapt to sea level rise.

- *Future proof planning, incorporate sensible precautions and contingencies for proposed future developments, or potentially restricting certain types of development in areas with a high risk of natural attrition due to sea level rise*
- *Better protection for existing, low-lying developments*
- *Better flood control through revised drainage planning*
- *Measures to improve resilience to exposed infrastructure²⁹*

In the short term it is recommended that the City of Melbourne revise planning guidelines for habitable floor levels, promote water sensitive urban design and increase capture of stormwater. Capture of stormwater is considered to have the highest value and highest priority as it reduces the likelihood of flash flooding, at the same time as lessening drought impacts and improving river health.

The New Zealand *Coastal Hazard and Climate Guidance Manual for Local Government* (see Section 10.2.3) provides detailed guidance on applying the risk assessment process in coastal hazard evaluation and is based on AS/NZ4360.

When there is a good appreciation of current and future susceptibility to coastal hazards structured risk assessments can provide the proper framework for implementing planning tools to reduce and manage risk.

²⁹ City of Melbourne (2008) Draft Climate Change Adaptation Report: A Risk Assessment and Action Plan: Discussion Paper.

5. The Existing Planning Framework

The existing planning framework is driven by the provisions of the *Planning and Environment Act 1987*. Victoria has a hierarchical planning structure. Its main elements are:

- The *Planning and Environment Act 1987* (discussed in Section 4.1.1).
- The Victoria Planning Provisions (VPP).
- Ministerial Directions - These provide specific direction on a select range of matters deemed to be of importance to planning in the State.
- Local Government Planning Schemes.
- Various state, regional, and local level strategies.

In brief, the *Planning and Environment Act 1987* sets the 'big picture' rules, and the VPP provides government policy that sits under the Act. Planning schemes implement the Act and the VPP, and establish a local framework for orderly local land use planning and development control.

5.1 Victoria Planning Provisions

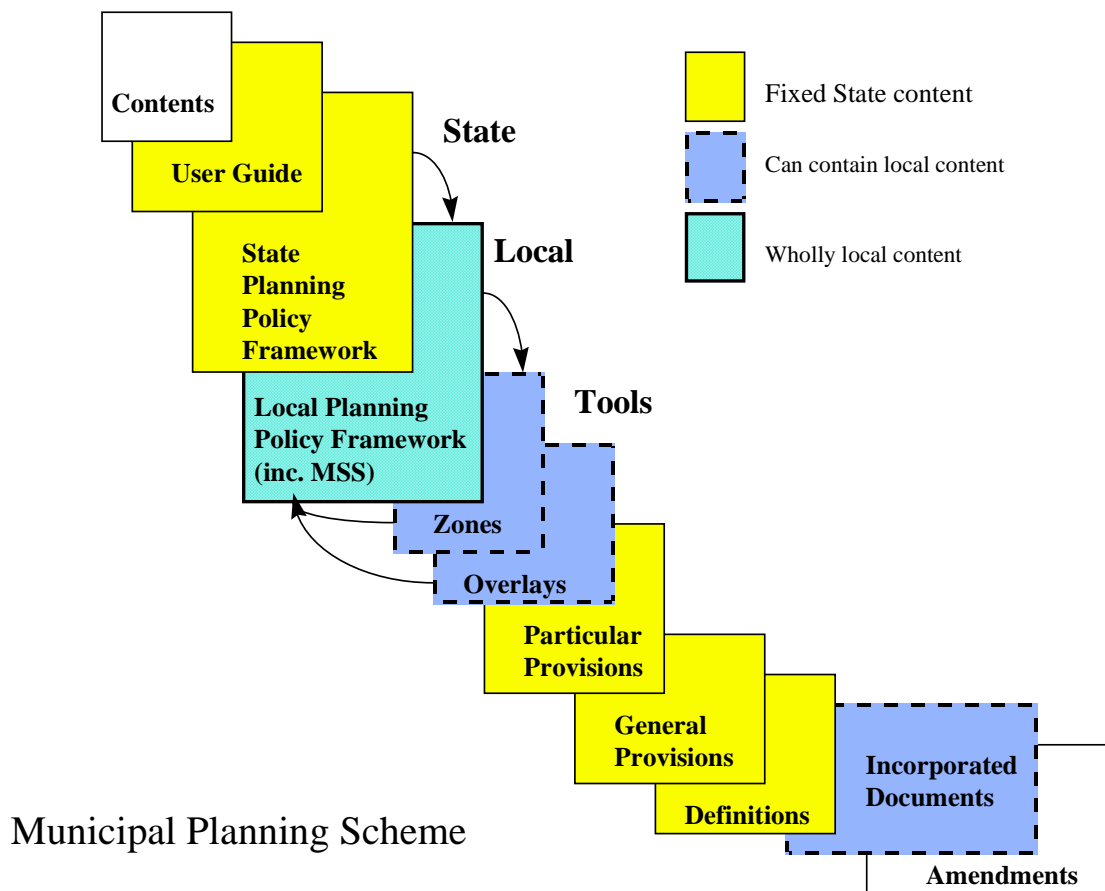
The Victoria Planning Provisions (VPP) set out the format and allowable content of planning schemes in Victoria. They provide a 'toolkit' to enable planning authorities to prepare planning schemes. The VPP provides the framework, standard provisions and State planning policy. The planning authority must provide the local planning policy content, including a Municipal Strategic Statement (MSS), and select the appropriate zones and overlays from the VPP that are supported by the local planning policy directions, for inclusion in their planning scheme.

The VPP requires a planning scheme:

- *To provide a clear and consistent framework within which decisions about the use and development of land can be made.*
- *To express state, regional, local and community expectations for areas and land uses.*
- *To provide for the implementation of State, regional and local policies affecting land use and development.*

The following diagram explains the structure of a planning scheme and the relationship between different sections.

Figure 7: Structure of a planning scheme



5.2 State Planning Policy Framework

Under Clause 10 of the VPP, the State Planning Policy Framework (SPPF) policies apply to all land in Victoria and must be taken into account when preparing amendments or making decisions under a planning scheme. Those policies that are most relevant to coastal climate change are outlined below.

Clause 11 – *Introduction Goals and Principles* – Clause 11.03 - *Principles of Land Use and Development Planning* identifies the following 7 general principles for planning in Victoria; Settlement; Environment; Management of Resources; Infrastructure; Economic Well-being; Social needs and Regional Co-operation. In short, planning must take account of the above matters including their underlying policies and strategies, to ensure the best overall outcomes for current and future generations. This inevitably involves judgement on balances between individual principles. It requires that Victoria’s planning objectives are fostered through appropriate land use and development planning which integrates relevant environmental, social and economic factors in the interests of net community benefit and sustainable development.

Clause 11.03-1 – *Settlement* requires planning to anticipate and respond to the needs of existing and future communities through provision of zoned and serviced land for housing, employment, recreation and open space, commercial and community facilities and infrastructure. This is relevant in the context of ensuring the protection of the environment and natural resources and community health and safety in relation to coastal hazards arising from the effects of climate change.

11.03-2 – *Environment* relates to obligations under national and state environment policies and strategies. The policy requires planning to:

- *Adopt a best practice environmental management and risk management approach which aims to avoid or minimise environmental degradation and hazards.*
- *Prevent environmental problems created by siting incompatible land uses close together.*
- *Help to protect the health of ecological systems and the biodiversity they support (including ecosystems, habitats, species and genetic diversity).*
- *Protect areas and sites with significant historic, architectural, aesthetic, scientific and cultural values.*

11.03-3 - *Management of resources* is relevant because it requires planning to assist in the conservation of natural resources, to minimise hazards such as flooding, and to minimise impacts on estuarine, coastal and marine environments. It also recognises the Department of Sustainability and Environment and Committees of Management as managers of Crown land when making decisions affecting Crown land.

11.03-4 – *Infrastructure* is relevant as it requires that the provision of infrastructure such as coastal protection works, raising roads and upgrading services be efficient, equitable, accessible and timely.

11.03-5 - *Economic well-being* is relevant because it seeks to foster the well being of communities and support economic growth through the provision of land and resolving land use conflicts.

11.03-6 - *Social needs* seeks to provide a safe physical and social environment for residents, through the appropriate location of uses and developments.

11.03-7 - *Regional co-operation* seeks to provide planning and responsible authorities the opportunity to address issues which extend beyond municipal boundaries such as coastal climate change.

Clause 12 *Metropolitan Development* - This clause provides objectives and strategies for Metropolitan Melbourne. Clause 12.05-2 – *Strategies* includes a

number of subheadings including *Open Space* and *Coastal Areas*. One of the principles included in the *Open Space* strategy requires the provision of public access to stream banks and foreshores as well requiring that public land immediately adjoining waterways and coastlines remains in public ownership.

The Coastal Areas strategy seeks to improve the environmental health of the bays through reducing the pressures of urban growth through growth area planning, managing waterway and stormwater quality and protecting coastal and foreshore environments, providing public access and recreation facilities around the Bays. Importantly, the policy also requires coastal planning and management to be consistent with the Victorian Coastal Strategy and to manage privately owned foreshore consistently with the adjoining public land.

Under Clause 12.07 – *A greener city*, Clause 21.07-2 – *Strategies* under *Native habitat and biodiversity* seeks to protect flora and fauna habitat and landscapes such as the coastal areas, Western Port and the Mornington Peninsula.

Clause 14 – *Settlement* under Clause 14.01-2 – *General Implementation* recognises the need to plan to accommodate projected population growth taking account of land capability and natural hazards, environmental quality and the costs of providing infrastructure. The policy also seeks to protect environmentally sensitive areas such as Western Port and Port Phillip Bays and their foreshores, the Gippsland Lakes and its foreshore and coastal areas and their foreshores from development which would diminish their environmental conservation or recreation values.

Clause 15 – *Environment* under Clause 15.01 – Protection of catchments, waterways and groundwater seeks to:

To assist the protection and, where possible, restoration of catchments, waterways, water bodies, groundwater, and the marine environment.

Under Clause 15.01-2 – *General Implementation* under *Catchment planning and management* requires planning and responsible authorities to consider impacts on coastal and marine environments and encourage the retention of natural drainage corridors with a vegetated buffer zone at least 30m wide to minimise erosion. Under 15.01-2 *Water quality protection* there is a requirement that land use activities are sited and managed to protect fresh and marine waters by minimising nutrient contributions and meeting the water quality objectives specified in the State environment protection policy (Waters of Victoria) which has specific schedules water quality for Western Port and Port Phillip Bay, the Gippsland Lakes and the Yarra River. Also under this section it specifies that development is to be discouraged in areas subject to flooding.

Clause 15-02 *Floodplain management* – one of the objectives of this Clause is to assist with the protection of life, property and community from flood hazard.

Protection is based on the historical 1 in 100 year flood events however under climate change with predicted increased frequency of storm surges and sea level rise the frequency of flood events is also predicted to increase along the coast.

Clause 15.08 – *Coastal Areas* is the key policy relating to coastal climate change effects. It was amended under VC52 on 18 December 2008 following the release of the 2008 VCS. Under Clause 15.08-1 the objectives are:

- *To protect and enhance the natural ecosystems and landscapes of the coastal estuarine and marine environment.*
- *To ensure sustainable use of natural coastal resources.*
- *To achieve development that provides an environmental, social and economic balance.*
- *To recognise and enhance the community's value of the coast.*
- ***To plan for and manage the potential coastal impacts of climate change*** (Our emphasis).

Under Clause 15.08-2 – *Strategies*, the clause outlines strategies under key themes including integrated planning for the future, managing coastal hazards and the coastal impacts of climate change, population growth and development, sustainable use, protection and management of environmental and cultural values and planning for the Great Ocean Road region:

Integrated planning for the future

Land use and development planning should be coordinated with the requirements of the Coastal Management Act 1995 to:

- *Provide clear direction for the future sustainable use of the coast, including the marine environment, for recreation, conservation, tourism, commerce and similar uses in appropriate areas.*
- *Protect and maintain areas of environmental significance.*
- *Identify suitable areas and opportunities for improved facilities.*

Decision-making by planning authorities and responsible authorities should apply the hierarchy of principles for coastal planning and management as set out in the Victorian Coastal Strategy 2008, which are:

1. *Provide for the protection of significant environmental and cultural values.*
2. *Undertake integrated planning and provide clear direction for the future.*
3. *Ensure the sustainable use of natural coastal resources.*

When the above principles have been considered and addressed:

4. *Ensure development on the coast is located within existing modified and resilient environments where the demand for development is evident and the impact can be managed.*

Managing coastal hazards and the coastal impacts of climate change.

Planning to manage coastal hazards and the coastal impacts of climate change should:

- ***Plan for sea level rise of not less than 0.8 metres by 2100, and allow for the combined effects of tides, storm surges, coastal processes and local conditions such as topography and geology when assessing risks and coastal impacts associated with climate change.***
- ***Apply the precautionary principle to planning and management decision-making when considering the risks associated with climate change.***
- ***Ensure that new development is located and designed to take account of the impacts of climate change on coastal hazards such as the combined effects of storm tides, river flooding, coastal erosion and sand drift.***
- ***Ensure that land subject to coastal hazards are identified and appropriately managed to ensure that future development is not at risk.***
- ***Avoid development in identified coastal hazard areas susceptible to inundation (both river and coastal), erosion, landslip/landslide, acid sulfate soils, wildfire and geotechnical risk.***

[Bold text is our emphasis]

Population growth and sustainable development

Planning for population growth and sustainable development should:

- ***Identify a clear settlement boundary around coastal settlements to ensure that growth in coastal areas is planned and coastal values protected. Where no settlement boundary is identified, the extent of a settlement is defined by the extent of existing urban zoned land and any land identified on a plan in the planning scheme for future urban settlement.***
- ***Direct residential and other urban development and infrastructure within defined settlement boundaries of existing settlements that are capable of accommodating growth.***

- *Support a network of diverse coastal settlements which provides for a broad range of housing types, economic opportunities and services.*
- *Ensure a sustainable water supply, stormwater and sewerage treatment for all development.*
- *Encourage urban renewal and redevelopment opportunities within existing settlements to reduce the demand for urban sprawl.*
- *Avoid linear urban sprawl along the coastal edge and ribbon development within rural landscapes and protect areas between settlements for non-urban use.*
- *Encourage opportunities to restructure old and inappropriate subdivisions to reduce development impacts on the environment.*
- *Ensure development is sensitively sited and designed and respects the character of coastal settlements.*
- *Minimise the quantity and enhance the quality of storm water discharge from new development into the ocean, bays and estuaries.*
- *Promote ecological sustainable design techniques such as energy efficiency and water sensitive urban design.*
- *Avoid development on ridgelines, primary coastal dune systems and low lying coastal areas.*

Sustainable use, protection and management of environmental and cultural values

Planning for sustainable use, protection and management of significant environmental and cultural values should:

- *Ensure development conserves, protects and seeks to enhance coastal biodiversity and ecological values by:*
 - *Encouraging revegetation of cleared land abutting coastal reserves.*
 - *Maintaining the natural drainage patterns, water quality and biodiversity within and adjacent to coastal estuaries, wetlands and waterways.*
 - *Avoiding disturbance of coastal acid sulfate soils.*
- *Protect cultural heritage places, including Aboriginal places, archaeological sites and historic shipwrecks.*
- *Ensure that use and development on or adjacent to coastal foreshore Crown land:*
 - *Maintains safe, equitable public access and improves public benefit whilst protecting local environmental and social values.*
 - *Demonstrates need and coastal dependency.*
 - *Is located within a defined activity or recreation node.*

- *Encourage suitably located and designed coastal and marine tourism opportunities which:*
 - *Ensure that a diverse range of accommodation options and coastal experience are maintained and provided for and that sites and facilities are accessible to all.*
 - *Demonstrate a tourist accommodation need and support a nature based approach within non-urban areas.*
 - *Are of an appropriate scale, use and intensity relative to its location and minimises impacts on the surrounding natural visual, environmental and coastal character.*

Planning for the Great Ocean Road Region

In addition to the land use and development strategies above, planning for the Great Ocean Road Region should:

- *Protect the landscape and environment by:*
 - *Protecting public land and parks and identified significant landscapes.*
 - *Ensuring development responds to the identified landscape character of the area.*
 - *Managing the impact of development on catchments and coastal areas.*
 - *Managing the impact of development on the environmental and cultural values of the area.*
- *Manage the growth of towns by:*
 - *Respecting the character of coastal towns and promoting best practice design for new development.*
 - *Directing urban growth to strategically identified areas.*
 - *Encouraging environmentally sustainable development.*
- *Improve the management of access and transport by:*
 - *Managing the Great Ocean Road for tourism and regional access.*
 - *Enhancing the safety and travelling experience of the Great Ocean Road.*
 - *Improving the safety and operational performance of the inland routes from the Princes Highway to the Great Ocean Road.*
 - *Providing travel choices to and within the region.*
- *Encourage sustainable tourism and resource use by:*
 - *Developing a network of tourism opportunities throughout the region.*
 - *Supporting tourism activities that provide environmental, economic and social benefits.*
 - *Supporting the land use and transport needs of key regional industries including tourism.*

- *Using natural resources with care.*

Clause 15.08-3 - *Geographic strategies* requires decision making to be consistent with the following:

- *The Victorian Coastal Strategy 2008.*
- *The Great Ocean Road Region - A Land Use and Transport Strategy (Department of Sustainability and Environment, 2004).*
- *The purpose for which land is reserved under the Crown Land (Reserves) Act 1978.*
- *Any relevant State environment protection policy.*
- *Any relevant coastal action plan or management plan approved under the Coastal Management Act 1995 or National Parks Act 1975.*
- *Any approved recommendations from the Land Conservation Council or the Victorian Environment Assessment Council.*

and have regard to (as relevant):

- *The Coastal Spaces Landscape Assessment Study (Department of Sustainability and Environment, 2006).*
- *The Great Ocean Road Landscape Assessment Study (Department of Sustainability and Environment, 2004).*
- *The Siting and Design Guidelines for Structures on the Victorian Coast (Victorian Coastal Council, 1998).*

Clause 15.09 – *Conservation of native flora and fauna* seeks:

To assist the protection and conservation of biodiversity, including native vegetation retention and provision of habitats for native plants and animals and control of pest plants and animals.

This policy is important because it requires attention to be given to wetlands including those protected under the Ramsar Convention.

Clause 18.01 – *Roads* is relevant because roads are required to optimise accessibility, safety, emergency access, service and amenity.

Clause 18.05 – *Ports* is relevant because although it seeks to support port facilities for their economic benefits, planning should integrate with policies for environment protection and for the marine environment.

Clause 18.09 - *Water supply, sewerage and drainage* is relevant because seeks to plan for water supply, sewerage and drainage services that meets community needs and protects the environment.

The Committee notes that a policy neutral re-structure of the SPPF has recently been subject to public review. The revised structure of the SPPF provides for differentiation between:

- *Coastal settlement* under *Settlement* which seeks to avoid development on primary coastal dunes and low lying coastal areas;
- *Protection of coastal areas* under *Environmental Values* which seeks to ensure that development protects coastal biodiversity and avoids acid sulfate soils; and
- *Coastal inundation and erosion* under *Environmental Risk* which seeks to plan for and manage the potential coastal impacts of climate change. It is of interest to note that although the re-structure is meant to be policy neutral, changes to wording relating to the Victorian Coastal Strategy 2008 have changed the emphasis from requiring that decisions to be consistent with the Strategy to having regard to the Strategy plus there is a reference, under policy guidelines, to Future Coasts – coastal climate change vulnerability mapping.

5.3 Local Planning Policy Framework

The Local Planning Policy Framework (LPPF) of planning schemes usually comprises a MSS and Local Planning Policies (LPP). Currently, not all coastal planning schemes in Victoria contain references to climate change or potential sea level rise. Most relate to area-specific provisions introduced into the schemes in the last few years. Where reference is made to climate change and its effects on the coast with regards to sea level rise, these are either policy statements in the MSS which are not followed through into detailed provisions or alternatively, are specific overlay provisions that do not stem from any obvious strategic basis.

With regards to planning policies in the MSS a notable example is the Bass Coast Planning Scheme with Clause 21.05 – *Settlement* under Clause 21.05-1 – *Growth of Towns* under *Objectives and Strategies* – Objective 4 and Strategy 4.2 and 4.3 which address coastal hazard risk and state:

Objective 4 To discourage urban development that encroaches or impacts on significant environmental features and in areas affected by future climate change impacts.

Strategy 4.2 Manage climate change impacts by:

- *Identifying areas subject to future impacts of climate change.*
- *Preparing a strategy to deal with the possible impacts of climate change for developments located within existing urban boundaries.*
- *Avoiding development in areas outside of town boundaries where there are possible impacts as a result of climate change.*

Strategy 4.3 Ensure that development is set back from the coast to accommodate coastal features, vegetation and climate change impacts.

Clause 21.07-3 – *Environmental Hazards* under *Objectives and Strategies* under *Erosion and Subsidence* – Objective 4 and Strategies 4.1, 4.2 and 4.3 which state:

Objective 4 To restrict and control development on land prone to erosion and subsidence.

Strategy 4.1 Ensure that new uses and developments are located on land that has the capability to sustain the development.

Strategy 4.2 Discourage development on land prone to erosion and subsidence, and ensure that development does not increase the risk of an environmental hazard.

Strategy 4.3 Encourage the planting of mangroves along the coast (particularly along Western Port) to minimise the impacts of coastal erosion.

Finally, Bass Coast has a specific policy in the MSS under Clause 21.07-4 – *Climate Change*, which states:

Overview

Climate change is predicted to cause an increase in sea levels, a decrease in rainfall and more frequent and severe storm events. It is predicted that sea levels will rise up to 0.8 metre by the year 2050 (Intergovernmental Panel on Climate Change Fourth Assessment Report: Synthesis Report, UNESCO, 2007).

There will be impacts on coastal settlements, biodiversity, infrastructure and agricultural production. As Bass Coast Shire has a number of low lying regions (both on the coast and further inland), and a large amount of viable agricultural land, the future impacts of climate change on the municipality are significant planning issues.

Objectives and Strategies

Objective 3 To discourage development in areas that may be affected by climate change.

Strategy 3.1 Determine the effects of sea level rise and storm surges and prepare and implement strategies to address any potential issues.

Strategy 3.2 Increase the Council and the community's knowledge and understanding of the effects of climate change in the municipality.

Strategy 3.3 Discourage individual landowners adjacent to the coast from constructing their own sea wall barriers in an attempt to minimise impacts from erosion and coastal processes.

Another recent example of MSS policy approach to coastal hazard risk is the Greater Geelong Planning Scheme MSS which has been reviewed and recently gazetted under Amendment C129 Part 1 in January 2010. The new MSS includes Clause 21.05 – *Natural Environment* which contains the following policies and strategies and which also introduces the concept of setbacks and buffers in an MSS policy:

- 21.05-4 - Coastal Environments, the objective is to protect, maintain and enhance the coast, estuaries and marine environment and to respect and manage coastal processes. Relevant strategies include:
 - *Setback future land use and development from coastal areas, estuaries and coastal wetlands to provide a buffer which is adequate to accommodate coastal recession and the landward migration of coastal wetland vegetation communities such as mangroves and salt marshes.*
- 21.05-5 - Climate Change, the objective is to plan for and adapt to the impacts of climate change. The relevant strategy is:
 - *Avoid land use and development within areas considered at risk of coastal erosion or inundation from flooding, storm surge or rising sea levels.*

With respect to LPP, a notable example is the Glenelg Planning Scheme LPP policy under 22.02-4 *Coastal Areas*, which applies to areas covered in Schedule 1 to the Environmental Significance Overlay. This policy has an objective to protect the natural and cultural values of the coast.

This objective recognises amongst other matters:

- *The dynamic, complex and interconnected nature of biological and physical processes in the coastal zone;*
- *The susceptibility of the coast to the effects of natural events, including sea-level rise;*
- *The importance of good water quality to marine ecosystems;*
- *The importance of maintaining representative or significant natural ecosystems and sites of biological importance, biodiversity and indigenous coastal flora and fauna.*

5.4 Zones

The zones determine what land uses are as of right, subject to permit or prohibited. Importantly, clause 31.02 states that:

Because a use is in Section 2 does not imply that a permit should or will be granted. The responsible authority must decide whether the proposal will produce acceptable outcomes in terms of the State Planning Policy Framework, the Local Planning Policy Framework, the purpose and decision guidelines of the zone and any of the other decision guidelines in Clause 65.

Relevant zones in relation to coastal climate change and sea level rise include the:

- Rural Conservation Zone.
- Green Wedge Zone.
- Farming Zone.
- Urban Floodway Zone.
- Comprehensive Development Zone.
- Public Use Zone.
- Public Conservation and Resource Zone.
- Public Park and Recreation Zone.

5.5 Overlays

Overlays regulate the development of land but do not usually control the use of land which is managed under the zones (an exception is the Airport Environs Overlay). The key overlays relevant to coastal climate change include the:

- Environmental Significance Overlay.
- Vegetation Protection Overlay.
- Design and Development Overlay.
- Incorporated Plan Overlay.
- Development Plan Overlay.
- Erosion Management Overlay.
- Salinity Management Overlay.
- Rural Floodway Overlay.
- Land Subject to Inundation Overlay.
- Special Building Overlay.
- Public Acquisition Overlay.
- Road Closure Overlay.
- Restructure Overlay.

- Environmental Audit Overlay.

5.6 Particular Provisions

The VPP describes Particular Provisions merely as provisions that apply to the matters specified. The most relevant provision is Clause 52.17 - *Native Vegetation*. Permits are required to remove, destroy or lop native vegetation subject to limited exemptions and demonstration of compliance with the three step approach of avoid then minimise and if these cannot be satisfied to offset any vegetation loss to achieve a net gain in the quantity and quality of native vegetation.

5.7 General Provisions

Clause 61.02 – *What area is covered by this scheme?* Specifies the area covered by the planning scheme, which is usually the municipal district, however there is provision for an alternative area to be specified in the schedule to Clause 61.02. An example is the Colac Otway Shire where the planning scheme applies to the area of the “Colac Otway Shire municipal district and the area of the Apollo Bay harbour between the land and the breakwaters.

Clause 65 - *Decision Guidelines* and Clause 65.01 – *Approval of an application or plan* is relevant because it requires that before deciding on an application or approval of a plan, the responsible authority must consider, as appropriate certain matters. Of relevance to coastal climate change are:

- *The matters set out in Section 60 of the Act* (this relates to the impact of development on the environment but also the impact of the environment on development).
- *The State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.*
- *The purpose of the zone, overlay or other provision.*
- *Any matter required to be considered in the zone, overlay or other provision.*
- *The orderly planning of the area.*
- *The effect on the amenity of the area.*
- *The proximity of the land to any public land.*
- *Factors likely to cause or contribute to land degradation, salinity or reduce water quality.*
- *The extent and character of native vegetation and the likelihood of its destruction.*

- *Whether native vegetation is to be or can be protected, planted or allowed to regenerate.*
- *The degree of flood, erosion or fire hazard associated with the location of the land and the use, development or management of the land so as to minimise any such hazard.*

65.02 - *Approval of an application to subdivide land.*

Before deciding on an application to subdivide land, the responsible authority must also consider, as appropriate:

- *The suitability of the land for subdivision.*
- *The existing use and possible future development of the land and nearby land.*
- *The subdivision pattern having regard to the physical characteristics of the land including existing vegetation.*

Clause 66 relates to referrals and notice provisions. There is no provision for referral or notice required as a result of climate change or sea level rise.

5.8 Incorporated Documents and Reference Documents

Incorporated documents are formally included as a part of Planning Schemes and have legal status in the Scheme. Designation of an 'Incorporated' document requires Ministerial endorsement through a Planning Scheme amendment process. Clause 81 – *Documents Incorporated into this Scheme* lists the documents in the schedule to Clause 81.01 that are incorporated documents under Section 6(2)(j) of the *Planning and Environment Act 1987*.

Reference documents contain information relevant to parts of planning schemes and should be referred to by Councils and others when considering relevant planning matters. However they are not formally part of the planning scheme. For example, the State Native Vegetation Management Framework– A Framework for Action is 'incorporated' into all Victorian Planning Schemes while Regional Native Vegetation Management Plans are Reference documents.

State and local level strategy documents such as structure plans are often prepared on issues, and can be designated either as Incorporated or Reference documents. Local policies from either level of document can also be included into the LPPF of Planning Schemes.

5.9 Ministerial Directions

When deemed appropriate, the Minister for Planning issues directions to planning authorities on preparing and amending planning schemes. Under Section 12(2)(a) of the *Planning and Environment Act 1987*, Planning authorities must have regard to any Ministerial direction when preparing a planning scheme or an amendment to a planning scheme.

In relation to coastal climate change, the Minister has prepared Ministerial Direction No. 13 – *Managing Coastal Hazards and the Coastal Impacts of Climate Change*. The Direction sets out the requirements for consideration of the impacts of climate change within coastal Victoria as part of an amendment which would have the effect of allowing non-urban land to be used for an urban use and development. It applies to any planning scheme amendment that provides for the rezoning of non-urban land for urban use and development of all land abutting the coastline or a coastal reserve and is less than 5 metres Australian Height Datum within one kilometre of the coastline including the Gippsland Lakes.

5.10 General Practice and Advisory Notes

General and Planning Practice notes variously cover: specific applications of the VPP; more general information about a range of processes; preparation of planning scheme content and assessment under schemes; and, advice about specific subjects like new initiatives such as coastal hazards.

The General Practice Note - *Managing coastal hazards and the coastal impacts of climate change*, December 2008 was also released at the time of the VCS, 2008. This document is a general guide; it does not form part of the planning scheme, but is available to assist Councils and applicants in addressing coastal hazard matters with not only amendment proposals to a planning scheme, but also planning permit applications.

The Department of Sustainability and Environment also has produced on its website³⁰ an Advisory Note: *How to consider a sea level rise along the Victorian Coast*. Its purpose is to provide guidance for decision makers in using the sea level rise predictions in the VCS. The Advisory Note has no formal status under the VPP however, it states that:

Sea level rise should be taken into consideration in long term planning as part of national, state and local responses to adapting to climate change.

³⁰ <http://www.dse.vic.gov.au/> under coasts and marine and under Victorian Coastal Strategy 2008.

Principles that underpin the importance of sea level rise information for long term coastal planning include:

- The precautionary principle - where there is the potential for serious or irreversible threat to the environment, climate systems or ecological systems, the lack of absolute certainty about the precise quantum of sea level rise and other aspects of climate change science should not be used as a reason for postponing adaptation measures.*
- Informed decision making - in all decision making regarding coastal planning and in particular in making decisions concerning land use and development there is a need to consider all relevant information available at the time. The impacts and risks of climate change including sea level rise need to be taken into account to make informed decisions.*
- Reduction of uncertainty - there is a level of uncertainty in every decision making process. However, the consideration of all relevant information available to the decision maker at the time the decision is made allows for informed decision making.*

The Advisory Note describes how the 2008 VCS sea level rise policy of not less than 0.8 metres rise by 2100 should be considered. It outlines that decision makers may need to undertake coastal hazard vulnerability assessments and that these should be informed by data on sea level rise, storm surge, coastal processes, flooding and inundation, local geology, etc...

5.11 Recent Developments in Planning

5.11.1 VCAT Decisions

To date, climate change has been a consideration for VCAT in the context of development in low-lying coastal areas. Since Amendment VC52 and the release of the Victorian Coastal Strategy 2008, there have been a number of decisions made to refuse development approval or to require a coastal vulnerability assessment in respect of development assessed as being vulnerable to coastal hazard risk.

In *Ronchi v Wellington Shire Council [2009] VCAT 1206* the Tribunal refused a permit for two dwellings in the coastal township of Seaspray. Whilst the permit was refused on character grounds, the decision refers to the application of clause 15.08 of the State Planning Policy Framework and the need for any future permit application to be informed by assessment of the site's vulnerability to the impacts of river and coastal hazards. The Tribunal also drew attention to a gap which exists with respect to single dwellings that do not require a planning permit and may therefore avoid a coastal hazard

vulnerability assessment. A planning scheme amendment was required to address this gap.

Owen v Casey CC [2009] VCAT 1946 decided that a coastal hazard vulnerability assessment was required for a permit application for two dwellings. Consistent with the decisions of *Myers* and *Ronchi*, the Tribunal held that State policy makes it clear that the wider risks and consequences for the community require this matter to be addressed in permit applications and in decision-making. Even though the proposal was only for two dwellings, Melbourne Water had not objected to the permit application, and the obligations may seem onerous, it was not appropriate to avoid an assessment. The Tribunal specifically rejected the proposition put by the permit applicant that the purported economic life of the proposed units of 40-50 years gives a basis to depart from the direction being pursued by State policy.

The Tribunal in *Myers v South Gippsland Shire Council [2009] VCAT 1022* required a permit applicant to prepare a coastal hazard vulnerability assessment for a small two-lot subdivision in the township of Waratah Bay. The Tribunal found that the subdivision was appropriate except for the fact that the site was effectively within a primary dune area, separated only from the coastline by a single street. In these circumstances, the Tribunal had regard to the policies in the planning scheme and the *Victorian Coastal Strategy 2008* and concluded that the general practice note on 'Managing Coastal Hazards and the Coastal Impacts of Climate Change' applied directly to the subject proposal.

5.11.2 Planning Scheme Amendments and Panel Reports

Recent amendments to planning schemes in Gippsland and the respective Panel reports have highlighted the issue of the implications of sea level rise on coastal settlement planning.

East Gippsland Planning Scheme Amendment C68

The East Gippsland Shire prepared Amendment C68 which sought to implement Urban Design Frameworks for the coastal settlements in the Shire and apply Significant Landscape Overlays along the coast. As part of the consideration of the amendment by the Panel, the issue of sea level rise and its effects on settlement on the coast was identified.

The Panel generally concluded that climate induced sea level rise and coastal hazards needs to be taken into account. They recommended that:

- A permit requirement for development should be included within the Design and Development Overlay (DDO) covering the Shire's coastal settlements for land that is less than 0.8 (or 1.0) metre AHD;

- Exemption from the need for a permit exemptions should be considered for developments such as non-habitable buildings and works; and
- An application for permit should be accompanied with a vulnerability assessment and, as appropriate, the preparation of a 'Climate Change (Sea Level Rise) Response Plan' which must include:
 - *A description of the physical characteristics of the property and the anticipated changes to be brought about by coastal processes including their timing;*
 - *Actions proposed to address risks such as loss of communications and other infrastructure, water damage to buildings, risk of drowning, damage to buildings etc; and*
 - *An agreement to be made under section 173 of the Planning and Environment Act 1987 in which the owner(s) commit(s) to complying with the requirements of the approved Response Plan.*

The Panel also highlighted the appropriateness of a permit trigger to enable adequate consideration of sea level rise hazards and considered that:

....it may well be preferable for there to be a State permit trigger of this kind which would apply to all Victorian coastal land. We envisage that a permit requirement for the construction of buildings and works with exemptions for certain types of non-habitable buildings and works could be introduced, with application requirements and decision guidelines such as we have described above. We would see such a requirement as being introduced in all planning schemes in the Particular Provisions section at Clause 52. This would obviate the need for delineation of affected areas and changes to maps. We understand that options of this kind for inclusion in the VPPs will be considered by an advisory committee to the Minister in forthcoming months but it may be some time yet before preferred new tools are identified.

South Gippsland Planning Scheme Amendment C45

Similar to East Gippsland C68, South Gippsland Shire prepared Amendment C45 which sought to implement Urban Design Frameworks for the coastal settlements in the Shire and apply Significant Landscape Overlays along the coast. Again, the Panel, consistent with the approach taken by the East Gippsland C68 Panel, considered the implications of sea level rise on the coastal settlements involved in C45.

The South Gippsland C45 Panel noted the recommendation from the Panel on East Gippsland C68. But also noted that using a permit trigger of 0.8m AHD would not capture properties (and access to them) that are currently subject to inundation as the AHD level is based on mean sea level rather than extreme events, storm surge and the like. The Panel recognised that Ministerial

Direction No. 13 – Managing Coastal Hazards and the Coastal Impacts of Climate Change provided some guidance on the issue of when coastal hazard assessments should be required. It was considered by the C45 Panel that:

As all of the settlements being considered are within 1 kilometre of the coast, it would suffice to relate the permit requirement under ESO7 to the 5m AHD level. The inclusion of this requirement would not be dependant on mapping/modelling currently underway as it would fall to applicants for permits to establish the height of the land above sea level. More sophisticated information would inform this process as it becomes available and may justify additional refinement of the Planning Scheme mechanisms.

We emphasise that the proposed permit trigger should not be interpreted as indicating that a property is necessarily vulnerable to coastal hazards. Rather, it provides a mechanism to ensure the issue is considered and, where a significant risk is identified, to enable appropriate responses to that risk.

Accordingly, the C45 Panel recommended that the ESO planning tool be modified (as a part from the DDO as recommended by the Panel on East Gippsland C68) to introduce application requirements to:

....provide a vulnerability assessment and, as appropriate, the preparation a 'Climate Change (Sea Level Rise) Response Plan' where the land is within a coastal reserve, adjoins the coast or is less than 5m Australian Height Datum (within 1 kilometre of the coast). Non-habitable buildings should be exempt from this interim requirement. The assessment and plan should include (as relevant):

- A description of the physical characteristics of the property and the anticipated changes to be brought about by coastal processes including their timing;*
- Actions proposed to address risks such as loss of communications and other infrastructure, water damage to buildings, risk of drowning, damage to buildings etc; and*
- An agreement to be made under section 173 of the Planning and Environment Act 1987 in which the owner(s) commit(s) to complying with the requirements of the approved Response Plan.*

Wellington Planning Scheme Amendment C50

Wellington Shire recently sought to implement Urban Design Frameworks for a number of settlements along its coast through a Planning Scheme Amendment³¹. While the amendment was about, among other things, establishing settlement boundaries and amending zones and overlays the Panel

³¹ Wellington Planning Scheme Amendment C50, Panel Report (November 2009)

considering this amendment expressed its concern about the vulnerability of some of the settlements to sea level rise, storm surge and tidal inundation. The Panel said that:

(It) considers while the amendment was not intended to provide a detailed planning response to climate change, the information available to both the Council and the Panel on the potential vulnerability to climate change impacts of townships along the Wellington Shire coast is too far reaching to ignore in this amendment.

It further judged that some of the low lying settlements are already vulnerable to inundation and that because of this existing vulnerability action could not wait for further assessments or the development of new planning tools. Immediate action was warranted and, as pointed out by the Panel, Clause 15.08 requires that a sea level rise of 'at least 0.8m' by 2100 be considered.

Prior to the Panel Hearing Wellington Shire had already required one property owner in the Honeysuckles, who applied for a permit to develop his property, to have Climate Change Response Plan (CCRP) which would be attached to the property title through a Section 173 Agreement. The CCRP sets in place responses by the owner to certain events, such as erosion of the dunes, and will apply to the current as well as future owners of the property.

The Panel considered the merits of using CCRPs in planning decision making and highlighted a number of problems in using them. However on balance it concluded that CCRPs are *a worthwhile interim tool in the planning toolbox, alert property owners and developers of the risk of building on low- lying land and ensure these risks are considered as required in clause 15.08 of the SPPF.*

In its recommendations the Panel proposed that for settlements highly vulnerable to coastal hazards such as Loch Sport and McLoughlins Beach, Wellington Shire amend its planning scheme to address this vulnerability using a mix of planning tools. These include:

- Amending Settlement strategies to allow for consistency with any relevant coastal vulnerability assessment for the settlement.
- Either amending various Design and Development Overlays to include clauses that requires that *siting and design of development takes into account recognised coastal hazards'*; and a requirement for a permit *where the building or works are proposed is 0.8m AHD or greater* which requires a *coastal vulnerability assessment and possibly a CCRP (be) incorporated on title in the form of a Section 173 agreement.* Or as an alternative to amending the DDO requirements, the Shire could request that LSIOs or ESOs be applied, as appropriate, as an interim control, *to produce provisions with the same intent; that is to communicate risk; and to allow for the assessment of hazard and possible response in any development.*

5.11.3 Point Lonsdale – Stockland Development

The property developer, Stockland, applied to the City of Greater Geelong to develop a diverse mixed use residential subdivision at Point Lonsdale on a 194.6 hectares of land, of which 81.5 hectares is zoned Residential 1. The site is less than one kilometre from Point Lonsdale Bay. The site also connected to a small man-made tidal inlet off Swan Bay, which is part of a Ramsar site, and is hydraulically connected via a series of artificial channels and culverts to Lake Victoria. The proposal was subject to an EES.

At the EES Directions Hearings the Panel directed that the proponent provide “clear evidence and supporting material to demonstrate the efficacy of your position on the issues of climate change ...”.

In view of this, Stockland, commissioned Golder Associates to undertake the analysis. The Supplementary Report: *Effects of Climate Change on Water Level in Lake Victoria, Site Lakes & Lakers Cutting*, (2 June 2008), was provided to the Panel prior to the hearing.

This report presents modelling results for potential sea level rise under the standard Intergovernmental Panel on Climate Change (IPCC) scenario groups which are best, intermediate and worst case scenarios based on future greenhouse gas emissions for the rest of this century. Golder modelled the implications of sea level rise up to 0.8 metres by 2100, superimposed with a climate change impacted coincident tidal storm surge and overland flooding caused by heavy rain.

Golder used the highly accessible climate change calculator available online through the CSIRO website, OzClim, as the basic tool for the assessment and coupled this with other site specific modelling. As Golder noted there is as yet no standardised modelling approach to undertake this type of assessment.

Some other features of the modelling include:

- Rainfall –run off characteristics based on site topography.
- The use of Western Channel Pile data from the 100 year storm surge (i.e. a combination of high tide, low pressure and wind) that occurred in 1934 to model the effects of a storm surge on the Lake Victoria catchment. During this 20 hour storm, the tides reached a peak of 1.41m AHD. Golder coupled this with a possible 0.8 metre sea level rise to simulate a worst case scenario.
- The size of the tidal channel inlet culverts were not changed as it was assumed that by 2100 the major roads (the Bellarine Highway, Fellows Road and Shell Road) would all be raised so that they are not overtopped by the rising sea water.

- As much of the site is at or below 0.5m AHD, Golder also modelled groundwater depths under a range of sea level rise scenarios using rainfall and evaporation for a historically dry year and for a historically wet year.

The modelling predicted that if there is a 0.8m sea level rise, a significant area of the present Point Lonsdale township would be inundated and the site's western conservation area is likely to be inundated but the residential area would not. The modelling also predicted some increase in mean groundwater levels in the coastal plain around the area of Lake Victoria and Lakers Cutting, but within the proposed residential area the groundwater level stays around the same due to the changes in the run off characteristics of the catchment.

In consideration of the modelling for sea level rise coupled with high tides and storm surge plus the maximum sea level rise of 0.8 metres by which was proposed in the Draft 2007 Victorian Coastal Strategy, the Panel recommended a minimum floor height for dwellings of 2.35 metres AHD.

6. Results of Initial Consultations

6.1 Consultations

Initial consultations were held with the organisations listed in the terms of reference and some other relevant bodies identified by the Committee (see Appendix B).

6.2 Summary of Issues Raised

The major issues raised in the consultations included:

- The need for a whole of government / whole of community approach to adaptation to coastal climate change, since the impacts go well beyond those that can be addressed through the planning system;
- Major concerns about the vulnerability of existing settlements, many of which are already subject to other environmental hazards; how to identify the areas at risk and the likely scale and timing of impacts; how to handle current or foreshadowed proposals for intensification of development in these areas; and how to identify the best adaptation strategy for each area or settlement;
- The need to better understand the interaction between catchment-based flooding and sea level rise and other climatic changes;
- The need to identify a source of advice to Councils regarding risks of coastal erosion;
- The need for better integration between planning for natural resource management and planning under the Planning and Environment Act, to protect biodiversity and provide opportunities for ecosystems to adapt to change;
- The need to integrate risk management approaches, particularly for essential infrastructure, with planning responses;
- Concerns over the potential loss of beaches and other coastal Crown land, with consequent impacts on public access, amenity and environmental values;
- Technical issues, such as whether planning for a combination of all potential hazards might lead to 'over adaptation';
- Concerns over perceived inconsistencies in some of the advice and documentation concerning application of the sea level rise planning benchmark in the Victorian Coastal Strategy (VCS); and

- The need to recognise that climate change may alter other planning parameters, such as land use, water availability and bushfire risk.

6.2.1 Whole of Government / Whole of Community Approach

There was a clear consensus that there is a need for Commonwealth and particularly State Government leadership in responding to the challenges of coastal climate change.

There was also strong support for the idea of co-operative regional approaches between government agencies, regional bodies and local government to identify areas at risk and to develop adaptation strategies which included standardised approaches to risk assessment.

However, it was stressed that co-ordinated adaptation frameworks at the State and regional level must provide within them scope and encouragement for communities to develop detailed localised responses, appropriate to their particular circumstances.

The need for community education on coastal climate change impacts to build resilience and encourage personal responsibility in decision making by landowners with coastal property was a key message.

6.2.2 Planning for Vulnerable Settlements and Activity Centres

Many developed urban areas are vulnerable to the impacts of coastal climate change. These include residential, commercial and industrial areas in metropolitan Melbourne and regional cities and towns and, in a few cases, whole townships.

Of particular concern to planning authorities is the conflict between the emerging picture of the vulnerability of these centres to climate change effects and the policy framework in *Melbourne 2030* and similar strategies for non-metropolitan activity centres, which advocate intensifying development within and around centres. The VCS also seeks to concentrate urban development on the coast within existing development nodes. However there was also a tacit belief that Melbourne bayside suburbs would be protected from impacts through engineering measures.

Future Coasts is developing a 'second pass' vulnerability assessment, which will identify in broad terms those areas of the Victorian coast likely to be at risk. The program will also involve a number of detailed studies ('third pass' assessments) looking at the interaction of particular risk factors in highly susceptible locations, and exploring potential responses. Coastal Councils are eagerly awaiting the results of the Future Coasts project's vulnerability assessment.

Some less intensively developed areas, such as the 'old and inappropriate subdivisions' on the Ninety Mile Beach, also present challenges arising from conflicts between previously established policy and the considerations of future climate change. Some owners have been working for years towards the lot consolidations identified in restructure plans, only to be told that it is now unlikely that they will be able to develop their land, due to vulnerability to coastal erosion and / or sea level rise.

6.2.3 Interaction Between Ocean and Catchments

Many participants in the consultations, particularly in regional areas, raised the issue of the need for a better integration of planning for catchment-based flooding and inundation from the ocean.

Particular issues included:

- Coastal climate change should be managed by Government and not left to market forces such as banks and insurers or other triggers such as decisions on vital infrastructure to determine.
- Leadership is required, as well as identification of which body is responsible for consistent referral advice concerning ocean-based inundation that may result from sea level rise and storm surge. The Growth Areas Authority approach to co-ordinated planning for new urban areas was viewed as a possible model for effective integrated management.
- Concern about how to apply the VCS requirement of planning for 'not less than 0.8 metres of sea level rise by 2100' to decisions regarding current and future planning applications.

6.2.4 Coastal Erosion

Various participants, particularly from Councils, spoke about the lack of skills in their areas or agencies to assess hazards to development from accelerated coastal erosion (including undermining of cliffs, leading to landslips). A related concern was the absence of a body with clear referral responsibilities in this area. There is no accredited course in Australia for coastal engineering, although upskilling of civil and environmental engineers in this area could be achieved in a relatively short timeframe.

6.2.5 Integration of Land Use and Environmental Planning

Participants in the consultations pointed to the importance of coastal intertidal areas and wetlands as habitats and refuges under a climate change regime.

Planning should attempt to minimise the impediments to 'spontaneous adaptation' of ecosystems, for example, saltmarshes or mangroves that might be able to move inland as water levels rise, provided there are no barriers such

as development, road embankments or levee banks/bunds. Seawalls can be engineered to support migration and adaptation.

Many wetlands are already on freehold land and other areas where adaptation may occur are also in private ownership. Integration of planning scheme provisions and planning for natural resource management will be required to achieve successful outcomes.

Similar comments were made about the co-ordination required to implement the Government's decision to establish 'biolinks' in priority areas, to provide landscape scale movement corridors for fauna and flora.

6.2.6 Risk Management and Life-cycle Assessment

Various infrastructure agencies spoke of work they are carrying out to assess the vulnerability of their networks and facilities to climate change. These studies include life-cycle assessments for individual assets, including water supply and sewerage systems, pipes and wires, ports and harbours, roads and drainage.

The results of these studies need to be incorporated into planning for the future of urban development in hazard areas. If assets are reaching the end of their design life, or are predicted to no longer be able to operate effectively once a certain stage of sea level rise (for example) has been reached, these considerations could act as triggers for planned retreat or relocation of vulnerable parts of settlements.

Participants considered that there is a need to develop criteria to determine priorities for coastal protection works in the short, medium and long terms. These might include concentrations of high assets values and high population density. Although off-site impacts should be avoided where possible, there may need to be tradeoffs with some environmental values to achieve net community benefit.

6.2.7 Coastal Crown Land

The considerable value of permanently-reserved coastal Crown land as a community and environmental asset to Victoria was identified by many people in the consultations. However, most recognised that it may not be possible to retain / regain a continuous strip of reserve. There will be a need to prioritise areas for public acquisition, using criteria such as providing for public access and recreation uses, enhancing the viability of public infrastructure, and protecting environmental values.

There was a call from local government for the State Government to clarify what it is going to do to protect its asset – coastal Crown land – in order to prevent the ocean or other waterways from encroaching on private land behind.

While it was generally felt that the Coastal Management Act would be effective in assessing proposals for protection structures on coastal Crown land, there were differing views about how – or even whether - such activities should be controlled on private land adjoining coastal reserves.

6.2.8 Uncertainties About the Rate of Change and Combinations of Events

Various issues were raised about scientific or technical uncertainties that make the task of planning more difficult. These include:

- Uncertainty about the rate of sea level rise. Will it be incremental (ie. rising at a relatively predictable amount per year) or will we experience ‘step change’ where sea levels rise substantially as a result of a particular event and then this becomes the new base level?
- The difficulties of knitting together models for catchment flooding and seaward inundation, to identify how far up the catchment any new controls on floor-levels, etc... should be extended.
- Uncertainties about rates of coastal erosion and where the sediments might go.
- Whether it is reasonable to plan for a combination of sea level rise, king tides, predicted maximum storm surges and catchment-based flooding in a single event, or whether this is likely to lead to ‘over adaptation’.

6.2.9 Inconsistencies in Planning Advice and Documentation

Concerns were expressed over perceived inconsistencies between Minister’s Direction No. 13 – *Managing Coastal Hazards and the Coastal Impacts of Climate Change* – and its accompanying General Practice Note (PPN) *Managing coastal hazards and the coastal impacts of climate change*.

The Minister’s Direction refers to the need for coastal hazard assessments to be carried out when it is proposed to rezone potentially vulnerable land, whereas the PPN extends this consideration to subdivision and development.

The Victorian Civil and Administrative Tribunal (VCAT), in several recent cases – discussed in Section 5.11.1 above – has confirmed that the requirement for a coastal hazard vulnerability assessment (CHVA) applies to permit applications for development of individual lots and for subdivisions that create new lots.

It was generally felt that the present system is both inequitable and inefficient. Planning schemes do not trigger permits for all development in vulnerable

areas; however, those happen do require a permit and will also have to prepare a CHVA.

Site specific CHVAs are costly, appropriate information on which to base them is not available in many areas, and assessments on adjoining sites can contradict each other. Small scale new development may be refused, while the issue of the vulnerability of the rest of the existing settlement is not addressed. There is also an issue about the lack of skills of Council staff in assessing CHVAs that are presented to them.

There was widespread support for the view that ideally vulnerability assessments should be done on a settlement basis and through a co-operative approach by State / regional agencies and Councils, with major funding provided by the State.

6.2.10 Issues Related to Planning Tools

A number of specific issues related to planning tools were raised:

- Existing planning tools such as the Land Subject to Inundation (LSIO) are not designed for coastal or tidal inundation;
- The VPP does not contain a specific planning tool to address coastal climate change hazards and there is a reluctance to modify an existing tool to address an issue for which it has not been specifically designed;
- Need to consider integrated coastal zone management through strategic planning, using a process such as that used for preparation of Green Wedge Management Plans, which can address both development and environmental assets i.e. wetland migration;
- Need for clear zoning such as the newly proposed 'no go' residential zone in conjunction with the use of an overlay. There is danger in conflicting aims if the underlying zone promotes development and a 'coastal hazard overlay' (or similar provision), which seeks the opposite outcome, is applied;
- Consideration should be given to extending planning schemes beyond the low water mark to address coastal processes influencing impacts on the foreshore;
- Consider the opportunity for transferable development rights potentially through the use of Particular Provisions and Section 173 Agreements, which may be particularly beneficial for wetland enhancement;
- The introduction of any new planning tools may be useless without an appropriate strategic context, e.g. a policy of avoiding development in low lying areas may only create conflict in urban areas that are already vulnerable, unless it is accompanied by a staged adaptation plan;
- Need for any 'coastal inundation overlay' to be capable of differentiating between various levels (or sensitivity) of risk such as high and low risk of

inundation and the duration of the event (e.g. short term or semi-permanent);

- Any planning tool must incorporate a referral mechanism to a body such as the Department of Sustainability and Environment (DSE) to support Councils with expert advice to assist assessment; and
- There may be a need to review the provision of existing use rights under Clause 63 of VPP to overcome issues of existing development at risk from coastal hazards.

6.2.11 Other Climate Change Issues

Climate change issues that are not coastal specific may also impact on planning for coastal areas. These include: reduced water availability for urban development in some areas; heightened risk of bushfires; and land use changes such as conversion from grazing to arable uses or from dairying to horticulture, with impacts on biodiversity conservation and water quality.

6.3 Climate change – Policy Responses Sought by Agencies

The major policy responses sought are:

- State government leadership and a whole of government approach. There is a need to face up to some difficult planning issues, such as requirements for backzoning and compensation for loss of development rights;
- Consistency of approach and direction, clarity and reduced complexity. Regulation should be minimised, but certainty is more important;
- Clear State and regional adaptation strategies are needed, based on the Future Coasts mapping and studies, with room for local initiatives within the overall framework;
- Resources should be provided to enable vulnerability to be assessed at a settlement level, rather than requiring site-specific assessment. This should be followed by development of a clear statement of what is intended for each settlement, and a strategy to achieve it;
- The information base (sea level rise, flooding, inundation, erosion, saline groundwater) needs to be overseen by the state and updated regularly;
- Local government, referral agencies and the coastal engineering profession in general need skills development and training to implement any new provisions;
- Biodiversity planning should be carried out in conjunction with planning for other land uses;
- Building controls should be developed to incorporate adaptation measures;
- Community education is critical to improving understanding and building resilience; and

- In the short term, resolution of the inconsistencies between Ministerial Direction No 13 and the PPN need to be resolved. Permit triggers should be provided for development of a reasonable scale to need a CHVA and minor developments (such as marginal increases in number of dwellings at risk) should be exempted.

6.4 Suggestions Re: Planning Approaches

Various Councils and other agencies made suggestions about potential uses of VPP tools to address issues of climate change. Proposals for complementary measures under other legislation were also put forward.

These are discussed in Chapter 12 onwards.

7. Legal and Property Issues

7.1 Legal Issues

7.1.1 Coastal Accretion and Erosion

The Victorian Planning and Environmental Law Association (VPELA) report warns that while action is already being taken from a planning perspective to restrict future coastal development that may be at risk from coastal inundation, property owners must also be aware that when sea water encroaches onto dry land, this can have significant impacts on existing title boundaries under the common law doctrine of diluvion.

VPELA set out that under the common law doctrines of accretion and diluvion, land adjoining the sea can be increased or reduced in size:

...if the boundary between the land and water is modified gradually through a 'slow and imperceptible' process that is not visibly apparent.

Under the doctrine of accretion, the boundary of land abutting the sea can be extended through 'alluvion' which is the:

...gradual increase of land as a result of the imperceptible addition of soil or retreat of water.

Land gained through the gradual alluvion of the sea belongs to the owner of the adjoining land, whether that land is privately owned or owned by the Crown. Conversely, under the doctrine of diluvion, the boundary of land abutting the sea can be diminished as a result of erosion and the gradual encroachment of the sea. Citing the case of *EPA v Leaghur Holdings Pty Ltd* (1995), VPELA suggest that land that has been encroached upon by water ceases to belong to the former owner and will be owned by the Crown instead.

7.1.2 Liability: Planning Decision-Making

Potential Liability for Local Councils

In their roles as planners, public authorities and asset managers, local governments have a responsibility to consider the impacts of climate change. A failure to consider the risks of climate change may lead to all manner of legal risks. VPELA commented that it is critical that local government is aware of climate change issues and responds effectively:

...in a manner which mitigates and where possible avoids these legal risks.

Given the rapid developments in this area of law, it is impossible to predict the extent and scope of future legal liability for the effects of climate change. However, VPELA predicts that the most likely causes of action against local government will be nuisance and negligence.

To establish nuisance it is necessary that there is material damage or injury resulting from unlawful interference with a person's land, and that the risk of this occurring was foreseeable. The example VPELA use in relation to negligence is where a residential property has been damaged by storm surges/floodwater. In this example, the council could be accused of failing to provide adequate infrastructure such as drainage systems given the foreseeable risks of rising sea levels and severe storms as a result of climate change.

Decision-makers may also face negligence actions. To establish negligence, a claimant must establish that a duty of care was owed to them (e.g. by a council) and that the council breached that duty of care and the breach caused loss and damage. VPELA believe that this element will become increasingly easier to establish given that there is now growing international scientific and political acceptance of the impacts of climate change and their risks to communities.

However, VPELA also made the observation that there are defences which can be raised by councils where they have been accused of a breach of their statutory duties. For instance, a council can argue that they have acted 'reasonably'. VPELA cited Section 84(2) of the *Wrongs Act 1958* (Vic) as an example. This Act provides that an act or omission by a public authority will not constitute a breach of a statutory duty unless the circumstances are:

...so unreasonable that no public authority having the functions of the authority in question could properly consider the act or omission to be a reasonable exercise of its functions.

Liability and Insurance Issues

The advice from VPELA establishes that insurance has historically played a key role in managing the risks of weather related damage. The rapid and unpredictable nature of climate change certainly poses challenges for insurers, as a less predictable climate makes it much more difficult to assess risk. The 'rapidly evolving and wide-ranging' impacts of climate change have also meant that there are natural events for which no insurance coverage currently exists, including sea level rise. There is also no coverage available to protect against decreases in land values for coastal properties. As VPELA suggest, the land value of a coastal property often far exceeds the value of any attached dwelling. However, while the dwelling is often insured, the land value is not. Indeed, many 'extreme weather' events are specifically excluded from insurance policies, including storm surges, landslips and sea level rise.

The Committee expects that there will no doubt be significant policy development in this area in the near future and notes the Commonwealth Government report entitled *Managing our Coastal Zone in a Changing Climate* report (released in October 2009) recommendation that the Productivity Commission undertake an inquiry into the projected impacts of climate change and related insurance matters.

7.1.3 Property Titles: Use of Agreements

Section 173 agreements are an agreement between a responsible authority and an owner of land. The VPELA advice states that some councils favour a requirement for Section 173 agreements within an LSIO area to both:

...provide further notice of the flooding risk and to regulate development of the land in the future.

Some councils are also making reference to coastal hazard vulnerability assessments in Section 173 agreements to pick up both notification of the assessments and enforcement of any ongoing requirements of the assessments. While they acknowledge the usefulness of Section 173 agreements in ensuring that all parties both present and future know about the 'carbon compromised' nature of the land, VPELA make the comment that there may be arguments that in using such agreements councils may be in breach of their statutory duty to refuse a development rather than allow one that is implicitly carbon compromised.

7.2 Property Values

At present, it is difficult to predict the effect climate change will have on property values. The effects, of particular types or particular locations, could be marked and sudden, or virtually unnoticeable and slow. It is interesting to note that despite the attention climate change is now receiving, that property prices in many coastal areas remain at record highs.

What people think may happen has the potential to drive changes in property values as much as what has actually happened to date. For example, a significant flood event in a region may heighten people's concerns about the impact of climate change in that area and affect property values accordingly.

8. Adequacy of the Victoria Planning Provisions

8.1 Objectives for the Victorian Planning System in Responding to Coastal Climate Change

As a result of the preliminary consultations outlined in Chapter 6, the Committee's terms of reference and our consideration of current policies and advice on coastal climate change, the Committee has identified objectives for an effective adaptation response through the planning system.

The following discussion assumes that preliminary studies have identified areas likely to be at risk from the following factors or a combination of them: sea level rise; storm surge; estuarine (catchment based) flooding; overland flows in storm events; backup of floodwaters through reticulated systems; saline intrusion into water tables and freshwater wetlands; beach and cliff erosion; severance of access; and coastal subsidence.

The VPP and planning schemes should provide tools to:

- Implement the Victorian Government's requirement – expressed in the 2008 VCS – of planning for sea level rise of not less than 0.8 metres by 2100, while recognising that the rate of sea level rise may change over time and that seas will continue rising well after the end of the century;
- Provide a clear strategic framework within which planning and responsible authorities can apply appropriate VPP tools to address climate change issues in their areas of responsibility;
- Achieve a permit and decision making regime that is clear and consistent, increases certainty, reduces duplication and avoids unnecessary permit applications, but still retains the flexibility to respond to changing conditions;
- Protect natural systems – terrestrial, estuarine & marine – and give them room to adapt;
- Retain important biodiversity features in the landscape and increase connectivity between them;
- Sustain the social and economic values of the coast, including public access for recreation and tourism;
- Designate new foreshore or lakeshore reserves to replace those lost to erosion / inundation;
- Direct new investment / development to areas identified as less vulnerable and ensure appropriate set-backs from the coast;
- Manage rural / non-urban areas identified as potentially at risk;

- Manage existing urban areas identified as vulnerable, by:
 - Allowing settlements to operate effectively and safely for as long as possible;
 - Matching the nature and intensity of new development / redevelopment to the degree of risk and likely timing of impacts;
 - Implementing appropriate short - to medium term strategies that protect existing development or accommodate existing development to climate change effects (e.g. building standards, floor heights, infrastructure improvements);
 - Developing and implementing longer term adaptation strategies to relocate development/uses from areas that will not be sustainable.
- Contribute to integrated coastal zone planning and management.

VPP tools should be accompanied by appropriate guidance to allow planning authorities to implement them in a manner that is economically efficient, equitable and environmentally sustainable.

8.2 Current Strategic Framework

8.2.1 State Planning Policy Framework

Chapter 5 has set out the current strategic and policy framework. In particular, it highlights the provisions of clause 15.08 of the SPPF, which encapsulates State policy on managing coastal hazards and the coastal impacts of climate change. The key section reads:

Managing coastal hazards and the coastal impacts of climate change

Planning to manage coastal hazards and the coastal impacts of climate change should:

- *Plan for sea level rise of not less than 0.8 metres by 2100, and allow for the combined effects of tides, storm surges, coastal processes and local conditions such as topography and geology when assessing risks and coastal impacts associated with climate change.*
- *Apply the precautionary principle to planning and management decision-making when considering the risks associated with climate change.*
- *Ensure that new development is located and designed to take account of the impacts of climate change on coastal hazards such as the combined effects of storm tides, river flooding, coastal erosion and sand drift.*
- *Ensure that land subject to coastal hazards are identified and appropriately managed to ensure that future development is not at risk.*

- *Avoid development in identified coastal hazard areas susceptible to inundation (both river and coastal), erosion, landslip/landslide, acid sulfate soils, wildfire and geotechnical risk.*

Clause 15.08 of the SPPF is supported by a Minister's Direction (No. 13) that sets out the requirements for consideration of the effects of climate change within coastal Victoria as part of an amendment which would allow non-urban land to be used for urban use and development.

The accompanying General Planning Practice Note (PPN) provides more detail on how to carry out a coastal hazard vulnerability assessment (CHVA) and the circumstances where an assessment should be required. There is also an Advisory Note – prepared by DSE – that provides guidance to relevant decision makers on how to consider and use the sea level rise predictions in the VCS.

The proposed 'policy neutral' restructure of the SPPF retains the policy provisions of Clause 15.08 but reallocates matters dealing with coastal settlement to the 'Settlement' chapter, those applying to protection of coastal areas to the 'Environmental Values' chapter, and the section on coastal hazards and climate change to a new chapter on 'Environmental Risk' (where it is renamed Coastal Inundation and Erosion).

As noted by the Committee at the end of Section 5.2, under the Policy Guidelines in the section on Coastal Inundation and Erosion in the restructured SPPF, as well as to referring to the strategic documents currently listed in Clause 15.08, a new dot point has been added:

- *Future Coasts: Coastal climate change vulnerability mapping (DSE)*

The Committee considers that, overall, with respect to sea level rise hazards the SPPF – both current and proposed – establishes the key principles, sets out a strategic approach to coastal climate change issues and provides clear directions concerning planning for new development. However, it is less helpful in assisting planning and responsible authorities to deal with decisions about appropriate adaptation responses to coastal hazards of existing settlements which are already at risk, or are likely to be so in the future.

The discussions undertaken as part of our initial round of consultations also revealed considerable disquiet on the part of responsible authorities (and others) about the PPN provision that broadens the level of consideration from rezoning matters to considerations of coastal hazards to individual planning permit applications and extends the need for a CHVA to decisions about subdivision or development of individual lots in established urban areas.

The Committee acknowledges the view that coastal hazard vulnerability assessments should ideally be carried out at the settlement level. To apply

them to development of individual lots (usually because a permit trigger exists in an overlay – which may or may not be related to coastal climate change or environmental issues) or to two lot subdivisions is both inefficient and inequitable. Undertaking such site specific vulnerability assessments, in the absence of mechanisms to deal with vulnerability at a broader, more strategic basis particularly for larger urban areas reflects an approach that may merely address symptoms of a problem in a fragmented manner.

In this regard, the Committee is interested in receiving submissions on how such regional or strategic vulnerability assessment could be undertaken and how their outcomes should best be incorporated into the planning scheme framework.

As noted in the summary of feedback from consultations (in Chapter 6), current policy – both in the SPPF and the VCS – supports consolidation of development in established urban areas, concentration of commercial development in activity centres and intensification of housing provision around them. The boundaries of some of these areas will need review in the light of their vulnerability to coastal climate change impacts.

8.2.2 Local Planning Policy Frameworks

As noted in Section 5.3 not all planning schemes covering coastal areas of Victoria contain references to climate change or sea level rise in their MSS and many of these do not carry through the treatment of these issues by applying appropriate zones or overlays to address the likely effects.

As described in Section 5.3 Bass Coast Shire has several objectives and strategies in its MSS that deal with climate change. They encompass references under Settlements, including a proposal to prepare a strategy to deal with the possible impacts of climate change for developments located within existing urban boundaries, as well as strategies to ensure that new development is set back from the coast. There are also relevant objectives and strategies under Environmental Hazards, concerning coastal erosion. In addition the MSS policy under Clause 21-07-4 (which was approved in 2009 as a result of Amendment C85) specifically addresses coastal climate change (refer to Section 5.3 for the quoted provisions).

This policy has not yet been followed through with the revision of relevant zones and overlays, although it will help to provide guidance on decisions under several existing overlays, including the ESO (particularly Schedules 1, which refers to Coastal Wetland Areas, and Schedule 3, Significant Flora and Fauna Habitats).

Several coastal planning schemes refer in overlay schedules to the need to assess the likely impacts of coastal climate change. Most of these were introduced as part of relatively recent site-specific amendments, but are not linked to any policy provisions in the LPPF. An exception is Glenelg, which has a local policy on coastal areas in the LPPF that deals (amongst other things) with sea level rise and coastal processes; this policy provides guidance on decisions under an Environmental Significance Overlay.

Coastal erosion is mentioned in a number of MSS, but again, only a few apply an overlay to manage its impacts. Flood risk – from catchment based flooding – is dealt with more frequently in the LPPF of planning schemes and the appropriate overlays are utilised more widely, although there are still significant gaps.

It would be desirable for all MSSs in coastal areas to include an outline of the specific nature of the hazards that may apply as a result of coastal climate change in the relevant area and a strategic response in terms of priorities for development of adaptation plans. Once detailed vulnerability assessments have been carried out these policies and strategies should be carried through into the application of appropriate zones and overlays.

8.3 Planning Tools Available in the VPP

8.3.1 Zones & Overlays

Chapter 5 summarises the existing zones and overlays that are likely to be most relevant to planning for coastal climate change.

8.3.2 Zones

Zones describe the type of land uses that will be encouraged in particular areas and establish permit requirements for both land use and development (comprising the construction of buildings and the undertaking of works such as earthworks etc...).

A wide range of land use and development situations will need to be managed to adapt effectively to coastal climate change. These range from dealing with relatively minor proposals for new land use and developments in rural or largely natural areas, through to proposals for intensification of land use or conversion of land from rural to urban, to new development – incremental or large scale – in relatively densely settled urban centres.

The application of zones under a planning scheme requires clear strategic direction. Consequently, the Committee considers that how zones have been applied along the coast given the issue of climate change impacts requires

review. There is a need to review existing zonings in vulnerable areas, to ensure that they do not imply that intensification of development will be encouraged. For example, in urban areas subject to medium or high risk of impacts from coastal climate change, application of the Residential 2 Zone (which encourages medium density residential development) would clearly be inappropriate, unless a high degree of confidence exists that structural measures will be implemented to protect these areas. Even Residential 1 and commercial and industrial zones may need to be reconsidered in areas vulnerable in the medium term. In non-urban areas, the Rural Living or Rural Activity zones should not be applied to areas at risk from sea level rise, inundation or erosion.

The statements of purpose of two VPP zones make explicit reference to their use to address issues relevant to coastal climate change:

- The Rural Conservation Zone (Clause 35.06), according to a DSE document on *Planning Provisions for Melbourne's Green Wedges* (2003) 'could be applied to rural areas degraded by environmental factors such as salinity or erosion'. In the climate change context, the zone could be used for areas where it is desirable to minimise future development in order to allow natural processes to operate freely, without pressure for protection of assets.

The Rural Conservation Zone also contains a schedule provision, which can be used to specify the circumstances in which a permit is required for:

- Earthworks which change the rate of flow or the discharge point of water across a property boundary.
- Earthworks which increase the discharge of saline groundwater.

These provisions, which also exist in the Farming Zone, could potentially be used to ensure that actions by individual landholders to protect their properties from the effects of climate change – for example by building sea walls or other structures – do not have adverse effects on adjoining land or coastal ecosystems.

- The Urban Floodway Zone (37.03) is also of obvious relevance. The Manual for the Victorian Planning Provisions (DSE, undated) says that:

It should be applied to urban land identified as part of the active floodway or high hazard areas where high flow velocities are known to occur and where impediments are likely to cause significant changes in flood flows, potentially causing flooding in other areas.

This zone has not been applied widely, partly because the zone is restrictive on land use and development of a habitable form and partly because mapping – especially outside the metropolitan area – was not sufficiently accurate to distinguish between levels of risk in flood-prone areas. This mapping problem has now been overcome in most regions. The UFZ could also be used to identify land most at risk of ocean based flooding, especially

from storm surge, but its objectives and decision guidelines would need to be modified for this purpose.

Other zones which could be relevant include the Comprehensive Development Zone (CDZ), which is designed to allow more complex developments in accordance with a comprehensive development plan (which is incorporated in the scheme).

The City of Kingston has used a schedule to this zone to apply requirements for evaluation of the potential effects of sea level rise on development proposals in the relevant area:

- Kingston Planning Scheme. Clause 37.03 – Comprehensive Development Zone, Schedule 1 – Endeavour Cove Comprehensive Development Plan 1999. The schedule includes a decision guideline that provides that, before deciding whether the development plan is satisfactory, the responsible authority must consider:
 - *The effects of future sea level rises, based on a projected sea level rise of 30cm to 2040.*

It has been suggested to the Committee that the CDZ could be used to provide a means of implementing an integrated coastal hazard response plan – or adaptation plan – for vulnerable coastal settlements. The Committee sees an inherent conflict between the presumption of support for intensification of development that is inherent in this zone and its use to manage adaptation strategies that may involve disinvestment in some areas or even staged retreat. However, the structure of the zone could form a model for a new zone to achieve this purpose.

The potential use of the CDZ structure as a model for a new zone to address the effects of sea level rise on coasts and estuaries is founded on the opportunity to use a schedule which can be specific to the needs of particular geographical locations. Would this structure offer benefits in terms of flexibility over the development and use a more standardised zone?

The Committee would appreciate comments on whether the development of any new zone modelled on the structure of the CDZ to address coastal vulnerability or adaptation to future sea level rise would be appropriate or not.

Submissions to the Committee that reviewed the VPP in 1997 suggested a new coastal zone should be created for coastal Crown land and that a coastal protection overlay was desirable for a broader coastal area, to improve links between the *Coastal Management Act 1995* and the operation of the planning system. That Committee's report did not support the idea of a new zone, but did recommend a coastal overlay (discussed below).

8.3.3 Overlays

Overlays identify areas with special values or constraints on development, or where particular development requirements apply. In principle, they control development (buildings and works) rather than use, although there are limited exceptions:

- The Airport Environs Overlay requires permits for certain sensitive uses (specified in the overlay), which must be referred to the airport owner.
- The Heritage Overlay has a provision that can be 'turned on' to allow consideration of otherwise prohibited uses, if this will assist with the conservation or adaptive reuse of a heritage place.

The 1997 Advisory Committee that reviewed the VPP recommended that a coastal overlay should be developed for application to all coastal land (and potentially to waters within 600 metres of the coastline). The report noted that the Victorian Coastal Council was finalising the first *Victorian Coastal Strategy* and commented:

A Coastal Overlay should be developed with purposes specifically oriented to coastal land. A buildings, works, vegetation removal and subdivision provision should be included with appropriate mechanisms for exempting development in accordance with Incorporated plans or other plans which may be developed under the Coastal Management Act. The Committee supports the submission by DNRE that the processes established by this legislation be integrated with planning schemes. ... The Overlay should have the capacity to apply to land in both public land zones and other zones.

The introduction of a Coastal Overlay supports State Planning Policy on Coastal Planning incorporated in Clause 15.08 of the SPPF.

The Committee recommended:

Develop a new Coastal Overlay suitable for application to all coastal land. Include appropriate referral provisions for Parks Victoria and other bodies responsible for coastal areas. Ensure integration with Coastal Management Act 1995.

The State departments responsible for planning (at that time Dept of Infrastructure, later Dept of Sustainability & Environment, and now Dept of Planning & Community Development) have not acted on this recommendation.

In the absence of a specific-purpose Coastal Overlay, a whole suite of VPP overlays is relevant or potentially relevant (with minor amendments) to planning for climate change adaptation. Options include:

- Clause 42.01 – Environmental Significance Overlay (ESO), which has, as one of its purposes:

- *To identify areas where the development of land may be affected by environmental constraints.*

The VPP Manual advises that it is intended to be interpreted widely and can be used for identification of a hazard or areas subject to particular planning requirements (such as buffer areas) as well as issues relating to the natural environment.

The French Island and South Gippsland Planning Scheme use the ESO to address issues of coastal erosion. The Wellington Planning Scheme contains decision guidelines in an ESO schedule - Schedule 1, Coastal & Gippsland Lakes Environments – to provide that the responsible authority must consider whether a proposed development:

- *Takes into account coastal processes for all construction and development on the coast*
- *Takes into account possible sea and water level rises when planning the siting and design of buildings and works.*

The issue raised in the consultation sessions about where to seek appropriate referral advice on coastal processes and coastal erosion would apply to all three of these ESOs.

The recent Panel report on Amendment C50 to the Wellington Planning Scheme suggested either adding climate change considerations to existing DDOs (see below) or, as an alternative:

... the Shire could request that LSIOs or ESOs be applied, as appropriate, and as an interim control, to produce provisions with the same intent; that is to communicate risk; and to allow for the assessment of hazard and possible response in any development.

The ESO could also be used to identify areas where development should be restricted in order to allow coastal ecosystems to adapt to climate change (e.g. to ensure that structures do not impede the ability of saltmarsh or mangrove communities to move inland as they respond to rising sea levels and higher temperatures).

An example of how the ESO has been amended to better address coastal climate change hazards and apply the concept of setbacks and buffers in an overlay perspective is the ESO1 – *Coastal Areas and Estuaries* under the Moyne Planning Scheme. Amendment C21 was gazetted in December 2009 and modified both the Schedule 1 to the ESO and its mapped coverage by applying the overlay over freehold land adjoining coastal crown land along the coastal and estuarine areas of the Shire (i.e. the Great Ocean Road near Peterborough, Killarney coast between Warrnambool and Port Fairy and the estuary of Lake Yambuk and Belfast Lough near Port Fairy). The ESO1 seeks:

- *To encourage development including infrastructure to locate away from the sea, estuaries and wetlands through the use of buffer zones. Buffer*

zones can assist in protecting development from sea level rise hazards, mitigate the impacts of development and permit wetland vegetation to migrate as a result of predicted sea level rise associated with climate change.

- Clause 42.02 –Vegetation Protection Overlay (VPO) includes among its purposes ‘to maintain and enhance habitat and habitat corridors for indigenous fauna’. This overlay could be used to facilitate protection of areas where coastal ecosystems might be given room to adapt naturally to the pressures of increases in sea level and average temperatures.
- Clause 43.02 – Design & Development Overlay (DDO) is principally intended to implement requirements based on a demonstrated need to control built form and the built environment.

The Panel for Amendment C68 to the East Gippsland Planning Scheme recommended the DDOs proposed by that amendment should be varied to:

- Add a new objective: ‘the siting and design of developments taking into account coastal hazards’
- Add permit trigger being ‘the land upon which the buildings and works are to be constructed is less than 0.8 (or 1.0) metre AHD’
- Insert application requirements for a vulnerability assessment and, as appropriate, the preparation of a ‘Climate Change (Sea Level Rise) Response Plan’.

East Gippsland Shire Council, in its formal consideration of these recommendations, resolved not to make the changes proposed, on the grounds that it would be preferable to have consistent planning provisions across the State for dealing with coastal climate change.

Nevertheless, the Committee notes that VCAT has used the fact that a permit for development is required under a DDO in some planning schemes as a trigger to indicate that a coastal hazard vulnerability assessment should be carried out.

The Panel for Amendment C50 to the Wellington Planning Scheme considered the use of the DDO as a short-term measure to address coastal climate change and recommended:

Either amending various Design and Development Overlays to include clauses that requires that ‘siting and design of development takes into account recognised coastal hazards’; and a requirement for a permit where the building or works are proposed is 0.8m AHD or greater which requires a coastal vulnerability assessment and possibly a CCRP (be) incorporated on title in the form of a Section 173 agreement. [Or alternatively, applying new ESOs or LSIOs with the same intent.]

- Clause 43.03 – Incorporated Plan Overlay (IPO) is used where some form of plan is required to specify requirements relating to the development of an area and it is necessary that the plan be incorporated in the scheme. This

overlay has potential as means to link an integrated coastal hazard response (or adaptation) plan for a settlement to planning requirements for particular areas within it. However, development of incorporated plans can be a lengthy and complicated process. It might also be argued that the requirement for incorporation would increase certainty but limit flexibility to respond to changing circumstances.

- Clause 43.04 – Development Plan Overlay (DPO) is similar in intent to the IPO, but is not incorporated in planning scheme.
- Clause 43.04 – Development Plan Overlay (DPO) is similar in intent to the IPO, but does not require a Development Plan to be incorporated in the planning scheme.

An example of how the DPO is used to address coastal climate change is under the Glenelg Planning Scheme. Clause 43.04 – Development Plan Overlay, Schedule 7 - Coastal area between Portland and Narrawong is used as follows:

- Sub-clause 1.0 sets out requirements for the Development Plan and provides that it must show (to the satisfaction of the responsible authority) a risk management assessment of the proposed development, taking account of such factors as coastal recession, storm surge and sea-level rise.
- Sub-clause 3.0 contains requirements for any permit that may be granted prior to the approval of the Development Plan and requires that applications must demonstrate that the development has been located away from the coast to avoid the risk from coastal processes and has adequately addressed factors such as coastal recession, sea level rise and storm surge.
- Clause 44.01 – Erosion Management Overlay (EMO) identifies areas subject to significant erosion hazard. We have not identified any instances of the EMO being used to address coastal erosion. Its purposes and decision guidelines are focussed on the impact of development on the environment, rather than the risks to development from environmental change. They may need to be modified if it is to be used for management of areas at risk from coastal erosion resulting from sea level rise.
- Clause 44.02 – Salinity Management Overlay (SMO) identifies areas subject to significant salinity.

This overlay has been used in near-coastal areas to identify areas of perched saline watertables. It could be extended to cover areas at risk of saline intrusion into groundwater. However, there may be difficulties in determining appropriate boundaries, if used for this purpose. The SMO has recently been introduced into the Surf Coast Planning Scheme (C38 gazetted in January 2010) where it has been used to identify sites of secondary salinity (human induced salinity effects). Although the strategic work

underpinning the SMO application identified sites of primary salinity (naturally occurring saline areas such as saltmarsh areas or saline lakes), these areas were addressed by applying the ESO rather than the land management hazard based SMO.

- Clause 44.03 – Rural Floodway Overlay (RFO) is the rural equivalent of the Urban Floodway Zone and delineates the active floodway or other areas of high flood hazard.

As discussed above, detailed mapping now exists to allow differentiation of areas that should be subject to the RFO, rather than the less restrictive LSIO. The use of this overlay to identify hazard areas for ocean-based flooding, or estuarine flooding exacerbated by sea level rise, may require some modifications to the head clause, particularly the objectives and the decision guidelines.

- Clause 44.04 – Land Subject to Inundation Overlay (LSIO), in contrast to the floodway zone and overlay, identifies urban or rural areas subject to flooding but not part of the primary floodway.

The use of this overlay to identify hazard areas for ocean-based flooding, or estuarine flooding exacerbated by sea level rise, may require some modifications to the head clause, particularly the objectives and the decision guidelines.

- Clause 44.05 – Special Building Overlay (SBO) applies only to urban areas, and also identifies land subject to inundation, including by overland flow.

This overlay has obvious relevance in terms of the potential for flooding through the stormwater disposal system or the sewerage system in high water-level events, caused by catchment flooding, high tides, storms surge, sea level rise or a combination of these. However, mapping depends to a large extent on observation of previous events, so predicting the additional impacts of coastal climate change may be difficult.

- Clause 45.01 – Public Acquisition Overlay (PAO) identifies land to be acquired for a public purpose.

The public purpose could be replacement of coastal reserves that have been lost to erosion or permanent inundation or to secure land to enable space for coastal wetlands such as mangroves and saltmarsh to migrate landwards in response to increase tidal inundation.

- Clause 45.04 – Road Closure Overlay (RCO) identifies roads that are to be closed through the planning scheme.

It could be used as part of a package of planning provisions, to identify roads that are at high risk of severance due to flooding or sea level rise, which should not be relied on for access in future.

- Clause 45.05 – Restructure Overlay (RO), which applies a restructure plan to 'old and inappropriate' subdivisions or lots in old Crown townships as a condition of development approval.

The RO could be applied to subdivided areas – not necessarily ‘old and inappropriate’ in the original understanding of the term – where it is desired to restrict development density to lessen exposure to hazards.

8.3.4 Use of Overlays to Assist Climate Change Adaptation

There are four major categories of adaptation actions – avoidance, protection, accommodation and retreat – and different overlays may be appropriate in each case:

- Avoidance: The ESO, EMO, SMO, RFO, LSIO, SBO assist in identifying areas likely to be at risk, where future development should be considered carefully.
- Protection: The overlays listed under ‘avoidance’ may also have elements of protection e.g. a requirement for a developer to undertake particular works as a condition of a permit, that would decrease the vulnerability of the development and/or its likely impact on the wider environment. However, the majority of protection activity would be approved outside the operation of the *Planning and Environment Act 1987*.
- Accommodation: The DDO could be used to set floor levels and access way levels for new development. The RO could also have a role in restructuring existing lot patterns to provide options for future development.
- Retreat: The IPO, DPO, PAO, RCO, RO could all contribute to planning for gradual disinvestment in hazard areas and subsequent staged retreat. The IPO and the DPO could also have roles in structure planning for the areas to which development is intended to relocate. These overlays may also have a role in constraining development in areas potentially at risk until such time as detailed assessment and planning has been carried out.

Several issues arise from the multiplicity of overlays identified:

- The major hazard categories (listed above) are not mutually exclusive. For example, areas at risk of inundation may also be in erosion hazard areas. This means that more than one overlay – often several – may be required to address risks in a particular area.
- In order to cover the range of development situations existing on the coast, and to allow for different adaptation responses over time – for example, through innovative measures such time-bounded or conditional permits – it may be desirable to control uses as well as development. While some overlays have the ability to do this, none of the ones listed above come into this category.
- Each overlay has its own purposes and decision guidelines (in addition to the general decision guidelines in Clause 65) and many schedules also have their own objectives. Responsible authorities may be faced with a whole raft of – potentially conflicting – decision guidelines to consider, when

exercising discretion in regard to planning applications in coastal hazard areas.

These problems recall the comments of the Advisory Committee on the VPP (1997) about the layering of overlays. Whilst recognising that this was a characteristic of the system, the Committee considered it:

... will need to be monitored with a view to identifying whether there is a need to introduce any new zones or overlays which may collapse some of the purposes and controls found in several overlays into a single zone or overlay.

This may have been one of the considerations that led the Committee to recommend development of a specific purpose Coastal Overlay.

Is it feasible to approach the means of responding to sea level rise impacts through the planning system with the use of multiple existing overlays, or is a new overlay desirable?

8.3.5 Application of VPP Tools in Particular Environments

The comments above lead to a preliminary conclusion that the existing suite of VPP tools is inadequate: either tools are not flexible enough, or they introduce too much uncertainty; that to address all the potential issues, a very confusing layering of multiple overlays would be required; or that the use of appropriate overlays might contradict the expectations associated with the underlying zones.

In order to test these assumptions further, we developed a simplified coastal typology for Victoria:

- Clifed coasts – hard
- Clifed coasts – soft
- Alternating rocky headlands, with shore platforms, and sandy embayments
- River mouths with dune systems, lakes and wetlands
- Sandy beaches backed by dunes, with low lying land behind
- Barrier dune complexes backed by large estuarine systems
- Low profile, low energy coasts with mangroves or saltmarsh
- Low profile estuarine shorelines.

The typology has been used to identify the impacts likely to be felt from climate change on each type of coast – for both developed and undeveloped areas – and to examine the VPP tools that could be used to facilitate effective adaptation responses through the planning system.

Table 4 summarises the results of this assessment.

The analysis shows that for cliffed coasts, the predicted impacts of coastal climate change could be managed reasonably effectively using a combination of two or three existing VPP tools. Relevant tools include the Rural Conservation Zone, ESO, EMO, PAO, DDO, RO and the RCO. The package of controls chosen for each area could be tailored so that the role of each was clear, duplication was minimised and an unnecessary proliferation of decision guidelines was avoided.

Similar comments apply to rural and natural areas on other types of coasts.

Adaptation of existing developed areas, however, presents a number of the anticipated problems. As the range of impacts to be managed increases, so the number of VPP tools needed to address them expands. The restricted focus of some of the tools – particularly the flood overlays, which do not deal with risks of ocean-based inundation – would also limit their usefulness in many situations. Back-zoning may be needed in some areas, to counteract expectations that intensification of development will be allowed. In extreme cases, it may be necessary to plan for the eventual relocation of a whole town or parts of it.

The Committee would appreciate comment on the benefit or otherwise of the typology it has developed for assessing how different overlays may be used to respond to sea level rise impacts.

8.4 Use of Other Planning and Environment Act Provisions

8.4.1 Section 173 Agreements

Wellington Shire has a Council policy which applies to applications for permits for future development in vulnerable areas along the Ninety Mile. It requires an assessment of action that may be required if coastal hazards occur. The Ninety-Mile Beach area has a long history of old and inappropriate subdivisions forming pockets of small beachside settlements. The area already has restructure plans in place under the Restructure Overlay, which sought to achieve acceptable development patterns in what were previously 'old and inappropriate' subdivisions. The policy requires property owners to develop a Climate Change Response Plan (CCRP). This is then attached to the property title through a Section 173 Agreement. The CCRP sets in place responses by the owner to certain events, such as erosion of the dunes, and will apply to the current as well as future owners of the property. Only one CCRP has been approved to date, relating to a property at The Honeysuckles.

The Panel for the recent Wellington Amendment C50 considered the merits of using CCRPs in planning and highlighted a number of problems. However on balance it concluded that CCRPs:

...are a worthwhile interim tool in the planning toolbox, alert property owners and developers of the risk of building on low-lying land and ensure these risks are considered as required in clause 15.08 of the SPPF.

The City of Casey is also using Section 173 Agreements to carry forward requirements that flow from preparation of coastal hazard vulnerability assessments (see section 8.5.2 below).

Is the use of agreements registered on titles etc... an appropriate way of being able to notify and inform landowners and prospective landowners of coastal vulnerability hazards or is another tool or provision required and what form should it take?

Table 4: Application of existing VPP tools

Coastal Type	Example Locations	Current Zoning	Climate Change Hazards	Potential Responses	Potential VPP Tools
Cliffed coasts – hard (basalt, granite)	Rural/natural: Phillip Island south coast, Cape Otway, Wilsons Promontory	PPRZ, PCRZ, FZ, RCZ	Relatively limited effects	Allow natural forces to operate	ESO, DDO
	Urban/developed: Mt Martha; Flinders	Public land zones, R1Z, Road zones	Seawalls & roads built on raised shore platforms at risk	Relocate infrastructure	RCO, PAO
Cliffed coasts – soft (limestone, sandstone)	Rural/natural: Port Campbell National Park	PCRZ	Risk of landslip/collapse if cliff undermined	Allow natural forces to operate	ESO or EMO, DDO, RO
	Urban/developed: Anglesea	PPRZ, PCRZ, R1Z, RDZ1	Risk of landslip/collapse if cliff undermined	Buffer distances, setbacks	ESO or EMO, PAO, DDO
Alternating rocky headlands with shore platforms and sandy embayments	Rural/natural: Cape Otway-Apollo Bay-Cape Patten; Croajingolong NP	PCRZ	Loss of sandy beaches	Accommodate to changed shoreline & retain public access in key locations	EMO, PAO, RO
	Urban/developed: Portland, NE shore of Port Phillip Bay, Mornington Peninsula (ocean coast)	INZ, R1Z, Business zones, Public Land zones, Road zones	Loss of public infrastructure on foreshores Loss of sandy beaches	Raise level of wharves, ramps, roads, etc. Avoid substantial new investment in risk areas Retain public access in key locations Longer term – relocate infrastructure at risk	UFZ / FO / LSIO, SBO DDO, RO, PAO
River mouths (with dune systems, lakes and wetlands)	Rural/natural: Aire River, Powlett River	PUZ1, Public land zones, FZ/RCZ	Inundation – as above Shoreline recession, risk of breaches in dunes Saline intrusion into groundwater and freshwater wetlands	Allow natural forces to operate. Retain public access in key areas. Retain space for ecosystems to adapt.	ESO, RO, PAO

Coastal Type	Example Locations	Current Zoning	Climate Change Hazards	Potential Responses	Potential VPP Tools
			Increased pressure for opening of seasonally closed estuaries.		
	Urban/developed: Nelson, Port Fairy, Barwon Heads, Newport-Port Melbourne, Inverloch, Mallacoota	Township, Residential, Business, Mixed Use, Industrial, Public use	Inundation – as above Shoreline recession, risk of breaches in dunes Saline intrusion into groundwater. Back-up through stormwater system & sewers	Raise level of wharves, ramps, roads, etc. Avoid substantial new investment in risk areas Retain public access in key locations Longer term – relocate infrastructure / urban development at risk	Rezoning UFZ / FO / LSIO, SBO, ESO, SMO, RO, DDO IPO/DPO
Sandy beaches backed by dunes, with low-lying land behind	Rural/natural: Discovery Bay, west end of 90-Mile Beach	Public land zones, FZ, RCZ	Beach erosion, shoreline recession	Allow natural forces to operate, retain Crown foreshore reserve in key areas (access, natural systems)	ESO, PAO, RO
	Urban/developed: Seaspray-Frankston	Public land zones, Residential, Commercial	Beach erosion, shoreline recession Loss of Crown foreshore reserves Roads & properties immediately inland at risk	Protect vegetation on dune systems Avoid substantial new investment in risk areas Retain public access in key locations Longer term – relocate infrastructure / urban development at risk	Rezoning LSIO, SBO, ESO, SMO, RO, PAO, DDO IPO/DPO
Barrier dune complexes backed by large estuarine systems	Rural/natural: 90-Mile Beach	Public land zones, LDRZ, Township	Breaches of barrier dune systems creating new entrances to lagoon systems	Retain space for natural systems to adapt, retain Crown foreshore reserve in key areas (access, natural systems).	ESO, RO, PAO
	Urban/developed: Loch Sport, Seaspray	Residential, Business, Public Land Zones.	Inundation – sea level rise in combination with catchment flooding Shoreline recession, risk of breaches in dunes	Protect vegetation on dune systems Raise level of ramps, roads, etc. Avoid substantial new investment in risk areas	Rezoning UFZ / FO / LSIO, SBO, EMO, SMO, DDO (ESO/VPO) PAO,

Coastal Type	Example Locations	Current Zoning	Climate Change Hazards	Potential Responses	Potential VPP Tools
			Saline intrusion into groundwater. Back-up through stormwater system & sewers	Retain public access in key locations Longer term – relocate infrastructure / urban development at risk	RO DPO/IPO
Low profile, low energy coasts with mangroves or saltmarsh (sometimes with barrier islands)	Rural/natural: Western Port, Corner Inlet	Public land zones, FZ, RCZ	Risk of natural systems being squeezed between rising sea and barriers – roads, etc.	Allow natural forces to operate, retain Crown foreshore reserve in key areas (access, natural systems)	ESO, PAO, RO
	Urban/developed: Warneet, Tooradin, Port Albert	Residential, Business, Public Land Zones	Increased frequency & extent of inundation Shoreline recession Saline intrusion into groundwater. Back-up through stormwater system & sewers	Raise level of ramps, roads, etc. Avoid substantial new investment in risk areas Retain public access in key locations Longer term – relocate infrastructure / urban development at risk	Rezoning UFZ / FO / LSIO, SBO, EMO, SMO, DDO (ESO/VPO) PAO, RO DPO/IPO
Low profile, estuarine shorelines	Rural/natural: Raymond Island (outside township), Wattle Point	Public land zones, FZ, RCZ, RL,	Beach erosion, shoreline recession	Allow natural forces to operate, retain Crown foreshore reserve in key areas (access, natural systems)	ESO, PAO, RO
	Urban/developed: Paynesville, Lakes Entrance	Public land zones, Residential, Business, Industrial	Increased frequency & extent of inundation – sea level rise in combination with catchment flooding (particularly if dune barriers breached) Shoreline recession Saline intrusion into groundwater Back-up through stormwater system & sewers	Raise level of ports, ramps, roads, etc. Avoid substantial new investment in risk areas Retain public access in key locations Medium term – coordinated provision of enhanced level of protection, if viable & appropriate Longer term – relocate infrastructure / urban development at risk	Rezoning UFZ / FO / LSIO, SBO, EMO, SMO, DDO (ESO/VPO) PAO, RO DPO/IPO

8.5 Recent or Proposed Uses of the VPP to address Coastal Issues

8.5.1 City of Greater Geelong

The City of Greater Geelong's planning department has drafted a schedule to the Environmental Significance Overlay to cover its coast and for inclusion in the Greater Geelong Planning Scheme. The Committee was advised that further consultation is still required before it is considered by Council. It was provided to the Committee for information only.

The statement of environmental significance recognizes the importance of the coast and the potential threats posed by development and climate change impacts including sea level rise and more extreme storm events and storm surge. It proposes:

... the linking of fragmented pockets of vegetation to form habitat corridors and the creation of buffers which will allow the migration of some species, as one way of contributing to the survival of coastal biodiversity threatened by climate change impacts..... The establishment of buffer areas needs to occur in advance of the impacts of coastal climate change becoming evident, as these corridors and buffers take time to establish and stabilise.

It goes on to say:

In the context of increasing residential and other development in coastal regions, it is also necessary to fully consider the risks related to climate change as part of the planning assessment process for future development.

It lists a number of works for which a permit is not required including works associated with normal farming activities, those undertaken by, or on behalf of, DSE or a committee of management, plus a number of minor rural or maritime structures.

Information to be included with a permit application includes photos or site plans, topographic information, native vegetation details and protection measures, an environmental assessment and a vulnerability assessment. The vulnerability assessment is to include details of the methodology used and identification of the elements at risk, e.g. property, people, services such as water supply, drainage, electricity supply, roads, vegetation.

In determining an application the responsible authority would be required to consider the following:

- *The impact of the proposal on coastal processes and the need to protect and enhance environmentally sensitive coastlines.*
- *The maintenance and improvement of the stability of the coastline.*
- *The preservation of any existing native vegetation.*
- *The need to provide vegetation offsets.*
- *The siting of buildings and works.*
- *The location of building envelopes and siting of services in any proposed subdivision.*
- *The works to control drainage and stormwater run-off from any building, access road or driveway.*
- *The need for conditions on permits that require protective measures to control disturbance associated with building construction activities.*
- *The impact the provision of physical infrastructure will have on the coastal environment.*
- *The capacity of the soil and water to absorb wastes and the design of any effluent disposal.*
- *The protection of the area for its recreational value, where relevant.*
- *The location of public access points to the coastline.*
- *The location, dimension and level of any excavation or alteration to the natural surface including works to stabilise batters in areas of fill or excavation.*
- *The need to prevent stock access to coastal areas.*
- *The locational requirements of the proposed development.*
- *The future use of the land and whether it is appropriate to include conditions requiring restoration, regeneration, revegetation or other treatment of any part of the land.*
- *The importance of using indigenous species of local provenance for revegetation.*
- *Whether adequate provision has been made for the landscaping and treatment of the site to enhance the coastal environmental values.*
- *The recommendations of any relevant Coastal Action Plan.*

The draft has 17 individual ESO schedules which identify the environmental features and challenges for each area and articulate the environmental management objectives to be achieved by the overlay. The environmental management objectives at this stage are predominantly focused on reflecting the assessment guidelines, that is, protecting the natural features and biodiversity of the areas concerned. There is only an occasional reference to climate change impacts.

8.5.2 City of Casey

The City of Casey, with a population of more than 240,000 and about 45 kilometres south east of Melbourne, is one of Victoria's fastest growing municipalities. The south edge of the City of Casey is the low lying Western Port Bay and includes the coastal villages of Tooradin, Blind Bight, Cannons Creek and Warneet, home to people of moderate average household income.

Based on legal advice and as a result of the Western Port climate change impact assessment, the December 2008 amendments to the VPP Clause 15.08, and VCAT decisions the City of Casey determined that it had a legal obligation to incorporate climate change impacts into its land use planning strategy.

In January 2009 Council passed the following resolution:

'That until a more accurate vulnerability assessment is available Council use the existing LSIO as a guide to vulnerable areas and seek to include warnings to developers and future purchasers of the potential impacts of coastal change where appropriate.'

'Before the plan of subdivision is certified under the Subdivision Act 1988, the owner must enter into an agreement with the Responsible Authority made pursuant to Section 173 of the Planning and Environment Act 1987, and make application to the Registrar of Titles to have the agreement registered on the title to the land under Section 181 of the Act which provides that owner recognises the climate change risks, rising sea levels and increased frequency and severity of flooding associated with proceeding with subdivision and development in a flood prone area. The owner must pay any reasonable costs of the preparation, execution and registration of the Section 173 agreement.'

Council is now providing the following advice to applicants in low lying coastal areas who are considering applying for a permit:

Following a decision by the Victorian Civil and Administrative Tribunal (VCAT) it has become necessary for Council to require you to provide a

coastal hazard vulnerability assessment. The assessment must consider factors including sea level rise, storm tide and surge, coastal processes and local topography and geology. The assessment must be undertaken by a suitably qualified coastal engineer or hydrology expert.

Your assessment must be provided before Council can determine your application.

As noted in Chapter 6, Council officers commented that there is currently very little guidance on how coastal hazard vulnerability assessments are to be undertaken. In addition, there is a limited number of coastal engineers with the skills to do these assessments and these studies place an undue cost burden on applicants. In addition, Council does not have the skills to properly consider the assessment so it has been taking them on face value.

Section 173 agreement are considered an interim measure to minimise Council's liability, as the LSIO is only designed to deal with development in areas subject to 1-in-100-year flood event and not with climate change.

Instead the City of Casey considers that a Coastal Hazard Overlay would be a more appropriate mechanism as it would:

- *Implement strategies contained in Clause 15.08-2.*
- *Identify coastal hazard areas susceptible to inundation from sea-level rise, tides and storm surge, erosion, landslip/landslide, acid sulfate soils, wildfire and geotechnical risk.*
- *Be modelled on LSIO and applied over existing the zoning, which would remain principal tool for controlling land use.*
- *Would also specify general application requirements, referral agencies (e.g. floodplain management authority, coastal land manager) and decision guidelines, and exemptions from notice and review.*

In addition Casey considers that:

- *Under CHO permit would be required for all buildings and works, with specified inclusions and exclusions.*
- *Schedules to CHO could specify permit exemptions, together with additional application requirements, referral agencies and decision guidelines relevant to local area of risk.*
- *Multiple schedules could be used to define discrete areas of risk and specify relevant requirements (e.g. erosion, landslip/landslide).*

- *CHO could also give effect to area-based (e.g. regional or township) Coastal Hazard Vulnerability Assessments (CHVAs) that were incorporated in the planning scheme, much like a Local Floodplain Development Plan.*
- *CHO could specify that an application must be consistent with any CHVA incorporated into the planning scheme for the subject area.*
- *CHO could also specify in decision guidelines that responsible, authority must consider any requirements of a CHVA.*

8.5.3 Borough of Queenscliffe

Based on climate change and sea level rise modelling for Queenscliff and Point Lonsdale, the Corangamite Catchment Management Authority (CCMA) has issued an Interim Local Floodplain Development Plan in which it identifies areas of low, medium, high and extreme risk and proposes conditions on development within these areas. It recommends the use of the Interim Floodplain Development Plan until further direction or advice is issued by the State Government.

In summary the Interim Floodplain Development Plan proposes:

- No new subdivision or new dwellings in a high risk zone.
- New subdivisions and new buildings allowed in medium and low risk areas provided there is a safe evacuation path and floors levels are set at 300mm above the flood level, plus for subdivisions in the medium risk area there are individual flood risk assessments.
- Additions to existing dwellings have restrictions based on the floor area and risk level. For example in the medium risk area large extension (>80m²) is required to have new floors 300mm above the applicable flood level.
- No restrictions on sheds and outbuildings.

In October 2009 the Borough of Queenscliffe announced it is seeking community feedback on its proposal to refer all planning applications in the risk areas to the CCMA for advice.

8.6 Models for an Integrated Adaptation Response

In several of the initial consultations, there was discussion of options for developing a custom-designed response to climate change, particularly in vulnerable areas that are already substantially developed.

As discussed above, these included the potential to use the IPO or the DPO to call up an integrated climate change adaptation plan for a town or part of an urban area.

Other suggestions included use of a process similar to that employed by the Growth Areas Authority (GAA) for planning new lands being brought within Melbourne's urban growth boundary and rezoned to the Urban Growth Zone. The essential feature of the process is broad-scale comprehensive planning involving identification of environmental values and constraints and the requirements for provision of infrastructure and services. This, in turn, enables design of an efficient and equitable urban structure, sustainable neighbourhoods, activity centres and open space networks. The products are a hierarchy of structure plans and precinct structure plans, which are then incorporated in the planning scheme.

The features of this process that were seen to be relevant to adaptation to coastal climate change included:

- A well resourced body – removed from political decision making influences – having responsibility for broad scale planning for substantial areas. In the coastal context, this could imply a state or regional body with a specific responsibility for planning for adaptation of vulnerable urban areas (or defined areas within them).
- The involvement of all relevant agencies in the planning phase, to ensure that environmental, economic, infrastructure and social issues are all considered and that the adopted outcome resolves these matters, rather than leaving them dealt with at the later subdivision or development stage. This process has worked particularly well for the identification and prioritised protection of endangered grassland communities within the Metropolitan Melbourne growth areas.
- Detailed planning for precincts must be in accordance with the framework provided by the structure plan.

The Committee considers that this suggestion has some merit in establishing the initial framework for an adaptation plan. However, the key to successful adaptation is likely to be management of implementation, which will be rather more complex in this case than is the construction of greenfields

development and may occur over a much longer time frame. It will also involve ongoing uncertainties.

Furthermore, implementation of a GAA-style approach to comprehensive planning for vulnerable settlements would probably require the development of a new VPP zone, to apply to the areas determined to be at risk. While the use of an IPO or DPO for this purpose would theoretically be possible, we consider that there could be problems in applying it over an existing urban zoning pattern.

Are the impacts of climate change on our coast and estuaries and associated rural and urban communities significant enough to warrant new regional planning entities to undertake and manage future regional land use planning and if so, what form should such regional planning take?

9. Complementary Actions Under Other Victorian Legislation

9.1 Planning and Development Control Mechanisms

The planning system under the *Planning and Environment Act 1987*, based on the Victoria Planning Provisions (VPP), is only one of the strategic planning mechanisms available under Victorian legislation for addressing the impacts of coastal climate change.

Other key planning processes include:

- Coastal Action Plans (CAPs) prepared under the Coastal Management Act;
- Regional Catchment Strategies (RCS) and other plans (such as river health strategies and Special Area Plans) prepared under the Catchment and Land Protection Act;
- Floodplain management processes under the Water Act; and
- Management plans for Crown land in coastal areas, including Foreshore Management Plans prepared under the Crown Land (Reserves) Act or the Coastal Management Act, Forest Management Plans prepared under the Forests Act and National Park Management Plans prepared under the National Parks Act.

Building controls under the *Building Regulations 1996* have a major part to play in dealing with development in potentially vulnerable areas. State Environment Protection Policies (SEPPs) under the Environment Protection Act are also relevant, particularly to protect surface water quality or saline penetration into groundwater.

9.2 Strategic planning

9.2.1 Coastal Action Plans

CAPs, prepared by the relevant Regional Coastal Board, must be endorsed by the Victorian Coastal Council (VCC), before forwarding to the Minister for Environment and Climate Change for approval.

They identify strategic directions and objectives for use and development in the region and provide for detailed planning to:

- Facilitate recreational use and tourism; and
- Provide for protection and enhancement of significant features of the region's coast, including the marine environment.

CAPs must be consistent with the Victorian Coastal Strategy (VCS) and other legislation applying to reserved Crown land and National Parks and must be reviewed every five years.

Existing CAPs in the three coastal regions – Western, Central and Gippsland – cover a range of topics at a range of scales, including recreational boating, planning for specific areas of urban coast, estuaries management and integrated coastal planning.

The Gippsland Coastal Board (GCB) has developed a preliminary proposal for a CAP to apply the results of the studies it has commissioned over the past five years from the CSIRO and others on the potential impacts of climate change in the region. The outputs of the Future Coasts program would also be incorporated in this work. The VCC and the other regional coastal boards have shown interest in using Gippsland as a model that could be applied – with appropriate modifications to suit local circumstances – in the other coastal regions.

GCBs proposed CAP was to be based on the principles of Integrated Coastal Zone Management (ICZM) and to seek to apply the policies and strategies from the Victorian Coastal Strategy at a regional level. In regard to coastal climate change, the CAP would provide an opportunity to look at issues on a regional basis, and identify opportunities for co-operative approaches between agencies and local governments across Gippsland.

The Land and Biodiversity White Paper identifies one of the roles of the new Natural Resource and Catchment Authorities (NRCAs) as 'providing a regional interpretation of the Victorian Coastal Strategy'. Work previously proposed to prepare the new CAP is continuing, in conjunction with the two Gippsland CMAs. It is now anticipated that it will form an input into the new Regional Catchment Strategy (RCS) and, potentially, a subsidiary strategy to sit under the RCS.

9.2.2 Regional Catchment Strategies and Other Plans for Natural Resource Management

As noted in Chapter 4, Regional Catchment Strategies (RCS) are a major tool for planning for natural resource management on a catchment basis. The Catchment and Land Protection Act provides that they must (at Section 24(2):

- a) assess the land and water resources of the catchments in the region and how they are used; and*
- (b) assess the nature, causes, extent and severity of land degradation of the catchments in the region and identify areas for priority attention; and*
- (c) identify objectives for the quality of the land and water resources of the catchments in the region; and*
- (d) set a program of measures to promote improved use of land and water resources and to treat land degradation; and*
- (e) state the action necessary to implement the strategy and who should take it; and*
- (f) specify procedures for monitoring the implementation of the strategy, achieving the land and water resource quality objectives and assessing the effectiveness of the program set under paragraph (d); and*
- (g) provide for the review of the strategy.*

While existing RCS cover all land in the catchment, including the coast, the Land and Biodiversity White Paper envisages that the next iteration of strategies will have a much stronger focus on coastal and marine assets and issues.

In addition to the overarching RCS, each CMA has also prepared a River Health Strategy. The White Paper has changed the future focus of these documents by renaming them 'strategies for healthy rivers, wetlands and estuaries'.

Together the new RCSs and their subsidiary strategies are likely to be effective mechanisms for addressing many of the impacts of coastal climate change, particularly in relation to provision for adaptation in the natural environment.

The White Paper also envisages that the new authorities will have a stronger role in land use planning. Each RCS is to include a planning addendum setting out priorities for each local government area in protecting catchment values. The RCSs will also include model Environmental Significance Overlay (ESO) schedules 'to improve the alignment of whole-of-catchment land use and planning' and clearly identify regional priorities for the protection of remnant vegetation.

NRCAs will work with local government to review the application of zones and overlays in relation to the latest natural resource management information and evaluations. The authorities will also have wider referral powers under planning schemes, to assess all applications that impact on water resources.

The guidelines for renewal of the RCSs have not yet been released, but they are expected to provide advice on how to address the likely effects of climate change on catchments.

9.2.3 Floodplain management

Under sections 202 and 203 of the Water Act, floodplain management authorities – Melbourne Water in the metropolitan area and the Catchment Management Authorities in the regions – have a responsibility to:

- Determine the likely extent and height of floodwaters;
- Declare flood levels and flood fringe areas;
- Declare building lines in relation to either side of a designated waterway or of designated land or works;
- Control developments that have occurred or may be proposed for land adjoining waterways; and
- Develop and implement plans and take any action necessary to minimise flooding and flood damage.

The Act provides that a floodplain management authority:

...may adopt a flood level, a flood fringe area or a building line which, in its opinion, is the best estimate, based on available evidence, of a flood event which has a probability of occurrence of 1 per cent in any one year.

In areas where flood levels have not yet been declared, the Minister may, on advice of the floodplain management authority, declare any area to be an area of land liable to flooding or to be in a floodway area (defined as the high hazard area of the floodplain comprising active flow paths and / or storage areas).

The consent of the floodplain management authority is required to erect structures or carry out works on land declared to be liable to flooding or to be a floodway area, if the development may have the effect of controlling or mitigating floodwaters, discharging stormwater, excluding tidal water or concentrating or diverting floodwater or stormwater. Consent is also required for works or structures between any declared building line and the relevant waterway or designated land or works.

Flood mapping prepared by the floodplain management authorities, often accompanied by a local floodplain management plan, forms the basis for application of appropriate zones and overlays in planning schemes.

For example, Moyne Shire Council and the Glenelg-Hopkins CMA have prepared a flood study for Port Fairy, which is located on the estuary of the Moyne River and the Belfast Lough. The flood study modelled the effects of inundation from both catchment and tidal flows including storm surge effects and found that with increasing sea level rise, rainfall intensity and storm surge events the number of properties affected increases substantially from 191 to 517 by 2100.

The study also found that there is the potential for a shift in the frequency of flood events as a result of climate change, whereby the current 1 in 100 year event that is experienced under the current climate could have a shorter recurrence interval with climate change³². Floodplain management authorities such as Melbourne Water and the CMAs are Section 55 referral authorities for planning applications under the Urban Floodway Zone, the Rural Floodway Overlay, the Land Subject to Inundation Overlay and the Special Building Overlay. Accordingly, there is the opportunity for the implications of climate change effects on the coast either from increased rainfall intensities or coastal inundation from rising seas levels to be considered in the referral responses from these agencies.

Flood levels, floodways and flood fringe areas have traditionally been declared on the basis of predictions of catchment based flooding, not on the potential for inundation from the ocean, or from a combination of landward flooding and high tides and/or storm surges. As a result, the introduction of the VCS policy requirement to plan for a sea level rise of not less than 0.8 metres by 2100 has created some uncertainty in how it should be applied with regards to coastal flooding. This is partly due to the lack of information, prediction and mapping over the potential extent of flooding caused and

³² Australian Government (2009) Climate Change Risks to Australia's Coast – A First Pass National Vulnerability Assessment. Department of Climate Change, Canberra.

aggravated by sea level rise. The Committee notes that clarification over how the policy is to be administered is needed.

9.2.4 Management Plans

Management plans for Crown land are provided for under a number of Acts. They include foreshore management plans, Forest Management Plans and plans of management for National Parks and other parks declared under the National Parks Act.

Foreshore management plans will have a role in adapting to coastal climate change, including by ensuring that any facilities or infrastructure provided on the coast is designed and sited to take account of rising sea levels and the risks of coastal recession.

National Park management plans have particular potential in addressing issues of the effects of climate change on the natural environment. For this to be most effective, planning may need to be more strongly integrated with land use planning – under planning schemes and under the Forests Act and the Lands Act – for the areas adjoining parks.

9.3 Regulations

9.3.1 Building regulations

The Building Regulations 2006 provide that, before a building permit can be issued for development on an allotment that is in an area liable to flooding – declared under the Water Act, in a planning scheme or on a subdivision plan – the report and consent of the relevant council must be obtained (or a planning permit must be issued, if one is required). The report from the council may specify a level for the surface of the lowest floor of a building on the site. This must be done in consultation with the floodplain management authority and must specify a level at least 300 mm above any flood levels declared under the Water Act or otherwise determined by the authority, (unless agreed to a lower level). If a floor level is set, council must advise the floodplain management authority and the relevant sewerage authority.

The regulations specify that a council must not give its consent to the issue of a building permit if it is of the opinion that there is likely to be a danger to the life, health or safety of the occupants of the building due to flooding of the site.

9.3.2 State Environment Protection Policies

Two existing State Environment Protection Policies (SEPPs) address issues of water quality for both surface waters and groundwater.

The SEPP (Waters of Victoria), which applies to all surface waters of Victoria, aims to provide a co-ordinated approach for the protection and, where necessary, rehabilitation of the health of Victoria's water environments. This policy protects the environmental values, beneficial uses and associated social and economic values of the water environment to ensure that the needs of current and future generations are met. It has a number of schedules that outline the surface water quality standards to be met for different water bodies, including Port Phillip Bay, the Yarra Catchment, Western Port and Catchment and the Gippsland Lakes and Catchment.

SEPP (Groundwaters of Victoria) aims to maintain and, where necessary, improve groundwater quality to a standard that protects existing and potential beneficial use of groundwater. It sets a consistent approach to, and provides quality objectives for groundwater protection throughout Victoria. The SEPP is based on ESD principles including the precautionary principle and intergenerational equity, and also adopts a 'polluter pays' approach. It states that:

...groundwater and aquifers should be protected to the greatest extent practicable from serious or irreversible damage arising from human activity.

The SEPP (Groundwaters of Victoria) may be potentially relevant to saline contamination of groundwater as a result of sea level rise. However, measures to protect groundwater from saline intrusion may be difficult to design and implement.

The Environment Protection Act, under Part IXB, also provides for the Environment Protection Authority (EPA) to approve onsite treatment systems for domestic wastewater. Local councils then have the responsibility of assessing applications against the standards and conditions set by the EPA, prior to deciding whether to issue a septic tank permit.

Under a sea level rise scenario, particularly when combined with storm surge and king tides, some current industrial locations are likely to be vulnerable, with potential impacts on water quality. The licensing and enforcement regimes under the SEPP (Waters of Victoria) may have a role in managing adaptation or relocation of these activities.

9.4 Advisory Committee Consideration

The principal matter that stands out from the above consideration of potential actions under complementary legislation is the central importance of identifying and managing areas liable to flooding. It is of fundamental importance that all planning schemes are updated with new or amended zones and overlays to reflect the latest information on potential catchment flooding, even if provision for the effects of ocean-based flooding and storm surges cannot be included immediately.

However, the Committee considers issues about responsibility for, and how, application of the VCS planning guideline for sea level rise to coastal flooding is to be applied should be resolved as a matter of urgency.

The Committee sees merit in proposals for the use of Coastal Action Plans – or subsidiary plans under Regional Catchment Strategies, in the proposed new structure for natural resource management – as a means of co-ordinating a regional approach to adaptation to coastal climate change, based on the best available information.

Is there a need for Coastal Action Plan(s) to be developed to plan and act on sea level rise and coastal climate change effects along our coast and estuaries and if so, should they be regionally based?

10. Lessons from Other Jurisdictions - Australia

Reviews of other State Government actions in relation to coastal climate change has revealed an increasing trend towards actions to better plan and anticipate the effects of climate change and sea level rise along their respective coastlines. This section of the Issues and Options paper seeks to see what can be learnt from actions that other governments around Australia are taking with respect to both legislation and planning policy and how it could be applied in Victoria.

The examples outlined here are in no particular order and is not an exhaustive list however, the Committee has identified and outlined below a summary of the key legislation and policy initiatives from around the country and analysed what aspects from each may be relevant and useful for the Victorian situation.

10.1 South Australia

Key legislation in South Australia dealing with issues and effects relevant to coastal climate change includes:

- The *Development Act 1993* which establishes the legislative framework for planning land use and development including Development Plans and statewide policy objectives and development principles; and
- The *Coast Protection Act 1972* which addresses coastal management including the establishment of the Coast Protection Board which develops planning policy for the coast and acts as a referral authority on key development proposals on the coast.

10.1.1 Development Plan Policy

Development Plans in South Australia contain standard planning policies dealing with sea level rise³³. These statewide policies cover environmental protection, maintenance of public access, hazard risk minimisation, erosion buffers, land division, protection of economic resources and development in appropriate locations. Fundamentally, the policy position is:

³³ Planning policies dealing with coastal issues were incorporated into South Australian Development Plans via a Ministerial amendment in 1994.

- To protect and maintain coastal processes and plan for a 1.0m rise in sea levels by 2100.
- Development should only occur on land that is not subject to or can be protected from coastal hazards.
- Development can accommodate changes in sea level during the first 100 years of its life.
- Development will not require public funds for protection in the future.
- Development should be designed and sited so that it does not prevent natural coastal processes including landward migration of mangroves, coastal saltmarsh and dune systems.
- Development should ensure the provision of a 50 metre coastal reserve to maintain public access to the coast.
- With respect to coastal hazards the key principles of development control include:
 - Minimise coastal hazards by ensuring site development levels are at least 0.3 metres above sea flood levels; that floor levels are 0.55 metres above sea flood levels and protect development from an additional rise in sea levels of 0.7 metres and including that from land subsidence by 2100.
 - Small scale development should be setback from coastal erosion a sufficient distance to provide for 100 years of coastal retreat and 200 metres for large scale development and township areas unless appropriate private protection is provided or council protection of the public reserve is to be provided.
- Where a coastal reserve exists or is to be provided it should be increased in width by the amount of any required erosion buffer. The width of an erosion buffer should be based on the following:
 - The susceptibility of the coast to erosion.
 - Local coastal processes.
 - The effect of severe storm events.
 - The effect of a 0.3 metres sea level rise over the next 50 years on coastal processes and storms.
 - The availability of practical measures to protect the development from erosion caused by a further sea level rise of 0.7 metres per 50 years thereafter.
- Development should not occur where essential services cannot be provided and maintained having regard to flood risk and sea level rise, or where emergency vehicle access would be prevented by a 1 in 100 year

average return interval flood event, adjusted for 100 years of sea level rise.

10.1.2 Development Plan Zones

The standard planning provisions also contain a Coastal Conservation Zone and a Coastal Settlement Zone, which are relevant to coastal climate change impacts. The primary role of the Coastal Conservation Zone is to safeguard coastal features and habitats that are highly sensitive to the direct impacts of development, including coastal dunes, coastal wetlands, samphire (tidal marshes), mangrove areas, estuaries and other important habitat areas.

The policies in the Zone seek to:

- *Safeguard areas of environmental significance on the coast, including sensitive coastal features, natural ecosystems, habitats (and linkages between these systems) and the marine environment.*
- *Protect development from coastal hazards, such as flooding, erosion (including taking into account the impacts of climate change) and acid sulfate soil.*
- *Safeguard significant coastal areas or places of historic, cultural or scientific significance.*
- *Support the provision of appropriate public access to the coast and foreshore.*
- *Allow appropriate development activity in balance with the natural environment and cultural values associated with the coast.*

The Zone can be introduced where the land includes:

- *Coastal features and habitats highly sensitive to the direct impacts of development, including coastal dunes, coastal wetlands, samphire (tidal marsh), mangrove areas and other important habitat areas.*
- *Important coastal geological features or other natural features of scientific, education, heritage or cultural importance (such as coastal cliffs).*
- *Buffers that provide separation between development and sensitive coastal habitats or important marine fauna sites.*
- *Very high quality landscapes fundamentally coastal in nature (excluding land of rural character that provides a backdrop to the coast).*

- *Undeveloped areas exposed to coastal hazards (such as seawater flooding or erosion) where there are no provisions to resolve the deficiency (such as a council managed seawall or levee bank) or a strategy to protect development.*

The Coastal Settlement Zone can be applied to developed areas along the coast where there are sensitive coastal features or coastal processes. It can accommodate existing developed areas that may need to be protected from coastal flooding or erosion.

The Zone seeks to:

- *Protect development from coastal hazards such as flooding and erosion (including taking into account the impacts of climate change) and acid sulfate soils.*
- *Allow appropriate development activity in balance with the natural environment and cultural values associated with the coast.*

10.2 New South Wales

The New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (the EP&A Act 1979) establishes a hierarchy of statutory planning instruments including:

- **State Environmental Planning Policies (SEPP NSW)** which cover state wide planning issues. For example SEPP 71 – ‘Coastal Protection’ requires councils to consider the impact of coastal processes and coastal hazards when preparing Local Environmental Plans and assessing development in the NSW coastal zone.
- **Local Environmental Plans (LEPs)** are prepared and administered by the local authority and must be consistent with SEPP (NSW). A Standard Instrument, or template for Local Environmental Plans (LEPs), requires impacts of climate change and sea level rise to be considered and accommodated in principal LEPs in accordance with the NSW Coastal Policy.
- **Development Control Plans (DCPs)** outlines detailed controls and must be consistent with a LEP. DCPs provides detailed planning provisions and enables the implementation of specific land use controls such as particular coastline hazards at nominated locations along the coastline.

The *Coastal Protection Act 1979* aims to protect the coastal environment. The Act establishes the NSW Coastline Hazard Policy and Coastline Management Manual, 1990 and also provides for local councils to prepare coastal management plans to protect and manage their respective coastlines. The

Coastline Management Manual addresses the following types of coastal hazards:

- *beach erosion*
- *shoreline recession*
- *coastal entrance instability*
- *vegetation degradation and sand drift*
- *coastal inundation*
- *slope and cliff instability*
- *stormwater erosion*

Included in its management options are restrictive zoning and use of development control conditions (including requiring relocatable buildings, setbacks, design conditions such as specific foundation conditions and floor levels), planned retreat and voluntary purchasing including acquisition and lease back. It advocates that advises councils to accommodate sea level rise in its planning. Development of an approved coastal management plan addressing the above coastal hazards offers indemnity protection to councils under the Act for decisions and actions taken in accordance with the approved Plan.

The Standard LEP contains a provision that prevents the granting of development consent on land that is wholly or partly within the NSW coastal zone, unless consideration has been given to the effect of the impact of coastal processes and hazards on the proposed development. Therefore, in due course this provision will be included in the LEPs for all areas within NSW.

The NSW Government has announced recent reforms for managing coastal erosion risks, through the NSW Coastal Policy and the Coastal Protection Act.³⁴ These reforms include the identification of 'hot spots' where erosion is severe and the coastline is actively receding, a Sea Level Rise policy statement, a requirement for councils in hotspots to prepare coastal erosion emergency management plans (by 30 June 2010), a proposal to amend the Coastal Protection Act, the Local Government Act and various regulations to:

- 1) *include adaptation to sea level rise as a management objective;*
- 2) *enable councils that implement coastal erosion protection works through their approved coastal management plans to require*

³⁴ *Recent Developments Reforms to coastal erosion management in NSW* (2009) www.environment.nsw.gov.au/coasts/coastalerosionmgmt.htm 221009

benefiting landowners to make pro rata contributions to their costs, through a coastal protection service charge;

- 3) *provide new powers to enable a council or the Minister to issue an order to stop an unapproved action likely to result in significant beach erosion, backed by increased penalties for unlawful works or activities. These orders may be appealed in the Land and Environment Court.*

The Draft Flood Risk Management Guide: Incorporating sea level rise benchmarks in flood risk assessments was also released³⁵. This guide recognizes that inland areas may be affected by sea level rise.

10.2.1 Sea Level Rise Policy Statement

The Sea Level Rise Policy Statement sets planning benchmarks of 40 cm to 2050, and 90 cm to 2100 above 1990 mean sea levels, for the NSW coastline and will supersede the NSW Coastline Hazard Policy.

10.2.2 Draft NSW Coastal Planning Guideline: Adapting to Sea level Rise

The Draft NSW Coastal Planning Guideline: Adapting to Sea level Rise (DECCW 2009) outlines a proposed approach for addressing sea level rise in land use planning and development assessment in coastal NSW. It based around the following principles:

- *Principle 1 – Assess and evaluate coastal risks taking into account the NSW sea level rise planning benchmarks.*
- *Principle 2 – Advise the public of coastal risks to ensure that informed land use planning and development decision-making can occur.*
- *Principle 3 – Avoid intensifying land use in coastal risk areas through appropriate strategic and land use planning.*
- *Principle 4 – Consider options to reduce land use intensity in coastal risk areas where feasible.*
- *Principle 5 – Minimise the exposure to coastal risks from proposed development in coastal areas.*
- *Principle 6 – Implement appropriate management responses and adaptation strategies, with consideration for the environmental, social and economic impacts of each option.*

³⁵ See www.environment.nsw.gov.au/resources/climatechange/097111draftfloodrisk.pdf

The draft guideline considers the use of planning certificates and other council notices to inform the community and individual landowners that land is at risk of that council has adopted a policy that restricts the development of the land because of coastal hazards. It identifies a potential LEP planning policy dealing with coastal risk areas, which have been defined on a series of maps of the NSW coast with the objectives to maintain coastal processes, avoid adverse impacts on coastal processes and the environment, makes the coast safer and ensure compatible use with coastal risks.

The draft guideline also discusses zoning options in coastal risk areas including:

- Using the Environmental Management Zone or Environmental Conservation Zone for rural or undeveloped areas in coastal risk areas to carefully manage land subject to environmental hazards or coastal processes such as beach or foreshore erosion.
- Using zones which will limit the intensification of land use and development in floodplain areas that have not yet been zoned for urban uses and which are at risk in the future to flooding.

With respect to development control, the draft guideline recognises that coastal development applications should include adaptation responses such as safe exit routes, demountable buildings, buildings with habitable floor above storm height levels, using appropriate foundations (i.e. piles not slabs). The draft guideline outlines that applications for approval should be accompanied by information to assist with assessment of impacts. Key information includes:

- outlining the type of proposed development including:
 - The nature, bulk, scale and location of proposed development; and
 - The proposed use and occupation of buildings, and those on adjoining land.
- Plans illustrating the position and configuration of the proposed development in relation to coastal risks including:
 - The position of the existing and proposed buildings;
 - The existing ground levels to AHD around the perimeter of the building and contours of site;
 - The existing or proposed floor levels in AHD and foundation type; and
 - The topographic levels to an accuracy of 0.1m, and structures to an accuracy of 0.01m, showing relative levels to AHD.

- A report addressing the following issues relating to sea level rise as they relate to the development site, where relevant:
 - A permanent increase in sea level and increased tidal range;
 - Soft coast erosion – beach and foredune loss and/or migration, shoreline recession, beach realignment;
 - Coastal flooding;
 - Coastal entrance behaviour;
 - Changes to coastal lagoons and estuaries;
 - Cliff and slope instability;
 - Coastal wetland migration; and
 - Changes to groundwater elevation and/or salinisation.
- Information that demonstrates whether the development proposal:
 - Is consistent with any relevant approved coastline or floodplain management plan;
 - Is consistent with any relevant planning strategy or planning policy that relates to coastal or flood issues;
 - Meets the coastal protection requirements of any relevant planning strategy or policy; and
 - Incorporates appropriate management responses and adaptation strategies.

The above information requirements are noted by the Committee as it may be equally important for similar type of information to be required as part of any modified or new zone or overlay that may be considered. Any zone or overlay purporting to address land use and/or development in coastal risk areas may need to identify what information would be required to facilitate any assessment of a land use or development in coastal risk areas.

The draft guideline discusses how development controls could be administered in coastal risk areas including where proposed developments located seaward of the 2100 hazard line incorporating sea level rise projections will need to address the planning criteria of the guideline (Figure 8). For example, buildings should be designed to be easily relocated in the event of coastal erosion (eg. not slab-on-ground, modular in construction). It is not suitable to develop land seaward of the immediate hazard line (i.e. in close proximity to the erosion escarpment).

Figure 8: Coastal erosion considerations in planning approval assessment in NSW

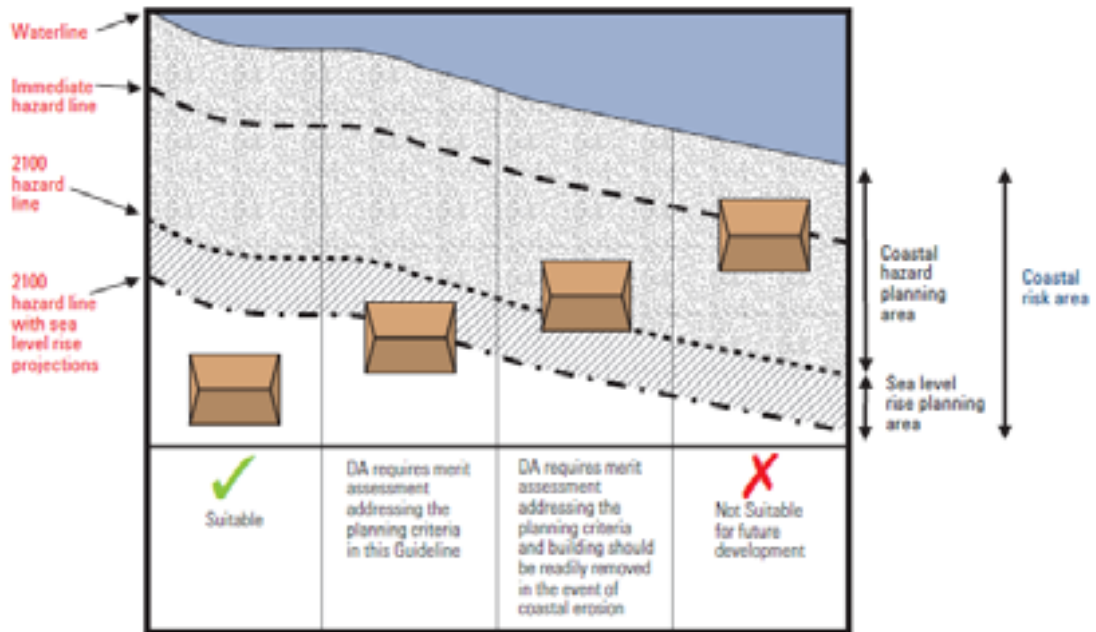
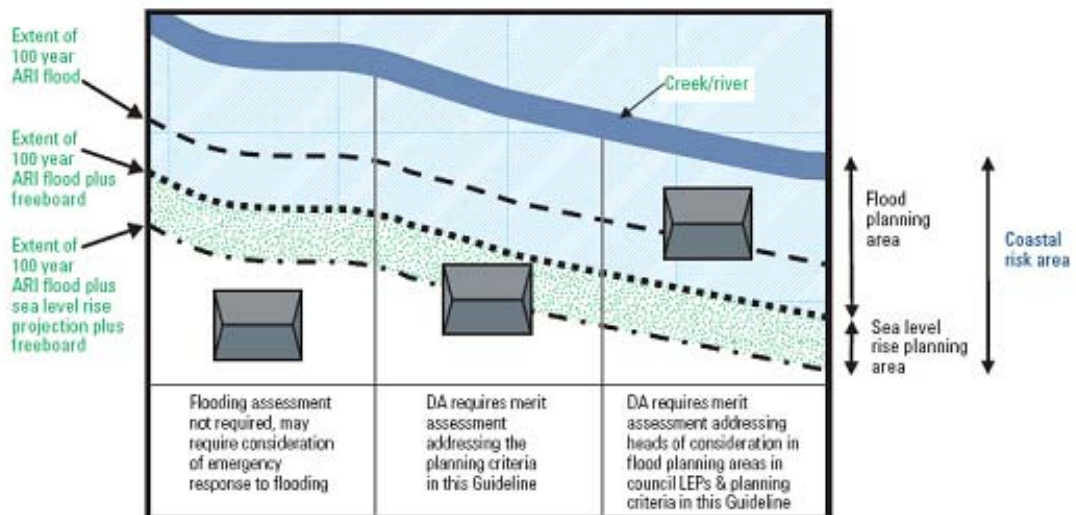


Figure 9: Coastal inundation consideration in planning approval assessment in NSW



Likewise, in relation to flooding (Figure 9) all development that falls within or below the sea level rise planning area will require merit assessment addressing the planning criteria in the guideline. Furthermore, council's existing flood planning requirements continue to apply in the flood planning area. Development located outside the coastal risk area may still require consideration of flood emergency response such as adequate evacuation routes, especially in cases where the site is wholly surrounded by low-lying areas susceptible to flooding.

In addition, two draft guides have been prepared to assist councils in preparing coastal hazard and flood studies to incorporate the sea level rise planning benchmarks:

- Draft Coastal Risk Management Guide: Incorporating the sea level rise benchmarks in coastal hazard assessments (DECCW 2009a); and
- Draft Flood Risk Management Guide: Incorporating the sea level rise benchmarks in flood risk assessments (DECCW 2009b).

The *Draft Coastal Risk Management Guide: Incorporating sea level rise benchmarks in coastal risk assessments*³⁶ proposes that for consideration of sea level rise beyond 2100, an additional 0.1 metres per decade allowance can be used above the 2100 benchmark level. And that until more sophisticated methodologies are available, the Bruun Rule approach is recommended for estimating the likely width of shoreline recession attributable to sea level rise.

10.3 Tasmania

An example of local government in Tasmania dealing with coastal climate change is the City of Clarence, which is located on the eastern shore of the Derwent River and across the river from the City of Hobart. The Council assessed the impacts of sea level rise of both a 0.5 metre rise and a 0.9 metre rise by 2100.

The emphasis of the coastal hazard management assessment of the City of Clarence work is on **encouraging performance based responses that maintain acceptable levels of risk over the life of the structure**. Thus a dwelling designed to be moved back from a moving erosion face, piled to be stable in spite of erosion and capable of withstanding waves or a structure designed to be elevated readily as sea levels rise could also be acceptable. In addition there is a need to allow existing owners to re-evaluate their choices and to suffer minimal losses from the changing conditions. As existing owners were not aware of the developing risk and are not in control of the causes of this developing risk, it is proposed that **for a period of 25 years, risk reduction and management measures be borne by the wider community**. After that time, the cost of further risk management measures would be the responsibility of those that benefit from coastal use or occupation. Risk management works undertaken by the Council could be paid for by a special coastal risk reduction rate in affected areas. Funding

³⁶ See www.environment.nsw.gov.au/resources/climatechange/09710draftcoastrisk.pdf

assistance from higher levels of government would be required during the 25 year transition period.

Relevant Council Planning Scheme overlays considered in the City of Clarence work include:

- Sea Level Rise and Storm Surge Overlay
- Coastal Management Overlay
- Inundation Overlay

10.3.1 Subject to Inundation Overlay

This overlay includes identifying areas subject to inundation and precludes development that will be affected by floodwater or flows. It is not specifically aimed at flooding from the sea however the final clause in the design requirements specifies that the effects of sea level rise must be included.

For areas within the overlay, development is discretionary and a permit is required for all use and development except within an existing building, those activities normally not requiring a permit and some other specified works. In addition to the usual Application Requirements an application for use or development under this overlay are required to be accompanied by a report, from a suitably qualified person, demonstrating that (based on a 1 in 100 year event):

- (a) The proposal will not have a significant affect on flood flow;*
- (b) Any habitable areas of a dwelling will not be subject to inundation;
and*
- (c) The development will not cause an unreasonable risk to the life of the users of the site or damage to property.*

Specific Decision Requirements are:

- (a) Mitigation measures should be sufficient to ensure habitable buildings will be protected from flooding;*
- (b) Any mitigation measures should also protect any protected environmental values and use of the water body or catchment.*
- (c) Mitigation measures should also be sufficient to consider the additional cumulative impact of sea level rise, as determined by any State published and adopted authority on the phenomenon.*

10.3.2 Subject to Sea Level Rise and Storm Surge

This overlay aims to control impacts on coastal infrastructure and development from sea level rise and storm surge in coastal areas as defined by a 2004 coastal vulnerability study. For areas within the overlay, development is discretionary and a permit is required for all use and development except within an existing building, those activities normally not requiring a permit and some other specified works.

Development application within the overlay must include, where relevant, information to show, among other things:

- How hazard risk can be mitigated through an identification of structural or siting methods to avoid damage to or loss of buildings and other works.
- That the development will not increase the level of risk of hazard for adjoining or nearby properties or public infrastructure.
- That the need for future remediation works is minimised.
- That important natural features are adequately protected.
- Hazard risk can be mitigated through identification of measures to be used to modify the hazard.
- The health and safety of individuals is not placed at risk.

Specific Decision Requirements associated with this overlay include indemnifying Council and other relevant bodies *against future actions arising from the effects of sea level rise and storm surge activity where necessary.*

10.3.3 Coastal Management Overlay

The purpose of this overlay is to implement the provisions of the State Coastal Policy. Development is prohibited within the frontal dune system, and within 50 metres of any tidal flat, saltmarsh or lagoon, (excluding rehabilitation and conservation activities, aquaculture, works, structures and demolition associated with access to the water or foreshore). Generally a permit is required for all use and development except for changes to an existing building and approval is at the Council's discretion.

The project report proposes some amendments to these overlays, for example restricting the changes to existing buildings where a permit is not required, encouraging elevated floor levels and providing Council with the ability to raise a special levy where the inundation overlay applies.

In addition to the reviews of each area assessed and related recommendations there is much useful discussion and comment for

consideration for building resilience into planning system under climate constrained environment. Below is a small selection.

The degree of variability makes setting 'universal' setbacks or elevation standards questionable as they will be far too conservative in some areas and unsafe in others. As the community generally expects that development standards are there to make development 'safe', local standards based on evaluated risk are preferred.

*While setting floor levels to suit 2100 high scenario flood effects or set backs for erosion may be appropriate as a general 'deemed to comply' basis for development, it is suggested that the emphasis should be on **encouraging performance based responses that maintain acceptable levels of risk over the life of the structure.** Thus a dwelling designed to be moved back from a moving erosion face, piled to be stable in spite of erosion and capable of withstanding waves or a structure designed to be elevated readily as sea levels rise could also be acceptable.*

With current sea level rise projections, development proposals for any land below 10 m Australian Height Datum⁹ (AHD) and/or within 500 m of the coast need at least a cursory consideration of whether more detailed assessment is required. The 10 m level is suggested as it is readily identifiable on Council's GIS system and above any calculated wave runup level within the foreseeable 100 year planning period used in this report. Road access to sites also needs to be considered, for even if a site itself is above any inundation level, access to the site may be restricted during storm events.

The report also gives indicative costs for various mitigation works and evaluating options. For example raising a suburban road 0.5m is likely to cost in the order of \$400 per m of suburban roads and \$600 per m of road for suburban roads raised 1 m. Major highways would be more expensive, \$1500 per m or more including hardening the seaward face depending on the height and level of exposure to waves.

10.4 Queensland

The Sustainable Planning Act 2009 has replaced the Integrated Planning Act 1997 and regulates Queensland land use and development system. The new Act establishes standard planning scheme provisions (Queensland Planning Provisions (QPPs) and includes the following overlays:

Erosion management overlay - *to be used for areas prone to erosion, landslide or other land degradation processes.*

Landslide hazard overlay - *deals with areas of land identified pursuant to the requirements of State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide. It may include areas of land identified within the local government area as having landslide potential.*

Flood hazard overlay - *deals with areas of land identified by State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide. It may include the following areas of land identified within the local government area as:*

- *areas of land with flooding and inundation potential*
- *overland flow paths identified locally.*

Coastal management overlay - *deals with locally identified coastal management areas.*

The principal Act regulating coastal planning in Queensland is the Coastal Protection and Management Act 1995. The Act provides for the development of a State Management Plan for the coastal zone, as well as Regional Management Plans. A draft revised Coastal Plan has been developed in consideration of the *Sustainable Planning Act 2009*.

The draft Coastal Plan includes the following elements:

- Draft State Policy Guideline Coastal Management
- Draft State Planning Policy Guideline Coastal Protection
- Draft Guideline Coastal Hazards

This suite of drafts under the umbrella of the Coastal Plan has aims to:

- *maintain physical coastal processes*
- *conserve and protect coastal resources continue public awareness and appreciation of coastal resources*
- *retain and enhance public access to the coast*
- *protect life and property from coastal hazards (such as coastal erosion and storm tide inundation)*
- *identify opportunities for suitably located maritime development*
- *ensure ecologically sustainable development of the coastal zone*

The draft Coastal Plan requires that coastal hazard risk assessments are to be based on:

- *A planning period of 100 years for coastal development;*

- *Projected sea level rise of 0.8 metres by 2100 due to climate change (relative to 1990 value);*
- *The 100-year average return interval for extreme storm event or water level; and*
- *A 10 per cent increase in cyclone intensity (relative to maximum potential intensity) due to climate change.*

Fundamentally, it is proposed to consider sea level rises of 30cm by 2050 and 80cm by 2100.

10.4.1 Draft State Planning Policy Coastal Protection

This draft policy ³⁷ sets out criteria for land-use planning and development assessment within the coastal zone. Included in the outcomes sought by this policy is:

Development in the coastal zone¹, is planned, designed, constructed and operated to:

- *Ensure the protection of people and property from coastal hazard taking into account the predicted effects of climate change; and*
- *Allow for natural fluctuations of the coast to occur including as a result of sea level rise; and...*

Generally, the draft policy prefers that development is located outside areas at risk of coastal hazards—to avoid risks to public safety and minimise potential future disaster response costs. It does not support expansion of urban areas into areas at risk of coastal hazards. There will be situations where development already exists or an area has been identified for development in areas at risk of coastal hazards. In these situations redevelopment or infill development is acceptable if it is located, designed and constructed to withstand or avoid the impacts of coastal hazards. Where an area has been committed to planned development, erosion prone areas and high hazard inundation areas are to be avoided.

Maps have been developed to help determine which properties are within the coastal zone and where the draft policy would apply. It is proposed under the draft Policy that the coastline potentially affected by erosion over a nominated planning period be set aside as a development-free buffer zone.

³⁷ http://www.derm.qld.gov.au/coastalplan/pdf/policy_coastal_protection.pdf

10.4.2 Draft State Policy Guideline Coastal Management

It identifies coastal hazards as being coastal erosion and storm tide inundation or permanent inundation due to sea level rise and provides a table of outcomes resulting from coastal hazards as well as possible solutions to protect against these hazards. For example for:

- For development in an urban area with a high potential for storm tide inundation possible solutions include the designing and constructing development to withstand hydrostatic and hydrodynamic storm tide forces and locating above the storm tide event level or constructing buildings which can be relocated or are temporary or can be abandoned or ensuring that only development which is used on a short term or intermittent basis takes place in the area. It also proposes that future urban areas in a high hazard zone be used for maritime, open space or sport and recreation facilities and that it be built to withstand sustain regular high intensity flooding.
- Essential services is able to function effectively during and immediately after a recommended storm tide event by either not locating that has been identified by storm tide hazard mapping or it can withstand the inundation.
- All development does not increase the severity of the storm tide event related impacts offsite of the property by not including any physical alteration to the high hazard zone or minimizes alteration impacts.
- All coastal works are designed and located to minimize disruption to physical coastal processes and coastal processes and coastal landforms.
- Development is built to avoid significant adverse effects to ecological values within and adjacent to the development site or where this is not possible then the effects are minimised.
- With the exception of maritime development is not located within 100 metres of coastal wetlands or there is sufficient setback to protect the wetland ecosystems and habitat values and allow for fluctuations such as sea level rise.
- Development avoids disturbing nesting shorebirds by providing a vegetated buffer during construction and operation and the quality and extent of the habitat is maintained.

10.4.3 Coastal Hazards Draft Guideline

This guideline³⁸ describes coastal hazard as a collective term for:

- *Coastal erosion—the wearing away of land or the removal of beach or dune sediments by wave or wind action, tidal currents, wave currents or drainage.*
- *Sea level rise inundation—permanent inundation of land due to a rise in sea level.*
- *Storm tide inundation—temporary inundation of land by abnormally high ocean levels. Storm tide means the effect on coastal water of a storm surge combined with the normally occurring astronomical tide.*

It proposes retreat, beach nourishment or coastline defence as options for countering erosion. Where retreat is the preferred option under the *Queensland Coastal Protection and Management Act 1995*, in certain circumstances land can be surrendered to the State as a condition of a development approval. The State can then ban further development.

Coastline defence such as building sea walls are not regarded as a preferred management tool because they interfere with natural beach processes and often result in deterioration of the original beach.

10.5 Western Australia

The Western Australian State Coastal Planning Policy (Planning Policy No. 26)³⁹ which comes under the *Planning and Development Act 2005* has as one of its objectives:

...ensure that the location of coastal facilities and development takes into account coastal processes including erosion, accretion, storm surge, tides, wave conditions, sea level change and biophysical criteria.

It requires that a coastal planning strategy and/or a foreshore management plan be developed and these should take into account coastal processes and sea level changes.

In addition new buildings and foreshore infrastructure on the coast is to be positioned so that they avoid damage from coastal processes as well as the need seawalls and other physical structures for protection.

³⁸ http://www.derm.qld.gov.au/coastalplan/pdf/coastal_plan_guide_coastal_hazards.pdf

³⁹ 10 June 2003 GOVERNMENT GAZETTE, WA, *State Coastal Planning Policy* 2061

The Policy includes setback guidelines to be used to determine setbacks to accommodate coastal processes. The determination of the setback uses the Bruun rule and 0.38 metres sea level rise (based on the *Third Assessment Report of the Intergovernmental Panel on Climate Change Working Group, 2001*).

10.6 Advisory Committee Response

In reviewing the various approaches being undertaken by other state governments around the country it is clear to the Committee that the effects and climate change on the coast and sea level rise impacts in particular are being seriously considered. Coastal flooding and erosion of coastlines are being planned for with different approaches based on the particular legislative structure that each state has.

Five states in Australia have established sea level rise benchmarks:

- Victoria has a benchmark of 80cm by 2100;
- NSW is proposing to introduce a stepped approach to sea level rise up to 2100 with a sea level rise benchmark of 0.4 metres by 2050 and 0.9 metres by 2100;
- Queensland are proposing to consider a sea level rise of 30cm by 2050 and 80cm by 2100;
- South Australia has benchmarks of 30cm by 2050 and 100cm by 2100; and
- Western Australia advises of a 38cm rise in sea levels by 2100.
- Tasmania has not adopted a sea level rise benchmark but has instead adopted a risk based approach that requires a decision maker to take into account the location and planning life of a development.

With the exception of Victoria, each of the states is reviewing their respective benchmarks. Even so, the levels of the NSW benchmarks are similar to those of the other states, with the exception of Western Australia. The difference between the NSW benchmarks and those of the other states result from the inclusion of regional variation that is attributable to the effect of the East Australian Current in NSW.

South Australia and NSW appear to have in place systems that were established some decades ago with both their coastal protection legislation dating back to the 1970s. South Australia in particular has had a planning policy framework in place within their Development Plans since 1994.

Both NSW and Queensland are embarking upon reforms which are establishing a management framework which will assist with more detailed planning for coastlines and estuaries and coastal hazard risk. In NSW, the

emphasis is on local governments to prepare more detailed coastal management plans which use the sea level rise benchmarks contained in their new policy.

Queensland and Victoria use a similar 2100 benchmark, while South Australia applies a two stepped approach to sea level rise of 0.3 metres by 2030 and a further 0.7 metres by 2100 accumulating to a 1.0 metres rise by 2100. The Queensland approach is a suite of policy and guidelines that enables individuals and/or governments to prepare detailed coastal hazard risk assessments.

With respect to zones, only South Australia offers useful insights into how zoning could be used to address coastal hazards with the use of both the Coastal Conservation Zone and the Coastal Settlement Zone.

In NSW the emphasis is on coastal management plans with some guidance offered with respect to policy in a standard LEP. It is interesting to note that NSW is intending to pursue further legislative amendments to assist the implementation of its State policies, for example to allow Councils to implement a coastal protection service charge, and to issue stop-work orders for actions likely to result in significant erosion.

Queensland offers little guidance on the use of zones or overlays apart from some standard overlays under their standard planning scheme template. Tasmania on the other hand has both a Coastal Management Overlay and Sea Level Rise and Storm Surge Overlay that offer useful insights into any overlay for use in Victoria.

With regards to planning policy it appears that South Australia offers an example of how detailed policy at a statewide level can be used to effectively and clearly express desired outcomes.

The Committee is interested in responses about whether a new zone should be introduced into the VPP or an existing zone amended to address coastal climate change impacts. Should zones similar to those used in South Australia be considered?

Similarly, should an existing or new overlay be amended/developed to relate to both protection and hazard management?

Finally, is the policy framework satisfactory particularly given the re-structure proposed for the SPPF?

11. Lessons from Other Jurisdictions - International

Informed by RMIT University's Barbara Norman's high level review *Planning for coastal climate change – an insight into international and national approaches* (June 2009)⁴⁰ literature from Canada, the USA, the United Kingdom, New Zealand and South Africa has been reviewed for this issues paper.

The United Kingdom and New Zealand have made considerable progress in developing and implementing planning legislation and other controls to tackle the impacts of climate change in coastal areas. Both these countries take a risk-based approach as outlined below.

In the United States there does not appear to be any substantive work in the generally considered, more progressive coastal states such as California, Florida or New York on considering climate change impacts in planning legislation.

Canada's New Brunswick is regarded as being one of the more progressive provinces in addressing climate change coastal impacts. To date it has a Coastal Areas Protection Policy (2001?) which outlines a number of objectives to manage land-based coastal resources. It has adopted three zones to control development however it does not have the depth and comprehensiveness of UK and New Zealand in considering and responding to the issues relevant to this paper. South Africa recently passed its *Integrated Coastal Management Act* (2009). As explained below this Act defines the coastal boundaries including inland shifts due to sea level rise and lays down directives for loss of privately owned land resulting from erosion.

11.1 United Kingdom

The United Kingdom has on many occasions experienced significant flooding events that have been due to meteorological conditions typified by heavy rainfall, high tides and storm surge. The UK has an ongoing flood maintenance program and has extensive coastline defence systems which

⁴⁰ www.climatechange.vic.gov.au

have been strengthened, raised and extended over time to protect the 30 million people who live in urban areas along the coast.

The iconic Thames Barrier, a mitigation measure, has been used to protect London from tidal flooding (exacerbated by land slippage) since the mid 1980s. Under normal conditions the ten gates that make up the Barrier allow river traffic into and out of the Thames but shut when tidal surges are forecast. As of February 2009 the Thames Barrier has been used 114 times to protect London from flooding⁴¹. In recent times the barriers have been overtopped.

Other measures used in the UK to mitigate flooding are embankments, walls, weirs, sluices and pumping stations as well as natural methods called 'soft defences' which use mudflats and saltmarshes to provide space for floodwater and prevent flooding from occurring elsewhere.

11.1.1 Climate Impacts Programme (UKCIP)

In 1997 the UK established its Climate Impacts Programme (UKCIP) *to help co-ordinate scientific research into the impacts of climate change, and to help organisations adapt to those unavoidable impacts.* ⁴² The UKCIP technical report *Climate adaptation: Risk, uncertainty and decision-making*⁴³ focuses on risk assessment using the following decision making framework to identify no regrets climate adaptation options:

- Stage 1 Identify problem and objectives
- Stage 2 Establish decision-making criteria
- Stage 3 Assess risk
- Stage 4 Identify options
- Stage 5 Appraise options
- Stage 6 Make decision
- Stage 7 Implement decision
- Stage 8 Monitor, evaluate and review.

This framework represents a risk based assessment process in dealing with climate change impacts including coastal flooding and erosion and was developed to help identify important risk factors, and to describe their relative uncertainty and implications for decision making.

⁴¹ www.environment-agency.gov.uk/homeandleisure/floods/105281.aspx

⁴² www.ukcip.org.uk

⁴³ UKCIP (2003) *Climate adaptation: Risk, uncertainty and decision-making*, editors R Willows and R Connell

11.1.2 Making Space for Water

In the UK, the general approach to climate change adaptation in coastal areas has been promoted under the *Making Space for Water* (DEFRA 2005) strategy which recognises the need for managed retreat or managed realignment in coastal areas at risk of inundation and/or erosion. This includes recommendations for flood risk assessment in the planning process (see below). A risk based approach based on a hierarchy of appraise, avoid, manage and mitigate impacts is proposed. Shoreline Management Plans are proposed as an integral aspect of the policy reforms and will identify key local risks and management options. The policy framework seeks to ensure that inappropriate development should not be permitted in vulnerable areas and that in areas that have traditionally been protected; consideration is being given to re-flooding parts of the coast as the British Government realizes that it cannot economically sustain the fight against nature. Over 6,000 miles of coast has been surveyed to determine which areas should be afforded protection and which left to nature.

11.1.3 Planning Policy Statement 25: Development and Flood Risk

The UK's *Planning Policy Statement 25: Development and Flood Risk* (December 2006) is the Government's policy for preparing Regional Spatial Strategies and in the preparation of local development regulation documents in relation to flood risks.

The Statement requires the regional and local planning authorities prepare flood risk appraisals and measures to reduce flood risk such as sustainable drainage systems, surface water management plans, providing flood storage, recreating floodplains and setting back defences. It uses a risk based approach and requires that all new developments in flood risk areas are appropriately flood resilient and resistant including safe egress during emergencies. It proposes that relocation of existing development could be an option where climate change is expected to increase flood risk.

The Statement has sequential flood zones which determine whether land in flood risk areas is suitable for development. The four flood zones are:

- Flood Zone 1 – has a low probability of flooding - a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%). All uses of land are appropriate in this zone. Developers and local authorities should also seek opportunities to reduce the overall level of flood risk in this area and beyond.
- Flood Zone 2 – has a medium probability of flooding - between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%), or between

a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year. The water-compatible, less vulnerable and more vulnerable uses are allowed in this zone.

- **Flood Zone 3a** – has a high probability of flooding - a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year. Infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood. Authorities should aim to reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques, relocating existing development to land in zones with a lower probability of flooding, or by creating space for flooding to occur.
- **Flood Zone 3b** is functionally a floodplain and comprises land where water has to flow or be stored in times of flood. There is an annual probability of 1 in 20 (5%) or greater in any year of flooding, or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the local planning authority and the Environment Agency, including water conveyance routes). Only the water-compatible uses and some listed essential infrastructure are allowed in this zone. Developers and local authorities should seek opportunities to: relocate existing development to land with a lower probability of flooding (among other things).

The Statement then goes on to classify highly vulnerable (e.g. basement dwellings and mobile homes), more vulnerable (e.g. hospitals, dwellings and landfills) and less vulnerable land uses and developments (shops, water treatment plants and general industry) as well as water compatible development (e.g. docks, marinas, ship building lifeguard and coastguard stations and outdoor recreation facilities) and essential infrastructure.

Exceptions can be made to locate certain development in a less than suitable zone if certain conditions are met.

11.1.4 Planning Policy Statement: Planning and Climate Change: Supplement to Planning Policy Statement 1

Planning Policy Statement: Planning and Climate Change: Supplement to Planning Policy Statement 1 (December 2007), sets out how planning should contribute to reducing emissions and stabilising climate change and take into account the unavoidable consequences. This is through, among other things, minimising vulnerability when selecting land for development and considering sea level rise and flood risk in spatial planning.

One of the key planning objectives with regards to responding to climate change is for planning authorities to plan to minimise vulnerability and provide resilience to new development and places and to conserve and enhance biodiversity and recognising that habitat distribution will be affected by climate change. The Policy also requires planning authorities to apply the following principles in their strategic planning and decision making:

- *New development should be planned to minimise future vulnerability in a changing climate;*
- *Mitigation and adaptation should not be considered independently of each other, and new development should be planned with both in mind;*

In preparing the Regional Spatial Strategy regional planning bodies are advised to:

- *Consider the region's vulnerability to climate change using, for example, the most recent climate change scenarios available from the UK Climate Change Impacts Programme (UKCIP)¹³, and specifically the implications for built development, infrastructure and services¹⁴ and biodiversity;*
- *Consider the desirability of avoiding new development in those areas with likely increased vulnerability to the effects of climate change, particularly where it is not viable to manage likely risks through suitable measures to provide resilience; and*
- *Bring forward adaptation options for existing development in likely vulnerable areas.*

In selecting land for development planning authorities are advised to include in their consideration:

- *The effect of development on biodiversity and its capacity to adapt to likely changes in the climate;*
- *Known physical and environmental constraints on the development of land such as sea level rises, flood risk and stability, and take a precautionary approach to increases in risk that could arise as a result of likely changes to the climate.*

And in determining planning applications, planning authorities should also consider the likely impact of proposed development on (amongst other things), *the vulnerability to climate change of existing or proposed development.*

11.1.5 The London Climate Change Adaptation Strategy, Draft Report

London with its high population density is particularly at risk to sea level rise and flooding because of the position on the Thames, its low level and ground movement. It is prone to five flood sources - tidal flooding from the sea, fluvial flooding from the Thames and its tributaries, surface water flooding from heavy rainfall overcoming the drainage system, from the sewers and from rising groundwater.

This puts both its people and its infrastructure including the London Underground, road tunnels and the City Airport as well as bridges and embankments in jeopardy during severe meteorological events and, over time, climate change impacts. The Mayor of London's, *The London climate change adaptation strategy, Draft Report*, (Greater London Authority, August 2008) proposes proactive and reactive measures based on risk assessment that are categorized as preventative, preparatory, responses and recovery measures. The risk assessment includes a vulnerability measure that is an assessment of the number of receptors (people and/or assets) that could be at risk. The Mayor of London who has responsibility for setting out planning and development plans and policies for London, has indicated that *on some stretches of the tributaries to the Thames, the standard of protection is below the level at which insurers are committed to provide insurance.*⁴⁴

The Mayor's strategy states that 15 per cent of London currently lies in the 'high' risk flood zone, including 1.25 million people and extensive public infrastructure and that the risk is increasing of climate change and because of new development on flood plains. It is claimed that without the protection of its flood defences, much of London would flood twice a day, every day on each high tide. Londoners can register to receive an automated flood warning is sent by fax or phone when a fluvial flood is predicted.

London has taken a heavy engineering approach to reduce the impact of floods and while it is recognized that has had a negative impact on biodiversity and amenity, further structural and non- structural flood risk measures are being considered. These are given in the following table.

⁴⁴ Greater London Authority, *The London climate change adaptation strategy, Draft Report*, August 2008

Table 5: Flood risk management techniques proposed for London

Structural measures	Non-structural measures
Flood defence walls and gates	Not locating flood-vulnerable development and infrastructure in high flood risk areas
Set back defences (giving rivers room)	Public awareness
Modify land levels (raise or lower)	Flood warning systems
Storm drains	Public contingency plans
Secondary flood defences	Business continuity measures
Temporary flood storage	Emergency services capability
Flood conveyance channels	Flood insurance
Emergency access and egress routes	'Risk trading'
Flood resilient design	
Sustainable urban drainage	

Some of the actions proposed in the strategy are to:

- *Work with the Environment Agency to plan the next generation of tidal flood defences; encourage the restoration of London's rivers to provide flood storage.*
- *Improve the permeability of London's urban landscape through an urban greening programme.*
- *Review the London Strategic Flood Response Plan to identify the key assets at risk.*
- *Promote flood resilient design for development at highest risk and raise public awareness through an information campaign.*
- *Lobby government and insurers to provide a mechanism that encourages property owners at flood risk to retrofit their properties to make them appropriately flood resilient or resistant.*
- *Require developers building in areas of flood risk to contribute to the development and maintenance of a local flood emergency response plan (in consultation with the borough flood response plan, where this exists).*
- *Encourage boroughs to produce flood recovery plans that identify their likely immediate and long-term recovery commitments.*

In addition, and of interest, the draft strategy mentions that most London Boroughs are undertaking Strategic Flood Risk Assessments and that the Government's water strategy proposes that the permitted development right to allow the paving over of front gardens will be removed if impermeable surfaces are used.

11.2 New Zealand

In New Zealand the approach to managing coastal impacts of climate change is based on a combination of national, regional and local planning policy statements and statutory plans all governed and required under the *Resource Management Act 1991*.

11.2.1 New Zealand Coastal Policy Statement 2004

The *New Zealand Coastal Policy Statement 1994* is the current national policy (although it is about to be replaced with a revised policy statement- see below) which, in relation to climate change impacts requires:

- Policy statements and plans recognise the possibility of sea level rise and should identify areas which would be subject to erosion or inundation due to sea level rise.
- Future subdivisions, uses and development should take into account that some natural features may migrate inland as a result of dynamic coastal processes including sea level rise.
- Natural systems, which are a natural defence to erosion and/or inundation, should be identified, and their integrity protected and new subdivision, use and development should be so located and designed that the need for hazard protection works is avoided.
- Abandonment or relocation of existing development threatened by coastal hazard should be considered.

11.2.2 Proposed New Zealand Coastal Policy Statement 2008

The Proposed *New Zealand Coastal Policy Statement 2008* has as one of its objectives that coastal hazard risks *are managed increasingly by locating or relocating development away from risk areas, protecting or restoring natural defences and discouraging recourse to hard protection structures*.

The proposed Statement specifies policies which, in summary, consider the following:

- Reclamation - the expected effects of climate change and sea level rise, over no less than 100 years, needs to be considered and reclamation should avoid consequential erosion and accretion (Policy 27).
- Hazard identification – both short term and long term (100 year time frame) high risk coastal environments should be identified, including those at risk from the effects of climate change including sea level rise, on hazard migration, fluctuating erosion and accretion, storm frequency and intensity and surges, coastal dynamics (Policy 51).

- Development in hazardous areas – subdivision and redevelopment should be avoided in these areas and retreat, relocation removal or abandonment of existing structures shall be managed or existing development replaced, or modified without the use of hard protection structures (Policy 52).
- Protection of structures - alternatives to hard protection structures should be considered including soft engineering solutions, relocation, removal and abandonment (Policy 54).

11.2.3 Coastal Hazards and Climate Change Guidance Manual for Local Government.

In 2008 New Zealand's Ministry for the Environment published the second edition of its coastal hazards and climate change guidance manual for local government.⁴⁵ This manual provides a risk assessment framework for incorporating coastal hazard and climate change considerations into policy and planning. The manual aims to promote long-term adaptive capacity for managing coastal hazard through adaptive management and no-regrets options. It advocates that a paradigm shift is required that changes the way we view coastal changes. For example: rather than considering erosion as a hazard, it should be recognised a natural cyclic processes; decisions about coastal management should take a more balanced and long term holistic approach rather than the focus being on short term single issues focus; and, being proactive rather than reactive in managing coastal hazards.

A move to this paradigm shift will have challenges in changing perceptions of existing use rights, the permanency of property and the roles and responsibility of local government to provide to protection against the impacts from coastal hazards.

The principles used in the manual are:

- Precautionary approach using scientific knowledge, and uncertainties, as well as risk assessment when considering new development and changes to existing development;
- Progressive risk reduction so new development is not exposed to risk in the future;
- Coastal margin importance as the fundamental defence and as an environmental, social and cultural resource;
- Integrated, sustainable approach in coastal management.

⁴⁵ Ministry for the Environment (2008) *Coastal Hazards and Climate Change. A Guidance Manual for Local Government in New Zealand*, 2nd edition, Ramsay, D, and Bell, R. (NIWA), prepared for Ministry for the Environment.

The Manual recommends the use of IPCC Fourth Assessment Report sea level rise predictions with at the very least *a mean sea-level rise of at least 0.8 m relative to the 1980–1999 average* for time frames to the end of this century and an allowance for sea-level rise of 10 mm per year beyond 2100 (possibly for many centuries). Consideration also needs to be given to higher tides, more frequent storm surges, waves, swell, coastal sediment supply, rising ground water tables and consequential coastal flooding and saline water encroachment in the coastal margins.

In considering a risk management approach to coastal climate change impacts the guideline suggests that:

- In undeveloped coastal areas, identify and understand coastal hazard risks, then plan to avoid new developments in coastal hazard areas; and
- In partly developed coastal areas and developed coastal areas, in addition to the above items, plan to sustainably reduce coastal hazard risks in areas already developed or subdivided using a risk-based approach, and plan for evacuation.
- For greenfields sites, new development should be located landward of defined coastal hazard zones. Planning provisions should implement appropriate controls to give effect to this.

Suggestions for dealing with existing development located in areas likely to be impacted by coastal hazards in the future include information and education, land use planning regulation and controls, land purchase and the use of soft or hard protective structures. Planned or managed retreat are proposed as commonly applied risk-reduction measure within the next few decades and the use of hard coastal protection would be the exception. Retreat includes elevating building and structures. Property title covenants and regulation prohibiting hard protection works, specifying relocation triggers and controls on land-use rights for new and existing development (such as vulnerability zoning) are suggested as retreat management methods along with financial instruments and insurance disincentives.

A range of non-statutory measures which can be used to support statutory measure for managing coastal hazards include design guidelines, structure plans and growth strategies and financial measures such as grants and rate relief.

11.2.4 Auckland Regional Coastal Plan

The *Auckland Regional Coastal Plan* incorporates climate change adaptation strategies by requiring, for example that new subdivisions avoid areas prone to the effects of sea level rise and climate change. New subdivisions should be located and designed to avoid interference with natural coastal features that have a tendency to migrate inland as a result of climate and sea level changes. One of the aims of this is to avoid the need for coastal protection measures. Further subdivision, use or development in existing developed areas prone to sea level rises should be avoided. The best available estimate of mean sea level rise for a locality should be used in assessing the effect that a rise in mean sea level may have on subdivision, use, development and protection of the coastal environment.

The Auckland Regional Council also has a policy of sharing information particularly for the identification of areas which could be subject to erosion or inundation as a result of mean sea level rise, to maintain a database of identified areas and to undertake research on the risks and impacts, and methods to avoid, remedy or mitigate hazards.

11.2.5 Environment Waikato

Environment Waikato, a regional council in the North Island of New Zealand, released a draft of its second Regional Policy Statement⁴⁶ in December 2009 for comment. Regional Policy Statements (RPS) which aim to integrate the management of natural and physical resources across the Region by setting objectives, policies and programs and identifying anticipated environmental outcomes, are a requirement of New Zealand Resource Management Act.

The draft Regional Policy Statement which incorporates issues such as sustainable management including intergenerational equity, has a policy horizon of 100 years to allow for policy actions to take effect and to plan and account for long lived infrastructure.

Under the proposed NZ Coastal Policy Statement, as discussed above, regions are required to identify areas prone to coastal hazards. The Waikato draft RPS identifies development in hazardous zones, along the coast and rivers, as one of its four regionally significant resource management issues particularly because of existing use rights, investment and emotions of

⁴⁶ www.ew.govt.nz

property owners and the expectation of private property protection, anticipated environmental effects and the stresses these place on councils as well as public amenity issues.

Included in the objectives of the Waikato draft RPS is to develop the built environment in an integrated and planned manner that among other things *anticipates and responds to climate change*. The draft provides policy guidance for managing new and existing development along the coast by using adequate setbacks to protect natural and public coastal amenity, allowing space for the coastal habitat migration due to climate change sea level rise impacts and not increasing the coastal hazards associated with erosions and inundation. It does not propose that development be stopped rather a precautionary approach be taken to proposed new development. For existing development it advocates realigning setbacks through relocation or retirement or surrender of land where that development poses an impediment to changes to natural features.

A risk-based approach based on avoidance or mitigation of natural hazards, such as coastal processes which could cause erosion, inundation and land instability on use and development, is proposed. This approach which is to incorporate predicted effects of climate change and use a precautionary approach, is aimed at protecting personal health and safety, public and private property assets, infrastructure and essential community services.

Primary and residual natural hazard zones over a 100-year timeframe are to be identified on maps. Existing development is to only continue in a natural hazard zone if risks can be reduced through redevelopment and will not continue if the risk is too high. Proposed new subdivision, use and development can only go ahead if there is no increase in natural hazard risk and the use of any structural defences are avoided.

11.3 South Africa

In February 2009 South Africa passed a comprehensive *Integrated Coastal Management Act* which among other things:

- Defines a coastal protection zone as land within one kilometre of the high water mark including agricultural land and not already zoned including coastal wetlands, lakes and dams and any land which would be inundated in a one in 50 year flood or storm event. One of the main aims of the coastal zone is *to protect the ecological integrity, natural character and the economic, social and aesthetic value of coastal public property and to protect people, property and economic activity from risks arising from dynamic coastal processes including the risk of sea-level rise*. If the high-water mark moves

inland due to erosion of the coast, sea-level rise or other natural causes, the coastal protection zone also moves and an owner of land situated inland of the high-water mark loses ownership of any portion of that land that becomes situated below the high-water mark. That owner is not entitled to compensation for the loss of property. Conversely where accretion occurs the land becomes public property.

- Prohibits a person from building, extending or maintaining structures designed to prevent or promote erosion or accretion of the seashore and also may not require the government to do so either. However there are exemptions at discretion, following consultation, of the Executive Council of the lead agency in a province.
- An area that requires protection can be declared a *Special Management Area*.
- Coastal set backs, potentially wholly or partially in the coastal zone can be established beyond which building is prohibited or restricted. For example Cape Town has a coastal development guideline that prohibits new development below the 5m contour level.
- Development cannot take place in a coastal protection zone.
- Development cannot take place if it is, without mitigation likely to cause irreversible or long lasting adverse effects to any aspect of the coastal environment, or it cannot be satisfactorily mitigated, or the development is likely to be significantly damaged or prejudiced by dynamic coastal processes. However authorisation can be obtained if the activity or development requires it to be in a coastal protection zone or provides an important service to the public when using the coast.
- Coastal leases can be for no more than 20 years.

The Act requires that each province appoints a Provincial Coastal Committee and allows for the appointment of municipal coastal committees. It requires that municipal land use schemes are consistent with the Act and gives the Minister the authority to establish and implement Coastal Planning Schemes in areas which straddle the border between two provinces and to repair or remove structures, rehabilitate coastal land within a coastal protection zone.

11.4 Canada

In New Brunswick in Canada, a *Coastal Areas Protection Policy for New Brunswick* establishes objectives for planning for coastal climate change including:

- To reduce the likelihood of threats to personal safety by storm surges and to minimize the danger to personnel involved in emergency and rescue efforts during storm and/or flooding events;
- To maintain the buffering capacity of coastal areas to protect inland areas from storm surges;
- To maintain flora and fauna, both for the role they play in traditional fisheries and eco-tourism, as well for their inherent value in maintaining the coastal eco-system; and
- To minimize public expenditures required to repair storm damage to public property such as roads, bridges, public buildings and so on, as well as to reduce the expenditures required to control erosion as a means of protecting human-made structures.

To implement these policies, three coastal zones exist:

- Zone A - the areas closest to the water known as the coastal lands core area and encompassing the more sensitive areas such as beaches, dunes and marshes. The activities are acceptable in this zone:
 - The maintenance or enhancement of the coastal feature, e.g. sand fencing or planting native dune grasses to protect sand dunes;
 - Acceptable erosion control structures;
 - Development associated with access and interpretation for educational or research purposes;
 - A development or undertaking to protect a coastal feature while providing approved public or private access to a shoreline, e.g. a boardwalk; and
 - On coastal marshes that have been historically dyked for agricultural purposes the carrying out agricultural practices, construction of agricultural storage buildings for activities related to the use of that land, e.g. hay storage (provided no hazardous materials are stored) and allowing dyked marshlands to naturally revert to salt water marshes by removing controls.
- Zone B - the areas beyond Zone A which provide a further buffer of 30 metres and which a broader range of activities are acceptable including all activities acceptable in Zone A and:
 - The construction of a new single family residence if it meets conditions related to existing residences on either side of lot, proximity to the boundary of Zone A, size of structure, and ability to meet other regulatory requirements, e.g. septic system; and
 - Subject to a review, the repair, expansion or replacement of existing structures subject to the conditions such as the activity be

no closer to Zone A than the existing building, the total increase in size of the building does not exceed 40% of the existing building, and in the case of new or rebuilt structures, the habitable portion of the structure is at least 2 metres above the Higher High Water Large Tide elevation.

- Zone C - the areas beyond Zone B that form a transition from coastal to inland areas in which the effects of coastal climate change processes will vary greatly. The broadest range of activities in the coastal zones would be allowed in Zone C. Permitted activities would be determined according to criteria rather than prescribed activities. These criteria include the susceptibility of the area to storm surges, and the biophysical impact on the coastal ecosystem of the development.

11.5 United States of America

Generally, activity in the USA is based on each State establishing their respective frameworks within which planning for coastal climate change impacts will occur. An interesting example of land tenure management is that in Texas.

11.5.1 Texas

In Texas, a unique legal instrument called a 'rolling easement' has been developed to deal with the dynamic coastal processes along the Gulf of Mexico which result in the frequent realignment of the coast on barrier islands due to storms and hurricanes. Where a storm shifts the shoreline inland with the result that a previously landward building is located seaward, then the rolling easement requires the landowner to relocate the building landward of the new shoreline position. Encroachments such as bulkheads and seawalls are prohibited, thus ensuring that the natural coastal processes are not be impeded. Rolling easements have resulted in the development of shorefront properties in Texas' barrier islands primarily built on pilings or stilts in order to be easily moved when the coastline shifts. It has been argued that one benefit of the rolling easement, compared to mandated setbacks, is that it does not deprive a landowner of all economic use of one's property. Another benefit is that it obviates the complicated decision of where to delineate a setback⁴⁷.

⁴⁷ VPELA briefing report to Coastal Climate Change Advisory Committee.

11.6 Advisory Committee Response

In reviewing the various key approaches internationally it is clear to the Committee that the effects of climate change on the coast and sea level rise impacts are being considered by countries around the globe. Although the methods vary due to the different forms of legislative systems that operate in different countries, it is clear that the general use of a risk management approach to addressing coastal impacts of climate change is common place. It is also noticeable that key principles being applied include; the general concept of avoiding further development in identified vulnerable areas; protection of natural coastal systems at risk and providing direction for community safety at risk from coastal hazards.

The hierarchical approach undertaken in New Zealand is interesting because it involves national, regional and local planning directions and initiatives. This is something that may be prudent for Australia with Commonwealth Government leadership and more importantly financial support for actions that involve protection and acquisition of important and threatened coastal environments.

The Committee believes that there are key lessons to learn from these international examples. There is the importance of surveying the coastline to identify the degrees of vulnerability to coastal flooding and erosion hazards. The results of this work needs to be used to inform strategic planning processes preferably on a regional and/or local government scale. In this way key areas of the coast both developed and undeveloped that are vulnerable can be planned for with the application of planning controls and guidance to ensure avoidance of risk to public safety, damage to buildings and works and maintenance of environmental values.

The Committee is interested to know whether the concept of rolling easements used in Texas, or the hierarchical zoning approach used in New Brunswick would be appropriate to introduce in legislation and planning schemes respectively. Or would the structured risk assessment approach under taken in New Zealand and the UK be more advantageous for Victorian conditions?

From what the Committee views, the key issues appear to be:

- Protection of important environmental values such keeping our beaches, maintaining public access to the coast for recreation and allowing our mangroves, coastal saltmarsh to migrate landward in response to

increased tidal inundation and estuaries to continue to function and provide their ecosystem services, such as fishery production.

- Avoiding new development in areas identified as vulnerable to coastal inundation and/or erosion.
- Identifying key areas where development exists that should be protected to reduce the extent of flooding or erosion and which should be allowed to be managed for retreat (planned retreat).

The Committee welcomes responses to these matters for its further consideration.

12. Land Use Planning in a Time of Climate Change

12.1 Principles

The Committee has identified a number of key principles that are essential to consider in looking forward, in order to try to visualise what planning may need to become in dealing with climate change on the coast, and particularly sea level rise.

These principles recognise that land use planning has a number of strengths and limitations.

12.1.1 Beyond Land Use Planning

Whilst land use planning has a broad ambit, and this is reflected in the objectives of *Planning and Environment Act 1987* as shown in Section 4.1.1, the planning system is but one element in the policy and regulatory matrix.

Many of the decision that will need to be made in coastal environments because of climate change impacts are driven by broader concerns such as political or economic imperatives, emergency management or the need to protect particular ecosystems.

In some cases the planning system (for example through strategic planning for townships) may well be at the forefront of framing the problem and developing or implementing the tools to respond to climate change impacts. However in other cases it may not be able to offer the solutions that communities need or demand and other processes will be able to respond more appropriately.

Principle: Land use planning is a tool to help determine goals and achieve outcomes sought by society, but there will be issues and situations where broader societal concerns are paramount.

12.1.2 Certainty

The certainty of the current land use planning is one of its inherent strengths. This certainty provides clear direction to the community, business and Government about future outcomes and visions for land use, development, urban and rural communities and the protection and enhancement of the

environment. At its simplest, it enables the owner of land or a prospective purchaser to appreciate the limits that society has placed on that parcel of land or opportunities it provides.

Whilst this certainty is not absolute, and land use planning changes happen every day through planning scheme amendments and development approvals, it does mean that the system of land use and development generally takes place in a logical and ordered environment.

Principle: The land use planning system must continue to provide a high level of certainty for land use and development to ensure that communities, the private sector and Government have a sound framework within which to make decisions concerning property, investment, the environment and governance.

12.1.3 Responsiveness and Adaptability

Whilst the certainty discussed in the previous principle is a great strength of the planning system, in a time of climate change the lengthy planning processes that contribute to this certainty may lack the level of responsiveness needed.

Developing new municipal strategic statements or planning scheme amendments is often a prolonged and expensive process. Undertaking a planning scheme amendment may take in the order of years to do and impose on a Council a substantial amount of resources both in terms of money and officer time and specialist advice.

This inbuilt conservatism in the system is strength as it helps to prevent overly rapid and reactive planning responses and requires a planning authority to consider carefully whether an amendment is required. However, a faster response to climate change may be needed if climate change impacts occur more rapidly than originally calculated.

Whilst State level mechanisms exist to expedite changes to planning schemes (e.g. the Ministerial amendments provided for in Section 20(4) of the *Planning & Environment Act 1987*, where no notice is required), it may be that a more streamlined 'normal' amendment process is needed.

Principle: The land use planning system must become more adaptable and flexible in the face of climate change-induced sea level rise to ensure timely planning responses can be implemented.

12.1.4 Integrated Planning Decision Making

Currently land use planning decisions in the coastal environment are made by a number of different authorities. Local Government is usually the planning authority for private land but a range of other decisions (such as Coastal Management Act consent on Crown land) may also be involved.

Strategic planning functions are also often shared, for example by Local Government as the planning authority and with the Coastal Boards who exercise a strategic planning function through the preparation of Coastal Action Plans. Whilst the Land and Biodiversity White Paper outlines new Natural Resource and Catchment Authorities that will impact on this latter role, the need to ensure consistent coordinated planning decision making remains.

In a time of climate change when already dynamic coastal environments are likely to be changing at even greater rates, planning decision making and governance will need to be improved.

Principle: Land use planning decisions on the coast must be made in an integrated manner with consideration of all interests by the decision maker.

12.1.5 Regional Areas versus Metropolitan Melbourne

It is clear that some areas of metropolitan Melbourne are vulnerable to sea level rise at levels well below the 0.8m benchmark currently included in planning schemes.

Parts of the City of Port Phillip are already covered by a Special Building Overlay (see Figure 10) related to catchment and coastal flooding. As another example, parts of the City of Kingston are covered by the Land Subject to Inundation Overlay and/or the Special Building Overlay (see Figure 11).

It was put to the Committee during initial consultation that because of the concentration of population (and hence political power) in Melbourne, it will always be protected, because the Government of the day could not afford otherwise. For example, the Commonwealth Government report on Climate Change Risks to Australia's Coast – A First Pass National Assessment, 2009 indicated that providing dykes or sea wall protection around low lying areas of Port Phillip Bay in Melbourne is estimated to cost up to \$5 billion. To prevent flooding along river catchments, flood/tide gates would be required on every river system feeding into the Bay, which would be likely to double the cost. However, even if the cost of protection was \$10 billion for

Melbourne alone, it would still be a lower cost alternative to losing low lying infrastructure, built assets and the cost of disruption to the local economy and society.

Responses ranging from building more seawalls, to a 'Thames Barrier' style gate across Port Phillip heads have also been raised by various participants in the initial consultation process.

The 'defence' of Melbourne is assumed by many to be a given, but there are a number of public policy, cost and other considerations that will weigh on the eventual decisions. In particular, decision about 'strategic defences' at a regional level should be made early enough to avoid wasting resources on ad-hoc local responses.

Whatever the decisions that are eventually made, the Committee considers that members of the community should be treated equitably in the decision making process.

Principle: Coastal residents across the State should be treated equitably and fairly in relation to the impacts of coastal climate change.

Figure 10: Extract from Port Phillip Planning Scheme Map 8SBO

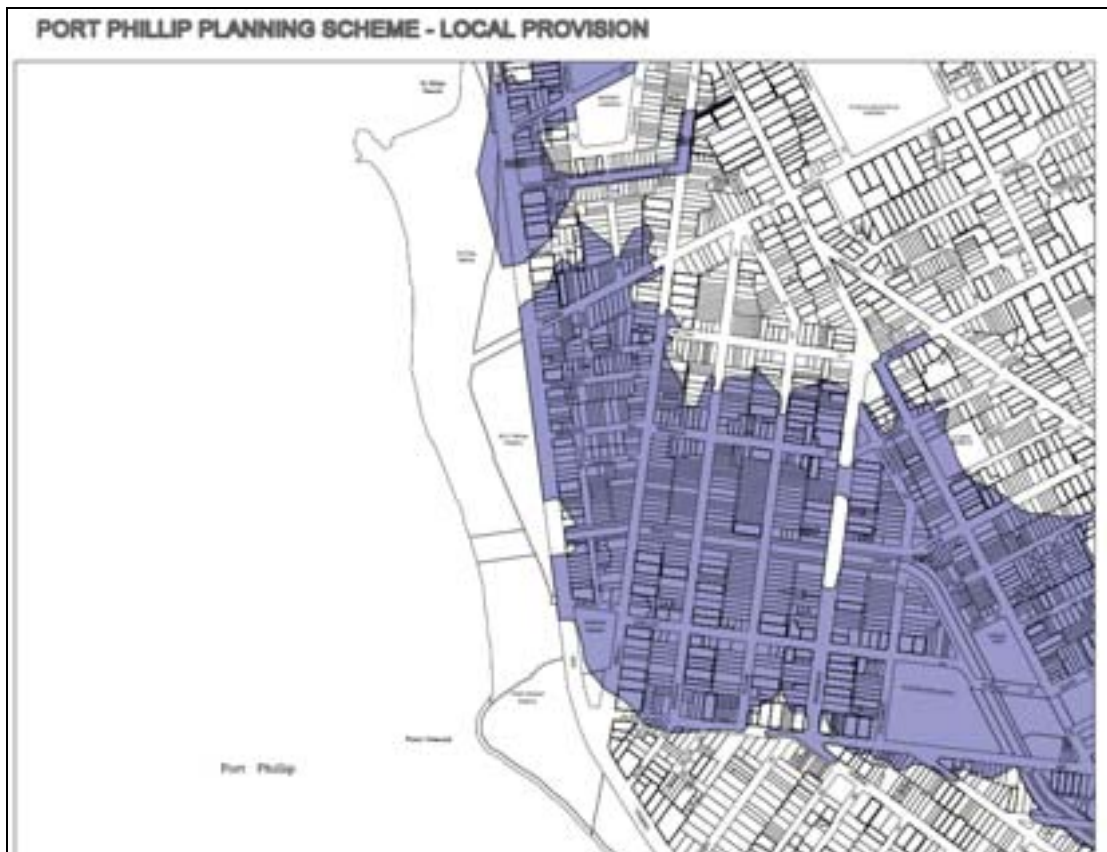
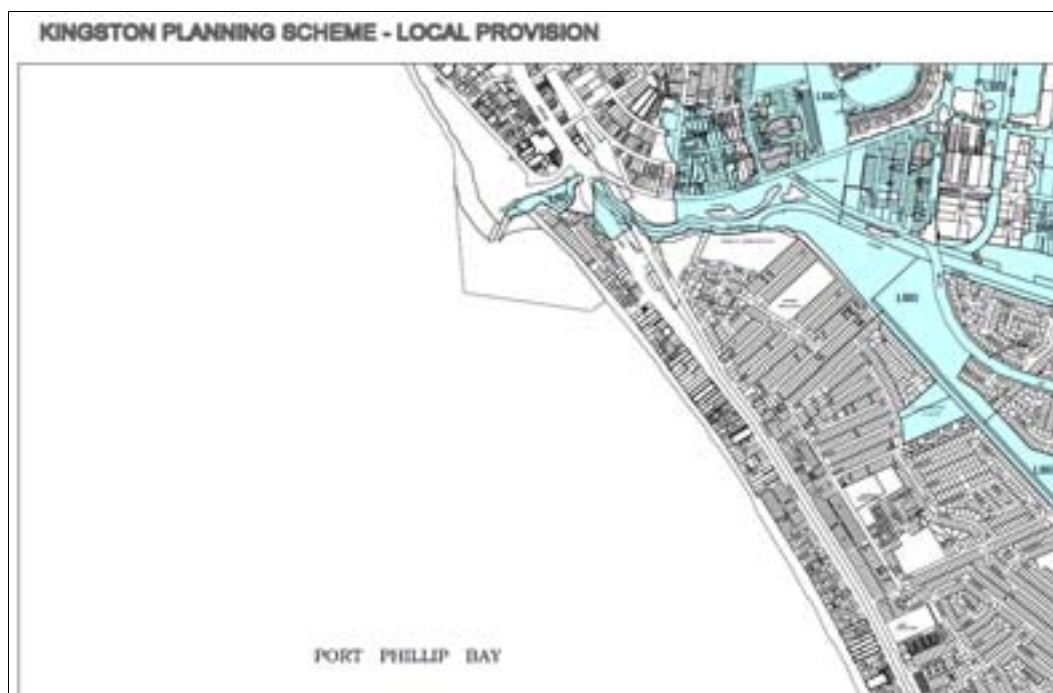


Figure 11: Extract from Kingston Planning Scheme Map 7LSIO



12.1.6 Revolution versus Evolution

One of the first questions to ask is whether the planning system is fundamentally sound or whether there is a need to have a major overhaul of the structural elements of planning in Victoria.

Noting that a review of the Planning and Environment Act is currently underway, the Committee's view is that the planning system, either with its existing tools, modified tools or the development of new ones, can deliver the outcomes that are required in a time of climate change. There was no indication in the preliminary consultation sessions that a radical overhaul of the planning system is needed in the foreseeable future to respond to the challenges of coastal climate change impacts.

Principle: The Victorian Planning System is fundamentally sound. Whilst it can and should be improved in relation to climate change impacts on the coast, change should be incremental and evolutionary.

12.2 The Next 12 Months

12.2.1 Background

In Section 3 'Method' of the terms of reference, phase 1 is to include:

- *Any immediate and/or interim planning and development provision or consequential measure which may be required to further support implementation of the Government's policy position.*

During the Committee's initial consultation, a range of issues were raised by practitioners around the long term framework needed for planning on the coast in a time of climate change.

However it became apparent that there was some disquiet about the short term responses needed and the range of planning decision being made under the planning framework introduced in December 2008 when the Victorian Coastal Strategy was released.

12.2.2 Key Issues

Whilst the new State Planning Policy Framework at Clause 15.08 of planning schemes provided a benchmark for planning for sea level rise (and it seemed to the Committee that there is general support for this benchmark or at least the concept), it was suggested there was little further guidance provided on how to apply this figure, particularly at the development approval level.

The perceived inconsistency between Ministerial Direction 13 and the General Practice Note (PPN) *Managing coastal hazards and the coastal impacts of climate change* has also been criticised in that the Ministerial Direction appears to relate to planning scheme amendments whilst the Practice Note addresses amendments and permits for existing zoned land.

Planning scheme amendments are normally a comprehensive process and the vulnerability of land to future coastal climate change impacts (particularly if it is being zoned for urban use) can and should be considered.

As the PPN itself recognises, the situation with regard to permits is more complex, and whilst a matrix is provided to address this complexity, there are some areas of concern.

Firstly, the Victorian Civil and Administrative Tribunal (VCAT) has taken a conservative approach when matters have been appealed to them, and have required coastal hazard vulnerability assessments (CHVAs) for minor planning proposals (some of the cases are summarised in Section 5.11.1).

Secondly, an issue of equity may arise. A person building a house on a vacant block may not require a permit and therefore may not require a vulnerability assessment. The neighbour may wish to subdivide off their garden and allow for a second dwelling which then does require a permit and therefore triggers the need for a coastal vulnerability assessment.

Both developments are intensifying the use to the same degree but one requires a coastal vulnerability assessment and one does not. In vulnerable areas the first person also may be exposing themselves to significant hazard and not even be aware of it.

A related area is the requirement for CHVAs and what they might consist of. A number have been done (for example in the City of Casey) at the single lot level, which raises issues about the practicality of responses at the lot, as opposed to settlement, level.

The Department of Sustainability and Environment through Future Coasts has recently called for tenders to prepare guidelines for considering coastal hazard vulnerability. The guidelines look to assist management authorities to plan and design actions and works that could assist to mitigate hazard risks. They should be available later this year.

The Municipal Association of Victoria (MAV) undertook a number of workshops with key stakeholders in the latter half of 2009 around these issues. Recommendations from a paper from that process are attached at Appendix D.

12.2.3 Advisory Committee Consideration

The situation can be summarised thus:

- Where relevant, planning scheme amendments can and must respond to the 'at least 0.8m' of sea level rise where they are proposed at less than 5m AHD and 1km from the coast;
- Where a permit trigger exists in a planning scheme, the 0.8m prediction must also be taken into account when determining an application for land use or development. This will, under the terms of the PPN and decisions of VCAT, require preparation of a CHVA, which may lead to modification or refusal of the application;
- Some 'as of right' development will not trigger a CHVA although it may be located in ostensibly vulnerable areas; and
- Where a CHVA is required for relatively minor development in existing settlements and the development is potentially vulnerable, the responses that can be undertaken may be limited without impacting on surrounding

properties (eg. filling the site to raise its level may increase the flood risk to adjoining houses).

Of these the Committee considers the issue of consistency to be important. It does not seem reasonable to have a planning system where the assessment of vulnerability is based on the vagaries of the planning scheme rather than the existence of vulnerability itself.

This needs to be clarified. One response is to provide some sort of general exemption for development of a certain scale, for example the development of houses on existing lots or subdivisions creating no more than four lots. However this is an artifice given the whole intent of the new clause 15.08 in the State Planning Policy Framework is to alert the community to the real risks of sea level rise and to allow them to start planning for it.

The Committee considers a better approach is to require consideration of all proposals to intensify use and development in vulnerable areas, with some exemptions for development that does not result in 'intensification of occupation', that is, it does not increase the number of people potentially subject to hazard.

Given that we do not as yet have fine scale knowledge of exact areas of vulnerability, the Committee is suggesting such a control should be established as interim measure subject to further vulnerability assessment and strategic planning and responses.

In relation to site specific vulnerability assessments, the assessment may discover that a) the property is vulnerable (at say 0.4m sea level rise); and b) there is little that can be done at the property level to protect it but there may be strategic responses possible.

The Committee considers that this provides the responsible authority with valuable input to decision making. They may decide that on the basis of broader strategic work a development permit can be issued, or alternatively the development must be refused due to the level of likely risk (or a middle ground solution involving particular property works or a time limited permit may be appropriate).

Either way, the possible requirement for a CHVA provides a mechanism that will inform both the applicant and the responsible authority of the likely impacts of sea level rise at that particular property in the absence of the more strategic series of assessments that are being prepared.

12.2.4 Advisory Committee Preferred Approach

The Committee considers that whilst the current policy tools (Victorian Coastal Strategy, State Planning Policy Framework, Ministerial Direction 13 and the Planning Practice Note) have been extremely effective in raising awareness of the issues around sea level rise, there is a need for additional short term, interim controls to ensure consistency of approach and to produce equitable outcomes.

The Committee considers that an interim planning tool that clearly addresses the need for consistent consideration of coastal vulnerability for land use and development proposals along the coast is required and should be introduced to the VPP under Clause 52 - Particular Provisions. The Committee believes that this would complement the requirements of Ministerial Direction No. 13 with regards to rezoning considerations and incorporate the outcomes emanating from recent VCAT decisions.

The new Particular Provision would be proposed to operate on an interim basis until such time as more fundamental decisions are made with respect to the final recommendations from the Committee and the Minister's response. It will apply only to coastal Councils and will trigger planning permits for land use and development on land near the coast. The interim provision should identify the requirements for when a coastal hazard vulnerability assessment may or may not be required and will reference the existing Planning Practice Note.

Accordingly, the Advisory Committee will advise the Minister of this preferred approach, including the drafting an appropriate new provision.

12.3 2010 and Beyond: A Framework for the Future

The Victorian Government, through the Victorian Coastal Strategy (VCS) and incorporation of elements of the VCS in planning schemes requires consideration of sea level rise of not less than 0.8m by 2100 including allowances for storm surge and other factors.

This 90 year period provides many challenges for the planning system including:

- What will the rate of sea level rise be?
- For how long and under what conditions should people continue to use property in vulnerable areas?
- What are the range of policy responses and associated planning responses that might be required?

To conceptualise how the planning system might respond to these challenges, the Committee has developed a framework as shown in Table 6 that allows short, medium and long term consideration of planning responses.

Table 6: Planning Time Periods

Time Period	Title	Characteristics/Approach
2010 – 2015	Focus on Vulnerability	<p>Progressively improving understanding of the rate of sea level rise and climate change impacts;</p> <p>Completion of detailed vulnerability assessments for all coastal settlements and at-risk ecosystems;</p> <p>Commencement of preparation of strategic adaptation and response plans at the settlement level;</p> <p>Use of refined set of existing planning tools or new tools to 1) communicate risk: and 2) begin implementation of strategic planning;</p> <p>Focus on ‘soft’ investment in vulnerability assessment, policy and planning.</p>
2015- 2020	Focus on Strategic Planning	<p>Progressively improving understanding of the rate of sea level rise and climate change impacts; observation of significant impact;</p> <p>Completion of ‘climate change ready’ strategic planning for coastal settlements and between settlement areas;</p> <p>Implementation of policy and planning for settlements including protect, adapt, retreat;</p> <p>Introduction of new and improved planning tools to actively respond to the policy framework for particular settlements and ecosystems;</p> <p>Consideration of decision making arrangements and the need for alternative models to improve responsiveness (eg a regional Planning Authority);</p> <p>Moving to focus on ‘hard’ investment in protection and adaptation processes and works</p>
2020 – 2050 and Beyond	Transition in Action	<p>Progressively improving understanding of the rate of sea level rise and climate change impacts; observation of significant impact;</p> <p>Continued implementation and refinement of coastal climate change response.</p>

These time periods are not fixed and are only a tool for the Committee to conceptualise how the planning system might respond in future as certainty

around climate change rates and impacts increases. They should not be considered as fixed or inflexible either in the time periods or content.

They are discussed in more detail in following chapters.

13. 2010 – 2015: Focus on Vulnerability

13.1 Characterisation

The last 18 months have been characterised by a rapid and increasing focus on the implications of sea level rise for coastal communities, both human and natural.

Arguably in Victoria the catalyst was the Grip Road, Toora decision of VCAT⁴⁸. Amongst other significant planning matters, the Tribunal included the risk of climate change, and more specifically sea level rise, in its reasons for refusing planning permits for dwellings in a rural area.

Since that decision in July 2008, there has been a plethora of legal decisions, policy announcements, parliamentary inquiries, consultancies and other studies into how coastal communities may be affected by climate change and sea level rise and how they may respond. This report provides an overview of some of these key initiatives at the international, national, state and local levels.

In the next five years, this intense focus is likely to continue and if anything intensify, as more information about risk becomes available and scientific certainty increases.

Sea level rise in itself over the next five years is likely to see at least a continuation of the trend recorded over the past 20 years of 3.1 millimetres per year (see Chapter 3). Increasing storm frequency and intensity is also likely although the rate at which this occurs is unlikely to be significant in the short time period we are considering in this chapter.

The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report synthesis report is scheduled for release in September 2014. The IPCC has recently been criticised for poor science in a number of areas (Himalayan Glaciers, Amazonian Rainforest).

Whilst scientific rigour is critical to the work of the IPCC and to climate change more broadly, the recent challenges are not likely to displace the IPCC as the pre-eminent scientific advisory body on climate change. If the

⁴⁸ Gippsland Coastal Board v South Gippsland SC & Ors (No 2) [2008] VCAT 1545

trends indicated in previous IPCC assessment reports continue, the impact of climate change on sea level rise is likely to accelerate, rather than decelerate in the future. It is worth noting that observed global temperatures are tracking at the upper end of the range projected in earlier modelling by the IPCC.

In the next five years the political environment at all levels is likely to remain charged as global and national discussion and negotiation continues. This in turn will continue to cause uncertainty at the regional and local level until the potential impacts of sea level rise are more accurately predicted and appropriate responses developed.

In summary, whilst the direct physical manifestation of climate change on the coast will not always be readily apparent, the political and social environment will continue to evolve rapidly as better information becomes available and more detailed responses are developed.

In this first five year period, the Committee considers the primary focus should be on vulnerability and risk assessment, with the progressive development and implementation of appropriate planning tools.

13.2 Planning Objectives

The objectives of planning in Victoria are included in the *Planning and Environment Act 1987* at Section 4 and are included in Section 4.1.1 of this report. For each of the time horizons in this issues paper, the Committee is suggesting a series of objectives for the *planning system*, not for planning per se.

These are to help frame the direction for each time period. For this first period the objectives are:

- to improve our understanding of the vulnerability of coastal communities, both human and natural, to coastal climate change and particularly sea level rise; and
- to ensure those human communities identified as vulnerable to coastal climate change are clearly informed, through the planning system, of the likely impacts of climate change and the level of risk and certainty around that knowledge.

13.3 The Planning Tools

13.3.1 Strategic Planning

State Planning Policy Framework

The revised clause 15.08 of the State Planning Policy Framework (SPPF) is shown in Section 5.2. This was adopted in late 2008 at the same time as the latest Victorian Coastal Strategy was released.

The adequacy of the existing provisions is discussed in Chapter 8. In the Committee's initial consultation there has not been much criticism of the SPPF (and Clause 15.08 in particular), but there has been concern expressed at a perceived gap or lack of guidance in interpreting the SPPF at the local level.

One area of interest in the existing Clause 15.08 is that of regional policy statements. In the current Clause 15.08 there is reference to a regional strategy for the Great Ocean Road Region. If a regional approach is required for addressing coastal climate change impacts the strengthening of regional planning provisions through the SPPF may provide the necessary high level support and direction. The Committee discusses this issue in more depth in the next time period.

The Committee is aware that a revised 'policy neutral' SPPF has been developed and is out for public comment. This revised version restructures the SPPF into more logical themes, and whilst the Committee has not adopted a formal position on it, considers that it is an improvement over the existing SPPF and does not in any way dilute the precautionary approach to coastal climate change articulated in the existing Clause 15.08.

Municipal Strategic Statement and Local Policy

In general there is limited reference to the impacts of coastal climate change and sea level rise in MSSs or local policy (some exceptions are mentioned in Section 5.3).

Introducing new strategic directions into MSSs and developing local policy could be a valuable way for planning authorities to articulate the local and regional interpretation for coastal communities based on the broad direction set in the SPPF. It could also be a way for planning authorities to articulate a consistent approach to different coastal communities within their area of responsibility.

Advisory Committee Consideration

The Committee considers that for the next five years the SPPF will be adequate for providing the high level direction to planning and responsible authorities to enable them to effectively consider coastal hazards and the coastal impacts of climate change.

The sea level rise figure of 'not less than 0.8m' can be revised as necessary if new and convincing information becomes available in the short term to suggest the figure should be changed.

The Committee considers that planning authorities will need to begin the process of developing and strengthening MSSs and local policy in this area. To this end a 'model local policy' could be developed to provide a starting point and some level of guidance for planning authorities but to allow for the local conditions that such a policy should recognise.

Advisory Committee Preferred Approach

The Committee considers:

- The SPPF as it exists in relation to this issue (including the policy neutral rearrangement being considered) is adequate for the short term to provide the high level guidance to planning authorities and responsible authorities to enable them to adequately consider the coastal impacts of climate change.
- A model local policy could be developed to assist planning authorities to address the issue of coastal hazards and the coastal impacts of climate change.

13.3.2 Statutory Planning

A number of tools exist already that either could be used as they are or with modification (discussed in Chapter 8). The Committee's consultation process has identified that whatever the approach, there is a need for improvement in the short term to ensure:

- A consistent approach to the consideration of use and development; and
- The clear communication of the potential hazard from coastal climate change to vulnerable communities and properties.

The Committee has already discussed the issue of an interim control, via a new clause under the Particular Provisions of the VPP, which will be recommended to the Minister for Planning for consideration.

Possible approaches in the short term utilising other tools are suggested below.

A New Coastal Zone

The analysis of existing zones is undertaken in Section 8.3.1. It is possible that a new coastal zone could be introduced covering both private and public land on the coast to control use and development in vulnerable areas. South Australia has a system of coastal zones for controlling use and development.

The disadvantage of introducing a new zone is that it may cause considerable disruption if it proposes curtailment of land use and development opportunities afforded by existing zones. Effectively this may result in 'backzoning' of areas.

Another disadvantage in the creation of a new zone is the potential for its limited uptake by planning authorities because of problems experienced with the creation of existing use rights. This can result in the perception of limited effectiveness because existing use rights may override the ability of the new zone to achieve its purposes. This problem has been experienced to some extent with the application of the Rural Conservation Zone in rural areas where the former Farming Zone, which previously applied permitted agriculture as of right without the need for a permit and, which, when replaced by the Rural Conservation Zone changed the status of agriculture to a permit required use, with the existing use right status of agriculture preventing the achievement of the purposes of the Rural Conservation Zone.

The need to consider applying a new zone for the coast to regulate land use which may either be threatened by coastal hazards or intensify land use and hence further increase the level of risk will likely be required over time. This need may be heightened in some coastal areas as the impacts of coastal climate change and sea level rise are felt.

Any application of a new zone needs to be part of a strategic planning process similar to how any other zone, overlay or any planning tool for that matter is selected from the VPP and applied within a planning scheme. The benefits and disbenefits of such an approach will need to be carefully considered. The Committee believes however, that the level of information on coastal vulnerability, its identification on location and extent will be more accessible as a result of the Future Coasts Program.

This information on coastal vulnerability will enable planning authorities to plan for their coastal areas, both developed and undeveloped to identify go

and no-go areas and to set policy for how coastal areas are to be planned, managed and protected.

In the interim the Ministerial Direction No. 13 requires assessment of sea level rise and coastal climate change in any new rezoning proposals.

Coastal Hazard Overlay

There is discussion regarding consideration of a 'Coastal Overlay' in the new format planning scheme process in the late 1990s in Section 8.3.3. Whilst an overlay was not introduced in that process, it has considerable merit as a tool for potentially:

- Communicating risk of known or suspected coastal vulnerability to prospective purchasers;
- Providing a local trigger for consideration of vulnerability when considering development and implementing the policy directions in the SPPF;
- Providing an 'anchor' for consideration of hazard assessment and risk management tools (either those done at the settlement level or for particular properties).

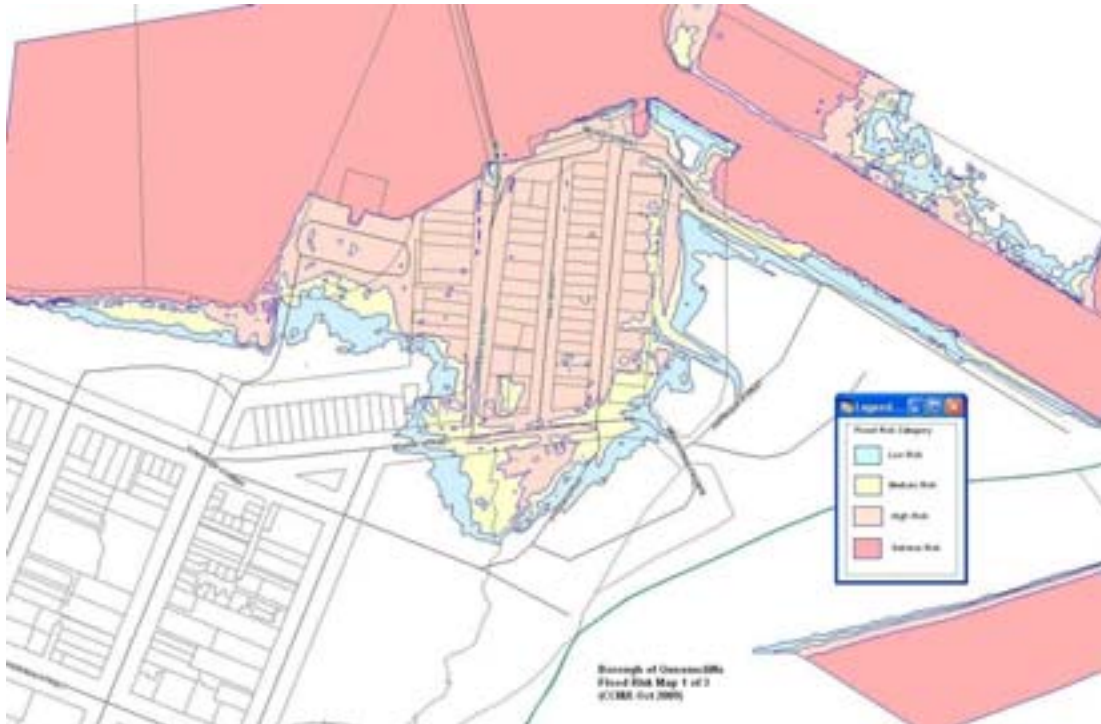
As vulnerability and risk assessment work is undertaken by Future Coasts and other agencies, one of the questions will be how this material is reflected in, or used in, the planning system.

For example the work undertaken for the Borough of Queenscliffe by the Corangamite Catchment Management Authority (example map shown in Figure 12) maps areas of risk of inundation related to coastal flooding and sea level rise. The area subject to these maps could be covered with a Coastal Hazard Overlay (CHO) which triggers a permit for development.

The maps themselves could be reference documents, in that Council is required to consider them via decision guidelines, or if they are part of a broader strategic vulnerability and risk assessment, this document itself could be incorporated in the scheme at Clause 81.

The CHO could cover all relevant climate change issues, including coastal flooding and coastal recession and remove the need for applying multiple (amended) overlays from the existing suite in planning schemes (for example the LSIO, EMO, SMO etc...).

Figure 12: The Borough of Queenscliffe and CCMA risk mapping⁴⁹



This approach, of assessing development in vulnerable areas based on risk is that being pursued in many States (for example Tasmania via the City of Clarence work, the New South Wales approach shown in Figure 8 in Section 5.2).

The Committee has not drafted a possible CHO at this time but if the concept has support will consider doing so later in the Committee process.

As discussed in Chapter 3, the methodology for a consistent approach to hazard and risk assessment is being developed by DSE as part of Future Coasts. Whichever approach is adopted (and Queenscliffe is one well developed model), the CHO should be able to be used as the mechanism for giving them effect in planning schemes in the short to medium term.

The Committee is suggesting an interim control via a new clause in the Particular Provisions of the VPP for the short term (to be provided in advice to the Minister for Planning). The CHO could then be progressively applied to areas identified as vulnerable through the Future Coasts work and programs initiated by other agencies and Local Government.

⁴⁹ From the Borough of Queenscliffe website (www.queenscliffe.vic.gov.au). Shows example map for the area in northern Queenscliffe around Beach Street.

Advisory Committee Consideration

The development of a new zone may be premature during this early period. One of the positives in planning for sea level rise is that the rate of rise may provide planning authorities with time to assess options for what any new zone should do.

However the Committee's view is that a new control, the CHO, is justified in this instance. The intent of the overlay is purely to identify and manage development in areas subject to coastal hazards, namely inundation of varying frequency and duration, coastal erosion and recession, and the impacts of coastal storm surge.

There may be difficulties in determining where the CHO and LSIO start and end, for example in estuarine areas, but this should be manageable if the CHO has inundation provisions similar to those contained in the LSIO. The flooding itself, whether freshwater or salt, could also provide a logical direction on which tool to use and which type of flooding predominates. If both types of flooding occurs in an area then both overlays could be used. Multi layering of overlays over land is possible so long as the intent of each overlay provision is clear and their permit triggers are consistent.

The CHO could be applied based on detailed and rigorous vulnerability assessments where they exist, for example the Queenscliff work, or applied in a precautionary sense based on elevations where such vulnerability information does not exist and is not likely to for some time.

Although the Advisory Committee discusses a zone option in the next chapter, the Committee remains interested in receiving submissions about whether a new zone for coastal vulnerability or hazards or conservation should be developed and what it should seek to achieve in terms of land use planning in relation to sea level rise. Commensurately, comments would also be appreciated on what land uses should be allowed as of right, be subject to permit and be prohibited as well as referral mechanisms, application requirements and decision guidelines for land use, buildings and works and subdivision that could or should be included in any new zone(s).

Whether to modify existing VPP tools (for example to include coastal flooding in the Land Subject to Inundation Overlay) or introduce a new one is also an option that requires careful consideration and the Committee would appreciate feedback on this matter.

Advisory Committee Preferred Approach

The Committee considers:

- A new Coastal Hazard Overlay should be introduced as a mechanism for:
 - Communicating risk of sea level rise and coastal climate change; and
 - Providing a trigger for consideration of vulnerability.

Accordingly, the Committee would also appreciate comments on what a CHO should aim to do and contain particularly in terms of permit triggers or exemptions and decision guidelines and how and where it could be applied.

13.3.3 Ministerial Direction No 13 and Planning Practice Note

There has been some criticism of the Ministerial Direction and Planning Practice Note (Managing coastal hazards and the coastal impacts of climate change) during initial consultation, primarily related to the suggestion that the planning practice note appears to have a broader scope of application than the Ministerial Direction.

As VPELA notes in its report, the Ministerial Direction is aimed at new development and does not provide any guidance for existing residential zoned land. The practice note on the other hand, does try to provide a decision making framework for permits for existing zoned land.

If the Committee's preferred approach in the short term (interim particular provision, introduction of a Coastal Hazard Overlay) is pursued, then the practice note in particular will need to be revised.

13.4 Summary of Approach

For this next nominal five year period, the Committee considers that the focus will be on continuing vulnerability assessments and consequent measures to incorporate such assessments in planning schemes. To do this the Committee is suggesting a planning framework as shown in Table 7.

Table 7: Summary of Committee's Preferred Approach 2010-2015

Element of system	Approach
State Planning Policy Framework	Essentially unchanged. 'Policy neutral' review of SPPF supported
MSS and Local Policy	Consider development of model local policy to assist planning authorities. Support continued policy development/refinement through strategic planning processes informed by Future Coasts information on coastal vulnerability nature and extent
Zones	Essentially unchanged in this period
Overlays	Introduce a Coastal Hazard Overlay to communicate risk and 'anchor' improving coastal vulnerability assessment knowledge
Particular Provisions	Interim control (as a particular provision) recommended

14. 2015 – 2020: Focus on Strategic Planning

14.1 Characterisation

Five years after the first moves were made to prepare national, state and local vulnerability assessments, this work has now been completed and the community have a good understanding of the implications of climate change on the coast, and particularly sea level rise.

The most vulnerable communities, physically (low lying, soft sandy or muddy coasts), economically (low resilience to economic shocks), and socially (coastal areas of social disadvantage) have been identified and priorities for strategic planning and adaptation have been developed.

Short term, urgent priorities for action have been identified and coastal protection works, both permanent and temporary have commenced to give time for longer term decision making.

The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report will have been released and policy makers will be determining responses based on its findings, including a better understanding of the rate and nature of sea level rise resulting from climate change (i.e. incremental or step changes following particular events).

The political environment remains charged as the possible and likely effects on communities and coastal ecosystems become clearer. Strategic planning at the regional and local level has commenced in many areas based on the coastal vulnerability information now available.

This program of strategic planning in 2015-2020 moves into overdrive as the knowledge of vulnerability provides a framework and sense of priorities for communities to respond. The strategic planning, driven jointly by State and Local Government, is the most comprehensive spatial planning ever undertaken in Victoria and involves:

- Spatial planning for coastal settlements including long term planning for the relocation of existing vulnerable settlements or parts of them;
- Cost-benefit and triple bottom line analysis of options for sea level rise response – protect, accommodate, retreat - for particular settlements and urban areas;
- The identification of long term ‘migration’ areas for coastal settlements;

- Coordinating spatial planning with infrastructure providers and aligning town plans with asset lives;
- The development of regional Natural Catchment Plans that include response to sea level rise as a core component.

The physical manifestations of climate change on the coast continue to occur gradually but inexorably.

14.2 Planning Objectives

The planning objectives for this time period are:

- To use the increasing knowledge of coastal vulnerability to prepare regional and local strategic climate change response plans for settlements and urban areas and the 'coastal spaces' between settlements; and
- To ensure the planning tools exist to support and implement this strategic planning.

14.3 The Planning Tools

14.3.1 Strategic Planning

State Planning Policy Framework

The essence of the coastal section of the State Planning Policy Framework (SPPF) is likely to continue but in this timeframe will be influenced by at least the following factors:

- The release of the IPCC Fifth Assessment Report;
- The translation of this work into a new Victorian Coastal Strategy, a Victorian Natural Resource and Catchment Strategy, a Victorian Marine Plan at the state level and Regional Catchment Strategies and subsidiary plans at the regional level.

This is likely to change both the depth of policy around this issue and possibly the 'headline' figure of at least 0.8m sea level rise by 2100.

If more intensive broad strategic planning is required to reflect the vulnerability assessments coming forward, this is likely to require a much stronger imprimatur, and possibly direction, in the SPPF.

This will need to occur for settlement and urban area planning as well as natural area planning across the public and private realm. Natural resource planning, where planning will need to accommodate migration of natural

ecosystems into the private realm in some areas, cannot be kept in a public land only planning framework.

The role of coastal regional planning in the SPPF to cover the public and private realm will need to be strengthened. Settlement and urban area planning can only occur effectively within a regional framework where difficult decisions will need to be made about coastal protection and/or retreat.

The SPPF already contains one example of regional planning, in the Great Ocean Road Strategy.

Municipal Strategic Statement and Local Policy

Municipal Strategic Statements (MSS) and local policy will be critical in both driving the key directions for settlements desired by Local Government but also in responding to and implementing vulnerability assessments as they are completed.

Subject to assistance in preparing and implementing amendments, the framework for local policy is likely to be adequate.

Advisory Committee Consideration

If there is to be intense period of strategic planning to address the emerging vulnerability information, it raises a number of key questions. The work is likely to be needed at the settlement and urban area level, and also the coastal spaces between settlements to address natural area planning.

In the metropolitan area it is possible to see a revised metropolitan strategy in some form tackling this issue. One of the striking inconsistencies at the moment relates to activity centres (for example Rosebud is a major activity centre) where development is being pursued, but some of the coastal centres are likely to be vulnerable to sea level rise in the medium term.

Who might drive this regional and intensive settlement planning is an important question. Does the right agency exist (whether Local Government or State Agencies) to lead this work? If as suggested in the characterisation section above it needs to integrate spatial planning, management of proposed and existing infrastructure, expertise in assessment of cost of potential responses, the difficult issue of potentially migrating settlements or parts of settlements, and management of natural resources and ecosystems.

The Committee has an open mind on whether this strategic planning can be delivered through existing agencies. The coordination of resources and

negotiation through a difficult political environment may require consideration of a new entity to manage the process.

Advisory Committee Preferred Approach

The Committee considers:

- In this time period the State Planning Policy Framework will need to be modified to:
 - Accommodate new sea level rise and coastal climate change physical impact information; and
 - Provide a much stronger focus on regional and settlement planning to enable the long term detailed planning for responding to sea level rise.
- The model for delivery of this intensive regional planning, within the imprimatur of an expanded and strengthened SPPF will need to be carefully considered.

14.3.2 Statutory Planning

It is likely that the intensive strategic planning envisaged in this time period will include difficult decisions for coastal communities about the long term sustainability of some areas in a time of climate change.

Many of the changes can be accommodated by using existing tools as discussed in Chapter 8. For example the Environmental Significance Overlay (ESO) can be used to migrate ecosystems, or the Public Acquisition Overlay (PAO) to acquire replacement Crown land in some instances.

One area which is likely to prove difficult is where the long term future of existing urban areas or settlements is not sustainable. These areas will start to be identified in the strategic planning being undertaken in this time period.

For example, a low lying coastal settlement or part of a settlement that can not be protected long term (due to cost or physical impossibility) may need to be migrated in a planned, strategic way. Doing this under current statutory planning arrangements may be possible, but may not offer the flexibility required.

The possibility of using the Comprehensive Development Zone (CDZ) was discussed in Chapter 8 but this does not accurately reflect the outcomes that might need to be achieved.

One option is to introduce a new zone with the specific purpose of transitioning vulnerable areas over time.

A Coastal Transition Zone

Consider a theoretical township where 50% is likely to be vulnerable to coastal recession and inundation by 2100. Of that 50% approximately 20% can be protected via an engineering solution that is likely to be cost effective for at least 100 years. The strategic plan for the township based on vulnerability assessment suggests that 30% of the township is likely to be unsustainable by 2100 if not before.

A Coastal Transition Zone (CTZ) could be applied over the whole township, including areas where new development or migrated development would be accommodated. This would provide an anchor for the strategic plan developed for the township. Existing tools such as the Development Plan Overlay (DPO) could be used to provide the finer scale planning for new development areas.

The CTZ could also provide a framework for establishing tradeable development rights for those in vulnerable areas who want to relocate.

The intent of the zone would be to provide a high level of flexibility for the planning authority to manage risk, facilitate land use change using innovative methods and provide a clear tool for adaptation to climate change.

Time Based Planning Permits

The use of time based planning permits has been identified by the Committee as a statutory planning means by which development may be used until such time as the threat from sea level rise becomes real. A time based planning permit is one which gives a land use or development a finite period of time within which the use or development may lawfully operate. When either a specified time or date of expiry is reached then the use or development must either cease or adjust depending on the nature of conditions at the time specified in the permit.

The advantage of time based planning permits is that they allow land to be used or developed for a period of time when the direct threat from sea level rise is not evident. This permits the economic use and enjoyment of land to occur and avoids issues of blight from occurring, which can be particularly problematic in urban settings.

The disadvantage of time based planning permits is that may be difficult to enforce when the time comes or that there is uncertainty in terms of how the permit can be administered possibly many years on from when it was originally granted. There is also the risk of future land use planning intentions and directions regarding adjusting land use to future/changed conditions not being appropriately conveyed to landowners, developers and the wider community.

The use of time based planning permits may offer some relief to coastal property owners on an interim basis but may create future legal problems for responsible authorities.

Advisory Committee Consideration

Whether in this time period or further into the future, it is likely that interventionist tools will be needed to enable coastal communities to adapt. Whilst much of the responsibility will fall to individual property owners, this in itself cannot be relied upon.

For example a community that suffers more frequent inundation or more active coastal recession may be left as a mix of inhabited and uninhabited houses with decaying infrastructure. The strategic planning suggested as a focus in this time period should aim to prevent such scenarios.

To effectively implement the strategic planning, a flexible, but powerful, tool such as a CTZ should be useful in achieving the overall objectives for the particular community.

It may be desirable in areas of high impact and high vulnerability with consequently more difficult transition needs that a different model for a planning authority may need to be considered. In this case a separate statutory authority one step removed from the political process may be an option. The Growth Area Authority model is discussed in Section 8.6.

The Committee considers that whilst this may be an option, such decisions will need to be made at a future date as the rate of sea level rise and other climate change impacts become apparent, as do agencies capacity to respond.

The option of being able to use time based planning permits may assist in efficiently and equitably utilising coastal land on an interim basis until such time as the threat of sea level rise becomes evident. However, the practicalities of using such tools may be unrealistic. The Committee welcomes comment on this issue.

Advisory Committee Preferred Approach

The Committee considers:

- A new zone for 2015 and beyond could be considered (such as a Coastal Transition Zone) to provide an overarching land use framework for managing vulnerable coastal communities and ecosystems.

14.4 Summary of Approach

For this five year period, the Committee considers that the focus will be on strategic planning based on the completed vulnerability assessments to be provided through Future Coasts and other specific-area studies.

Undertaking this intensive strategic planning for the metropolitan area and regionally will require strong direction from the SPPF and a range of new tools to help implement the strategic plans.

To do this the Committee is suggesting a planning framework as shown in the table below.

Table 8: Summary of Committee's Preferred Approach 2015-2020

Element of system	Approach
State Planning Policy Framework	Revise to include updated references to IPCC Fifth Assessment Report, new Victorian Coastal Strategy and revised 'headline' sea level rise figures. Strengthen policy for regional planning and settlement planning based on coastal vulnerability assessments
MSS and Local Policy	Revise to facilitate settlement planning and coastal vulnerability assessments
Zones	Consider introduction of a Coastal Transition Zone for strategic planning implementation
Overlays	Unchanged

15. 2020 – 2050 and Beyond: Transition in Action

15.1 Characterisation

Increasing scientific certainty as to the rate and magnitude of climate change will be evident, as will increasing manifestation of the physical effects of climate change in rising sea levels and increasing storm events.

Physical threats to vulnerable coastal communities will increase in frequency and extent. Expenditure on coastal defences and emergency management can be expected to increase significantly.

The strategic planning undertaken in the 2015-2020 period has provided a sound basis for managing impacts in a planned way and as changes are monitored and the threats increase, responses from defence to managed retreat are implemented effectively, with the responsibility shared between Government, the community and the private sector.

15.2 Planning Objectives

The planning objectives for this period are:

- To ensure the range of planning tools are effectively managing the transition of vulnerable human communities and allowing the migration or replacement of ecosystems, enhancement of the social and recreational values of the coast and protection or replacement of coast-dependent economic assets and infrastructure.

15.3 The Planning Tools

This period will essentially be an implementation, monitoring and feedback stage where the range of planning responses developed during the strategic planning phase are rolled out and reviewed frequently to ensure they are still appropriate in the face of knowledge of climate change and vulnerability.

It is likely to be a time of great change in vulnerable coastal communities, perhaps accompanied over the period by an increasingly rapid rise in sea levels as the effects of global climate change and increased temperatures make their impact.

Appendix A Terms of Reference

RESPONDING TO COASTAL CLIMATE CHANGE IMPACTS THROUGH THE PLANNING SYSTEM TERMS OF REFERENCE

ADVISORY COMMITTEE APPOINTED PURSUANT TO PART 7, SECTION 151 OF THE
PLANNING AND ENVIRONMENT ACT 1987

1. PURPOSE

The purpose of the Coastal Climate Change Advisory Committee (CCCAC) is to investigate and recommend ways in which Victoria's land-use planning and development controls can best support the Victorian Government's policy for managing the coastal impacts of climate change as outlined within the Victorian Coastal Strategy 2008.

The CCCAC will need to consider strategic and statutory planning and development provisions to support implementation of the above in order to:

- Support emerging vulnerability information being assembled as part of the Victorian Government's *Future Coasts* program.
- Improve the operation and effectiveness of the Victorian planning system to deal with coastal hazards and the impacts of climate change into the future.
- Support the ability for strategic, long-term adaptation planning of coastal areas to ensure sustainable and appropriately located development and infrastructure.

Key areas for consideration by the CCCAC include:

- The operation and appropriateness of existing Victoria Planning Provisions (VPP) for example, policy, zones and overlays, in considering coastal climate change impacts.
- The form of new or amended VPP provisions to facilitate the use of emerging vulnerability information from the Government's *Future Coasts* program.
- Consideration of international and national approaches, frameworks etc and relevant case studies within Australia which are relevant to the Victorian context.
- The use and application of appropriate coastal hazard assessment methods and information within current or proposed planning and development control provisions of the VPP.
- Relevant regulatory and legislative arrangements which interact with Victoria's land-use planning system.
- Any other matters that the CCCAC considers relevant to planning and development decisions that facilitate climate change adaptation along the coast.

Further issues for consideration by the CCCAC can be found at Attachment 1.

2. BACKGROUND

Reasons for the CCCAC

Climate change represents an unparalleled challenge that will alter the coastline as we know it. Predicted sea level rise presents one of the greatest long term planning challenges facing Victoria. In the short to medium term, changing weather patterns combined with rising sea levels will create a more immediate challenge to coastal land-use planning and management.

Periodic flooding from rivers and the sea is a natural process that plays an important role in shaping the natural environment. Flooding threatens and causes substantial damage to property and communities. Approximately 60% of all coastal settlements in Victoria are located next to an estuary or on low-lying land associated with an estuary.

The climate change story for the coast is evolving. Modelling of the impacts of coastal vulnerability is being prepared for the entire coastline over time. A parallel investigation into planning and development approaches and responses is required in order to support the use of this information as well as evolve coastal land-use policy and planning.

Victorian Coastal Strategy 2008

On 10 December 2008, the Victorian Government released the *Victorian Coastal Strategy 2008* (the Strategy). The Strategy is the third iteration since its inception in 1997. It was reviewed in accordance with the *Coastal Management Act 1995* and approved by the Minister for Environment and Climate Change.

The Strategy identifies a number of significant challenges for the future management of the coast. In particular, it identifies the impacts of climate change as a significant challenge facing all jurisdictions.

The Strategy identifies the need to plan for the long term impacts of sea level rise (up to 0.8m to 2100) and the combined impacts of coastal hazards such as storm surges, erosion and inundation.

As a first step to supporting the policy position of Government (through the Strategy) the Minister for Planning has adopted the following measures to provide initial guidance:

- Update of clause 15.08 of the State Planning Policy Framework of the VPP providing updated reference to new coastal planning policy (see Attachment 2) ;
- Release of Ministerial Direction No.13 requesting coastal rezoning proposals from non-urban to urban uses be accompanied by a suitable assessment of coastal hazard vulnerability (see Attachment 3); and
- Release of a General Practice Note providing an overview of coastal hazard vulnerability and what climate change means for these hazards.

Future Coasts Program

The Future Coasts program represents a multi-million dollar investment by the Victorian Government to consider climate change adaptation on the coast.

Future Coasts will produce detailed mapping of the coastline that will be used as a tool for assessing the physical vulnerability of coastal areas to climate change.

These physical vulnerability assessments, along with on-going consultation with coastal managers and stakeholders, will be used to inform coastal policy and develop planning measures that help coastal settlements adapt to the impacts of sea level rise and storm surge.

These assessments, along with on-going consultation with coastal managers and stakeholders, will be used to inform coastal policy and develop planning measures that help coastal settlements adapt to the impacts of sea level rise and storm surge.

Within this context, the role and function of Victoria's land-use planning and development system is considered as one of a number of significant tools available to government to assess, respond and manage the future challenges facing the coast.

Other activity

Increasing momentum and activity is being generated along the coast to find solutions to this significant challenge. Activity that is currently underway on the issue of climate change with an element or focus on coastal planning include:

- Victorian Climate Change Green/White Paper.
- Council of Australian Governments – Climate Change and Water Adaption Group.
- House of Representatives (Federal) – Inquiry into climate change and environmental impacts on coastal communities.

3. METHOD

The CCCAC will be expected to liaise on an ongoing basis with the *Future Coasts* program to ensure consistency, progress priority issues, release of reports and exchange of relevant information as part of its program.

The CCCAC should undertake its review through the following phases:

- Phase 1: Investigation, Issues and Options Paper for consultation:
 - Consultation with key stakeholders identified in this Terms of Reference and others as determined by the CCCAC.
 - Any immediate and/or interim planning and development provision or consequential measure which may be required to further support implementation of the Government's policy position.
 - Gaps and opportunities within existing governance arrangements to achieve integrated management of climate change impacts within coastal areas.
 - Public exhibition of the Issues and Options Paper.
- Phase 2: Submissions on the Issues and Options Paper to include:
 - An appropriate program of hearings based across the coastal regional Victoria and Melbourne.
 - A variety of workshops, hearings and other individual meetings with stakeholders.

- Phase 3: Preparation of a Final Report containing recommendations that:
 - Form the basis for further adjustments, changes and considerations to the planning and development provisions in Victoria.
 - Assist in the development of further actions and activities as part of the Victorian Government's *Future Coasts* program.

4. CONSULTATION

Within this context, the CCCAC is encouraged to provide a focus for effective engagement relevant to the planning and environmental law sector in preparing its advice and any associated recommendations.

To inform the preparation of an Issues and Options Paper and the Final Report, the CCCAC should seek the views and opinions of (but not limited to) the following key stakeholders:

- All coastal local councils
- Building Commission (Victoria)
- Catchment Management Authorities
- Department of Planning and Community Development
- Department of Premier and Cabinet
- Department of Treasury and Finance
- Department of Sustainability and Environment
- Engineers Australia (Victoria)
- Municipal Association of Victoria
- Melbourne Water
- Planning Institute of Australia
- Property Council of Australia
- Urban Development Institute of Australia (Victoria)
- Victorian Coastal Council and Regional Coastal Boards.
- Victorian Civil and Administrative Tribunal
- Victorian Local Government Association
- Victorian Planning and Environmental Law Association
- Water Authorities

The CCCAC may inform itself in any way it sees fit including inviting submissions, arranging hearings and consulting with other stakeholders beyond those listed.

5. TIMING

The activities of the CCCAC should be completed within the following time frame:

- Phase 1 – by October 2009
- Phase 2 – by March 2010
- Phase 3 – by December 2010

6. FEES

The member(s) of the Advisory Committee will receive fees and allowances as prescribed for a Panel appointed under Division 1, of Part 8 of the *Planning and Environment Act 1987*.

The CCCAC may operate as a quorum of one as required and/or as determined by the Chair.

7. FURTHER INFORMATION

Day to day liaison for the review will be through:

| [REDACTED]
 Senior Policy Officer
 Planning Policy
 Planning and Local Government Division
 Department of Planning and Community Development
| [REDACTED]



.....

JUSTIN MADDEN MLC
Minister for Planning

Date: 19.5.09

ATTACHMENT 1: ISSUES FOR CONSIDERATION

Issues for consideration and advice sought from the Advisory Committee include for example, but are not limited to:

Statutory planning provisions

- The adequacy of existing zones, overlays and other relevant provisions to support the implementation of coastal vulnerability assessments.
- The fundamental and practical need for new zones, overlays and other provisions to respond to the impacts of climate change on the coast.
- Any consequential amendments or improvements to existing provisions that should be made immediately to allow improved efficiency of decision making.
- The general construct and operation of any proposed new provision to be applied through the VPP.
- The effect, use and application of the *Precautionary Principle* in land-use planning and decision making, and advice on improving guidance on its use and application.
- Appropriate planning and development provisions for e.g. building setbacks, minimum floor levels, appropriate engineering assessments, construction techniques, building materials and temporary/demountable dwellings etc.

Strategic planning

- The consideration of risk management approaches and frameworks and their applicability within Victoria and the Victorian land-use planning system.
- Consideration of strategic climate change adaptation responses and the role of the Victorian planning and development system within these.
- Advice on measures that might assist in the achievement of strategic adaptation through the land-use planning system.

Planning and property law

- Potential use and application of common law doctrines relating to coastal land accretion and erosion.
- Common law liability and its relationship to coastal climate change impacts and land-use planning decision making.
- Potential role of property titles and relevant legislation in communicating and conveying risk.
- Use and appropriateness of Agreements under section 173 of the *Planning and Environment Act 1987*.

Emergency management and planning

- The nexus between emergency management planning and land-use planning decision making in a coastal context.

Operational context

- The extent and role of the Victorian planning and development system in responding to coastal climate change impacts.
- The interrelationships and operation of relevant legislation, such as the *Environment Effects Act 1978*, *Coastal Management Act 1995*, *Catchment and Land Protection Act 1994* etc in achieving integrated coastal zone management.

Appendix B Initial Consultation List

The following were invited to initial consultation sessions with the Advisory Committee. Many of these were required under the Terms of Reference. Others were invited by the Committee as they were thought likely to provide valuable input to the process. Only a small number invited could not attend due to other engagements.

Organisation	Organisation
Australian Conservation Foundation	Greater Geelong City Council
Barwon Water	Hobsons Bay City Council
Bass Coast Shire Council	Insurance Council of Australia
Bayside City Council	Kingston City Council
Borough of Queenscliffe	Melbourne City Council
Building Commission	Melbourne Water
Cardinia Shire Council	Mornington Peninsula Shire Council
Central Coastal Board	Moyne Shire Council
City of Casey	Municipal Association of Victoria
City of Greater Geelong	Parks Victoria
City of Kingston	Planning Institute of Australia (Victorian Division)
City of Melbourne	Port of Melbourne
City of Port Phillip	Port Phillip and Western Port CMA
Colac Otway Shire Council	Property Council
Corangamite CMA	REIV
Corangamite Shire Council	South Gippsland Shire Council
Department of Planning and Community Development	South Gippsland Water

Department of Premier and Cabinet	Surf Coast Shire Council
Department of Sustainability and Environment	Surveying and Spatial Sciences Institute
Department of Treasury and Finance	UDIA Victoria
East Gippsland CMA	Victorian Catchment Management Council
East Gippsland Shire Council	Victorian Civil and Administrative Tribunal
East Gippsland Water	Victorian Coastal Council
EIANZ	Victorian National Parks Association
Engineers Australia	Victorian Planning and Environmental Law Association
Environment Defenders Office	Wannon Water
Environment Victoria	Warrnambool City Council
Frankston City Council	Wellington Shire Council
Gippsland Coastal Board	West Gippsland CMA
Gippsland Ports	Western Coastal Board
Gippsland Water	Western Port Water
Glenelg Hopkins CMA	Wyndham City Council
Glenelg Shire Council	

Appendix C Ministerial Direction 13 and the Coastal Planning Practice Note

Planning and Environment Act 1987

Section 12 (2) (a)

DIRECTION NO. 13

MANAGING COASTAL HAZARDS AND THE COASTAL IMPACTS OF CLIMATE CHANGE

Purpose

The purpose of this Direction is to set out the general requirements for consideration of the impacts of climate change within coastal Victoria as part of an amendment which would have the effect of allowing non-urban land to be used for an urban use and development.

Application

This Direction applies to any planning scheme amendment that provides for the rezoning of non-urban land for urban use and development of all land:

- Abutting the coastline or a coastal reserve.
- Less than 5 metres Australian Height Datum within one kilometre of the coastline including the Gippsland Lakes.

Definition

In this Direction:

Coastline means the line of the low water mark off the sea coast which includes any bay, inlet, estuary and any waters within the ebb and flow of the tide.

Coastal hazard means an occurrence of an event within coastal Victoria which includes the individual or combined effects of inundation by the sea, the effects of storm tides, river flooding, coastal erosion, landslip/landslide and sand drift which adversely affects or may adversely affect human life, property or aspects of the environment.

Requirements to be met

In preparing an amendment which would have the effect of rezoning non-urban land for urban use or development, a planning authority must include in the explanatory report how the proposed amendment:

- Is consistent with the policies, objectives and strategies for coastal Victoria as outlined in Clause 15.08 of the State Planning Policy Framework.
- Addresses the current and future risks and impacts associated with projected sea level rise and the individual and/or combined effects of storm surges, tides, river flooding and coastal erosion.
- Is based on an evaluation of the potential risks and presents an outcome that seeks to avoid or minimise exposing future development to projected coastal hazards.

- Ensures that new development will be located, designed and protected from potential coastal hazards to the extent practicable and how future management arrangements will ensure ongoing risk minimisation.
- Considers the views of the relevant floodplain manager and the Department of Sustainability and Environment.

Exemption by Minister

The Minister may grant an exemption from the need to comply with this Direction in relation to a particular amendment. An exemption may be granted subject to conditions.

JUSTIN MADDEN MLC
Minister for Planning

18 December 2008



Managing coastal hazards and the coastal impacts of climate change

This General Practice Note provides guidance on:

- ▶ managing coastal hazards in the context of climate change
- ▶ coastal vulnerability assessments
- ▶ the decision making process for assessing coastal hazard risk
- ▶ planning for development in vulnerable coastal areas.

Background

Significant development has already occurred in coastal areas. Population growth and the demand for coastal living are ongoing pressures. The potential impacts of climate change on existing coastal hazards are also likely to increase.

The *Victorian Coastal Strategy 2008* identifies that during this century our coastline is likely to be impacted by climate change. Impacts such as sea level rise and an increase in frequency and severity of storm events are projected which are likely to lead to greater coastal inundation and erosion that may cause damage and loss to property, infrastructure and the environment.

Managing risk exposure relative to such coastal hazards and understanding how climate change will impact on these coastal hazards is an important component of informed decision making.

What are coastal hazards?

There are many coastal hazards that need to be considered as part of any planning process, for example, wildfire, various forms of flooding, acid sulfate soils, landslip and landslide. For the purposes of this practice note, coastal hazards mean inundation (both coastal and river) and erosion.

Coastal inundation

Coastal inundation is the flooding of land by ocean waters or river catchments. The frequency, extent and magnitude of coastal and river inundation is likely to be altered by climate change over time and through the combined interactions with sea level rise, tide ranges, storm surges and other coastal processes.

Coastal erosion

Erosion is a naturally occurring process which is impacted on by a number of climatic factors. Erosion can be classified as either long term or short term.

Long term erosion refers to a trend of erosion extending over several years and can be caused by a reduction in the annual offshore deposition of sand or in the rate of longshore deposition of sand.

Short term erosion refers to erosion that can occur over a short period of time as a result of extreme weather events. Short term erosion caused by sudden and extreme weather can result in significant eroding of the beach profile. During a short term erosion event the sand is transported offshore. After the storm passes the normal coastal process brings the sand back onshore and restores the beach naturally over many months or years.



How will climate change affect coastal hazards?

With the exception of long term sea level rise, climate change is not likely to introduce new types of coastal hazards. However, climate change is likely to increase the frequency, intensity and extent of existing coastal hazards.

This means that for some parts of the Victorian coast, climate change impacts are likely to exacerbate coastal erosion processes and inundation, potentially further increasing the impacts of these coastal hazards on existing and future coastal communities and development.

While some climate change impacts such as sea level rise are gradual and occur over a long timeframe, extreme weather events can occur at any time and can significantly reshape the coastline.

Land use planning decisions have long-term implications due to the relatively long life span and permanency of use and development proposals such as residential growth areas, buildings, roads and utilities.

What is sea level rise and what is the benchmark for planning purposes?

Sea level rise means an increase in the mean level of the ocean. Even if atmospheric concentrations of greenhouse gases were stabilised at today's levels, ongoing sea-level rise would continue from past greenhouse gas emissions and consequent warming.

Sea level rise

Key contributions to sea level rise include the melting of ice stored in glaciers and the polar ice sheets, increasing the amount of water in the ocean. Warming contributes to thermal expansion of oceans contributing to the raising of sea levels.

The Fourth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC) November 2007 concludes that:

- ▶ global average sea level has increased at an average rate of 1.8 millimetres per year between 1961 and 2003 but between 1993 and 2003 at 3.1 millimetres per year; and
- ▶ annual average ice extent has shrunk by 2.7 per cent per decade since 1978.

The Victorian Coastal Strategy 2008, identifies sea level rise as a significant coastal issue that requires specific attention. Based on current scientific projections by the IPCC, the Strategy identifies the need to:

Plan for sea-level rise of not less than 0.8 metres by 2100, and allow for the combined effects of tides, storm surges, coastal processes and local conditions such as topography and geology when assessing risks and impacts associated with climate change.

The upper limit of sea level rise of 0.8 metres by 2100 is derived from the Fourth Assessment Report of the IPCC (November 2007). This includes a provision of 0.2 metres to take into account the projected extent of ice sheet melt to that time.

For further information about Victorian Government policy on planning for sea level rise please refer to the Coastal Advisory Note: How to consider sea level rise along the Victorian Coast (Department of Sustainability and Environment, 2008).

What are coastal hazard vulnerability assessments?

Our understanding of the coastal impacts of climate change is evolving and as time progresses our knowledge and understanding will continue to improve. Understanding coastal hazard vulnerability will help avoid increased risk exposure as part of future coastal development.

Planning and responsible authorities should determine if a coastal hazard vulnerability assessment is required to assist in making informed decisions about use and development proposals or to inform long term settlement and strategic planning activities.

If coastal hazard vulnerability assessments are required, consideration should include factors such as sea level rise, storm tide and surge, coastal processes, river inundation and local topography and geology.

Coastal hazard vulnerability assessments can be undertaken at a scale appropriate to inform a particular proposal or development need. In some areas this work may have already been undertaken.



The Future Coasts Program

Future Coasts is a major program of the Victorian Government to assess the physical vulnerability of Victoria's coast to climate change, and develop strategies to help communities and industry respond and adapt. The Future Coasts program is being led by the Department of Sustainability and Environment. Further information on this important project can be obtained at: www.climatechange.vic.gov.au/futurecoasts

Coastal vulnerability assessments can be undertaken by a suitably qualified coastal engineer or coastal processes specialist to assist with understanding erosion rates and developing appropriate setbacks or protection works.

In some instances, where local geology may be unknown or unstable, or where inundation from rivers and streams may also be an issue, advice can also be sought from a qualified hydrological or geotechnical expert.

What is the process for assessing coastal hazard risks?

The *Victorian Coastal Strategy 2008* sets out the policy and strategic direction for responding to coastal hazard risks in the context of climate change. This is reflected in the State Planning Policy Framework through Clause 15.08 'Coastal areas'.

The general steps in the process for assessing and responding to proposals in coastal areas are outlined in Figure 1.

Planning decision making for the impacts of climate change on coastal hazards should be guided by a process of investigation and number of general principles. These include:

Risk Avoidance: New use and development should be sited and designed in a way that does not unnecessarily expose future communities and assets to coastal hazard risks over its intended lifespan.

For coastal erosion, avoidance means ensuring that new use and development is not affected by the retreat of a coastline over the intended design lifespan.

For inundation, avoidance means ensuring that new use and development is not placed in harms way and is located beyond, or above an area prone to temporary inundation.

Integrated coastal planning: Requires the assessment of the future impacts of coastal hazard risk exposure on the economic, environmental and social wellbeing of people and communities in coastal areas.

Precautionary approach: The precautionary approach is an accepted principle in coastal decision making. It requires decision makers to act having regard to the best available science, knowledge and understanding of the consequences of decisions and in the context of increasing uncertainty, to make decisions that minimise adverse impacts on current and future generations and the environment.

Figure 1: Decision making process





How can planning seek to avoid development in vulnerable areas?

Planning for the impacts of climate change on coastal hazards need to be considered for:

- ▶ Amendments to planning schemes which seek to rezone land which would have the effect of allowing non-urban land to be used for a new urban use and development. Refer to Ministerial Direction No. 13 *Managing coastal hazards and the coastal impacts of climate change*.
- ▶ Considerations regarding development of individual parcels of land within existing zoning and overlay provisions within planning schemes.

In both the above cases, coastal hazard assessments may be required to understand the risks and identification of strategies to respond to and manage risk.

Rezoning of land for urban purposes

Given the current body of knowledge and information an important principle is the need to avoid the further intensification of development in areas that are likely to be impacted by projected coastal hazards under climate change.

Proposals to rezone land should be accompanied by an informed coastal vulnerability assessment for that part of the coastline. This should be informed using the best available information to understand the impacts of climate change.

Considerations as part of this process may include:

- ▶ The intended use and design lifespan and value of a proposal assessed against the relative risk exposure during that time.
- ▶ The local geographic characteristics of the coastline such as ocean exposure (for example open coast or sheltered exposure) and land type (such as sandy, rocky, engineered).
- ▶ The role of natural coastal processes and the need to provide for allowances for such processes to continue as a cost effective form of coastal defence against climate change.
- ▶ The critical need for coastal protection infrastructure and the type, location and cost of providing and maintaining such infrastructure throughout its intended lifespan.

- ▶ The need to establish and provide for appropriate setbacks to avoid a projected permanent hazard event and/or withstand a temporary event.
- ▶ The ability for a proposal to provide safe, all-weather access during times of emergency.
- ▶ Consideration of appropriate built form responses such as the need for land fill, materials, sub-floor and floor level heights.
- ▶ The cumulative impacts or any flow-on effects of proposed development and any associated protection works to adjacent properties and the coastline.
- ▶ Other identified coastal hazards such as coastal acid sulfate soils, land subsidence, wildfire and other general geotechnical risks.
- ▶ Any other issues relative to the orderly and proper management of use and development within coastal areas such as development within identified settlement boundary, significant landscapes, native vegetation and cultural heritage.
- ▶ Any other issues relative to the orderly and proper management of use and development within coastal areas such as development within an identified settlement boundary, significant landscapes, native vegetation and cultural heritage.

Strategic investigations should take into consideration the above and other future management issue that may be relevant to ensure risk minimisation and effective long term management of new use and development.



Assessing applications for planning permits

A more complex planning issue is dealing with existing developed areas in particular within or adjacent to low lying areas susceptible to coastal hazards.

The following provides an overview of potential situations and possible considerations:

Minor buildings and works

Situation	Permits for minor building and works, for example non-habitable buildings, dwelling extensions or ancillary farm buildings.
Consideration	Typically no change from current practice. Assessment of impacts may be advisable for high value assets. Siting and design considerations may also need to be factored in.

Existing urban and non-urban areas

Situation	Permits for buildings and works such as replacement of an existing dwelling or construction on a vacant allotment.
Consideration	Assessment of impacts may be advisable for sites immediately adjacent to the coast or near an existing floodplain. Location specific information may be required to inform a localised coastal vulnerability assessment and the development of appropriate land suitability, set back or design responses. The relevant flood plain manager or a suitably qualified coastal engineer or hydrology expert can provide relevant advice as required.

Large scale development/subdivision proposals

Situation	Permits for buildings and works that seek to introduce significant change to built form and intensity within and adjacent to the coast or near existing floodplains.
Consideration	A coastal hazard vulnerability assessment may be required to determine potential exposure and development suitability of the land to evaluate risks. This may include coastal engineering, design or setback responses necessary to demonstrate assessed risks can be effectively and sustainably managed. The relevant flood plain manager or a suitably qualified coastal engineer or hydrology expert can provide relevant advice as required.

Obtaining further information

For guidance on whether a coastal process or coastal hazard vulnerability assessment is required for developments along the Victorian coast, and the key elements of a hazard assessment, advice should be sought from the appropriate flood plain management authority and the Department of Sustainability and Environment.

For more information regarding the *Victorian Coastal Strategy 2008* and the Victorian Government climate change program please visit the following websites:

www.vcc.vic.gov.au
www.climatechange.vic.gov.au

ISBN 978-1-921331-99-2

Published by the Victorian Government Department of Planning and Community Development Melbourne, December 2008.

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www.dpcd.vic.gov.au/planning

Appendix D Recommendations in paper prepared by the Municipal Association of Victoria

Consultation with local government has identified a number of issues that require assessment by the CCCAC. These are:

Strategic issues

1. There is a need to strategically identify the outcome we want. Is it protection of some areas? Is it retreat of others? What about retention of natural coastal processes? A strategic planning exercise needs to be undertaken to determine what outcome is sought. It is then that the right tools to achieve that outcome can be identified.
2. A strategic assessment should be in the form of state or regional vulnerability assessment. That is perhaps, what is the lifespan of some towns? – (5yrs, 50 yrs or 500 yrs) and therefore what resourcing do we put into them to protect, retreat or adapt?
3. Strong community engagement needs to be included in this process so that there is a community understanding and ownership of decisions made.
4. There is a need to link this work to other strategic planning policy, e.g. Growth area policy and state coastal strategy where activity nodes are identified. This should include consideration to economic, environmental and also social impacts of decisions made.
5. In determining the life of a town and the cost of adapting or retreating, there is a need to consider the costs and capacity to service areas, not just if dwellings can individually survive rise in sea level. Eg. works on public land to support development on private land, access roads, drainage and sewer systems.

Statutory issues

6. There needs to be a consistent trigger point to when a vulnerability assessment should be considered. The most obvious solution is to establish a coastal vulnerability overlay over areas of identified vulnerability. The MAV notes the example of Clarence City Council as providing a base form which an overlay may be developed (refer attachment of clause 7.3 – Coastal Management Overlay and 7.4 – Sea Level Rise and Storm Surge Overlay to this report)
7. There is a need for strategic risk assessment, standard identification of high, medium and low risk so that vulnerability assessments can be classified and consistent response applied. Attached table 1 seeks to provide a basis on which a system could be applied.
8. There is a need for a new or amended agency to address coastal vulnerability issues. This could be the Department of Sustainability and Environment to address issues in a consistent manner across the state. It could also be Catchment Management Authorities, however, if CMA's are to provide the role

their statutory function and referral authority would need to be expanded to cover all issues associated with sea level rise.

9. Whichever agency provides the referral comments the agency needs to have statutory power under Section 55 of the Planning and Environment Act, 1987. It is expected that policy response should enable that not all applications require referral. Policy should be sufficiently clear that responsible authorities do not need to burden a statutory body with referral comments unless certain (to be determined) criteria are not met.
10. The CCCAC should consider if time limits for developments / agreements should be used.
11. Suggest as an idea that a levy on construction could be required, similar to DCP or open space contribution – for 30 yrs to fund the reconstruction or mitigation works to built up area where individual response is not logical but some responsibility to future risk should be acknowledged.

Recommendation:

- **Refer the above comments to the CCCAC for further consideration.**