Planning policy and practice: The right mechanism to tackle climate change?

September 2010
# Table of contents

**Introduction**  
1

**The physical impact of climate change on our communities**  
1

**What role can planning play in combating climate change?**  
2
  - Planning objectives and principles  
  - Planning instruments  
  - Planning decisions makers  
  - The role of planning along the climate change spectrum  

**Adaptation**  
8
  - Sea level rise  
    - Governance arrangements  
    - Planning framework  
    - Definition of the coastal zone  
    - Sea level rise projections  
    - Principles  
    - Case study - Application of the precautionary principle by the Courts  
    - Planning tools  
    - Case study - Amendment to planning instruments to implement new coastal policy  
    - Case study - Combating climate change through Coastal Management Plans  
    - Development assessment  
    - Case study - Development assessment in coastal areas  
    - Coastal zone information  

**Bushfires**  
21
  - Governance arrangements  
  - Planning framework  
  - Bushfire prone areas  
  - Case study - Guidance in mapping bushfire prone areas  
  - Planning principles  
  - Planning tools  
  - Case study - Responding to bushfire risk through zoning  
  - Development assessment  
  - Case study - Development assessment in bushfire prone areas  
  - Supporting information for development applications  

**Flooding**  
29
  - Legislative framework  
  - Flood prone areas  
  - Case study - Planning for flood risk on the Sunshine Coast
Planning policy and practice: The right mechanism to tackle climate change?

Introduction

Planning is the process of making decisions regarding the development, use and protection of urban and rural land, infrastructure and facilities for the present as well as for the future.

When it is done well, planning can help to establish and develop communities where people want to work, shop, live or visit by:

- ensuring that a community's basic needs are met, such as fresh air, clean water and recreational space
- facilitating the fair, orderly, aesthetic and sustainable use and development of land for housing, industry and community services
- providing access to essential infrastructure, including public transport, waste and other public facilities
- helping to protect and conserve natural and man-made resources, buildings and facilities.

Climate change is a challenging contemporary issue, which is testing the boundaries of how far planning policy and practice can be used to meet communities' expectations. At a practical level, planning is in many ways an ideal tool to respond to the effects of climate change given its broad scope of application and reach and its relative flexibility as a tool to control land use and development. Nevertheless, planning was not specifically designed as a mechanism to tackle climate change and there are valid questions about its appropriateness in this regard.

In this paper, we discuss:

- the role that planning can and should play in addressing climate change
- the ways in which planning currently is being used to combat climate change in various jurisdictions throughout Australia
- the main legal and practical challenges for local governments and their planners in dealing with climate change
- possible planning developments in the future to address climate change.

The physical impact of climate change on our communities

There is now an overwhelming view that human activities have resulted in the emission of high concentrations of greenhouse gases into the atmosphere. These gases have been associated with global warming and other physical phenomena linked to climate change. It is predicted that continued growth in the emission of greenhouse gases will increase the already significant risk of dangerous climate change.

The 2008 Garnaut Report states that Australia's per capita emissions are the highest in the OECD and among the highest in the world. The majority of Australia's emissions are the result of electricity and other stationary energy generation, which relies heavily on the burning of fossil fuels. However, significant emissions also emanate from the transport sector (through the combustion of fuels for road transport) and industrial processes (such as chemical reactions associated with manufacturing
Higher concentrations of greenhouse gases have been linked to a range of physical phenomena associated with climate change, including:

- higher temperatures
- sea level rise and flooding
- lower rainfall and drought in some areas (for example, southern and eastern Australia)
- increased intensity of storms
- bushfires
- erosion.

These consequences have and will continue to have a direct impact on communities throughout Australia, although the prevalence, nature and intensity of these climate change effects will differ depending upon the physical profile of a particular locality. Sea level rise and flooding pose considerable challenges for coastal areas and areas that are liable to flooding. These challenges are likely to be heightened as the incidence of extreme storms and wind gusts rises. Bushfire prone areas, which exist throughout Australia, will need to be prepared for increasing frequency and intensity of bushfires. Higher temperatures and lower rainfall will exacerbate the severe drought conditions and consequential erosion that has already plagued many rural and agricultural regions during the past decade.

There are two main ways in which the impact of climate change can be addressed:

- **Mitigation** - Climate change mitigation involves action to reduce the concentrations of greenhouse gases, either by limiting their sources or by increasing carbon sinks.
- **Adaptation** - Adaptation to climate change involves actions to help communities that are vulnerable to the effects of climate change to adapt to those effects.

There may also be adaptive actions that have consequential mitigation benefits and vice versa.

In the next section of our paper, we examine the role planning can play in relation to mitigation, adaptation and actions that have both adaptive and mitigating benefits.

**What role can planning play in combating climate change?**

The aims and objectives of planning have evolved over time. The original rationale for the planning system as we now know it was to address particular concerns arising from urbanisation and industrialisation – namely, urban sprawl and pollution. Modern planning focused on separating incompatible land uses to ensure that such uses could occur without imposing undue burdens on others. More recently, planning has assumed a broader role to help create environmentally sustainable communities through, among other things, high density residential living, mixed development and use, and enhanced access to public transport.
The evolution of the role of planning over time illustrates its versatility and responsiveness to current issues and concerns. The question arises as to whether or not it is appropriate to now use planning as a mechanism to respond to a pressing contemporary issue – namely, climate change. The answer to this question depends upon a range of factors, including:

- the extent to which objectives and core principles underlying planning regimes accommodate responses to climate change
- whether planning instruments can be tailored to address climate change
- the resources and skills possessed by those responsible for administering the planning system
- whether there are better alternative mechanisms to deal with climate change.

We consider each of these factors below.

**Planning objectives and principles**

The objectives and core principles underlying current Australian planning regimes typically include the following:

- **Facilitate development** - Planning seeks to facilitate development, while balancing the impact of development on the broader environment. In other words, planning can be used to encourage development provided that the negative impact of the development on the physical environment and the impact of the physical environment on the development do not outweigh the benefits that a community may derive from the development.

- **Improve quality of life** - Planning assists in providing communities and individuals with a pleasant, efficient and safe environment within which to live, work and play and, therefore, can have a profound impact on quality of life. Given the negative impact that climate change can have on the physical environment and, consequentially, on quality of life, planning could play an important role in helping communities adapt to climate change and, thereby, maintain quality of life.

- **Sustainable development** - Sustainable development helps to enhance the long-term viability of cities and towns. Planning can achieve this through, among other things, ensuring efficient resource use, ecological conservation and healthy living environments. Planning policy and decisions that encourage energy efficiency and conservation, renewable energy generation, urban heat island mitigation and water sensitive urban design – all of which would help to adapt and mitigate the effects of climate change – would fall within the scope of this principle.

- **Inter-generational equity** - This principle is encompassed within the notion of sustainable development but warrants particular consideration in the context of climate change. From a planning perspective, the principle of inter-generational equity implies that development should meet the needs of the present without compromising the ability of future generations to meet their own needs. In practical terms, this means that planning decisions should account for the impact of climate change not just on present generations, but also on generations to come. The application of this principle could have particular relevance for climate change effects that have not yet materialised or are likely to escalate in intensity and frequency in the future.

- **Precautionary principle** - The precautionary principle, which also falls within the scope of the sustainable development principle, means that, 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. When applied to planning policy and decisions, this principle implies that scientific uncertainty cannot be used as a basis to ignore or discount the threat of environmental damage, including as a result of climate change. A careful evaluation of planning policy and decisions is needed to avoid serious or irreversible damage to the environment.
Planning instruments

Most land in Australia is covered by planning instruments, which are prepared and administered by state and local government authorities and generally apply to Australia’s various municipalities. These instruments comprise the regulatory framework within which land use and development is controlled in the municipality. The relevant instruments will indicate if a planning permit is required for a development or to change use of land, if use or development of land for a certain purpose is prohibited, and any conditions that should be attached to the development or use.

The planning framework within a particular municipality will usually consist of:

- a written document, which sets out the conditions applicable to the use and development of land within the municipality
- incorporated documents, such as policies that apply to particular types of developments
- a map, which shows how land is zoned and overlays affecting land within the municipality:
  - zones reflect the primary character of land (such as residential, industrial or rural) and indicate the types of use that are allowed within that zone. The zone may reflect existing land use within an area or a new strategic direction for that area
  - some areas within municipalities may also be subject to special planning controls, which are known as overlays in Victoria. These controls ensure that important aspects of the land are recognised, such as areas of special heritage significance, where significant vegetation exists or areas that are prone to bushfires, floods or landslip.

Each component of the planning framework may be used to reflect the particular priorities and circumstances of the municipality. This inherent flexibility makes the planning system particularly well suited to responding to the localised effects of climate change or to further the sustainability agenda of a local council. For example:

- a policy may be incorporated in the municipality’s local planning scheme, which imposes strict controls on land use and development in flood or bushfire prone areas
- changes may be made to zones if, for example, drought conditions in the municipality mean that agricultural activities are no longer sustainable
- a development overlay may impose set back requirements for land that is subject to coastal inundation
- the local planning document for a particular municipality may require the imposition of conditions to reduce greenhouse gas emissions from a type of land use or development before planning approval can be granted.

Examples of how the various elements of a planning scheme have been used to address the effects of climate change are described later in this paper.

Planning decision-makers

State governments are the lead policy makers in relation to planning, including for climate change. Nevertheless, it is local government, for whom planning is a core function, which plays and will continue to play a critical role in addressing the effects of climate change.
Councils normally play two key roles in the context of the planning system:

- **Strategic planning** - A council will establish the strategic direction for planning within the municipality and will initiate changes to the relevant planning instruments, when required. This function – known as strategic planning – involves the development of planning frameworks, policies and strategies to further the objectives of the municipality.

- **Statutory planning** - A council’s statutory planners will apply and enforce the planning framework in the municipality. Statutory planning involves the case-by-case assessment of permit applications for development or change of land use.

The ability of individual councils to respond to the effects of climate change adequately and in a timely fashion in the execution of both of these roles will depend upon a number of factors, including available resources, internal processes, access to information, community attitudes and the broader regulatory environment within which councils are called upon to perform their planning role.

**The role of planning along the climate change spectrum**

Planning has, in the past, evolved to respond to physical and practical challenges. In a similar way, planning must be responsive to climate change, which is perhaps the most taxing contemporary challenge with which planners will have to contend.

Indeed, in many ways, planning is an ideally suited tool to combat climate change. In general terms, the objectives and core principles underlying current Australian planning regimes support the use of planning as a mechanism to tackle climate change. In addition, planning tools exist that can be adapted to deal with climate change. Moreover, by virtue of the localised scope of planning, it is well suited to respond to the localised consequences of climate change in a practical and effective way.

We are increasingly seeing planning being used as a way to respond to climate change across the spectrum of climate change actions that are possible, including adaptive actions, mitigating actions and actions that have both adaptive and mitigating effects. There are now numerous instances of planning being used to help communities that are vulnerable to the effects of climate change to adapt to the effects of climate change, including sea level rise, increased frequency and intensity of bushfires, prolonged drought and erosion. Planning has also played a role in efforts to mitigate the effects of climate change through, for example, assessment of developments or changes in land use that seek to reduce the concentration of greenhouse gas emissions in the atmosphere by reducing transport emissions or improving energy efficiency.

Nevertheless, it is important that, in using planning to address the effects of climate change, the underlying objectives and principles are at all times respected. This will help to ensure that planning is not used in areas for which it is not ideally suited and/or where there are other more appropriate tools. Such an approach will assist in guaranteeing that the use of planning in the context of climate change is consistent with its philosophical underpinnings rather than as a stop-gap mechanism in cases where the broader policy and legislative environment is not adequately developed.

In particular, climate change is a global problem that requires global solutions. Additional greenhouse gas emissions from any source have a worldwide, not merely a local impact. In this way, greenhouse gas pollution is distinctive from many other forms of pollution that have a much more contained and localised impact. Despite the difficulties in achieving global agreement, agreement by nations to significantly reduce their emissions and substantial national action to achieve these reductions is necessary if the world is to avoid potentially catastrophic climate change. Accordingly, planning measures to address climate change need to complement such national actions and not be inconsistent with them.
In our view, the role for planning in addressing climate change is clearest in the context of climate change adaptation. Throughout its history, planning has performed an adaptive function, responding to the physical and environmental challenges of the day. Assisting communities to adapt to the effects of climate change is entirely consistent with this function.

However, the role for planning in the context of mitigation is less clear. Mitigation involves proactive actions taken to reduce greenhouse gas emissions. While planning has a legitimate role to play in mitigation through, for example, planning more efficient settlement that reduces transport emissions, local planning rules that are inconsistent with national mitigation action are not desirable and run the risk of increasing the national cost of mitigation and deterring appropriate developments.

In the case of hybrid action that has both adaptive and mitigating benefits, planning would have a clearer role to play in ensuring that the action in question responds to the effects of climate change than aspects of the action that seek to mitigate the effects of climate change.

The figure below illustrates the spectrum of actions that may be taken to address climate change and which may implicate the planning system. We explore the role of planning in the context of each of these types of action later in this paper.
Adaptation

In this section of our paper, we discuss the role of planning in helping communities adapt to the effects of climate change. We identify the various physical effects of climate change that planners are likely to encounter. The regulatory context for making planning decisions to deal with these effects is examined to illustrate the kinds of principles and tools available to planners to address these physical effects.

**Sea level rise**

One consequence of climate change of particular relevance for coastal regions is sea level rise. Up until now, this climate change impact has attracted the most attention from policymakers and legislators in the planning area.

Global warming caused by the concentration of greenhouse gases in the atmosphere contributes to sea level rise in two main ways. The melting of ice stored in glaciers and the polar ice sheets increases the amount of water in the ocean. As the oceans warm, water expands, thereby raising the sea level.

As our climate changes, and sea levels continue to rise, there will be an increasing incidence of coastal flooding and erosion, particularly during extreme weather events, such as storm surges, which could lead to coastline recession over time. Collectively, these events are referred to as ‘coastal hazards’, which will affect land use, development and protection of natural resources in the vicinity of coastal areas.

The threat of sea level rise to coastal regions is significant given high population densities and the associated development and infrastructure that typically characterise these regions, particularly in Australia where more than 80% of the population live along the coast.

**Governance arrangements**

Primary responsibility for coastal land use management rests with state and territory governments who have, in turn, vested local government authorities with planning functions over coastal areas.

While the federal government does not have any express jurisdiction over these areas, it has developed a number of policies and initiatives that are aimed at ensuring the adoption of a co-ordinated and co-operative approach in managing Australia’s coastal areas. The main mechanism established at the federal level to achieve this objective is the Framework for a National Cooperative Approach to Coastal Zone Management.

In October 2003, the Commonwealth, States and Territories – through the National Resource Management Ministerial Council – endorsed a Framework for a National Cooperative Approach to Integrated Coastal Zone Management (ICZM). The ICZM framework was subsequently updated and supplemented with an implementation plan in 2006.

The ICZM framework seeks to facilitate national cooperation in managing coastal issues and to ensure effective and complementary arrangements within and across jurisdictions. The mechanisms anticipated by the framework include:

- national capacity building
- encouragement of collaborative behaviour among institutions and user groups
- sharing of information, knowledge and resources.
Notwithstanding the ICZM framework, governance arrangements for the Australian coastal zone have been characterised as complex, highly fragmented and, at times, inconsistent. A report issued by the bipartisan House Standing Committee on Climate Change, Water, Environment and the Arts (Parliamentary Committee) in 2009 on the climate change and environmental impacts on coastal communities – ‘Managing our Coastal Zone in a Changing Climate: the Time to Act is Now’ stressed the need for national leadership to promote sustainable use of Australia’s coastal zone and address growing concerns about climate change impacts on the coast.

The report anticipates the development of an Intergovernmental Agreement on the Coastal Zone, which would define the roles and responsibilities of the three tiers of government – federal, state and local – involved in coastal zone management. Up until now, apart from launching the National Coastal Landform and Stability Mapping Tool, which maps coastal landform types for the entire Australian coastline (discussed later), the federal government’s role in addressing climate change through the planning system has been limited. State governments have progressively developed coastal policies to address sea level rise, whereas local government is most directly involved in interpreting and applying coastal policy on a day-to-day basis.

The report also envisages the establishment of a national coastal policy, which would set out the principles, objectives and actions that must be undertaken to address the challenges of integrated coastal zone management. This implies a greater role for federal government in planning for sea level rise than is currently the case. A national coastal policy of this kind would ensure a certain degree of consistency in approach throughout the country and may provide an opportunity to fill in policy gaps, particularly in jurisdictions that are lagging behind in taking the necessary action. On the other hand, however, a national approach may result in a lowest-common-denominator outcome, that could hamper more progressive jurisdictions in their efforts to effectively combat the consequences of climate change.

Pending development of a national framework, planning in Australia’s coastal areas remains governed by state and territory legislation and policies, which are then applied by local governments in the development of local planning frameworks and assessment of development and land use applications.

Planning framework

The planning framework for coastal areas in most Australian jurisdictions is typically characterised by an array of instruments, including overarching legislation and policy documents to guide decision-making in such areas.

In most jurisdictions, the development of planning policy for coastal areas has been an ongoing process, with most states recently revising their policies to respond to changes in the coastal environment caused by climate change. This is, in part, a response to the Council of Australian Governments’ initiative (through the Local Government and Planning Ministers Council) to require development of state-specific climate change planning policies by mid 2011.

By way of example, the Victorian Coastal Strategy 2008 forms the core of the regulatory framework to address sea level rise in Victoria. It sets out the state government’s projections about sea level rise and planning responses to those effects. Similar policy documents have been or are being developed in the other jurisdictions.
Definition of the coastal zone

Typically, the notion of a ‘coastal zone’ is used to delineate the areas in which special planning rules for coastal areas apply.

In some jurisdictions, the coastal zone definition is very specific, identifying with precision the waters and land that are encompassed within the definition. For example, the coastal zone in New South Wales is defined in the Coastal Management Act 1979 and the New South Wales Coastal Policy 1997 as the area bounded by:

- three nautical miles seaward of the mainland and offshore islands
- one kilometre landward of the open coast high water mark
- a distance of one kilometre around:
  - all bays, estuaries, coastal lakes, lagoons and islands
  - tidal waters of coastal rivers to the limit of mangroves or the tidal limit whichever is closer to the sea.

The New South Wales coastal zone is defined to include urban and non-urban areas and private as well as public land.

Other jurisdictions have been less specific in identifying the land covered by the coastal zone definition, which could ultimately lead to uncertainty regarding the areas in which special planning controls to address the effects of sea level rise should apply. For example, the Queensland coastal zone is defined under the Coastal Protection and Management Act 1995 as encompassing all areas within or neighbouring the Queensland foreshore, including inland areas where features, processes or activities could affect the coast. Similarly, under the Victorian Coastal Strategy 2008, the coastal zone in Victoria includes all private and Crown land directly influenced by the sea or directly influencing the coastline.

In cases where the distance landward from the coastal shoreline that is covered by the coastal zone has been clearly defined, there can be quite a significant variation in that distance. The Tasmanian Draft State Coastal Policy 2008 will apply to land within two kilometres inland from the high water mark. In contrast, Queensland’s Draft State Planning Policy for Coastal Protection 2009 proposes a new definition of the coastal zone to include land within 5 kilometres of the coast or below 10 metres Australian Height Datum, whichever is furthest inland. A series of maps, which illustrate Queensland’s coastal zone, have been prepared to help interpret and apply the Draft State Planning Policy for Coastal Protection 2009. Obviously, the further landward the coastal zone extends, the more far reaching the potential impact on development of special planning principles to address coastal hazards.

In order to provide certainty for planners, definitions of the coastal zone should ideally be contained in legislation or in binding policy documents.

Sea level rise projections

Sea level rise projections provide the context within which planning instruments in coastal areas are to be applied. The higher the sea level rise projections and the faster the rate at which sea level rise is predicted to occur, the greater the need for strict planning controls to limit the impact of coastal inundation and erosion that will inevitably accompany such rises.
Notably, there is some variation in sea level rise projections around the country. For example:

- The New South Wales Sea Level Rise Policy Statement 2009 states that a sea level rise benchmark of 0.4m by 2050 and 0.9m by 2100 should be adopted in coastal planning.

- The Victorian Coastal Strategy 2008 provides a policy of planning for sea level rise of not less than 0.8m by 2100.

- In Queensland, the State Coastal Management Plan 2002, which is still in force, indicates that, in assessing coastal erosion prone areas, a 0.3m rise in sea level over a 50 year planning period should be adopted.

- Tasmania has not identified any specific sea level projections. Rather, in its Summary and Practical Guide for Planners and Managers entitled Sea-Level Extremes 2008, assessment of the risk of coastal hazards is based on a 1% annual exceedance probability – that is, the probability of a high sea-level event having a 1% chance of occurring once or more in any one year. To determine exceedance probabilities, Tasmania’s coastline is classified into a number of ‘tidal zones’. For any given height of a location, the risk of a high sea level event flooding that point can be determined and the risk over time (up to 2100) can also be identified.

Most jurisdictions that have identified specific sea level rise projections have indicated that these projections will be periodically reviewed as further relevant information becomes available.

The variation in sea level projections among Australian jurisdictions is not necessarily surprising, given the localised effects of climate change, which may vary depending upon a variety of factors, including the composition and form of the coastline. Nevertheless, the Parliamentary Committee has recommended consideration of the benefits of adoption of a nationally consistent sea level rise planning benchmark. The risks of such an approach is that the planning benchmark underestimates the impact of sea level rise in some jurisdictions and, potentially, overestimates it in others.

In terms of what these sea level rise projections mean in practical terms, the so-called ‘Bruun rule’ estimates that one centimetre of sea level rise results in about one metre of coastal recession, although the actual degree of coastal recession is likely to depend on a range of factors, including winds, waves and currents.

The New South Wales Policy Statement on Sea Level Rise 2009 states that sea level rise projections can be used for purposes including:

- incorporating the projected impacts of sea level rise in predictions about flood risks and coastal hazards
- designing and upgrading public assets in low-lying coastal areas where appropriate, taking into account the design life of the asset and the projected sea level rise over this period
- assessing the influence of sea level rise on new development.

It also suggests that planning and investment decisions should consider the range of sea level rise projections over the life of an asset to decide where an asset should be located and/or how it should be designed to avoid or minimise impacts associated with sea level rise.
Principles

There are a number of core principles that are reflected in most coastal planning and management regimes around Australia, which are relevant to addressing the effects of sea level rise in coastal municipalities.

(a) Ecologically sustainable development

When applied in the context of coastal areas, the principle of Ecologically Sustainable Development (ESD) involves ensuring that development should use, conserve and enhance a community’s resources in such a manner that ecological processes are maintained. In practical terms, ESD implies identification, assessment and accommodation of natural coastal processes in planning and development decisions, bearing in mind both the current and future effects of these coastal processes.

The South Australian Coast Protection Board Policy Document 2002 explains that ESD may be given effect through, among other things:

- minimising or stopping development in areas subject to coastal hazards
- minimising the impact of development on the coast
- maintaining compact coastal settlements and restraining sprawl along coastlines
- conserving developed coastal areas for land uses that require a coastal location.

(b) Precautionary principle

The precautionary principle is also of particular relevance in coastal areas. The New South Wales Coastal Policy 1997 states that the precautionary principle should be applied both at a strategic level in the development of coastline management plans and local environmental plans as well as at the project level in assessing development applications in areas prone to receding shorelines.

The Victorian Coastal Strategy 2008 refers to three possible adaptation options available in the areas in Victoria affected by sea level rise, which should be adopted on a precautionary basis, namely:

- Protect – Protection of beaches, dunes and infrastructure, land use and development.
- Accommodate – Planning and building policies and provisions, redesign and rebuild.
- Retreat – Relocation of infrastructure, land use and development.
Application of the precautionary principle by the Courts

The case of L Taip v East Gippsland Shire Council [2010] VCAT 1222 concerned a decision by the East Gippsland Shire Council to grant a permit for residential development of eight dwellings in Lakes Entrance, which is a coastal regional town in Eastern Victoria that is subject to flooding. The land subject of the permit application is in a Business 1 Zone and is affected by a Land Subject to Inundation Overlay (LSIO). A local resident sought review of Council's decision before VCAT. The core issue under consideration by VCAT was the impact of climate change risks on the site in question and its surrounds.

The Tribunal considered that the design response in the permit application did not adequately address climate change risks. Based on material tabled before VCAT, the Tribunal considered that, over time, the depth of flooding would increase, flood events would become more frequent and there would be a corresponding increase in hazards to residents and emergency personnel. In the Tribunal's view, the elevation of the dwellings above projected water levels would not be sufficient to protect against the totality of climate change risks.

According to Council, despite these risks, approval of the permit application was justified because climate change impacts would not materialise for some time, that in the meantime, the economic life of the development could be realised and properly considered policy responses would be developed to guide future planning outcomes. It argued that refusal of a permit in these circumstances would be tantamount to an imposed, unsupported strategy for 'coastal retreat' for Lakes Entrance.

In rejecting the approach adopted by the Council, the Tribunal relied heavily on the application of the precautionary principle. VCAT explained that the overall approach in applying the precautionary principle is to ensure that:

- Planning decisions about particular developments are made in the face of acknowledged climate change impacts and should not be deferred
- Decisions should assess how the risks from climate change can be minimised to an acceptable level
- Any uncertainty surrounding the potential impacts from climate change should not be a reason to defer decision making.

On the assumption that this application of the precautionary principle was correct, VCAT considered that:

- There were acknowledged and accepted risks to the development in question from coastal climate change impacts
- Not all these risks had been properly considered and sought to be minimised
- Council had effectively deferred the difficult decisions as to how the risks of climate change impacts in Lakes Entrance could be addressed and minimised.

VCAT concluded that the decision to grant the permit, which would allow more intensive development of Lakes Entrance, would not lead to an orderly planning outcome because it would fail to satisfy the purposes of planning in Victoria for intergenerational equity, sustainable, fair and socially responsible development. It advised that a cautious approach should be adopted in relation to development until future planning frameworks and responses are put in place to address and minimise these risks.
Planning tools

The effectiveness of planning systems in facilitating adaptation to sea level rise will ultimately depend upon implementation of the relevant principles and policies through planning instruments and decisions.

(a) Municipal strategies and schemes

Most jurisdictions encourage and, in some cases, require implementation in planning instruments of the principles contained in the relevant coastal policy documents to address the effects of climate change. For example, the Victorian Coastal Strategy 2008 states that coastal climate change impacts should be considered when reviewing Municipal Strategic Statements and in the development of land use planning strategies. Queensland's Draft State Planning Policy for Coastal Protection 2009 expresses a preference for the impact of coastal hazards being addressed through planning instruments in the first instance, rather than only through development assessment. This approach provides relative clarity and certainty about the way the effects of climate change will be addressed for particular development and land use applications.

The degree of guidance provided to planners in making or amending planning instruments to take account of applicable coastal policies may differ. Tasmania's Draft State Coastal Policy 2008 provides relatively detailed guidance. It requires all statutory instruments that manage or control use or development in the Tasmanian Coastal Area, including planning schemes, to comply with the policy. In addition, the Implementation Guide for the Draft State Coastal Policy 2008 states that:

- the extent of development fronting the coast should be contained and restrained and this should be reflected in planning scheme objectives
- with respect to existing development:
  - the zoning of land should place limits on the expansion of urban and residential development on the coast
  - areas set aside for such development should be infill development or be located at the edge of existing settlements to consolidate development
  - otherwise, residential, commercial and industrial development should not extend along the coast or coastal roads in a ribbon-like manner.

The Implementation Guide for the Draft State Coastal Policy 2008 also stresses the importance of undertaking an audit of existing planning schemes against the objectives and outcomes of the policy and, if necessary, developing an implementation plan to ensure that those objectives and outcomes are achieved.
Amendment to planning instruments to implement new coastal policy

Following adoption of the Victorian Coastal Strategy 2008, all Victorian Planning Schemes were amended via Amendment VC52. The amendment was to give effect to the objectives of the Victorian Coastal Strategy by amending Clause 15.08 of all Victorian Planning Schemes.

Surf Coast Shire is located in the western district of Victoria and includes well-known surf and tourist towns such as Torquay, Anglesea and Lorne. Clause 15.08 of the Surf Coast Planning Scheme was amended and now requires the council to apply the principles of the Victorian Coastal Strategy 2008 in making decisions pertaining to planning. Among other things, this requires council to ensure that new development in coastal areas within the shire is located and designed to take account of the impacts of climate change.

(b) Coastal management plans

The traditional planning instruments may be complemented by coastal management plans in coastal areas.

Various planning frameworks in Australia provide for the development of coastal management plans, which establish a framework for sustainable use, development and protection in particular coastal areas. These plans may address the effects of climate change but will usually also cover a broad array of other matters regarding the management of coastal areas.

Under the New South Wales Coastal Protection Act 1979, a council whose municipality is partly or entirely within the NSW coastal zone may, and must, if directed to do so by the Minister, make a Coastal Zone Management Plan in accordance with the Act. The rationale for not mandating the preparation of coastal zone management plans by all councils in New South Wales reflects a recognition that councils face different issues in coastal management depending upon the profile of the coastline within a particular municipality. Resource demands and priorities may also differ.

In Victoria, similar plans are developed under the Coastal Management Act 1995 by either Regional Coastal Boards or state government coastal managers. Bodies that carry out functions related to the management of land in areas covered by such plans – including local councils – are required under the Coastal Management Act 1995 to take those plans into account.

Under Queensland’s Coastal Protection and Management Act 1995, the Minister is required to prepare Regional Coastal Management Plans for parts of the Queensland Coastal Zone. Under the Act, Regional Coastal Plans have the effect of a State Planning Policy and, therefore, must be taken into account when assessing development applications.

The contents of coastal management plans will differ depending upon local conditions and priorities. They may provide for:

- identification of key coastal sites requiring special coastal management
- provide guidelines and criteria for development addressing matters including location, form and land use within development nodes
- emergency works aimed at protecting property that is subject to beach erosion
- mechanisms to ensure continuing and undiminished public access to beaches, headlands and waterways, particularly where public access is threatened or affected by accretion.
Combating climate change through Coastal Management Plans

Byron Shire Council is in the process of finalising its Coastal Zone Management Plan (CZMP). The draft CZMP area covers both marine and terrestrial environments that are likely to be affected by human activities and coastal processes.

Among other things, the CZMP elaborates on the principle of planned retreat from coastal hazards, including from climate change. In essence, planned retreat establishes a development-free buffer from erosion. Development is allowed in coastal hazard areas, but is made subject to conditions that are designed to minimise risk. Conditions include requiring removable or relocatable structures.

The CZMP will:

- establish a uniform 20 metre, development-free buffer between the erosion escarpment and human settlement
- continue to enforce relocation of property and removal of structures from the buffer area
- provide an Emergency Action Plan for how to implement planned retreat in the event of a coastal emergency.

Development assessment

To the extent that planning instruments have been amended to incorporate principles and rules to address the threat of coastal hazards, development assessment must be consistent with those principles and rules. In addition, specific guidance is also contained in a number of state coastal policy documents to assist in assessing development applications in coastal areas.

- **Conditions to minimise impact of coastal hazards** - The *New South Wales Coastal Policy 1997* states that approval of development proposals on the coastline and offshore that are threatened by coastal hazards or where they pose a threat to the physical well-being of the coastline must be made subject to conditions which minimise impacts or rejected where they pose an unacceptable threat to the physical well being of the coastline.

- **Treatment of existing and new development** - Queensland’s *Draft State Planning Policy for Coastal Protection 2009* distinguishes between existing development and new development.
  - With respect to existing development, the draft policy states that re-development or infill development is acceptable provided that it is located, designed and constructed to withstand or avoid the impacts of coastal hazards. Coastal building lines are to be used to ensure that new structures associated with re-development or infill are located as far from the coast as is practicable.
  - Regarding new development, the draft policy states that where an area has been committed to planned development, erosion-prone areas and high hazard inundation areas are to be avoided. Developments must be set back outside areas prone to coastal erosion. In areas vulnerable to storm tide inundation, development should be located, designed and operated to mitigate against the potential impacts of a storm tide – for example, by raising floor heights of habitable rooms and lists the following strategic action regarding assessment of development applications.

- **Siting of coastal development**
  - The *Victorian Coastal Strategy 2008* and Clause 15.08 of the *State Planning Policy Framework 2002* state that new development should be located and designed so that it can be appropriately protected from the current and future impact of climate change and coastal hazards.
The Western Australian State Coastal Planning Policy 2006 states that new buildings and foreshore infrastructure should be positioned to avoid risk of damage from coastal processes and, where possible, avoid the need for physical structures to protect development from potential damage caused by such processes. It also provides that development siting should be guided by setback guidelines, which assist in determining appropriate setbacks to accommodate coastal processes.

**Development assessment in coastal areas**

In the matter of *Seifert v Colac-Otway Shire Council* [2009] VCAT 1453, VCAT decided to issue a permit for a proposed 2 lot subdivision on Great Ocean Road in Apollo Bay subject to certain conditions.

The Tribunal noted that it should be conscious so as not to ‘approve coastal developments that are likely to be unduly threatened by future flooding and/or coastal inundation’.

Of critical importance to VCAT in reaching its decision was the fact that the Great Ocean Road lies between the foreshore and the subject site. However, the proposed development site was within close enough proximity to the foreshore (irrespective of the position of the Great Ocean Road) to be at risk of coastal inundation, particularly given the ‘gully-like area’.

Consequently, the proposal was only allowed subject to the imposition of a number of conditions including a setback from the Great Ocean Road of 17 metres and the inclusion of a building exclusion zone.

**Coastal zone information**

Ensuring access to accurate and up-to-date information about the impact of coastal processes on coastal areas is critical to ensuring the soundness of planning decisions. Such information will enable planners to properly assess the risks to buildings and infrastructure associated with climate change and, particularly, sea level rise. There are various sources of information that planners can rely upon.

(a) **National Coastal Landform and Stability Mapping Tool**

In August 2009, the federal government launched the National Coastal Landform and Stability Mapping Tool, which maps coastal landform types for the entire Australian coastline. The Mapping Tool was commissioned because pre-existing coastal landform and geology information that was available consisted of numerous maps in different formats, classifications and scales. The Mapping Tool seeks to provide a national map, presented in a single nationally consistent format and classification.

The Mapping Tool provides information about:

- what the coast is made of (such as, hard rock, sand or mud)
- landform types (such as beaches, cliffs, shore platforms or rocky slopes)
- how different parts of the coast are likely to respond to or resist drivers of change, such as storms and sea-level rise.
(b) National Climate Change Risks to Australia's Coast

In November 2009, the federal government issued a report on Climate Change Risks to Australia's Coasts. The report presents the findings of the first pass national assessment of the risks of climate change for the Australia's coast. The report includes an identification of the key risks to infrastructure, including residential buildings, at state and local government levels.

(c) Local coastal vulnerability assessments

Given the localised effects of climate change, including sea level rise, some States are also undertaking their own vulnerability assessments. For example, Victoria is currently undertaking the Future Coasts project to develop comprehensive vulnerability assessments for the Victorian coastline. This project will also develop planning and policy guidance and adaptation strategies for decision-making.

Bushfires

Climate change, resulting from very high concentrations of greenhouse gas emissions in the atmosphere, has been associated with higher temperatures, lower rainfall and increasing drought frequency, all of which are considered to increase the likelihood, severity and duration of bushfires in Australia.

The south east of Australia is particularly prone to bushfires, although other parts of Australia are not immune to bushfire risk. Summers in the south east are characteristically hot and dry while winters are relatively mild and wet. Winter and spring promote vegetative growth, whereas the hot, dry summers convert such growth into fuel for fire.

Current projections indicate that the parts of Australia that are vulnerable to bushfires will witness an increase in the frequency of extreme fire danger days, especially in inland areas. Another troubling trend is the increasing risk posed by bushfires to urban areas. Whereas in the past, bushfires were associated largely with rural areas, recent events abroad and in Australia have illustrated the real and significant threat that bushfires may also pose to built-up urban areas.

Strategic and statutory planning decisions regarding the development and use of land can significantly reduce the exposure of people and property to the impacts of bushfires and, thereby, assist in adaptation to this climate change risk. In theory, planning rules and decisions can be used to effectively force retreat from bushfire prone areas. Nevertheless, most Australian jurisdictions have adopted a less extreme approach, which accepts that development will occur in or proximate to bushfire prone areas but controls are imposed on such development to mitigate risk.

Governance arrangements

As in the case of sea level rise, responsibility for planning and management of bushfire prone areas rests principally with state and local governments. However, in contrast to efforts at the federal level to co-ordinate and ensure consistency in approach with respect to addressing the effects of sea level rise, there are no similar federal mechanisms dealing with bushfire risk. As a consequence, there is some variation in the approach various state and territory governments have adopted to address the planning implications of increased bushfire risk.
Planning framework

In most jurisdictions around Australia, the planning framework for addressing bushfire risks consists of
overarching legislation establishing the basic planning principles for bushfires and policy documents
containing detailed provisions regarding how the planning principles should be implemented.

In New South Wales, section 79BA of the Environmental Planning and Assessment Act 1979 requires
all new development on bushfire prone land to comply with Planning for Bush Fire Protection 2006,
which is a policy document produced by the NSW Rural Fire Service. Furthermore, a Ministerial
Direction requires regard to be had to Planning for Bush Fire Protection 2006 in the preparation of
local environment plans. The primary aim of Planning for Bush Fire Protection 2006 is to use the
NSW planning development assessment system to provide for the protection of human life and to
minimise impacts on property from the threat of bushfire, while having due regard to development
potential, on-site amenity and protection of the environment.

The ACT has established a similar framework. The Emergency Services Act 2004 sets in place the
legislative basis for bushfire planning in the ACT. Among other things, the Act requires the preparation
of a Strategic Bushfire Management Plan for the ACT. The Strategic Bushfire Management Plan
for the ACT 2009 aims to minimise the likelihood of bushfires and their negative consequences by
providing clear direction for the community and government to reduce bushfire risk. Specifically, the
ACT Government is urged to develop and implement an integrated, efficient and effective bushfire
management program whereas the broader community is encouraged to increase its knowledge of
bushfires and to take personal actions to minimise the risk and consequences of bushfire events.
It is supplemented by a document prepared by the ACT Planning and Land Authority – namely,
the Planning for Bushfire Risk Mitigation General Code, which seeks to ensure that bushfire risk
is appropriately assessed and considered during planning, development and construction in the
ACT.

Bushfire prone areas

The identification and assessment of bushfire prone areas is a necessary first step to the development
and application of planning controls to mitigate bushfire risk.

In Queensland, such areas are identified by councils in their planning schemes pursuant to State
Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide. Guidelines
have been prepared to guide councils in the identification of these areas.

In comparison, the identification of bushfire prone areas in New South Wales is undertaken by the
Commissioner of the Rural Fire Services under section 146 of the Environmental Planning and
council then prepares a map, which locates bush fire prone areas within a particular locality. These
maps also identify bush fire hazards and associated buffer zones.

Western Australia's Planning for Bushfire Protection 2001 refers to four levels of bush fire hazard,
which are used for identifying bushfire prone areas:

- low bush fire hazard areas include areas devoid of standing native vegetation and areas which,
due to climatic conditions, do not experience bush fires, such as inner urban and suburban areas
  with maintained gardens
medium bush fire hazard areas include areas containing grassland with slopes in excess of 10°, open woodland and open shrubland. Suburban areas with some native tree cover would also fall in this category.

high bush fire hazard areas includes low shrubs on steep slopes.

extreme bush fire hazard areas generally include forested areas with a dense understorey, areas of woodland where a hazard reduction program is not in place or implemented and areas containing predominantly tall shrubs.

All areas with a medium, high and extreme bush fire hazard level are considered to be bushfire prone areas for planning and building controls. Bush fire prone areas may be designated by either local government or the fire service responsible for an area or both.

Following the tragic 2009 bushfires in Victoria, the Victorian Bushfires Royal Commission recommended in its final report that the bushfire zone mapping criteria should be urgently reviewed so that they are based on best available science or take account of all relevant aspects of bushfire risk. The Royal Commission also recommended that the mapping and designation of bushfire prone areas should be centralised, but undertaken in consultation with municipal councils and fire agencies.

**Guidance in mapping bushfire prone areas**

In New South Wales, the Rural Fire Service has prepared a guideline to assist councils with mapping bushfire prone areas. Among other things, the guideline sets out the methodology and criteria that councils should use in designating bushfire prone areas, including:

- identify and map vegetation groups
- the main vegetation groups are:
  - forest
  - woodlands, heaths and wetlands
  - moist rainforests, shrubland, open woodlands, mallee and grasslands
- once vegetation classes have been determined and mapped across a council area, bushfire vegetation categories must be applied
- once areas of vegetation have been defined and appropriate bush fire vegetation categories applied, it is necessary to apply the applicable buffering criteria. Application of buffering will, in effect, produce the bush fire prone land map.

**Planning principles**

Planning regimes throughout the country reflect a number of core principles regarding the treatment of bushfire risk in the context of planning schemes and decisions, including:

- reduce bushfire risk – for example, through fuel reduction and firebreak management programs
- discourage land use and development that is incompatible with the need to protect people and property in bushfire prone areas
- undertake fire protection measures that will help to make buildings, developments and infrastructure less vulnerable to bushfires.

These principles could support a range of planning approaches, including prohibiting development in bushfire prone areas or allowing such development but imposing controls to reduce bushfire risk.
Planning tools

There are various tools that have been used to implement bushfire principles in planning systems. The most commonly used tools are discussed below.

(a) Bushfire abatement zones

Bushfire abatement zones are essentially buffer zones between bushfire hazards and buildings, infrastructure and other types of development that might be affected by radiant heat, flames, ember and smoke attack. The location and alignment of bushfire abatement zones will depend on a number of factors related to the risk of fires starting, spreading and causing damage, including vegetation type, land slope and type and levels of construction. Zoning allows for controls to be tailored to the degree of bushfire risk in a particular zone.

In New South Wales, a Ministerial Direction requires designation of an ‘Asset Protection Zone’, consisting of:

- Inner Protection Area, which is closest to buildings and incorporates ‘defendable space’ for managing heat intensity at the building surface. Vegetation in this area must be maintained for easy defence of a dwelling, plantings including a 15% maximum tree canopy, garden beds must be no closer than 10 metres from an exposed window or door, and lower limbs on trees must be lopped to 2 metres above ground.

- Outer Protection Area for reducing the potential length of flames by slowing the rate of spread, filtering embers and suppressing fire. Vegetation is to be managed to reduce risk, including a maximum tree canopy cover of 30%, and understorey to be managed for fire risk, including mowing.

The difference between these two categories of protection areas is essentially the nature and extent of vegetation to be removed.

Responding to bushfire risk through zoning


Under the ACT Strategic Bushfire Management Plan 2009, a number of bushfire management zones have been identified including ember zones, inner asset protection zones, outer asset protection zones and home asset protection zones. The bushfire zone categories also include:

- Agricultural Fire Management Zones, which are areas of rural leasehold and agisted lands where bushfire mitigation is undertaken less intensely and in accordance with rural production objectives.

- Strategic Firefighting Advantage Zones, which are strategically located zones to slow the spread of unplanned fires and reduce fire intensity and spotting.

Studies conducted in the USA note that safety zones of at least 20 metres are required to ensure fire-fighters can safely defend property. These studies together with research on the distribution of embers from a fire’s edge were considered in determining the width of the various protection zones in the ACT.
(b) Fire protection measures

Fire protection measures can assist in defending against bushfires, should they occur. The type of building, infrastructure or other type of development will influence the selection of appropriate fire protection measures.

Victoria's Wildfire Management Overlay seeks to ensure that development in high bushfire risk areas include appropriate fire protection measures, including:

- adequate and accessible water supply for fire-fighting purposes
- access for fire-fighting and other emergency vehicles and safe evacuation
- building siting, design and construction to maximise fire safety
- minimisation of fuel hazards around buildings.

(c) Firebreaks

A firebreak is a gap in vegetation or other combustible material that acts as a barrier to slow or stop the progress of a bushfire or wildfire.

Under section 47 of Northern Territory's Bushfires Act 2004, the Director of Parks and Wildlife has the authority to order the establishment of firebreaks on any land which represents a wildfire threat. Failure to comply may result in fines. In addition, the Chief Fire Control Officer has the authority to issue an order empowering entry into property to undertake the required works.

(d) Special measures for extreme bushfire risk

Following the deadly bushfires in Victoria in 2009, Clause 52.43 of the Victorian Planning Provisions was introduced to enable the removal of a greater extent of native vegetation for bushfire protection without a planning permit. The exemption applies to all regional, rural and selected Melbourne metropolitan areas. It is an interim measure for the 2009/2010 bushfire season and will expire in August 2010. The Victorian Government has indicated that it will reassess vegetation removal for bushfire protection following the conclusion of the Victorian Bushfire Royal Commission, whose final report was released on 31 July 2010. The Royal Commission recommended amendment of the Victoria Planning Provisions to require that, when assessing a permit to remove native vegetation around an existing dwelling, account should be taken of fire hazard and weight should be given to fire protection purposes.

Development assessment

A number of planning frameworks contain provisions dealing with the assessment of development applications in bushfire prone areas. In some cases, the guidance is general, whereas in other cases, the guidance is detailed and more prescriptive.
Western Australia’s Policy No. DC 3.7 Fire Planning illustrates a relatively detailed approach. It imposes the following requirements regarding development assessment:

- fire risk must be considered in planning decisions to avoid increasing the risk through inappropriately located or designed land use and development
- more intensive development, such as residential, rural-residential, hobby farms, tourist and industrial developments should not be permitted in extreme fire hazard areas without permanent hazard level reduction measures being implemented to reduce the hazard level to high, medium or low
- in high and medium fire hazard areas, the use and development of land for more intensive purposes should not be permitted without assessment of the bush fire risk and compliance with the performance criteria and acceptable solutions set out in Planning for Bushfire Protection 2001
- more intensive land use and development should only take place in areas where the performance criteria and acceptable solutions set out in Planning for Bushfire Protection 2001 can be achieved.

The acceptable solutions set out in Planning for Bushfire Protection 2001 indicate ways of minimising the impact of fire, by ensuring that:

- buildings are not located in highly vulnerable positions and are also sufficiently distant from areas of potentially hazardous fire behaviour
- road layout and other access features combine both fire service access and resident safety
- water supplies are sufficient for the fire services
- the fire service response is adequate to meet the building and bush fire risk.

In Victoria, a planning permit is required in an area covered by a Wildfire Management Overlay for buildings and works associated with specific land uses, including a new dwelling or a dwelling extension of more than 50% of the existing floor area. Applicants are required to comply with standard fire protection conditions, including the provision of a dedicated fire fighting static water tank and the provision of access into and on the allotment appropriate for the use of fire fighting vehicles. The conditions vary according to the applicable category of bushfire attack – that is, low, medium, high or extreme bushfire attack.

Section 79BA of the NSW Environmental Planning and Assessment Act 1979 prohibits a consent authority from granting approval for developments in a bush fire prone area unless the proposal complies with Planning for Bush Fire Protection 2006 or the Commissioner of the Rural Fire Service has been consulted on any non-compliance. Planning for Bush Fire Protection 2006 indicates that the type of development that is proposed on bush fire prone land will influence the applicable protection measures and the way the application is assessed. It also states that a minimum setback – ‘defendable space’ – from a bushfire hazard is always required.
Development assessment in bushfire prone areas

In the matter of *PGH Environmental Planning v Wollongong City Council* [2009] NSWLEC 1385, the Land and Environment Court of NSW considered an application for a review of the refusal by Council of the proposed development of 6 dwellings in a bushfire prone area.

The Court upheld the decision of Council in refusing the proposed development on a number of grounds. With respect to the location of the site within a bushfire prone zone, the Court held that two of the proposed dwellings would be constructed on sites which provided inadequate bushfire egress and, on that ground alone, the proposal should be refused.

In this regard, the Court observed that the manual published by the Rural Fire Service, *Planning for Bushfire Protection*, requires two emergency egress paths from sites that are at a distance of more than 200 metres from the nearest public road. The Court held that the network of trail paths which intersected with the two egress paths from the site in question resulted in a significant risk of danger to those using the paths, who might stray onto minor trails and become lost, particularly in times of poor visibility from smoke or darkness. The Court held that the resulting risk to both future residents and emergency services was unacceptable.

A further factor considered by the Court in refusing the application was that the vegetation in the surrounding area was such that, even if it were maintained, it would always pose the risk of blocking the egress paths by fallen trees.

Supporting information for development applications

As bushfire risk increases, so too will the need for comprehensive bushfire assessments for development applications made in the context of bushfire prone areas.

In Queensland, the *State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide* requires preparation of a Bushfire Management Plan (BMP) for development that materially increases the number of people living or working (except for single dwellings on existing lots) in a high severity bushfire hazard area, or that involve hazardous materials that are manufactured or stored in bulk in a high or medium severity bushfire hazard area. A BMP may also be required for certain types of community infrastructure in either a high or medium severity bushfire hazard area.

The *State Planning Policy 1/03 Guideline: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide* states that a comprehensive BMP should include the following:

- an assessment of the nature and severity of the bushfire hazard affecting the site
- an assessment of the specific risk factors associated with the development proposal
- a plan for mitigating the bushfire risk for the proposed development.

A BMP should be prepared by a suitably qualified professional with appropriate technical expertise in the identification and mitigation of bushfire hazard. Furthermore, the policy guideline states that, at a minimum, the local government, responsible Rural and/or Urban Fire Brigade, and managers of adjacent parks or reserves should be consulted in the preparation of the BMP.
Similarly, the NSW Planning for Bush Fire Protection 2006 states that development applications on bush fire prone land must be accompanied by a Bush Fire Assessment Report demonstrating compliance with the aim and objectives of Planning for Bush Fire Protection 2006 and the specific objectives and performance criteria for the land use proposed.

**Flooding**

Many of Australia’s cities and towns are located on inland and coastal floodplains – that is, areas that are susceptible to inundation by floodwaters from any source. The explanation is, in part, historical. Floodplains provided communities with access to water, transportation options and recreational opportunities. Furthermore, these areas are generally more fertile than other areas of the country and, therefore, may be conducive to agricultural activities.

Nevertheless, despite the opportunities that floodplains present, they also face the threat of flooding, a threat which is becoming increasingly pronounced as a result of climate change. Flooding can affect the health and safety of individuals, it could damage or destroy property and it may affect the well-functioning of the floodplain on an ongoing basis.

The various types of floods that might pose a risk to communities based near floodplains include:

- river flooding, which occurs when the volume of water flowing into the river systems exceeds the capacity of the channels
- storm surges resulting from a combination of storm systems, including strong wings, and high tides, which can cause large quantities of water to build up along coastlines
- flash floods are caused by very heavy rainfall over extended periods of time. These floods can occur anywhere but are particularly common in urban environments, where the ground surface is unable to adequately absorb excessive amounts of water.

Floodplain management can be used to mitigate the risk of flooding in floodplain areas. It includes the use of the planning system to control development and land use in floodplains and, thereby, reduce or, ideally, eliminate, the impact of floods.

This is not to say that development on flood prone land should be prohibited altogether. Rather, a flexible approach is needed to ensure that the benefits associated with floodplains can continue to be realised, but this needs to be balanced against the real risks that floods present. Striking the right balance will pose particular challenges for planning authorities in their efforts to facilitate adaptation in flood prone areas.

**Legislative framework**

The planning framework for addressing flood risks is similar to those developed to address sea level rise and bush fire risks. In particular, the framework typically consists of overarching legislation, which establishes the basic planning principles for flood management. The regulatory framework includes policy documents containing detailed provisions regarding how the planning principles should be implemented. In several jurisdictions, detailed guidelines exist to assist planners in implementing these policy documents.

For example, in New South Wales, Section 117 Ministerial Direction No. 15 – Flood Prone Land 2007 requires draft local environmental plans to be consistent with the Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005. The direction applies to all councils whose municipalities include flood prone land. The Flood Prone Land Policy is incorporated in the Floodplain Development Manual 2005. The main objective of the policy is to reduce the impact of
floods and flood liability on owners and occupiers of property in flood prone areas, using ecologically sustainable methods where possible. The Guideline On Development Controls On Low Flood Risk Areas – Floodplain Development Manual 2005 provides advice to councils on appropriate flood controls for residential and non-residential development in flood prone areas.

In Victoria, Clause 15.02 – Floodplain management – State Planning Policy Framework aims to achieve consistency in planning controls for flood affected areas by providing a broad framework for the integration of flood policy and provisions into planning schemes. Clause 15.02 is supplemented by a number of flood zones and overlays, which help to tailor the planning response to local flood risks. Applying the Flood Provisions in Planning Schemes – A Guide for Councils 2000 (VPP Planning Guide) is a Victorian Planning Provision Practice Note. It provides guidance about various matters, including the preparation of flood management policy and identification of land affected by flooding. Applying for a Planning Permit under the Flood Provisions – A Guide for Councils, Referral Authorities and Applicants 2000 (VPP Planning Permit Guide) is also a Victorian Planning Provision Practice Note, which provides guidance about making an application for a planning permit where flooding is a consideration and explains how an application will be assessed by the responsible council.

Flood prone areas

Flood prone areas are usually defined by reference to a particular flood event, which is typically the worst flood event that is possible within a specific time period.

In New South Wales, flood prone land is defined in the Floodplain Development Manual 2005 as the area inundated by a Possible Maximum Flood (PMF) event – that is, the largest flood that could conceivably occur at a particular location, which is usually estimated on the basis of the maximum probable precipitation and, where applicable, snow melt and coupled with the worst flood producing catchment conditions.

The Floodplain Development Manual 2005 recommends that flood prone land be further categorised according to:

- frequency of inundation
- hydraulic function (that is, floodways in which floodwaters are conveyed, flood storage areas where flood waters are temporarily stored during flood events, and flood fringe areas)
- degree of flood hazard.

Queensland’s State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide states that a flood management area is land inundated by a ‘Defined Flood Event’. It is up to individual councils to determine what the Defined Flood Event should be for a particular municipality. Nevertheless, the State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide also states that the Queensland Government’s position is that, generally, the appropriate flood event for determining a flood management area is the 1% Annual Exceedance Probability (AEP) flood – that is, there is a 1% likelihood occurrence of a flood of a given size or larger in any one year.

The State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide states that flood management areas should be identified in planning schemes. The State Planning Policy 1/03 Guideline: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide further provides that, ideally, these areas should be identified on the basis of a comprehensive floodplain management study and, ideally, flood management areas should be mapped as overlays for the whole municipality.
Planning for flood risk on the Sunshine Coast

The Intergovernmental Panel on Climate Change (IPCC) has identified coastal areas of south east Queensland, including the Sunshine Coast, as being particularly vulnerable to climate change.

The Sunshine Coast is in the process of developing a new planning scheme, which council expects to complete in 2012. Among other things, the new planning scheme will endeavour to better and positively respond to the effects of climate change.

As a first step in this process, council has prepared a Statement of Proposals, which summarises the proposed key principles and key directions for the new planning scheme. Various discussion papers have been prepared as background to the Statement of Proposals, including one on flooding and stormwater management.

The discussion paper notes that the existing planning scheme provisions for the Sunshine Coast generally do not require consideration of flood events in excess of the anticipated 1 in 100 year Average Recurrence Interval (ARI) flood event. However, it is proposed that the new planning scheme include stronger provisions requiring a response to the residual flood risk above a defined flood event, such as the 1 in 100 year ARI and up to Probable Maximum Flood. The discussion paper states that these provisions will require consideration of areas that are potentially isolated or inundated by extreme flood conditions, requiring evacuation routes and demonstration of other flood risk management responses.

Planning principles

The principles reflected in flood management planning frameworks range from an emphasis on avoiding intensifying the possible impact of flooding by allowing development in flood prone areas to fostering development in such areas, provided that flood risks are mitigated.

The following main principles, which lie at the heart of the NSW Flood Prone Land Policy, tend to favour development in flood prone areas:

- flood prone land is a valuable resource that should not be sterilised by unnecessarily precluding development
- a merit-based approach should be adopted for all development decisions in the floodplain to take account of social, economic and ecological factors as well as flooding considerations
- the impact of flooding and flood liability on existing developed areas shall be reduced by ongoing flood mitigation works and measures
- the potential for flood losses in all areas proposed for development or re-development shall be contained by the application of ecologically sustainable planning and development controls.

In contrast, Victoria’s Clause 15.02 – Floodplain management – State Planning Policy Framework stresses the need to avoid intensifying the impacts of flooding through inappropriately located uses and developments whereas Queensland’s State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide emphasises the importance of mitigating flood risks.
Planning tools

(a) Flood planning levels

Flood planning levels may be used as a threshold below which flood-related planning controls are applied for a specific area or location. They are usually linked to flood events, which are used to define flood prone areas.

The NSW Flood Prone Land Policy states that councils are responsible for the determination of appropriate planning and development controls, including appropriate flood planning levels (FPL), to manage future flood risk to an acceptable level. The Floodplain Development Manual 2005 states that, unless there are exceptional circumstances, FPLs for typical residential development should be based around a hypothetical flood representing a likelihood of occurrence of 100 years plus an appropriate freeboard, which is a factor of safety usually expressed as a height above the adopted flood level and is typically 0.5m.

The Floodplain Development Manual 2005 notes that:

- with respect to areas that are below the residential FPL, development controls may be needed to limit the area that can be developed and may include minimum fill levels, minimum floor levels, the requirement to use flood compatible building materials and need to address emergency management issues

- regarding areas above the residential FPL, no development controls should apply for residential development. Nevertheless, the safety of people and associated emergency response management still needs to be considered. Consequently, restrictions on types of development which are particularly vulnerable to emergency response, for example developments for aged care, may be needed.

(b) Zoning and overlays

In Victoria, there are a range of zoning and overlay options available to address flood risks.

- The Urban Floodway Zone (UFZ) prohibits most uses and development. It is designed to be applied to urban environments where the flood risk is high. Only low intensity uses and development (such as recreation) are suitable in such a zone.

- The Floodway Overlay (FO) applies to mainstream flooding in both rural and urban areas, but the flood risk is lower compared to the UFZ. The FO is suitable for areas where there is less need for control over land use, and the focus is more on the control of development. While particular types of development are not encouraged in these areas, some buildings and works associated with low intensity uses may be permitted. Key considerations include whether the development will obstruct flood flows or increase flood risk.

- The Land Subject to Inundation Overlay (LSIO) applies to mainstream flooding in both rural and urban areas. In general, areas covered by the LSIO have a lower flood risk than UFZ or FO areas. The LSIO can also be used as an interim measure to identify flood affected areas where detailed information to define the floodway is not available. The LSIO only requires a permit for buildings and works and does not prohibit either use or development.

The VPP Planning Guide notes that the level of planning control associated with each tool is commensurate with the potential flood risk.
Judicial consideration of climate change in the context of a flood overlay

In *W & B Cabinets v Casey City Council* [2009] VCAT 2072, an application was made to Council to construct 22 single storey dwellings on a lot. The land was within a Residential 1 Zone and subject to a Land Subject to Inundation Overlay. Melbourne Water was a referral authority under the Overlay.

Council eventually refused the application. One of the grounds of refusal was that the application was for an intensive development in an area susceptible to flooding and did not include a Coastal Hazard Vulnerability Assessment.

VCAT distinguished this case from that of *Myers v South Gippsland Shire Council* (No 2) [2009] VCAT 2414. In that case, VCAT concluded that to grant a permit to subdivide the land into two lots in the prevailing circumstances would have resulted in a ‘poor planning outcome that would unnecessarily burden future generations’. Moreover, VCAT was not confident that there was a sufficiently certain mitigation measure proposed by any of the parties to overcome the inundation predictions concerning the site in question.

In contrast, in this case, VCAT said that the lot in question was not directly opposite the beach. Another distinguishing factor was that the relevant floodplain manager, Melbourne Water, advised that it was satisfied that the South Gippsland Highway provided a sufficient degree of protection from the effects of future sea level rise. Based on these considerations, VCAT was satisfied that an appropriate assessment had been conducted and that appropriate limitations on development had been suggested.

Nevertheless, after considering other issues, including character of the area and the local policy framework, VCAT upheld the Council’s decision to refuse the application and ordered no planning permit should be issued.

(c) Local floodplain development plan

In several jurisdictions, councils are empowered to create local floodplain development plans, which may be incorporated into the council’s planning framework or may merely provide policy guidance.

Such plans provide councils with the opportunity to:

- assess flood risks and devise a strategy to assist in adaptation to those risks
- identify specific requirements and guidelines for development in a particular flood prone area that respond to local circumstances
- simplify and streamline the consideration of planning permit applications in flood prone areas.
Guidance for development assessment

A number of planning frameworks contain provisions dealing with the assessment of development applications in flood prone areas. For example, in Victoria, a council may prescribe permit conditions regarding development in flood prone areas, which may address a range of matters, including:

- the location and extent of buildings and works
- minimum building floor levels
- floor level and size requirements for building extensions
- flood-proofing measures for buildings, such as type of materials, method of construction, flood gates, etc.
- land drainage and effluent disposal requirements
- requirements for access roads and tracks.

The VPP Planning Permit Guide provides some guidance on the types of activities in respect of which planning controls may be necessary:

- **Land use** - Increasing the intensity of land use or a change in land use can increase flood risk. Therefore, in areas of highest flood risk and with a potential for land use intensification, it may be appropriate to restrict land use.

- **Buildings and works** - Buildings and works can interfere with the free passage of floodwater, which can result in substantial flood damage and flood risk. Accordingly, most buildings and works require a permit under the flood zone and overlays provisions. Some buildings may not be allowed or may need to be redesigned or relocated to meet the objectives of the flood provisions.

In addition, Clause 15.02 – Floodplain management – State Planning Policy Framework requires that emergency and community facilities (including hospitals, ambulance stations, police stations, fire stations, transport facilities, communications facilities, community shelters and schools) be located outside the 100-year ARI floodplain and, where possible, above the Probable Maximum Flood level.

The conditions imposed on development or land use to mitigate flood risk may be the subject of agreements between councils and applicants. Some planning legislation enables a council to register a planning agreement on the land title, which then runs with land.
Planning

Controlling the impact of climate change through agreements between councils and landowners

Agreements between councils and applicants can be used to:

- put future owners on notice of the future coastal hazards, including flooding hazards, associated with sea level rise
- require owners to comply with private management plans that respond to sea level rise and coastal hazards and mitigate associated risks
- require a financial contribution to be paid toward coastal protection works.

Agreements can be useful to impose ongoing obligations on landowners to mitigate risks associated with the effects of climate change, including flooding into the future. For instance, an agreement of this kind could require the owner to prepare a ‘climate change management plan’. The precise requirements may depend on the application before council and consideration must be given to the site’s location, topography, the proposed development and the current and predicted future coastal hazard.

The types of matters a climate change management plan could include are:

- the form and shape of developments including the minimum habitable floor level and building envelopes
- access arrangements to and from the site – for instance, access to be kept clear from obstructions at all times, or new access provided (for example, by construction of a raised foot bridge, driveway levels etc)
- specifying building materials, for instance, materials under a certain height to be water-resistant
- emergency response plan, setting out an evacuation plan and management arrangements for the land

The limitations of an agreement entered into now will be that increased flood risk associated with climate change will not necessarily become apparent until many years into the future. Furthermore, these agreements will require ongoing oversight of implementation, which may impose a considerable administrative burden on local government.

Drought

Australia is overall the driest populated continent on earth and parts of Australia are currently suffering from the worst drought on record. Two effects of climate change are at least partly responsible for this situation – namely, higher temperatures and lower rainfall, which are physical effects that have been associated with the concentration of greenhouse gases in the atmosphere.

The consequences of the increasing prevalence of drought in Australia was the subject of comment by the Intergovernmental Panel on Climate Change in its 4th Assessment Report, which was issued in November 2007. The IPCC predicted that, by 2030, production from agriculture and forestry would decline over much of southern and eastern Australia due to increased drought.
Prolonged periods of drought have rendered areas of the state that were traditionally used for farming purposes unsuitable for such uses. Nevertheless, unlike sea level rise, bushfires and flooding, the possibility of addressing the impact of drought through the planning system has attracted relatively limited attention.

In theory, zoning may be used to identify land that was previously used for agricultural purposes but, because of the effects of climate change, the use is no longer appropriate. However, the use of zoning in this way would require a shift in the approach to agricultural zoning, which has typically focused on protecting farming land from non-agricultural uses rather than forcing people to move location to areas that are more suitable for farming or to change crops that are better suited to the local environment.

Erosion

A number of physical phenomena that have been associated with climate change also increase the risk of erosion. Sea level rise and attendant flooding can result in coastal and inland erosion. Drought will result in vegetative cover, which will increase the risk of soil erosion. This risk of erosion will be exacerbated by high winds.

As in the case of drought, there has been no systematic response in the various planning systems to the problems caused by climate change-related erosion in the context of the planning system, although a number of existing tools can be used in the interim.

Within Victoria, the Erosion Management Overlay constitutes the principal means to respond to the effects of erosion. More specifically, by placing controls on the extent to which buildings and works can be undertaken on, and vegetation removed from, land that is subject to erosion, the control seeks to minimise land disturbance and inappropriate development.

Pursuant to section 38 of the New South Wales’ Native Vegetation Act 2003 (NSW), the Director General of the Department of Environment and Climate Change may order a landowner or manager to repair, remediate or rehabilitate land on which native vegetation has been cleared and which is, as a result, in danger of suffering from erosion. Additionally, the Rural Lands Protection Act 1998 (NSW) contains provisions compelling authorities to draft management plans for rural land protected under the Act. As part of these management plans, the authorities are required to have regard to the objective of protecting the reserves against soil erosion and diminution of water quality.

Possible consequences of failing to facilitate adaptation

Perhaps the biggest challenge that climate change poses for local governments, including planning authorities, is dealing with the consequences of:

- **Maladaptive decisions** – For example, approving developments in areas that are vulnerable to effects of climate change or approving developments in such areas without applying appropriate conditions.

- **Inaction** – For example, failing to incorporate standards in the local planning scheme to address localised impact of climate change.

The types of circumstances that might expose local governments for failing to adapt to the effects of climate change include bushfires, land slides, flooding and storm surges.
The consequences that could ensue for councils for failing to account for climate change in their planning decisions include administrative review, which could include planning decisions being overturned, and negligence suits, which could expose council to costs awards for loss and damage.

**Administrative review of planning decisions**

There is an emerging line of authority in a number of jurisdictions where the issue has already been tested that climate change risks must be considered in the context of development assessment pursuant to the concept of ESD.

**Consideration of climate change impacts under the principle of ESD**

Reliance on ESD concepts to require a consideration of future climate change impacts was a feature of a decision issued by the Victorian Civil and Administrative Tribunal (VCAT) in *Gippsland Coastal Board v South Gippsland Shire Council & Ors* [2008] VCAT 1545 prior to the explicit recognition of climate change in planning controls. That case concerned applications for permits for residential dwellings on rural allotments, outside the township of Toora in a farming zone. The Tribunal described the land as being ‘low lying, prone to high water tables and water logging, subject to flooding and at risk of inundation from sea level rise and coastal subsidence. It has been identified as potentially containing coastal acid sulphate soils’.

The Tribunal noted that the specific consideration of sea level rises, coastal inundation and the effects of climate change were not contained in the relevant Victorian Planning Provisions at the time the decision was taken. Despite the absence of specific planning provisions or policy relating to coastal recession or sea level rise in Victorian Planning Provisions, in the Gippsland Coastal Board case, the Tribunal noted section 60(1)(e) of the *Planning & Environment Act* 1987. That provision requires that a responsible authority ‘considers the use or development may have on the environment or which the responsible authority considers the environment may have on the use or development’ when assessing planning permit applications.

The Tribunal formed the view that rising sea levels are likely and will have an influence on the future shape of the Victorian coastline and that the requirement in section 60(1)(e) is sufficiently broad to include consideration of the influence that climate change and coastal processes may have on proposed developments.

With respect to the specific case before the Tribunal, it accepted that ‘there is growing evidence of sea level rises and risks of coastal inundation’ even though ‘there is uncertainty as to the magnitude of the sea level rise’. The Tribunal applied the precautionary principle and concluded that ‘increases in the severity of storm events coupled with rising sea level create a reasonably foreseeable risk of inundation of the subject land and the proposed dwellings, which is unacceptable’. Accordingly, the Tribunal decided to refuse to grant the planning permits.

Had the permits been granted despite the existence of a ‘reasonably foreseeable risk’ of inundation, it is possible that the council involved could have been the subject of litigation for failing to have taken account of the effects of climate change in approving the planning application.
**Common law liability**

The forms of common law liability that councils are most likely to be exposed to for failing to properly address the effects of climate change through planning decisions are claims in nuisance or negligence.

Under civil liability legislation in each state, councils will only be held liable if their actions or inactions are ‘so unreasonable’ that no other authority would consider them to be reasonable. Failing to keep abreast of current information relating to the impact of climate change and accounting for that information in planning decisions may constitute unreasonable conduct, particularly if the council’s relative size and access to resources allows such an approach.

New South Wales provides some protection from liability through its *Local Government Act 1979*. In particular, section 733 of the Act exempts councils from liability ‘in respect of advice furnished, action taken, or anything done or omitted to be done which relates to natural hazards in the coastal zone, provided that the decision was taken in good faith’.

Responding to concerns regarding liability of parties involved in coastal zone adaptation, particularly local government, the Parliamentary Committee has recommended that the Australian Law Reform Commission undertake an urgent inquiry into liability issues including:

- liability of public authorities involved in adaptation to the effects of climate change
- legal issues regarding the impact of climate change on existing developments, as opposed to planned new developments
- mechanisms to ensure mandatory risk disclosure to the public about climate change risks and coastal hazards
- whether there should be broader indemnification of local government
- legacy issues relating to past planning decisions that had allowed development in low-lying areas
- legal basis underpinning strategies of protect, adapt and retreat and the permissible scope of adaptation strategies
- compensation issues for landowners affected by climate change.

**Risk management strategies**

The ever-increasing threat posed by climate change does not mean that local governments and planning authorities should focus exclusively on climate change risks in making decisions. Indeed, local governments and planning authorities are entitled to balance climate change issues against competing considerations, such as resource limitations and unavailability of information.

Nevertheless, there are some steps that can be taken now that will help manage liability risks associated with the effects of climate change. These steps include:

- closely monitoring the effects of climate change, particularly those effects that are prevalent in the relevant locality
- adopting an integrated risk management and climate change strategy
- taking into account all relevant documents and available information.
Planning

Mitigation

In this section of our paper, we discuss the role that planning is playing or could play in mitigating the effects of climate change.

Stationary energy

More than half of Australia’s greenhouse gas emissions come from stationary energy production through the burning of fossil fuels for electricity and other types of energy. Renewable energy – wind, hydro, solar, biomass and geothermal – provides the opportunity for significantly reducing Australia’s emissions.

In most states and territories, a permit is required under the planning system in order to develop land for the purpose of energy generation, whether it be through renewable or traditional power sources. In some cases, land may need to be rezoned to enable such a development to proceed. The question for planners will be the extent to which mitigation of carbon emissions is relevant to the planning assessment of whether or not a stationary energy development should proceed.

The role of planning in mitigation of carbon emissions from stationary energy sources is necessarily limited because planning is directed towards use and development, not the control of emissions into the atmosphere. Nevertheless, arguments have been made in some cases that consideration needs to be given to the generation of greenhouse gases by a proposed energy generation development project in the context of planning assessment. Furthermore, some states are using the planning system to facilitate renewable energy development.

Non-renewable energy

The production of energy from non-renewable sources (for example, a coal-fired power station) is one of the most significant sources of carbon pollution.

While the impact that the generation of non-renewable energy may have on the environment is now recognised as a relevant consideration in deciding whether or not to approve development of a non-renewable energy facility, it is almost universally recognised that planning should not be used to refuse development of this kind on the basis of climate change impacts alone.

In this regard, it is notable that the emissions impact of any one non-renewable energy development project is likely to be small by comparison with the overall level of greenhouse gases in the atmosphere. Furthermore, counterbalancing the negative environmental implications of these types of development are the economic and broader public benefits associated with reliable sources of stationary energy.
Climate change as a factor in assessment of non-renewable energy development

The case of Australian Conservation Foundation & Ors v Minister for Planning [2004] VCAT 2029 involved an appeal brought by various conservation groups. The appeal concerned the alleged failure of the planning panel appointed to consider submissions on the development of an additional coal field by International Power Hazelwood to consider future greenhouse gas emissions associated with the continued burning of coal at the Hazelwood Power Station in Victoria’s Latrobe Valley, which required an amendment to the planning scheme. The specific question for VCAT was whether the planning panel could refuse to consider the environmental effects of greenhouse gases resulting from the continued operation of the power station.

Section 24 of the Planning & Environment Act 1987 provides that a panel appointed to consider submissions about an amendment to a planning scheme must consider all submissions referred to it and give a reasonable opportunity to be heard to any person who has made a submission. VCAT held that, pursuant to this provision, the panel was required to consider all relevant submissions.

VCAT considered that relevant submissions includes submissions that relate to an indirect effect of the amendment provided that there is a sufficient nexus between the amendment and the effect. Applying this test, it was held that there was a sufficient nexus between the approval of Amendment C32 to the planning scheme and the environmental effect of greenhouse gases that are likely to be produced by the use of the Hazelwood Power Station.

It was noted that approval of the planning scheme amendment would make it more probable that the Hazelwood Power Station would continue to operate beyond 2009, which, in turn, would probably make it more likely that the atmosphere will receive greater greenhouse gas emissions than would otherwise be the case. Nevertheless, after consideration of the relevant submissions, the Panel found that the relatively limited climate change impact of the development did not justify refusal of planning permission.

Renewable energy

In contrast, the role of planning in the context of assessment of renewable energy facilities is evolving quite differently.

In some states, the planning system is being actively used to foster renewable energy projects. For example, in South Australia, the practice is to declare major renewable energy projects as ‘Major Development’, which will be assessed by a Development Assessment Commission. The Governor has the final decision on these kinds of projects and there are no rights of challenge. Similar approaches are taken in NSW and Victoria. In other jurisdictions, local government retains decision-making powers in relation to these types of development.

The argument in favour of facilitating renewable energy development through the planning system is the overwhelming need for non-carbon based energy sources to reduce reliance on traditional non-renewable energy sources (particularly, coal) and move more quickly to a carbon neutral society. It is on the basis of this need that governments are ‘holding the hand’ of commercial renewable energy industry and bringing forward approval decisions on renewable energy projects.

Nevertheless, in the context of statutory planning, the decision-maker must weigh the need for renewable energy to mitigate the impacts of climate change against the adverse impacts of the proposal on the environment, including the visual, acoustic and other amenity impacts and impacts on flora and fauna. These local impacts are often the source of staunch opposition to renewable energy proposals, particularly wind farms.
Assessment of amenity impacts of renewable energy development

There are instances where the environmental and amenity impacts outweigh the public interest in development of renewable energy sources. For instance, VCAT recently upheld Moyne Shire Council’s decision to refuse 12 wind turbines on four farms on the ground that it posed unacceptable noise impacts on neighbouring properties, particularly when the collective impact of a neighbouring wind farm at Mortlake South was considered (The Sisters Wind Farm Pty Ltd v Moyne SC [2010] VCAT 719).

The Land and Environment Court took a different approach in relation to acoustic impacts on individual residences in relation to a much larger wind farm in Taralga (Taralga Landscape Guardians v Minister for Planning & Anor [2007] NSWLEC 59). In its decision, the Court required the wind farm proponent to acquire land that was adversely affected by the development, but ultimately approved the project.

Planning for renewable energy facilities at a strategic planning level would, perhaps, be more beneficial. Strategic planning may assist in identifying areas where renewable energy projects will be encouraged and areas where they are not considered to be appropriate. For instance, the Victorian wind farm guidelines, Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria (2009) indicate that wind farms are not permitted in national parks.

The Victorian and Queensland governments have announced their intention to go further and introduce a ‘green door’ to fast-track renewable energy development and provide greater certainty for investment in renewable energy technologies. Nevertheless, the fast-tracked process will still require appropriate levels of environmental assessment to ensure that the impetus for renewable energy does not come with its own adverse environmental legacy.

In addition, smaller scale development such as installation of household solar cells and wind turbines are increasingly being exempted from planning permit requirements. In Victoria, installation of solar photovoltaics for domestic use are exempt from a planning permit, with some limited exceptions, for instance, where a building is protected by local heritage controls. A similar approach is being suggested in NSW with a discussion paper released in April 2010 Discussion on Planning for Renewable Energy Generation – Solar Energy, which proposes that installation of small scale solar cells and wind turbines will be exempt.

Carbon capture and storage

Carbon capture and storage, otherwise known as geological sequestration or geosequestration, mitigates carbon emissions from stationary energy sources by diverting carbon into underground aquifers for permanent storage. Whilst the development of this technology is in its early stages, it may prove to be an important tool in reduction of greenhouse gas emissions in the future.

Planning approval would ordinarily be required for development associated with the various stages of carbon capture and storage:

- **Exploration stage** – Identifying land with underground aquifers suitable for storage of carbon.
- **Testing stage** – Undertaking works on land to test carbon storage.
- **Injection stage** – Works associated with the injection of carbon into storage areas, including capture and separation plant, compression plant, transport (by pipelines) and injection wells.
- **Monitoring stage** – Ongoing works to test the stability of storage areas.
However, most jurisdictions have enacted legislation to remove the need for planning approval subject to compliance with that legislation. Victoria and Queensland were the first states to enact such legislation, with the passage respectively of the Victorian Greenhouse Gas Geological Sequestration Act 2008 and the Queensland Greenhouse Gas Storage Act 2008.

The Victorian legislation expressly provides that a holder of an exploration licence or an injection or monitoring licence under the Victorian Act overrides anything in a planning scheme that prohibits the carrying out of the activity. This provision is subject to a condition that an Environment Effects Statement must be obtained for injection and monitoring licences under the Environment Effects Act 1978 in order to have the benefit of the exemption. The purpose of an EES is to assess the environmental impacts associated with an activity through a public process.

Amendments were recently introduced to the Victorian Planning Provisions by the Victorian Government to introduce consistent planning controls. The new controls exempt use of land from permit requirements for the purposes of ‘greenhouse gas sequestration exploration’ approved under the Greenhouse Gas Geological Sequestration Act 2008. A planning permit will be required to use and develop land for the purposes of greenhouse gas sequestration, unless an EES is prepared for that project, the EES is assessed and submitted to the Environment Minister and the Energy Minister authorises the action.

The intention of this legislation is clearly to ensure that there is some level of public process involved in the approval of carbon capture and storage projects, but to limit administrative doubling up, thereby delaying the introduction and application of the technology. Notably, a permit for greenhouse gas sequestration comes with notice obligations and third party review rights. We anticipate there will be a significant level of public interest in the first planning permit application or EES for a carbon sequestration project.

### Agriculture

Agriculture accounts for approximately 16% of Australia’s greenhouse gas emissions. These emissions come from the release of methane by the digestive process in sheep and cattle, and emissions of carbon dioxide and nitrous oxide from soils, fertilisers and savannah burning. Agricultural activities may also contribute to mitigation of greenhouse gas emissions through reducing livestock and crop emissions and increasing the amount of carbon stored in soils.

Farmers can play a role in sequestering carbon in their soils by fostering deep-rooted perennial plant species that have significant biomass in their root systems, which function as carbon sinks. They can also reduce livestock emissions and increase soil carbon through optimising grazing intensity and timing.

The benefits that soil carbon are said to offer to farmers include:

- increased soil fertility, which can enhance productivity
- better usage of water, reducing erosion, silting, and salination
- increased farm values, giving farm families financial flexibility.
Soil carbon may generate carbon offsets under the National Carbon Offset Standard (NCOS), which can be sold in the voluntary offset market. The voluntary offset market is concerned with the generation and sale of carbon offsets for purposes that do not relate to the compliance with mandatory emission reduction obligations. In the voluntary market, entities are able to purchase carbon offsets on a voluntary basis to mitigate their own greenhouse gas emissions from transportation, electricity use, and other sources to meet voluntarily assumed corporate environmental and social responsibility commitments.

Given the lack of large-scale uptake of soil carbon up until now, the role of the planning system in facilitating or controlling this relatively new land use is unclear. Overlays may be needed to reserve tracts of land that are best suited to soil carbon techniques for that purpose.

**Forestation, deforestation and vegetation clearing**

Mitigation of carbon pollution can be achieved through reforestation (plantations and permanent environmental plantings) or avoided deforestation (the protection of existing vegetation). A report by ClimateWorks Australia estimates that this sector could contribute emissions reductions of 70 MtCO$_2$ by 2020.

Planning legislation and instruments in Australia do not specifically address reforestation or avoided deforestation in those terms. Nevertheless, the clearing of vegetation is regulated in all jurisdictions. Furthermore, some systems require that biodiversity offsets be obtained in cases where native vegetation has been removed as a result of development activity.

Development will necessarily involve the removal of vegetation, both native and introduced. Most planning systems seek to protect vegetation and permits are required before removal can occur. These requirements were imposed to protect biodiversity but they have an incidental carbon mitigation benefit.

A biodiversity offset might be required as a condition of a permit, consent or approval for a development where that development involves the clearing of native vegetation. In Victoria, the stated purpose of these requirements is to achieve a 'net gain', where the net hectare value of native vegetation planted in offsets exceeds the net hectare value of the native vegetation removed through development. Generally, offsets will be required to be provided on the land on which the clearing takes place. This ensures that environmental losses are minimised, as species can readily relocate to the offset area, which is close to the habitat that has been removed.

The Carbon Pollution Reduction Scheme (CPRS) proposed by the federal government in 2008 provided that saleable permits would be issued for each tonne of carbon sequestered through reforestation (but not for avoided deforestation or revegetation other than forestry). If an emissions trading scheme is eventually introduced such as the CPRS it is likely to lead to substantial investment in reforestation.

In the meantime, NCOS allows voluntary carbon offsetting for revegetation that does not meet the Kyoto Protocol definitions of afforestation and reforestation. This establishes an incentive for increased revegetation of farmland.

Reforestation and revegetation could have significant benefits including more environmental tree planting with consequent biodiversity benefits and improved habitat. However, proper land use planning will be critical to avoid negative impacts of large scale, poorly planned reforestation.
Potential negative impacts of unplanned reforestation include:

- unsustainable demand on the water system
- monoculture and loss of biodiversity
- loss of food producing land
- increased fire risk
- depopulation and social impacts on towns.

Accordingly, it will be critical to develop planning mechanisms to ensure that the carbon market does not lead to adverse environmental outcomes.

**Transport, transit-oriented development and activity centres**

Transport accounts for 14% of Australia’s greenhouse gas emissions with road transport accounting for the majority of this. Transport emissions are rising rapidly as the population increases, city sprawl expands and people have to travel further for work and recreation. This increased car dependency is also contributing to traffic congestion, inefficiency, reduced productivity and reduced liveability.

Planning can reduce vehicle, particularly motor vehicle, trips and accordingly transport emissions through its central role in determining the shape of our cities, the distribution of land uses and the links between land use and transport.

Reduction of transport emissions can be achieved through a number of planning measures including:

- transit-oriented development
- activity centres and mixed use areas
- the creation of more compact cities with higher urban densities
- placing employment opportunities near new suburbs
- providing public transport, walking and cycling options for new suburbs.

Activity centres and transit-oriented development can make a significant contribution to mitigating the effects of climate change.

An activity centre is an area in which a variety of activities are concentrated such as shopping, working, studying, recreating or socialising. Activity centres are characterised by high density residential buildings and other facilities clustered around public transport nodes rather than being widely dispersed.

Activity centres are increasingly being advocated for the environmental benefits that they generate. In particular, activity centres reduce dependence on cars which, in turn, reduces fuel emissions. In addition, mixed use activity centres are considered to have significant social advantages because they are more interesting and dynamic than single use areas. Moreover, synergies may develop as a result of the co-location of businesses within an activity centre.
Planning helps to support activity centres through transit-oriented development (TOD), which is a mixed-use residential or commercial area designed to maximise access to public transport. More specifically, rather than segregating uses, planning may aggregate uses in a defined area or zone by indicating which particular uses can be carried out in that zone.

**Transit cities**

Melbourne 2030 seeks to implement the principles of transit-oriented development through the Transit Cities program. The Victorian Government has initially identified 5 sites in Melbourne to implement transit cities.

The elements of the Transit Cities program include the:

- development of urban cities around central public transport services
- integration of private and public investment and development
- appointment of an agency to coordinate development within the Transit City
- encouragement of high density development
- increase in public transport use.

Despite planning policies that have encouraged urban consolidation, much development continues to take place at the urban fringe. However, planning for these new urban fringe suburbs can reduce vehicle trips and hence transport emissions, if employment and recreation opportunities are nearby and alternatives to the motor vehicle are provided (cycling and walking).

**Energy efficiency**

Energy efficient buildings and precincts can contribute to both climate change adaptation and mitigation. Buildings and precincts that are designed and built to stay cooler in summer will better cope with increased temperatures in the future and reduce the energy demand for cooling. Energy efficiency can contribute to substantial emissions reductions and reduce electricity bills on an ongoing basis.

Energy efficiency measures include:

- more efficient building design to reduce heat in summer and heat loss in winter
- more efficient heating and cooling systems and equipment
- more efficient appliances
- efficient lighting
- cogeneration providing combined cooling, heat and power.

As part of its recently announced ‘Cleaner, Greener Buildings Policy’, the Queensland Government will introduce a ‘green door policy’ into its planning scheme to encourage energy efficient developments.

Expanded powers will be given to the Planning Minister to issue ‘ministerial directions’ to councils to fast-track approvals where a development exhibits sustainability features, including energy efficiency.
A ‘Green Door Advisory Committee’ will be established to advise the Planning Minister on appropriate developments that should be considered for a ministerial direction. Committee members will include local government representatives as well as industry and sustainability experts. It is unclear how effective the ‘Green Door’ policy will be, although it is notable that similar policies have been adopted in a number of places in the United States.

In New South Wales, State Environment Planning Policy (Building Sustainability Index: BASIX) 2004 requires certain residential developments to comply with ‘BASIX’, which is a Building Sustainability Index. Among other things, BASIX sets energy efficiency targets.

In Victoria, the Victorian Planning Provisions (VPPs) also encourage energy efficiency in the context of land use and development. In particular, Clause 15.12 of the VPPs requires planning authorities to ‘promote energy efficient building and subdivision design’. In practical terms, this clause means that the energy efficiency features would help to support a development application. However, there is limited guidance for local councils in implementing this provision, and it is unclear how effective it is as a tool to achieve real energy efficiency outcomes.

**Energy efficiency requirements in planning instruments**

In New South Wales, Development Control Plans are policy instruments that do not carry direct statutory force. Rather, they are intended to ‘flesh out’ the provisions of Local Environmental Plans. Planning authorities must consider any applicable DCP before determining a development application under the *Environmental Planning and Assessment Act* 1979.

Part D7 of the Bankstown DCP 2005, entitled Sustainable Industrial and Commercial Buildings, refers to a number of mandatory energy efficiency measures including:

- energy efficient lighting
- measures to maximise solar access and natural lighting
- measures to maximise natural heating, cooling and ventilation
  hot water heating system that is energy rated to at least 4 stars.

A key issue is whether the planning system is the best mechanism to achieve energy efficiency outcomes. In most states, building regulations address energy efficiency requirements. This raises the question whether it is appropriate for councils and other planning authorities to impose energy efficiency requirements in addition to those contained in building regulations.

**Energy efficiency requirements as a condition of development approval**

In *Hasan v Moreland City Council* [2005] VCAT 1931, VCAT found that conditions on a planning permit for a dual occupancy requiring a solar hot water system, rainwater tank and 5-star energy rating were inappropriate given that such matters are covered in Building Regulations. The Tribunal also held that one of the advantages of relying on the Building Regulations is that all dwellings require a building permit whereas many single dwellings do not require a planning permit.

However, in the later case of *Jolin Nominees Pty Ltd v Moreland City Council* [2006] VCAT 467, the Tribunal upheld council’s permit condition that required a developer to prepare an Environmentally Sustainable Development Plan that addressed energy management in a multi-unit residential development. The Tribunal found that such a condition was reasonable if it was proportional and relevant to the scale and the nature of the development, was backed by a proper strategic basis, and did not duplicate other more suitable mechanisms.
Water-sensitive urban design

Water Sensitive Urban Design (WSUD) aims to incorporate consideration of water resources and the broader water environment into the urban design and planning process. It applies to all water flows, including stormwater and wastewater. It provides the opportunity for both climate adaptation and mitigation.

The objectives underlying WSUD include:

- reducing potable water demand through the use of water efficient appliances, rainwater and greywater reuse
- minimising wastewater generation and treatment of wastewater to a standard suitable for effluent reuse opportunities and/or release to receiving waters
- harvesting urban stormwater and treating it for reuse and/or discharge to surface waters
- improving the environment of urban rivers, creeks and waterways
- using water and vegetation for ecosystem services, such as reducing the urban heat island effect.

WSUD can assist in adaptation to climate change and, particularly, in adapting to reduced rainfall and higher temperatures. Reduced rainfall in most urbanised parts of Australia makes it desirable for cities to seek more diverse sources of water supply. Diversity of water supply increases resilience to climate change and lowers the risk attached to relying on traditional dams. Stormwater harvesting and local water recycling supported by WSUD are potential new water sources. Stormwater harvesting in wetlands, ponds and aquifers can also assist with flood protection, which is an increased risk under climate change.

WSUD also reduces the urban heat island effect through wetlands and vegetation water treatment systems that have the effect of lowering local temperatures. This is likely to be particularly important in the urban environment where climate change temperature increases on top of urban heat island impacts of up to 4 degrees are likely to result in significant health risks.

WSUD can also play a positive role in mitigating greenhouse gas emissions. Stormwater harvesting using natural vegetation for water quality treatment is a low energy source of water. Increased use of stormwater will reduce the future need to build more energy-intensive desalination plants. There is also the potential for combining local energy generation with WSUD to achieve emissions reductions. For example, the waste heat from a local cogeneration plant could be used for treating stormwater thereby reducing emissions and providing extra water. Increasingly, precinct planning will encourage the nexus between water and energy consumption.

In practical terms, WSUD can be incorporated into urban design and planning through a range of options, such as:

- capture and use of stormwater as an alternative source of water to conserve potable water
- use of vegetation for filtering purposes
- water-efficient landscaping
- localised water harvesting for various uses
- localised wastewater treatment systems.
As yet, WSUD is not entrenched in all Australian planning systems. Clause 56.07 of the Victorian Planning Provisions, entitled Integrated Water Management, is an example where it has. That clause requires developers to use WUSD design techniques to meet best practice targets for stormwater quality and discharge in new residential subdivision developments. Over time it is expected that this will be extended to commercial and industrial developments.

Tools exist in several jurisdictions throughout Australia to facilitate WSUD through the development process. In particular, in addition to encouraging energy efficiency, BASIX in New South Wales also helps to ensure that homes are more water efficient. BASIX-compliant homes have rainwater tanks, which can be plumbed to the toilet and laundry, as well as providing water for the garden. These homes typically have efficient shower heads and tap fixtures, reducing water use and costs and use indigenous or low water use species for landscaping.

Challenges faced by planners in responding to the effects of climate change

It is evident that most, if not all, municipalities will be touched by at least one of the effects of climate change discussed in this paper. Planners will face significant challenges in assisting communities, particularly in relation to adaptation to the effects of climate change, a number of which are discussed below.

**Addressing the uncertainty of the effects of climate change**

While the types of risks that may affect a particular municipality may be relatively clear, uncertainty is likely to exist about the scale, frequency, duration and precise location of these effects. This uncertainty is particularly problematic for planners because they need to address the needs of current as well as future inhabitants and uses of the land, which requires forecasting about the effects of climate change.

State-wide projections about, for example, the degree of sea level rise or the number of extreme fire danger days may be helpful in this regard. Nevertheless, the specific, localised effects of a number of these physical phenomena may require a vulnerability assessment to be undertaken at the regional or even local level to ensure that the planning response – whether through planning instruments or development assessment – is adequate.

**Complexity and fragmentation of regulatory regime**

The planning frameworks that have been established in the various jurisdictions to address the effects of climate change are typically complex, consisting of multiple instruments that must be read in conjunction. It is not always immediately obvious whether and how these instruments interplay. Some guidance exists to assist planners in applying some of the relevant rules and policies. However, such guidance may be of limited use if it takes the form of high level principles rather than illustrating practical application.

**Development objectives**

A planning approach that will probably become more commonplace as the effects of climate change become more pronounced is to avoid further intensification of development in areas that are likely to be impacted by climate change by effectively retreating from the climate change risk.
Councils may be concerned about being perceived as anti-development if their adaptation action effectively deters development in certain areas – for example, through the identification of setback lines in areas prone to sea level rise and bushfires. Councils may also face a backlash from local residents if planning decisions to halt new development, which are aimed at adapting to climate change risks, effectively blight existing development, causing property values to decrease. This is particularly the case in relation to infill development in existing settlements.

Ultimately, planners will be called on to engage in a complex balancing exercise involving the weighing of the potentially competing economic, social and environmental interests at stake.

**Preservation of existing use rights**

Another significant issue that planners will need to grapple with in the future is the possible change to title boundaries as a result of impact of climate change. Under the common law doctrines of accretion and diluvion, ownership of land adjoining areas affected by climate change (particularly coastal areas) can vary. For example, as sea levels continue to rise and coastal erosion becomes more extensive, land that was formerly privately owned may become Crown land at common law. Changes in title boundaries will create practical difficulties for planners in cases where the former private landowners have long-standing existing uses of the land that has or will become Crown land. Mechanisms will need to be developed to address these existing use rights.

**Existing development**

Regulatory frameworks that have been developed to address the effects of climate change are currently largely focused on the treatment of new development. However, it may be necessary to consider whether the planning system can be used to address the risks posed by climate change to existing development.

In some jurisdictions, it may be possible for land owners to claim compensation from the local council for loss of property resulting from climate change under compulsory acquisition legislation. In New South Wales, under the *Land Acquisition (Just Terms Compensation) Act* 1991, council may be required to acquire land which, by virtue of coastal recession, has converted private land into beach. However, the NSW *Sea Level Rise Policy Statement* 2009 clearly states that compensation will not be provided for any impact on property titles due to erosion or sea level rise.

There may also be the potential for a council to be held liable to a land owner for compensation for damage to property or personal injury caused by a failure of the council to exercise reasonable care in developing and implementing its coastal management plans.

**Choosing the right planning tool**

There are a variety of planning tools available to address the effects of climate change. Some tools are generic in nature and can be applied in a variety of contexts, whereas others have been specifically created to deal with particular climate change effects.

Choice of the planning tool, and the circumstances in which that tool is applicable, may prove critical in determining whether or not the planning response to the effects of climate change is successful. It may be necessary to periodically review the adequacy of the tool selected to ensure that it adequately and appropriately responds to particular climate change effect it is directed at addressing.
Knowledge, education and training

Keeping abreast of information and current issues on the impact of climate change is a formidable task. Knowing where to obtain information, deciding the extent to which the information is relevant and understanding how to interpret the information are important challenges faced by councils and their planners, which should not be underestimated.

The task is made all the more daunting for planners if they lack sufficient education and training to deal with the complex effects of climate change, particularly in the context of their local municipality. As the effects of climate change become more pronounced, councils will need to increasingly invest in education and training for their planning staff to ensure that they are equipped to deal with challenges that climate change presents.

The future of planning for climate change

This paper has demonstrated the important and constructive role that planning is playing in assisting communities to adapt to and mitigate the effects of climate change.

We envisage that planning will continue to play an important role in addressing the effects of climate change, regardless of the broader policy and legislative environment that might emerge over time.

The role of planning will continue to be particularly significant in the context of adaptation, but its importance in the area of mitigation is also likely to increase over time as serious efforts to curb greenhouse gas emissions gain momentum.

- In relation to adaptation:
  - Planning tools that are specifically designed to address climate change are likely to emerge. For example, new zones may be developed to address the particular issues that may arise in areas that are vulnerable to the impacts of climate change. This idea has already been touted in relation to coastal hazards and sea level rise in Victoria. It is possible that the idea will be extended to other jurisdictions as well as to other types of climate change impacts.
  - We are likely to see growing attention being paid to the planning implications of measures designed to protect localities from climate change impacts. Such measures will become particularly important for existing settlements that are vulnerable to sudden and intense events, like storm surges and bushfires. However, they will also continue to play a significant role in protecting localities from the slow onset of climate change impacts, like sea level rise, drought and erosion. It will be necessary to ensure that planning facilitates implementation of these protection measures, but not at the expense of the other objectives that planning is designed to achieve, such as visual amenity and environmental protection. It will also be necessary to determine how these protection measures will be funded.
  - Policies of ‘planned retreat’ are likely to become more common, where planning systems are used to progressively move development away from the direct impacts of climate change. Such policies are already being implemented in areas that are vulnerable to coastal hazards. However, it is possible that similar approaches will be adopted for other climate change impacts, particularly areas that are vulnerable to bushfires and flooding resulting from storm surges.
The availability of information to assist planners in assessing climate change risks in the context of proposed new developments is likely to continue to increase over time. While detailed information already exists for sea level rise and coastal hazards, the information for other types of climate change risks is not as comprehensive. The challenge will be to ensure that the information is detailed enough to reflect local climate change impacts and to ensure that risks can be properly assessed but not so complex that it is difficult for users to understand and apply in practice.

Proposals have already been made to clarify liability rules in cases where loss and damage has been suffered as a result of climate change impacts. These efforts are likely to become more concerted as the effects of climate change become more frequent, pronounced and widespread.

In relation to mitigation:

- Planning will continue to play an important role in development involving transit-oriented design and activity centres. These initiatives will become more commonplace in the future and planning will help to ensure that the benefits that such initiatives can offer are realised.

- We envisage that more detailed planning guidance will eventually emerge to address the diverse and increasingly numerous types of renewable energy facilities that will be developed in the future. This will assist planners to assess the specific amenity and environmental issues that are particular to the different types of facilities that will be developed.

- Planning mechanisms to facilitate renewable energy and energy efficiency projects – like Queensland's Green Door policy – are likely to become more common. Such mechanisms will serve as an important incentive to encourage such projects.

- Agricultural and forestry projects aimed at sequestering carbon will require some new thinking in the planning area. As the financial incentives to invest in these types of projects increase, there is a possibility that large swaths of land that were formerly used for other uses will be increasingly used primarily or exclusively as carbon sinks in the future. Planning will play an important role in managing this transition, which will involve a balance between the benefits of carbon sequestration and the impact on local communities and development.
Our contact details

This paper was prepared by Dariel De Sousa, Nicole Sommer and John Thwaites.

For further information about the issues raised in this paper, please contact a member of the Maddocks Sustainability & Climate Change Team.