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Submission No: 91
Date Received: 24-6-08
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For reply please quote: *TF/08/3086 – 08/5772 - IGR*

18 JUN 2008

Ms Jennie George MP
Chair
Standing Committee on Climate Change,
Water, Environment and the Arts
PO Box 6021
House of Representatives
Parliament House
CANBERRA ACT 2600

Dear Ms George

Please find attached Queensland's final submission to the inquiry into climate change and environmental impacts on coastal communities.

Thank you for the opportunity to participate in this inquiry.

Yours sincerely

PAUL LUCAS MP
Acting Premier

Queensland Government

Queensland Government Submission

to the

Inquiry into Climate Change and Environmental Impacts on Coastal Communities

1 Executive Summary

The Queensland coastal zone extends more than 9500 kilometres and is home to over 87% of the State's population. Queensland's coast includes parts of the Wet Tropics, the Great Barrier Reef and Fraser Island - three outstanding World Heritage areas - and is home to abundant native wildlife, tropical rainforests and extensive coastal wetlands. The natural assets of Queensland's coast are the foundation of the State's tourism industry. The coastal zone is also the location of many rural and primary production industries that provide critical economic and employment activity in coastal communities and are essential for the cost-effective provision of fresh produce.

Like many natural resources, the coastal zone is subject to ongoing pressures from continued population growth and economic development. Without appropriate management, these pressures can result in significant environmental impacts and flow-on effects to local communities.

Climate change impacts are expected to exacerbate existing, and potentially generate new, environmental impacts. Some coastal communities and infrastructure are already vulnerable to coastal erosion, storm tide inundation and flooding, and these hazards are expected to pose a greater risk as a result of climate change. Changes in temperature, rainfall patterns and the range of pests and diseases will also have negative affects on the rural/primary production and fishing industries on the coast. Natural assets are at significant risk of degradation or loss due to temperature and rainfall changes, more severe weather events and permanent inundation.

Governments around Australia have put in place actions to manage environmental impacts on the coastal zone, with varying degrees of success. Lessons from these experiences can help to inform action taken to plan for climate change impacts.

A key challenge for the future is how to effectively integrate climate change, with its uncertainty and ongoing evolution, into coastal planning and management. This requires foundation data and climate change information at a scale relevant to decision-making. Building the capacity of decision-makers to understand, interpret and apply this information on a day-to-day basis is also essential for achieving action 'on the ground'.

The Queensland Government has made progress in incorporating climate change science into its coastal planning and in providing support to local government. However, further assistance and policy guidance at the national level would be beneficial. There is potentially a role for the Australian Government to:

- Lead the development of regional scale climate change projections in order to ensure consistency of approach and avoid duplication of effort;
- Lead the development of a set of nationally consistent default climate change scenarios for use in planning, particularly for sea-level rise;
- Coordinate and provide financial assistance for the development of a nationally consistent, high resolution merged topographic and bathymetric DEM for the

coast and develop a set of nationally consistent definitions for coastal/marine terminology; and

- Lead the development of nationally consistent methodologies for assessing climate change risk and/or vulnerability;
- Collaborate and provide financial support for States and/or local government to undertake a suite of vulnerability assessments targeting the following:
  - ***Coastal communities*** – detailed assessment of areas identified as high priority through the 'first-pass' risk assessment currently underway as part of the National Coastal Vulnerability Assessment. These detailed assessments would include an assessment of vulnerability of natural and built assets to climate change and response options.
  - ***Remote/disadvantaged communities*** – first-pass assessment of those communities likely to be most vulnerable (e.g. Torres Strait Islands), followed by more detailed assessment of those identified as vulnerable and response options.
  - ***Infrastructure*** – assessment of the vulnerability of 'critical' coastal infrastructure to climate change impacts and options for response and future infrastructure investment.
  - ***Ecosystems*** – identification of high value ecosystems and support for more detailed investigations about the impacts of climate change on ecosystems and response options.

2 Introduction

The Queensland Government has been invited to make a submission to an inquiry into climate change and environmental impacts on coastal communities, which is being conducted by the House of Representatives Standing Committee on Climate Change, Water, Environment and the Arts. The terms of reference for the inquiry are as follows:

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

3 Coastal Planning and Management in Queensland

The Queensland Government has a wide range of legislation and policies relating to management of the coastal zone. The primary legislation is the *Coastal Protection and Management Act 1995* (the Coastal Act), which is administered by the Environmental Protection Agency (EPA). The Coastal Act establishes the framework for how coastal management is to be achieved in Queensland. Key mechanisms for achieving the objectives of the Act include:

- *State and regional coastal management plans* – provide policies for coastal use and development and identify areas on the coast subject to specific management or development control requirements. The plans have the effect of a State Planning Policy under the *Integrated Planning Act 1997* (IPA), which means that they must be regarded by relevant parties when making or amending planning schemes and other government policy or legislation, when assessing development applications and when designating land for community infrastructure.
- *Erosion prone areas* – provide a development-free buffer zone for areas that have a high likelihood of experiencing coastal erosion over a 50 year period. Their primary role is to manage future development through a land surrender condition. The methodology for determining erosion prone areas includes a factor that takes account of expected sea level rise and an increase in the intensity of cyclones attributed to climate change.
- *Coastal Management Districts and Coastal Building Lines* – under IPA, development applications seaward of a Coastal Management District or Coastal Building Line are referred to the EPA, as assessment manager or concurrence agency (depending on the circumstance), and are assessed against the provisions of the State Coastal Management Plan and where applicable, the relevant Regional Coastal Management Plan.
- *Storm tide inundation areas* – areas where there is a high likelihood of storm or cyclone induced inundation from the sea. Under the State Coastal Plan, development in storm tide inundation areas must meet specific outcomes, which

seek to ensure that development does not occur in locations that would put human life at risk, and that appropriate mitigation measures are adopted. The methodology for determining storm tide inundation areas includes a factor that takes account of expected sea level rise and an increase in the intensity of cyclones attributed to climate change.

Other policies and legislation related to coastal zone management and planning in Queensland include:

- *Land Act 1994* – under this Act, the State Government, through the Department of Natural Resources and Water, is responsible for the allocation and management of substantial areas of coastal State land, in particular unallocated State land, in addition to reserves, trust land, roads and esplanades generally administered by local governments.
- *Statutory Regional Plans* - Statutory regional plans, which have authority under IPA, guide decision making related to growth, development and management of regions. They aim to ensure that future development occurs in areas less prone to the impacts of climate change. A regional plan is already in place for South East Queensland and the draft Far North Queensland Regional Draft Plan 2025 has recently been released.
- *State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide* – ensures that the natural hazards of flood, bushfire and landslide are adequately considered when making land use planning decisions.
- *State Planning Policy 2/02: Planning and Managing Development involving Acid Sulfate Soils* – requires new planning schemes to take account of acid sulphate soils and those development proposals in high probability areas undertake assessment and management of acid sulphate soil risk.
- *State Planning Policy 1/92: Development and the Conservation of Agricultural Land* - though it applies State-wide, has applicability to coastal areas and is a statutory planning tool used to regulate the development of urban areas potentially encroaching upon productive coastal agricultural land.
- *Fisheries Act 1994* - Marine plants and fish habitats are managed under the provisions of the Act through the specific protection of marine plants, the declaration of fish habitat areas and the restoration of fish habitats damaged or destroyed without authorisation.
- *State marine parks legislation* - The main legislation regulating marine park management, planning and declaration is the *Marine Parks Act 2004*, *Marine Parks Regulation 2006* (the Regulation) and the *Marine Parks (Declaration) Regulation 2006* (Declaration Regulation). The Act and Regulations apply to all State marine parks. The aim of the Act is 'to provide for conservation of the marine environment'. The Regulation provides for the overall management and use of marine parks, while the Declaration Regulation details the boundaries of Queensland's marine parks.
- *Great Barrier Reef Marine Park Act 1975* (Cth) - The types of activity that may be carried out within a given area of the Marine Park are specified through area-specific Zoning Plans.

The Queensland Government is also progressing number of initiatives to improve the understanding of local climate change impacts and the availability of mapping and data to support climate change vulnerability assessment. These include:

- *Storm Tide Mapping Project* - will result in those populated areas of Queensland most at risk from storm tides being mapped. Maps for Burdekin, Whitsundays, Cairns, Mackay, Palm Island and Hervey Bay have already been developed, and Burnett will be finalised soon.
- *Torres Strait Islands Tide Gauge Project* - Tidal data for the Torres Straight Islands region is insufficiently accurate to manage and respond to events such as storm surge and projected sea level rise. The project will provide accurate data to inform such activities as storm surge and sea-level rise mapping for the islands.
- *Gulf of Carpentaria Storm Tide Study* - The study will provide inundation mapping for emergency response, planning and public awareness purposes.
- *Wetland mapping and classification* – The Queensland Mapping and Classification project will deliver comprehensive maps of Queensland's wetlands.
- *South East Queensland Regional Plan Climate Change Strategy* - A climate change strategy is currently being developed to inform the review of the South East Queensland Regional Plan. The strategy will identify those priority climate change issues of importance in the region and adaptation strategies to be integrated into revised regional plan.
- *Queensland Climate Change Centre of Excellence* – The QCCCE is undertaking a number of projects including:
  - Development of summaries of climate change variables across 13 local government areas in Queensland.
  - Identification of the factors contributing to the variability in the state's climate and their relative contributions
  - Downscaling of general climate circulation models to produce regional and local climate change projections.
  - Working collaboratively with national and international organisations to improve climate change projections and has formal agreements with the UK Met Office Hadley Centre, the Walker Institute at Reading University and the United States International Research Institute for Climate and Society (IRI) New York

Further information about the coastal planning and management framework in Queensland is contained in the Appendix.

4 Key challenges and needs

Queensland has incorporated climate change science into its coastal protection and management policies and decision support mechanisms since the early 1990's. Queensland's Erosion Prone Area's and associated land surrender planning instrument has worked effectively for over 20 years in managing the coastal zone in Queensland and is specifically directed at natural hazard reduction.

There are however, a number of key challenges and information gaps that need to be addressed to meet the growing challenge of dealing with climate change impacts in the coastal zone. Whilst the Queensland Government is currently undertaking a range of work to address these needs, further assistance and/or policy guidance would be beneficial at the national level.

4.1 Effective integration of climate change into land use planning

Although the State Coastal Management Plan has made some achievements towards providing an effective integrated coastal zone management policy framework at a strategic level, its translation into local planning schemes has been challenging to achieve. The State Coastal Management Plan (and associated Regional Plans) do not bind local councils, they only need to "have regard" to these plans in the development of new planning schemes and assessment of development applications.

Experience shows that if adequate protection measures are not built into forward planning documents it becomes extremely difficult to deliver these measures once development is in place. The State Coastal Management Plan policies, with regard to climate change, do not provide detailed enough guidance or information to enable local council's to implement actions on the ground. The policies are also not supported by comprehensive mapping, which would be very useful for local councils when attempting to deliver the policy outcomes through statutory land use planning schemes.

The EPA is currently reviewing and revising the State Coastal Management Plan and associated governance frameworks to identify and reinforce the effective and efficient elements of the current system and address existing deficiencies so as to ensure best practice coastal zone management can be achieved in Queensland.

The review will also provide an opportunity to consider the effectiveness of current coastal policies and the methodologies used to determine erosion prone and storm tide inundation areas in the light of contemporary science. The development of a set of nationally consistent default climate change scenarios, particularly for sea level rise, would be extremely useful in progressing this work and achieving a degree of consistency between jurisdictions. This issue is outlined in more detail in section 4.3 below.

4.2 Climate change impacts at regional and local scales

Understanding climate change science, its uncertainties and implications for land use planning is an important prerequisite to making better decisions. The challenge is that climate change science is based on science modelled at a global scale. The CSIRO and the Bureau of Meteorology have played a critical role in interpreting this science for Australia in the technical report *Climate Change in Australia*. However, it still remains a challenge for State and local governments to interpret or downscale this information to a local scale so that locally specific responses can be implemented.

This issue is most effectively addressed at the national level, where development of regional scale climate change projections could be undertaken in a way that ensures consistency of approach, avoids duplication and ensures there is coordination of activities.

Development of a set of nationally consistent default climate change scenarios for use in planning, particularly coastal planning, is also best addressed at the national level. Scenarios would be based on best available data, updated as new information

becomes available and be used in the absence of more detailed information relevant to the local area.

Further research is required on how the impacts of climate change will be felt by coastal communities. More frequent and extreme weather events are likely to have significant impacts and the likely extent of these impacts, including the flow-on social and economic impacts, is largely unknown. Issues such as insurance coverage, legal liability, emergency response capacity and impacts on local economies require significantly more investigation. For example, further investigation is required to identify the socio-economic implications for coastal centres where fishery and tourism industry make a significant contribution to the local economy. Changes in rainfall patterns as a result of climate change are likely to affect the sustainability of fish populations and the productivity of estuarine and inshore waters for fisheries. These impacts will have significant implications for not only the recreational and commercial fishing industry but also the tourism sector where fishing is a key activity.

Understanding of how climate change will impact on coastal ecosystems also represents a significant gap in understanding. The response of these ecosystems to the changes, and what adaptation measures are available and are effective, is still largely unknown. For example, development buffers may need to be extended in some areas to allow significant ecosystems, such as fish habitats, to migrate with climate change impacts. Decisions such as these will need strong scientific basis given their environmental, social and economic implications. Identification of high value ecosystems and support for more detailed investigations about the impacts of climate change on ecosystems is a high priority.

4.3 Planning for sea level rise

Given there is a significant degree of uncertainty regarding the range of sea level rise projections from the Intergovernmental Panel on Climate Change (IPCC) (and others), there is an emerging need for an agreed sea level rise benchmark figure for planning purposes in Australia.

Queensland's current sea level rise figure of 0.3m over 50 years is within the range projected by the latest climate change science. However, there is growing opinion that a level that takes into account the upper range of projections (~0.9m) should be considered given the potential implications that underestimation could have and the uncertainty that exists around the contribution ice sheets may make to sea level rise in future. South Australia has taken into account the upper range of projections in its Development Plans (statutory development assessment documents) by factoring in a consideration of sea level rise of 0.3 metres to the year 2050, and a further 0.7 metres (i.e. a total of 1 metre) to the year 2100.

State and local governments would benefit from guidance as to what range of sea level rise would be considered most appropriate for planning purposes. Without such guidance, there will be inconsistency across jurisdictions in the application of sea level rise projections. The Queensland Government is therefore seeking the development of a set of nationally consistent default climate change scenarios for use in planning, particularly for sea level rise. Scenarios would be based on best available

data, updated as new information becomes available and be used in the absence of more detailed information relevant to the local area.

4.4 Consistent high resolution digital elevation model for the coast

A high resolution continuous topographic and bathymetric digital elevation model (DEM) that covers land adjacent to the coast and the sea bed to a depth of 20m is essential for identifying areas at risk of inundation from the sea as a result of climate change. It provides the foundation elevation data needed to accurately model the impacts of sea-level rise, storm surge and coastal flooding due to climate change.

A DEM is an essential data input for accurate climate change vulnerability assessment, which supports the development of appropriate adaptation strategies.

There is a range of topographic DEMs currently available for Queensland. Most of the high resolution DEMs have been acquired by Local Governments, but they vary according to quality (resolution and accuracy), coverage and licensing arrangements. These issues mean they are largely unsuitable for detailed assessments of the impacts of climate change. Availability of bathymetric DEMs for Queensland is very limited in terms of both coverage and accuracy.

Although the Australian Government is developing a DEM for the Australian coast (resolution of 20m and height accuracy of around 8-10m), it is being done at a scale too coarse for climate change vulnerability assessment.

A consistent, high resolution DEM would assist in:

- Identifying and mapping areas likely to be at increased risk to inform land use planning.
- Assisting in storm tide inundation assessments.
- Identifying areas that are likely to be more vulnerable to erosion.
- Identifying where highest astronomical tide (HAT), and mean low water spring and mean high water spring tides will be in the future (as more areas become permanently inundated, this will affect HAT).

The Queensland Government is progressing the development of a DEM for key areas of the coast, however the initial development and ongoing maintenance of the dataset is very expensive and there is a limited number of contractors available to undertake the work. Given that there is an identified need for a national DEM for the whole of Australia, national coordination of DEM development across jurisdictions would ensure consistency, economic efficiency and reduction of duplication. Ongoing investment in a framework for data management, access and maintenance would also be required.

4.5 Consistent definitions for coastal jurisdictional boundaries

The ability to define jurisdictional boundaries is essential to effective coastal zone management. However, many legal boundary descriptions which include reference to the coastline are ambiguous and create uncertainty as to the true intended location of

that boundary. For example, the term "high water", the boundary to which property and council rights extend within most jurisdictions, has a different definition in several pieces of Queensland legislation. Within one piece of legislation as an example, high water is defined as "the mean height of the higher tide at spring tides", and within another as "the ordinary high water mark at spring tides". This issue is not unique to Queensland and therefore the Queensland Government supports a national approach towards creating an agreed set of definitions for the marine cadastre.

A nationally consistent set of definitions for key coastal/marine terms will:

- reduce confusion across jurisdictions and policy/legislative instruments;
- facilitate a common/shared understanding;
- promote easier communication; and
- enable more effective and consistent legislation, particularly in relation to the definition and determination of legislative boundaries.

4.6 Building response capacity

The majority of day to day management decisions regarding the coast are made by local government, particularly in relation to managing growth through land use planning and through the day to day management of public land under the control of local authorities in coastal areas. This means that they are ideally placed to be at the forefront of climate change adaptation in local communities.

However, not all local governments have the capacity, expertise and resources to adequately address the impacts of climate change through the planning process, management activities and capital works. In particular, there are likely to be significant financial costs associated with the need to undertake 'coastal hardening' (build or upgrade shoreline protective structures to protect infrastructure and other development from increased erosion as a result of climate change). This is an issue not just for local government but for all jurisdictions as well as private landowners.

Consideration needs to be given to the potentially high financial cost to Australia which will undoubtedly flow from the need for coastal hardening against the impacts of climate change. The Queensland Government supports thought being given to a future financial framework to address the problem in the context of future national budget framing.

The Queensland Government is assisting local governments in the development of Shoreline Erosion Management Plans for areas subject to erosion hazards through the Environmental Infrastructure funding scheme. The plans are developed in a framework that includes significant community and state government involvement.

The resulting plan recommends erosion management options consistent with the State Coastal Plan, potential costs and priorities based on risk assessment. The development of these plans gives councils a head start in gaining further funding for capital works and the existence of a plan streamlines the development approval process. While this program has been beneficial, a longer term and more strategic approach for building the capacity and expertise of local government in responding to climate change are needed.

4.7 Existing development in vulnerable areas

State and local governments are currently faced with the problem of how to deal with a legacy of planning decisions that allowed development in low lying areas. The "sea change" and "tree change" phenomenon and the historical basis of town planning, has often seen, and even encouraged, development in areas that we now understand will be vulnerable to sea level rise and more extreme events due to our changing climate.

The present planning framework in Queensland is largely only able to address future development, not existing development which is at risk because of its location in vulnerable areas. Existing development presently relies on emergency response and preparedness actions and other adaptation responses, such as coastal hardening.

With the capture of a high resolution coastal DEM of Queensland and the existing data held by the State and Local Governments the vulnerability of coastal communities to coastal hazards can be rapidly assessed to a level where more strategic climate change adaptation planning can commence. The next step is to prioritise vulnerable communities, infrastructure and ecosystems and provide resources on this basis to effectively adapt.

There is potentially a role for the Australian Government in leading the development of agreed nationally consistent methodologies for assessing climate change risks and/or vulnerability in the coastal zone. Such methodologies would be beneficial in ensuring consistent application of the latest climate change science and would allow comparison of risk/vulnerability to inform priority setting for adaptation action. A set of potential response options based on levels of identified risk could also be developed to support decision making at a local scale.

The Queensland Government would encourage collaboration and financial support for States and/or local government to undertake a suite of vulnerability assessments targeting the following high priorities:

- ***Coastal communities*** – detailed assessment of areas identified as high priority through the 'first-pass' risk assessment currently underway as part of the National Coastal Vulnerability Assessment. These detailed assessments would include an assessment of vulnerability of natural and built assets to climate change and response options.
- ***Remote/disadvantaged communities*** – first-pass assessment of those communities likely to be most vulnerable (e.g. Torres Strait Islands), followed by more detailed assessment of those identified as vulnerable and response options.
- ***Infrastructure*** – vulnerability of 'critical' coastal infrastructure to climate change impacts and options for response and future infrastructure investment.
- ***Ecosystems*** – identification of high value ecosystems and support for more detailed investigations about the impacts of climate change on ecosystems and response options.

4.8 Insurance

There are growing concerns that the scope of insurance coverage is being reduced in some coastal areas of Australia because of climate change, particularly the increased threat of sea inundation and riverine flooding. There are already examples from Britain and the United States where insurance had been withdrawn or not been renewed in areas deemed prone to climate change impacts. If insurers come to the conclusion that some areas are not insurable then these communities will have a greater reliance on government relief, ultimately placing an additional burden on government and tax payers. The Queensland Government therefore supports consideration being given to the development of a national contingency fund to mitigate the impact on individuals and businesses of increased coastal and riverine threat brought by climate change as the risks are likely to be beyond what the insurance industry will see as acceptable risk.

5 Conclusion

The Queensland Government recognises the risks faced by coastal communities as a result of continued population growth coupled with the impacts of climate change. The Queensland Government is therefore progressing its own responses to address these risks but strongly supports collaboration of further actions that are mutually beneficial to both the Queensland and Australian Government.

Appendix: Queensland's Coastal Planning and Management Framework

The Coastal Act

The Coastal Act establishes the framework for how coastal management is to be achieved in Queensland. The Act directs the development of both State and regional coastal management plans. The State Coastal Management Plan provides the overarching framework for coastal planning in Queensland and divides the State into 11 regions, for which regional coastal management plans must be developed. Regional coastal management plans have been developed for Curtis Coast, Cardwell-Hinchinbrook and Wet Tropics. The South East Queensland plan has recently been finalised. Draft plans or processes have commenced in Wide Bay, Mackay-Whitsunday, Cape York Peninsula and the Dry Tropical. Plans are not yet underway in Torres Strait, Capricorn or the Gulf of Carpentaria.

The Coastal Act also establishes a Coastal Protection Advisory Council whose role is to advise the Minister on a range of coastal management issues. Council members are appointed by the Minister and must include members from the community recognised for their experience in, and knowledge of coastal management.

Coastal Management Plans

The State Coastal Management Plan and Regional Coastal Management Plans are prepared under the Coastal Act. The plans have the effect of a State Planning Policy (SPP) under the *Integrated Planning Act 1997*, which means that they must be regarded by relevant parties when making or amending planning schemes and other government policy or legislation, when assessing development applications and when designating land for community infrastructure.

As a statutory instrument, the State coastal plan defines the State interests in the coastal zone and guides relevant decisions by the State, local governments and the Planning and Environment Court. The State coastal plan is the primary policy document for coastal management in Queensland. It provides coastal management directions and defines how these directions should be implemented. Such direction provides a consistent and collaborative approach to coastal management.

Regional coastal plans operate in conjunction with the State coastal plan and include specific policies and information for the application of State coastal plan policies to geographic areas. Regional coastal plans contain spatial information such as resource and interpretive maps. Regional coastal plans define the boundaries of areas such as coastal management districts and key coastal sites. The coastal management district identifies areas where the EPA has concurrence agency or assessment manager powers for development assessment under the *Integrated Planning Act 1997*. Key coastal sites guide decision makers to identify desired coastal management outcomes and provide detailed information on coastal resources and values.

The State and Regional coastal plans also make many references to the allocation, development and management of coastal State land, that are based on Department of

Natural Resources and Water policy, for example, for erosion control, public access and maritime infrastructure.

Erosion Prone Areas

One of the intentions of the State Coastal Plan is to set aside the width of coastline potentially affected by erosion over a design period (the erosion-prone area width) as a development-free buffer zone. Since 1984, Queensland has had statutory Erosion Prone Areas mapped along the entire Queensland coast and tidal waters. These Erosion Prone Areas are based on a linear distance inland from the seaward toe of the frontal dune which is approximated by the extent of terrestrial vegetation. The distances for the open coast have been calculated using the following formula:

$$E = [(N \times R + C + G) \times F] + D$$

where
- E = erosion prone area width (metres)
- N = planning period (years) currently 50 years
- R = rate of long term erosion (metres/year)
- C = short term erosion (metres) – currently 1% ARI storm event
- G = expected erosion due to greenhouse effect (m) currently based on 0.3m sea level rise over 50 years
- F = factor of safety
- D = dune scarp component (metres)

The Erosion Prone Areas are not fixed but move with shoreline feature they are measured from. Their primary role is to manage future development through a land surrender condition in the Coastal Act. When an application for reconfiguration of a lot (subdivision) that falls wholly or partially within Erosion Prone Area is received the State may require the surrender of the land within the Erosion Prone Area for the purposes of coastal management. There is no right of appeal and no compensation payable. Queensland has achieved significant coastal management outcomes from this legislation and this provides a significant vehicle to reduce climate change adaptation costs to government into the future. The parameters used in the formula are currently under review.

Where development has occurred historically in Erosion Prone Areas the Queensland State Coastal Plan policy is structured to where possible retain the coast free of hard protection works that adversely impact on coastal processes, coastal ecosystems and public access/amenity. While retreat and voluntary buy back have been used historically the value of coastal land has limited the practicality of these options. For this reason beach nourishment is a primary tool recommended to manage erosion hazards.

Coastal Management Districts and Coastal Building Lines

In addition to Erosion Prone Areas (which were established under the now repealed Beach Protection Act 1968), the Coastal Act establishes authority for Coastal Management Districts (CMDs) (Coastal Act Part 4). CMDs currently comprise the existing erosion prone areas and coastal management control districts established under the *Beach Protection Act 1968*, as well as additional coastal features, as provided for in ss.55-56 of the Coastal Act. The Coastal Act s.66 also establishes the authority for a Coastal Building Line (CBL).

Under the *Integrated Planning Act 1997*, development applications seaward of the CMD and the CBL are referred to the EPA, as assessment manager or concurrence agency (depending on the circumstance), and are assessed against the provisions of the State Coastal Plan and where applicable, the relevant Regional Coastal Plan.

Storm tide inundation areas

Queensland's State Coastal Plan includes policy on how coastal areas at risk from storm tide inundation hazard should be managed. (2.2.4 Coastal Hazards). The guideline *Mitigating the Adverse Impacts of Storm Tide Inundation* (the storm tide guideline) provides guidance on the application of policy 2.2.4 and a default storm tide inundation trigger level. This default value has been defined using the results of the "Queensland Climate Change and Community Vulnerability to Tropical Cyclones – Report Series" published in 2001 in a collaborative State and Federal Government Project. (The study storm tide levels included climate change scenarios associated with 0.3m sea level rise, 10% cyclone intensity increase and some southerly movement of cyclone events.)

The default level of HAT+1.5m equates to an event rarer than a 1 in 500 year ARI with the above climate change scenarios. Any proposed development below this level requires a detailed storm tide inundation study to ensure future development is not located in high storm tide inundation areas. In parallel with this the Natural Disaster Mitigation Programme is assisting local governments in the completion of detailed storm tide studies for regional areas to identify storm tide inundation areas for planning and emergency response. This policy is also a significant statutory vehicle in minimising future costs of climate change adaptation. The EPA collects wave and storm tide data throughout the state to support this policy and emergency services.

Land Act

The State Government, through the Department of Natural Resources and Water under the *Land Act 1994*, is responsible for the allocation and management of substantial areas of coastal State land, in particular unallocated State land, in addition to reserves, trust land, roads and esplanades generally administered by local governments.

State Planning Policy 1/03

Working along side the storm tide guideline is *State Planning Policy 1/03: Mitigating the Adverse Impacts of Flood, Bushfire and Landslide*, which ensures that the natural hazards of flood, bushfire and landslide are adequately considered when making land use planning decisions. Whilst storm tide is addressed under the State coastal plan, SPP 1/03 requires the cumulative impacts of storm tide to be considered when assessing the extent and severity of flood. The SPP 1/03 Guideline provides advice and information on interpreting an implementing the SPP 1/03.

The policy is due for review in 2009 and, in line with other planning processes in the State, it is intended to update the policy to reflect the potential impact of climate change. This process is expected to commence later in 2008.

State Planning Policy 1/92

State Planning Policy 1/92: Development and the Conservation of Agricultural Land is a statutory planning tool used to regulate the development of urban areas potentially encroaching upon productive coastal agricultural land. Although it applies across the State it has applicability to coastal areas.

Statutory Regional Plans

The Qld Government is developing statutory regional plans and other planning tools as part of its planning reform agenda under the *Integrated Planning Act 1997.* Statutory plans, which have authority under Chapter 2 Part 5A of the *Integrated Planning Act 1997,* reconcile and integrate State interests, such as climate change and biodiversity. A regional plan is already in place for South East Queensland and the draft Far North Queensland Regional Draft Plan 2025 has recently been released.

The South East Queensland (SEQ) Regional Plan, released in 2005, provides an overarching framework for management of development in local government areas of south-east Queensland. Nine of these are located on the coast, and all except one fall within coastal catchments. The SEQ Regional Plan includes a number of policies and principles relating to climate change.

These policies included the need for local governments and State agencies to consider climate change in the preparation of planning schemes and land use strategies, to protect the coast from increased storm tide inundation and sea level rise, consider the effects of climate change with regard to the impact of flooding, bushfires and landslides, and incorporate energy efficient building design into developments. Many policies regarding transport use and urban consolidation have contributed to reduced emissions of greenhouse gasses.

The SEQ Regional Plan is a statutory instrument under the *Statutory Instruments Act 1992* and is also a planning instrument under the *Integrated Planning Act 1997* (IPA). It has a direct effect in its own right and indirect effect through the amendment and alignment of local government planning schemes and state plans and policies. Regional policies of the SEQ Regional Plan provide the planning principles and guidelines for managing the future development of the SEQ region.

The Queensland Government has been undertaking a range of work to integrate climate change into land use planning. A climate change risk assessment process was undertaken last year to inform the development of the Far North Queensland Regional Plan. Two stakeholder workshops were undertaken to identify climate change risks to the region and develop adaptation responses which were fed into the development of the regional plan.

A climate change strategy is currently being developed to inform the review of the SEQ Regional Plan. The strategy will identify those priority climate change issues of importance in the region and adaptation strategies to be integrated into revised regional plan.

The Queensland Government has also committed to developing a State Planning Policy for Climate Change. The regional planning exercises outlined above will be used to inform development of the policy, particularly regarding which climate

change issues are likely to be best addressed through a regional or State-level planning instrument.

Acid sulphate soils policy framework

The *State Planning Policy 2/02: Planning and Managing Development Involving Acid Sulfate Soils* requires new planning schemes by local governments to take account of acid sulfate soils. It also requires those making new development proposals in high probability areas to undertake assessment and management of acid sulfate soils risk. In Together with the *Queensland Acid Sulfate Soil Technical Manual*, these tools are the basis upon which local government manages this issue through the development assessment process.

The policy and management guidelines are cross-referenced to guidelines, plans, codes and procedures that implement the *Integrated Planning Act 1997*), the *Fisheries Act 1994*), the *Environmental Protection Act 1994*, the *Vegetation Management Act 1999* and the Coastal Act. The most recent addition is the release of acid sulfate soil management measures in the *Guidelines for Constructing and Maintaining Aquaculture Containment Structures* published by the Department of Primary Industries and Fisheries.

The statutory SEQ Regional Plan 2005–2026, which defines an urban footprint to avoid further urban sprawl in coastal and other sensitive areas, is expected to prove beneficial in minimising new acid sulfate soil disturbances.

Fisheries legislation

Marine plants and fish habitats are managed under the provisions of the *Fisheries Act 1994* through the specific protection of marine plants, the declaration of fish habitat areas and the restoration of fish habitats damaged or destroyed without authorisation.

As of 1 March 2005, permit approvals previously issued by DPI&F under the *Fisheries Act 1994* for marine plant disturbance and works in declared fish habitat areas are administered under the *Integrated Planning Act 1997*and the Integrated Development Assessment System (IDAS) as fisheries development approvals.

Offsetting (mitigation) of impacts of coastal development is a key component of their assessment. A number of self-assessable codes have been developed to reduce bureaucracy and the fees associated with maintenance works in coastal areas where these works involve low impact removal of marine plants.

Declared fish habitat areas (FHAs) protect inshore and estuarine fish habitats that are important for sustaining local and regional fisheries. Declared FHAs are managed under the *Fisheries Act 1994* and *Fisheries Regulation 1995*. Once an area is declared as an FHA, it equally protects all habitat types (for example, vegetation, sand bars and rocky headlands) from direct physical disturbance and coastal development.

A declared FHA is a form of 'multiple-use' marine protected area, protecting natural fish habitats from alteration and degradation while allowing for community use, including a continuation of legal fishing and boating activities. The declared FHA program arose in the late 1960s out of a need to counter the growing impacts of coastal development on Queensland's fisheries. The program has established a

network of fish habitats that are essential to sustaining these fisheries. DPI&F is responsible for sustainable fisheries in Queensland, and the declaration and management of declared FHAs are key elements of its management strategy.

State Marine Parks Legislation

The main legislation regulating marine park management, planning and declaration is the *Marine Parks Act 2004*, *Marine Parks Regulation 2006* (the Regulation) and the *Marine Parks (Declaration) Regulation 2006* (Declaration Regulation). The Act and Regulations apply to all State marine parks. The aim of the Act is 'to provide for conservation of the marine environment'. The Regulation provides for the overall management and use of marine parks, while the Declaration Regulation details the boundaries of Queensland's marine parks.

Great Barrier Reef Marine Park Legislation

The Great Barrier Reef Marine Park is administered under the *Great Barrier Reef Marine Park Act 1975* (Cth) and its subsidiary legislation, the *Great Barrier Reef Marine Park Regulations 1983*. These are the primary legislative instruments by which activities in the Marine Park are managed. The types of activity that may be carried out within a given area of the Marine Park are specified through area-specific Zoning Plans. Also, Plans of Management govern specific activities (such as tourism) within certain areas (like the Whitsundays).

Reef Water Quality Protection Plan

The Reef Water Quality Protection Plan identifies actions, mechanisms and partnerships to build on existing Commonwealth and Queensland Government policies and industry and community initiatives to assist in halting and reversing the decline in the quality of the water entering the Great Barrier Reef.

Storm Tide Mapping Project

The State Government is working with local governments along Queensland's coast to identify and map the areas most at risk of experiencing storm tides. The project is being run by Emergency management Queensland and will produce a consistent series of maps (based on the EMA-initiated National Storm Tide Mapping and Modelling standard) to be used to identify storm tide hazard areas for emergency response purposes.

The storm tide mapping project is jointly funded by the Commonwealth and State under the Natural Disaster Mitigation Program. Maps for Burdekin, Whitsundays, Cairns, Mackay, Palm Island and Hervey Bay have already been developed, and Burrnett will be finalised soon.

The emergency management storm tide maps will make operational responses to storms and cyclones much more efficient. Emergency managers will have the capacity to assess the risk of storm tide more accurately, and make quick decisions on evacuating areas at risk of flooding. The project will also be a useful tool in educating residents about the risk of storm tide inundation where they live.

The project commenced in December 2005 and is expected to be completed by the end of 2009.

Torres Strait Islands Tide Gauge Project

Tidal data for the Torres Straight Islands region is insufficiently accurate to manage and respond to events such as storm surge and projected sea level rise. To address this, the Department of Natural Resources and Water, in partnership with other agencies and Griffith University, is currently progressing the Torres Strait Islands Tide Gauge Project to establish coordinated datum on 17 inhabited islands in the Torres Strait. Through this process, the positional accuracy of all existing spatial information for the islands will be resolved; the acquired information can then inform such activities as storm surge and sea-level rise mapping for the islands.

Gulf of Carpentaria Storm Tide Study

The study aim is to undertake numerical simulations of tropical cyclone storm surge, waves and wave effects for the Gulf of Carpentaria region, and to undertake inundation mapping of select locations.

The scope of the study is to use state-of-the-art numerical modelling techniques to generate statistics for storm tides and extreme waves due to tropical cyclones at selected locations along the Gulf of Carpentaria coastline in both Queensland and the Northern Territory.

The anticipated study outcomes are:

- storm tide statistics (i.e. the total of tide, surge and wave set-up) for a range of Average Recurrence Intervals (ARI);
- extreme wave statistics for selected locations;
- joint probability statistics of waves and water levels at a number of selected locations; and
- inundation mapping for emergency response, planning and public awareness purposes.

It is expected that the study will be completed within 12 months.