

# Planning for Coastal Hazards - the Queensland Coastal Plan

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## ABSTRACT

The Queensland coastal strip is the most populous area of Queensland and will face significant challenges from the impacts of climate change over the next 50 to 100 years. Queensland communities already experience significant impacts from storms and cyclones, so how ready are we for this emerging threat?

The key to preparedness is to understand the threat. Coastal communities and infrastructure will be increasingly exposed to the impacts of climate change including a projected 0.8 metre sea level rise and an increase in the intensity and southern tracking of tropical cyclones by 2100. Large areas of the Queensland coast will likely suffer increasing coastal erosion, permanent inundation of low lying areas and increased frequency and extent of storm tide inundation. Relevant policy and adaptation strategies are essential but cannot be clearly focused unless the risks are understood.

This presentation will outline the key developments in coastal policy and coastal hazard area identification for the coastal zone and the work within the Department of Environment and Resource Management to understand and map the area at risk from future coastal hazards. It will also highlight initiatives DERM is proposing to build knowledge, improve hazard mapping quality and increase public awareness in this area.

## INTRODUCTION

The Queensland coast is subject to extreme weather conditions that can cause coastal erosion and storm tide inundation. These naturally occurring events can pose a significant threat to life and property and are collectively described as 'coastal hazards'. In the future, rising sea levels and more severe weather events associated with climate change are expected to increase the risks posed by these hazards.



**Photo 1: Erosion and storm tide inundation risks in Queensland**

It is estimated over 80 percent of Queenslanders live on or near the coast. Further population growth will increase demand for new urban development and place additional pressure on coastal

land. Queensland has a long history of coastal legislation to deal with these coastal hazards beginning with the *Beach Protection Act 1968*. The current Queensland Coastal Policy is the State Coastal Management Plan 2001 which underwent an extensive review in 2008. As a result of that review the new Queensland Coastal Plan (QCP) has been developed and is expected to commence on 31 October 2011.

The QCP also addresses urban settlement pattern, ecological values, coastal dependent land use and scenic amenity, but coastal hazards are the focus of this paper.

## **KEY DIRECTIONS IN THE MANAGEMENT OF COASTAL HAZARDS**

The QCP contains State Planning Policy 3/11 Coastal Protection which recognises the need for new development to both avoid and minimise risk to people and property and to allow coastal processes to occur naturally. The QCP also for the first time directs planning for climate change impacts and mandates climate change factors to be used in planning and development assessment on the coast. The intent of the QCP is to manage new development in coastal hazard areas, or where there are existing development commitments, to ensure that the risk to people and property is not increased. Furthermore, the plan requires an adaptation strategy to be prepared in urban localities prior to any intensification of development to ensure the risks are fully addressed.

To assist decision makers and inform the public, coastal hazard mapping has been prepared to show the areas where the coastal hazard policies of the QCP apply. They include the coastal zone, coastal management districts and coastal hazard areas.

## **CLIMATE CHANGE AND COASTAL HAZARDS**

The QCP now mandates climate change factors to be considered in planning and development assessment decisions and includes a sea level rise of 0.8m and a 10% increase in cyclone maximum potential intensity by 2100. Climate change factors used in the QCP are based on the projection of the Intergovernmental Panel on Climate Change Fourth Assessment Report report. To remain relevant with respect to the rapidly developing climate change science, climate change projections used in the QCP are linked to future IPCC reports. As the IPCC assessments change so can the climate change factors in the QCP as a review of the factors is mandated in this circumstance by the QCP.

The QCP identifies 2 types of coastal hazards:

1. Coastal erosion - from storm and cyclones, where there is a long term sediment deficit at the coast or from tidal inundation. Risk for the entire Queensland coast has been determined and is based on the following simplified calculation: erosion prone area = storm erosion + long term erosion + dune scarp slump + sea level rise + safety factor and is based on a 100 year planning period.
2. Storm tide inundation - which is a temporary elevation of water levels from storms and cyclones which can extend several metres above normal water levels. The QCP specifies a 100 year average recurrence interval

Inundation by sea level rise is not considered as a discrete coastal hazard in the QCP. Rather, it is considered as additive to the impacts of coastal erosion and storm tide inundation. It is a discrete component of the erosion prone area and is shown on erosion prone area footprint maps as an area of permanent inundation by 2100. It is also included in the erosion prone area calculation as a morphological response in which sediment is permanently transferred from the upper profile to deeper water offshore.

For storm tide inundation hazard, although many local governments had completed storm tide hazard studies, few had considered the climate change factors specified in the QCP. Therefore default water levels have been set in the QCP based on recent state-wide assessments of storm tide levels. The default values are::

- 1.5m above highest astronomical tide for southern QLD
- 2.0m highest astronomical tide for central and northern QLD

Future initiatives to improve coastal hazard mapping are:

- replacement of the default inundation areas with mapping derived from regional storm tide inundation studies through a cooperative approach with local governments: and
- refinement or erosion recession estimates through studies to be undertaken by the Queensland Climate Change Centre of Excellence.

## **COASTAL HAZARD MAPPING**

To support and facilitate application of the policy in the QCP the decision was made to produce maps of all coastal hazard areas along the coast. Mapping of coastal hazard areas on a State-wide scale has not been previously available. This proposal posed significant technical challenges. The response to these challenges was to develop a methodology which provided a conservative and robust mapping product.

The capacity to provide state-wide mapping at a 5 metre resolution was only possible with the use of the recently captured coastal LiDAR - a \$7 million project funded by Commonwealth, State and local governments which provided high resolution land level data for 66,000square kilometres of coast.

The coastal hazard mapping is now available from the DERM website as an indicative footprint map both at a township scale and at a lot based scale. Figure 1 provides samples of the erosion prone area and storm tide inundation area mapping, respectively.

## **DEVELOPMENT CONSTRAINTS AND COASTAL HAZARD AREAS**

The policy thrust for coastal hazards is broadly similar to historical policy in this area. The major difference is a more specific policy, a policy directed equally at planning instruments and development assessment and a greater emphasis on climate change.

Historically Queensland's coastal policies have focused on the exclusion of new development from coastal hazard areas. This has commonly been referred to as the buffer zone concept and an example of this is provided in Photo 2.

The general development requirements of the policy are provided in Table 1

Key QCP outcomes include:

- greater emphasis in influencing land use decisions in the planning stage(regional plans, planning schemes) rather than the development assessment stage;
- no new urban areas to be designated in coastal hazard areas (exceptions for far north remote communities & industrial zones);
- constraints on new permanent development to in erosion prone areas;
- existing urban areas in high risk coastal hazard areas to be subject to adaptation planning (phased in over five years);
- after five years, intensification of existing land use not permitted unless supported by an adaptation plan; and
- adaption strategies to be reflected by local government planning instruments and other relevant local government plans.

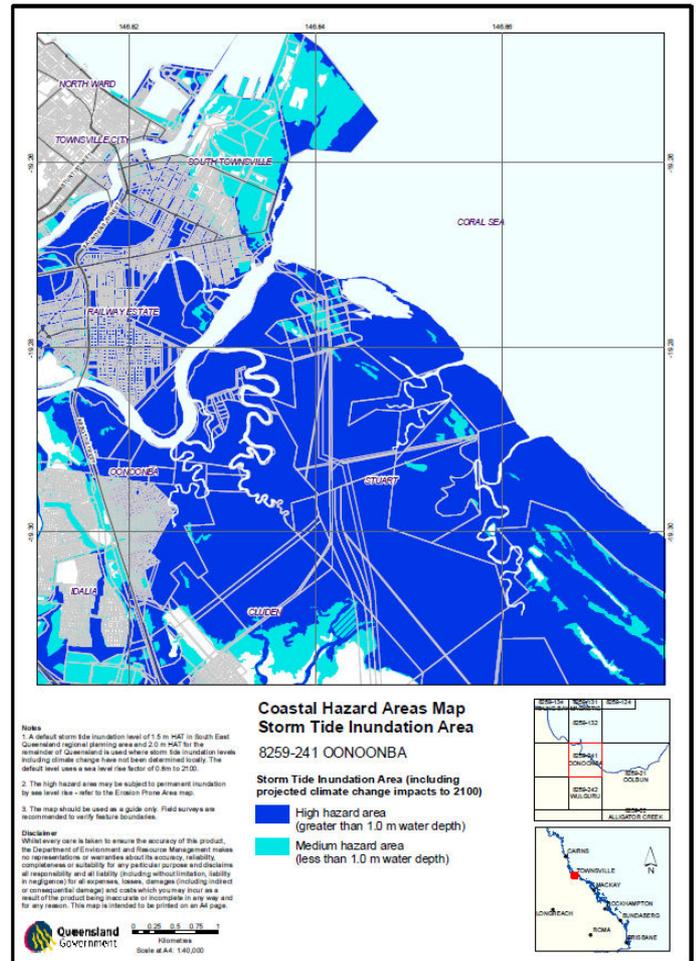
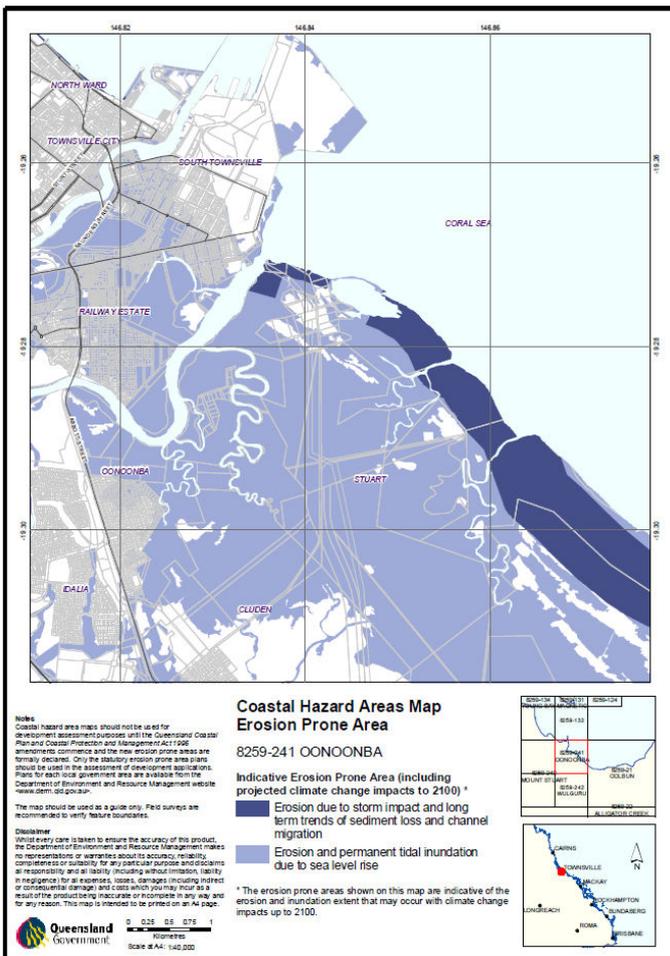


Figure 1: Coastal hazard area mapping for Queensland.

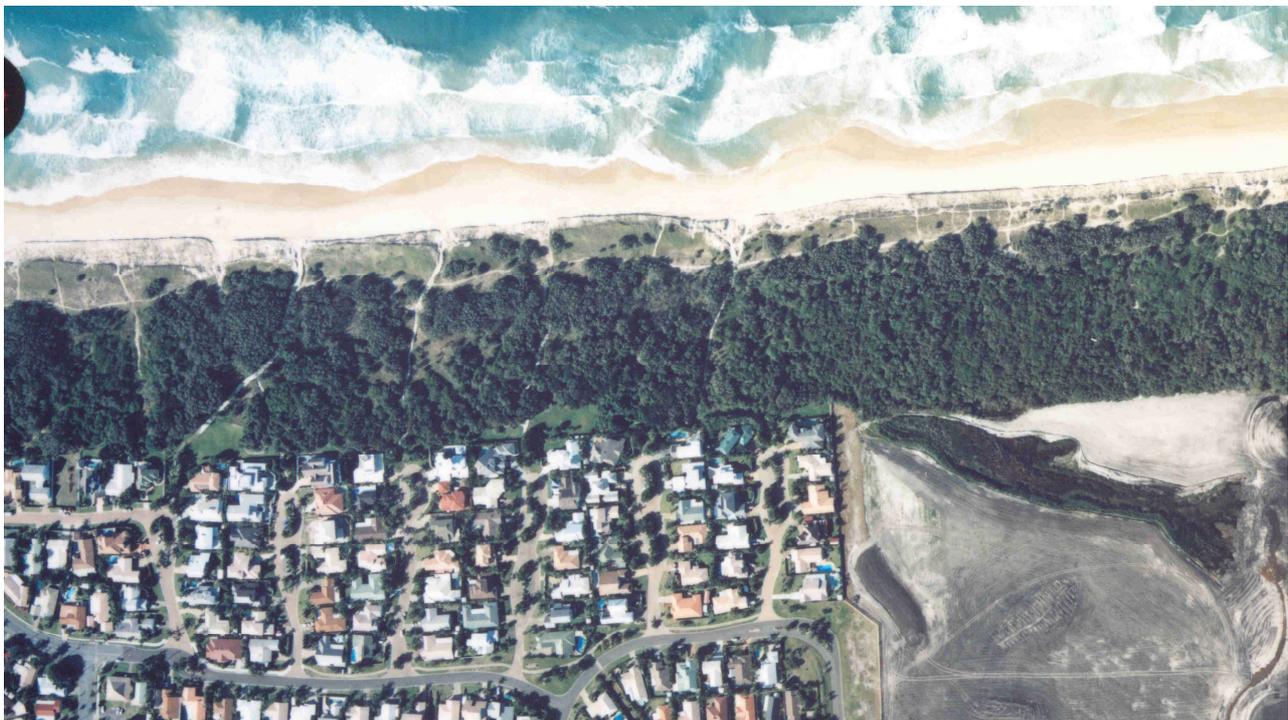


Photo 2 Establishment of coastal buffer zones based on land surrender provisions in the Coastal Act for new urban development.

**Table 1: Development requirements for land use types under the Queensland Coastal Plan.**

	<b>Hazard category at 2100 and development requirements</b>	
<b>Land use</b>	<b>High hazard area</b> Description: <ul style="list-style-type: none"> <li>Erosion prone area including area of permanent inundation due to SLR</li> <li>inundation during defined storm tide event greater than 1m deep</li> </ul>	<b>Medium hazard</b> Description: <ul style="list-style-type: none"> <li>inundation during defined storm tide event of less than 1.0m deep.</li> </ul>
<b>Existing urban areas</b> <ul style="list-style-type: none"> <li>built-up urban areas</li> <li>committed for urban development <ul style="list-style-type: none"> <li>future urban zones</li> <li>master plan areas</li> <li>urban development areas</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>after 3 to 5 years—adaptation plan required.</li> <li>interim - assessment to mitigate risk</li> </ul>	<ul style="list-style-type: none"> <li>assessment to mitigate risk</li> </ul>
<b>Greenfield urban footprint areas (uncommitted)</b> <ul style="list-style-type: none"> <li>investigation areas</li> <li>future development areas</li> </ul>	<ul style="list-style-type: none"> <li>no new urban development, except for coastal dependent, industrial and small-medium scale tourist development</li> <li>assessment/adaptation plan to mitigate risks</li> </ul>	<ul style="list-style-type: none"> <li>no new residential development</li> <li>assessment to mitigate risks.</li> </ul>
<b>Non-urban areas</b> <ul style="list-style-type: none"> <li>rural</li> </ul>	<ul style="list-style-type: none"> <li>no new urban area designation, except for coastal dependent, industrial and small-medium scale tourist development</li> <li>risk assessment/adaptation plan to mitigate risk</li> </ul>	<ul style="list-style-type: none"> <li>no new urban area designation, except for coastal dependent, industrial and small-medium scale tourist development</li> <li>assessment/to mitigate risk</li> </ul>

### TAKE HOME MESSAGES

The QPC is the third iteration of coastal policy in Queensland and squarely faces the emerging issue of climate change with a policy focus that addresses the issues at the planning stage rather than the development assessment stage. For the first time in Queensland highly detailed mapping of coastal hazard areas clearly depict the emerging risks which sets the platform for long term adaptation strategies required by the policy for future development.

### ACKNOWLEDGMENTS

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