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DEVELOPMENT CONSULTANTS • MANAGERS • ENGINEERS • PLANNERS

PROJECT NO: 5002/02

Townsville Ocean Terminal

&

Breakwater Cove

5002/02
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Review of Provision for Climate Change

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1.0 INTRODUCTION

City Pacific lodged an EIS for the development of the Townsville Ocean Terminal and associated residential/commercial development described as Breakwater Cove in September 2007.

Responding submissions to the EIS were received from a number of government agencies, commercial organisations, clubs and private individuals. The Commonwealth Department of Environment Water Heritage and the Arts (DEWHA) have requested an independent review of provision for climate change in the design of the Townsville Ocean Terminal and Breakwater Cove.

The Department requires consideration of the impacts if changes to the regional climate occur resulting in greater storm and cyclone activity, higher waves , stronger winds and increased water levels.

This report reviews the regulatory framework and design parameters adopted in the preliminary design as shown in the EIS and investigates whether adequate allowance has been made for the impacts of climate change.

2.0 REGULATORY FRAMEWORK

The regulatory framework associated with coastal hazards and climate change as it relates to the proposed Townsville Ocean Terminal and Breakwater Cove can be defined as the relevant provisions of the following statutory documents as they relate to coastal hazards and climate change:

- Coastal Protection and Management Plan 1995;
- State Coastal Management Plan;
- Environmental Protection Agency (EPA) Policies and Guidelines;
- The Townsville City Council City Plan 2005 and Policy Manual.

2.1 Coastal Protection and Management act 1995

The purpose of the *Coastal Protection and Management Act 1995* (the Act) is to provide a framework for the protection and conservation of key coastal resources. Specifically, the main objectives of the Act are to:

(a) provide for the protection, conservation, rehabilitation and management of the coast, including its resources and biological diversity; and
(b) have regard to the goal, core objectives and guiding principles of the National Strategy for Ecologically Sustainable Development in the use of the coastal zone; and
(c) provide in conjunction with other legislation, a coordinated and integrated management and administrative framework for the ecologically sustainable development of the coastal zone; and
(d) encourage the enhancement of knowledge of the coastal resources and the effect of human activities on the coastal zone.

Coastal Management is achieved through the implementation of coastal management plans and coastal management districts. *The State Coastal Management Plan* must be prepared in accordance with the provisions of the Act, and must include the following:

- *state principles and polices for coastal management;*

- *identify key coastal sites and coastal resources in the coastal zone and planning for their long term protection or management;*
- *are developed in consultation with the public; and*
- *have regard to Aboriginal tradition and Island custom of Aboriginal and Torrs Strait Islander people particularly concerned with land affected by the plans.*

The Act also requires that Regional Coastal Management Plans are declared in accordance with the provisions of the Act. The New Townsville City Council local government area is not subject to a Regional Coastal Management Plan (RCMP). The draft RMCP for the Townsville local government area has been postponed pending review of the State Coastal Management Plan. In the absence of a RCMP, the provisions of the State Coastal Management Plan apply.

The Coastal Management and Protection Act 1995 does not specifically address the technical requirements associated with coastal hazards and climate change; rather it provides the legislative framework for the preparation of other statutory documents that sit under the Coastal Management and Protection Act 1995 to address these particular issues.

2.2 The State Coastal Management Plan

The State Coastal Management Plan (SCMP) is a statutory instrument under the provisions of the Coastal Protection and Management Act 1995 (CPMA). The purpose of the SCMP is to describe how the coastal zone is to be managed.

Chapter 1 of the State Coastal Management Plan provides the framework for the vision of Queensland's coast. This chapter explores the issue of coastal management in the Queensland context and the issues and concerns faced with protecting key Queensland coastal area.

It is worth noting that Chapter 1 provides a brief commentary on predicted global climate change due to enhanced greenhouse effects and the potential impacts of the coastal environment. Specifically, the SCMP states that *'research into climate change, assessments of impacts and vulnerability, and planning to adapt will be an important long term management strategy'.*

Chapter 2 of the State Coastal Management Plan provides the framework for management of Queensland's coastal zones under ten (10) topic areas. These topics include the coastal use and development, physical coastal processes, public access to the coast, water quality, Indigenous Traditional Owner cultural resources, cultural heritage, coastal landscapes, conserving nature, coordinated management, and research and information.

Section 2.2 of the SCMP – Physical Coastal Processes provides for coastal management outcomes associated with natural fluctuations that occur as a result of climate change and sea level rise, and provide protection for life and property.

The Principles of Topic No. 2 – Physical Coastal Processes include the following:

2A – trends in climate change including sea level rise, more extensive storm tide flooding and associated potential impacts are taken into account in the planning process;
2C – the consequence of physical coastal processes are recognised and such processes generally are allowed to occur naturally;
2D – risks associated with all relevant hazards including storm tide inundation and cyclone effects are minimised; and

Policies 2.2.1 and 2.2.4 of Chapter 2 provide an overview of the Policy context as it relates to Climate Change and Coastal Hazards.

Policy 2.2.1 – Adaptation to Climate Change lists some of the impacts associated climate change and a policy for understanding and mitigating some of these impacts. The impacts include, but are not limited to:

- *higher frequency and more extensive storm tide flooding;*
- *possibly more frequent severe storm events such as tropical cyclones;*
- *potential shoreline recession;*
- *increased risk of damage to coastal infrastructure;*
- *loss of tourism, recreation* and transportation functions, and impacts on agriculture on the coast.

The policy specifies four targets with the aim of setting the foundation for cost effective adaptation measures associated with climate change. The four targets are:

- *avoidance of development on vulnerable areas;*
- *improved knowledge and understanding of climate change;*
- *assessment of impacts and vulnerability; and*
- *incorporating adaptation strategies into coastal planning and management.*

Policy 2.2.4 – Coastal Hazards provides the framework for managing events such as storm tides, cyclones and related inundation. The Policy states that *'when determining new areas for urban land uses on the coast, an evaluation is to be carried out to identify the level of potential risk to life and property from coastal hazards. This evaluation should be based on mapping of storm tide hazard areas in addition to considering the impact of coastal processes, including any impacts from potential sea level rise'.*

Notwithstanding the above, the SCMP does not specifically list design standards to mitigate against the impacts of coastal hazards or climate change. The SCMP provides broad guidelines of recommendation; it could be reasonably argued that it would be up to the proponent of a development to undertake the necessary investigations to develop strategies to mitigate against coastal hazards and climate change.

2.3 ECOaccess Guidelines

The Environmental Protection Agency's Ecoaccess Unit is a unit within the EPA designed to coordinate environmental licences and permits. The Ecoaccess Unit also provides a series of fact sheets and guidelines relevant to a range of activities that require an environmental license or permit. In particular, there are several policies and guidelines that relate to coastal development and the State Coastal Management Plan.

Operational Policy – Coastal Development – Building and Engineering Standards for Tidal Works provides guidance on minimum policy standards that must be adopted for building and engineering criteria for tidal works in accordance with the provisions of the *Integrated Planning Act 1997*.

The Policy contains a Table of Assessment which defines performance indicators and minimum acceptable standards applicable for tidal works. It should be noted that the Code is complied with if the performance indicators specified in Column 1 of the Table of Assessment is met or exceeded by the minimum requirements set out in Column 2 of the Table of Assessment.

The Guideline – State Coastal Management Plan - *Mitigating the Adverse Impacts of Storm Tide Inundation* provides advice and information on interpreting and implementing Policy 2.2.4 – Coastal Hazards of the State Coastal Management Plan.

This Guideline defines the Storm Tide hazard by the Designated Storm Tide Event (DSTE). The DSTE is further defined as "the storm tide level adopted by local government for management of a particular locality.

2.4 State and Regional Coastal Management Plans – Queensland's Coastal Policy – November Interim Guideline

The purpose of this Guideline is to provide advice on interpreting and implementing the State Coastal Management Plan and Regional Coastal Management Plan where a Regional Coastal Management Plan is in force.

Section 2.2 of the above Guideline – Physical Coastal Processes provides examples of assessment criteria that achieve the State Coastal Plan Policy as it relates to adaptation to climate change and erosion prone area.

Some of the examples provide specific solutions to minimise impacts, while other example provide recommendations for other studies or reports to be prepared to provide evidence that the coast is managed to allow for natural fluctuations including any that occur as a result of climate change and sea level rise, and provide protection for life and property.

2.5 Townsville City Council City Plan 2005

The Townsville City Plan 2005 and Policy Manual have been reviewed in relation to provisions for coastal hazards in these documents, and both the Cityplan 05 and the Policy Manual do not contain any regulatory framework provisions for the management of coastal hazards or climate change.

A Report prepared by Maunsell in December 2005 (Townsville Flood Hazard Assessment Study) included a section on risk analysis, evaluation and treatment options associated with flood immunity and inundation.

The following recommendations were included in the Report:

- *Engineering works: construction of retarding basins, drainage upgrades, infrastructure improvements, road raising, channel clearing and diversions;*
- *Planning controls: adoption of policies restricting infill development in existing flood prone areas, thereby reducing risk escalation. Planning policies include setting board development levels, freeboard requirements and even strategies to implement voluntary buy-back schemes and developing a flood prone land code for new development.*

It is interesting to note that that the recommendation in dot point 2 above has not been included in the Planning Scheme to date.

- *Warning systems: effective warning systems are essential in conveying information to the community, particularly in areas prone to flash flooding;*

- *Regulations, standards and local laws: appropriate hazard resistant building particularly for the design and construction of major infrastructure and components of essential services; and*
- *Land use planning: appropriate location of service networks and facilities through coordinated planning of infrastructure.*

Similarly, the Townsville – Thuringowa Local Disaster Management Plan prepared in June 2005 included a section on risk management and recommended prevention and preparedness strategies.

Section 10.02 of the Report discusses cyclone, severe storm and storm tide impacts and also provides short, medium and long term solutions for the prevention and preparation of cyclones, severe storm and storm tides. Specifically, the long term recommendation included addressing town planning issues. However, it is noted that the Townsville City Council Planning Scheme has not been amended to incorporate regulatory planning provisions associated with cyclones, severe storms or storm tides.

2.6 Summary

The Environmental Protection Agency provides numerous documents which detail the regulatory framework associated with development in the coastal zone. Development in the coastal zone and the recommendations for consequential mitigation measures required to address coastal hazards and climate change are extensive.

However, the actual methodologies for achieving compliance with the relevant statutory documents are less obvious. The State Coastal Management Plan does not include performance criteria or acceptable solutions for achieving compliance with the policies listed in this document, nor does the Townsville City Council Planning Scheme or Policy Manual.

Operational Policies and Guidelines assist with interpreting and implementing the State Coastal Management Plan and provide some tangible solutions for achieving policy requirements; however they are also limited.

It is understood that the Federal and Sate Governments are undertaking studies into the impact of climate change which may could result in changes to current regulatory arrangements and / or the prescription of modified regulations and standards to deal with the anticipated impacts of climate change.

3.0 STANDARDS ADOPTED FOR THE PRELIMINARY DESIGN

In accordance with the regulatory policies and guidelines, the proponent enquired with the Townsville City Council as to the appropriate Designated Storm Tide Event on which to base the preliminary design for development. As noted earlier the DSTE is defined as the *"storm tide level adopted by The Local Government at Management level for a particular locality*".

A more recent informal enquiry with Council in relation to the appropriate standard on which to design coastal facilities indicated that the design Storm Tide Event is defined as the 100 Year ARI Storm Tide Event. A similar standard as been applied to Coastal Projects in the vicinity of the TOT and Breakwater Cove Project. It is apparent that the DSTE 100 Year ARI Event is the adopted standard in accordance with the regulatory framework.

Notwithstanding this, and in accordance the requirements of the State Coastal Management Plan that "*research into climate change, assessments of impacts and vulnerability, and planning to adapt will be an important long term management strategy*"". The then Townsville City Council and The City of Thuringowa Councils engaged GHD to conduct an investigation titled the "*Townsville -Thuringowa Storm Tide Study*". This study was completed in April 2007.

An important consideration within that study was the impacts in climate change on the frequency and intensity of cyclone events. The study is a complex study, however in Section 7, the possible impacts enhanced greenhouse effects were considered. In particular reference is made to Section 7.2 of the study which dealt with the "Enhanced Greenhouse Effect". The study considered potential sea level rises as a consequence of global warming as well as possible changes to tropical cyclones.

In section 7.2.2 the Study cites the major conclusions of the current IPCC (2001) view on the possible effects of climate change as follows:

- *Long term reliable data on tropical cyclone intensity and frequency show substantial multi-decadal variability, but there is no clear evidence of any long term trends in number, intensity or location.*
- *Recent thermodynamic modelling attempts to estimate the maximum potential intensity (MPI) of tropical cyclones in present climates have shown good agreements with observations.*
- *Applications of MPI techniques to change climate indicate that MPI cyclones will remain the same or undergo a modest increase of up to 10-20% at the extreme end of the scale. The broad geographic regions of cyclone genesis and therefore the regions affected by tropical cyclones are not expected to change significantly.*
- *The very modest available evidence points to expectation of little or no change in global frequency.*
- *Regional and local frequency currents may however change substantially in either direction because of the cyclone genesis and track on other phenomena that are not yet predictable.*

The climate change scenarios in the GHD study are shown in Table 7.3. These indicate the following;

Table 7-3 Enhanced Greenhouse Scenarios

Scenario Year	Increase in Frequency of Occurrence	Increase in Maximum Potential Intensity	Increase in Mean Sea Level
	%	%	M
2050	10	10	0.5
2100	10	20	0.9

The GHD report concluded that the estimated increase in total storm tide levels would enhance greenhouse scenarios in the Year 2050 for The Breakwater Casino area were 0.5 for the 50 year return period and a further 0.4 for the 100 Year return period. It is understood that Townsville City Council has adopted the GHD study, however this is not explicitly evident in any policy document.

Coastal Engineering Solutions Pty Ltd (CES)have taken into account the more recent studies undertaken by GHD, in the preparation of the preliminary design which is included in the EIS. CES have adopted the storm tide levels included in The Townsville Thuringowa Storm Tide Study which is explicitly stated in the Executive Summary of the Coastal Engineering Studies included as Appendix A13 of the EIS.

In the preparation of the design Coastal Engineering Solutions have adopted a standard which is in excess of the existing standard that has applied to other coastal developments within the locale, as it takes into account the more recent estimate of the DSTE reflecting potential increases in sea level as a consequence of climate change.

Coastal Engineering Solutions have advised that preliminary designs have been based on mathematical modelling. It is noted that detailed design prior to seeking operational works approval will be tested and refined by physical modelling. The physical model will permit the identification and adoption of design standards which will meet or exceed the minimum standards required by the regulatory framework, including any adopted higher levels of as identified in more recent studies.

In the event that as yet unpublished studies and investigations into the impacts of anticipated climate change currently being carried out by Federal and State Government agencies result in changes to regulatory arrangements and/or the prescription of standards in excess of the standards adopted for the preliminary design, the detailed design of the will conform with the revised standards.

4.0 CONCLUSIONS

Based on review of the documentation available, the regulatory framework, the report on Townsville Thuringowa Storm Tide Study and advice supplied by Coastal Engineering Solutions it can be concluded that:

- Adequate allowance has been made in the preliminary design for the potential impacts of climate change on the intensity and frequency of extreme cyclone events and the consequent impacts on storm-tide level.
- Current Regulatory arrangements and standards may be revised as a consequence of as yet unpublished studies and investigations that are being carried out by Federal and State Government agencies into the impacts of anticipated climate change.
- The detailed design of the Ocean Terminal and Breakwater Cove will conform with any revised regulatory arrangements and standards that may apply at the time that operational works approval is sought.