

Sustainability of reclaimed foreshore – case study: Southport Broadwater Parklands

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ABSTRACT

The sustainability of an upcoming reclamation project at Southport Parklands on the Gold Coast, Australia, was assessed. Southport Parklands has been under development for a long time, which led to irreversible damages to the coastal environment. Therefore, it is important to have a proactive design strategy for a sustainable development. In the present study, a numerical model has been established to simulate hydrodynamic processes. A better understanding of the physical processes advocated developers to adopt a proactive strategy for all new foreshore protection designing.

KEY WORDS: Estuarine environment; Foreshore management; Gold Coast; Hydrodynamic model; Reclamation; Sediment transport; Sustainability.

INTRODUCTION

Land reclamation has always been widely used for the development of coastal areas. Its impacts on the environment need to be considered. The purpose of this study was to assess the sustainability of the land reclamation to reshape coastal zones for human convenience. The new development to extend the foreshore at Southport Parklands, Gold Coast, within the Broadwater is shown in Figure 1. The Broadwater is a semi-enclosed estuarine which plays a significant role in the Gold Coast community life (Mirfenderesk, 2007). It has been continuously modified during the last 60 years to respond to the community aspirations. The earlier modifications have not always been conducted by a sustainable approach, and led the Southern part of the Broadwater to a dangerous situation (Burton, 2003; Mirfenderesk, 2007). The Broadwater's sub-area, Southport Parklands, which runs from the Loders Creek to the Sundale Bridge in Southport, is particularly relevant. It is the outcome of 60 years of land reclamation fully dedicated to recreational activities.

A proactive strategy is needed to shape the reclamation in order to minimize eventual impacts on local hydrodynamic and sediment transport processes. A depth averaged two-dimensional hydrodynamic model GEMS has been developed by the Griffith Centre for Coastal Management on the software MIKE 21. The hydrodynamic results from the model have been combined with results from the GCCC Flood model and historical data to get a better understanding on the evolution of a reclaimed foreshore and its surrounding. This knowledge has been used to extend the proactive strategy to the foreshore protection design, through the proposal of improvements on techniques applied to protect

this reclaimed foreshore at Southport Parklands.

STUDY SITE

The Broadwater

The Broadwater is a semi-enclosed water body separated from the Coral Sea by the Spit on its southern part and by South Stradbroke Island on the remaining part. The Southern part of the waterway, which encompasses the proposed reclamation site, is linked to the ocean through the Gold Coast Seaway and alimented in freshwater by the Nerang River and a few creeks (Mirfenderesk, 2007). The studied area is quite shallow (generally <6m), with a mean tidal range of 1.5m with a maximum of 2m. Water circulation is mainly driven by tidal inputs as their amplitude is significantly larger than the freshwater flows from the rivers, except during flood events (Burton, 2003; Mirfenderesk, 2007; McInnes, et al., 2000).

The geomorphology of the Southern part of the Broadwater is directly influenced by its entrance on the Coral Sea. This entrance of the Broadwater has never stopped moving till 1985 with the creation of the Gold Coast Seaway. This shallow inlet was naturally migrated northward or southward under the action of alongshore sediment transport on the seaside, severe storms and flooding events. During the decades preceding the opening of the Gold Coast Seaway, the northward migration of the inlet generated numerous shoals. Those shoals proved to be naturally stable. As from the mid 1900's, the increase of human activity within the Broadwater has led to an extensive dredging of the delta shoals coupled with land reclamation to extend the foreshore (Tomlinson & al, 2007). The land reclamation has been used at Southport Parklands to extend recreational purpose areas in an area facing strong growing urbanization stress.