

## Beneficial Reuse of Dredged Material for Beach Nourishment in WA

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### Summary

This paper shares experiences gained in managing projects that combined dredging and beneficial reuse of sediments for beach nourishment in WA, Australia in the period 2014-2022. The paper identifies and demonstrates with examples the engineering and management aspects, planning and execution considerations, and merits and challenges associated with these works. The paper further explores the benefits of collaboration between Governmental and Regulatory bodies to facilitate, fund and manage these projects in the context of increasing demand and popularity to drive better outcomes and combat the impacts of climate change and coastal erosion.

### Extended Abstract

Australia has a highly dynamic coastline of over 30,000 kilometres. Around 85% of the population now live in the coastal region and it is of immense economic, social and environmental importance to the nation (Department of Climate Change 2009).

Climate change and sea level rise brings significant risks to these coastal regions. The Climate Change and Risks to Australia's Coasts Report found that, by the turn of the century, a significant number of residential buildings may be at risk of inundation and damage from a sea level rise of 1.1 metres (high end scenario for 2100). Coastal industries, particularly the tourism industry, will also face increasing challenges from erosion and reduction of popular beach amenities due to climate change and will need to plan to manage projected risk.

Coastal erosion is a natural process which occurs whenever the transport of material away from the shoreline is not balanced by new material being deposited onto the shoreline. Beach nourishment is an artificial process where sand lost through coastal erosion is replaced from other sources to combat erosion and improve beach amenity. Due to the foreseen sea level rise, it is expected that the need for coastal protection measures in Australia will continue to increase significantly. These can include soft engineering measures such as beach nourishment, hard measures such as coastal structures armouring, and even managed retreat from the existing coastal lines in some locations.

Ports and harbours within Australia have experienced a seventeen-fold increase in activity in the last half of the 20<sup>th</sup> century (Tull, 2006). The development of and maintenance of these ever-expanding waterways require the dredging of seabed material to deepen and maintain safe navigable depths. Beneficial reuse is the practice of using dredged material for another purpose that provides social, economic or environmental benefits

(Lukens, 2000). In Australia, the disposal and placement of dredged material to both offshore and confined onshore sites is challenging from environmental and regulatory perspectives. Throughout dredging projects in Australia and around the world, the beneficial reuse of dredged material for coastal applications such as beach nourishment is a long- and well-established coastal management approach and considered as important value adding principle. The benefits include potential for a win-win situation for both a dredging and coastal hazard adaptation perspective but are not without inherent challenges and pitfalls.

The Western Australian (WA) Department of Transport (DoT) Maritime manages coastal infrastructure assets and waterways at over 35 locations along the WA coastline from Esperance in the south-east to Wyndham in the far north. In the last 10 years, maintenance dredging and coastal management works at nine locations have involved beneficial re-use of sand for nourishment of local beaches, the long-term planning and management of which has allowed a systemic view of these works across the project life cycle.

The purpose of this paper is to share practical experience and observations from managing these projects including planning considerations, inherent challenges and disadvantages of the process, and future opportunities. The paper will examine both technical and managerial aspects and approaches which it is hoped may be useful in applying across different jurisdictions to drive better outcomes. The technical aspects include beach profile design, particle size grading, and construction methods. The planning and management aspects include environmental and heritage impact assessment and management, public perception and consultation, construction costs, and coastal monitoring. The paper will further explore the benefits of collaboration between State (including interdepartmental) and Local Governments, Port

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