Case Story – Highlights

Supporting sand management along Adelaide's shoreline

Applying shoreline morphology modelling supported by 40+ years of coastal monitoring to evaluate management options

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Updated description of coastal processes based on historic data and models

Comparison of management options and associated morphological impacts

Data to support future decision making for coastal management

Challenge

Despite recent large annual backpass campaigns, localised ongoing recession of the shoreline between the Adelaide Shores boat harbour and West Beach Surf Life Saving Club has been observed. The Government of South Australia's Department for Environment and Water commissioned DHI to conduct a coastal processes modelling study to better understand the coastal processes at West Beach and to examine alternative long-term management options.

The Adelaide Metropolitan coastline comprises a discrete littoral sediment cell that extends along 30 km of the semi-protected eastern shoreline of Gulf St Vincent in South Australia. Sediment within the littoral cell is moved in a net northward direction with no significant supply of sediment provided from the south or offshore to replenish the beaches. The chronic sediment supply deficit combined with the impacts of historical coastal developments pose an ongoing challenge to the management of Adelaide's Metropolitan coastline.

Solution

A comprehensive assessment of the coastal processes and observed erosion in the West Beach sediment cell has been undertaken using a combination of analysis of existing data sets and a state-of-the-art numerical modelling framework for the modelling of long-term shoreline evolution.

Driven by MIKE Powered by DHI software, hydrodynamic (MIKE 21 Hydrodynamics Flow Model), wave (MIKE 21 Spectral Waves) and shoreline morphology (MIKE 21 Shoreline Morphology) models were developed and calibrated based on available measurements.

In total, six management scenarios comprising of combinations of soft management options (nourishment, backpass systems) and hard structures have been simulated. For each scenario, the morphological evolution of the entire West Beach shoreline has been simulated for 7.5 years providing comparative assessments of the pros and cons of each scenario.

Government of South Australia
Department for Environment and Water

'The coastal processes at West Beach are complex and previous modelling undertaken in the early 2000s was inconclusive. With the latest coastal processes modelling software and access to international supercomputers, DHI were able to quantify the littoral drift processes at West Beach and then correlate the results with the Coast Protection Board's historic beach monitoring data. The modelling of alternative management strategies was a crucial element in developing the long term coastal management strategy subsequently adopted by the South Australian government.'

Murray Townsend, Manager Coast and Marine
Department of Environment and Water, Government of South Australia

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