West Beach Coastal Processes Study

Stakeholder Presentation

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6 December 2018

Agenda

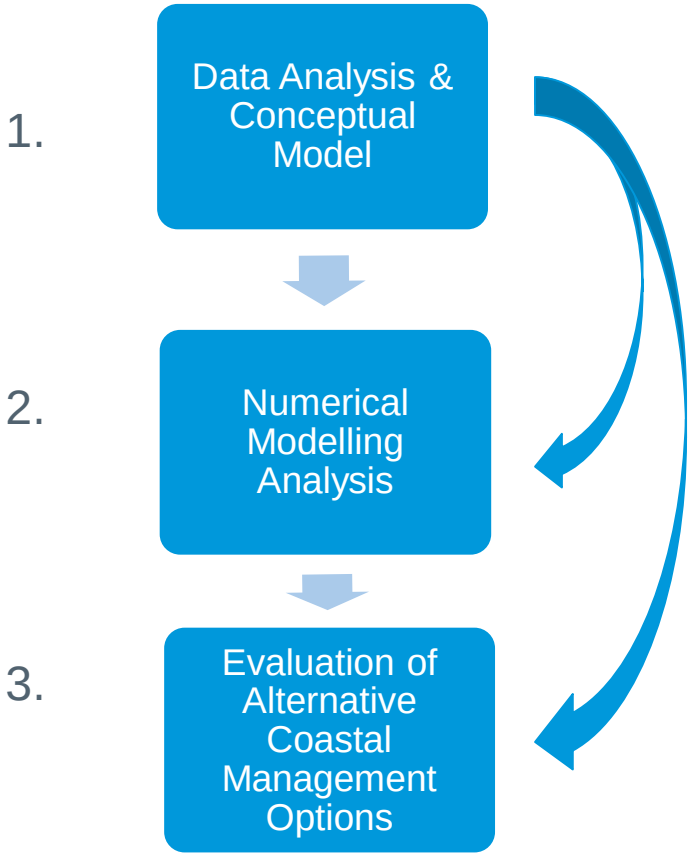
Overview of DHI Study

- Scope of Works;
- Methodology
- Findings
- Further Opportunities;

Project Scope

1. Establish a coastal sediment transport model for the area of interest at West Beach
2. Following calibration and verification of the model, examine a number of alternative coastal managment scenarios as agreed with DEW
3. Model possible design modifications to the configuration of Adelaide Shores boat harbour breakwater to minimise sand and seagrass wrack ingress
4. Prepare a final report summarising the project methodology, modelling results and recommendations.

Study Methodology

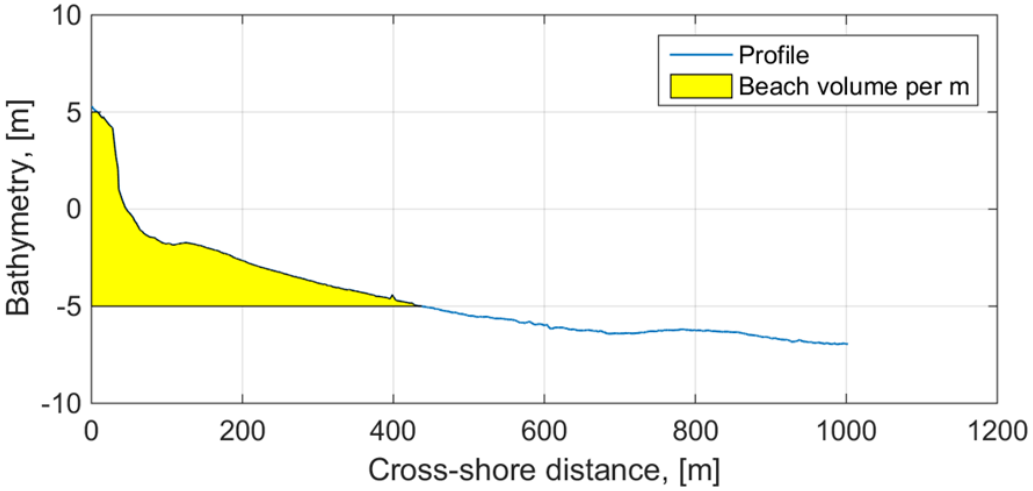


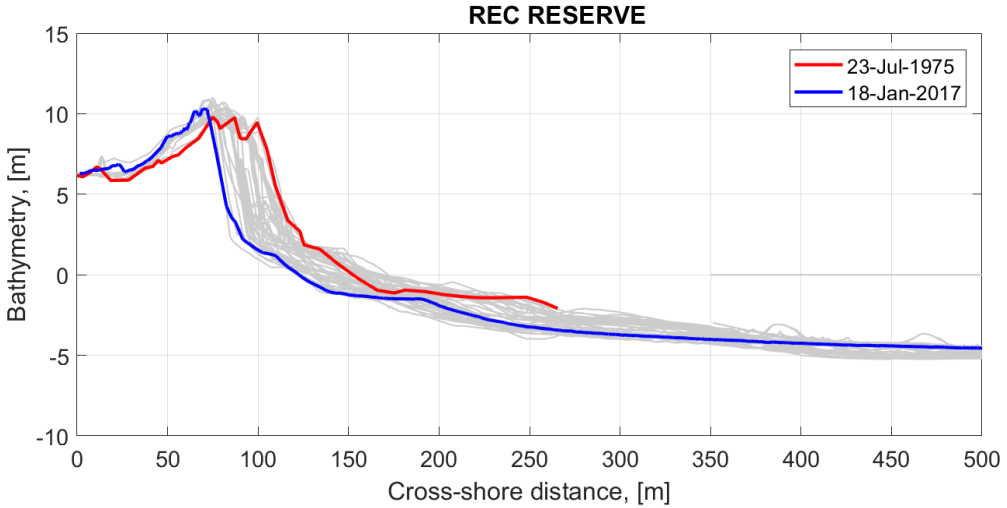
ALB Strategy Conceptual Model of West Beach

- Identified a deficit in supply of sand from the south to West Beach
- Best estimates of the longshore transport capacity at the time were ~50,000m^3/yr. (modelling uncertainty acknowledged)
- Annual backpassing from Torrens Outlet of ~50,000m^3/yr to balance the longshore transport capacity

Shoreline Profile Analysis

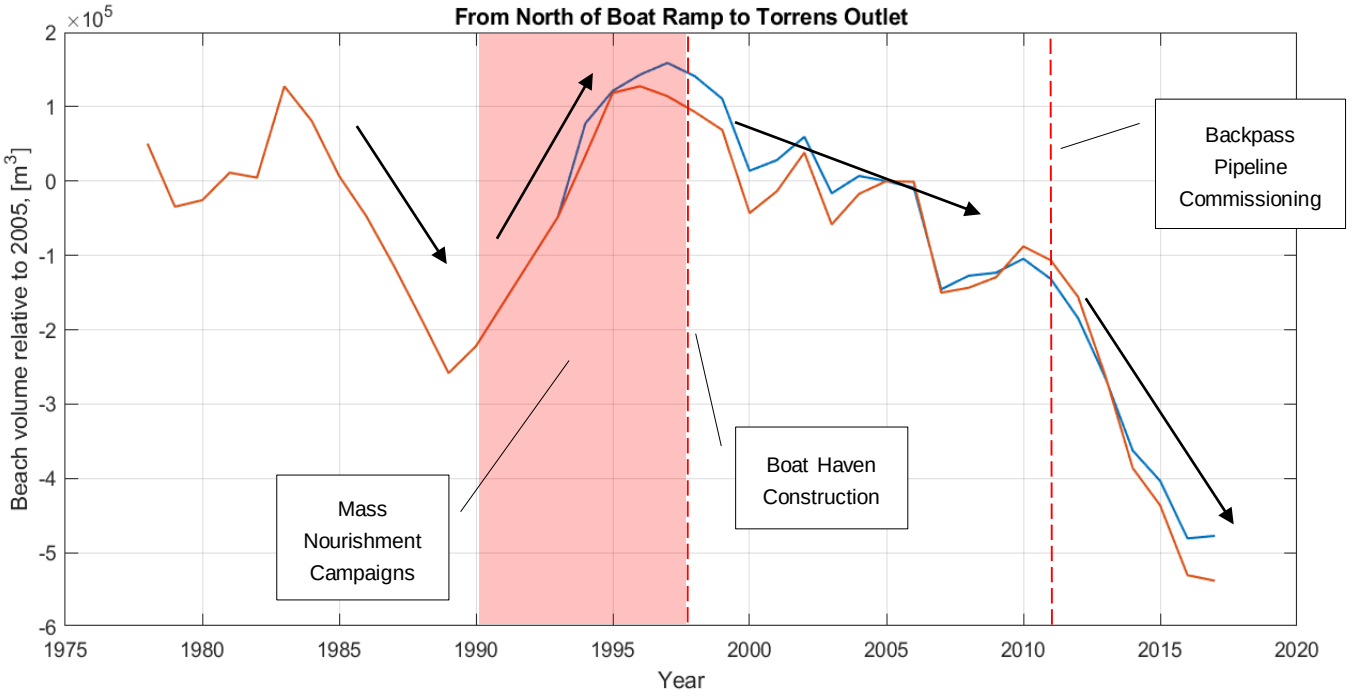
- >1000 shoreline profile surveys analysed
- Spanning 1975 to present
- Extending from Brighton Yacht Club to North Haven SLSC
- Enabled robust estimates of historical changes in beach volumes and rates of longshore transport to be derived.
- Cross referencing with historical coastal management actions and interventions enabled an updated conceptual understanding of the coastal processes of West Beach





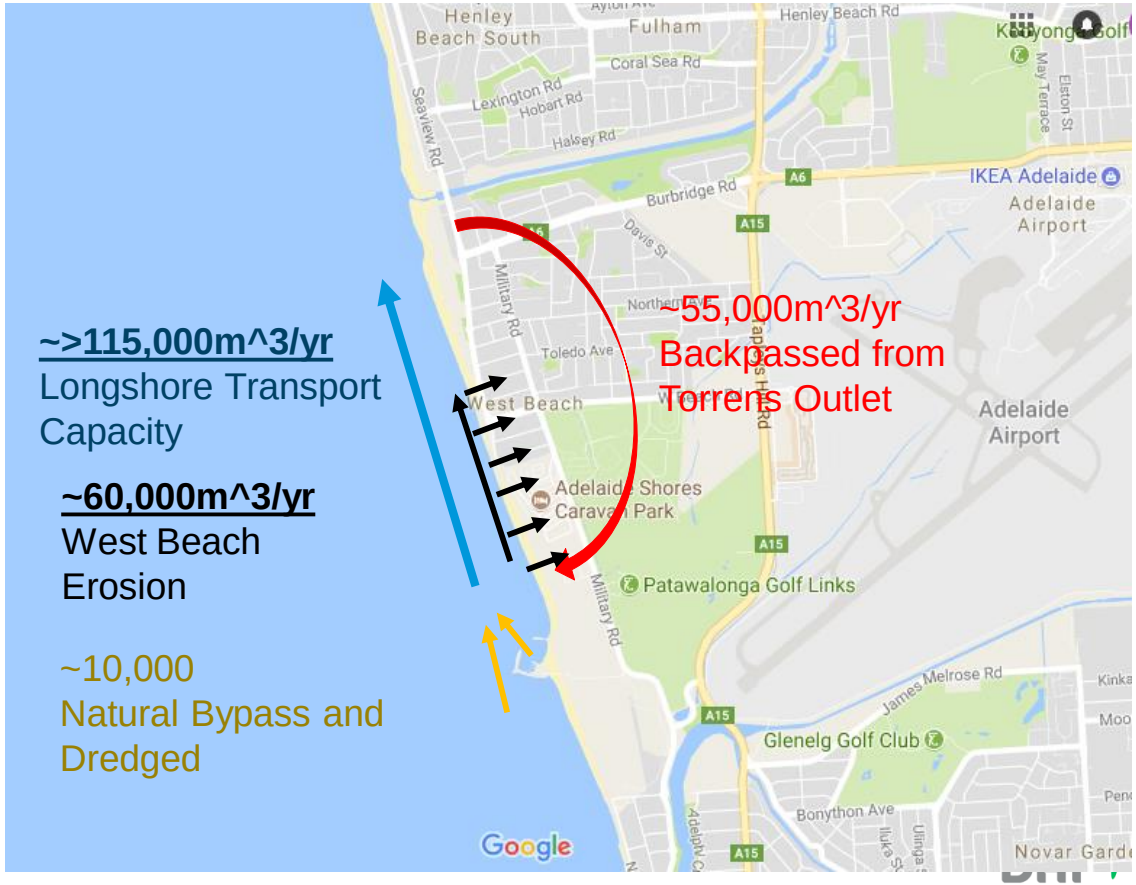
Beach Volume History of West Beach

- Significant decline mid-late 1980s
- 1M m3 mass nourishment 1990s significantly increased beach volume
- Volumes have declined continuously since late 1990s
- Total volume loss approximately 600,000m3



2011-2017 Conceptual Model of West Beach

- Longshore transport capacity is upto 2x greater than previous estimates
- The rate of erosion observed is very significant (~60,000m3/yr)
- Without the sand backpassing over this period, the rate of erosion observed would have been worse



Selection of Potential Management Options for West Beach

Principal Technical and Feasibility Considerations agreed by DEW

- Significant initial nourishment required to restore the beach volume of West Beach
- Continuing to backpass from Torrens Outlet would need additional external sources of sand
- All management options would need to provide ongoing supply of sand to downdrift Henley Beach cell that match the longshore transport capacity of 100,000m3/yr

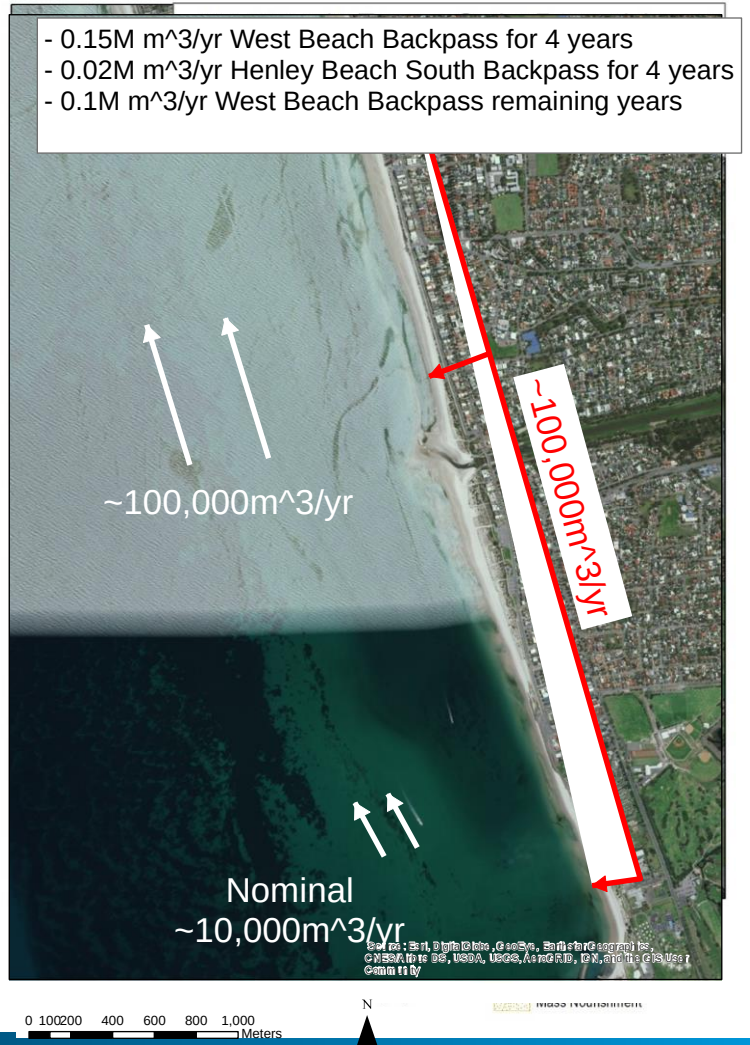
Coastal Management Options

Scenario 1 – Do Nothing

Scenario 2 – Mass Replenishment

Scenario 3 – Interim Management

Scenario 4 – Large Scale Backpassing



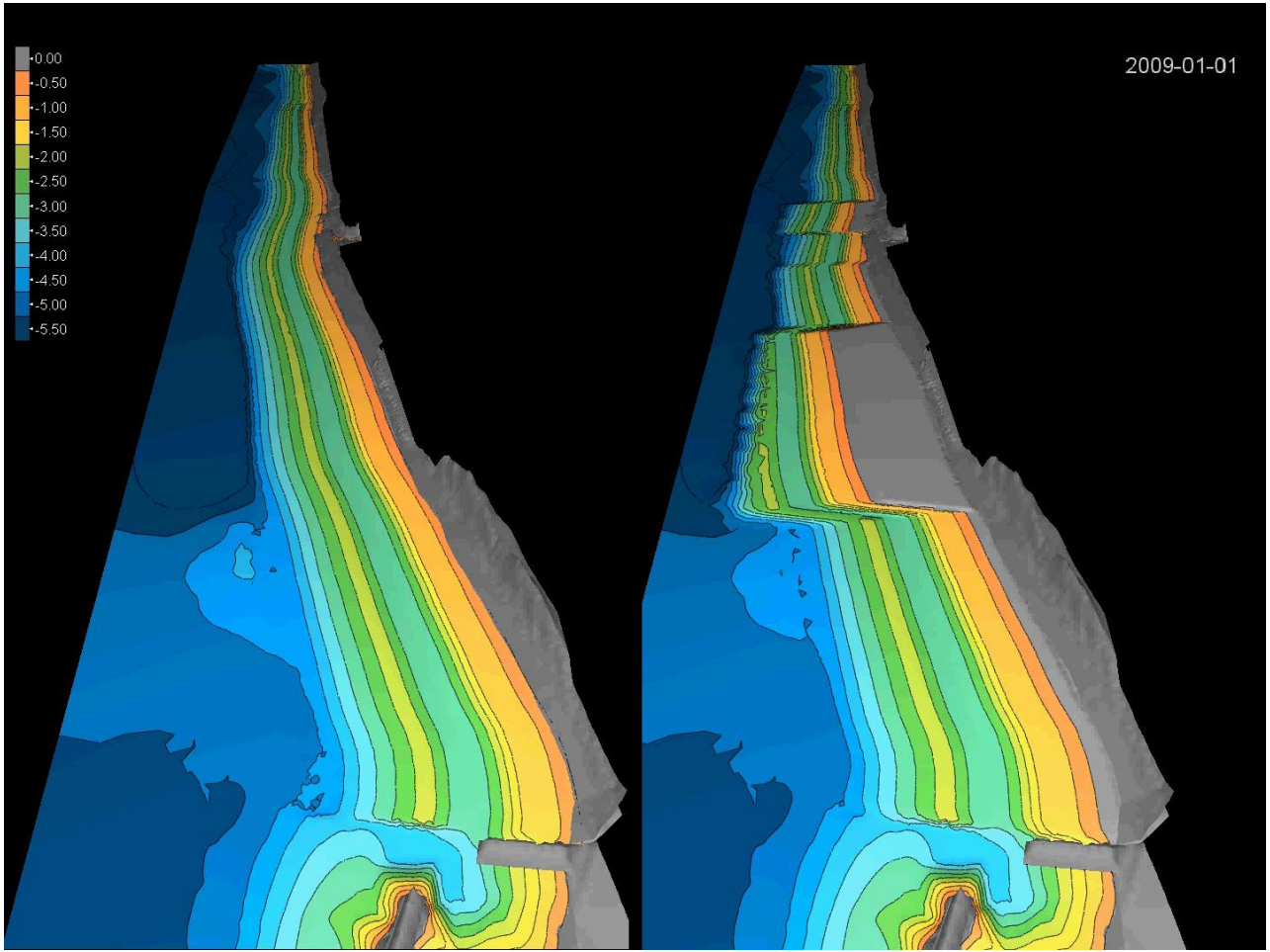
Numerical Modelling

Overview

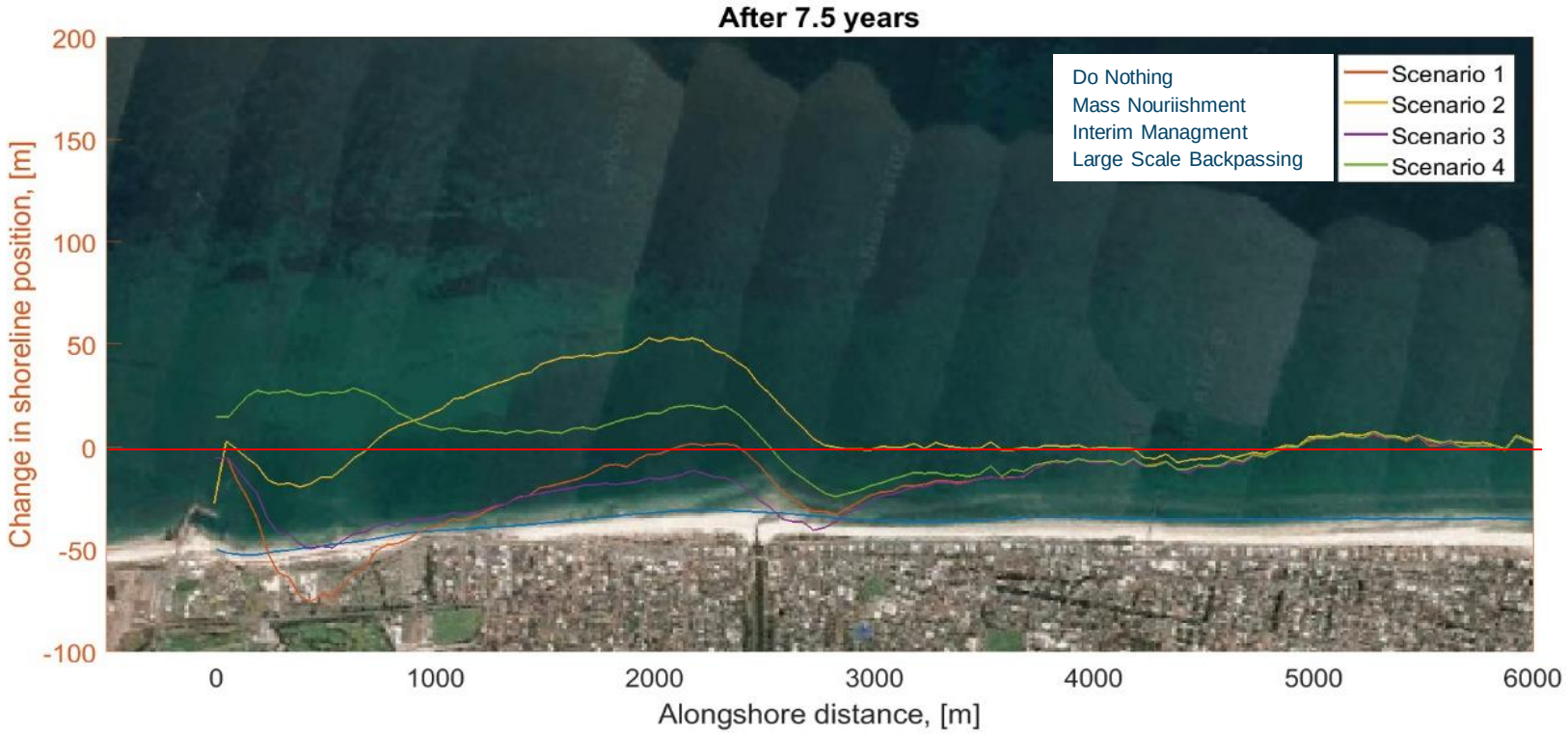
- A complex mathmatical model describing the behaviour of waves and current and the sediment transport processes of West Beach was developed
- The model was validated against the rates of longshore transport estimated from the historical shoreline profile surveys
- The model provides a predictive tool to test what if scenarios on West Beach
- The model was used to predict the response of West Beach to each coastal management option over a 7.5 year period

Do Nothing

Mass Replenishment



Coastal Management Option Results After 7.5 years



Key Findings

- A sustainable solution to the observed erosion problems at West Beach needs to include some form of long term nourishment at a rate of around 100,000 m3/yr on average; otherwise, the erosion problems will continue to worsen and migrate northwards into the Henley Beach cell.

- A mass nourishment at West Beach of around 1.5 M m3 will solve the erosion problems at West Beach and prevent erosion of Henley Beach cell for a period of at least 7.5 years. Back-passing sand from Torrens Outlet could extend the benefit of the mass nourishment solution for up to 10 years.

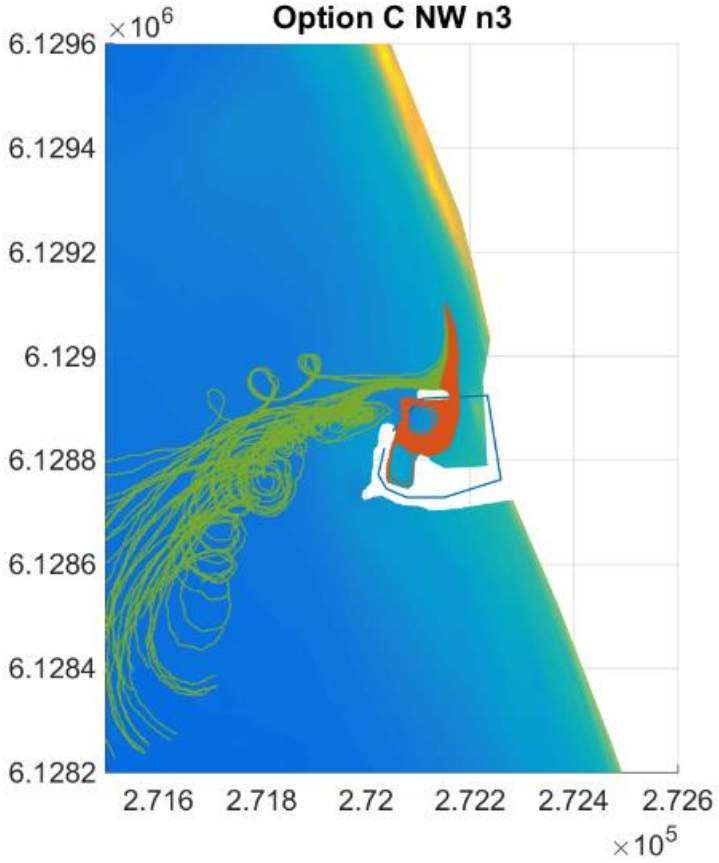
- Back-passing sand at a rate of around 100,000 m3/year from the northern sediment cells via a pumping system every year would stabilise the erosion at West Beach.

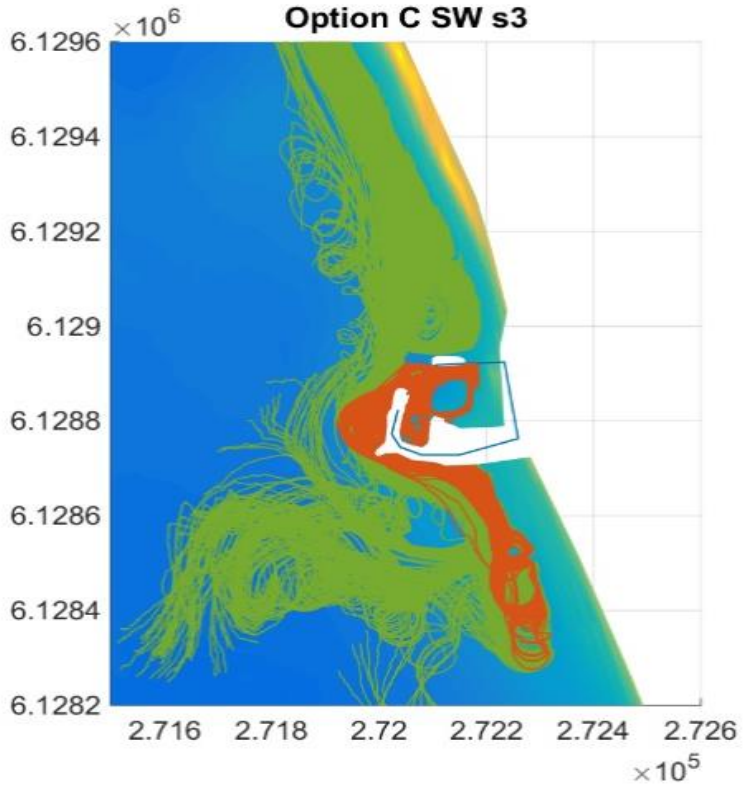
Seagrass Ingress Modelling into West Beach Harbour

Assessments of potential modifications to the Adelaide Shores boat harbour breakwaters were undertaken to limit the ingress of seagrass wrack into the harbour basin and to improve the attenuation of waves impacting the boat ramp.

Option 0: Base Case, i.e. existing conditions.
Option A: Removal of the ‘heel’ on the southern breakwater;
Option B: Lengthen the southern breakwater whilst maintain minimum 50m entrance width;
Option C: Extension the seaward end of the northern breakwater.

Seagrass Ingress Modelling





Key Findings

1. None of the options investigated are recommended from seagrass wrack intrusion perspective;
2. To test reduce the amount of seagrass wrack in the harbour, the opening between the northern breakwater and the shoreline needs to be closed
3. Option B resulted in the most significant reduction in wave heights at the boat ramp compared to the base case

Recommendations & Further Opportunities

- Further analysis of the long term mass nourishment and large scale backpassing options is undertaken to evaluate the full financial, social and environmental implications of these options.

- Further analysis of the option to close the shoreward opening of the Adelaide Shores northern breakwater to limit seagrass ingress is undertaken.

- The historical shoreline profile survey data sets of the Adelaide Metropolitan Beaches are further standardised and presented to inform all stakeholders of the status of Adelaide's Metropolitan Beaches.

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