Summary Paper

West Beach sand management – an overview of the coastal processes modelling report

September 2018

The State Government is investigating new ways to replenish sand on the shore around West Beach so we can maintain the health, resilience and appeal of one the most important parts of Adelaide's metropolitan coastline.

A detailed report undertaken by external consultants DHI on behalf of the Department for Environment and Water, the Coast Protection Board, City of Charles Sturt and West Beach Parks sets out new options for managing the beach and dune erosion at West Beach.

The report makes it clear that even if current management activities are maintained, dune erosion will continue around West Beach and Henley South, and progressively move north.

This summary paper provides brief background on past and present coastal management strategies and an overview of the options modelled for West Beach.

The Government is now determining an approach that will best meet the community's needs when environmental, recreational, practical and financial considerations are taken into account.

Background

Coastal management

Successive governments have been working with local councils since 1973 to actively manage Adelaide's metropolitan beach system – which runs 28 kilometres from Kingston Park to Outer Harbor.

The 2005 Adelaide Living Beaches strategy determined that as we essentially have one long beach with several built structures that interrupt natural sand movement, it could be more effectively managed in discrete sections or "cells". These cells were necessary because of the impact the built structures were having on sand movement. Decisions, including sand movement, are made in relation to individual cells, while still providing for the movement of sand between cells as required.

The original proposal was to provide pumping infrastructure along the entire coast, but this proved to be cost prohibitive at the time. Pumps were installed to allow sand movement within some cells, with trucks used to cart sand elsewhere.

Three things have become apparent since 2005:

1. The northward movement of sand along the middle part of our coast at West Beach is greater than previously estimated.
2. There has been a net decline in the volume of sand along the total metropolitan beach system since 2011.
3. Some cells are affected more than others.

West Beach circa 1968 (DEWNR)

West Beach 2018 (Google Earth)

Sand loss at West Beach

We define West Beach as the section of coastline running north from the West Beach boat harbour at West Beach Parks to the Torrens Outlet. This is officially known as Cell 3.

When the Adelaide's Living Beaches strategy was developed, it was estimated that sand loss from this cell was about 50,000 cubic metres (m^3)/year. Most of this is through northward movement. Very little is lost offshore.

The new modelling suggests that annual losses are between two to three times that rate, meaning that even when current replenishment activities are taken into account there is a net annual loss of 60,000 m^3.

By contrast, there has been a significant increase in sand volume between Grange and Semaphore South over the past two decades, and a large sand volume increase further north in Largs Bay.

Sand source

In each of the following options there are other possible sources of sand:

- bringing sand back from the northern cells; or
- bringing in new sand from sources outside the beach system.

External sources tend to be expensive because sand is an in-demand resource.

The nature and quality of the sand also needs to be considered. Quarry sand might not be the same as beach sand, and studies show that the sand that occurs naturally between Semaphore and North Haven is finer and has a higher carbonate content than the native sand further south.

Options for action

The modelling for each of these options was based on a timescale of 7½ years. A fourth option - do nothing - was considered, but does not help the situation.

Option 1: Mass replenishment

Importing
1.5 TO 1.8 million
cubic metres of sand

The first option is to immediately import in 1.5 to 1.8 million m³ of sand. The modelling suggests such a mass replenishment would solve the erosion problems at West Beach and prevent erosion at Henley Beach for at least 7½ years.

The modelling also suggests that this could be extended to 10 years by also back-passing sand from the Torrens Outlet to the south end of West Beach each year. A sustainable solution could therefore be to mass nourish West Beach with around 1 million m³ of sand every 10 years, with annual back-passing.

This is the most expensive option and it is unclear whether sand is available in such volumes. It is certainly considered unrealistic that over 1 million m³ could be taken from northern cells without unacceptable impacts. Sand deposits from outside the beach system are an option, but these need further investigation and may be better used to increase the amount of sand on our beaches to meet the challenge of rising sea level.

Option 2: Interim management

The second option has three parts: bring in around 100,000 m³ of sand for immediate replenishment of Torrens Outlet and Henley Beach South; extend the West Beach rock revetment (sea wall) along West Beach Parks dunes; and bring in an additional 30,000 m³ before each summer to create a seasonal beach in front of West Beach Parks.

This is the lowest cost option. Modelling suggests it would be neither sustainable nor effective in the medium term.

Significant erosion is likely at Henley Beach South after four years and at West Beach after 7½ years. In addition, while the extended sea-wall may be effective in reducing erosion of the dunes at West Beach, it would result in the almost permanent loss of the beach.

bring in **100,000 cubic metres of sand**
for replenishment at Torrens Outlet and Henley Beach South

Extend the West Beach **rock wall**
along West Beach Parks dunes

bring in **30,000 cubic metres of sand**
each summer to create a seasonal beach

Option 3: Ongoing replenishment

For the first four years move
150,000 cubic metres of sand per year
to West Beach *and*
20,000 cubic metres of sand per year
to Henley Beach South

For the remaining 3½ years move
100,000 cubic metres of sand per year
to West Beach

Option 3 is an increased level of ongoing replenishment. The proposal, as modelled, is to:

- for the first four years, move 150,000 m³/year to West Beach to provide an increase in the sand volume in Cell 3 of around 200,000 m³ and move 20,000 m³/year to Henley Beach South to compensate for ongoing erosion.
- for the remaining 3½ years, move 100,000 m³/year to West Beach to match the sand loss from this area.

Sand could either be sourced from outside the beach system (which will need further investigations to identify), or could be back-passed from northern cells. Here there are two options.

Option a - The first is to continue trucking sand, which would probably cost about the same amount as external sand.

Option b - A longer-term option is to install infrastructure for pumping sand from north to south. While this would involve a significant upfront cost, increasing the total cost over the 7½ years used for the modelling, it would prove cost-effective over the expected 25-year life of a pumping system.

Pumping has the advantage of keeping trucks off the road, but both methods involve some annual disturbance for beach users as sand is transported.

For the full technical report visit www.environment.sa.gov.au/coasts