

Moana beach

Coastal Adaptation Study

Assessing the coastal impacts of rising sea levels

What did the study investigate and why?

Changes in our climate are causing sea levels to rise over the long term. The aim of the Coastal Adaptation Study was to understand how people, the natural environment and built assets might be impacted by rising sea levels. This information will help council and other stakeholders, such as state government and private landowners, to plan and take action for the future. The study was undertaken by consultancy Integrated Coasts with input from Flinders University coastal experts.

The study is just another step in an ongoing journey of adaptation that is likely to take place over the coming years, decades, and even centuries. Our next step is to engage with our communities and develop a Coastal Adaptation Plan that responds to the identified risks and lays the groundwork for effective coastal management now and into the future.

The City of Onkaparinga has already completed extensive coastal adaptation work over previous decades. Our long history of proactive coastal adaptation means that we have built a solid foundation upon which to respond to future coastal hazards and climate risks.

What is coastal adaptation?

Coastal adaptation involves adjusting our practices in response to the impacts of our current and expected climate. This means identifying actions to manage our coastline that provide benefits across many sectors (e.g. safety, tourism, health, environment and recreation). It also means avoiding things that would make it more difficult to cope with coastal hazards and climate risk in the future.

There is a range of potential adaptation options available in the areas of planning, engineering, environmental management, and community awareness and education.

Onkaparinga's coastline is of significant cultural, social, environmental and economic value to the Kurna people, our wider communities and visitors.



Cell: 06 Moana beach

What were the focus areas of the study?

Onkaparinga's coastline was divided into 12 sections or coastal 'cells', with a separate report prepared for each cell. This fact sheet summarises the key findings for the Moana beach cell.

There are fact sheets available for the other 11 coastal cells. There is also an 'About the project' fact sheet explaining the study and its overall findings in more detail.

How has each cell been studied?

The study investigated the current and future risks (for now, 2050 and 2100) to built assets, people and ecosystems located along Onkaparinga's coastline in the context of projected global sea level rise. A range of data was gathered to inform the analysis.

The nature of the coastline was analysed, for example, whether the coast is sandy or rocky, or whether it is at low elevation or high elevation.

The history of each cell was evaluated to see how the coast in that area has changed over time and how people have interacted with it in different time periods.

The impacts of various storms and tides have been modelled using a 3D computer model to assess current risks and also the future risks associated with sea level rise. The study has adopted South Australian Coast Protection Board sea level rise policy projections for a 0.30m rise by 2050 and a 1.00m rise by 2100, which the board believes is based on the best available advice, including advice from the Intergovernmental Panel on Climate Change.

Studying past storms provides a window into the future.

The impact of previous storms was studied, including the storm of 9 May 2016, which was the highest storm on record in Gulf St Vincent. This storm was significant because it almost reached the risk level set by the South Australian Coast Protection Board known as the 1-in-100-year extreme event.

Taking into account current risks from actions of the sea and the risks from projected sea level rise, the study has evaluated the risks to public assets, private assets, public safety and the potential for disruption to ecosystems.

For example, a low-lying freshwater ecosystem would be disrupted if sea water flowed into the area.

*Pedler Creek outlet,
Moana beach,
South Australia, 1933*



Historical comparison

We compared aerial photographs of Moana beach from 1949–2018 to measure how much the coastline has moved and changed. Where available, we also used older land-based photography to assess changes to the coast. For example, the photos below show that the soft sediment dune backshores have been modified to hard surfaces.



Moana beach 1929



Moana beach 2020

Historical analysis demonstrates cycles of erosion and accretion. Human interventions are also observed.



The foreshore layout was changed in the 1990s and dunes installed to the foreshore. Moana 1989.

What past storms tell us

At Moana, the 9 May 2016 storm had a significant impact on the seawall. Water flowed through the gaps in the wall leaving a trail of seaweed debris and flowed up the ramps and stairs in front of the Moana Surf Life Saving Club which required sandbagging at its entrances. Water flowed up Pedler Creek and caused minor flooding on Nashwauk Terrace.



Cliff and walkway collapse 4 July 2007



Storm impact 9 May 2016

Forecast impacts

Example: the flood event of 9 May 2016 was close to what is known as a 1-in-100-year extreme event. If seas rise as projected by 2100, events like this are likely to occur every month. Extreme events in 2100 would be likely to flood Pedler Creek and the caravan park in a similar pattern as depicted. The sand dunes would also be likely to erode.



Moana beach extreme event 2020



Pedler Creek extreme event 2100

Key findings for Moana beach

MOANA (north of Pedler Creek)

Moana beach (north) is a sandy beach backed by a seawall and foreshore development. Further north, a steep earthen embankment is situated under the upper carpark. Offshore is dominated by sand with a low-profile reef. The position of the backshore has been controlled by the installation of carparks and a seawall. The storm of 4 July 2007 impacted the embankment under the carpark causing it to slump. Sandbags and rock have been placed at the base to slow any further erosion, but the storm of 9 May 2016 dislodged some of the sandbags. Sea flood modelling for 2050 shows impacts on the seawall, along with waves flowing onto the foreshore area. Ongoing actions of the sea adjacent to the seawall is likely to cause sand levels to drop on the beach. Sea flood modelling for 2100 indicates that the current layout of Moana foreshore is very likely to be vulnerable, and consideration will need to be given to adaptation options.

MOANA (south of Pedler Creek)

Moana beach (south) is a sandy beach backed by a shingle ridge, and sand dunes behind the ridge. Positioned behind the sand dunes is Moana Sands Conservation Park and further south is a residential settlement. The nearshore and surf-zone are dominated by sand, with an offshore low-profile reef most dominant at the southern end near Ochre Point. The beach undergoes a normal cycle of accretion (when the shoreline builds out) and erosion (when the shoreline recedes). Overall, the vegetation line south of Moana Creek has receded by about 4m. The storm of 9 May 2016 did impact the back of the beach but this has rebuilt. Modelling for 2050 indicates minor recession of the backshore is likely. Modelling for 2100 indicates that both extreme events and routine monthly highwater events are likely to cause rapid recession of the shingle ridge and dunes.

PEDLER CREEK

Moana beach is dissected by Pedler Creek just south of the Moana beach foreshore area. A detention pond system has been installed on the eastern side of Commercial Road that controls stormwater flows from the upper catchment areas. A comparison of aerial photographs from 1949 reveals that Pedler Creek has remained largely unchanged. The storm event of 9 May 2016 resulted in seawater flowing up Pedler Creek approximately 500m and also flowing up stormwater piping, resulting in minor flooding on Nashwauk Terrace. Modelling of current 1-in-100-year storm events does not show flooding of the caravan park or any other urban infrastructure. However, whether stormwater and storm surge flows may occur together, requires further investigation. The modelling for 2050 indicates potential flooding of the caravan park and inundation of Moana Crescent. It also indicates that inundation is likely at Nashwauk Terrace at low heights (0.3m). The scenario modelling for 2100 depicts flooding at depths of 0.7m to 1.0m over the caravan park.

Key adaptation issues for Moana beach

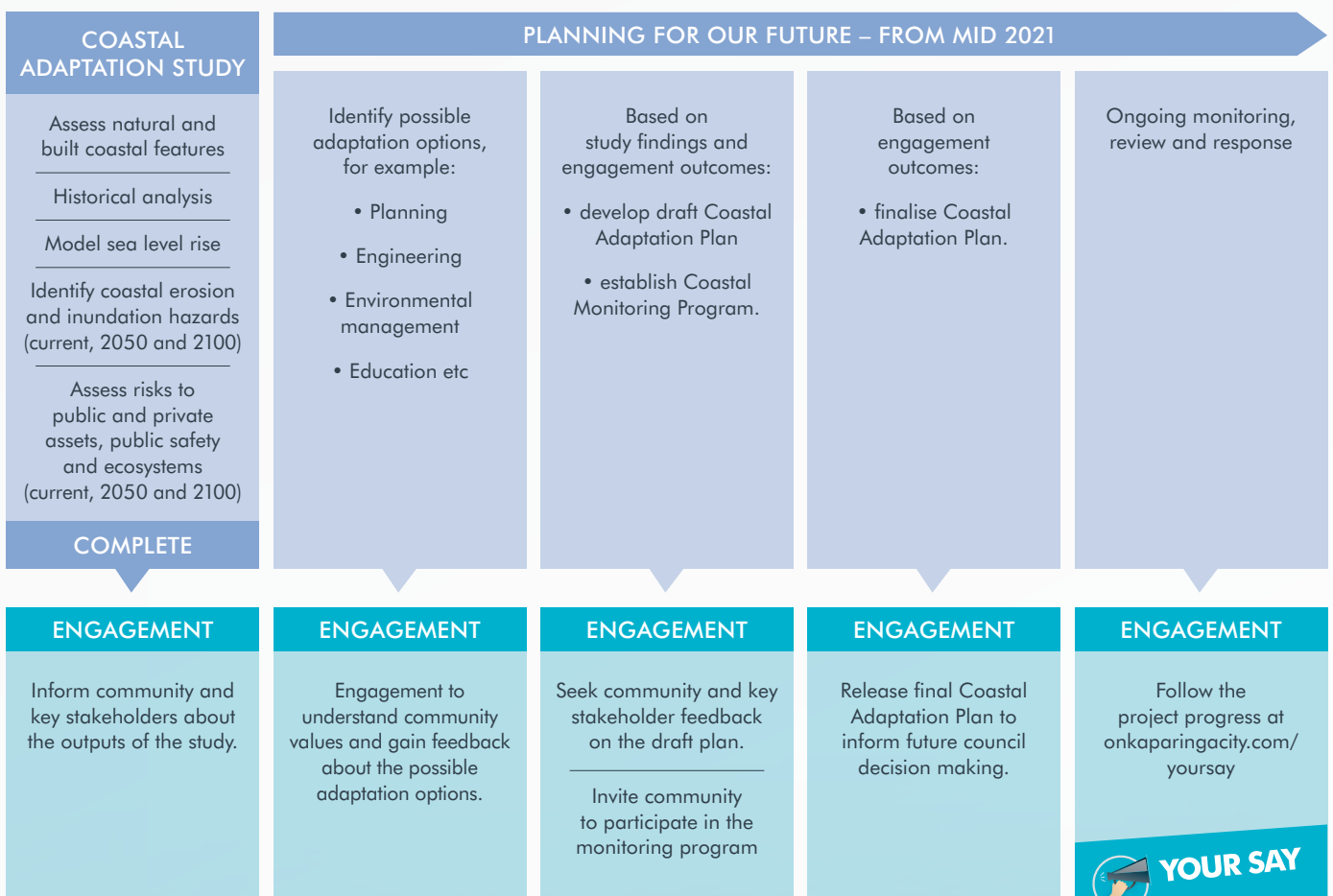
IF SEAS RISE AS PROJECTED:

- public assets such as the foreshore area and associated carparks are likely to be vulnerable in their present layout after 2050. The caravan park and sections of Moana Crescent and Nashwauk Terrace may be increasingly vulnerable to inundation by 2100. Any new assets, such as the Coast Park Trail, should be designed for future conditions
- private assets that are set behind Esplanade will not be impacted by rising sea levels. However, modelling shows some private assets on Nashwauk Terrace may be vulnerable to flooding by 2100
- freshwater ecosystems are not expected to be significantly impacted by seawater flows due to the elevated nature of the backshore. Modelling indicates that seawater will not flow much further upstream within Pedler Creek nor is it likely to flow into Moana Sands Conservation Reserve
- increased sea flooding into the lower reaches of Pedler Creek may increase public safety issues, however the speed at which sea flooding flows is much less than riverine flooding.

Next steps

Now that the study is complete, we'll be engaging with our communities and developing a Coastal Adaptation Plan that responds to the identified risks and lays the groundwork for effective coastal management now and into the future.

COASTAL ADAPTATION PLANNING AND ENGAGEMENT PROCESS



More information

To learn more about the Coastal Adaptation Study visit yoursay.onkaparinga.sa.gov.au/coastal-adaptation-study, email mail@onkaparinga.sa.gov.au or phone 8384 0666.



The Coastal Adaptation Study was delivered by Integrated Coasts with input from Flinders University coastal experts.

Historical photos courtesy of Onkaparinga Libraries

Disclaimer

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