FACT SHEET

CELL: 04

Port Noarlunga

Coastal Adaptation Study

Assessing the coastal impacts of rising sea levels

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

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.

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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 Port Noarlunga 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.

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.

Boating on the Onkaparinga River at Port Noarlunga, South Australia, circa 1940.

Historical comparison

We compared aerial photographs of Port Noarlunga from 1949–2018 to assess how the coastline has moved and changed. For example, there has been little change to the sand dunes at Port Noarlunga and South Port over a fifty-year period. Comparisons of historical photographs demonstrate that the sand spit at Port Noarlunga and South Port has been largely stable over a fifty-year period.

Where available, we also used land-based photography to make comparisons to assess how the coast has changed over time and how humans have intervened in the past. For example, the former dune system at Port Noarlunga was replaced with concrete and stone walling in the 1960s. In previous times, the coast was more flexible and able to adapt to changing climate systems and rebuild after storms.

Port Noarlunga coastline in 1922 was a flexible dune system.

Port Noarlunga coastline in 2020 has an inflexible backshore.

Forecast impacts

Example: modelling of an extreme event projected for 2100 shows the potential impact on the seawall. As the photograph of the storm of 9 May 2016 shows, the real-life experience of a sea storm event is different than the modelling depicts, especially in the context of an increase of sea level by 1.00m.

2100
Port Noarlunga extreme event

What past storms tell us

Studying past storms provides a window into the future. The storm of 9 May 2016 had a significant impact in the Port Noarlunga region, both on the foreshore and within the Onkaparinga River.

Sue Bennett, 9 May 2016

Port Noarlunga lifesavers at the beach, Port Noarlunga, S. Aust., 1937.

Key findings for Port Noarlunga

The Port Noarlunga beach near the jetty is characterised as a sandy beach backed by seawalls and a formal promenade. It is backed by a small dune field in front of the Esplanade to the south and significant sand dunes further south towards the mouth of the Onkaparinga River. Offshore is dominated by sand and a reef that runs parallel to the beach.

A substantial dune system was formerly situated in the vicinity of the jetty, which was replaced with an inflexible backshore when the sloping concrete seawalls were installed. Sand levels are lower in this area than other sections of the beach. A comparison of aerial photography demonstrates that the coastline south of the jetty undergoes cycles of accretion (when the shoreline builds out) and erosion (when the shoreline recedes) that takes place over decades. Overall, this section of coast has been very stable over a 70-year period.

When thinking about our current risk, photographs of the storm of 9 May 2016 provide an insight into the likely impact of the 1-in-100-year extreme event for Port Noarlunga. By 2050, modelling shows that seawater is unlikely to flow over the seawalls and dunes, but sand levels are expected to decrease in front of the seawalls and the dunes are expected to suffer minor recession. If seas rise as projected in the latter part of this century, then the modelling shows significant undermining of the seawalls would be likely and extreme events and routine highwater events would be likely to cause significant recession to the dunes in the vicinity of the Esplanade and to the south towards the mouth of the Onkaparinga River.

Storm of 9 May 2016, Port Noarlunga jetty, Ray Palmer.

Onkaparinga River, Sue Bennett. 9 May 2016

Key adaptation issues for Port Noarlunga

IF SEAS RISE AS PROJECTED:

- public assets such as the sea walling, promenade including buildings, and the Esplanade are likely to come under increased threat from actions of the sea after 2050
- private assets are not expected to come under threat over the course of this century because they are set back behind the Esplanade
- freshwater ecosystems will not be impacted due to the elevated nature of the backshore
- increased overtopping of the jetty and promenade is likely to increase risks to public safety.

Key findings for Onkaparinga River

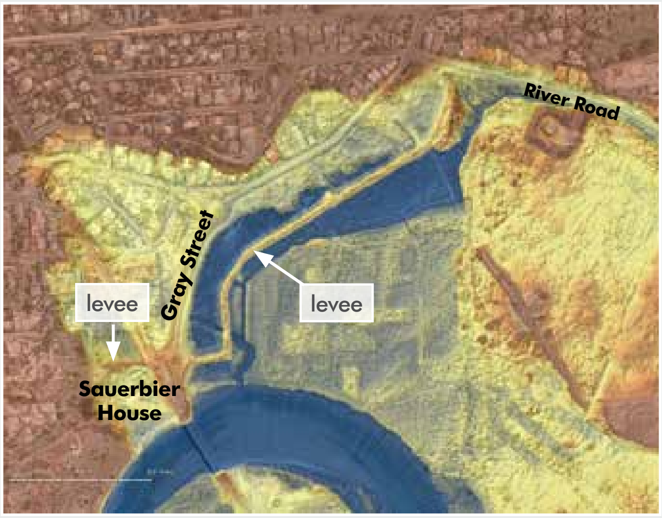
South of the Onkaparinga River footbridge, the river takes its last turn towards the west. Cliffs south of the Onkaparinga River footbridge are subject to the erosive forces of riverine, tidal estuarine, and surface runoff flows. Close to the footbridge, cliff recession occurred between 1949 and 1979. Further south, a mass slide movement of softer material occurred between 1949 and 1979. Rock falls and recession have occurred on the southern portion of cliffs. Council has collapsed unstable sections of cliffs by blasting or mechanical means in the 1990s. Rock has been installed to the base of the limestone cliffs, first in the 1980s and then in 2000s.

North of the South Port footbridge, the river takes a wide sweeping turn under Saltfleet Street bridge. In higher tides, water flows into the floodplain on the north of the river. A levee system was constructed in the 1970s from River Road in the east and which culminates behind Sauerbier House in the west, primarily to protect the township from riverine flooding. Seawater flows under the levee through pipes and fills up the area adjacent to Gray Street. The terrain map depicts the main features of the levee system, surrounding land heights and approximate flow paths of seawater.

The focus of this project has been to consider the impact of sea level rise in the Onkaparinga River and its associated impact on the township of Port Noarlunga. We have not considered the possibility of a combination of a significant rainfall event and a very high tide or significant storm event.

Since settlement, there have been numerous floods of the Noarlunga district. Six have been since the construction of the Mount Bold Reservoir in 1938, but the heights of the floods have been lower. Three floods have occurred in the absence of a high tide, although it is accepted that a higher tide will exacerbate flooding.

This section of cliff was collapsed by council in the 1990s. The photo dates from the 1980s (Source: Unknown).



Example terrain map: Blue represents current seawater flow paths, yellow represents lower lying areas and brown represents higher elevations.

The event of 9 May 2016 (the highest sea flood on record in Gulf St Vincent) flowed over Saltfleet Street and into the Jubilee Playground. Seawater also flowed into the carpark north of Saltfleet Bridge.

South Port footbridge, Ben Tazer, 9 May 2016

Saltfleet Street, Ben Tazer, 9 May 2016

Modelling shows that the current levee system is likely to protect most of the Port Noarlunga township from storm surge events from the ocean (excluding rainfall events) until 2070. Modelling of the 2050 extreme event risk does not penetrate the levee system, but the modelling indicates seawater would flow into the grounds of Sauerbier House. Modelling for the 2100 extreme event shows significant potential inundation of the Port Noarlunga township with water over roads, possibly up to 1.10m deep, the deepest point being at the main roundabout on Gawler Street at a depth of 1.60m. Further investigation is required to ascertain if such a flood would flow onto River Road.

These findings are based on the flood mapping for the event of 9 May 2016, which represents the current risk, and for 2050 and 2100 risk in the context of projected sea level rises of 0.30m and 1.00m respectively. It is important to remember when viewing the flood modelling that these are rare events.

Key adaptation issues for Onkaparinga River

IF SEAS RISE AS PROJECTED:

- public assets such as roads, playgrounds and carparks are likely to be increasingly flooded. After 2050, sea floods are likely to flow further inland, such as into the grounds of Sauerbier House. The current levee system protects most of the township until 2070
- private assets are primarily protected by the levee system. However, after 2070 flood waters are projected to rise over the levee, and possibly sooner if a sea storm was combined with a significant rainfall event
- increasing flows of seawater will flow over and into freshwater ecosystems, which will likely cause significant disruption to these ecologies
- increased frequency and depth of flooding is likely to increase risks to public safety, although the speed of the flow from the sea is relatively slow.

Three boys at Port Noarlunga sand hills, Port Noarlunga, S. Aust., 1930s.

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.

THE COASTAL ADAPTATION PLAN WILL BE INFORMED BY WORK ALREADY UNDERTAKEN INCLUDING:

- designs to upgrade the rock walling and infrastructure at the end of Wearing Street to manage sea level rise and storm impacts
- investigations for a sea-flood levee positioned on Gray and Gawler streets to manage sea level rise and flood impacts to 2100.

COASTAL ADAPTATION PLANNING AND ENGAGEMENT PROCESS

COASTAL ADAPTATION STUDY

Assess natural and built coastal features

Historical analysis

Model sea level rise

Identify coastal erosion and inundation hazards (current, 2050 and 2100)

Assess risks to public and private assets, public safety and ecosystems (current, 2050 and 2100)

COMPLETE

ENGAGEMENT

Inform community and key stakeholders about the outputs of the study.

PLANNING FOR OUR FUTURE – FROM MID 2021

Identify possible adaptation options, for example:

- Planning
- Engineering
- Environmental management
- Education etc

ENGAGEMENT

Engagement to understand community values and gain feedback about the possible adaptation options.

Based on study findings and engagement outcomes:

- develop draft Coastal Adaptation Plan
- establish Coastal Monitoring Program.

ENGAGEMENT

Seek community and key stakeholder feedback on the draft plan.

Invite community to participate in the monitoring program

Based on engagement outcomes:

- finalise Coastal Adaptation Plan.

ENGAGEMENT

Release final Coastal Adaptation Plan to inform future council decision making.

Ongoing monitoring, review and response

ENGAGEMENT

Follow the project progress at onkaparingacity.com/yoursay

YOUR SAY

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**.

Integrated Coasts

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

Historical photos courtesy of Onkaparinga Libraries