Inverloch Region Coastal Hazard Assessment

Inundation Report Summary October 2022

Improving our ability to plan, manage and prepare for the impacts of coastal hazards between Cape Paterson and Cape Liptrap, delivered as part of the Cape to Cape Resilience Project

The Inverloch Region Coastal Hazard Assessment was undertaken to increase our understanding of the coastal processes in the Cape to Cape region, including assessing the potential for coastal flooding along our low lying coastal areas.

Coastal inundation is when sea water rises high enough that it floods the land next to the coast.

This summary shares key findings from the Inundation Hazard report by Water Technology. It is one of seven reports from the Coastal Hazard Assessment. Refer to the full report for more details.

The report describes the drivers and potential impact of coastal inundation into the future. It also describes the impact of climate change on coastal inundation.

Computer models were used to help understand the coastal inundation hazard in the Cape to Cape region.

Models were based on the following scenarios.

Table 1. Scenarios modelled to determine inundation hazard zones

Sea level rise	Year	Ocean storm events
Nil	2020	1%, 5%, 10 % AEP
0.2m	2040	
0.5m	2070	
0.8m	2100	
1.1m	2100	
1.4m	2100	

AEP: Annual exceedance probability is the probability of a storm event occurring in any given year.

Coastal Inundation Processes

Flooding and inundation can result from increased water levels driven by coastal processes (wind, waves, tides, currents) or catchment (land) processes (rainfall, flooding).

Coastal water levels are determined by a range of different conditions. The list below shows the conditions that were assessed as part of the investigation.

- Sea levels
- Astronomical tides (tides)
- Wind setup (wind on the water surface)
- Wave setup (waves breaking on a shoreline)
- Air pressure
- Storm surges
- Extreme offshore water levels (storm tide)
- Catchment processes (water flow)

The different water levels and components which make up the total water level are shown in the diagram below.

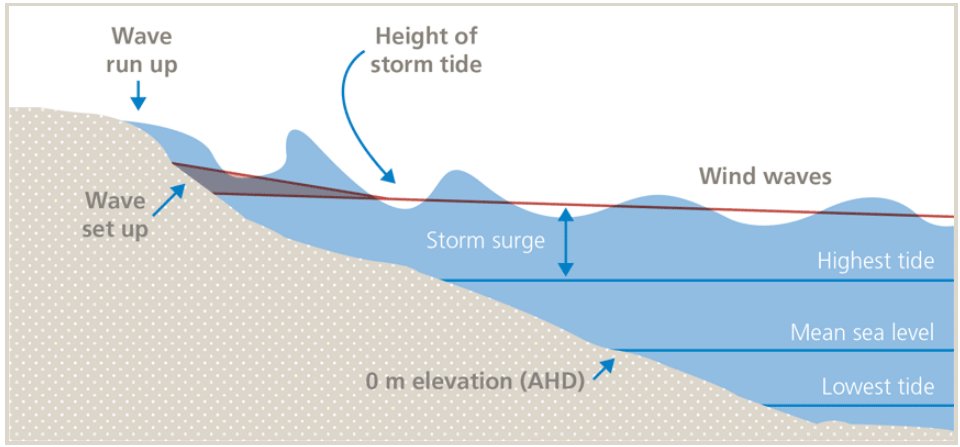

Figure 1. Diagram showing the components which make up the total water level

Methods used to determine coastal inundation

The following methods were used to assess the different exposure environments within the area:

Open Coast
Storm tides + wave setup

Anderson Inlet
Catchment inflows + offshore storm tides

Inverloch township
Catchment inflows + rainfall + storm tide tailwater

Inverloch Region Coastal Hazard Assessment

Findings: Open Coast

Coastal inundation on the open coast (Bunurong Road pocket beaches, Flat Rocks to Point Norman and the Venus Bay coastline from Point Smythe to Cape Liptrap) is caused by the elevated coastal water level and wave energy running up or overtopping the dune.

To establish the maximum water level, a model was used to simulate storm conditions across the local beach profile.
The maximum total coastal water level varied across the Cape to Cape area with exposure to waves and dune topography (shape and height).

Findings: Inverloch township

Flooding within Inverloch from direct coastal inundation is limited to the low lying areas (at or near sea level) around Screw Creek and Wreck Creek where there is also limited stormwater drainage.

The Ayr Creek catchment is steeper with limited low lying areas, which means that there are fewer areas exposed to coastal flooding. Localised flooding can occur within the town where the elevated coastal water levels prevent the free drainage of the stormwater system. This is particularly evident around Wreck Creek where the land is flatter and stormwater drainage is limited.

Flooding as a result of elevated coastal water levels is also observed around the Inverloch Jetty and Boat ramp and Screw Creek / Broadbeach estate.

Prediction of future flooding associated with Wreck Creek is complex. Currently, the dunes protect the backshore areas from direct coastal inundation but ongoing existing erosion and predicted future erosion will likely reduce or completely remove these dunes allowing direct inundation to occur.

Findings: Anderson Inlet

Coastal inundation within Anderson Inlet is caused by the offshore elevated water levels (storm tides) driving higher water levels into the inlet at the entrance and the catchment flow from the Tarwin River (and Pound Creek) flowing into the upstream end of the Inlet. Strong westerly winds can cause increased water levels in the east of the inlet.

For most of the inlet, there is less predicted inundation except for the area between Tarwin Lower and Venus Bay. In this area the inundation extent under existing sea level significantly increases between the three scenarios.

The amount of time the water will take to drain away depends on how long the storm tide lasts. This is generally only a period of hours, not days. Flooding caused by the overtopping or backflow around levees (embankments built to prevent the overflow of a river) may take longer to drain off the catchment.

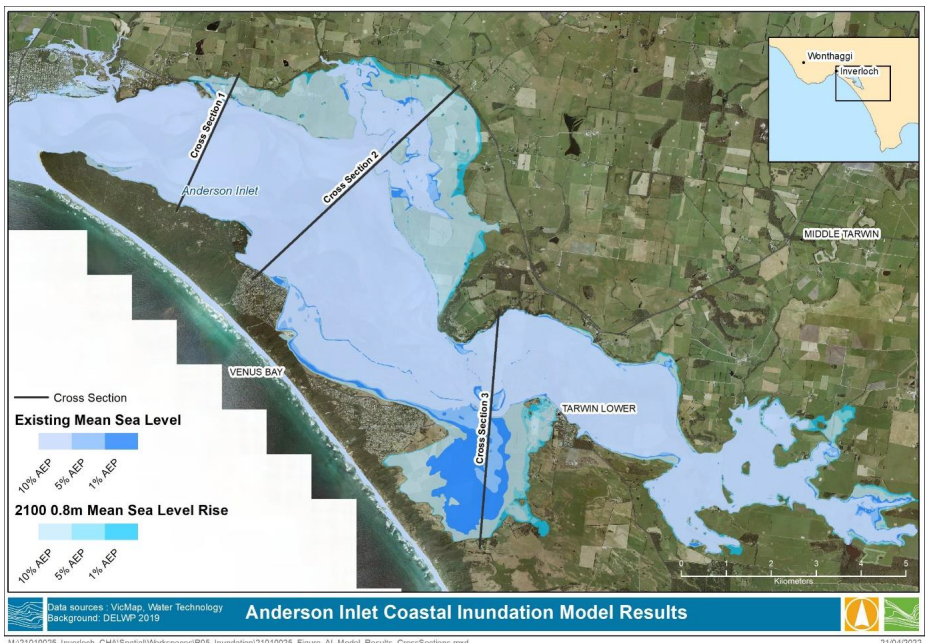

Figure 2. Image showing Anderson Inlet coastal inundation model results

Hazard maps showing inundation hazard zones are available on the Cape to Cape Resilience Project webpage.

Note: The coastal inundation hazards presented in the mapping show hazard zones, not a predicted future flood event.

Summary of Findings: Inundation Hazard

This investigation has provided us with a better understanding of the factors that influence coastal inundation and the potential extent of flooding in the Cape to Cape area. Coastal inundation is driven by elevated tidal levels from the ocean, combined in some locations with runoff from the catchment. The catchment to Anderson Inlet is extensive and inflows from the Tarwin River can cause widespread flooding without the addition of elevated coastal waters. Tidal levees within Anderson Inlet are unlikely to be enough to prevent flooding during combined future coastal and catchment extreme flood events.

Additional inundation over or around the levees is expected as sea levels rise across the coming century. However, the major residential areas within the inlet at Tarwin Lower and Venus Bay are almost completely above the predicted coastal inundation extents for all scenarios assessed. Inundation is limited to agricultural land and some isolated properties, however the main roads connecting Tarwin Lower and Venus Bay to major services are likely to be flooded during inundation events.

The town of Inverloch is mostly above the coastal inundation extent with the exception of areas around Wreck Creek and the Surf Beach residential area, around the boat ramp and jetty, and around the Screw Creek and Broadbeach Estate. The area around Wreck Creek is considered to be particularly vulnerable due to the recent erosion of the barrier dune. This dune currently limits direct coastal inundation of Wreck Creek and the residential area between Bunurong Road and the Surf Life Saving Club. Inundation along the open coast is limited due to the height of the Bunurong Road and sand dunes from Point Smythe to Cape Liptrap.

ISBN 978-1-76136-127-2 (pdf/online/MS word)

Accessibility

If you would like to receive this publication in an alternative format, please telephone the DELWP Customer Service Centre on 136 186, email customer.service@delwp.vic.gov.au or via the National Relay Service on 133 677 www.relayservice.com.au