Inverloch Region Coastal Hazard Assessment

Coastal Processes 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, with a focus on the causes of recent erosion at Inverloch Surf Beach.

Coastal processes are the forces within a coastal environment that affect the shape of the coastline. For example winds, waves, tides and currents.

This summary shares key findings from the Coastal Processes report by Water Technology Pty Ltd. It is one of seven reports from the Coastal Hazard Assessment.

Refer to the full report for more details.

Computer models were used to help understand the coastal processes. The models simulated the conditions of the local coastal, estuarine and catchment areas and looked at:

- Storm-tide
- Waves
- Sediment (sand) transport
- Shoreline response (erosion / accretion)

Models were based on the following scenarios.

Table 1. Scenarios modelled to determine erosion 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.

Findings: Coastal Bathymetry and Topography

Coastal bathymetry is the study and mapping of the sea floor. It involves getting measurements of the depth of the ocean and is the equivalent to mapping topography on land.

The ocean and coastal bathymetry have a key influence on the coastal processes and drivers (factors influencing coastal processes) in the Cape to Cape area.

Bass Strait is relatively shallow, around 70-80m in depth and the study area is dominated by rocky outcrops at Cape Paterson and Cape Liptrap.

Significant change has occurred on the sea floor of the entrance to Anderson Inlet between data captured in 2008/09 and present day.

A massive amount of sand has been lost resulting in a net change of -1.8M m3 in the overlapping surveys. Change is not even across the entrance. Some areas have significant volume loss (eg the Surf Beach) and others have volume gain (Ayr Creek lagoon).

Entrance channels have in general, become deeper and wider. However the main channel is wider and flatter across the outer bar. Significant loss of sand is noted upstream. It is unknown if this reduction continues within the Inlet or is limited to the entrance area.

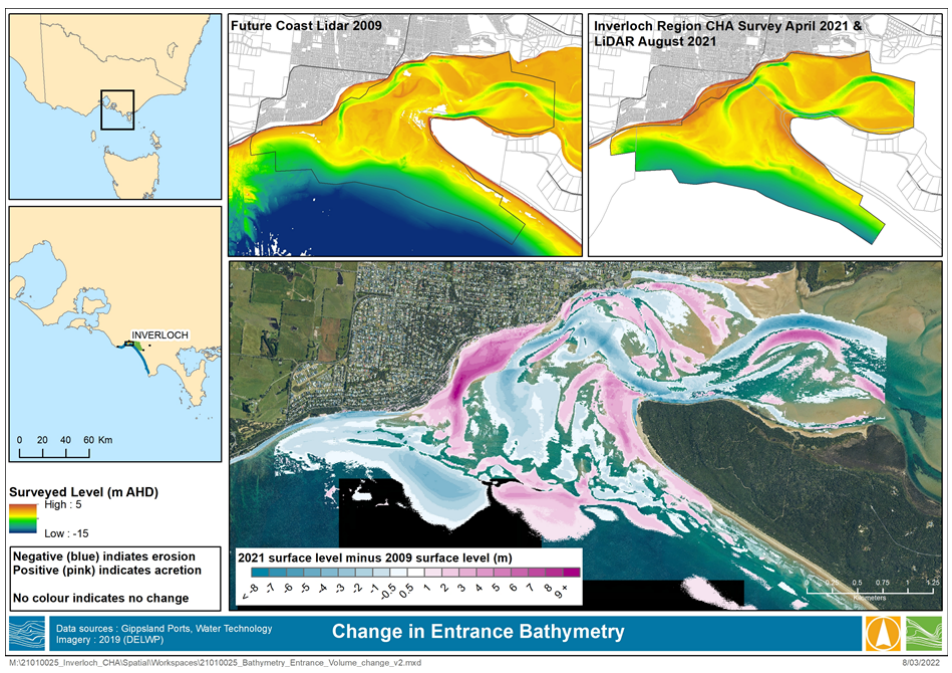

Figure 1. Map showing the net change in bathymetry at the entrance to Anderson Inlet

Inverloch Region Coastal Hazard Assessment

Findings: Sediment Transport

Sediment (sand) can be moved by currents or waves

The low ocean tidal currents were shown to have a minor impact on sand movement along the open coasts of the Cape to Cape area. However, currents were shown to have the potential to shift sand from the Inlet and entrance to the west toward Surf Beach and Flat Rocks.

Sand movement on the open coasts of the Cape to Cape area is driven by wave energy, with the highest potential of sand movement along Surf Beach due to the angle of the beach to the incoming waves.

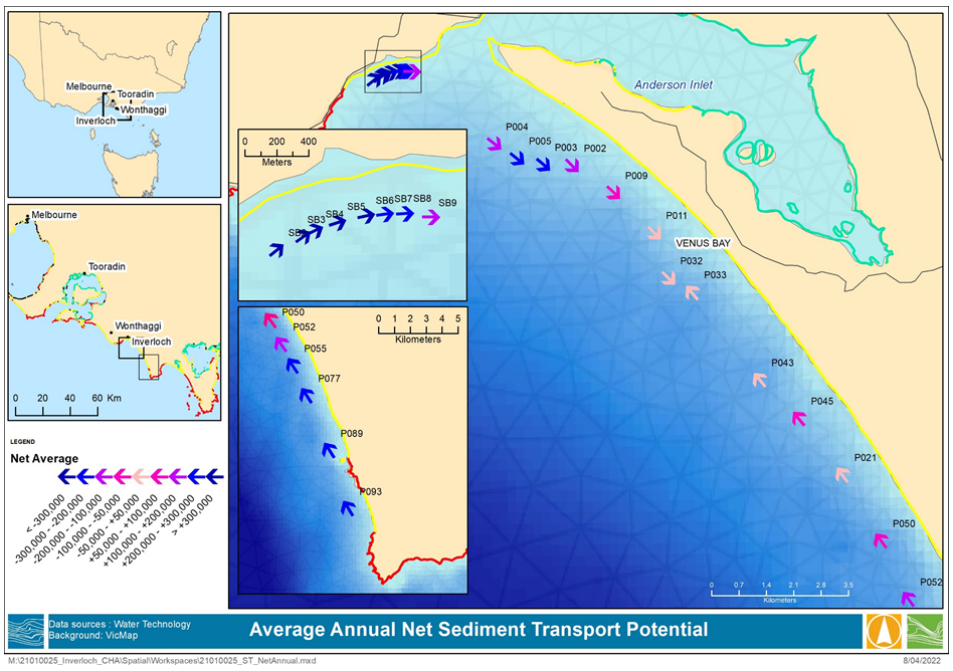

Figure 2. Map showing the direction of sand movement along the open coast.

Analysis of the sand transport modelling results showed more sand transport potential on the Venus Bay coastline was noted during winter months with the higher number of significant storms across Bass Strait.

Most significantly, the modelling indicated a strong increase in sand movement potential since 2012 on Surf Beach. This coincides with the rapid recession of the coast since this time.

Coastal Erosion Hazard

Hazard maps are available on the Cape to Cape Resilience Project webpage.

Note: The coastal erosion hazards presented in the mapping show hazard zones, not a predicted future shoreline position.

The coastline around the entrance is highly dynamic. This means that the position of the water's edge changes frequently due to the reshaping of the shoreline by wave and tidal energy. These regular changes can be observed with variation of erosion (beach loss) and accretion (beach build up) at the same location over time.

Summary of Findings: Erosion Hazard

The coastal process investigation has provided us with a better understanding of the physical environment, drivers and responses of the Cape to Cape coastline. This understanding has been used to develop coastal hazard zones which in turn have been used to identify assets and values which may be vulnerable to erosion (this data is shown in the hazard maps).

There has been significant net loss of sand and coastal erosion and accretion in the entrance area between 2012 and 2021.

The rapid change is a combined result of several coastal and estuarine processes and climate conditions:

- Changes in the channel position and depths
- Significant flood events in 2011 and 2012
- Increased westerly wave energy between 2012 and 2019

These processes have combined to reduce the extent and strength of the ebb tide jet (tidal water movement) and size of the delta (deposit of sand) which had formed offshore of Point Norman.

As this delta reduced, there was less and less sand available to feed back to the Surf Beach on the ebb tide. The more southerly facing beach angle encouraged and enabled increasing sand movement in a westerly direction, to wash sand from Point Norman into the entrance to Ayr Creek, and across the entrance to the Point Smythe nearshore zone.

The entrance is a dynamic environment, capable of relatively rapid and significant change. Adaptation options to minimise risk to assets and values in the area should factor these changes into any design.

Table 2. Coastal process drivers and responses that have influenced erosion

Driver	Response
Channel reaches maximum meander length and is no longer able to curve **More water flow due to floods**	• Weakening of main channel • Development of second, shorter channel • Water flow spreads across entrance, ebb tide delta is reduced
Increase in westerly wave climate *(waves come from a more westerly direction)*	• More sand movement across Surf Beach, filling in the main ebb tide channel • More sand available to move at Point Norman • Less periods of low wave conditions which allow ebb tide sand movement back to Surf Beach
Loss of ebb tide delta and jet stream *(not a coastal driver itself but results in a response)*	• Change of beach angle results in more sand movement across Point Norman • Less sand available beyond the wave breaker zone to return to the Surf Beach

© The State of Victoria Department of Environment, Land, Water and Planning 2022

This work is licensed under a Creative Commons Attribution 4.0 International licence. You are free to re-use the work under that licence, on the condition that you credit the State of Victoria as author. The licence does not apply to any images, photographs or branding, including the Victorian Coat of Arms, the Victorian Government logo and the Department of Environment, Land, Water and Planning (DELWP) logo. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4.0/

ISBN 978-1-76136-128-9 (pdf/online/MS word)

Disclaimer:
This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

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