

Information sheet - Apollo Bay coastal processes & sand movement studies
Updated 30 Sept 2016

1. **Port of Melbourne Authority (PMA). 1989. *Assessment of Coastal Regime – Apollo Bay Harbour***, prepared for Port of Geelong Authority, Report No. 89-01-05

An analysis of the historical changes that have occurred to the Apollo Bay coastline. Carried out in 1989 by the former Marine Models Laboratory of PMA for the Port of Geelong Authority. The purpose was to determine the coastal processes in the Apollo Bay Harbour area, assess the effect of the harbour, examine current dredging practices and outline possible future dredging and spoil disposal programs.

The analysis noted the 1956 construction and 1957 extensions of the Point Bunbury groyne to act as a sand trap and lessen the need for dredging. It notes the sand capture capability of the groyne decreases as it fills with sand. Inferring periodic removal of sand is needed. Recommends disposal of the sand in the vicinity of Cawood St to mitigate erosion.

The net sand transport to the north was estimated at 80,000 cu.m/yr. based on dredging records.

2. **Vantree Pty Ltd. 1996. *Apollo Bay Coastal Processes***, prepared for the Department of Natural Resources and Environment Southwest Area in association with Coastal Engineering Solutions, August 1996

An evaluation (including mathematical modelling) of the coastal processes causing accretion of sand on the south beach immediately north of the harbour (Mother's Beach) and erosion of beaches and storm water outlets further north. Makes recommendations for controlling coastal processes for long-term strategic management of the coastline.

Notes the direction of sand movement is seasonal and is different for the swell and the sea. The swell results in a predominant south to north movement, with some short-term reversals over the winter months. The transport resulting from the more locally generated sea is quite variable but tends to be from north to south over the summer months and from south to north over winter.

Concluded the beaches experienced major changes as a result of the harbour construction, but has now stabilized with any ongoing erosion being localized at storm water outlets. It noted the success of the Wild Dog Creek groyne as an indication of the likely effect of additional groynes along the coast.

Recommended battering of dune faces made steep and dangerous by storms, and groynes be built on the south side of outfalls to widen the beach locally and to stop storm damage to the Great Ocean Road. Warned against fattening of the dunes to obtain a view of the sea. Note the frontal dune system is a dynamic feature and timber paths crossing these dunes can be expected to suffer storm damage at times.

3. **Byrne G (Vantree Pty Ltd.) 1997. *Mounts Bay Beach - Report on Coastal Erosion***, prepared for the Department of Natural Resources and Environment, May 1997.

Studies the general processes that occur along the Mounts Bay section of coast south of the Harbour. Suggests non-steady (i.e. storm-related) longshore sand movement in excess of 80,000 cubic meters per annum. Interprets 1942, 1952, 1966, 1991 and 1997 aerial photos (55 years). Makes observation

that the beach erosion is very dynamic and cyclic, rather than slow overall erosion. Based on the findings of the study, the report recommends (i) fencing of dune, (ii) push sand up from lower part of beach, (iii) plant scarpe and front of dune, (iv) monitor and resist plans to build revetments. Makes comment it is not practical to renourish the beach because of large sand volumes required each year.

Concludes (i) beach expected to vary considerably in size, (ii) worst erosion was in 1952, with 1997 nearly as bad but with less erosion at northern and southern end, (iii) probable the erosion is cyclic and not a long-term phenomenon, (iv) short-term remediation measures include fencing and planting with fast colonising coastal vegetation, and (v) it would be useful to monitor on a regular basis.

4. **Coastal Engineering Solutions (CES). 2005. *Apollo Bay Sand Study***, prepared for Colac Otway Shire & Department of Sustainability and Environment.

Prepared to identify and assess the most effective and sustainable solutions to problems caused by the build up of sand at the entrance to Apollo Bay Harbour and erosion along Marengo (Mounts Bay) beach.

It notes Colac Otway Shire regularly removes sand from the Point Bunbury groyne area and carts it by truck with disposal to narrow areas of beach from Mariners Lookout Road to the north of Pieces Caravan Park. It lists the volumes of sand carted between 1999 and 2005.

Apollo Bay: Concludes pumping the sand further up the coast from the harbour at Apollo Bay has no advantage compared to the present sand disposal location (i.e. off the lee breakwater). Recommends the trial of a “sand shifter” system to intercept the moving sand before it silts the entrance. If successful this approach could (partly?) remove the need for dredging.

Mounts Bay: The study concluded the presence of Apollo Bay Harbour has negligible effect on Mounts Bay beach. Prior to the construction of the harbour, Point Bunbury provided a barrier to southward movement of sand, as does the harbour now.

It recommends the rock that was originally placed on Mounts Bay beach to protect a toilet block should be removed. It also recommends the beach be built up by “back-passing” most of the sand caught at the Point Bunbury groyne to the most vulnerable beach areas along Mounts Bay.

5. **PPK Environment & Infrastructure Pty Ltd. 2005. Colac Otway Strategic Development Master Plan - Coastal Action Plan - Skenes Creek to Marengo**, prepared for Colac Otway Shire and Western Coastal Board, November 2005

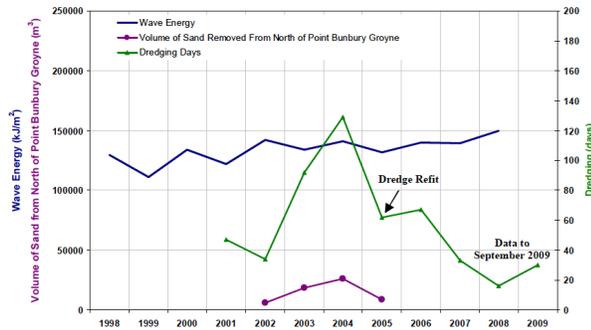
Provide a strategic planning framework for the future protection and development of the coast and near-shore waters. It recognises coastal erosion hazards highlighted in previous reports, but does not make any specific recommendations for mitigation.

6. **GHD Pty Ltd. 2008. *Final Report for Apollo Bay Sand and Dredging Options Study: Assessment of Sand Management and Dredging Options***, prepared for Colac Otway Shire, October 2009

Review of past studies to evaluate and prioritise options to address i) sand removal, ii) sand disposal, and iii) sand accretion in the southeast corner of the Harbour.

Notes the majority of the waves approach at greater than normal in the vicinity of Apollo Bay causing sediment transport to the north. Occasionally (<3% of the time), the wave can cause sediment transport to the south. Also notes a consistent upward trend in wave energy (see below).

Figure 22 Total Annual Offshore Wave Energy, Dredging Days and Volume of Sand Removed from North of Point Bunbury Groyne to 2009



Recommends i) a new suction dredge and additional dredging north(-east?) of the main breakwater to capture sand drifting from the south, ii) disposal of dredged sand north of the harbour via an offshore disposal barge to encourage sand to migrate to north rather than accumulate in south adjacent to the harbour (Mother's Beach), and iii) annual removal of captured sand between the main breakwater and the Point Bunbury groyne to reduce the amount of sand blown into the south-east corner of the harbour.

Further recommends immediate commencement of steps to obtain the necessary environmental approvals for dredging operations and offshore discharge. Notes sand removal north of the groyne should be nominal and consider the potential impacts on the stability of the southern end of the main breakwater.

Water Technology. 2012. (DRAFT), Coastal Hazards Management Plan Marengo to Skenes Creek, the Department of Sustainability and Environment, October 2012, unpublished.

Uses a risk management methodology in accordance with the Victorian Coastal Hazard Guide, to prepare a Coastal Hazards Management Plan (CHP) for mitigating risks to key assets and infrastructure over a 10-year time frame.

Proposes soft engineering approaches such as beach renourishment/sand carting in preference to hard engineering options. However recognises that at some locations in the study area and in the long term, there may be little option other than to consider the use of hard engineering structures to protect high value assets. As a contingency, recommendations are contained within the plan to begin the long term planning and investigations required to evaluate the use of hard engineering structures to protect high value assets in the study area that cannot be practically relocated in the long term

Mounts Bay: Great Ocean Road (GOR) and Barwon Water assets are at high risk. Proposes annual sand carting from the Point Bunbury groyne in the immediate term and commencement of feasibility studies to realign the GOR.

Apollo Bay: Attributes the erosion of the shoreline north of the Harbour between Cawood Street and Marriners Lookout Road to the sediment transport deficit associated with the accretion of bypassed sand in the lee of the Harbour. Supports previous studies (GHD 2009, CES 2005 and Vantree 1996) in recommendations to discharge sediment north of the harbour.

Supports GHD (2009) recommendation to (immediately) dispose of bypassed sediment through an offshore disposal barge to the north of the harbour to provide a flexible, low impact and cost effective method for re-establishing the long term sediment transport supply to the shoreline to the north of the Harbour.

Recommends sand carting an immediate and ongoing interim mitigation measure. The sand being sourced from the Point Bunbury groyne, inside the harbour or opportunistically from the Wild Dog Creek groyne and transported to the shorelines at risk north of the harbour

Also recommends monitoring and, if the risks to GOR worsen, consideration of the use revetments or groynes.

Wild Dog Creek to Skenes Creek: Recommends an immediate geotechnical investigation of GOR foundations to establish the extent of the risks to the Road's foundations along this section of coastline.

Monitoring and Review: Recommends 6 monthly surveys at critical locations and regular coastal profile monitoring of critical locations to improve the implementation of the CHP through improving the understanding of the physical processes, preventing "knee jerk" reactions to isolated storm erosion events, assessing the performance of the risk treatment measures, and establishing appropriate triggers for transitioning to more significant treatment measures.

Water Technology. 2013. Apollo Bay Harbour Coastal Hazard Vulnerability Assessment, prepared for Colac Otway Shire in June 2013.

Defines the extent of existing and potential future coastal hazards associated with climate change projections to the Apollo Bay Harbour Precinct, and adjacent beaches.

The main conclusions are as follows:

- The Apollo Bay Main Beach could be expected to undergo long-term recession due to sea level rise this century. Rule of thumb estimates suggest the shoreline could recede by 40 to 80 metres by the end of the century based on a 0.8 metres sea level rise scenario.
- The majority of the (harbour) site is located at elevations well above the 1% AEP storm tide levels to 2100 and is not at significant risk from coastal inundation.
- The breakwaters will be exposed to higher sea levels and wave heights. The armour layer rock size and crest height may be required to be increased to maintain the function and stability of the structure in the longer term.

Water Technology. 2016. Marengo to Wild Dog Creek Sand Management Plan – Stage 1 Report, prepared for DELWP in January 2016. unpublished.

Extends Water Technology. 2012.
