Mornington Peninsula (seawards side) VIC03.01.08

Regional Setting

This compartment extends from Cape Schanck to Point Nepean.

It is directly exposed to south-westerly swells and experiences micro tides (approx. 1.5 m tidal range).

The dominant regional processes influencing coastal geomorphology in this region are the humid warm to cool temperate climate, micro-tides, south-easterly Tasman Sea swells, easterly seas, dominantly quartz (terrigenous) sediments with northerly longshore transport in the northern part, and the El Nino Southern Oscillation (driving beach erosion/accretion cycles, cyclone frequency).

Regional hazards or processes driving large scale rapid coastal changes include: East Coast Lows (extra-tropical cyclones), mid-latitude cyclones (depressions), and storm surges (<1m).

Justification of sensitivity

Sensitivity rating is 3 to 4. With probably only minor gains or losses of sand, beaches in this compartment are likely to show a medium term to late recessional response to sea-level rise. Recession will be limited by the hard calcarenite base.

The Mornington Peninsula is composed of lithified (hardened) calcareous dunes (calcarenite) that were originally sourced from substantially biogenic marine sands (shell fragments, etc.), transported from the Bass Strait shelf by winds during glacial-phase low sea stands, and by waves during post-glacial marine transgressions during the last million and more years of the Pleistocene. Younger unconsolidated sands, brought shorewards by the last post-glacial marine transgression or produced by wave-erosion of calcarenite at the present shoreline, form numerous beaches on the seawards side of Mornington Peninsula, while windblown sand sheets and dunes mantle the older and harder calcarenite in backshore areas.

Sand mobility modelling suggests there is likely to be some degree of ongoing wave-driven transport of sand from Bass Strait onto the Mornington Peninsula shore (Harris & Heap 2014). Numerous hard calcarenite promontories and reefs, and the bounding hard basalt promontory of Cape Schanck to the south-east, probably minimise alongshore sand drift, although there may be some leakage of sand into the large flood-tide delta that forms a sediment sink just inside Port Phillip Bay.

Overall, the sand budget for the ocean-facing Mornington Peninsula beaches is probably stable, with only minor losses and gains. Consequently, the seawards facing beaches of Mornington Peninsula are likely to be medium to late term responders to sea-level rise. When progressive shoreline recession into unconsolidated sandy beaches and dunes does occur, it will be limited by the underlying topography of the hard lithified calcarenite barrier complex.

Other Comments

Potential shoreline recession distances may be quite variable, depending on the buried calcarenite topography, but can be determined using drilling or geophysical methods such as ground-penetrating radar. Areas landwards of and above the distances at which underlying hard calcarenite surfaces rise several metres or more above present sea-level are unlikely to be at risk from shoreline recession or inundation before 2100 at least.

Only limited areas of this coast are subject to inundation hazards, owing to relative steep dune faces backing most of this shoreline.

Hard basalt cliffs at Cape Schanck are relatively resilient but may be prone to occasional slumps in response to ongoing wave attack.

Figure 1: *Compartment VIC03.01.08 Mornington Peninsula. This compartment description refers to the seawards (south-western) side of the Mornington Peninsula; the Port Philip side is exposed to different processes and is described separately as compartment VIC03.01.09.*

Confidence in sources

Moderate confidence: Based on geological mapping but limited coastal studies.

Additional information (links and references)

Geological mapping at several scales is available for this compartment. Previous studies of coastal hazards are limited.

Harris, PT & Heap, A 2014, 'Geomorphology and Holocene Sedimentology of the Tasmanian Continental Margin', in KD Corbett, PG Quilty & CR Calver (eds), *Geological Evolution of Tasmania*, Geological Society of Australia (Tasmania Division), pp. 530-539.