Darwin NT01.01.06

Regional Setting

The dominant regional processes influencing coastal geomorphology in this region are the wet-dry tropical climate, trade winds, monsoons, mega to meso (limited) tides, semi-diurnal, waves dominantly seas, episodic high river sediment discharges, mixed carbonate – terrigenous sediments, tidal sediment transport, limited longshore transport, the El Nino Southern Oscillation (driving high sea-level variability), and the Madden-Julian Oscillation (driving weather patterns including monsoons and tropical cyclones).

Regional hazards or processes driving large scale rapid coastal changes include: tropical cyclones, storm surges, king tides and river flooding.

This compartment extends from Charles Point West to Gunn Point.

Justification of sensitivity

Sensitivity rating is a 3 overall, although certain places in Darwin are rated as 5. There is no evidence on which to indicate patterns of shoreline change

Other comments

The western section of this compartment is predominantly lateritic cliffs with narrow beach and, in places, a fringe of mangroves. A small wetland area is occluded behind the beach west of Charles Point. Lateritic outcrops occur along the section from Charles Point to Mandorah, and back many of the beaches.

This compartment includes the city of Darwin. Darwin was devastated at Christmas in 1974 when Cyclone Tracy hit the city. As a consequence, storm surge zones were designated, and potential inundation scenarios have been modelled to 2100. Several

areas, such as parts of Rapid Creek, are already prone to flash flooding, and the city will remain sensitive to inundation.

Darwin Harbour is a large macrotidal embayment fringed around most of its shoreline with well-zoned mangrove forests (Semeniuk, 1985; Williams et al., 2006). There has been dredging as part of the INPEX project; this involves about 14.5 million m^3 of rock and sediment that was removed from the seafloor off East Arm wharf through to the INPEX site (Bladin Point), and which was dumped in 2014 about 12 km offshore of Lee Point. Highly turbid water is exchanged tidally through the entrance to Darwin Harbour, but the harbour shoreline appears relatively unchanged. The section from Lee Point to Hope Inlet is known as Shoal Bay, and the mudlflats along here have been accreting; they have formed a chenier plain with intermittent sandy ridges perched on the low-gradient mudflat. Mangroves were destroyed along parts of this coast by Cyclone Tracy in 1974 and have only partly recovered, with some mangrove progradation along parts of shore close to creeks (Woodroffe and Grime, 1999). Gunn Point is a lateritic outcrop with fringing mangroves and with a south-trending spit that has progressively extended into the entrance to Hope Inlet.

Confidence in sources

Medium confidence. Many site-specific studies are under way, associated with construction in Darwin Harbour.

Additional information (links and references)

- *An inventory of all the beaches in northern Australia has been compiled by Short (2006). This provides details of the geomorphology of each beach and other information that will be useful in determining the functioning of tertiary compartments:*

  Short, A.D., 2006. Beaches of the northern Australian coast: the Kimberley, Northern Territory & Cape York. Sydney University Press.

- *There has been little comprehensive study of the coast of the Northern Territory. There is little information on the offshore characteristics of NT. A workshop was held in 2007 that summarised the nature of the offshore environment, recognising Joseph Bonaparte Gulf in the west, Arafura in the north, and the Gulf of Carpentaria in the east. The report is available a*t www.environment.gov.au/system/.../characterisation-workshop-report.rtf

Semeniuk, V., 1985. Mangrove environments of Port Darwin, Northern Territory: the physical framework and habitats. Journal of the Royal Society of Western Australia 67, 81-97.

Williams, D., Wolanski, E., Spagnol, S., 2006. Hydrodynamics of Darwin Harbour, In: Wolanski, E. (Ed.), The Environment in Asia Pacific Harbours. Elsevier, Dordrecht, pp. 461-476.

Woodroffe, C.D., Grime, D., 1999. Storm impact and evolution of a mangrove-fringed chenier plain, Shoal Bay, Darwin, Australia. Marine Geology 159, 303-321.