

1. PROJECT DESCRIPTION

Linkon Construction Limited plans to build a marina and resort development in Nelly Bay, Magnetic Island (Figs. 1,2). This will involve the construction of a breakwater from material removed from Bright Point, the formation of a harbour inside the breakwater and the construction of hotel, marina, recreational and shopping facilities on Bright Point and the northern Nelly Bay foreshore (Figs. 3,4). Part of the Nelly Bay fringing reef will be covered by the breakwater and an access channel will also have to be cut through a small section of the reef. The eventual development will be able to house 187 boats in the marina, include accommodation for about 1000 people and use an upgraded sewage treatment works.

2. PHYSICAL NATURE OF SITE

The site is in one of the larger bays on the eastern coast of Magnetic Island and faces into Cleveland Bay (Figs. 1 & 2). The depth of offshore water in Cleveland Bay varies from 2 to 10 m. Cleveland Bay receives water from Ross Creek, Ross River, Alligator and Crocodile Creeks and other smaller creeks. The majority of the coastal frontage of the city of Townsville (population 110,000) lies on Cleveland Bay and industrial activity including a copper refinery, meat works, cement works, a large commercial and military airfield and extensive light industry may also influence water quality in the Bay (Fig. 1). The major Townsville sewage works discharges into Sandfly Creek and hence into Cleveland Bay. The plant is a secondary treatment works. Townsville is a major port city and Platypus Channel passing through the centre of Cleveland Bay and only 3 km off Nelly Bay is dredged on a regular (roughly annually) basis.

Water quality in Cleveland Bay has previously been studied during the Three Bays Project (1974-1979), and published by Walker and O'Donnell (1981) and Belperio (1978) and reference to their results will be made later in this report. A project to study general water quality in Cleveland Bay particularly with respect to impacts from the sewage discharge and dredging has been proposed and results from this will aid in interpreting results from Nelly Bay in the long term. Nelly Bay data is available from Zann and Collins in unpublished reports.

Within Nelly Bay the reef rises sharply from the general Cleveland Bay floor to form a wide reef flat which dries at the lowest low tides (Fig.

Figure 4

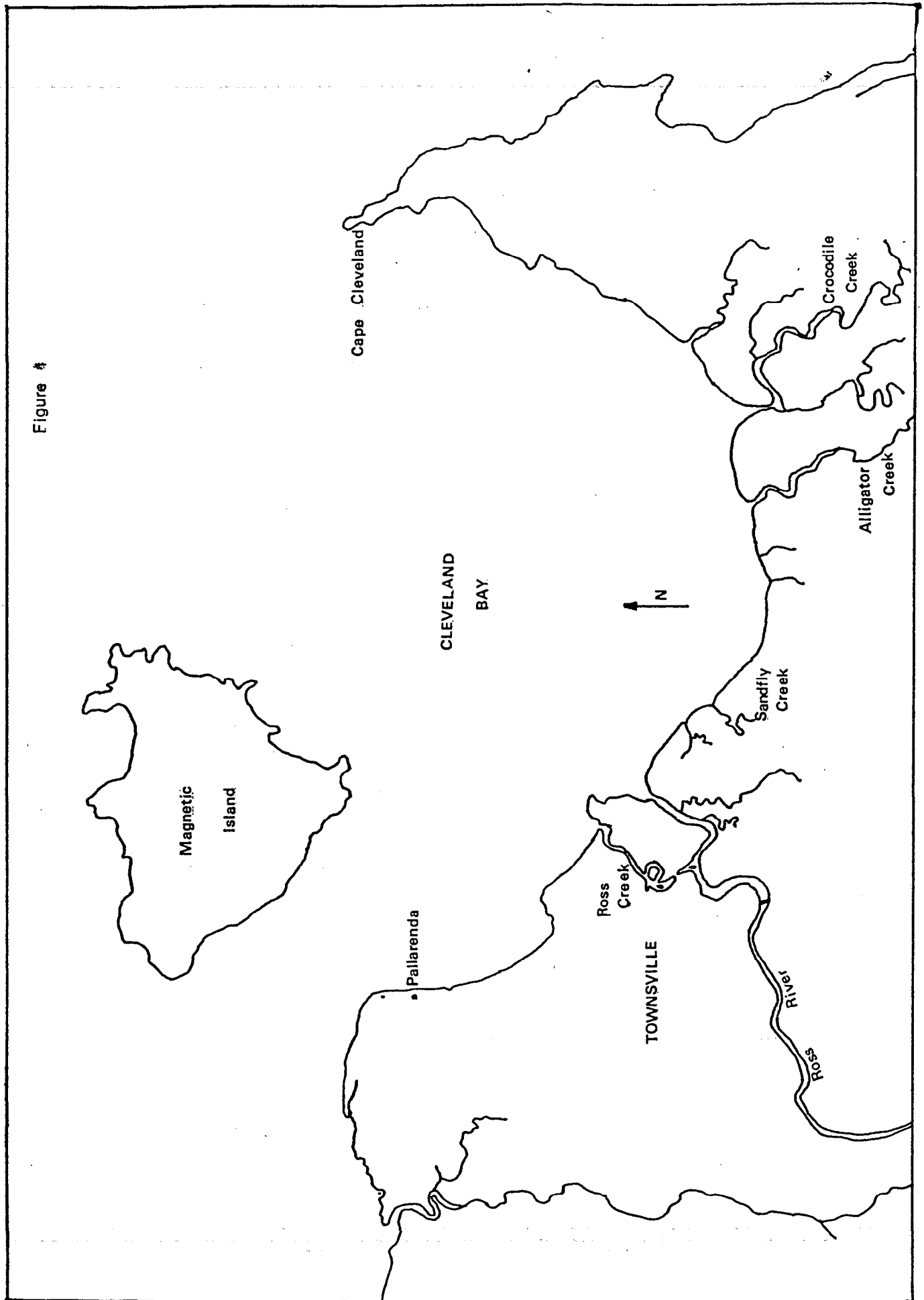


Figure 2

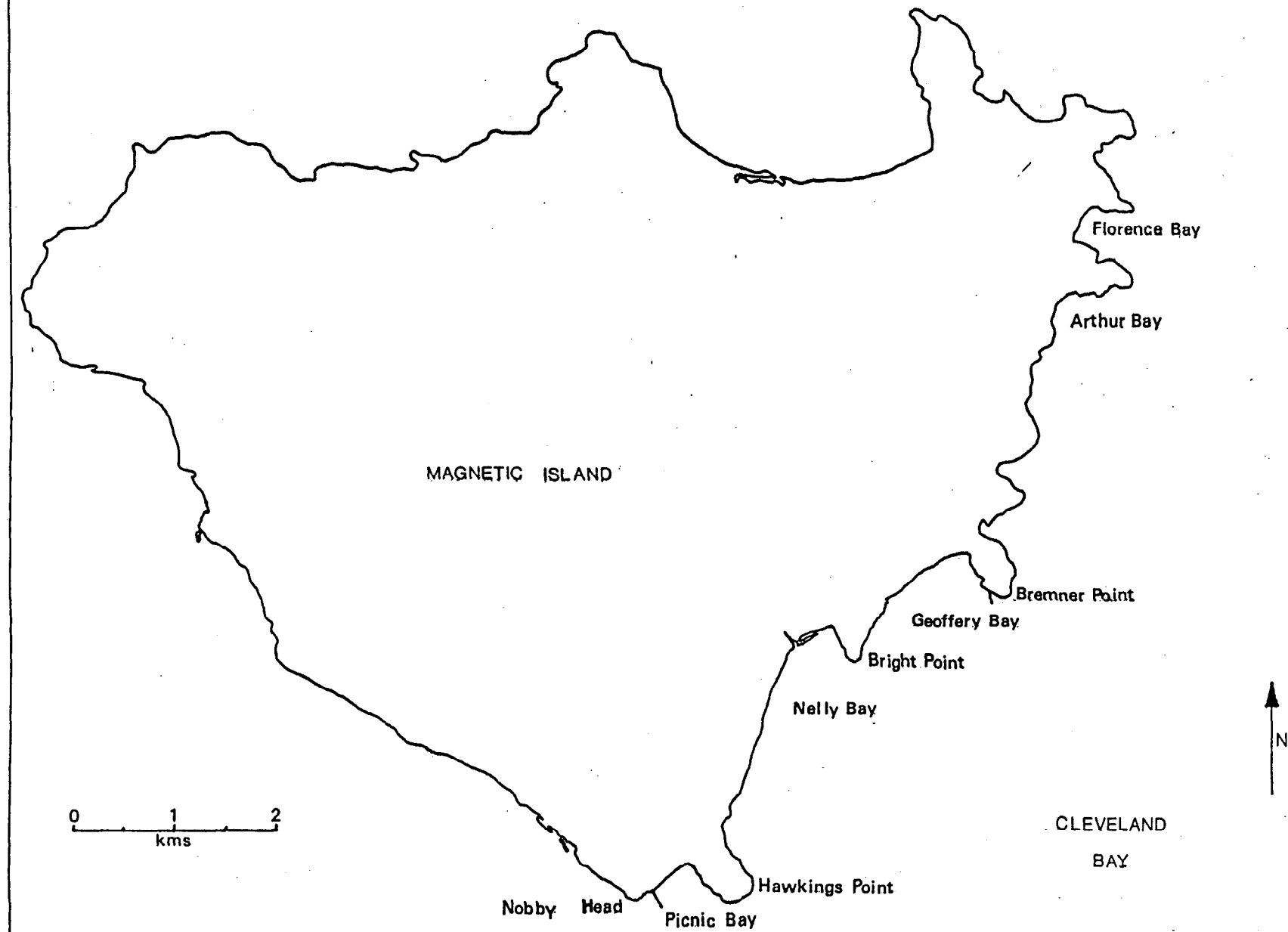
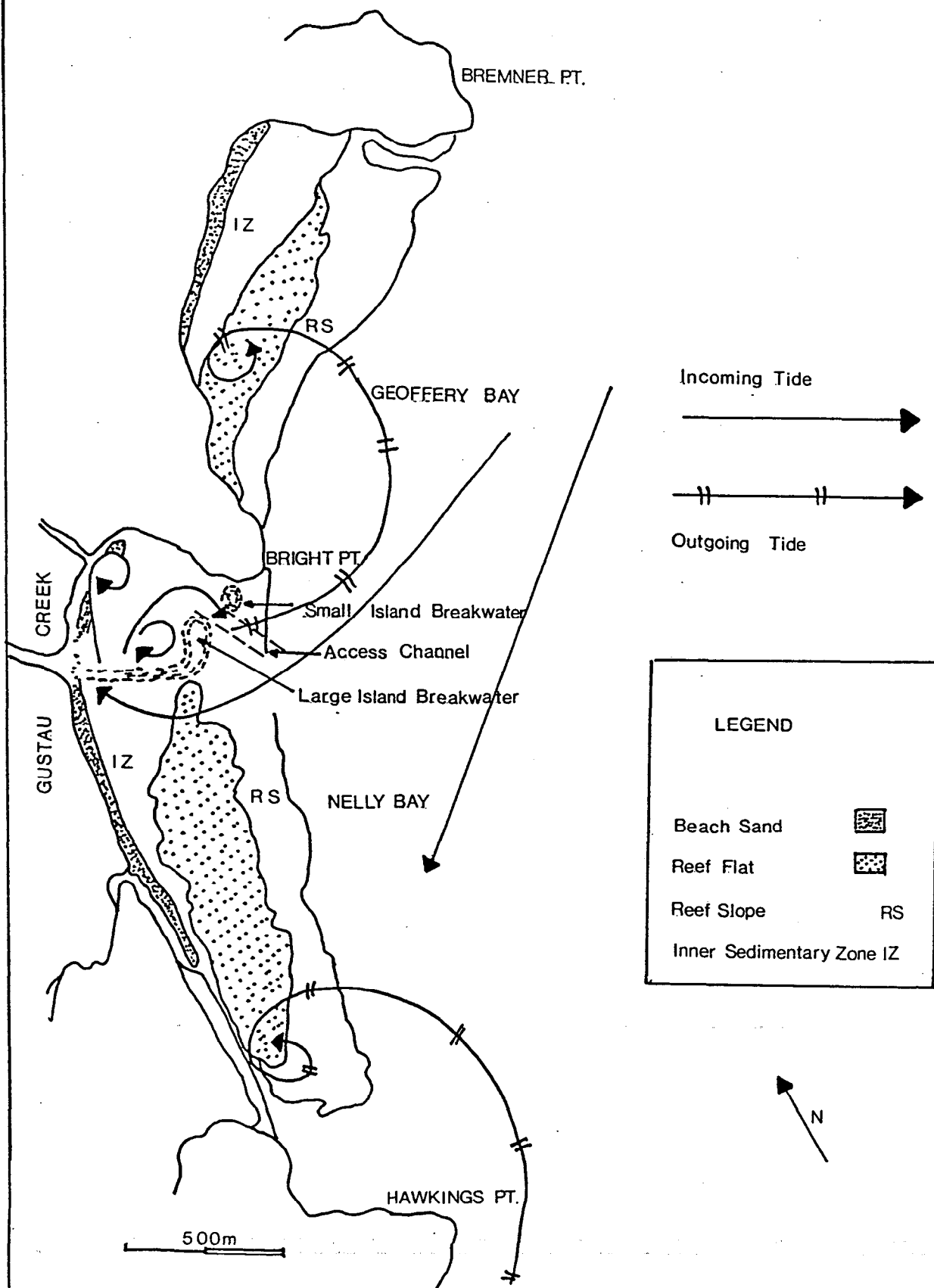
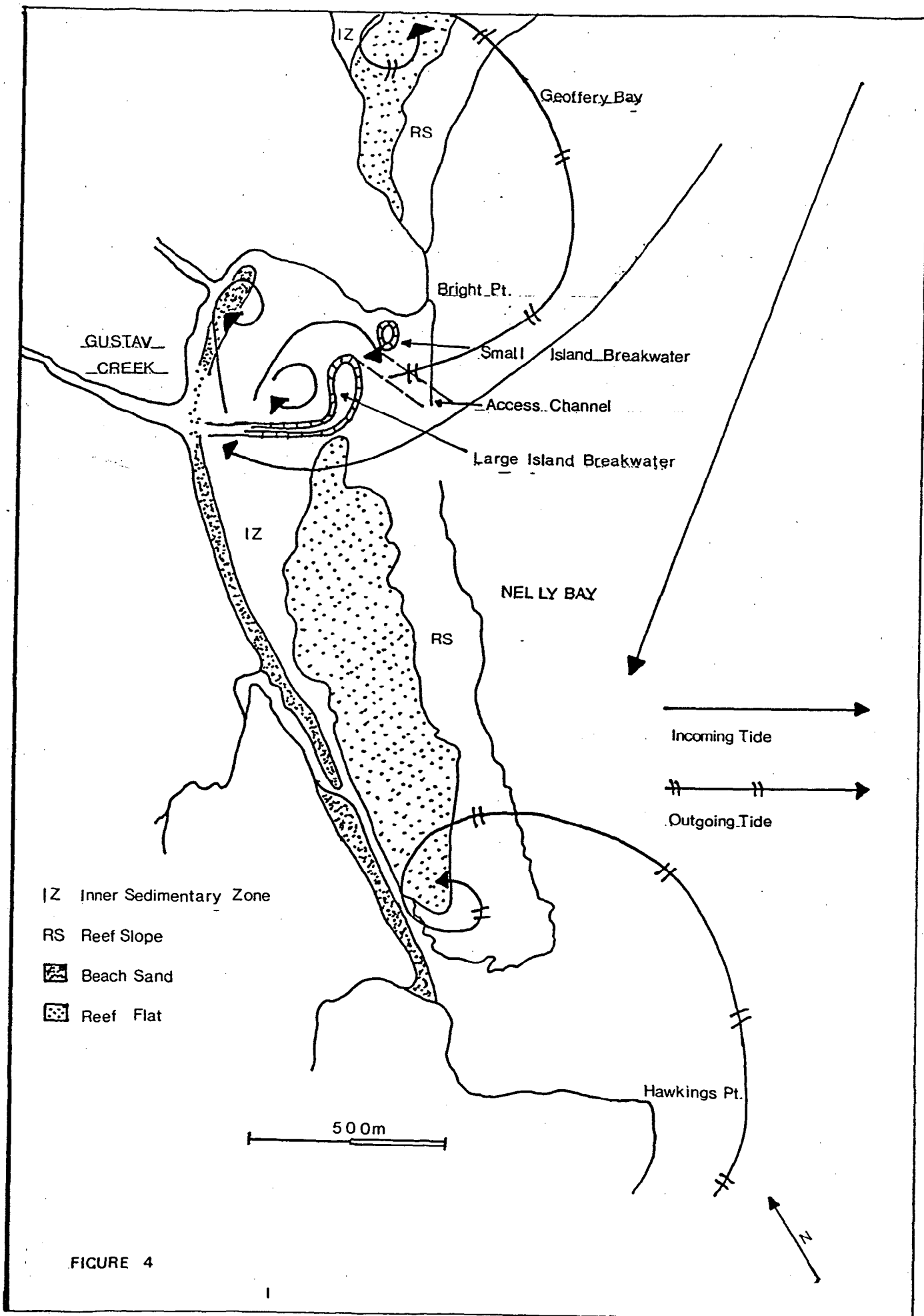


FIGURE 3





5). The reef slope area contains areas of abundant coral mixed with other areas dominated by brown algae. In the northern section of the Bay, where the marina is to be located, Gustav Creek enters but there is generally no surface flow through the front dune in the dry season and only intermittent flow in the wet season. However intense rainstorms in the Island interior can cause large surface freshwater flows across Nelly Bay and around into Geoffrey Bay. An event of this kind apparently occurred during the baseline monitoring period. Gustav Creek receives effluent from the small sewerage plant serving part of Nelly Bay and probably septic seepage and overflows from those parts of Nelly Bay not connected to the sewerage scheme. There is a history of faecal contamination in Gustav Creek (QWRC unpublished report, Brodie and Faithfull, unpublished data) but the levels found are typical of small urban streams receiving septic flows. The levels of faecal coliforms exceed primary contact water guidelines for Queensland.

Nelly Bay faces to the south-east and the prevailing wind and wave orientation is also from this direction but with a more north-east and easterly component in the summer months. The northern end of the Bay receives some protection from Bright Point when the winds are from the east or north-east but the rest of the Bay is open to the high frequency chop generated inside the Great Barrier Reef lagoon and inside Cleveland Bay itself. A low frequency swell component may also be present due to swells from the Coral Sea (outside the main reef) but this is strongly attenuated by the time it reaches Magnetic Island. During south-east winds waves in Nelly Bay tend to be lower and less confused than in the bays further north (e.g. Florence Bay) possibly due to some protection being afforded by Cape Cleveland.

Hydrodynamic studies in Nelly Bay and the adjacent Picnic and Geoffrey Bays were undertaken by Parnell and van Woesik and their results published in the Public Environment Report for the project in August 1988. They attempted to describe the hydrodynamics of Nelly Bay; to determine the likely hydrodynamic regimes that will prevail at various stages of development; to determine the pathways of sediment which may be put into suspension during the construction and to advise on construction procedures which will reduce the impact of sediment on the nearshore marine environment. Their conclusions draw attention to the tidal nature of circulation in Nelly Bay, extensive eddies at a number of sites and the strong influence of water movements from Nelly to Geoffrey Bay. Figures 3 and 4 show a stylized summary of their water movement findings.

Figure 5

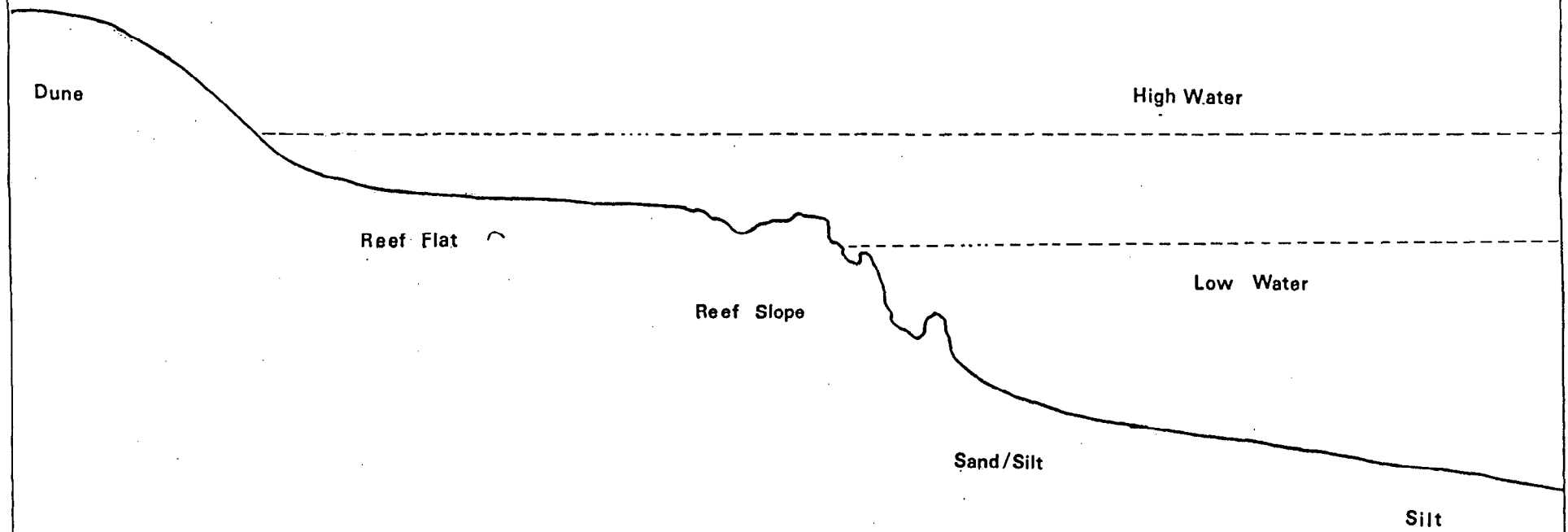


FIGURE 5

: Schematic_Bay_Section