7. RECOMMENDATIONS

7.1 Short Term

Management of Spoil Dump

As far as possible disturbance to the spoil dump should be avoided to minimise the release of silt onto the reef. Any excavations in it , particularly ones which open to the sea, should be carefully executed, properly supervised and, if necessary, their effects monitored.

Rubble left on the face of the spoil dump beach may be removed and used to protect erosion-prone areas near the jetty and the helipad. Care should be taken not to disturb the material underlying the beach sediments particularly near the jetty where there is a high proportion of silt present. Rubble removal and placement should normally be undertaken when no waves are breaking on or close to the affected areas.

Vegetation should be allowed to grow on the spoil dump, particularly on its seaward margin, to make the area more visually attractive and to allow wind blown sand to accumulate. In this way tourist use of the area may be enhanced and nesting areas provided for some bird species.

Monitoring of the Spoil Dump

Daily visual observations of waves, erosion and silt plumes, etc., as described in this report, should be continued for at least three years both to verify that conditions have reached some kind of equilibrium under normal wave action and to record the effects of any severe events which may disturb that equilibrium.

The spoil dump should be resurveyed at approximately twelve month intervals and after any severe events which cause significant changes to it. Additional survey control is required at the eastern end of the spoil dump.

Monitoring of the Reef Flat

Reef flat sediments should be sampled after any severe event. Monitoring programmes for reef flat biota should be maintained so that the impact of any severe event can be determined.

7.2 Long Term

Neutralisation of Fine Material in Spoil Dump

In the long term primary concern should be to neutralise the fine material stored within the spoil dump since actual physical removal of the spoil dump from the reef is clearly an impractical solution which could cause worse trouble in its execution.

Specific research is required into the lithification processes occurring in coral cay beaches, including the mechanisms for formation of beach rock and the factors which produce its cementing agents. Action can then be taken to simulate the required conditions within the spoil dump so as to produce and/or accelerate lithification of the fine material.

Reef-top Hydrodynamics

Measurements of tidal and wind-induced currents around the island would give a much clearer understanding of reef-top circulation, the movement of sediment plumes and the location of potential silt deposition regions. However, extensive field measurements on Heron Island Reef are likely to be expensive as well as difficult and possibly dangerous to make under a sufficiently wide range of conditions. Hence it would be more practical to use numerical modelling with a limited number of field measurements, sufficient for calibration and verification of the models.

Refining of the existing numerical cyclone wave prediction model (Gourlay and McMonagle 1989) with a smaller grid to reproduce waves reaching the reef edge and the propagation of cyclonic waves across the reef flat would make it possible to assess the likely effects of cyclonic waves on the spoil dump.

The relationship between wave conditions offshore on either side of the reef and on the reef platform in front of the beach could be established using wave rider buoys and electronic wave staffs.

Hydrographic Survey

There is no comprehensive, reliable survey of the reef flat around Heron Island. AUSLIG or another competent body should be commissioned to make a survey of Heron Reef, west of the lagoon, and of Heron Island as soon as practicable. None of the other investigations of reeftop conditions can be carried out until such a survey is made.

Shoreline Stability

Assessment of the long term stability of the shoreline on the western end of Heron Island and the influence of the boat harbour and other structures could and should be investigated in a large scale physical hydraulic model. The necessary wave conditions for operation of such a model would be derived using the numerical model and field recordings recommended above. No further expansion of the boat harbour or other development on the reef or within the littoral zone of the island should be permitted until their effects can be properly investigated before construction.

Overall stability of Heron Island should be monitored by periodic visual observations including oblique aerial photographs and beach profile measurements at intervals not longer than three to four months. Regular vertical aerial photography and photogrammetry should be undertaken, preferably every two years and definitely every five years, to determine long term changes in the shape of the cay, the volume of sand contained in it, and the development of its vegetation. Parallel monitoring activities should be undertaken of other selected cays in the Capricornia region with lower levels of human interference.

Reef-top Biology

Continuing monitoring of benthic organisms and research concerning reef-top ecology should be undertaken to provide baseline data for Heron Island reef **prior** to any future dredging and to increase general understanding of such communities for application to other reef locations where dredging or other construction works may have to be undertaken in the future.

7.3 General

Application to Other Projects

The fundamental lesson from the Heron Island boat harbour enlargement project is obvious. All dredging or construction projects which involve disturbance to coral reefs need to be carefully planned so as to minimise the release of silt and so avoid its deposition on reefal areas. The execution of projects needs to be carefully supervised and their effects monitored to ensure that operations have complied with the permit conditions.

Recording of Human Activity

Considerable difficulty was experienced during this project in determining when various human activities, such as relocation of rubble along the shoreline or reshaping of the beach or spoil dump, actually occurred. Consequently it is recommended that all persons or organisations which have permits to undertake continuing activities which may affect the portion of a reef or island being monitored should be required to maintain a log book recording the dates of occurrence, the nature and extent of such activities. The log book should be available for inspection by authorised persons and should be forwarded to the Authority for archiving on completion of the project or, in the case of continuing projects, at specified intervals.