

9 POTENTIAL QUARTZOSE SAND SOURCES

9.1 Introduction

Quartzose sand sources were sought in the areas where beach erosion problems have occurred (see above, Section 7.2). Selection of potential sites was based on the guidelines outlined in Sections 7.3 and 7.4. Both onshore and offshore sites were identified, and these are discussed below.

Several areas have already been intensively studied, and results of these are contained in the following reports:

- Marlin Coast beaches: BPA (1984),
- Whitsunday islands: Holmes (1987),
- Mackay: Gourlay and Hacker (1986), Holmes (1987), Jones (1987) and
- Capricorn Coast beaches: BPA (1979).

9.2 Onshore sources

River channels, beach ridges and dunes constitute potential onshore sources of quartzose sand for beach renourishment purposes. These have not been investigated in detail for this report, as a considerable body of information on them has been published by the Queensland Geological Survey. This includes details of current and potential sand sources, sediment composition and sizes, site ownership, and licensing arrangements. The relevant papers covering each area are:

- Mossman-Cairns: Willmott (1990), Willmott and Muller (1980),
- Innisfail-Tully-Ingham: Willmott (1980),
- Townsville: Martin (1978),
- Ayr-Bowen-Proserpine: Martin and Neville (1978), Holmes (1987),
- Mackay: Willmott and Neville (1979), Holmes (1987),
- Gladstone: Holmes (1980),
- Rockhampton: Willmott (1976), Trezise et al. (1983),
- Bundaberg: GSQ (1981).

9.3 Offshore sources

Intertidal and sub-tidal shoals, bars and deltas constitute potential offshore sources of sand for beach renourishment purposes. From the selection process detailed above, 11 sites were targeted for field work or further investigation. These were:

- Mossman-Port Douglas intertidal shoals,
- Flying Fish Point-Johnstone River mouth (near Innisfail),
- Cowley Beach (near Tully),
- Lucinda shoals (near Ingham),
- Burdekin delta,
- Clark shoals (near Bowen),
- Don River delta,
- Proserpine River mouth,
- Sandringham Bay (south of Mackay),
- Yeppoon intertidal shoals,
- Gladstone harbour entrance.

Potential sources were then selected on the basis of the following criteria:

- i) large volumes of suitable sediments are available,
- ii) the site is not actively supplying sediment to other parts of the coastal system and
- iii) there is no existing erosion problem.

Several of the sites were composed of sediments with particle sizes unsuitable for beach renourishment (Mossman-Port Douglas, Cowley Beach, Sandringham Bay), while others had persistent coastal erosion problems (Flying Fish Point, Proserpine River mouth). The Yeppoon area is dealt with in detail by the BPA (1979). The remaining sites, Lucinda shoals, Burdekin Delta, Clark shoals, Don River delta, Gladstone Harbour entrance, are discussed below. Full analysis of the suitability of these sites is beyond the scope of this report. The following section provides general information on the location, characteristics and suitability of the sites.

9.3.1 Lucinda shoals

The sugar-loading port of Lucinda is 23 km north-east of Ingham. Extensive areas of intertidal and sub-tidal sands occur here in waters shallower than 10 m. These sands constitute the marine portion of the Herbert River delta that occupies the southern end of Hinchinbrook Channel (Pringle, 1986). On Nautical chart AUS828, this marine portion of the delta covers some 70 km², with 24 km² shown as intertidal. Thus very large volumes of sediment occur in this area.

The northern part of the delta lies within the GBRMP, so that the area potentially available occurs south of a line running approximately parallel to and 1200 m north of the sugar loading pier. In addition, Coastal Management Control District 21 extends 1.6 km offshore presumably further limiting the available area to sub-tidal waters.

Three sand samples taken from the intertidal part of the shoals had mean sizes of 0.35 mm, which would be appropriate for renourishing beaches. Removal of sand from the sub-tidal parts of the deposit should result in little aesthetic or environmental impact.

9.3.2 Burdekin delta

The Burdekin River delivers very large amounts of sediment to the coastal zone. Some 450,000 tonnes/year of sand are deposited in the delta, although this amount will begin to decline now that the Burdekin Falls Dam has been commissioned. Patterns of sedimentation and coastal change have been recently described by Pringle (1983, 1986).

The area excluded from the GBRMP extends for 33 km along the whole delta coastline. On Nautical chart AUS826, 27 km² is shown as intertidal, and sub-tidal waters to 10 m depth cover a further 54 km². Clearly there is an enormous volume of sand in this system.

Sand samples collected in this study, and by Pringle (1983) from beaches at the northern end of the delta have mean sizes ranging from 0.23 - 1.74 mm. Removal of sand from the deeper sub-tidal parts of the system should have limited environmental or aesthetic consequences.

9.3.3 Clark Shoal

Clark Shoal is situated to the west of Abbot Point, 25 km north-west of Bowen. It lies in water depths of 1.8 - 3.7 m below CD and is shown on Nautical chart AUS826 as sand and covers 22 km². It is probably the downdrift extension of the Don River longshore drift system, and does not appear to be contributing sediment to the nearby coastal zone. Thus it may be a suitable source of borrow sand.

9.3.4 Don River delta

The Don River delta is 10 km north-west of Bowen. The sub marine part of the delta covers some 65 km² measured down to 10 m water depth, with about 27 km² in the shallower sub-tidal parts between 0 - 5 m (chart AUS826). Very little of this part of the delta area is exposed at low tide. The river appears to be delivering large volumes of sand to the coastal zone. Samples collected near the mouth have mean sizes of 0.66 mm and 0.37 mm, and exhibit a considerable range of particle sizes. These sediments may be appropriate for renourishing nearby beaches.

The delta is situated in CMCD #18 which extends to 1.7 km off shore. Only the deeper sub-tidal parts of the delta lie outside this zone.

9.3.5 Gladstone Harbour entrance

A large shoal area known as East Banks lies at the entrance to Gladstone Harbour, and extends 10 km south-east from southern end of Facing Island. Three small sand banks covering a total area of about 70 ha dry at low tide. However the bulk of the shoal is sub tidal, covering some 20 km² to a depth of 5 m below chart datum (nautical chart AUS819). This very large sand body was probably deposited by the Calliope and Boyne rivers during times of lower sea level. It appears to be largely unrelated to the present-day coastal zone sediment transfer system.

Conaghan (1966) maps the shoal as poorly sorted, fine-medium sand (0.13 - 0.5 mm). It is potentially suitable for beach renourishment purposes, and removal would appear to have minor environmental or aesthetic impacts.