

CHAPTER 1: INTRODUCTION

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The history of the John Brewer Reef Floating Hotel

The idea of a floating hotel evolved initially from the geography of the Great Barrier Reef (GBR) which lies, for the most part, some considerable distance and travelling time, off-shore. Its direction from mainland ports together with the most frequent prevailing wind conditions necessitates lengthy trips across a side-on swell. Tour operators believed that visitation could be significantly increased with shorter or faster trips, or through the provision of fixed off-shore accommodation. Several continental islands already had been developed to cater for tourists as well as two coral cays, and prevailing wisdom (i.e. Great Barrier Reef Consultative Committee; Australian Coral Reef Society; Buckley, 1983) was strongly opposed to further tourism developments on coral cays. Two options appeared to remain: build artificial islands or moor structures on or near reefs.

In 1981, a group of Townsville businessmen proposed an artificial island on the Great Barrier Reef, comprised of three partially sunken liners embedded in sand. This proposal was discarded because of potentially unacceptable environmental impacts and the costs of maintenance. The subsequent development of floating accommodation for the off-shore oil industry and the military (e.g. Falkland Islands) led a Townsville consortium to investigate the feasibility of locating a luxury version of that floating accommodation in the lagoon of John Brewer Reef, approximately 70 km north-east of Townsville (Figure 1).

Built by Consafe Engineering in Singapore, the floating hotel consisted of a five-storey self-contained floating building (Table 1.1), containing 140 double rooms and 34 luxury suites. Floating pontoons adjacent to the main structure served as walkways, and contained moorings, swimming pool and tennis courts.

Table 1.1. Project specifications of the floating hotel

Length	89.2 m
Width	27.6 m
Height from sea level	24.2 m
Draught	3.0 m
Freeboard	3.0 m
Ballast capacity	4000 t
Fuel oil capacity	200 t
Potable water supply	150 t/day
Generating capacity	2300 kW
Guest accommodation	356
Staff	98

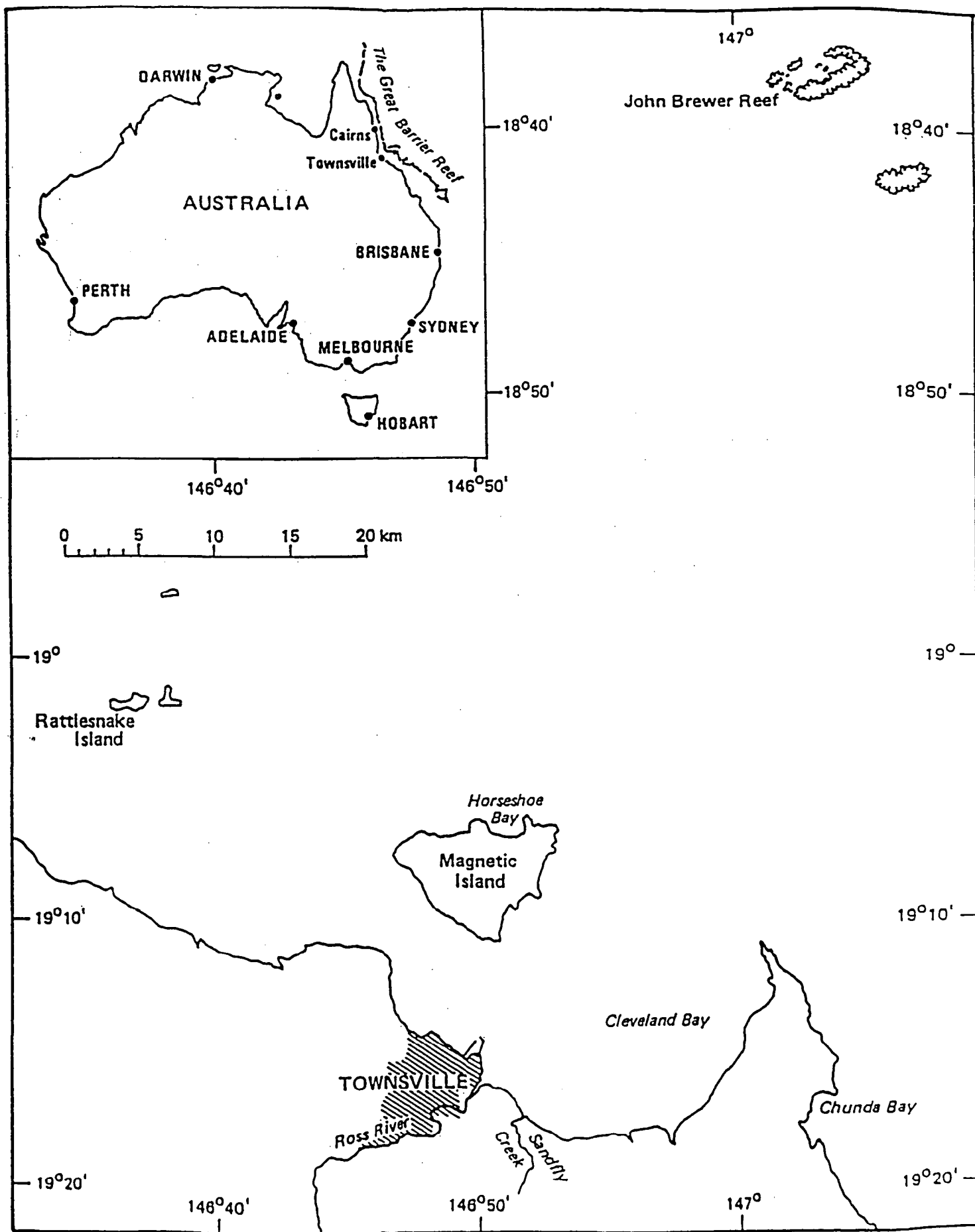


Figure 1. Location of John Brewer Reef

John Brewer Reef is an almost entirely closed, circular reef with a narrow opening 60 m wide on its northern side. The floating hotel was towed through this opening (after some obstructing coral bommies were cropped) and fixed in the lagoon using a single-point mooring system capable of withstanding a 100-year cyclone.

Water depth in the lagoon varies between 6-10 m at low water with a tidal range of up to 2.5 m. The volume of the John Brewer lagoon is approximately $7 \times 10^7 \text{ m}^3$ at mid tide and has flushing rates in the order of 80% every five days (Parnell, 1986). Consequently, the lagoon is shallow but well flushed. During the design phase of the hotel attempts were made to minimise any impacts of the hotel on the environment. With the exception of a brine plume from the desalination plant, no liquid wastes were to enter lagoonal waters. All waste water was treated by a package plant on board to secondary standards followed by disinfection. The solids were subsequently incinerated while the treated wastewater was loaded onto a barge and discharged at sea in an area designated under the *Environment Protection (Sea Dumping) Act 1981*.

Gaseous wastes from the incinerator were emitted from a 24 m high stack which modelling had shown (Best, 1986) to have virtually no impact on ecological or aesthetic values of the lagoon. All solid wastes were either incinerated at high temperature or returned to the mainland. Additional controls on accidental emissions (e.g. a protocol designed for fuel transfer to and from the floating hotel) were also developed (Centre for Coastal Management (CCM), 1987).

The chronology of major events during the project is given in Table 1.2 and shows that the regulatory context in which the project developed changed continuously. First, federal sea dumping legislation commenced operation in 1984 followed by Queensland state legislation on this topic in 1986. State legislation covering off-shore structures was then introduced, followed by federal legislation. Each set of regulations required permits for a project which had developed to that point without such requirements.

A number of accidental, but often only indirectly related, events occurred during the life of the project which undermined public confidence in the project. The newly acquired high-speed catamaran ('Reeflink II'), designed to carry 400 passengers to the floating hotel, caught alight during a transfer to John Brewer Reef before it could service the hotel. Between the arrival of the hotel at John Brewer Reef and its official opening, the hotel was hit by a cyclone and although it suffered no mishap, some of the peripheral structures, such as the floating tennis court, were damaged, delaying the opening to paying guests. Fantasy Island, a totally unrelated floating platform independently installed at John Brewer Reef, sank during a storm two months after the hotel opened. Finally, a large, previously unidentified ammunition dump was found in the lagoon of John Brewer Reef, approximately 5 km from the hotel!

Table 1.2. Chronology of major events in the life of the floating hotel project -1981-1989

Oct. 1981	Great Barrier Reef awarded World Heritage listing.
Nov. 1981	Preliminary engineering assessment prepared for the 'Great Barrier Reef City' - a resort comprising three ocean cruise ships permanently placed on the sea bed of John Brewer Reef, together with an artificial sand cay and underwater walk tubes, with facilities for 3,000 guests.
Mar. 1983	The concept of a floating hotel first conceived by a group of Townsville businessmen.
Mar. 1985	Draft EIS for floating hotel completed and submitted for public review.
Dec. 1985	Conditional permit (G701) issued by GBRMPA. <i>Queensland Marine (Sea Dumping) Act</i> gazetted.
Apr. 1986	A ten-year contract for the marketing and operation of the resort awarded to Four Seasons Limited.
Jun. 1986	Construction of floating hotel commenced in Singapore.
Aug. 1986	<i>Off-Shore Facilities Act (Qld.)</i> gazetted.
Sep. 1986	Barrier Reef Holdings Limited listed on Australian and New Zealand stock exchanges.
May 1987	Baseline survey of lagoon biota carried out. Permit (G87/153) issued by GBRMPA for the cropping of bommies in the vicinity of the hotel site.
Jul. 1987	EM Program independently reviewed. Monitoring of bommie cropping operation in lagoon. Reeflink II burned off Magnetic Island.
Sep. 1987	Report on the success of coral transplanting received.
Oct. 1987	Zoning Plan for Central Section of GBRMP gazetted. <i>Sea Installation Act</i> was passed by the Federal Government to provide regulatory regime for sea installations in waters adjacent to Australia. Barrier Reef Holdings issued with an Exemption Certificate under this Act pending the issue of a full permit.
Dec. 1987	EM Program and EM Plan accepted by GBRMPA. Permit (G97/416) to operate the resort issued to Barrier Reef Holdings. Barrier Reef Holdings scholarships advertised nationally.
Jan. 1988	First water quality baseline surveys undertaken. Permit to discharge treated wastewater at sea granted under <i>Environment Protection (Sea Dumping) Act 1981</i> . Resort arrived from Singapore and installed in John Brewer Reef lagoon.
Feb. 1988	Cyclone 'Charlie' passed over resort.
Mar. 1988	Resort commenced operation.
May 1988	Fantasy Island sank in John Brewer Reef lagoon.
Jul. 1988	Barrier Reef Holdings announce \$7.89 million loss for 87/88 financial year.
Sep. 1988	Resort put on the international market. Large old ammunition dump found in John Brewer Reef lagoon.
Apr. 1989	Barrier Reef Holdings became subsidiary of EIE Development Company Limited.
Aug. 1989	Overview report on EM Program covering May 1988-89 finalised. Floating hotel arrived in Ho Chi Minh City on the Mekong River, Vietnam.
Nov. 1989	Hotel officially opened to guests in Ho Chi Minh City.

After the company's takeover by Japanese interests (EIE), the floating hotel was moved to Vietnam to alleviate a shortage of quality hotel accommodation in Ho Chi Minh City - as evidenced by a >80% occupancy rate (Griffiths, pers. comm.).

Impact assessment, management and monitoring

Under the *Environment Protection (Impact of Proposals) Act 1974*, the Federal Minister for the Environment deemed that, as the project was likely to have significant environmental effects, an Environmental Impact Statement (EIS) was required and a draft EIS was submitted for public review in March 1985 (Det Norske Veritas and Coastal Ecosystems, 1985). Only six submissions were received in response to the draft EIS and the comments were incorporated into a final EIS. In December 1985, a conditional permit to install and operate the floating hotel was given by the appropriate federal agency, the Great Barrier Reef Marine Park Authority (GBRMPA).

Conditions of permission included (Dutton 1986):

- development of a resort management plan (CCM, 1987);
- development of an environmental monitoring program (CCM, 1988)
- classification of the facility and development of operational standards for matters such as public health and safety;
- insurance and environmental rehabilitation (bond) requirements;
- further research requirements (e.g. on brine plume modelling); and
- operational permission requirements (e.g. on bommie removal).

These requirements were the most comprehensive of any permit granted by GBRMPA to that time, and established a precedent for more elaborate environmental impact management regimes now used by GBRMPA for coastal and off-shore development projects (GBRMPA, 1991). In developing these requirements, the Authority also began to identify, for the first time, issues which were not capable of resolution under the planning and management regime developed to that time. As a consequence, a moratorium was placed on the further development of such facilities, to enable these permit provisions to be tested and further policy and planning studies to be completed (e.g. Cameron McNamara, 1985).

Program goal and objectives of the Environmental Monitoring Program (EMP)

The overall goal for this monitoring program was:

to provide information to management (both the resort operator and regulatory agencies) on the continuing environmental impact of the placement of the floating resort and associated operations.

The three main elements (sub-programs) of the monitoring program were defined by establishing the information needs of the operator and regulatory agencies. They included:

a. Baseline survey and trend monitoring

The baseline survey was an integral component of the monitoring activity. It was intended to provide information on the environment at John Brewer Reef and other areas of the Great Barrier Reef Marine Park to be used by the resort operation prior to the commencement of such operations. This survey allowed identification of any changes in the environment subsequent to establishment of the resort.

Trend monitoring involved the systematic assessment over time and/or space of the general state ('health') of John Brewer Reef. Trend monitoring allowed changes in the reef to be detected. This monitoring included monitoring of coral cover, fish life, crown of thorns starfish densities, etc.

Contingency monitoring, i.e. programs to monitor accidental events, changes in operational procedures or unidentified impacts as these arise, is included within this sub-program.

Objectives for the baseline survey and trend monitoring program were:

- to establish sufficient reference data on the environmental conditions at John Brewer Reef prior to the placement of the floating resort to enable comparative analysis with data obtained subsequently in other monitoring sub-programs;
- to sample episodic events in order to provide reference data for any subsequent monitoring purposes;
- to assess the overall 'health' of those areas of John Brewer Reef and other marine areas affected by this project, including those coral bommies requiring cropping for the resort placement, through purposeful and repeated examination of the state or condition of selected parameters;
- to compile data on the relative usage of the Great Barrier Reef Marine Park which directly resulted from the resort's operations; and
- to provide advance warning of environmental changes caused by the project, or which may have had an influence on the continuing operation of the project.

b. Compliance assessment

This included monitoring of any permit conditions and standards established by regulatory agencies, for example, water quality determinations on the sewage system effluent, etc. The goal was to determine the extent to which environmental quality standards and objectives established in permit conditions for the project were met.

c. Hypothesis testing

This involved structured investigations into specific areas of concern identified in the EIS, including areas where it was agreed that there was some uncertainty in relation to the possible environmental effects of an aspect of the project. These investigations included assessment of the validity of some of the predictions made in the EIS, for example, effects of night lighting on fish, noise on fish, effects of seabird droppings on lagoon water quality, etc.

Objectives of the hypothesis testing were:

- to evaluate specific hypotheses regarding the predicted environmental effects of the resort; and
- to assess the effects of aspects of the project for which no prediction was made in the EIS, or about which some uncertainty existed.

The results obtained from each of these monitoring programs form the basis of this case-study, and are discussed in detail in the following sections.