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# Proposed Clump Point Boat Ramp & Facilities - Review of Marine Environment Factors (seagrasses and other benthic habitats).

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*Report to*  
Queensland Department of Main Roads

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*Disclaimer*

Seagrass maps in this report are magnified so that small meadows can be illustrated. Estimates of mapping error (necessary for measuring changes in distribution) are not to be inferred from the scale of these hard-copy presentation maps. These can be obtained from the original GIS database maintained at the Northern Fisheries Centre, Cairns and archived at the Great Barrier Reef Marine Park Authority.

The Department of Primary Industries, Queensland has taken all reasonable steps to ensure the information contained in this publication is accurate at the time of the survey. Habitat distribution and abundance can change seasonally and between years, and readers should ensure that they make appropriate enquires to determine whether new information is available on the particular subject matter.

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## 1. INTRODUCTION & BACKGROUND

### 1.1. Consultancy Brief

The Queensland Department of Main Roads (QDMR), develops and manages the State's road network, and infrastructure. The proposed development by QDMR of an all weather boat ramp for recreational fishers at Clump Point includes extension of the existing breakwater, excavation of an all-tide access basin for boats and improvements to boat ramp and parking facilities. A two stage construction was proposed. Stage 1 comprises of a boat ramp, pontoon (modular jet float), an 80m extension to the existing breakwater, excavation of all-tide boat access basin and a landfall light. Stage 2 includes additional car parking facilities and improved access roads.

Prior to seeking permits from relevant agencies, QDMR decided to conduct a review of marine environment factors (REF) for the proposed works and has contracted the Queensland Department of Primary Industries (QDPI) Northern Fisheries Centre (NFC) to identify potential marine environment issues.

A survey and inspection of marine habitats was conducted at Clump Point, December 1998, with the following objectives set:

1. *Conduct a survey of benthic habitats, specifically seagrass distribution and cover, at Clump Point (in an area extending at least 250 metres radius of existing rock wall),*
2. *Present the results of the benthic survey on a GIS of the area,*
3. *Compile a report which will*
  - *Identify any likely environmental factors (including level of importance) associated with the construction and operational phases of the proposed boat ramp,*
  - *Identify alternative strategies for planning, design, construction or maintenance of proposed facilities, including timing of works, to minimise any likely impacts, and*
  - *Recommend whether further detailed assessment is required.*

### 1.2. Site Description

Clump Point is a northerly facing headland two kilometres north of the township of Mission Beach at approximately 17° 51'19.37''S 146° 6' 57.82''E (Figure 1). The headland promontory provides access to the existing Clump Point boat ramp. This promontory shelters Boat Bay and a second small bay which become exposed at low spring tides (Figure 2).

Major marine habitats include:

1. An intertidal mangrove fringe (predominantly *Rhizophora* spp. and *Avicennia marina*) around all of Clump Point and the small sheltered bays west of the point;

2. Sub-tidal macro-brown algae and hard coral growing on basalt boulders;
3. Intertidal and sub-tidal mud and sand substrate which supports invertebrate infauna (eg., burrowing shrimps and crabs); and
1. Sub-tidal seagrasses.

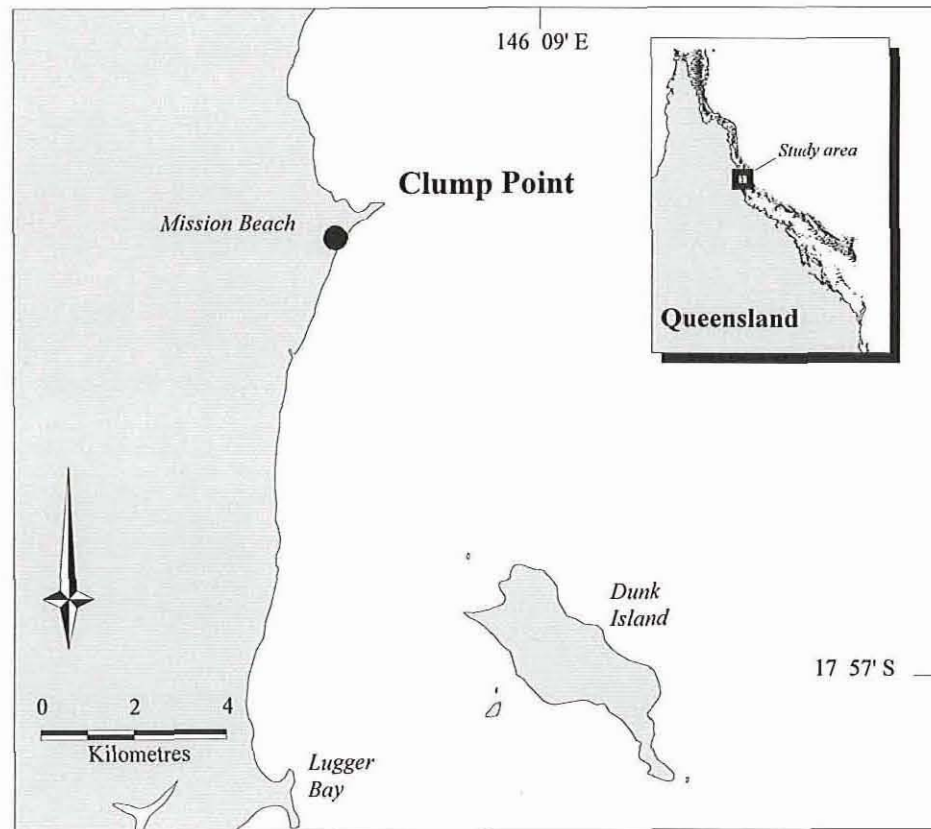


Figure 1. Location map of Clump Point.

## 2. SITE ASSESSMENT

### *Objectives:*

1. Conduct a survey of benthic habitats, specifically seagrass distribution and cover, at Clump Point (in an area extending at least 250 metres radius of existing rock wall),
2. Present the results of the benthic survey on a GIS of the area,

### 2.1. Survey methodology

Benthic habitats were surveyed between 11<sup>th</sup> and 12<sup>th</sup> of December 1997. Transects perpendicular to the shoreline were established with buoys across the reef flat and lagoon within a radius of 250m from the end of the existing breakwater. Survey sites were sampled approximately every 50 m along each transect, while random sites were sampled to measure continuity of benthic habitat between transects (Figure 2). At each survey site, estimates of



above-ground seagrass biomass (3 replicates of a 0.25 m<sup>2</sup> quadrat), seagrass species composition, % cover of each benthic category, and sediment characteristics were recorded. Sediment characteristics were described using visual estimates of grain size: shell grit, rock gravel, coarse sand, sand, fine sand and mud. A differential global positioning system (dGPS) was used to locate each survey site.

Above-ground seagrass biomass was determined by a “visual estimates of biomass” technique described by Mellors (1991). The technique requires each observer to rank above-ground seagrass biomass in the field. These ranks are then calibrated for each observer against a set of harvested quadrats to calculate above-ground biomass estimates in grams dry weight per square metre of substrate (g DW. m<sup>-2</sup>).

A systematic “point” method was used to estimate percent cover information of benthos within each quadrat. This is a modification of the video technique used to assess the sessile communities of coral reefs (Osborne and Oxley 1997). An observer identifies the benthos (benthic category) occurring under 5 points visualised within the quadrat. The 5 points within the quadrat are visualised, top-left = 1, top-right = 2, middle = 3, bottom-left = 4 and bottom-right = 5. For each quadrat, frequency of occurrence for each benthic category is converted to a percentage of the total number of points (5 per quadrat).

## ***2.2. Geographic Information System***

All data were entered onto a Geographic Information System (GIS). A new base-map for Clump Point was created from a rectified 1:12,000 aerial photograph (20 March 1996, Beach Protection Authority) and 5 dGPS control points. All maps and GIS outputs were produced using Australian Map Grid (AMG) Zone 55 projection.

Major benthic habitat types were identified within the survey area from survey data and interpretations of the aerial photo. Six dominant benthic habitat types were mapped, including 1) hard corals, 2) coral rubble, 3) boulder/rock, 4) macro brown algae, 5) seagrasses and 6) sand/mud bottom (Figure 2)

Boundaries of seagrass meadows, hard corals, rocks and brown algae were drawn based on the positions of survey sites and interpretations of the aerial photograph. Errors which should be considered when interpreting GIS maps include those associated with dGPS fixes for survey and control sites, and with digitising and rectifying the aerial photograph onto the GIS. The error from the position of diver relative to the GPS receiver was assumed to be embedded within this range.

## 2.3. Survey Results

### 2.3.1. Seagrass meadows

Five species of seagrasses (in 2 Families) were found within the Clump Point survey area:

**Family Cymodoceaceae**

*Cymodocea serrulata* (R. Br.) Aschers. And Magnus

*Enhalus acoroides* (L.f.) Royale

*Halodule uninervis* (Forsk.) Aschers. In Boissier

**Family Hydrocharitaceae**

*Halophila decipiens* Ostenfeld

*Halophila ovalis* (Br.) D.J. Hook.

In December 1998, approximately 2.8 hectares of seagrass in 8 meadows was mapped in the Clump Point survey area (Figure 3). The majority of seagrass was found along the outer edge of Boat Bay, the sheltered bay west of Clump point. Smaller patches were found in close to the existing boat ramp, and in sheltered parts of the fringing reef east of the breakwater. A small patch of the seagrass *Enhalus acoroides* was found inside Boat Bay, close to the mangrove fringe (Figure 2).

### 2.3.2. Hard corals (massive & branching)

Hard corals were not examined in detail, as it was beyond the scope of this survey. Hard corals were grouped into broad categories (massive and branching) and identified to family or genus where possible.

1.8ha of established and juvenile hard corals (*Porites spp.*, *Acropora spp.* and *Goniopora spp.*) were found along the fringing reef, and as isolated bommies, north to north-east of the existing breakwater (Figure 2). Three isolated bommies approx 100 - 500m north of the breakwater were found, and more are likely to occur. An isolated bommie was also found in the bay 220m SSW from the end of the existing breakwater.

### 2.3.3. Other benthic habitats

***Brown algae dominated***

3.7 ha of brown algae (*Sargassum spp* and *Padina spp.*) habitat was mapped in the Clump Point survey area (Figures 2 & 3). Brown algae (attached wherever boulders occurred sub-tidally) formed a continuous habitat across the outer edge of Boat Bay west of Clump Point, and along the north-eastern side of Clump Point, (Figures 2 & 3).

***Rocky habitat***

Boulders 0.2m to 2m diameter and of volcanic origin, formed a perimeter seaward of the mangrove zone of Clump Point and surrounding coast. In some areas these extended to below the intertidal zone and provide substrate for

brown algae or coral (see above). 4.3 hectares of rock occurred in a 20-100m intertidal band which fringed the mangrove zone along the northern side of Clump Point and perimeter of Boat Bay (Figures 2 & 3). These rocks provided a substrate for organisms such as oysters, and shelter for fish and crabs during high tide.

***Intertidal and sub-tidal sand/mud areas***

The majority of the intertidal and the subtidal area surveyed was predominantly bare sediment with occasional marine life such as hydroids, soft coral, clam shells, or green algae (Figure 2).

***2.4. Other issues***

Apart from hard corals and macro-algae, there was a high diversity of other marine life (eg., hydroids, sponges, soft corals, clams, red algae, green algae, and oysters), but these did not form dominant benthic communities. The sand and mud sediments in the immediate vicinity of the proposed facility supported populations of burrowing shrimp and crabs - and other prey items for animals of fisheries importance.

An archaeological assessment was undertaken for the Clump Point area during 1994 (Bird 1994) and found seven archaeological sites in or adjacent to Boat Bay (Appendix 1). These sites have both Aboriginal and European origins. Aboriginal sites include two stone alignments which are possible remnants of fish traps, a ceremonial ground and an isolated stone artefact. Sites of European heritage include the Cutten brothers walking track and the remains of a boat jetty built early this century.



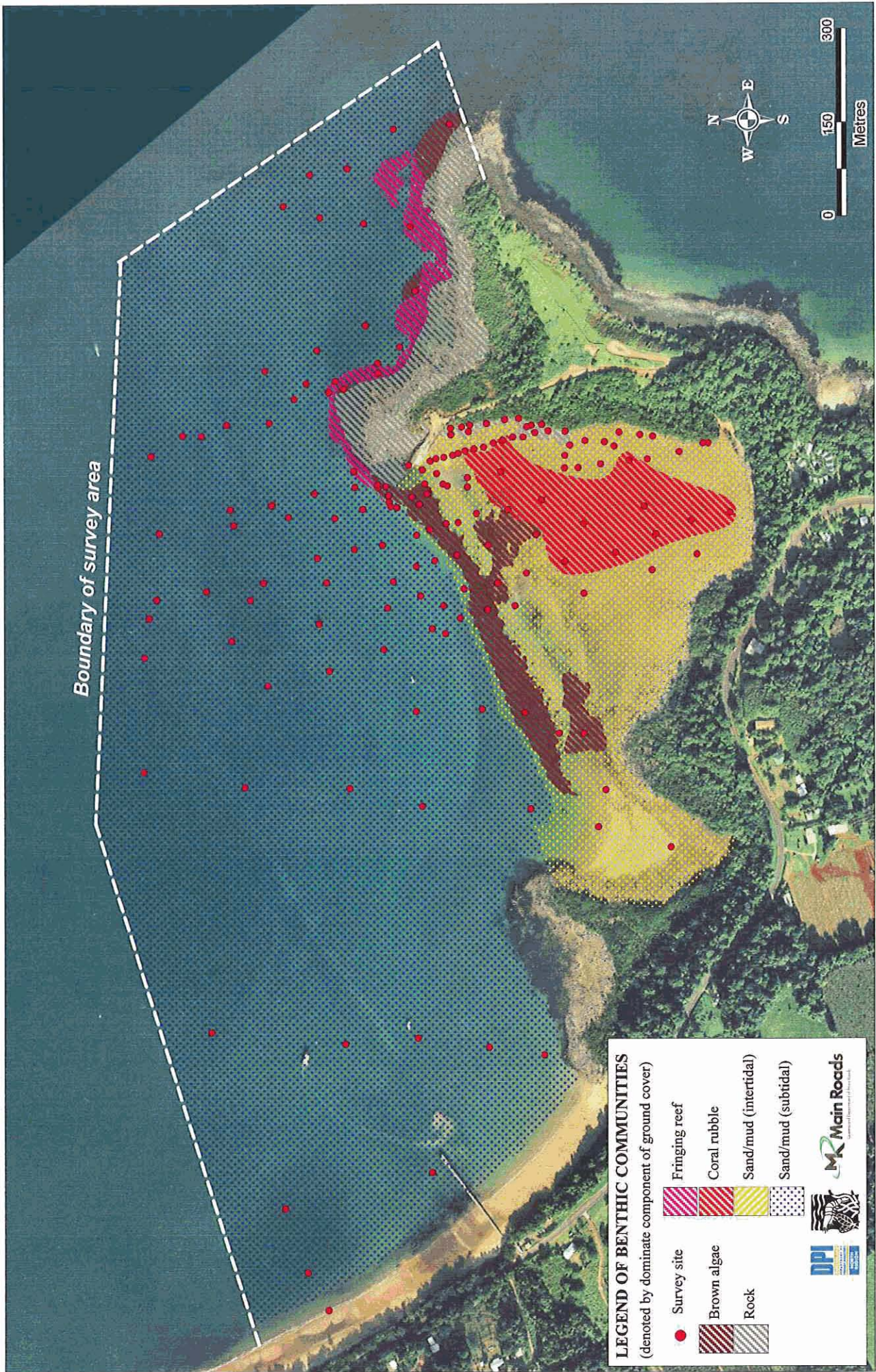


Figure 2. Location of survey sites and major benthic habitats at Clump Point, December 1997.



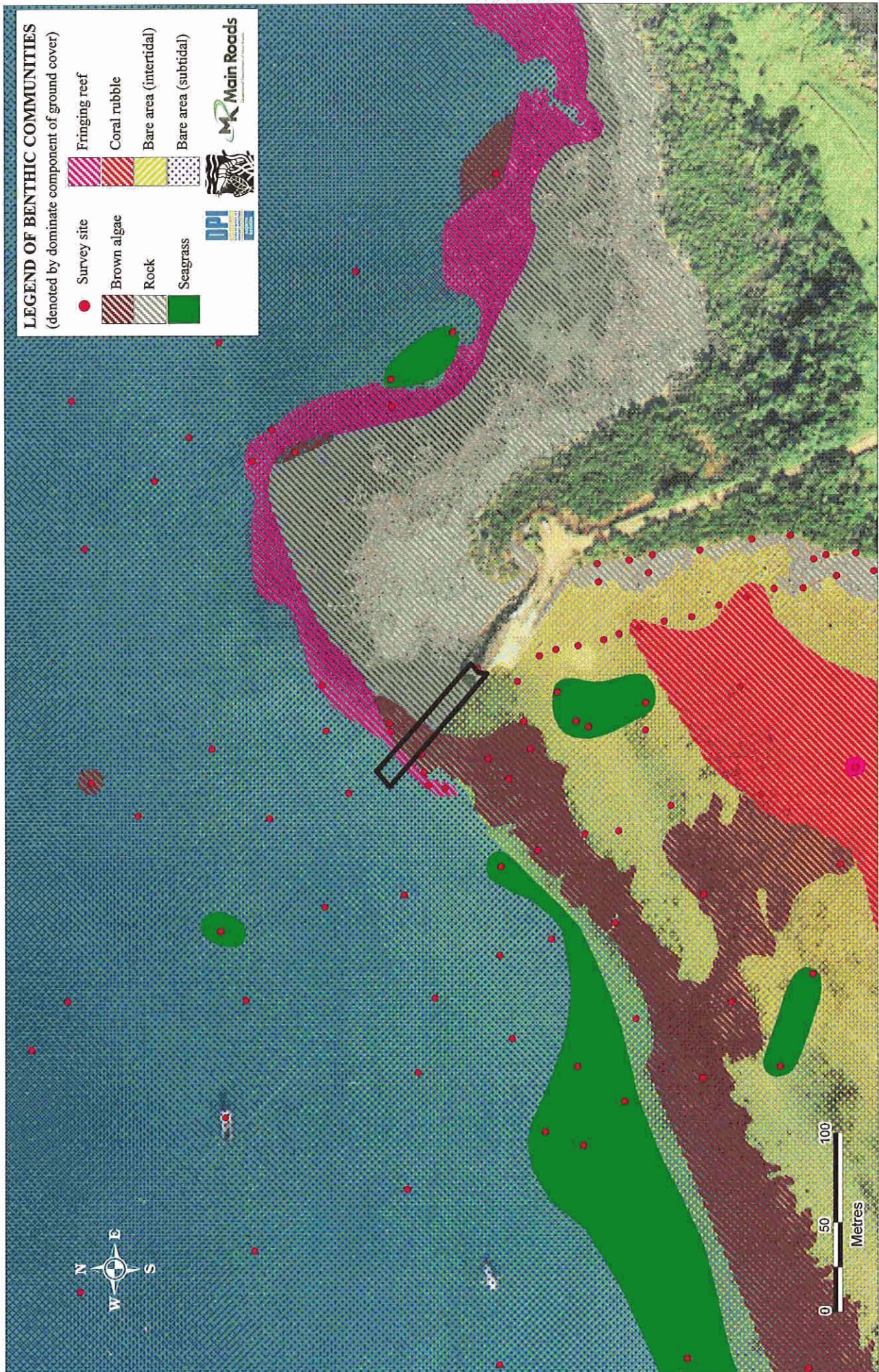


Figure 3. Location of seagrass meadows and benthic communities at Clump Pt, Dec 1997, with the proposed rock wall extension.



### ↳ 3. REVIEW OF ENVIRONMENTAL FACTORS

#### *Objective*

Compile a report which will

- *Identify any likely environmental impacts (including their level of significance) associated with the construction and operational phases of the proposed boat ramp,*
- *Identify alternative strategies for planning, design, construction or maintenance of proposed facilities, including timing of works, to minimise any likely impacts, and*
- *Recommend whether further detailed assessment is required.*

#### **3.1. Likely Environmental Impacts**

Clump Point marine habitats are in Queensland waters and located 5 kilometres from Great Barrier Reef Marine Park World Heritage Area (zoned Marine National Park "A"). Excavation and construction will require a Section 86 permit from Queensland Department of Environment and a Section 51 Permit from Queensland Department of Primary Industries. Plans would be expected to include methods of minimising sediment loads on surrounding fisheries habitat and to include appropriate storage/location and containment of excavated sediment and suggested mitigation of environmental impacts. A terrestrial sediment dumping option will likely require assessment of potential contaminants and acid sulphate soils. Some precautions for minimising impacts on fisheries habitats and fisheries values from the proposed works and associated sediment loads are listed below (Section 4).

The final development, including vessel operations, changes in hydrology and maintenance dredging, will likely have small impacts on marine habitats immediately adjacent to the facility. Factors to address here are the projected increases in vessel use and boat traffic at the facility and best practice methods to ensure these impacts can be contained to within acceptable levels. Some likely environmental factors are addressed below.

Hydro-carbons from motor-vessels (oil and fuel discards and spills) are likely to present chronic, low impacts on coral, mangrove and soft bottom habitats immediately adjacent to the facility.

Sediment accretion in the (proposed) excavated boat access basin will likely lead to requirement for maintenance dredging so the proposal will need to identify possible impacts of maintenance dredging and precautionary measures to minimise impacts (see below).

##### **3.1.1 Seagrasses**

Stage one will have a direct impact on a small area of seagrass habitat adjacent to the existing boat ramp. Construction of the breakwater and car park will not occur directly over seagrasses, however plumes of suspended sediments could shade nearby seagrasses for a period of time determined by currents (tide and wind driven), and the duration of construction works.



Excavation of materials for the all-tide access basin will damage or remove a small (0.16 ha, approximately 6% of the total survey area) seagrass meadow located adjacent to the existing boat ramp. During capital and maintenance dredging, seagrass meadows located over 90 metres to the west and south west of the boat ramp may be shaded for a period of time depending on the hydrological factors mentioned above. These possible impacts are considered to be very low and of little ecological importance.

### **3.1.2 Hard Corals**

A small amount of hard and soft corals to the north and north-west of the breakwater will be destroyed by the construction of the rock wall, while the majority of the fringing coral reef is sheltered from potential impact. Excavation of materials may cause a sediment plume, which could shade corals in the immediate area during construction. *Further investigation is recommended to assess the importance of these coral communities and possible impacts.*

### **3.1.3 Other Habitats**

Extension of the rock wall and excavation of materials will directly displace a small area of brown algae habitat to the north, north-west of the construction site, but new hard substrate formed as the base of the extended breakwater will likely contribute to replacement of the lost algae habitat. This impact is considered to be insignificant and impacts on the remainder of this habitat are likely to be close to nil. Excavation works may temporarily influence growth of brown algae and soft bottom communities within the bay, through suspended and resettled sediments, but impacts are likely to be insignificant against natural wind- and current-driven sediment suspension and re-settlement.

## **4 RECOMMENDATIONS**

1. A more detailed assessment of the hard coral communities at Clump Point will need to be conducted to determine their significance/importance to the site/region.
2. Results of this report could be included with the required application for a (QDPI) Section 51 Permit to remove, damage or destroy marine plants.
3. Detailed engineering and hydrographic information will likely be required with the final excavation and spoil-dumping plan to aid assessment for a Department of Environment Section 86 permit.
4. We suggest that construction take place at a time which will minimise impacts (eg., shading, or disturbance by sediment plumes) on hard corals, brown algae, seagrasses and other marine life in the area. Sediment excavation would best be conducted on an ebb tide and during southerly winds to allow suspended sediments to be flushed seaward and diluted rather than settle over more sensitive inshore and intertidal habitats. Limiting excavation operations to low-tide periods would also minimise the length of time sediments could be suspended and re-distributed in the water column, helping to minimise the extent of impacts on benthic communities. Issues of timing may be included as conditions of a Section 51 Permit.

5. Proposals for land or sea dumping of the dredge spoil material will require investigation of the potential for acid sulphate soil problems associated with excavated materials.
6. Stonework alignments described in the archaeology study (Bird 1994), and precautions which help preserve these cultural features need to be identified. Other cultural and heritage features including a fish trap, bora ground, and an isolated artefact are distant from the site and not likely to be affected with the construction of a rock wall and excavation of sediments. A historic boat jetty on the opposite side of Boat Bay may need to be considered when assessing impacts of increased vessel use of the boat ramp facility.

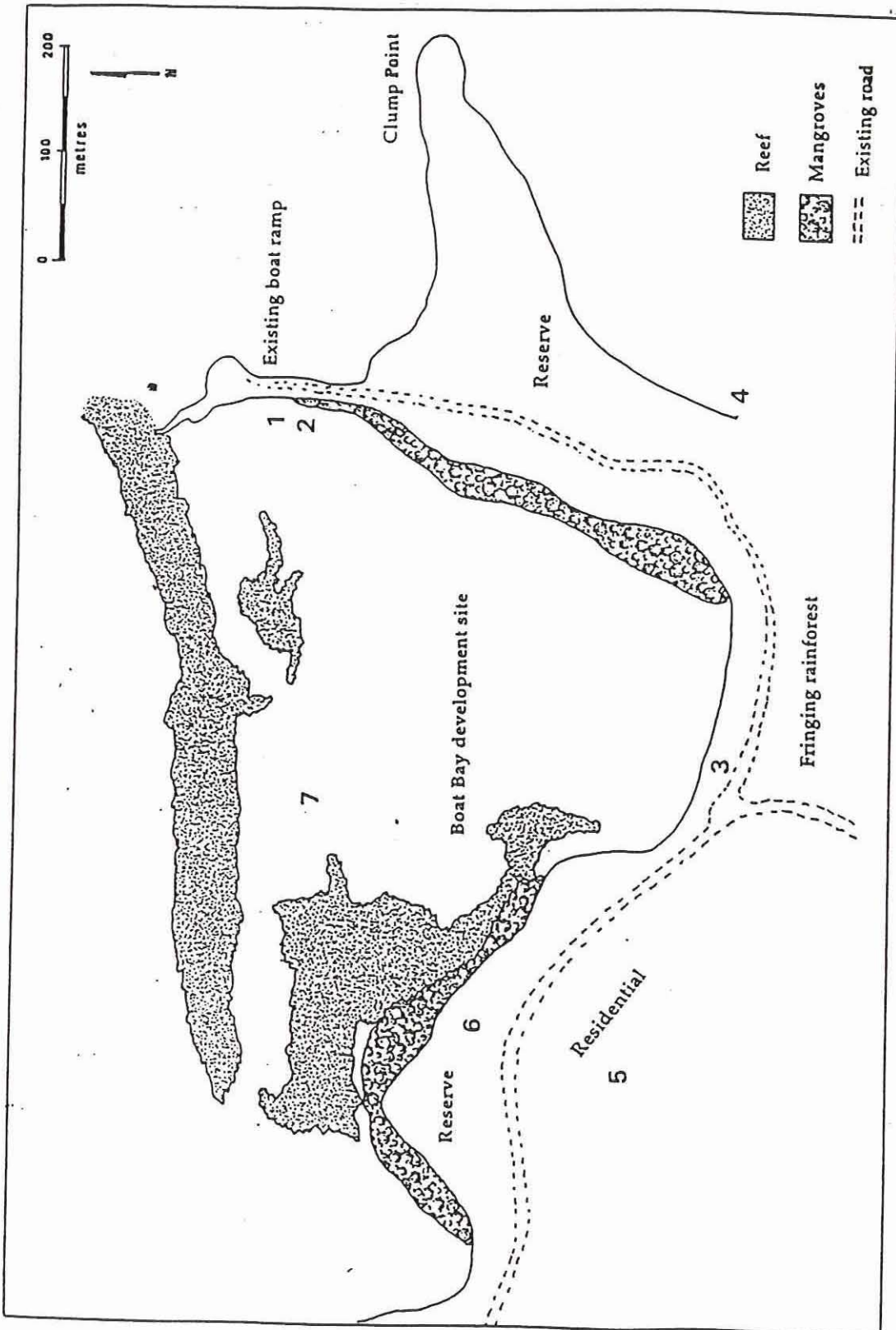
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Map of Clump Point and Boat Bay development site showing current land use and location of archaeological sites (reprinted from Bird 1994).



LEGEND

- 1 Stone alignment
- 2 Stone alignment
- 3 Isolated artefact
- 4 Fish trap
- 5 'Bora ground'
- 6 Historic walking track
- 7 Historic boat jetty