



C&R CONSULTING

Geochemical & Hydrobiological Solutions Pty Ltd

ABN 72 077 518 784

Marine and Coastal Processes and Dynamics
Groundwater and Environmental Specialists
Environmental Compliance and Monitoring
Contaminated Site and Soil Assessment
HydroGeomorphic Evaluations
Chemical & Water Modelling
Spatial Analysis
GIS Services

PO Box 1777
Thuringowa Qld, 4817, AUSTRALIA

Tel: +61 (0) 7 4725 3751
Mob: +61 (0) 417 635 032

info@candrconsulting.com.au
www.candrconsulting.com.au

June 6th, 2008

Ms Kelly Lynch
Environmental Consultant
Hyder Consulting
South Brisbane Q 4101

Dear Kelly,

Re: Townsville Ocean Terminal – Marine Habitat Map Interpretation

Attached please find a series of 6 biological distribution maps for the area to the west of the area known as the Duck Pond in Cleveland Bay, and for the specified section of Ross Creek associated with the proposed temporary bridge overpass for the Townsville Ocean Terminal.

Dr Ceccarelli's report on each site follows:

Map 1: Seagrass density

The density estimates shown in the map are derived from five replicate 25 by 25cm quadrats at each point – these sampling units were kept small by the extremely low visibility throughout the site. Open dots reflect points where no seagrasses were found. Seagrasses occur in the project footprint at low densities. Scattered patches are found in the northern half of the area, with a more contiguous cover occurring in the southern half. The species occurring throughout the area are *Halophila ovalis* and *H. spinulosa*, with isolated occurrences of *Halodule uninervis*. No dugong feeding scars were observed during this survey.

Overall, seagrass areas covered 17.9ha, or 30.5% of the project site.

The only substrate type found in the project site, apart from the rock walls, was fine silt.

Map 2: Macroalgal cover

The % cover of macroalgal species in the project footprint was minimal, and spread out in sparse patches over the southern two thirds of the area. The most abundant and widespread species was the calcified red alga *Jania* sp., with isolated patches of *Caulerpa* sp (green algae) and filamentous red algae.

Overall, macroalgae covered 7.9ha, or 13.9% of the project site.

Map 3: Benthic macroinvertebrate density

The benthic macroinvertebrate community included bivalves (scallops and oysters), hydroids, crinoids (feather stars), ascidians (both colonial and individual), sponges, flatworms, nudibranchs, crayfish and polychaetes (worms). Overall, there was a low density of invertebrates, with most organisms found in the southern two-thirds of the site. Many of these invertebrates have been recorded in the diets of commercially and recreationally important fish that occur in Cleveland Bay (see Appendix 1 in Nature Conservation Report).

Overall, benthic invertebrate habitat comprised 21.3ha, or 36.3% of the project site.

Map 4: Invertebrate burrow density

CLIENT:
PROJECT
REPORT
DATE:



Burrows in the sediment give an indication of the density of sediment-dwelling organisms within the site. These can also be important components in the diets of commercially and recreationally targeted fish (see Appendix 1 in Nature Conservation Report). Burrows primarily signal the presence of worms, crustaceans and small fish in the area; two fish in the family Gobiidae were observed during the surveys. Burrows are seen as evidence of live animals because they are likely to collapse when not regularly 'maintained' by the inhabitants. Most of the project footprint had very high densities of invertebrate burrows of varying sizes (a few mm to approximately 10cm in diameter). The highest densities were generally found towards the middle of the site.

Map 5: Ross Creek to Kissing Point marine plant map

There is a dense bed of *Caulerpa* sp., a green alga, extending from the lower intertidal (exposed to the air only on mid- to king low tides) approximately 200m seaward from the Strand along its whole length. Seagrasses occur in sparse patches (approx. 10-20% cover) at the southeastern end of the seagrass bed, becoming more contiguous towards Kissing Point. The area near Kissing Point also contains a diverse soft-bottom community including sponges, bryzoans, ascidians and other sessile invertebrates. These provide habitat for juvenile fish (observed during the June survey) and mobile invertebrates. These communities also increase in density towards Kissing Point.

Map 6: Ross Creek bank marine plant map

No seagrasses or other organisms were found in Ross Creek at the site of the proposed temporary bridge. The creek banks under the footprint of the proposed bridge contained a number of mangrove trees of the species *Avicennia marina*. Closer to the existing road, there were a number of Townsville wattles. The higher section of the bank contained a mixture of Guinea grass and Para grass. No saltwater couch was found growing in the area.

Other notes:

While conducting the mapping of the project site, the following animals were also seen:

- Unidentified shark
- Feeding Crested terns
- Feeding Brahminy kites
- Grey reef herons

Kind regards,

Cecily Rasmussen

Dr Cecily Rasmussen
Director / Geomorphologist
C&R Consulting
Geochemical and Hydrobiological Solutions Pty Ltd
Tel: +61 (0) 7 4725 3751
Mob: +61 (0) 417 635 032
cecily@candrconsulting.com.au
www.candrconsulting.com.au

481400 000000

481600 000000

481800 000000

482000 000000

482200 000000

7872400 000000

7872200 000000

7872000 000000

7871800 000000

7871600 000000

7871400 000000

7871200 000000

7872400 000000

7872200 000000

7872000 000000

7871800 000000

7871600 000000

7871400 000000

7871200 000000

Seagrass density (shoots per m²)
May 1 2008

- 3 - 6
- 7 - 19
- 20 - 45
- 46 - 86
- 87 - 170

seagrass habitat

C&R



200 100 0 200 Meters

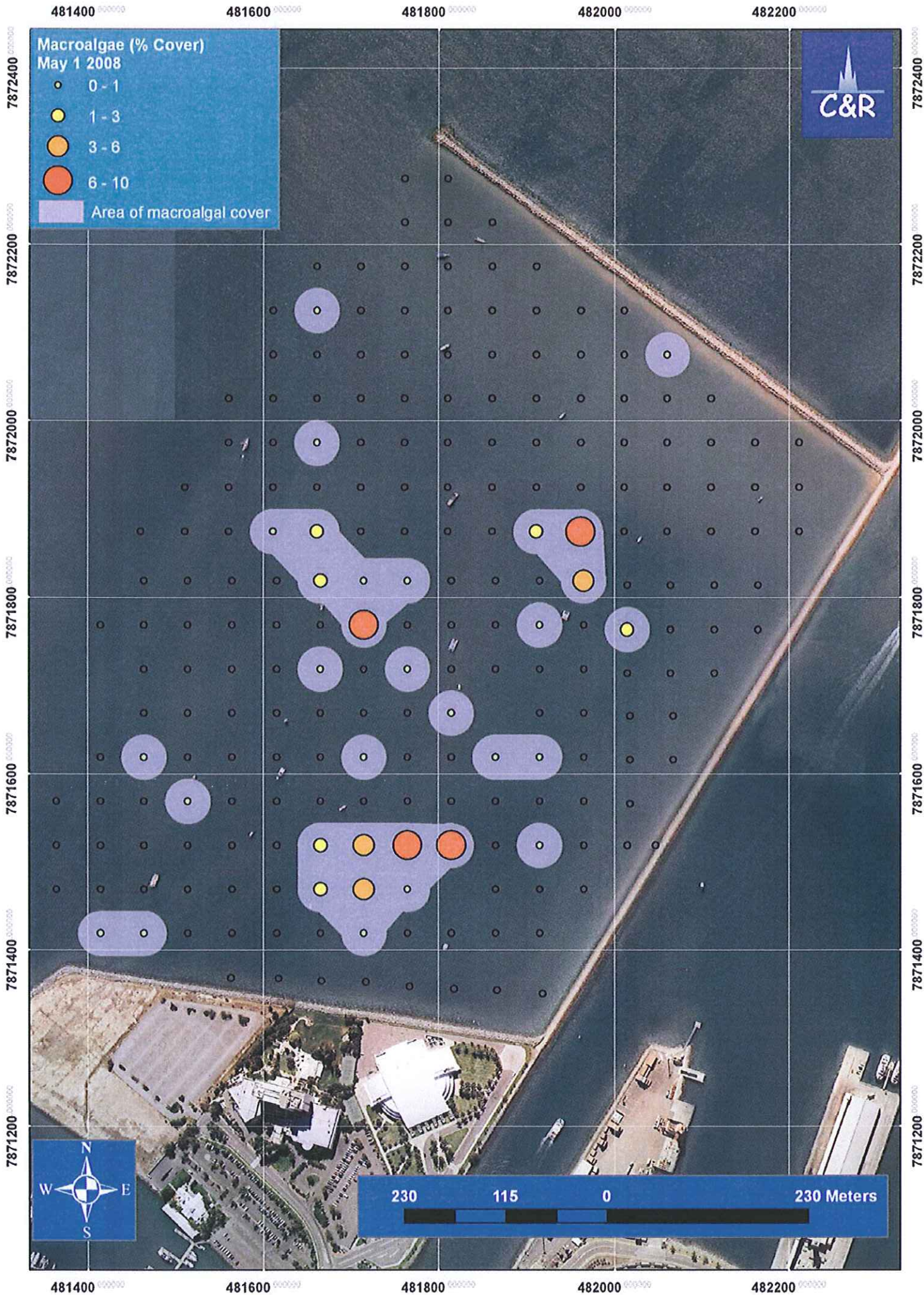
481400 000000

481600 000000

481800 000000

482000 000000

482200 000000



481400 000000

481600 000000

481800 000000

482000 000000

482200 000000

7872400 000000

7872200 000000

7872000 000000

7871800 000000

7871600 000000

7871400 000000

7871200 000000

7872400 000000

7872200 000000

7872000 000000

7871800 000000

7871600 000000

7871400 000000

7871200 000000

Benthic invertebrate density (numbers per m²)

May 1 2008

- 3 - 6
- 7 - 13
- 14 - 19
- 20 - 29
- 30 - 38

Benthic invertebrate habitat

C&R



200 100 0 200 Meters

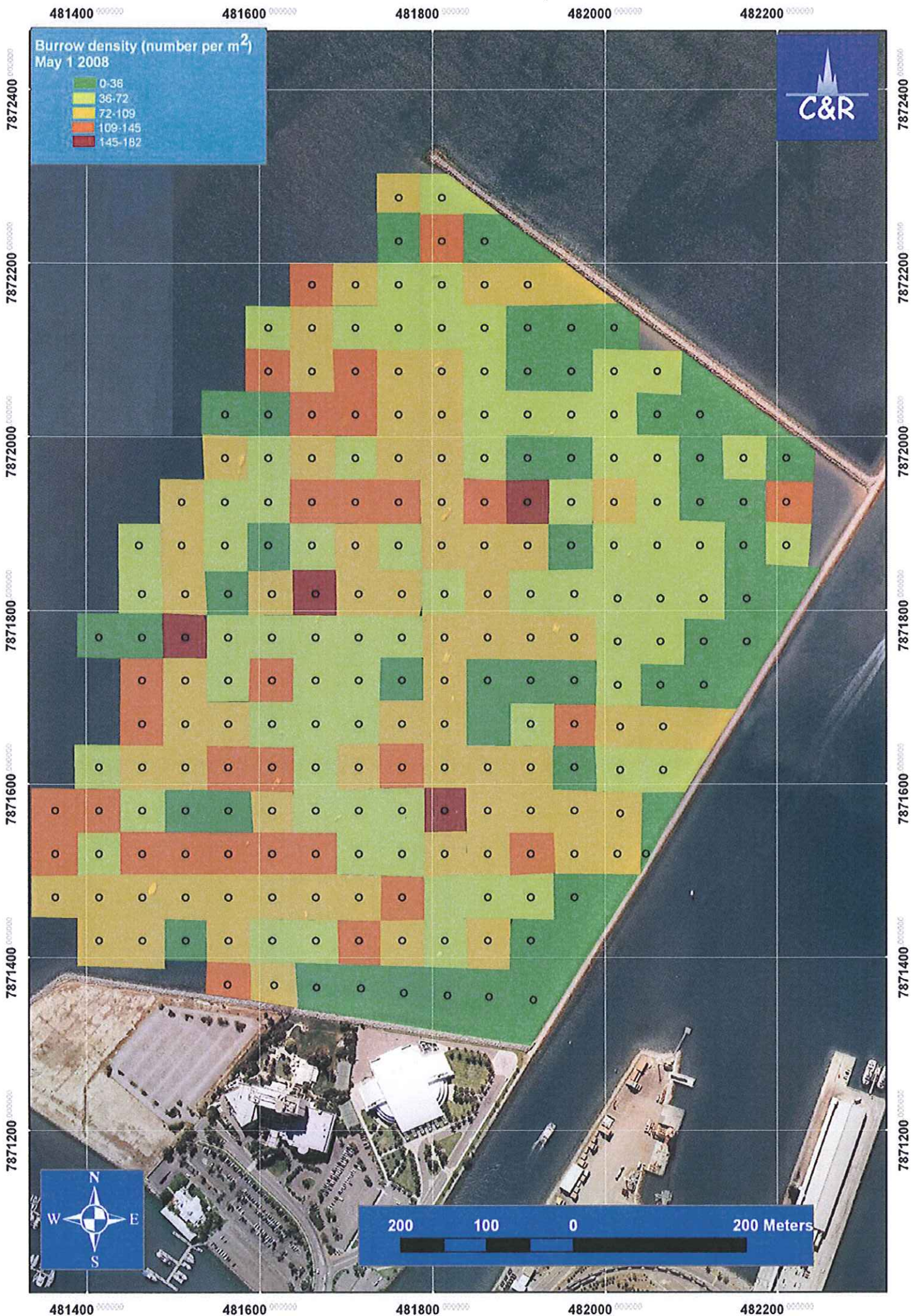
481400 000000

481600 000000

481800 000000

482000 000000

482200 000000





481700 000000

481600 000000

481500 000000

481700 000000

481600 000000

481500 000000



Marine Investigation Points Ross Creek June 2008

- ✕ Sample point locations
- *Avicennia marina*



50 Meters

0

25

50

7870500 000000

7870500 000000

