14. References

ACECRC (2008), Antarctic Climate & Ecosystems Cooperative Research Centre, 2008, A post IPCC-AR4 Update on Sea Level Rise.

Armstrong, K.J. (1990) "Holocene Coastal Evolution - Southern Bribie Island". Marine and Coastal Investigations Report MA 49/1, Queensland Department of Resource Industries, March 1990.

Climate change in the South East Queensland Region, Queensland Office of Climate Change, 2009, http://www.climatechange.qld.gov.au/_data/assets/pdf_file/0012/24006/SEQ_RegSumm_20090713_web.pdf.

EPA (2004), Options for the Management of Beach Erosion along the South-western Foreshore of Bribie Island Caboolture Shire, Environmental Protection Agency, February 2004, for the Caboolture Shire Council.

Ford, L.R. (1977), “Alternative means of combating beach erosion”, Beach Conservation No 29, newsletter of the Beach Protection Authority, October 1977.

GHD (2003), Storm Tide Modelling Study of the Whitsunday Coast and Resort Islands, GHD and SEA, November 2003.

Grosser, M.R. (1995) "Sedimentology, Stratigraphy and Quaternary Evolution of a Mesotidal Barrier-Lagoon-Estuary, Southern Pumicestone Passage", Honours Thesis, School of Geology, Queensland University of Technology, Brisbane

IPCC (2001), Intergovernmental Panel on Climate Change, 2001, Climate Change 2001: Synthesis Report. A Contribution of Working Groups I, II, and III to the Third Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom, and New York, NY, USA.

IPCC (2007), Intergovernmental Panel on Climate Change, 2007, Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Geneva, Switzerland.

Kamphuis J.W (1991) Alongshore sediment transport rate, 1991, Journal of Waterway, Port, Coastal, and Ocean Engineering, Vol. 117, No. 6.

Jones, M.R. (1992) "Quaternary Evolution of the Woorim - Point Cartwright Coastline". Report prepared for the Beach Protection Authority by the Marine Science Unit, Department of Minerals and Energy, Project Report MA 49/2, October 1992.

Milton, D & Dening, J. (2009) *Moreton Bay Regional Council Shorebird Habitat Mapping Project*; Queensland Wader Study Group and Moreton Bay Regional Council, Queensland

MSQ (2010), The Official Tide Tables and Boating Safety Guide, Maritime Safety Queensland, Queensland Government, 2010.

OHAR2, Ocean Hazards Assessment – Stage 2, Tropical Cyclone-Induced Water levels and Waves: Hervey Bay and Sunshine Coast, Queensland Government, SEA, JCU, BoM, July 2004.

OHAR3, Ocean Hazards Assessment – Stage 3, Surge Plus Tide Statistics for Selected Open Coast Locations along the Queensland East Coast, Queensland Government, SEA, JCU, BoM, July 2004.

Queensland Government. (2002) State Coastal Management Plan. http://www.derm.qld.gov.au/environmental_management/coast_and_oceans/coastal_management/state_coastal_management_plan/index.html

SEQ Catchments 2010, "Climate Proofing Bribie", A Climate Adaptation Action Plan, May 2010, SEQ Catchments in association with University of Sunshine Coast and Climate Proofing Bribie Working Group.

South East Queensland Healthy Waterways Partnership (2007). South East Queensland Healthy Waterways Strategy 2007-2012. http://www.healthywaterways.org/TheStrategy/ActionPlanLinks.aspx

Appendix A

Hydrodynamic and Wave Analysis

Moreton Bay Regional Council

Bellara, Bongaree & Sandstone Point Shoreline Erosion Management Plan

Hydrodynamic and Wave Analysis

December 2009

Contents

Table Index

Figure Index

Appendices

1. Description of Models

The numerical modelling aspects of the study were carried out using two models. These are:

- a two-dimensional (depth-averaged) hydrodynamic model based on the FLOW module of the Delft-3D modelling system; and
- a phase-averaged, third-generation, fully spectral wave model based on the SWAN (Simulating WAves Nearshore) model.

Details of the models are presented in the following sections.

1.1 Hydrodynamic Model

All simulations have been carried out using the Delft-3D modelling system developed by Delft Hydraulics (The Netherlands). This is a state-of-the-art, fully interactive coastal area modelling framework, with a long history of successful applications to coastal and estuarine waters and a proven capability of modelling hydrodynamics, transport and water quality processes in complex coastal areas.

1.1.1 Background

The adopted model is a variant of GHD's Moreton Bay model developed in 2002 (Figure 1-1). In its original version the Moreton Bay model consisted of 10303 active grid cells, ranging from 0.08 km^2 in southern Moreton Bay (near Russell Island) to as large as 4.0 km^2 along the North Passage open boundary. The extent of the model as shown in Figure 1-1 is approximately 40 km in the offshore direction (east to west) and approximately 140 km in the alongshore direction (north to south). In 2002, the Moreton Bay model was calibrated against predicted water levels at tidal station Brisbane Bar (Figure 1-2). A few years later (2004-2006), the model was successfully verified against additional water level data and integrated into GHD's South East Queensland modelling system (Figure 1-3).

1.1.2 Upgrade of Existing Hydrodynamic Model

The hydrodynamic model adopted for this study was deployed on the same orthogonal curvilinear grid as the 2002 Moreton Bay model. However, the model was substantially refined in order to adequately represent the cross-shore distribution of tidal streams and sand transport potential along the south-western coast of Bribie Island. As a result, the grid of the model was regenerated with a typical cell size of the order of 250-350 m in the Pumicestone Passage and the approaches leading to the Passage.

Orthogonal curvilinear grids allow variable spatial resolution to be used in the horizontal plane thus ensuring high overall computational efficiency and optimal topographical schematisation in the areas of interest (e.g. inner areas of the Bay) while ensuring a highly effective, albeit coarser, representation of bathymetric features and hydrodynamic conditions away from the areas of interest (e.g. near the offshore boundaries of the model).

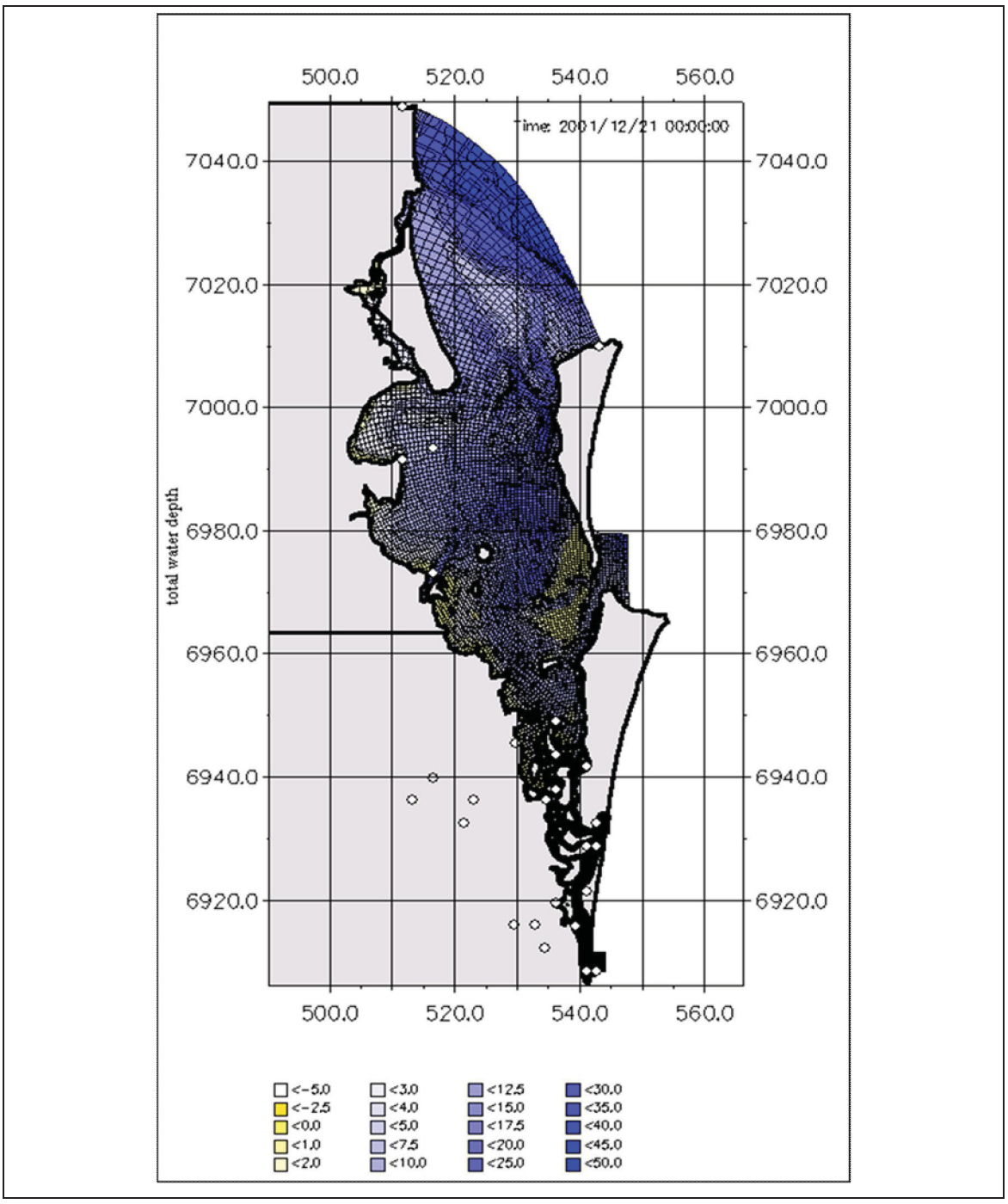


Figure 1-1: Extent of the hydrodynamic model of Moreton Bay developed in 2002.

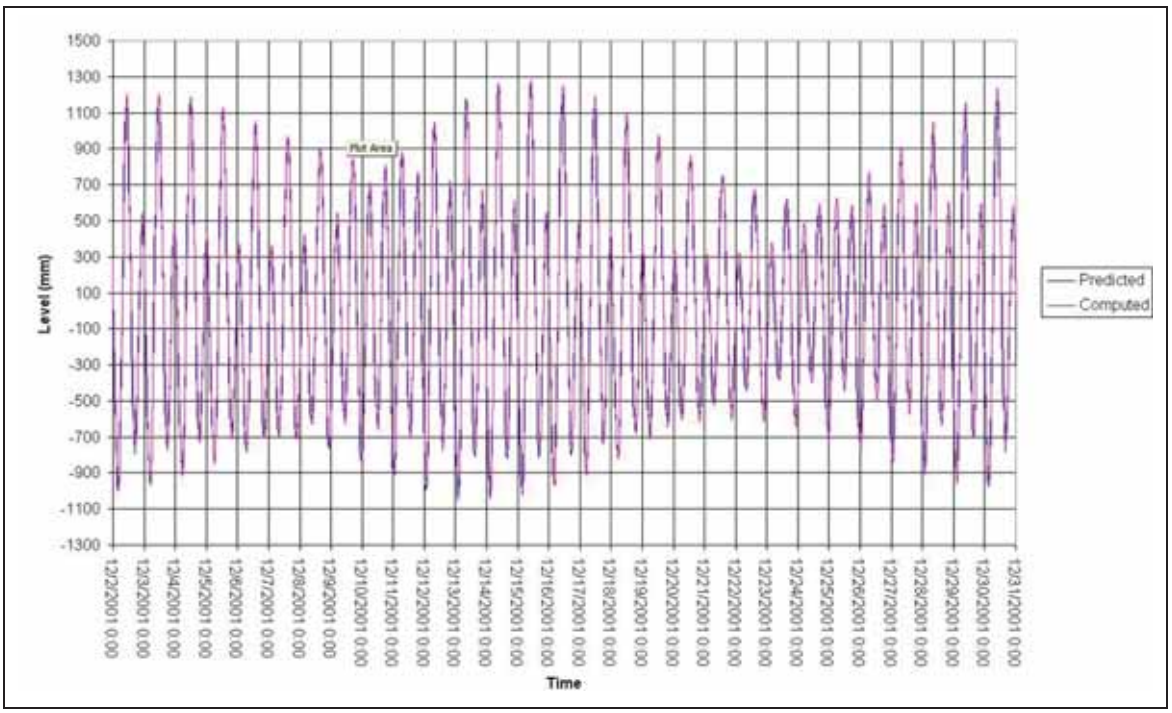


Figure 1-2: Model calibration illustrated via the comparison of modelled water levels (red) and MSQ predictions (blue) for the period 01 to 31 December 2001.

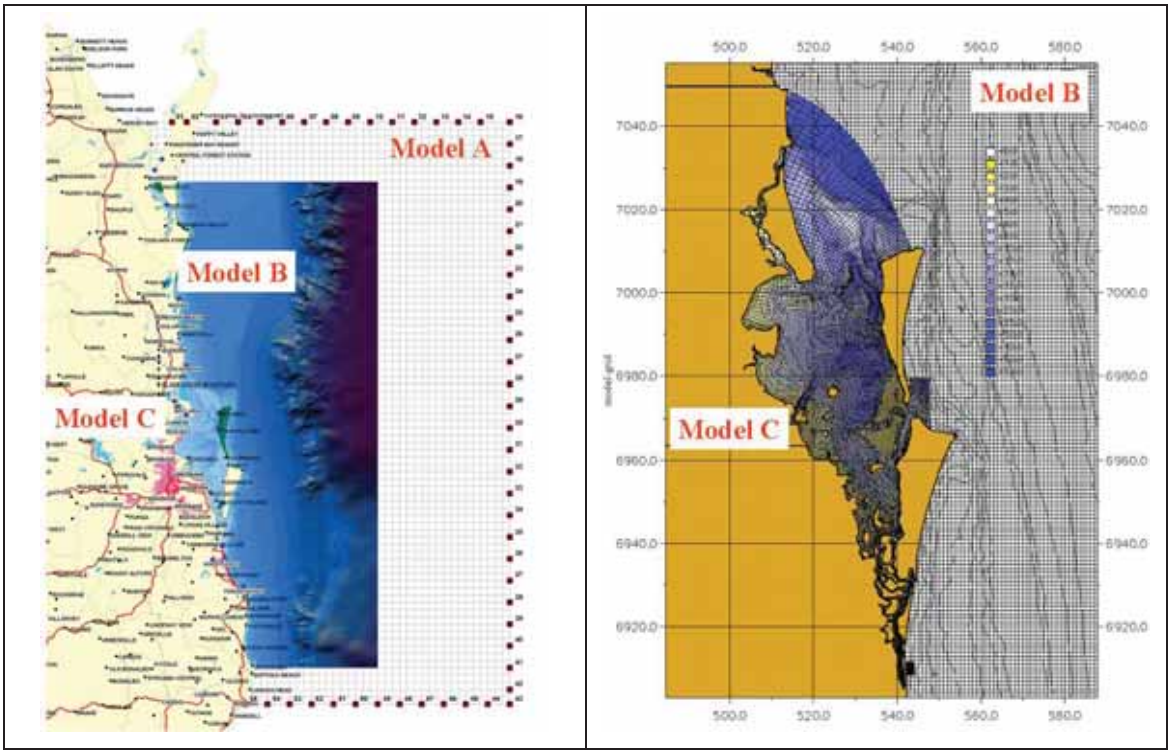


Figure 1-3: GHD's South East Queensland modelling system (left pane) and the Moreton Bay model overlaid on the grid of the parent model B

1.1.3 Bathymetry

The model bathymetry in the Pumicestone Passage has been derived from a 2001 hydrographic survey undertaken by the Hydrographic Services of Queensland Department of Transport (QDoT) and referred to as *B801-038, Pumicestone Passage, Wrights Creek to Woorim.*

The overall model bathymetry has been generated from the datasets presented in Table 1.

Table 1 Bathymetric Datasets

Dataset	Horizontal Datum	Vertical Datum	Comment
Maritime Safety Queensland (MSQ) Soundings Data	Map Grid of Australia 1994 (MGA 94) GDA (94)	Lowest Astronomical Tide (LAT)	This is the information used by MSQ to produce nautical charts of the Moreton Bay area. Files provided were contours in *.shp format and XYZ soundings.
HYDRO Runaway Bay	Australian Map Grid 1984 (AMG 84)	Australian Height Datum (AHD)	Hydrographic survey provided by Gold Coast City Council.
HYDRO Seaway	Australian Map Grid 1984 (AMG 84)	Australian Height Datum (AHD)	Hydrographic survey provided by Gold Coast City Council.
HYDRO Tugun	Australian Map Grid 1984 (AMG 84)	Australian Height Datum (AHD)	Hydrographic survey provided by Gold Coast City Council.
Geoscience Australia - 250m Bathymetry and Topography Grid.	Geographic WGS 84	Mean Sea Level.	Dataset acquired from Geoscience Australia.

1.1.4 Boundary Conditions

The model has four open boundaries. These are North Passage, South Passage, Jumpinpin and the Gold Coast Seaway (Figure A-1, Appendix **A**). Open boundaries define the locations where the forcing functions driving the model hydrodynamics are defined.

In this particular implementation, the model was forced by the tides. The tidal signal was synthesized from 29 tidal constituents provided by Maritime Safety Queensland. Additional details on the establishment of the boundary conditions can be found in Figure A-1 (Appendix **A**).

1.1.5 Period of Simulation

All operational model runs were undertaken for a period of two months (01 June to 01 August 2001) during which the Environment Protection Agency (EPA), now part of the Queensland

Department of Environment and Resource Management (DERM), had carried out recordings of tidal stream direction and magnitude in the Pumicestone Passage. These recordings have been used for further verification of the model as explained in chapter 2.

1.1.6 Model Operation

The hydrodynamic model was operated in two-dimensional, depth-averaged, time-dependent mode under the assumptions that (1) vertical accelerations are negligible and (2) velocity vectors generally point in the same direction over the entire depth of the water column at any instant of time.

The role of the model was to predict the water levels and tidal streams in the study area and provide the necessary support for the estimation of sediment transport rates.

1.2 Wave Modelling

In addition to the hydrodynamic model presented in section 1.1, a separate wave model was developed to complement the hydrodynamic model and represent the propagation of waves to inshore shallow locations where phenomena such as refraction, shoaling, bed friction and wave breaking dominate and govern coastal sediment transport processes. The wave model is an implementation of SWAN developed by the Technical University of Delft (The Netherlands). The model computes random, short-crested wind-generated sea states in coastal regions and inland waters and predicts a 2D wave field on a rectangular or curvilinear grid.

In the current implementation the model takes into account the following effects:

- shoaling and refraction due to current and depth;
- wave generation by wind;
- white capping, bottom friction and depth induced breaking; and
- wave induced set-up.

1.2.1 Extent of the Models

Two wave models have been developed – a regional model and a local model, nested into the regional one. Both models have been implemented on rectangular grids of uniform spacing. The regional model extends from Mooloolaba to the North to South Passage to the south and has a cell size of 100 m. The extent of the model is approximately 40 km by 60 km.

The local model covers an area of 8 km by 9 km to the south of Pumicestone Passage and has a cell size of 20 m. The selection of the local model grid size was primarily driven by the density of the soundings in bathymetric dataset *B801-038* (section 1.1.3).

The extent of the local SWAN model is shown in Figure 1-4.

The bathymetry for the regional wave model has been derived from the datasets described in section 1.1.3.

1.2.2 Operation of the Models

The wave models were operated in stationary mode and provided estimates of significant wave height, peak wave period and direction for a range of wave climates generated by the prevailing winds in the area.

Figure 1-4: Regional and local wave models overlaid on Pumicestone Passage.

2. Verification of Hydrodynamic Model

As described in section 1.1.1 and illustrated by Figure 1-2, the hydrodynamic model adopted for this study is an enhancement of a previously calibrated model developed by GHD in 2001 and 2004. By virtue of the adopted modelling approach (e.g. no changes to the boundary conditions and no changes in model bathymetry with the exception of the bathymetry in Pumicestone Passage), the new model was able to reproduce exactly the results shown in Figure 1-2. The latter results, however, are associated with tidal station Brisbane Bar. Accordingly, it was necessary to assess the performance of the model against data recorded at sites within the Pumicestone Passage, possibly near the southwest tip of Bribie Island. Two datasets were acquired that fulfilled the latter requirement, namely, a set of tidal constituents at Bongaree Jetty (courtesy of MSQ) that made it possible to synthesize the tide at this location and the recordings of tidal stream direction and magnitude referenced in section 1.1.5.

2.1 Water Levels

The hydrodynamic model was operated for a period of six months (01 December 2004 to 01 June 2005) and model results quantitatively assessed by comparing modelled water levels against predicted water levels at Bongaree Jetty. The predictions for water levels were generated using an identical set of tidal constituents (29 in total) as the one assigned at the open boundaries of the model. The results of the comparison are shown in Figure A-2 of Appendix A.

The level of agreement between model results and predictions was quantified by obtaining estimates of the root mean square error (RMSE) of water levels for each month of the simulated period. The RMSE is traditionally used as an objective quantitative criteria for the assessment of model performance. When assessing model performance in terms of water levels, RMSE values of 0.1 are considered to represent a good match.

As can be observed from Figure A-2, a Root Mean Square Error (RMSE) as low as 0.05 has been achieved for the month of December, however, on average, the RMSE is of the order of 0.1 for the simulated period.

2.2 Tidal Streams

Modelled and measured tidal stream magnitude and direction have been compared qualitatively at the two sites shown in Figure 1-4. The sites are denoted as site #1 offshore of Bellara (Sylvan Beach) and site #2 offshore of Banksia Beach.

The results of the comparison are presented in Figure A-3 (for site #1) and Figure A-4 (for site #2) of Appendix A. It can be observed from Figure A-3 that the match between modelled and measured tidal stream magnitude and direction at site #1 is good. For site #2, the match is also good during ebb tide and to a lesser degree during the flood phase of the tide.

With reference to EPA (2004)[1], the observed discrepancies are primarily attributed to inaccuracies in the representation of the sand banks offshore of Banksia Beach. Evidence has been collected that demonstrate that the latter have the potential to influence the tidal streams during the flood phase of the tide as the water levels increase and the flow changes direction toward the north north-west. When the banks are exposed at lower water levels (refer left pane of Figure A-5, Appendix A), the inflowing currents are constrained to the channel however once the sand banks are inundated (refer right pane of Figure A-5), the tidal stream tends to move in a more north-westerly direction across the entire width of the passage, therefore altering the flow pattern close to shore.

Figures A-3 and A-4 also demonstrate that the model is able to match, at both sites, the key findings of EPA 2004 in terms of the modulation of the tidal streams in the Passage. Namely, the currents offshore of Bellara have higher peak velocity on the flood tide than on the ebb tide. On the contrary, the currents offshore of Banksia Beach have higher peak velocity on the ebb tide than on the flood tide.

It is also noted that model results and measured tidal streams agree well in terms of tidal phase thus allowing the model to match another key finding of the EPA 2004 report, that is, flood tides run longer at Bellara compared to flood tides at Banksia Beach.

Based on the above evidence it is concluded that overall the agreement between model and observations is good and the model is capable of adequately representing the hydrodynamics in the Pumicestone Passage.

At this stage, a verification of the wave model was not undertaken because no reliable wave data in the Pumicestone Passage could be obtained.

[1] Report to Caboolture Shire Council on Options for the Management of Beach Erosion Along the South-western Foreshore of Bribie Island, Caboolture Shire, February 2004

3. Modelling Results

3.1 Hydrodynamics

The ebbing tidal streams along the Bellara coast flow at 130 degrees nautical and peak at 0.6 m/s whereas the flooding tidal streams are oriented toward 310 degrees nautical and reach a peak in excess of 0.8 m/s.

The ebbing tidal streams along Banksia Beach are predicted to flow at 170 degrees nautical and peak at 0.8 m/s whereas the flooding tidal streams are oriented toward 340-350 degrees nautical and reach a peak of approximately 0.45 m/s.

3.2 Wave Climate

Representative wave climate results (distributions of significant wave height) generated by 20 m/s winds blowing from the four cardinal directions (N, E, S and W) are shown in Figure A-7 of Appendix A. As observed from the figure, under these extreme conditions, significant wave heights could exceed significant wave heights of 0.5 m, in particular under winds from the east and the south. Other wind speeds that have been included in the analysis are 5.0, 10.0 and 15.0 m/s.

It should be noted that the wave climate results in this study have been obtained for a set of representative, statistically meaningful wind fields derived from the statistical analysis of the wind conditions recorded at the Inner Reciprocal Marker meteorological station in Moreton Bay. A key assumption in the wave analysis that has been undertaken is that the winds recorded at the Inner Reciprocal Marker are valid for the full extent of the wave model.

Appendix A

Hydrodynamic Model Boundary Conditions

Verification of Model Performance to Predicted Water Levels

Verification of Model Performance to Measurements

Typical Tidal Streams

Representative Wave Climate for Longshore Sediment Transport Analysis

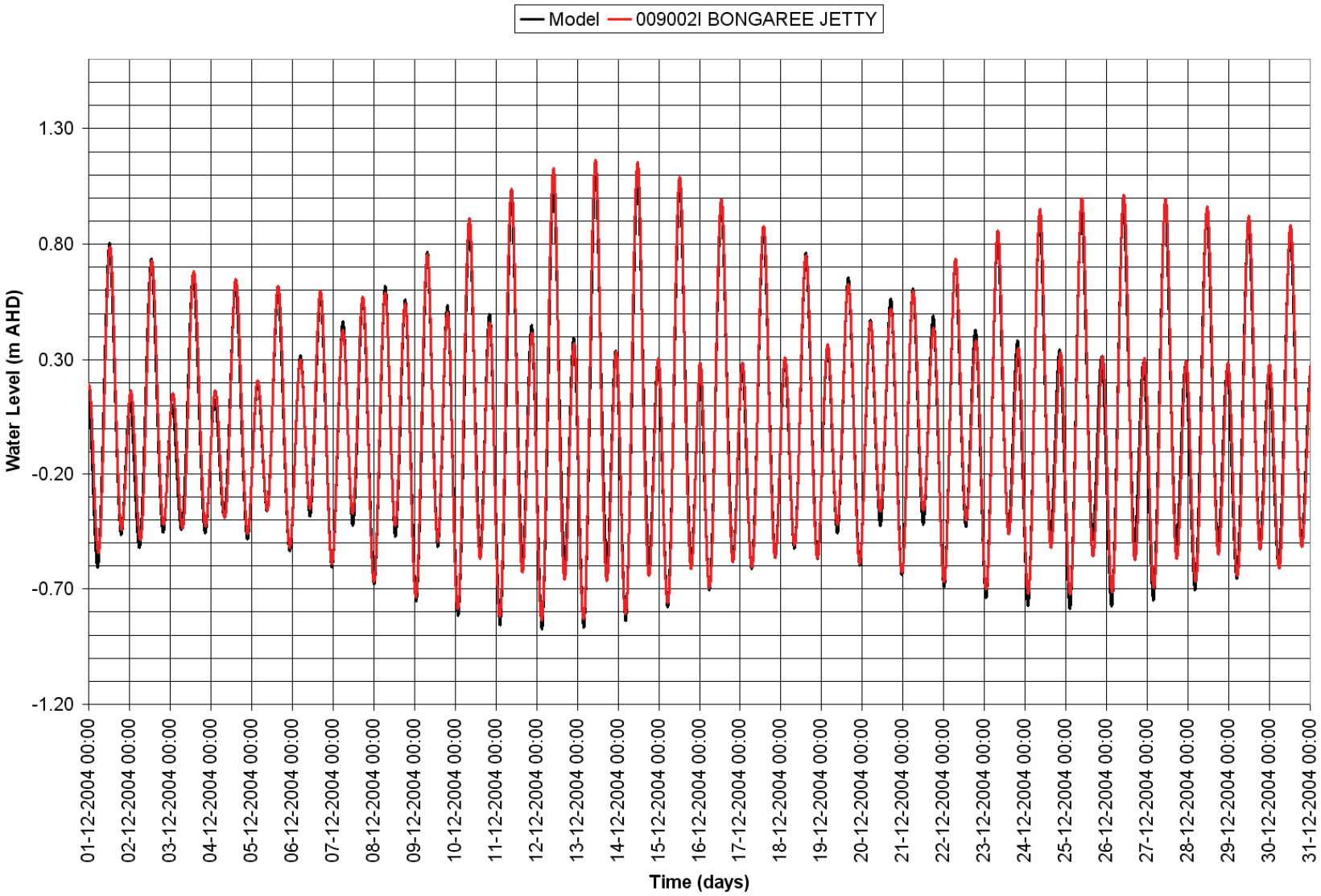


Figure A-2a: Comparison of water levels at Bongaree jetty for the period 1 December 2004 to 31 December 2004: Model prediction (solid black line) versus a prediction of the tides based on 29 constituents obtained from MSQ (red). RMSE for the simulated period = 0.05.

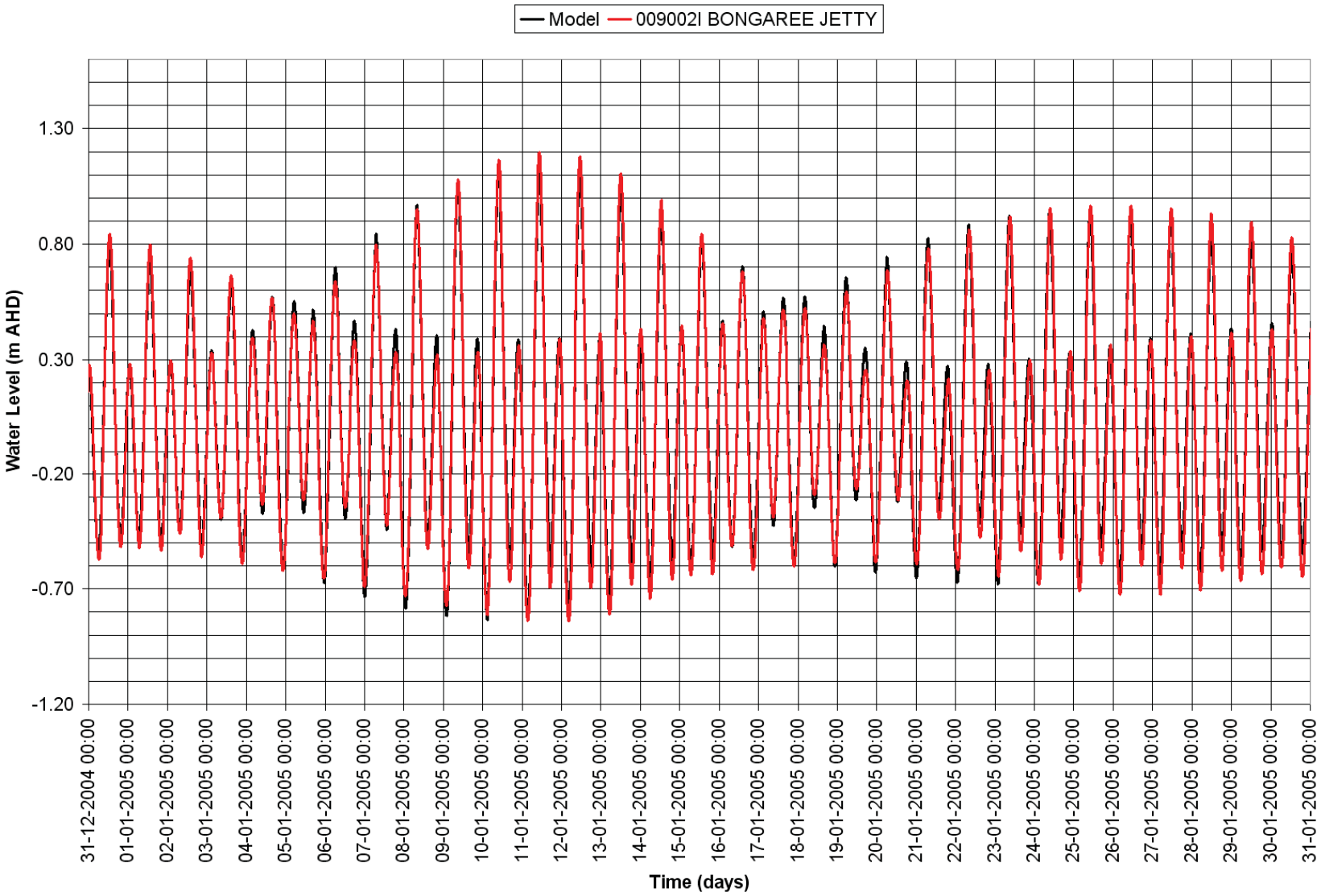


Figure A-2b: Comparison of water levels at Bongaree jetty for the period 1 January 2005 to 31 January 2005: Model prediction (solid black line) versus a prediction of the tides based on 29 constituents obtained from MSQ (red). RMSE for the simulated period = 0.06.

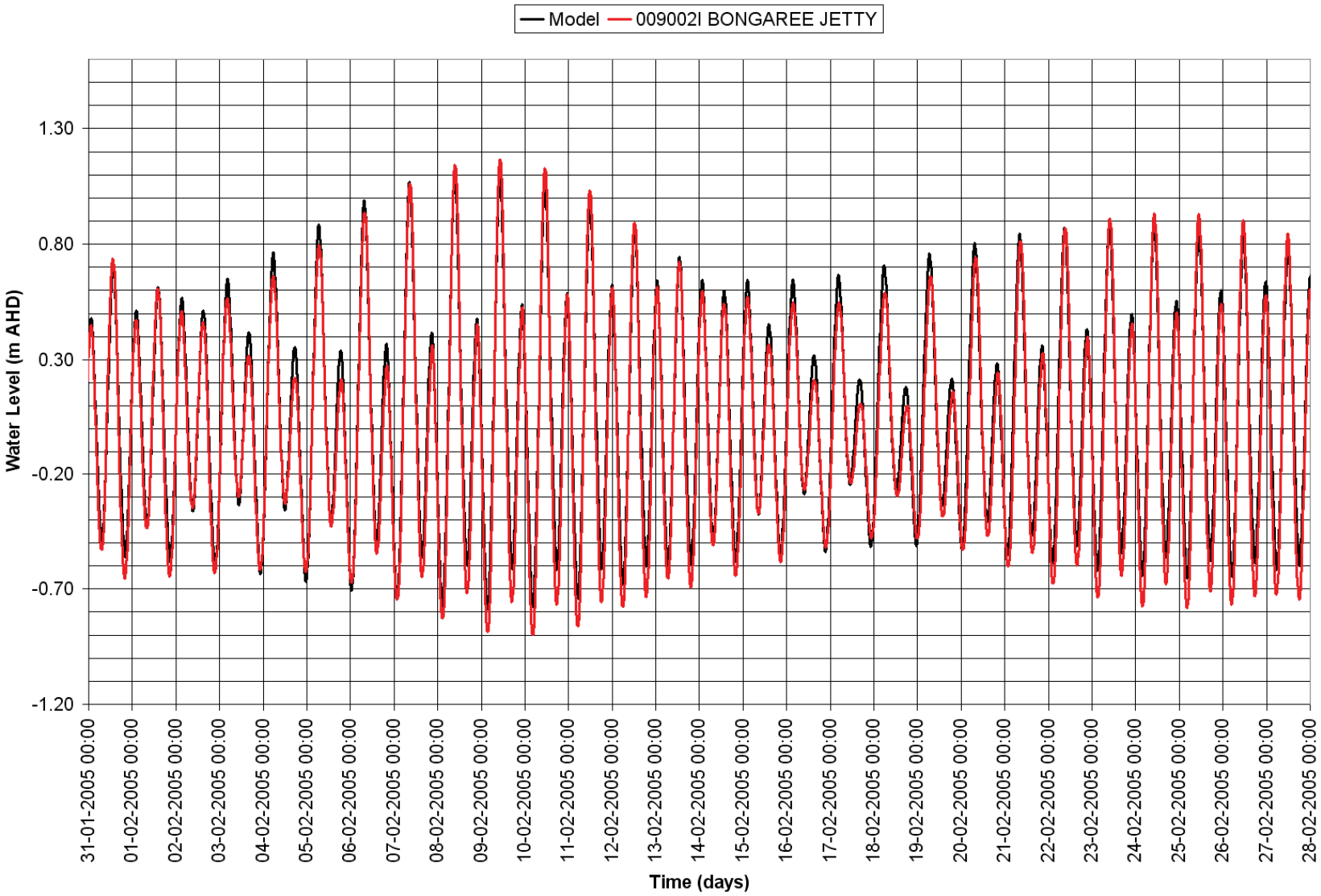


Figure A-2c: Comparison of water levels at Bongaree jetty for the period 1 February 2005 to 28 February 2005: Model prediction (solid black line) versus a prediction of the tides based on 29 constituents obtained from MSQ (red). RMSE for the simulated period = 0.08.

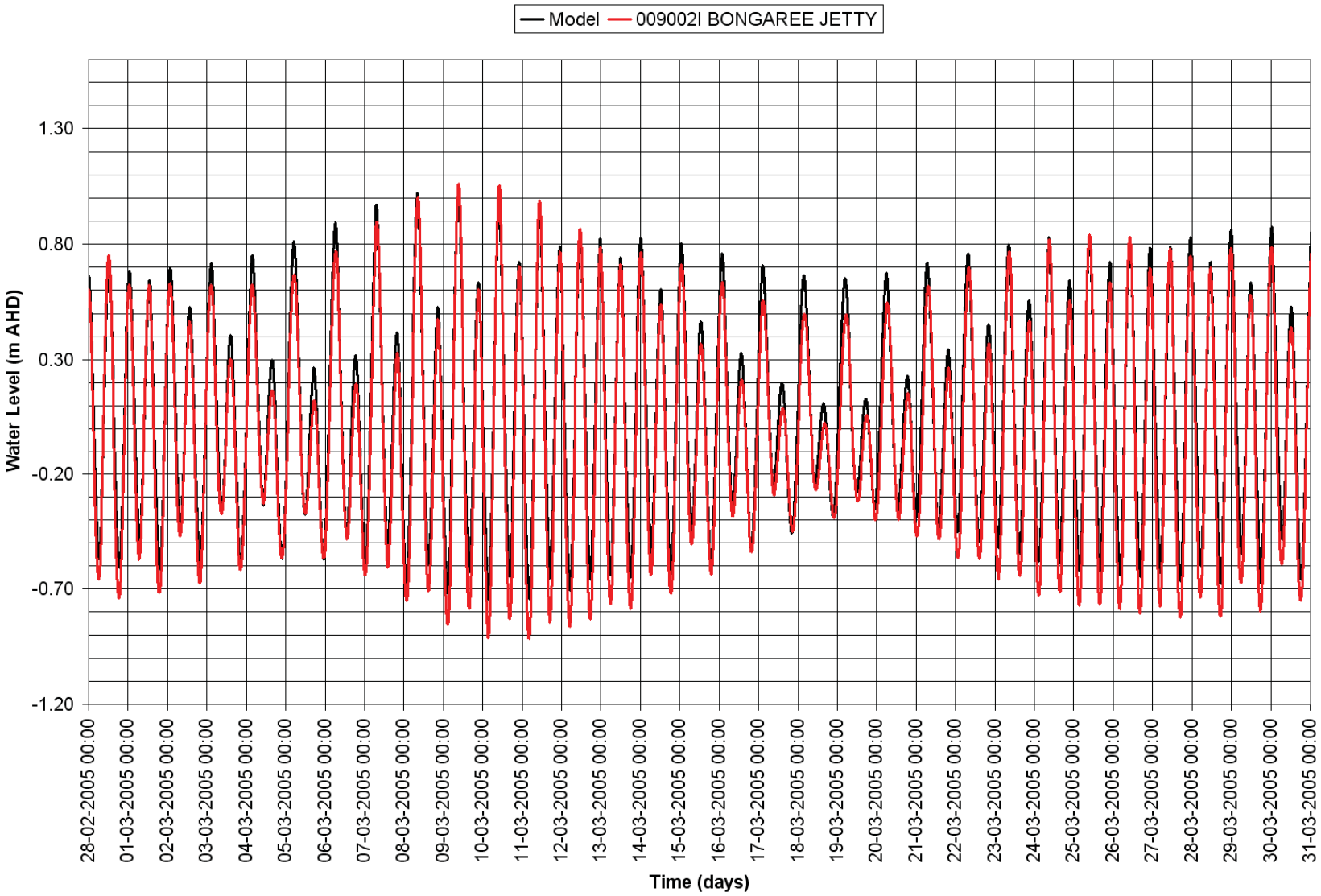


Figure A-2d: Comparison of water levels at Bongaree jetty for the period 1 March 2005 to 31 March 2005: Model prediction (solid black line) versus a prediction of the tides based on 29 constituents obtained from MSQ (red). RMSE for the simulated period = 0.10.

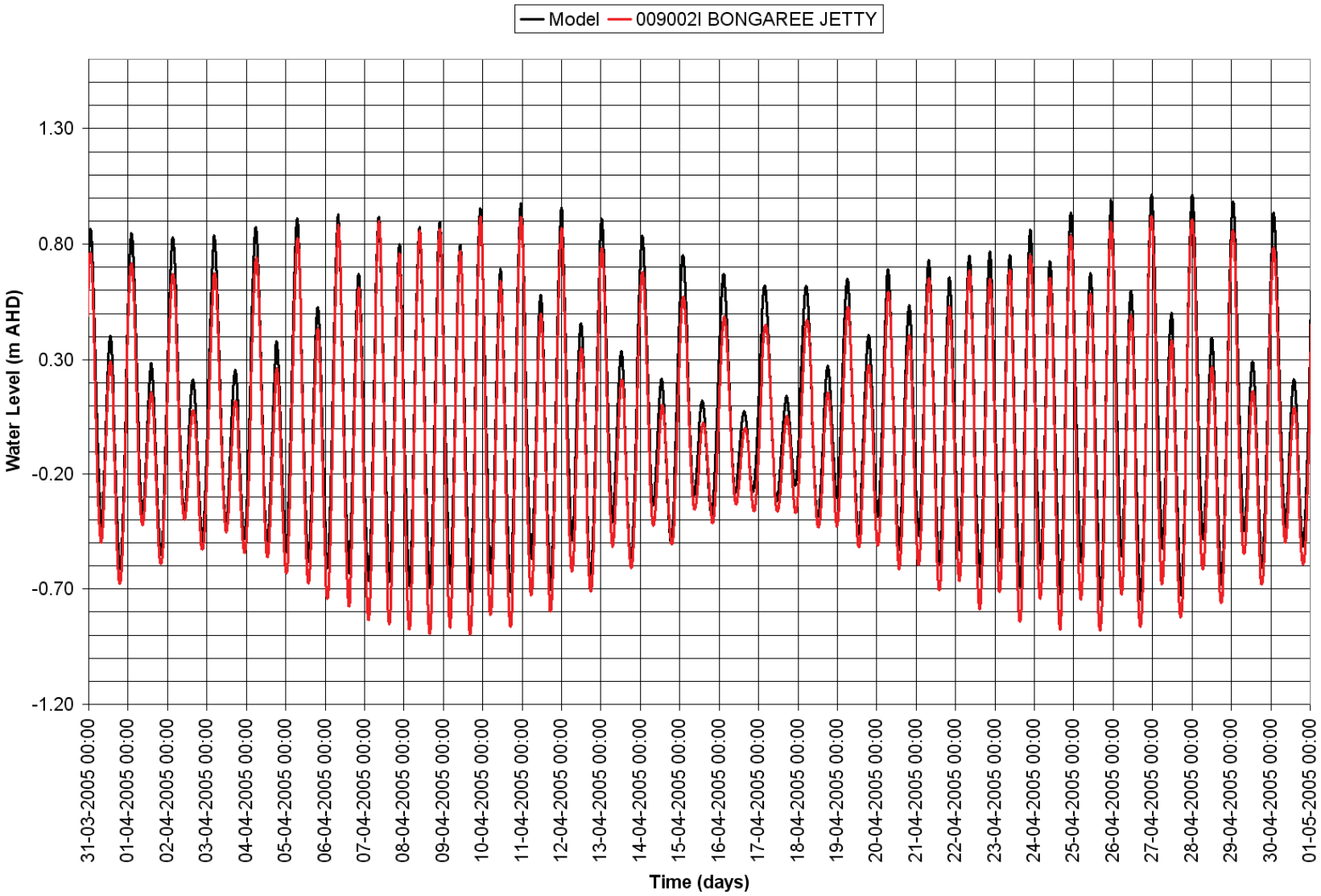


Figure A-2e: Comparison of water levels at Bongaree jetty for the period 1 April 2005 to 30 April 2005: Model prediction (solid black line) versus a prediction of the tides based on 29 constituents obtained from MSQ (red). RMSE for the simulated period = 0.12.

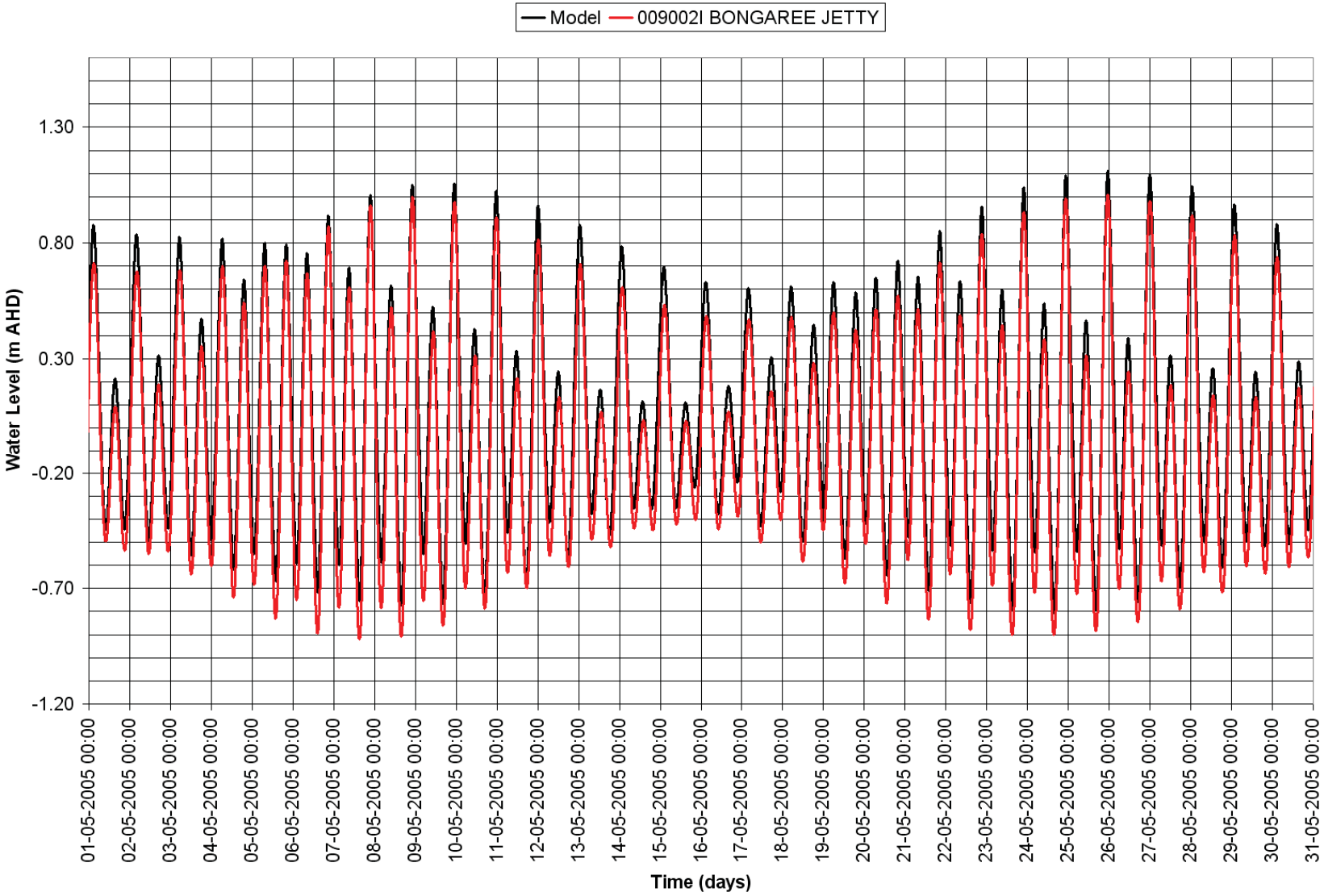


Figure A-2f: Comparison of water levels at Bongaree jetty for the period 1 May 2005 to 31 May 2005: Model prediction (solid black line) versus a prediction of the tides based on 29 constituents obtained from MSQ (red). RMSE for the simulated period = 0.13.

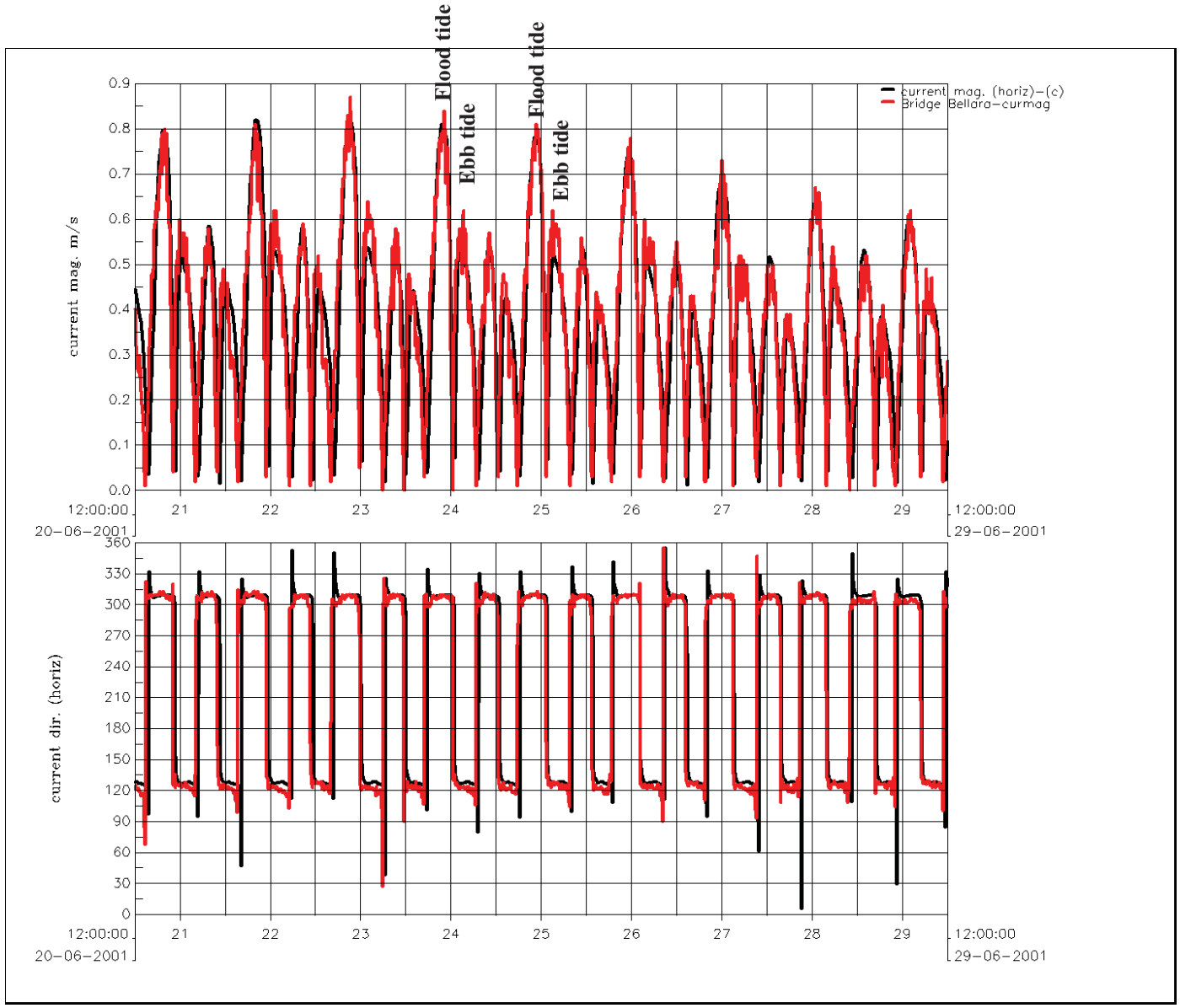


Figure A-3: Modelled (black solid line) versus observed (red solid line) tidal stream magnitude (top pane) and tidal stream direction (bottom pane) at site #1 offshore of Bellara (Sylvan Beach). Currents offshore of Bellara have higher peak velocity on the flood tide (EPA, 2004)

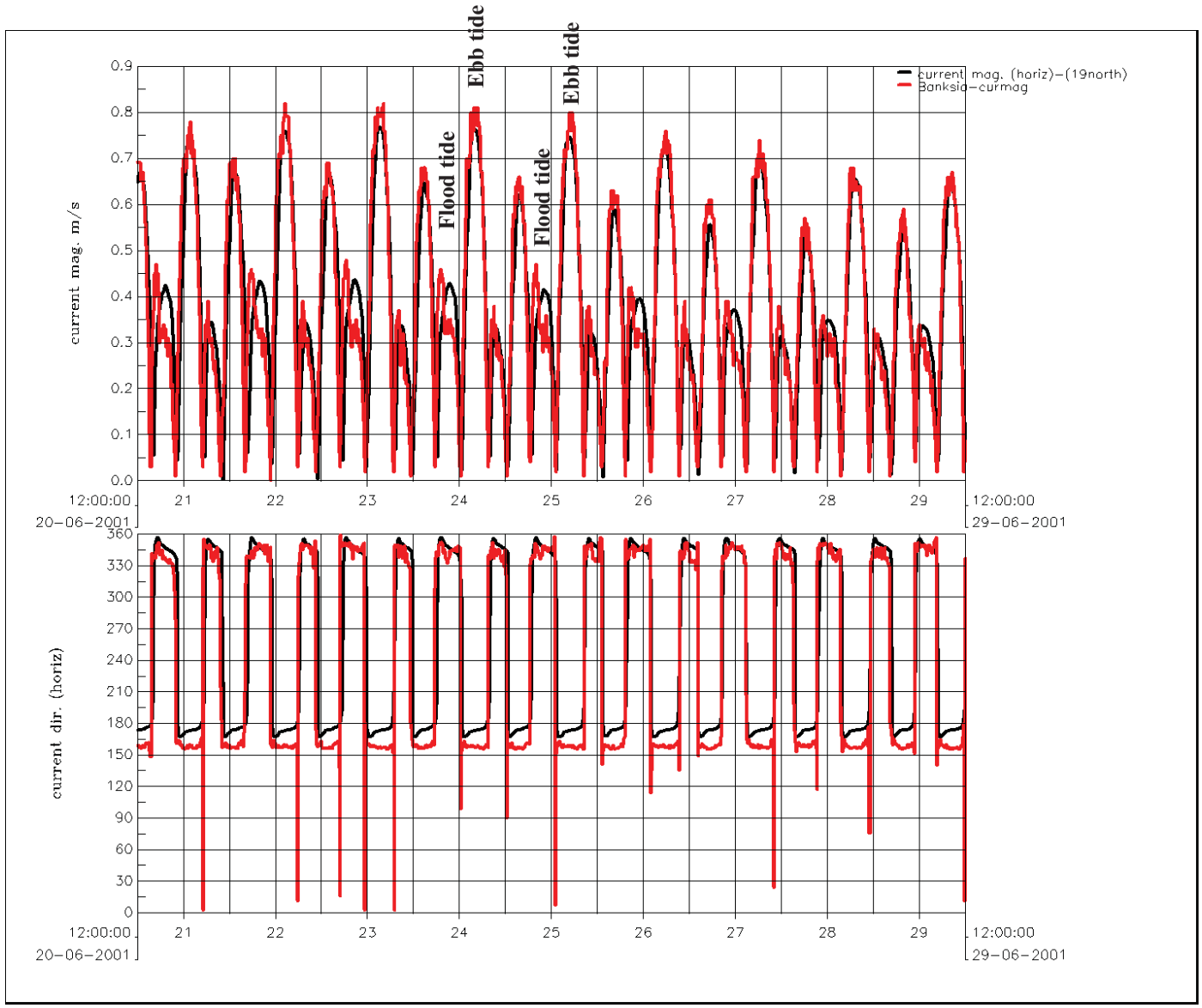


Figure A-4: Modelled (black solid line) versus observed (red solid line) tidal stream magnitude (top pane) and tidal stream direction (bottom pane) at site #2 offshore of Banksia Beach. Currents offshore of Banksia Beach have higher peak velocity on the ebb tide (EPA, 2004)

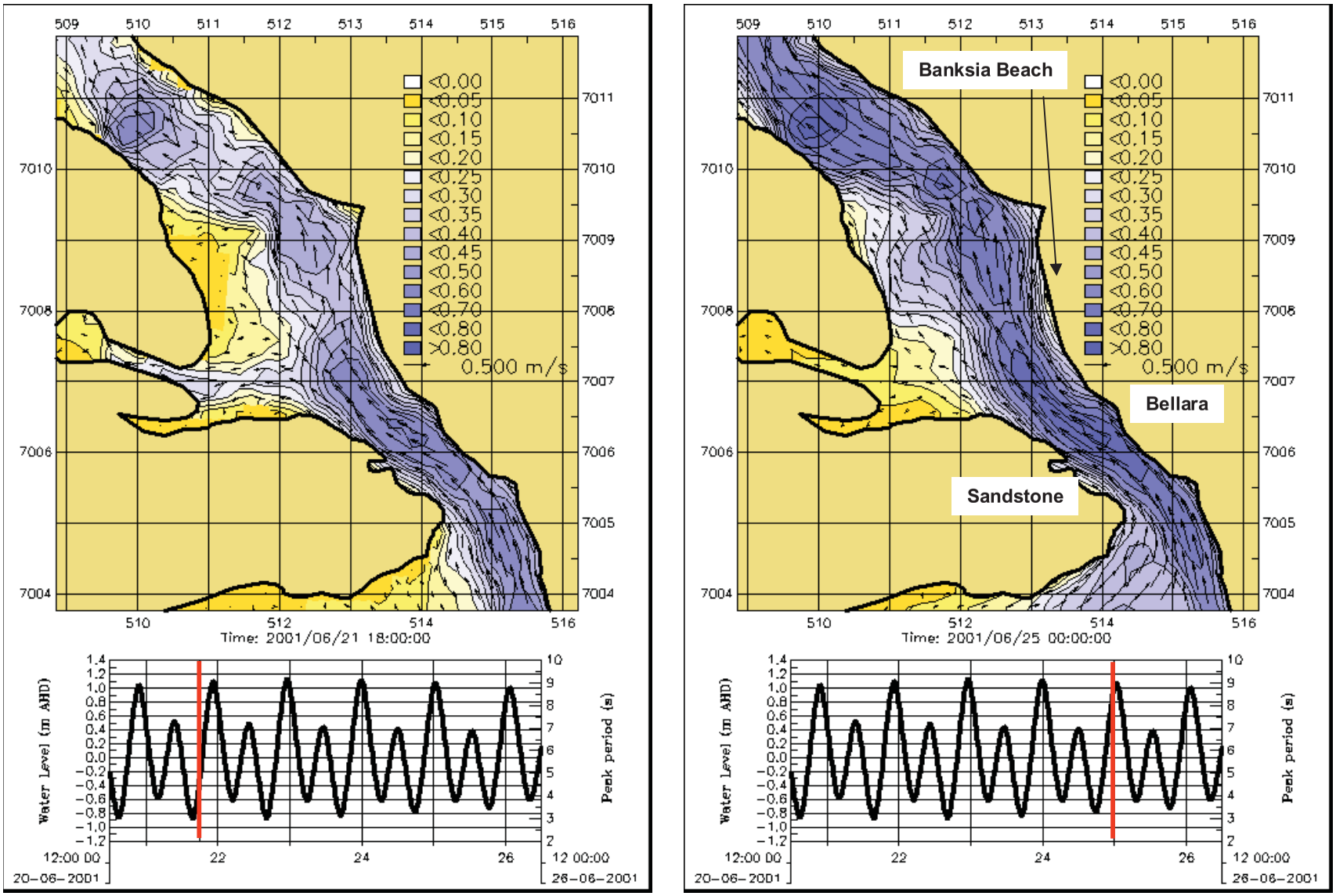


Figure A-5: Modelled tidal streams in Pumicestone Passage during flood tide: 21 June 2001 06 PM (left) and 25 June 2001 00 AM (right)

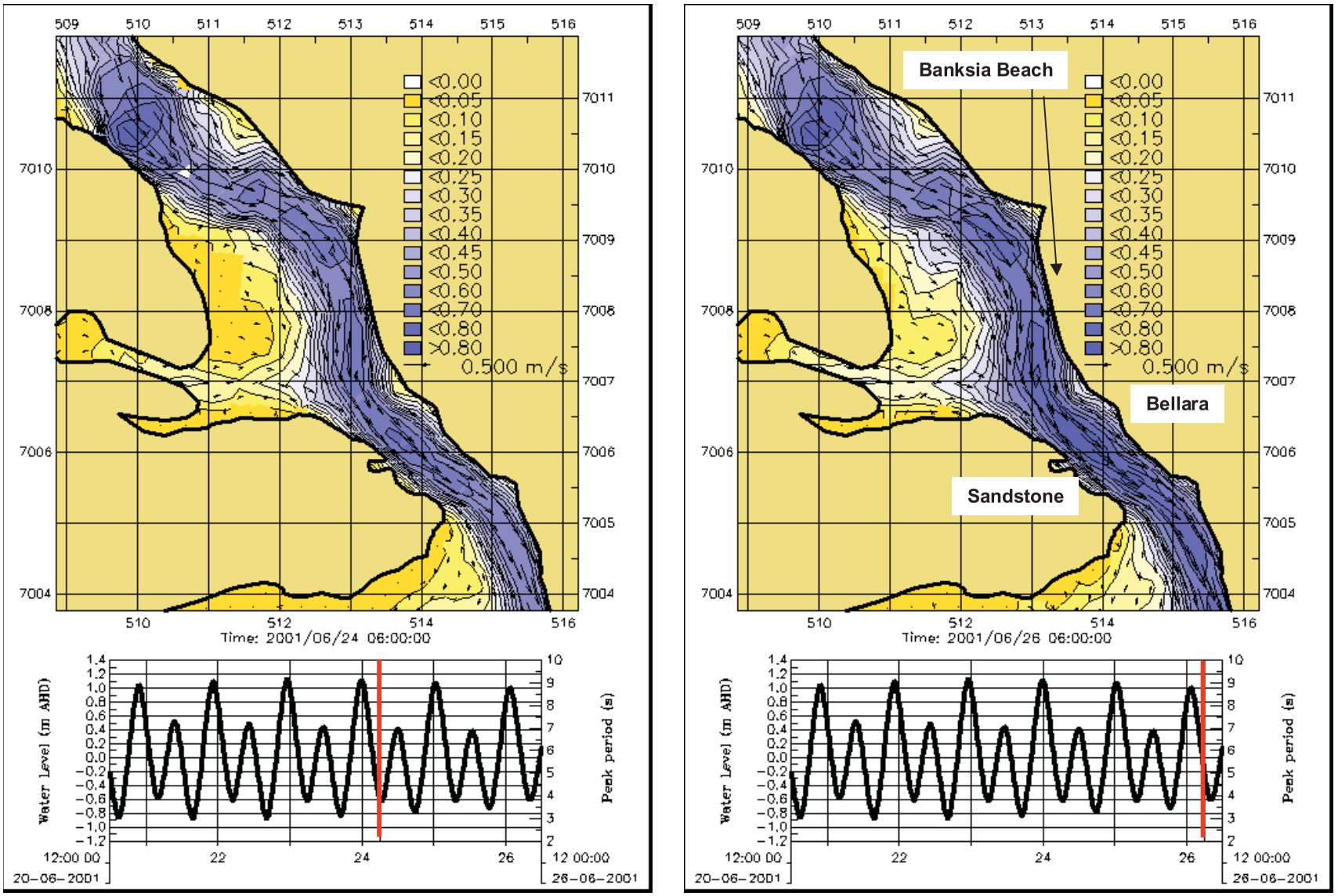


Figure A-6: Modelled tidal streams in Pumicestone Passage during ebb tide: 21 June 2001 06 PM (left) and 25 June 2001 00 AM (right)

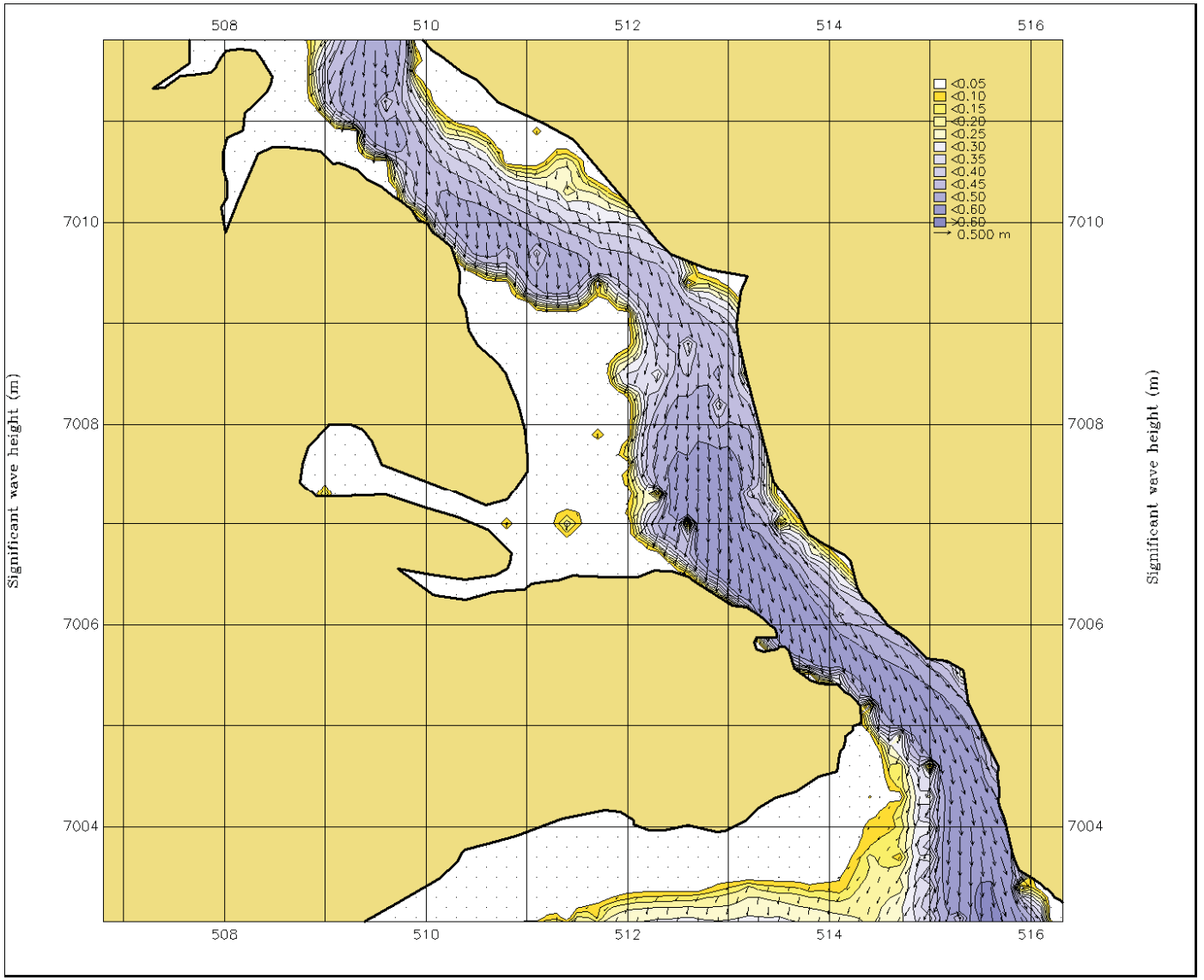


Figure A-7a: Modelled distribution of significant wave heights (m) in Pumicestone Passage generated by 20 m/s northerly winds.

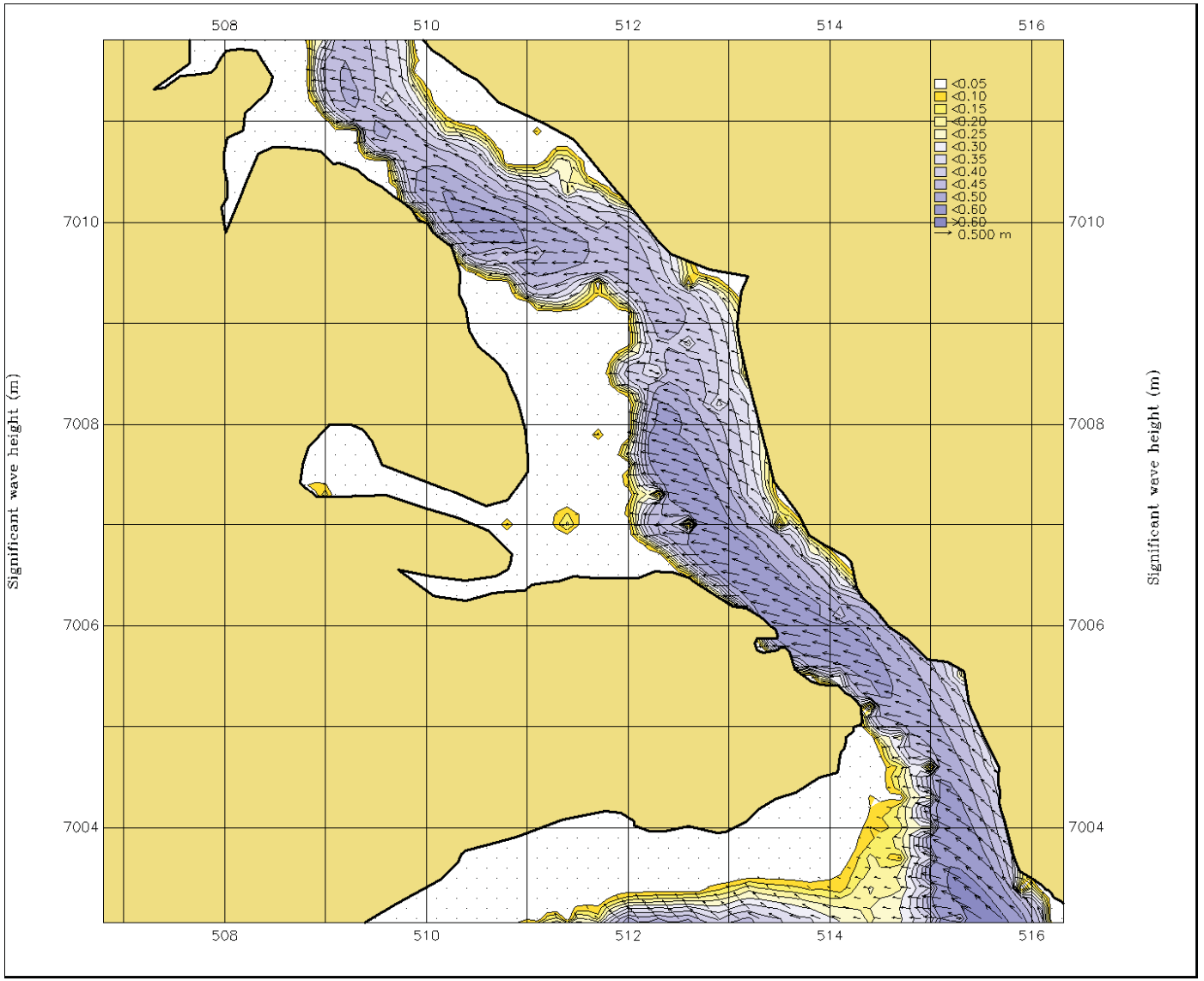


Figure A-7b: Modelled distribution of significant wave heights (m) in Pumicestone Passage generated by 20 m/s easterly winds.

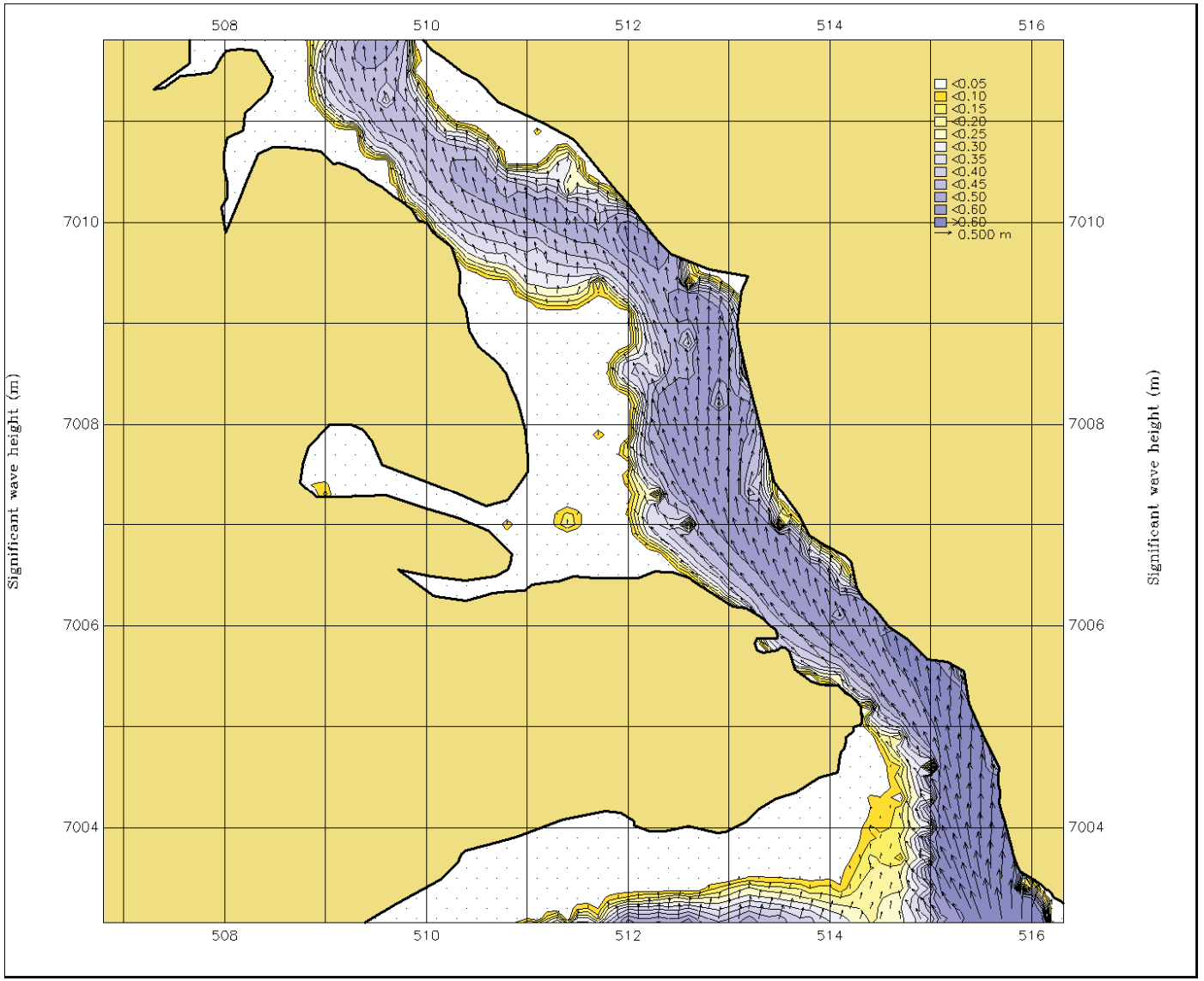


Figure A-7c: Modelled distribution of significant wave heights (m) in Pumicestone Passage generated by 20 m/s southerly winds.

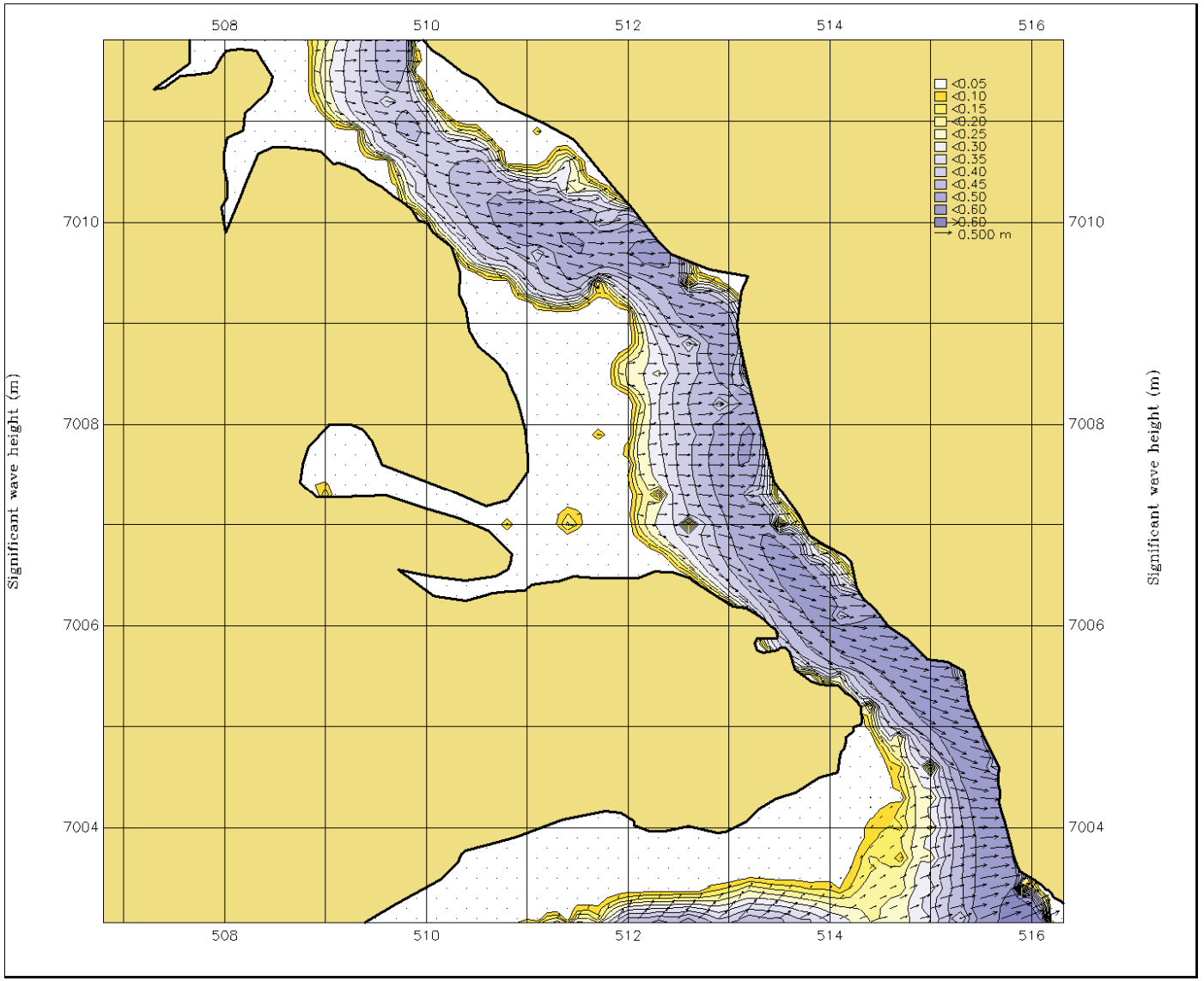


Figure A-7d: Modelled distribution of significant wave heights (m) in Pumicestone Passage generated by 20 m/s westerly winds.

GHD

201 Charlotte Street Brisbane QLD 4000
GPO Box 668 Brisbane QLD 4001
T: (07) 3316 3000 F: (07) 3316 3333 E: bnemail@ghd.com.au

Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	I Botev	P O'Keeffe		P O'Keeffe		4/06/10

Appendix B

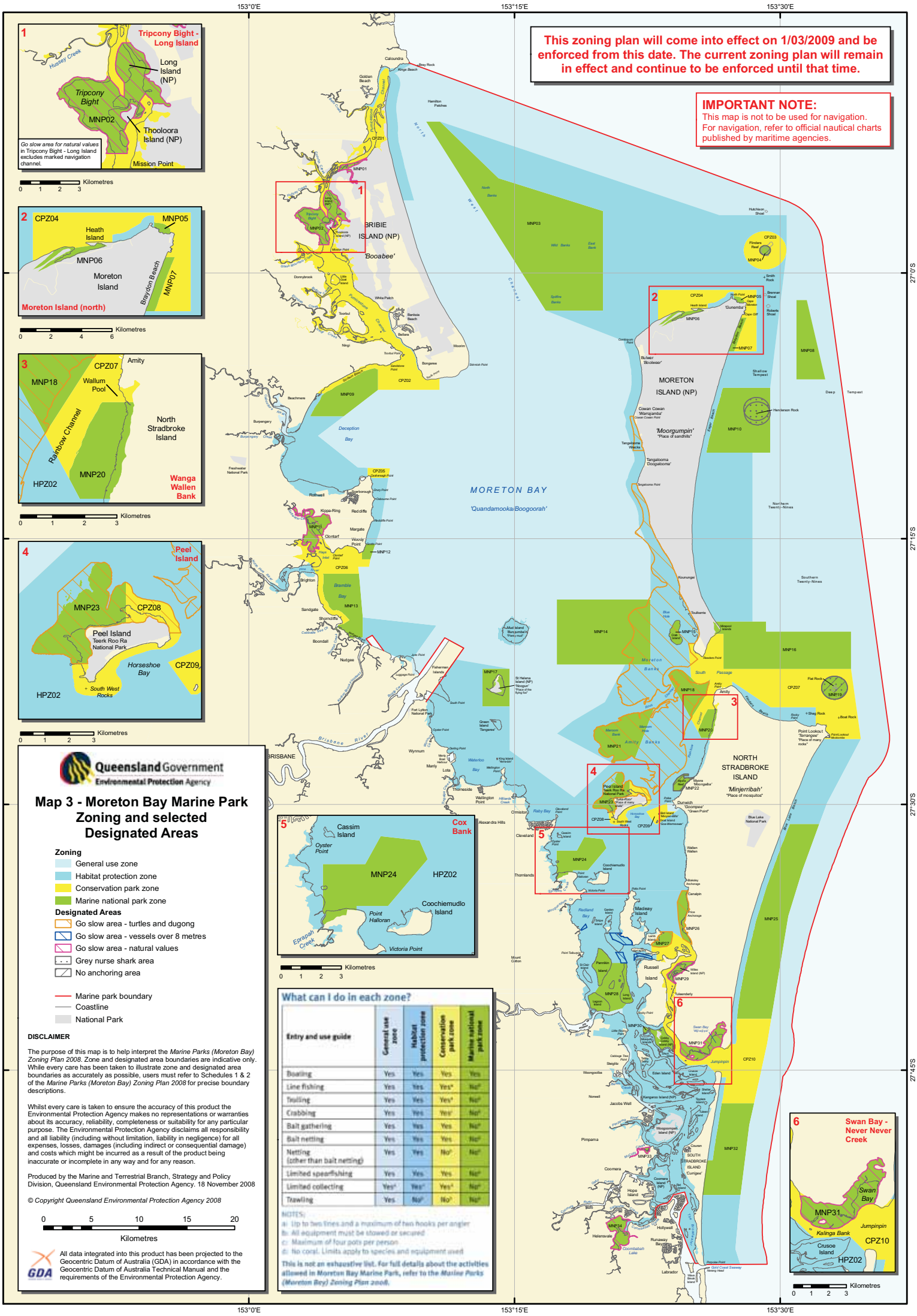
Maps of Environmental Features

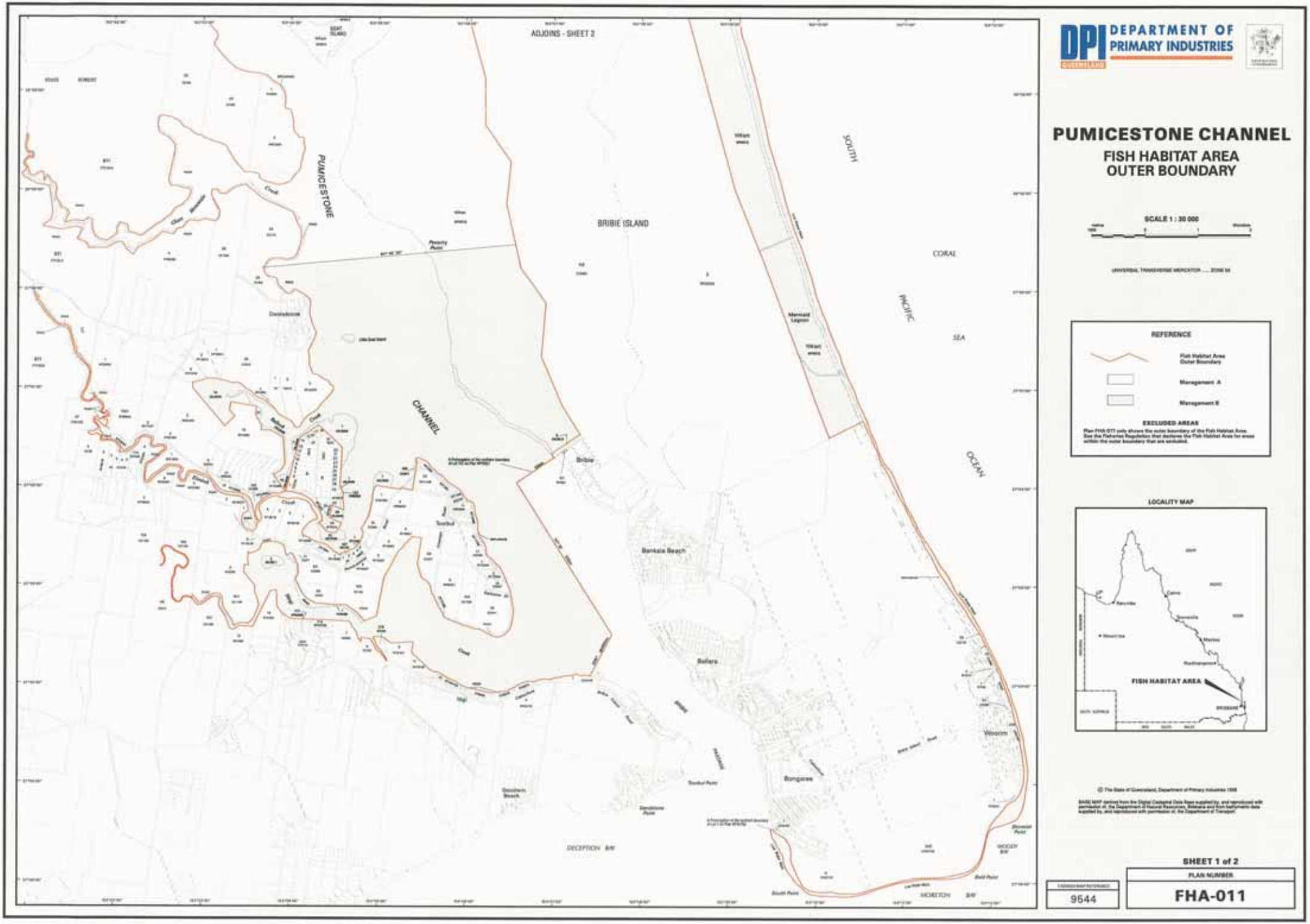
1. Moreton Bay Marine Park Zoning
(Environmental Protection Agency, 2008 sourced from: http://www.derm.qld.gov.au/parks_and_forests/marine_parks/moreton_bay_marine_park_zoning_plan_review/pdfs/map3-zoningplus.pdf)

2. Declared Fish Habitat Areas
(Department of Primary Industries, 1998 sourced from: http://www.dpi.qld.gov.au/documents/Fisheries_Habitats/FHA-map-pumiceston.pdf)

3. Coastal Management District
(Environmental Protection Agency, 2006 sourced from: http://www.derm.qld.gov.au/register/p01361bs.pdf)

4. Erosion Prone Areas
(Beach Protection Authority, 1984 sourced from: http://www.derm.qld.gov.au/images/ecoaccess/coastal_development/SC_3367.pdf)


This zoning plan will come into effect on 1/03/2009 and be enforced from this date. The current zoning plan will remain in effect and continue to be enforced until that time.
IMPORTANT NOTE:
This map is not to be used for navigation. For navigation, refer to official nautical charts published by maritime agencies.
1 Tripcony Bight - Long Island
Long Island (NP)
Tripcony Bight
MNP02
Thooloora Island (NP)
Mission Point
Go slow area for natural values in Tripcony Bight - Long Island excludes marked navigation channel.
2 Moreton Island (north)
CPZ04
MNP05
Heath Island
MNP06
Moreton Island
Braydon Beach
MNP07
3 Wanga Wallen Bank
CPZ07
Amity
MNP18
Wallum Pool
Rainbow Channel
North Stradbroke Island
MNP20
HPZ02
4 Peel Island
MNP23
CPZ08
Peel Island
Teerk Roo Ra National Park
Horseshoe Bay
CPZ09
South West Rocks
HPZ02
5 Cox Bank
Cassim Island
Oyster Point
MNP24
HPZ02
Coochiemudlo Island
Point Halloran
Victoria Point
6 Swan Bay - Never Never Creek
Swan Bay
MNP31
Jumpinpin
Kalinga Bank
CPZ10
Crusoe Island
HPZ02
BRIBIE ISLAND (NP)
'Booabee'
MORETON ISLAND (NP)
'Moorgumpin' "Place of sandhills"
MORETON BAY
'Quandamooka/Boogoorah'
NORTH STRADBROKE ISLAND
'Minjerribah' "Place of mosquitos"
SOUTH STRADBROKE ISLAND
'Currigee'
BRISBANE
Brisbane River
Kilometres
0 1 2 3
0 2 4 6
Queensland Government
Environmental Protection Agency
Map 3 - Moreton Bay Marine Park Zoning and selected Designated Areas
Zoning
General use zone
Habitat protection zone
Conservation park zone
Marine national park zone
Designated Areas
Go slow area - turtles and dugong
Go slow area - vessels over 8 metres
Go slow area - natural values
Grey nurse shark area
No anchoring area
Marine park boundary
Coastline
National Park
DISCLAIMER
The purpose of this map is to help interpret the Marine Parks (Moreton Bay) Zoning Plan 2008. Zone and designated area boundaries are indicative only. While every care has been taken to illustrate zone and designated area boundaries as accurately as possible, users must refer to Schedules 1 & 2 of the Marine Parks (Moreton Bay) Zoning Plan 2008 for precise boundary descriptions.
Whilst every care is taken to ensure the accuracy of this product the Environmental Protection Agency makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose. The Environmental Protection Agency disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which might be incurred as a result of the product being inaccurate or incomplete in any way and for any reason.
Produced by the Marine and Terrestrial Branch, Strategy and Policy Division, Queensland Environmental Protection Agency. 18 November 2008
© Copyright Queensland Environmental Protection Agency 2008
0 5 10 15 20
Kilometres
GDA
All data integrated into this product has been projected to the Geocentric Datum of Australia (GDA) in accordance with the Geocentric Datum of Australia Technical Manual and the requirements of the Environmental Protection Agency.
What can I do in each zone?
Entry and use guide
General use zone
Habitat protection zone
Conservation park zone
Marine national park zone
Boating Yes Yes Yes Yes
Line fishing Yes Yes Yes* No*
Trolling Yes Yes Yes* No*
Crabbing Yes Yes Yes* No*
Bait gathering Yes Yes Yes No*
Bait netting Yes Yes Yes No*
Netting (other than bait netting) Yes Yes No* No*
Limited spearfishing Yes Yes Yes No*
Limited collecting Yes* Yes* Yes* No*
Trawling Yes No* No* No*
NOTES:
a: Up to two lines and a maximum of two hooks per angler
b: All equipment must be stowed or secured
c: Maximum of four pots per person
d: No coral. Limits apply to species and equipment used
This is not an exhaustive list. For full details about the activities allowed in Moreton Bay Marine Park, refer to the Marine Parks (Moreton Bay) Zoning Plan 2008.
153°0'E
153°15'E
153°30'E
27°0'S
27°15'S
27°30'S
27°45'S



DEPARTMENT OF PRIMARY INDUSTRIES

PUMICESTONE CHANNEL

FISH HABITAT AREA OUTER BOUNDARY

SCALE 1 : 30 000

UNIVERSAL TRANSVERSE MERCATOR ..... ZONE 56

REFERENCE

- Fish Habitat Area Outer Boundary
- Management A
- Management B

EXCLUDED AREAS

Plan FHA-011 only shows the outer boundary of the Fish Habitat Area. See the Fisheries Regulation that declares the Fish Habitat Area for areas within the outer boundary that are excluded.

LOCALITY MAP

SHEET 1 of 2

	PLAN NUMBER
9544	FHA-011

DEPARTMENT OF PRIMARY INDUSTRIES

PUMICESTONE CHANNEL

FISH HABITAT AREA OUTER BOUNDARY

SCALE 1 : 30 000

UNIVERSAL TRANSVERSE MERCATOR ..... ZONE 56

REFERENCE

- Fish Habitat Area Outer Boundary
- Management A
- Management B

EXCLUDED AREAS

Plan FHA-011 only shows the outer boundary of the Fish Habitat Area. See the Fisheries Regulation that declares the Fish Habitat Area for areas within the outer boundary that are excluded.

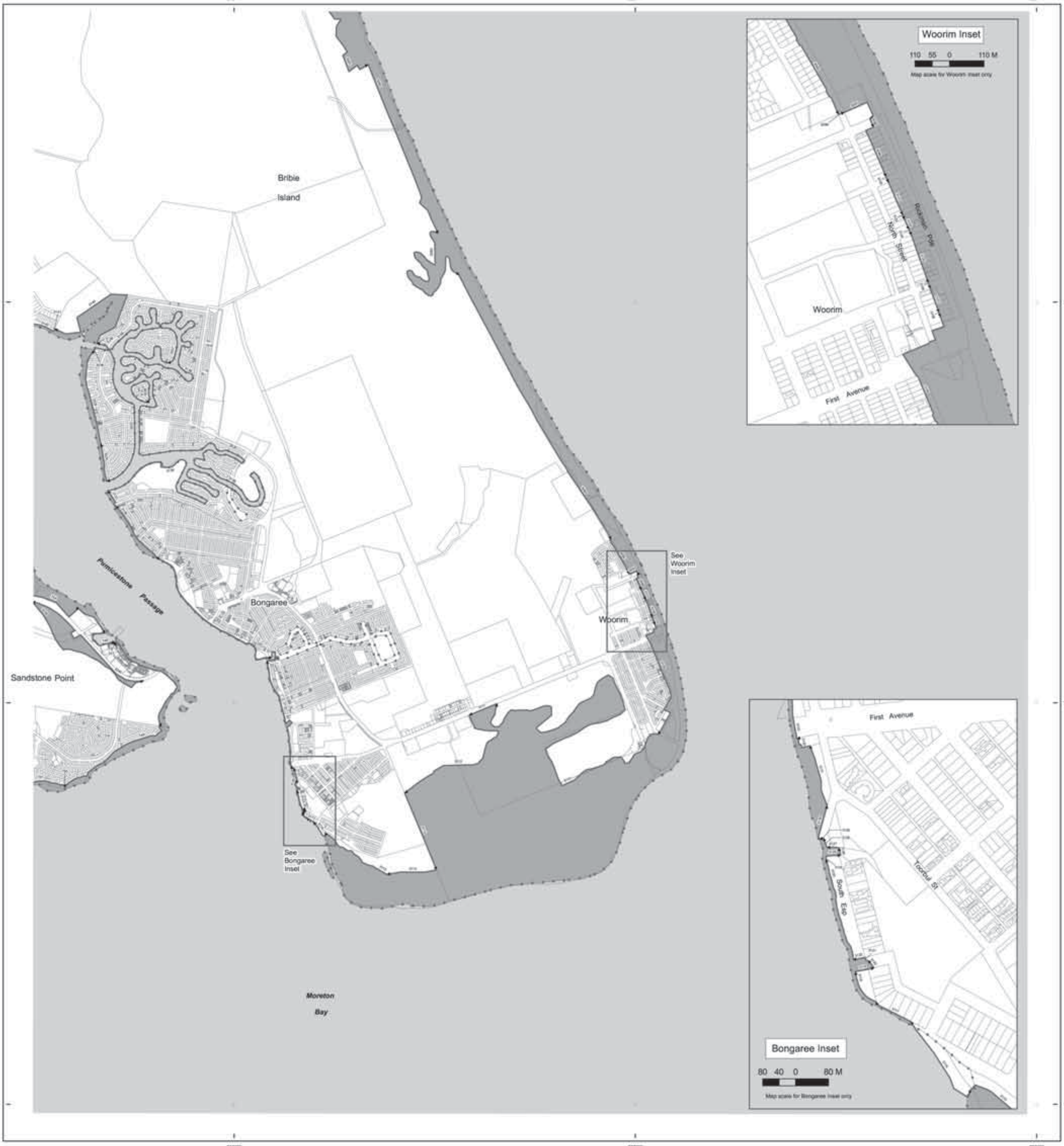
LOCALITY MAP

SHEET 2 of 2

1:100000 MAP REFERENCE	PLAN NUMBER
9544	FHA-011

South East Queensland Coastal Management District
Sheet 13.9 Pumicestone South

SHEET NUMBER 13.9
SHEET NAME Pumicestone South
Map 9 in a series of 34
DRAFT December 2005



INDEX TO 1:25 000 MAP SHEETS

Map 9 of 34

DATA SOURCES for the COASTAL MANAGEMENT DISTRICT (CMD)

Custodian	Title	Currency	Scale	Additional Details
NRM (formerly DNR)	Digital Cadastral Database (DCDB)	August 2004 - September 2005	Varies: Approx 1:2,000 in urban areas, up to approx 1:250,000 in more rural areas	Cadastral data has been provided with the permission of the Department of Natural Resources and Mines (current as at September 2005). The State of Queensland (Department of Natural Resources and Mines) [2005]. Cadastral boundaries are shown on the CMD maps. The CMD boundary also incorporates cadastral data from the DCDB.
	Highest Astronomical Tide (HAT) & Mean High Water at Spring Tide (MHWS)	2005	Variable	Available for the BCC area only. Developed by HR & W using a model that combines tidal gauge data with airborne laser scanner data. Horizontal accuracy varies with slope. 1987 data from the EPA is used outside the BCC area (see below).
	Mining Leases	July 2005	Approx similar to DCDB	Only current granted mining leases were considered when constructing the CMD.
	Orthophotos	flying dates range from 1990 to 1997	1:25,000	Orthophotos were used to support development and verification of the CMD.
	Orthophotos	flying dates range from 2000 to 2005	1:5,000	As above.
	Quickbird Satellite Imagery	2003	0.6m pixel	As above.
Geoscience Australia	Australian Maritime Boundaries Information System (AMBIS) (version 1.1)	Sep 2001	1:100,000	Used for derivation of 3 nautical miles CMD seaward extent boundary.
Gold Coast City	"A Line" Sewer Setback	Mar 2001	Unknown	Only applies to the Gold Coast City LGA.
Environmental Protection Agency (EPA)	Coastal Features of SEQ	Nov 2005	1:50,000	Coastline for Southeast Queensland compiled from best available data sources.
	Coastal Building Line Setbacks for SEQ	Aug 2002	1:25,000	Coastal Building Line Setbacks define areas where approval to build under the Building Act 1975 must not be given to build a structure completely or partly seaward of the coastal building line. For more information refer to the Coastal Protection and Management Act 1995.
	Dunes	Jun 2001	1:250,000	Refer to the report by Richard Whitlow, 'Mapping of Active Dune Systems for SEQ Regional Coastal Management Plan (June 2001).
	Erosion Prone Areas of SEQ	Jun 2002	Varies: Approx 1:100,000 to 1:25,000	Erosion Prone Areas are declared under the Coastal Protection and Management Act 1995. These areas delineate where development controls apply.
	Highest Astronomical Tide (HAT) & Mean High Water at Spring Tide (MHWS)	Dec 1988	1:25,000	Based on 1:25,000 mapping from the Coastal Wetlands of South Eastern Queensland (1996) by Dowling & Stephens.
	Section 55	Dec 2002	Varies	Formerly Section 58, this is the area where a Coastal Management District may be declared under Section 55 of the Coastal Protection and Management Act 1995. This dataset was a precursor to the current SEQ Coastal Management District.
Queensland Herbarium, EPA	Vegetation Communities and Regional Ecosystems of the South-Eastern Queensland Bioregion (version 3.3)	1999	1:100,000	This dataset was used to support delineation of wetlands in the CMD. Version 3.3 (March 2005 update).

Queensland Government
Environmental Protection Agency

N

1:25 000

0 0.25 0.5 1 1.5 2 2.5 3 3.5 4

Kilometres

GDA

PROJECTION: Universal Transverse Mercator, Zone 56
HORIZONTAL DATUM: Geocentric Datum of Australia 1994 (GDA94)
Grid tick marks indicate the 1000 metre Map Grid of Australia

April 2006

The Coastal Management District represents areas requiring special development controls and management practices. It has been prepared in accordance with the Coastal Protection and Management Act 1995 and is declared under the Coastal Protection and Management (Coastal Management Districts) Regulation 2003.

The Coastal Management District identified on the map and described in Table 1 includes all Queensland tidal waters.

Where the landward boundary of the coastal management district is described in relation to highest astronomical tide (HAT), mean high water springs (MHWS), or the toe of the frontal dune, the boundary may move over time as a result of natural coastal processes. The remaining line segments are fixed in location.

Production notes:
Produced by the Queensland Environmental Protection Agency, Southern Region, January 2006.

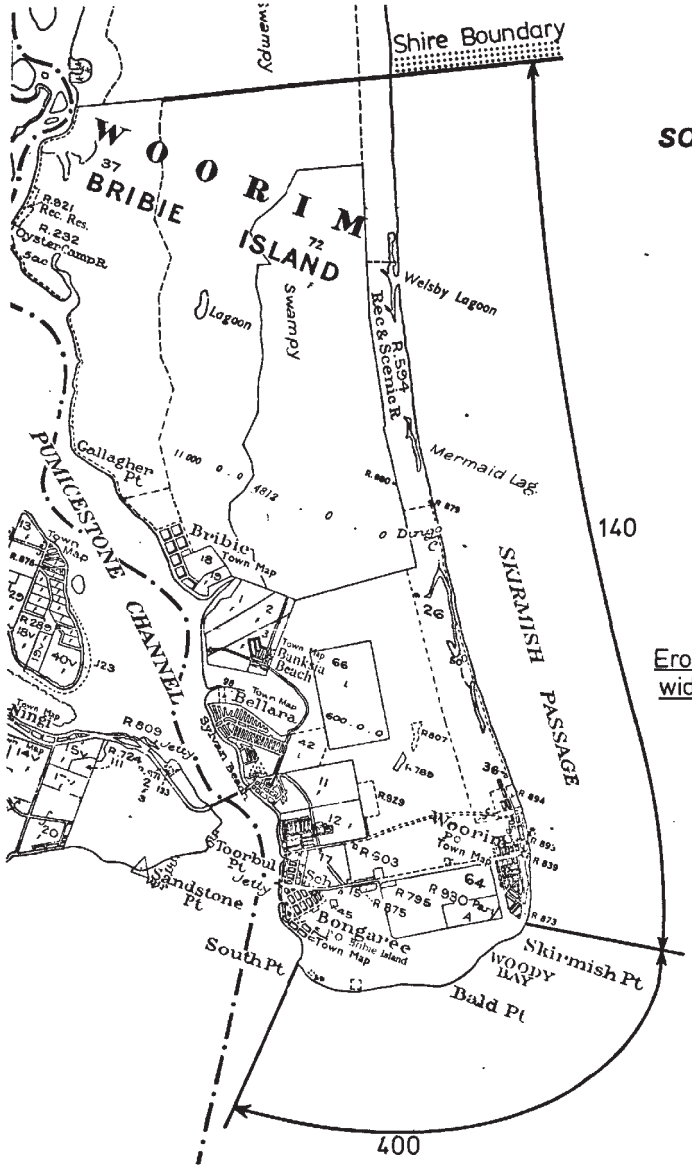
Disclaimer:
The Coastal Management District boundaries shown on this map are a visual representation only. While reasonable care and attention has been taken in collecting, processing and compiling data to illustrate CMD boundaries as accurately as possible, the EPA refers users to Table 1 for precise boundary descriptions. In addition, the users of this plan are encouraged to obtain any appropriate professional advice relevant to their particular circumstances.

Legend

- Coastal Management District Over Land
- Coastal Management District Over Water
- 91 Coastal Management District Boundary Segment Number (refer to segment descriptions in Table 1)
- Property Boundaries
- Coastline

Table 1: Boundary Descriptions

SEGMENT NUMBER	DESCRIPTION	SEGMENT NUMBER	DESCRIPTION
744	Lot	3117	Lot
745	MHWS + 40m	3118	Revet + 10m
746	HAT	3119	Lot
747	Lot	3120	MHWS + 40m
748	MHWS + 40m	3121	Transition
749	Lot	3122	Lot
750	MHWS + 40m	3123	Revet + 10m
751	Lot	3124	Transition
3091	MHWS + 40m	3125	Lot
3092	MHWS + 140m	3126	MHWS + 40m
3093	MHWS + 40m	3127	Lot
3094	MHWS + 140m	3128	Revet + 10m
3095	Lot	3129	Road
3096	Road	3130	West side of South Esplanade
3097	Lot		
3098	Road	3131	MHWS + 40m
3099	Lot	3132	Lot
3100	Road	3133	Revet + 10m
3101	Lot	3134	HAT
3102	40m Landward from seaward boundary of lot	3135	Revet + 10m
		3136	Coastal side of road
3103	Lot	3137	Lot
3104	Road	3138	HAT
3105	Lot	3139	Road
3106	Road	3140	Lot
3107	Lot	3141	Road
3108	40m Landward from seaward boundary of lot	3142	MHWS + 40m
		3223	HAT
3109	Lot	3224	Revet + 10m
3110	Dunes	3225	Coastal Side of Road
3111	Lot	3226	Lot
3112	Dunes	3227	HAT
3113	Lot	3228	HAT
3114	MHWS + 400m	3239	Dunes
3115	HAT	3240	Lot
3116	MHWS + 40m		



Erosion Prone Area widths in metres

SPECIAL NOTE

In the preparation of this plan, calculations have been made upon such information as is available but without providing for any projections relating to global climatic change such as the Greenhouse Effect.

SCALE 1 : 100 000

KILOMETRES 2 1 0 2 4 6 8 10 KILOMETRES

Drawn and Published at the Survey Office, Department of Lands, Brisbane.

Notes

(1) The seaward boundary of the erosion prone area for all local authority area/s to which this plan relates shall be defined by the seaward limit of Queensland waters.

(2) On land adjacent to coastal waters the landward boundary of the erosion prone area shall be defined as:

(i) a line measured 40 metres landward of the plan position of the mean high water springs (MHWS) tide level except where approved revetments exist, in which case the line is measured 10 metres landward of the upper seaward edge of the revetment, irrespective of the presence of outcropping bedrock; or

(ii) a line located by the linear distance (in metres) specified on this plan measured, unless specified otherwise, inland from:

(a) the seaward toe of the frontal dune. (The seaward toe of the frontal dune is normally approximated on aerial photography by the seaward limit of terrestrial vegetation); or
(b) a straight line drawn across the mouth of a waterway between the alignment of the seaward toe of the frontal dune on either side of the mouth.

or (iii) the plan position of Highest Astronomical Tide (HAT);

whichever provides the greater erosion prone area width except:

(a) where the linear distance specified on this plan is less than 40 metres, in which case note (2)(i) does not apply, however notes (2)(ii) and (2)(iii) do apply;
(b) where outcropping bedrock is present and no approved revetments exist, in which case the line is defined as being coincident with the most seaward bedrock outcrop within these defined boundaries but not seaward of the line of HAT;
(c) in approved canals in which case the line of HAT applies, irrespective of the presence of approved revetments or outcropping bedrock.

(3) Erosion prone areas defined in accordance with the above are deemed to exist throughout all the local authority area/s to which this plan relates, irrespective of whether the entire local authority area is depicted on erosion prone area plans for the local authority.

(4) Coastal waters, as referred to in note (2), are defined to be Queensland waters to the limit of HAT.

* Indicates possible presence of outcropping bedrock

Erosion Prone Area Plans may be updated from time to time and a new revision created. Please check with the Environmental Protection Agency or the Local Government that this copy is the current revision prior to using the contained information in any way

Revision E Notes modified as per amendment adopted at BPA meeting March 7, meeting No. 195

Revision D Notes modified as per amendment adopted at BPA meeting on 30/11/95, and renumbered.

Revision C Special Note A deleted and replaced with Special Note B. Approved at Authority Meeting of 9.6.94

Revision B Special Note A approved at the Authority Meeting of 16.9.93

Revision A SPECIAL NOTE ADDED 24·04·89 KJJ

DEPARTMENT OF HARBOURS & MARINE-QLD. BEACH PROTECTION AUTHORITY					CABOOLTURE SHIRE EROSION PRONE AREAS		
Prepared	Checked	Submitted	Drawn				
Supervised		Recommended	Traced		Scale 1 : 100 000	Date 3-12-1984	SC 3367 E
Engineer-in-charge Authority.		27.12.84	Checked				

Appendix C

Community Consultation

Overview

This Interim Report was developed during Phase One of the project and it involved a review of the existing coastal resources in the area. The detailed report for Phase Two of the project includes community feedback which was received during the public exhibition of the Interim Report to the public and the TWG. Comments received from the community and the TWG has been incorporated and addressed in the detailed report.

In developing the Bribie Island Shoreline Erosion Management Plan (SEMP), stakeholder consultation was undertaken with the members of the Technical Working Group (TWG) and the local community in order to collect comments and feedback on the Interim Bribie Island SEMP report.

Please note that comments received from members of the TWG have not been included in this report. This report provides a summary of the issues and general comments raised by the local community in response to the public exhibition of the Interim Bribie Island SEMP Report.

Moreton Bay Regional Council was responsible for undertaking the community consultation for the project. Council used the following consultation tools to allow the community and other interests to comment on the Interim SEMP report;

- Letters to local residents detailing the purpose of the Bribie Island SEMP and inviting their comments on the Plan; and
- Public exhibition of the Interim Bribie Island SEMP on Council's website.

The public exhibition of the Interim Bribie Island SEMP was carried out from mid June 2010 to mid July 2010. During this time the local community was encouraged to provide feedback to Council via email, mail or telephone. Feedback was then collected and forwarded onto GHD to review and include in the second stage of the Bribie Island SEMP.

Consultation Received

During the public exhibition of the Interim Bribie Island SEMP, Moreton Bay Regional Council received a number of comments from members of the local community. Feedback was received in the form of letters, emails and phone messages.

Table 1 provides a profile of stakeholders who provided feedback to Council. A total of 15 submissions were received, with the majority of the submission coming from local residents.

Table 1 Stakeholder Profile

Stakeholder Group	Number of Submission
Local Bribie Island and Sandstone Point Residents	12
Local community groups/ associations	3
Total	15

Stakeholder Feedback

This section provides a summary of the feedback received from the community during the public exhibition of the Interim SEMP report in July 2010. Key issues raised by the community have been have been separated into the following headings:

- General comments about the Interim Bribie Island SEMP Report
- General comments about South Point to Bongaree Jetty
- General comments about Bongaree Jetty to Bribie Gardens Estate
- General comments about Bongaree north to Bellara
- General comments about Sylvan Beach Boating Infrastructure
- General comments about Sylvan Beach North
- General comments about Banksia Beach
- General comments about Sandstone Point to Turners Camp

General Comments about the Interim Bribie Island SEMP Report

Table 2 outlines the comments made by the stakeholders with regard to the overall content and layout of the Interim Bribie Island SEMP report. The key issues raised by the stakeholders included the following:

- The names of the sites within the study area are incorrect and should be corrected;
- The SEMP should include more community input and should include community input from the previous Bribie Island Shoreline Erosion studies; and
- More photos of the study area should be included in the Interim SEMP.

Table 2 Comments received on the Interim Bribie Island SEMP Report from the Community

General Comments about the Interim Report
◗ Include aerial photographs that show the tidal stage. ◗ Ground photographs should include a date and the tidal stage. ◗ Attachments in Appendix B should be enlarged for easier reading. ◗ The Terms of Reference/study directive should be included in the final report. ◗ The SEMP should include a broader examination of foreshores including – natural influences, the shape and the nature of the coastline. It should also include a broader examination and analysis of the following: – stormwater drainage system, its design and impacts; – the condition and design of the existing revetment and retaining walls; and – shoreline inundation and unwanted sand accumulation. ◗ Figure 1 is misleading and should be amended as the names of the sites are incorrect. The suburb boundary between Bellara and Bongaree runs from the centre of the Bribie Bridge, along Benabrow Avenue and then out along Hornsby Road. It is therefore quite misleading to designate the section of the waterfront from Bribie Gardens Estate canal to the Bribie Island Hotel as Bellara and to have a chapter entitled Bellara. Sylvan Beach is not a suburb and it is misleading in Figure 1 to designate the Warrigal Street to Solander Canal compartment as Sylvan Beach. ◗ Chapter 2 (paragraph 2.9) reference to a tree listed as Callitirs columnaris is incorrect and

General Comments about the Interim Report
it should be *Callitris columnaris*. ◗ According to BICA legislation and related approvals which have been developed to protect the revetment wall, maintain amenities, stormwater management and canal access have been ineffective, costly and have only provided short term fixes. ◗ The Management Plan for the western foreshore of Bribie Island has resulted in several undesirable outcomes in the past which include the following: – The accretion of sand and infilling of the deep water surrounding the Jetty. – The erosion of the revetment wall in several locations. – The expenditure of Council (Community) funds to reinforce the revetment wall – the most recent example being opposite Hall Avenue, Bongaree. – The silting up of the entrance to the Bribie Gardens Estate. – Erosion of the boardwalk and foreshore area at Pirate Park (Crest Park). – Loss of foreshore, park and amenity at Banksia Beach. ◗ This SEMP should manage the entire western foreshore from foreshore from Buckley's Hole to Banksia Beach, to reduce the erosion, to maximise the amenity value of the area and to minimise the costs to Council and the community. ◗ The SEMP should include more community input and should include community input from the previous Bribie Island Erosion Plans.

General comments about South Point to Bongaree Jetty

Table 3 outlines the comments made by the stakeholders about the site at South Point to Bongaree Jetty. Feedback from the community revealed that sand accumulation and erosion are two major issues affecting the area.

Table 3 Comments about South Point to Bongaree Jetty for the Interim Bribie Island SEMP Report from the Community

South Point to Bongaree Jetty
1. There used to be timber groynes (1m high) about every 50m across the beach between South Esplanade Bongaree Jetty. The groynes are still present at the site, but they are covered by sand. ◗ There used to be another jetty near the middle of the South Esplanade. ◗ Pre-1990, water used to come right up to the revetment wall between South Esplanade and current Bongaree jetty position. ◗ There is an issue of sand build up in the area and this may be due to the following events: – removal of an old shipwreck from the foreshore in the South Esplanade area in early 1990s (maybe around 1993/94) – -commencement of sand bypass operations at Tweed River mouth and Gold Coast seaway 2. Beach erosion is a major problem at Buckley's Hole and sand nourishment or relocation

South Point to Bongaree Jetty
locally may be required to manage this problem.

General comments about South Point to Bongaree Jetty

Table 4 outlines the comments made by the stakeholders about the site at Bongaree Jetty to Bribie Gardens Estate. The key issues raised by the stakeholders relate to sand accumulation and beach erosion at the site, as well as the condition of the existing revetment walls.

Table 4 Comments about Bongaree Jetty to Bribie Gardens Estate for the Interim Bribie Island SEMP Report from the Community

Bongaree Jetty to Bribie Gardens Estate
◗ Sand accumulation at Bongaree Jetty is a major issue with more than 35m of sand/sediment being built up since the pontoons were attached. There is also considerable accumulation of sand southwards of the Jetty. ◗ The pontoons are preventing sand/sediment moving north, with the rapid infilling of the deep water surrounding the jetty resulting in loss of amenity to fishing, boating and tourism. The prevention of sand moving north is also resulting in the foreshore north of the jetty being starved of sand and the erosion of the revetment wall. It is recommended that sand should be moved to the north of the jetty either by routine pumping or periodic removal of the pontoons. Such action is urgently required or the amenity of this area will be lost for ever. ◗ Beach erosion has been occurring north of Bongaree Jetty. It is recommended that sand should be moved from the Jetty area and from south of the Jetty by pumping or by periodic removal of the pontoons to nourish the shoreline and revetment wall to the north. ◗ Beach erosion is occurring immediately north of the breakwater for the Bribie Gardens Estate. ◗ There is considerable build up of sand to the south of the breakwater. This is to be expected because of the northern movement of sand. This build up of sand must be addressed and pumped north of the entrance to the canal at Bribie Gardens Estate. The area to the north of the canal entrance is being starved of sand and the risk to the revetment wall has had to be reduced by the placement of rocks south and north of the Bribie Bridge at considerable expense. ◗ There is the issue of a sand bar which is again developing across the mouth of the canal entrance and the sand bank on the inside southern breakwater wall. Unfortunately, on a previous occasion, to reduce the problem of sediment build up in this area, the sand was pumped south into the already excessive area of sand south of the breakwater and removed by Council truck from the area altogether. It is recommended that action is taken to move the build up of sand to the north of the entrance to the canal at Bribie Gardens Estate. It will then nourish the area south to the Bribie Bridge and beyond. ◗ The stability of the revetment wall is likely to be improved once the sand is able to move north after being moved past the various structures including Williams Creek, the Jetty, Shirley Creek, and the mouth of the Bribie Gardens Estate. It is recommended that these sand accretion areas need to be clearly identified on an appropriate map/aerial

Bongaree Jetty to Bribie Gardens Estate
photograph so that a holistic plan of action can be developed and implemented.

General comments about Bongaree North to Bellara

Table 5 outlines the comments made by the stakeholders about the site north of Bongaree to Bellara. The comments received from the stakeholders provide a brief history of the area.

Table 5 Comments about Bongaree North to Bellara for the Interim Bribie Island SEMP Report from the Community

Bellara
◗ It is recommended that the pumping of sand from south of the Estate breakwater, the sand bar to the northern side of the canal mouth will nourish the area and revetment wall on the southern and northern sides of the Bribie Bridge.
◗ Many changes started occurring north of the canal entry groyne - Bribie Island Bridge immediately after the rerouting of the old waterway which is now the Groynes Entry to the Canal Estate. Whilst the Groyne faces mainly west, the old original creek emerged in a northerly direction for about 400 metres from the Groyne, forming a variable Sandbank parallel to the Pumicestone Passage which in main was North / South in direction.
◗ Since the construction of the pontoons on the jetty the surrounding beach has been adversely affected from south of the Bridge to the VMR boat ramp.

General comments about Sylvan Beach Boating Infrastructure

Table 6 outlines the comments made by the stakeholders about the site at Sylvan Beach Boating Infrastructure. The comments received from the stakeholders provide a brief history of the area and as well providing comments on the content of the Interim SEMP Report.

Table 6 Comments about Sylvan Beach Boating Infrastructure for the Interim Bribie Island SEMP Report from the Community

Sylvan Beach Boating Infrastructure
◗ The lagoon directly in front of property 95 Sylvan Beach Esplanade is the result of dredging. The lagoon was created to obtain material needed to fill the low lying ground in and around the VMR site and the adjacent boat parking areas adjacent to the realigned Sylvan Beach Esplanade.
◗ During the 1970s Sylvan Beach Esplanade ran from the Bribie Bridge straight up along the waterfront around the VMR building and up to Dander Avenue where it then took a 90 degree turn at Nambyn House (79 Sylvan Beach Esplanade). The Esplanade was realigned to its current route along in front of the Bribie Island Hotel and behind the VMR building and in conjunction with this, the bridge over the stormwater canal was removed and the remnants of the Esplanade around in front of the VMR building were renamed as Marine Parade.
◗ The Bellara boat ramp site is situated on the former site where the Bribie Island barge operated until 1963.
◗ In 1969 at the edge of the roadway along Sylvan Beach Esplanade it was a bush track

Sylvan Beach Boating Infrastructure
with about 5m wide and tar sealed, there was a sharp drop of around 1.5 m to the Passage floor. In the 1970s Council completely cleared all of the vegetation in this area subject to tidal inundation and filled the waterfront foreshore up to road level. ◗ In the early 1980s the Caboolture Shire Council took advantage of the funding from the Regional Employment Development Scheme and constructed a stepped concrete revetment wall which went along Sylvan Beach Esplanade. Currently the revetment is almost completely buried and only 30-45 cm of the wall is visible. ◗ On the western side of the site is a 46 unit complex called 'the Gums Anchorage'. It has a 124m frontage to Sylvan Beach Esplanade. In order to accommodate full width sealed Sylvan Beach Esplanade with a footpath on each side, it was necessary for Council to take part of the Pumicestone Passage by building a stone –concreted retaining wall from the end of the concrete stepped revetment wall through to Warrigal Street. The stone wall served its purpose until 2007 when it was but buried by fill dredged up some 200m away in front of the Volunteer Marine Rescue centre. ◗ Photo plate 6.6 captioned 'revegetated sand dune north of jetty facilities' shows Council's fifth attempt to use vegetation in order to stabilise the area. ◗ In 2007 a passageway into the VMR boating infrastructure area was dredged and the fill obtained was used to artificially create over 100m of foreshore (ie 20% of the study area) (refer to section 6-1 of the report). ◗ Chapter 6 of the report lacks details with regard to dredging that had occurred on the site, how much spoil was removed and the type of material that was removed. The report should also indicate where the material was moved to, why it was placed some 200m away in front of the Gums Anchorage units, how much of this new foreshore stills remains today and why it was so difficult to vegetate the foreshore. The problems of inundation in sections of the fill area should also be addressed. ◗ The report should include an engineering assessment of the effectiveness of undertaking dredging in the area and whether this should occur again. ◗ Five stormwater outlets within the area should be shown on Figure 29 of the Interim SEMP.

General comments about Sylvan Beach North

Table 7 outlines the comments made by the stakeholders about the site at Sylvan Beach North. The comments received from the stakeholders provide a brief history of the area and discusses the issue of erosion in the area.

Table 7 Comments about Sylvan Beach North for the Interim Bribie Island SEMP Report from the Community

Sylvan Beach North
◗ North of VMR, Crest Park, Pirate Park boardwalk and Sylvan Beach: The area immediately in front of the Gums Anchorage (cnr Warrigal St.), received a considerable amount of sand nourishment, 30 metres in width, when the State Government paid for the sand accumulated west of the VMR pontoon to be dredged. This considerable

Sylvan Beach North
volume of sand is now steadily being eroded and moved north. It has almost reached the Boardwalk area of Pirate Park (Crest Park). Previous to this nourishment, the revetment wall along Marine Parade was the only reason that the road was not lost to erosion. ◗ Pirate Park to Sylvan Beach: From the northern end of Marine Parade, past Pirate Park (Crest Park) to Sylvan Beach has been so severely eroded that part of the boardwalk became unsafe and was eventually removed. Currently the erosion in this area is still severe. This should be discussed in the SEMP. ◗ The foreshore in this area continues to be eroded, with the stumps of dead trees emphasizing losses. At the northern end of Sylvan Beach before the entrance to Pacific Harbour, a battery of groynes has been in place for some time. These groynes have and still do, where intact, slow down the movement of sand to the north and retain a minimal beach amenity. Action is required to repair and refurbish the groynes to stop any further erosion of the beach area

General comments about Banksia Beach

Table 8 outlines the comments made by the stakeholders about the site at Banksia Beach. The comments received from the stakeholders provide a brief history of the area and discusses the issue of erosion in the area.

Table 8 Comments about Banksia Beach for the Interim Bribie Island SEMP Report from the Community

Banksia Beach
◗ The loss of many trees along the foreshore between Pacific Harbour canal and Wrights Creek is predominately from erosion and not from storms. ◗ The fence adjacent to the toilet area has not allowed the mangroves to grow as these were already in place well before the fence was erected. ◗ The build up of sand on the northern site of the ramp is a direct result of sand nourishment by Council. ◗ According to photos taken in 1984, Dux Creek was already modified before the Pacific Harbour canal development. The Creek was originally modified as a result of the early development of Solander Lakes. A channel was created to control the flow of water between Pumicestone Passage and Solander Lakes. The channel is not referred to as a drainage channel that serves the purpose of assisting with the flow of water from Pacific Harbour. ◗ The aerial photos in the SEMP do not clearly show the loss of parkland at Banksia Beach. The northern section of the parkland at Banksia Beach in the vicinity of Wrights Creek was originally low-lying salt marsh wetland. Part of the wetland had been reclaimed before 1984. In 1984-85 the Pumicestone Passage extended right up to the Solander Esplanade road and the Esplanade continued on to Whitepatch. The parkland at Banksia Beach has lost a considerable number of trees due to erosion and the lack of water. During a storm event in October 2009, 13 mature trees along the waterline were lost due to erosion and destabilisation of their root system.

Banksia Beach
◗ Parkland at Banksia Beach is being lost at a considerable rate due to erosion and is exacerbated further by high and king tides. According to historical records and local residents an estimated of 30 metres of the park has been lost with small channels of erosion extending further eastwards into the park. To date no attempt has been made by Council to protect the reclaimed parkland from erosion.
◗ Mangroves and revetment walls have proven to be effective preventing erosion and this is evident at the southern end of the park up to the boat ramp. It is noted that after the heavy rains in 2009 and early 2010 that many new mangroves have taken root along the northern section of the park. Recent work by Council in nourishing the area by dumping sand along sections of the foreshore has not been effective in protecting the area.
◗ Concerns have been raised about erosion along the foreshore at Banksia beach near the toilet block opposite Walker/Elizabeth Batts Courts where the coastline had receded about 6-8 metres to the point where a fish clearing table now among the mangroves offshore used to be on land.
◗ Previous studies on shoreline erosion at Bribie Island have been undertaken.
◗ The drain at the northern end of Col Fisher Park, Banksia Beach has deteriorated over the last 20 years to the extent that the asbestos retaining wall has collapsed and the dangerous material is exposed. Temporary covering with sand does not diminish the health risk to people living in the area or children using the area. Furthermore, mangroves have taken over the drain to the extent that it no longer has the ability to fulfil the original design to flush the canals to the western side.
◗ Despite the fact that the Council has been made aware of these problems, over a period of years, this area has become a serious health hazard. The Council has a Duty of Care in respect of the Local and Visiting Citizens to this area. Urgent attention is required to rectify these problems.
◗ The Banksia Beach parkland is an extremely important recreational asset for residents and visitors. This level of importance cannot be over emphasized and will ultimately increase over time as the population increases. Any action plan must include three primary components if it is to be effective in controlling the significant erosion:-
◗ The first step must be to stop further erosion
◗ The second step should be to replenish lost sand and to cover the exposed coffee rock.
◗ The third step has to include the development of a long-term strategy that ensures retention of sand and the shoreline.

General comments about Sandstone Point to Turners Camp

Table 9 outlines the comments made by the stakeholders about the site at Sandstone Point to Turners Camp. The comments received from the stakeholders raised the issue of erosion on the area the issue of san build up at the Spinnaker Marina.

Table 9 Comments about Sandstone Point to Turners Camp for the Interim Bribie Island SEMP Report from the Community

Sandstone Point to Turners Camp
◗ Beach front and Marina entrance to Spinnaker marina and the land in front of Spinnaker Quays, South to the Bribie Island Bridge. ◗ The local residents would like the SEMP to include the following: – Sand removed from Spinnaker marina and replace on the waterfront south from the Marina towards the Bribie bridge. – Damage caused by speeding boats wash to be rectified, with signage placed on the red and green markers and also on the rock walls of the marina. Boat wash from the boats is resulting in erosion for the area. – The recommendation of a planned retreat is unacceptable. ◗ The shoreline between the Marina and the bridge and from Caravan Park to Turners Camp is not stable, as local residents have witnessed an acceleration of erosion of the shoreline over the last 5 years. Many trees have been lost as a result of this erosion. According to local residents the area should be prioritised and remediation is urgently required. ◗ Local residents have serious concerns regarding the erosion in front of Spinnaker Quays. Spinnaker Quays is north of the Spinnaker Blue Apartments and is located near the entrance to Spinnaker Sound Marina. Sand is currently travelling from the beach in front of Spinnaker Quays Complex to the entrance and inside the Marina. As a result the sand has blocked the stormwater drain from Spinnaker Quays. ◗ Local residents would encourage and support the excess sand being removed from the vicinity of the Marina and being placed back on the beach in front of Spinnaker Quays from where it travelled. ◗ Many years ago dune grass was removed form the front of the units and from the southern entrance of the Marina. Since then erosion has been a major issue with sand moving north because there is no natural protection left. Action is required to restore the sand at the foreshore and to prevent further erosion.

Addressing the Community's Feedback

As part of the revised Bribie Island SEMP, the Plan has taken into account a number of the community's comments which were raised during the community consultation period and these are discussed below:

The revised SEMP has added reference details to each of the photos within the Plan including the source and the date. Appendix B in the Plan has been amended to included the internet link for each of the maps. Figure 1 in the Plan has been amended with the correct names of the sites and the correct suburb boundaries. The reference to a tree listed as *Callitirs columaris* in Chapter 2 of the Plan has been changed to the correct name -*Callitris columnaris.* In addition the revised SEMP has now included historic information relating to White Patch and the first landing of Matthew Flinders on Bribie Island. It has also included additional information relating to dredging of Sylvan Beach in 2007.

GHD

4-6 Innovation Parkway, BIRTINYA QLD 4575
PO Box 1540, BUDDINA QLD 4575
T: 61 7 5413 8100 F: 61 7 5413 8199 E: bta1mail@ghd.com

Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	P O'Keeffe	D Willis		D Willis		May 11