

## Section 10

### Commonwealth Marine Area







## 10 Commonwealth Marine Area

### 10.1 Introduction

This section addresses the Commonwealth marine area (CMA) aspects of the Tailored EIS Guidelines. The CMA was identified as one of the controlling provisions for the Project (refer **Section 4.4.2** and **4.5.2**).

It is noted that DSEWPaC's *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (DEWHA 2009c) states that, where appropriate, precautions have been taken against translocating potential pest species, routine ship transits would not normally be expected to have a significant impact on a matter of NES. However, an assessment of Project-related shipping activities on the CMA has been made in accordance with the Tailored EIS Guidelines.

The CMA is defined under Section 24 of the EPBC Act and consists of any waters of the sea inside the seaward boundary of the exclusive economic zone except waters which have been vested in a State (known as "coastal waters") or waters within the limits of a State. It includes the seabed and airspace of these waters.

The limits of the coastal waters of a State are defined by the *Commonwealth Coastal Waters (State Powers) Act 1980* and generally comprise those waters within three nautical miles of the Territorial Sea Baseline (TSB). The TSB is generally the low-water line along the coastline. For bays, the TSB is taken as a straight line between the low-water lines of the natural entrance points to the bay.

The CMA generally extends from the seaward boundary of coastal waters to the 200 nautical mile exclusive economic zone boundary. This equates to a region between approximately 5.6km to 370.4km from the TSB.

The location of the CMA relative to the Project is shown in **Figure 10-1**. The TSB in the vicinity of Albatross Bay is taken as a straight line from the low-water mark of Jantz Point in the north to Pera Head in the south.

#### 10.1.1 General Structure of the Section

The Tailored EIS Guidelines require the following matters to be addressed for the CMA:

- a description of the CMA;
- identification of those aspects of the CMA likely to be impacted by the proposal, including information on:
  - listed threatened species;
  - migratory species; and,
  - any other component of the CMA that is likely to be impacted by the action.
- description and assessment of the nature and extent of the likely impacts;
- proposed avoidance and mitigation measures; and,
- assessment of residual impacts.

This section is structured address these requirements as follows.

- **Section 10.2** provides an overview of the values of the CMA;
- **Section 10.3** describes the construction and operational aspects of the proposed action that are relevant to the CMA;

- **Section 10.4** assesses the potential impacts within the CMA in terms of the significant impact criteria detailed in the *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (DEWHA 2009c) and proposed avoidance and mitigation measures; and,
- **Section 10.5** provides a summary of any residual impacts and draws conclusions from the assessment.

### 10.1.2 General Approach to Impact Assessment

Certain Project activities would be located directly within the CMA (i.e. proposed new spoil ground) or transit through the CMA (i.e. Project-related bauxite, cargo and fuel shipping) while some Project-related activities would be located outside the CMA (i.e. dredging, spoil disposal at Albatross Bay) but have the potential to indirectly impact on the CMA. **Section 10.3** identifies the relevant Project activities that require assessment of their potential impacts on the CMA.

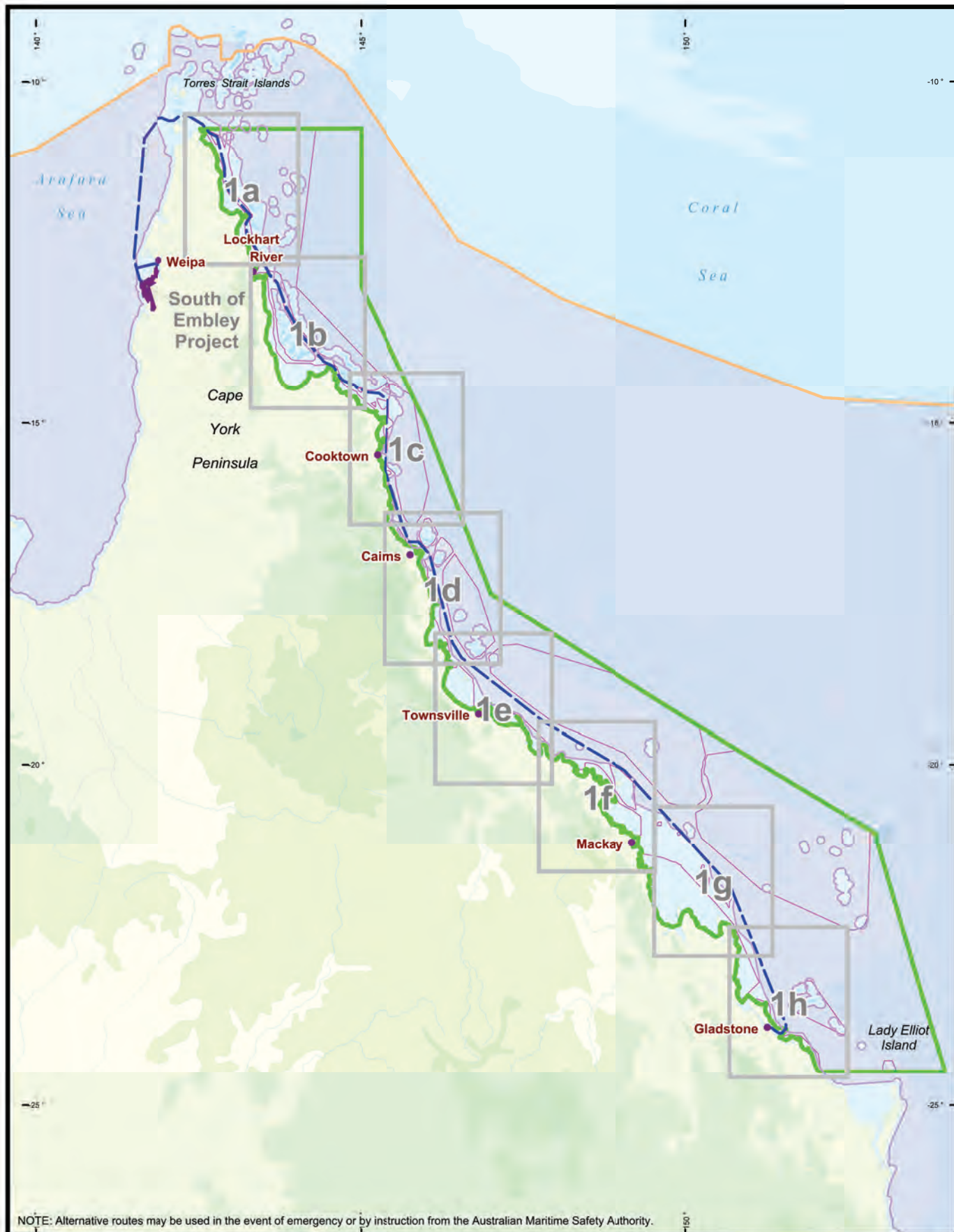
A detailed discussion of other potential impacts associated with Project-related shipping activities is provided in **Section 4.5.3**. Potential cumulative and consequential impacts on the CMA are discussed in **Section 18.4**.

For the purposes of this assessment, the magnitude of potential impacts on the values of the CMA is rated as either:

- None/negligible – unlikely to effect the values of the CMA.
- Minor impact – an isolated aspect or area of the values of the CMA may be affected directly or indirectly.
- Moderate impact – a number of aspects or areas of the values of the CMA may be affected directly or indirectly at a regional scale.
- High impact – the impact would threaten or permanently effect the values of the CMA at a reef-wide scale.

High and moderate residual impacts are considered to be significant, and none/negligible and minor residual impacts are not considered to be significant.





RioTinto Alcan

- Project Area
- City / Town
- River
- Great Barrier Reef Marine Park
- Coastal Waters (3 nautical mile limit)
- Exclusive Economic Zone (200 nautical mile limit)
- Designated Shipping Area
- Bauxite Shipping Route
- MapSheet Index
- Commonwealth Marine Area

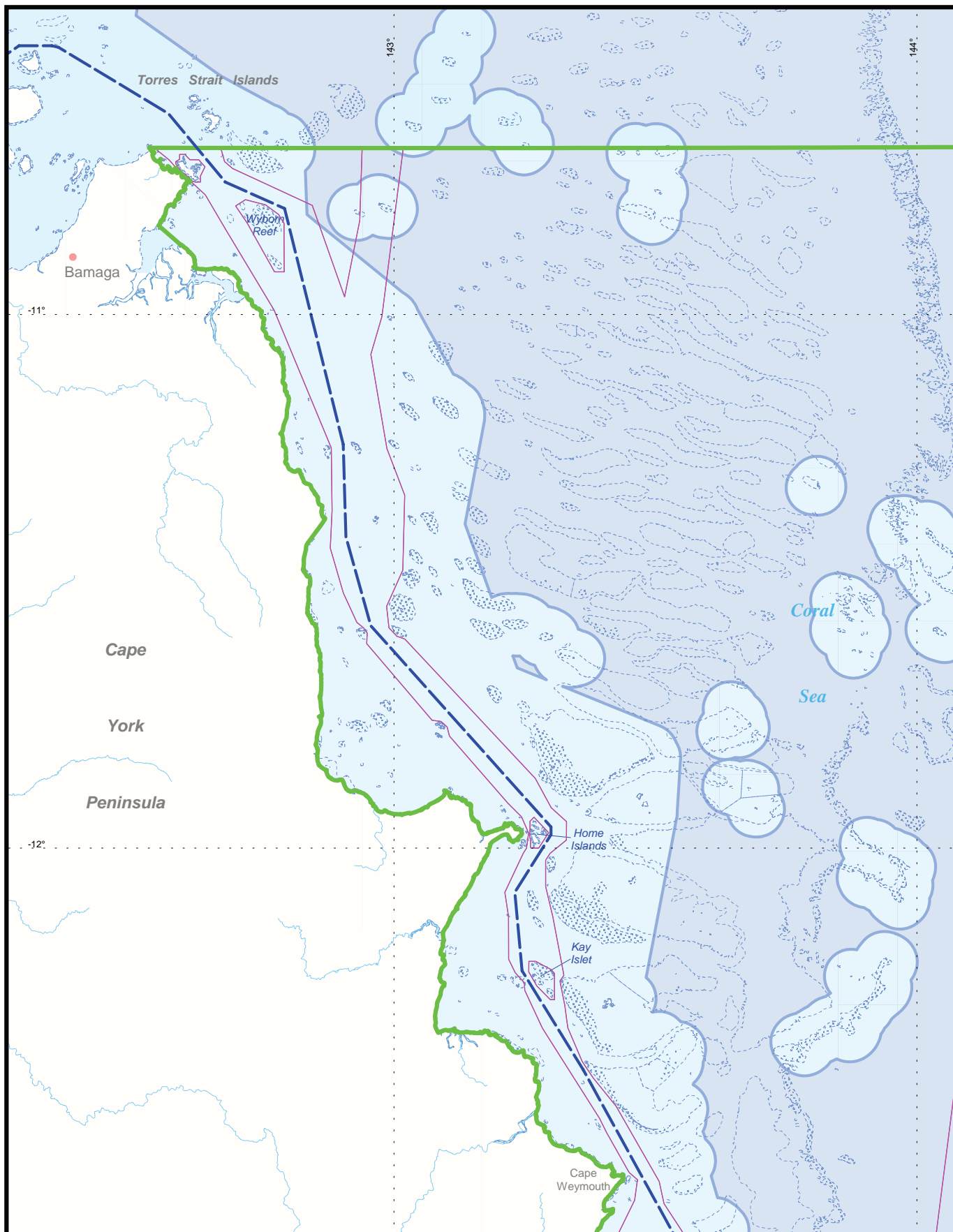
#### South of Embley Project

**Fig. 10-1: SoE Project and Commonwealth Marine Area**



100 0 100 200km

Datum/Projection: GDA94, Lat/Long Date: 06/09/2012



South of Embley Project

**Fig. 10-1a: Shipping in Commonwealth Marine Area (Cape York)**

Rio Tinto Alcan

- City / Town
- River
- ▨ Reef Flat
- - - Indicative Reef Boundary
- Great Barrier Reef Marine Park
- ▨ Commonwealth Marine Area
- Designated Shipping Area
- - - Bauxite Shipping Route

NOTE: Alternative Routes may be used in the event of emergency or by instruction from the Australian Maritime Safety Authority.

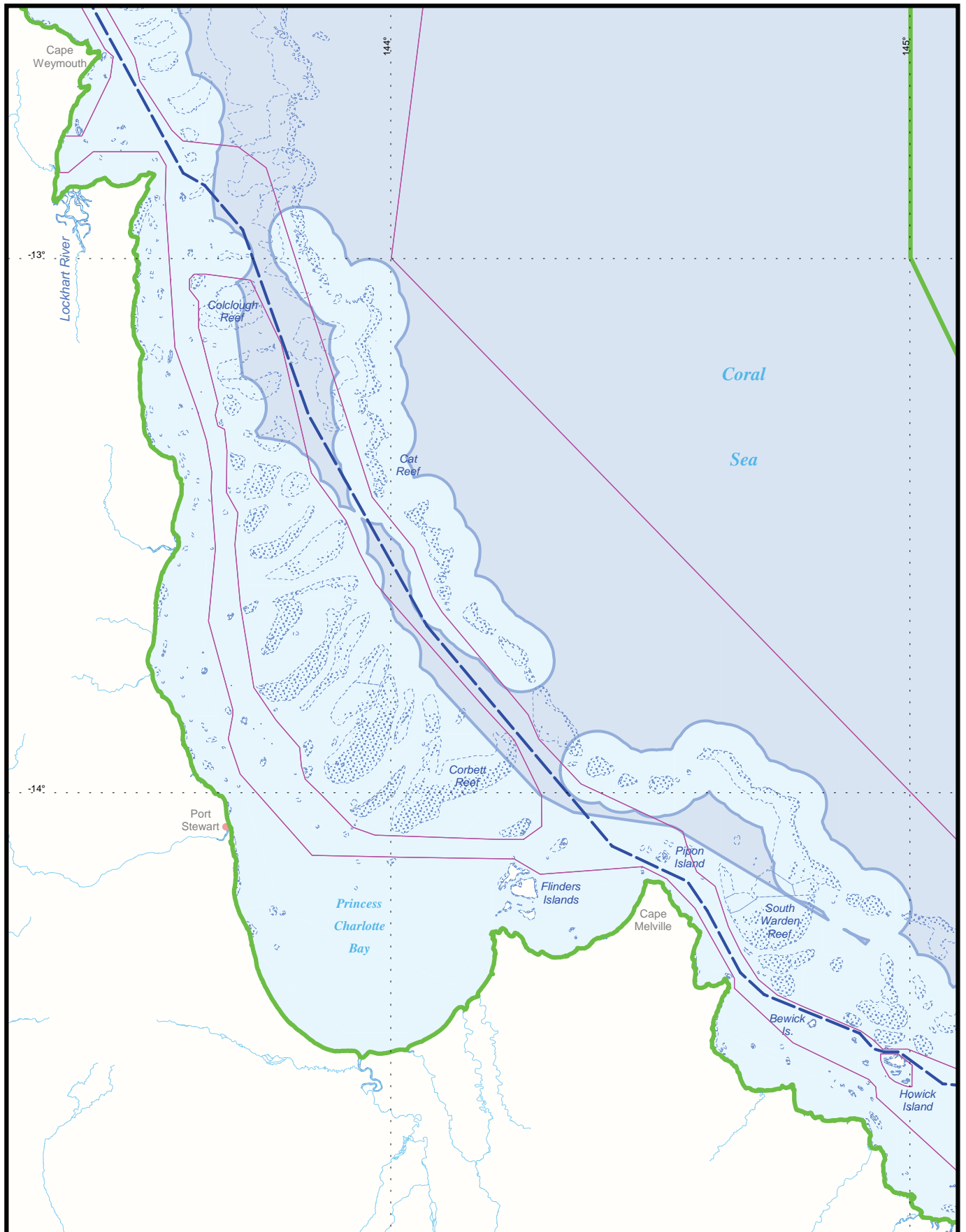


10 0 10 20 30km

Datum/Projection: GDA94, Lat/Long

Date: 06/09/2012





South of Embley Project

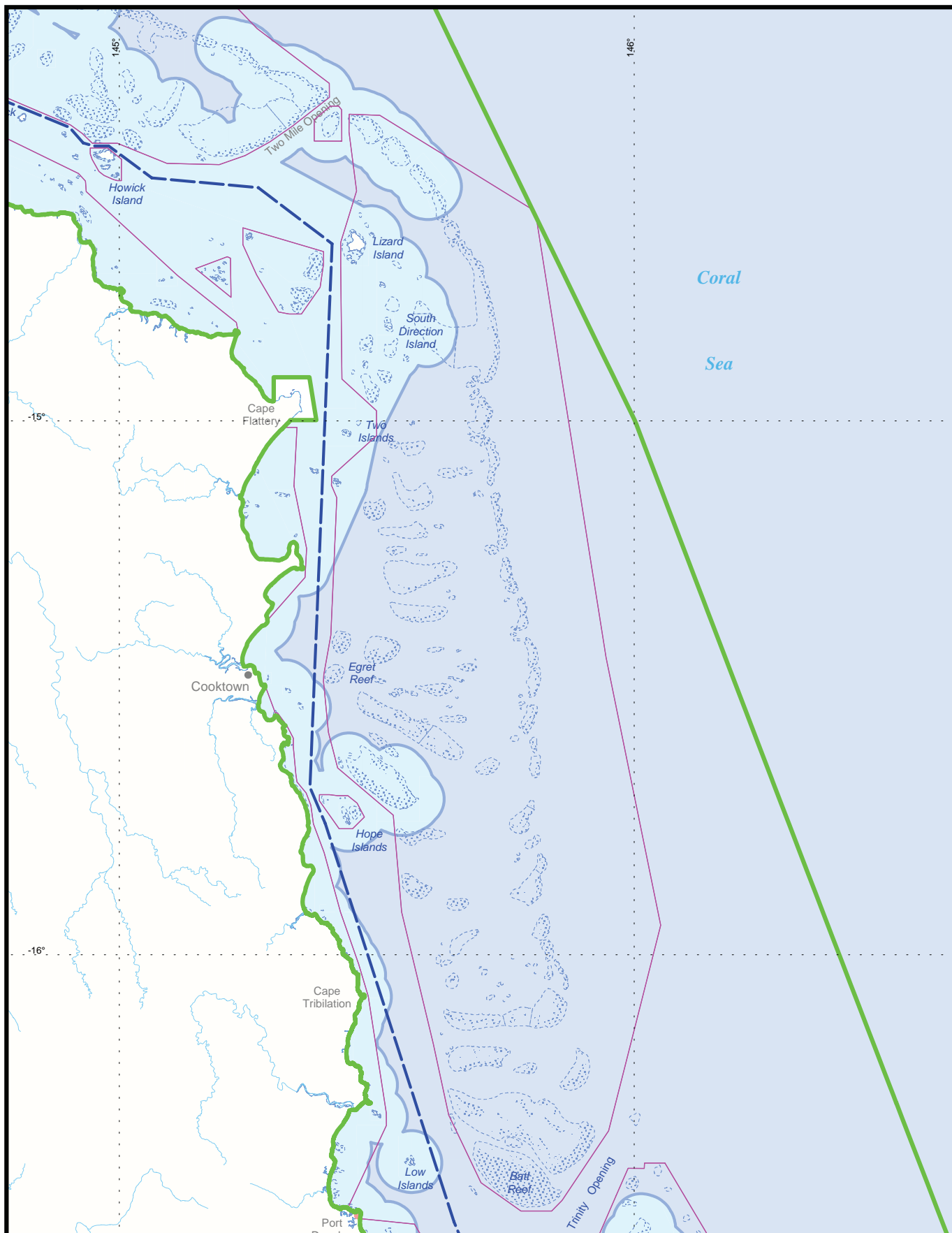
**Fig. 10-1b: Shipping in Commonwealth Marine Area (Lockhart River)**



10 0 10 20 30km

Datum/Projection: GDA94, Lat/Long Date: 05/09/2012

NOTE: Alternative Routes may be used in the event of emergency or by instruction from the Australian Maritime Safety Authority.



Rio Tinto Alcan

- City / Town
- River
- Reef Flat
- Indicative Reef Boundary
- Great Barrier Reef Marine Park
- Commonwealth Marine Area
- Designated Shipping Area
- Bauxite Shipping Route

NOTE: Alternative Routes may be used in the event of emergency or by instruction from the Australian Maritime Safety Authority.

South of Embley Project

**Fig. 10-1c: Shipping in  
Commonwealth Marine Area  
(Cooktown)**

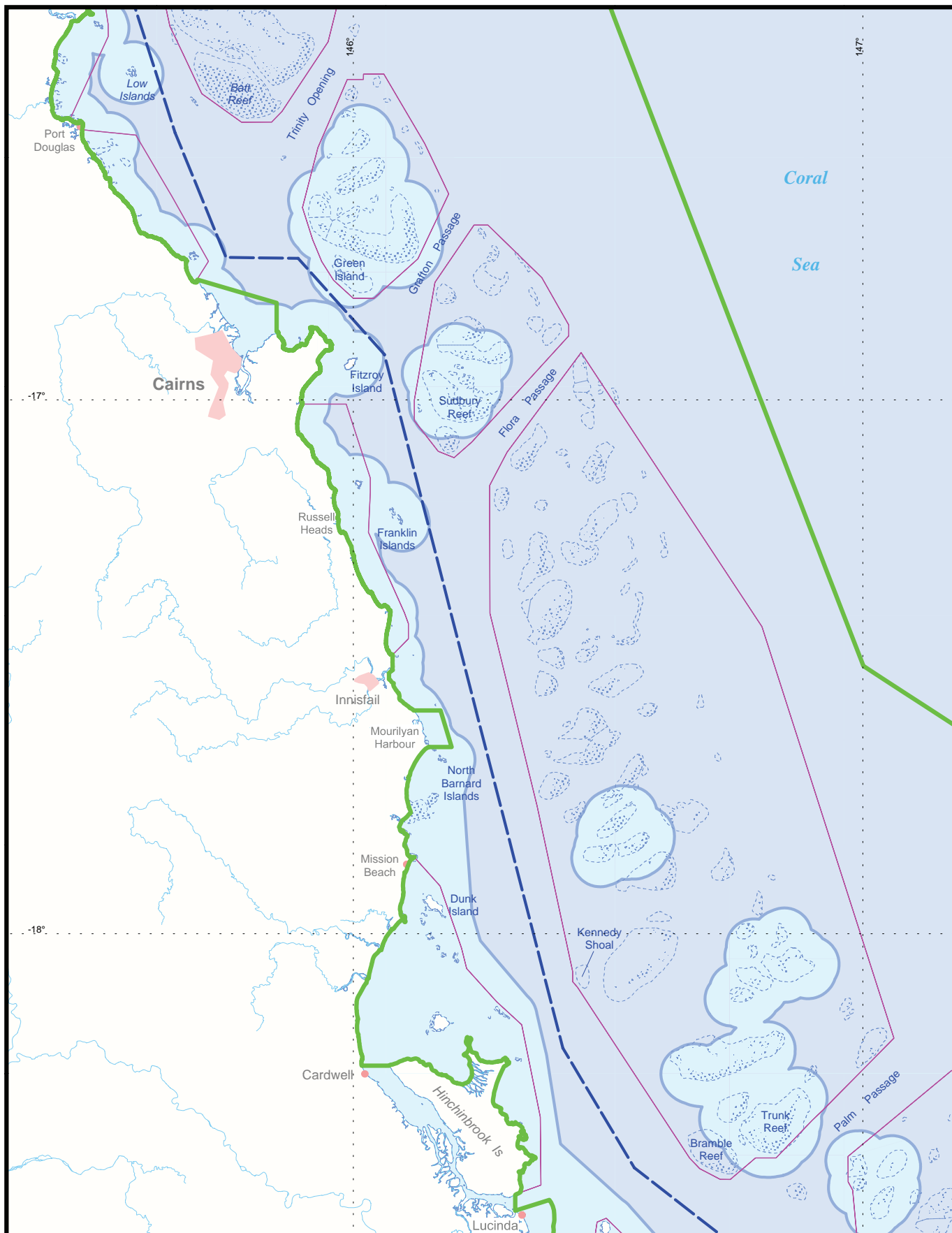


10 0 10 20 30km

Datum/Projection: GDA94, Lat/Long

Date: 06/09/2012





Rio Tinto Alcan

- City / Town
- River
- ⋯ Reef Flat
- ⋯ Indicative Reef Boundary
- Great Barrier Reef Marine Park
- Commonwealth Marine Area
- Designated Shipping Area
- Bauxite Shipping Route

NOTE: Alternative Routes may be used in the event of emergency or by instruction from the Australian Maritime Safety Authority.

South of Embley Project

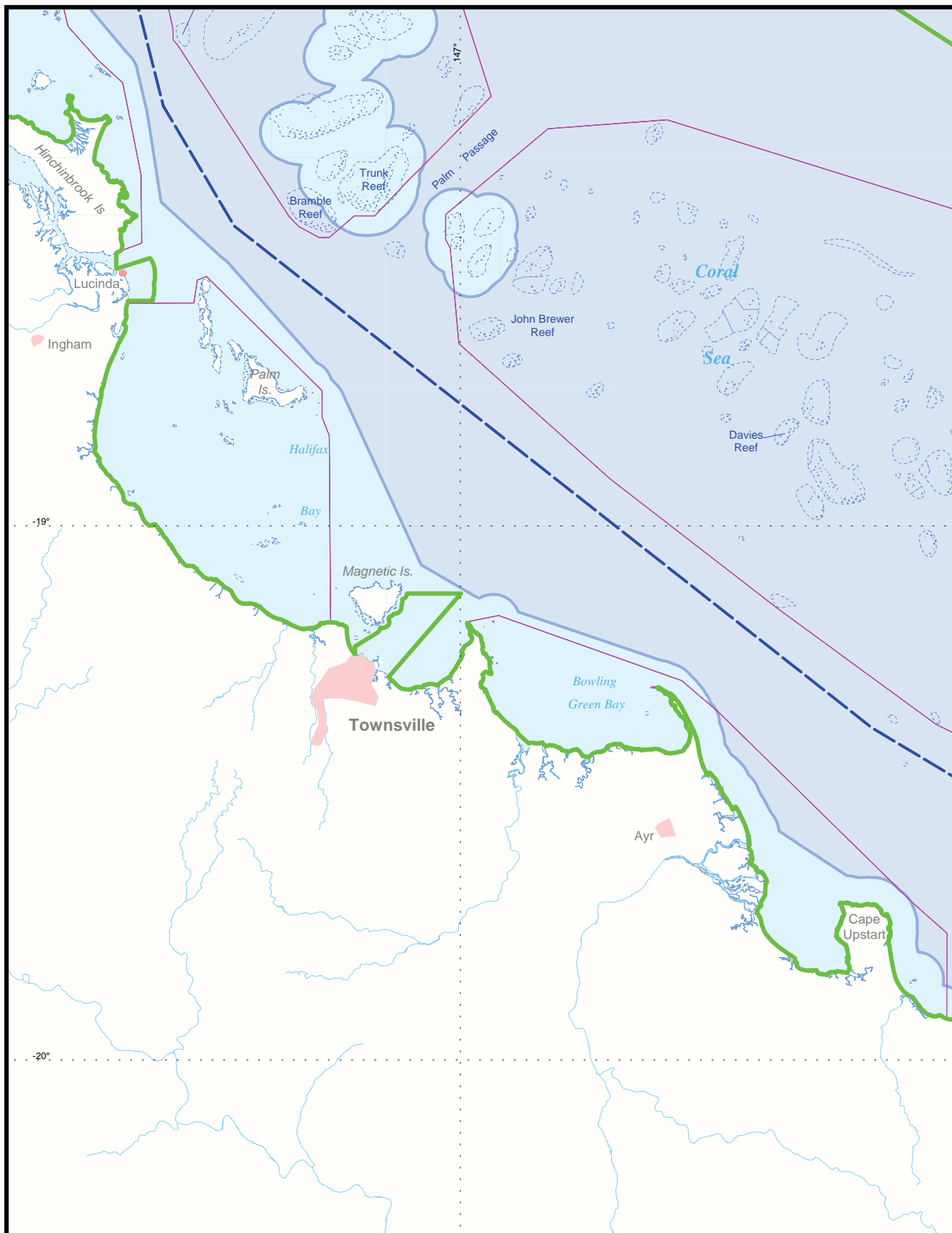
**Fig. 10-1d: Shipping in  
Commonwealth Marine Area  
(Cairns)**



10 0 10 20 30km

Datum/Projection: GDA94, Lat/Long

Date: 06/09/2012



South of Embley Project

**Fig. 10-1e: Shipping in Commonwealth Marine Area (Townsville)**

Rio Tinto Alcan

- City / Town
- River
- Reef Flat
- Indicative Reef Boundary
- Great Barrier Reef Marine Park
- Commonwealth Marine Area
- Designated Shipping Area
- Bauxite Shipping Route

NOTE: Alternative Routes may be used in the event of emergency or by instruction from the Australian Maritime Safety Authority.

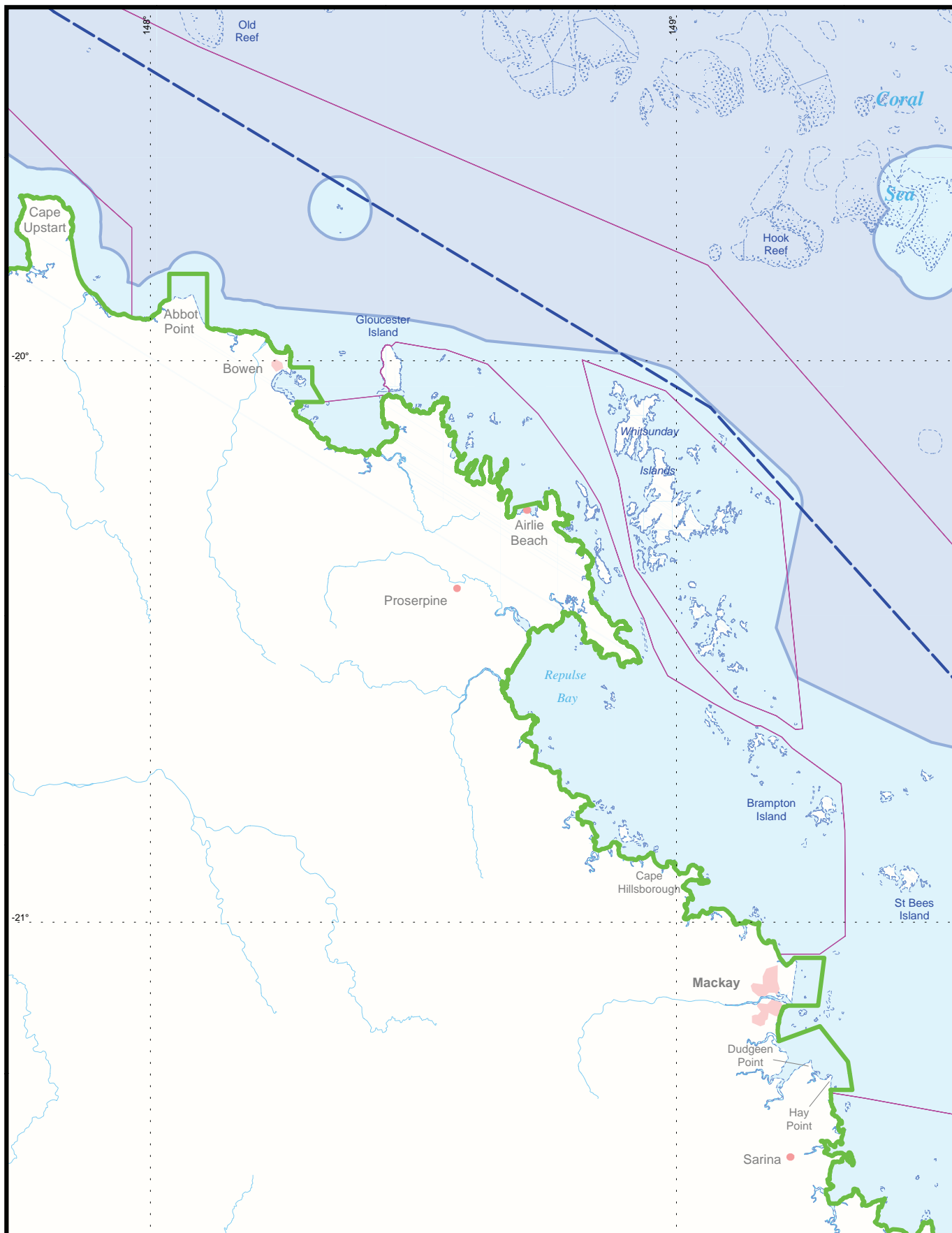


10 0 10 20 30km

Datum/Projection: GDA94, Lat/Long

Date: 06/09/2012





**Rio Tinto Alcan**

- City / Town
- River
- Reef Flat
- - - Indicative Reef Boundary
- ▬ Great Barrier Reef Marine Park
- ▬ Commonwealth Marine Area
- ▬ Designated Shipping Area
- - - Bauxite Shipping Route

NOTE: Alternative Routes may be used in the event of emergency or by instruction from the Australian Maritime Safety Authority.

South of Embley Project

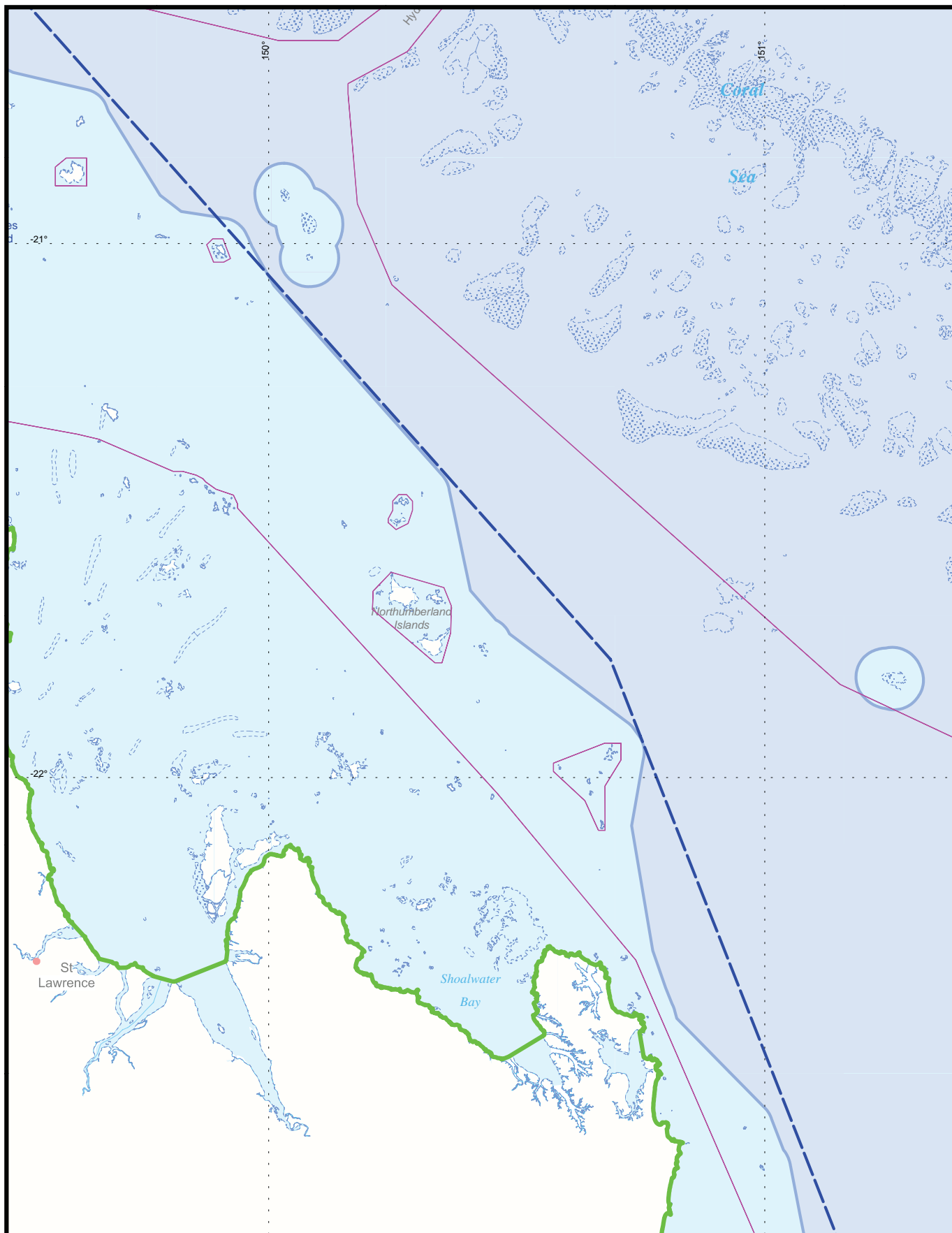
**Fig. 10-1f: Shipping in Commonwealth Marine Area (Mackay)**



10 0 10 20 30km

Datum/Projection: GDA94, Lat/Long

Date: 06/09/2012



South of Embley Project

**Fig. 10-1g: Shipping in Commonwealth Marine Area (Shoalwater Bay)**



10 0 10 20 30km

Datum/Projection: GDA94, Lat/Long

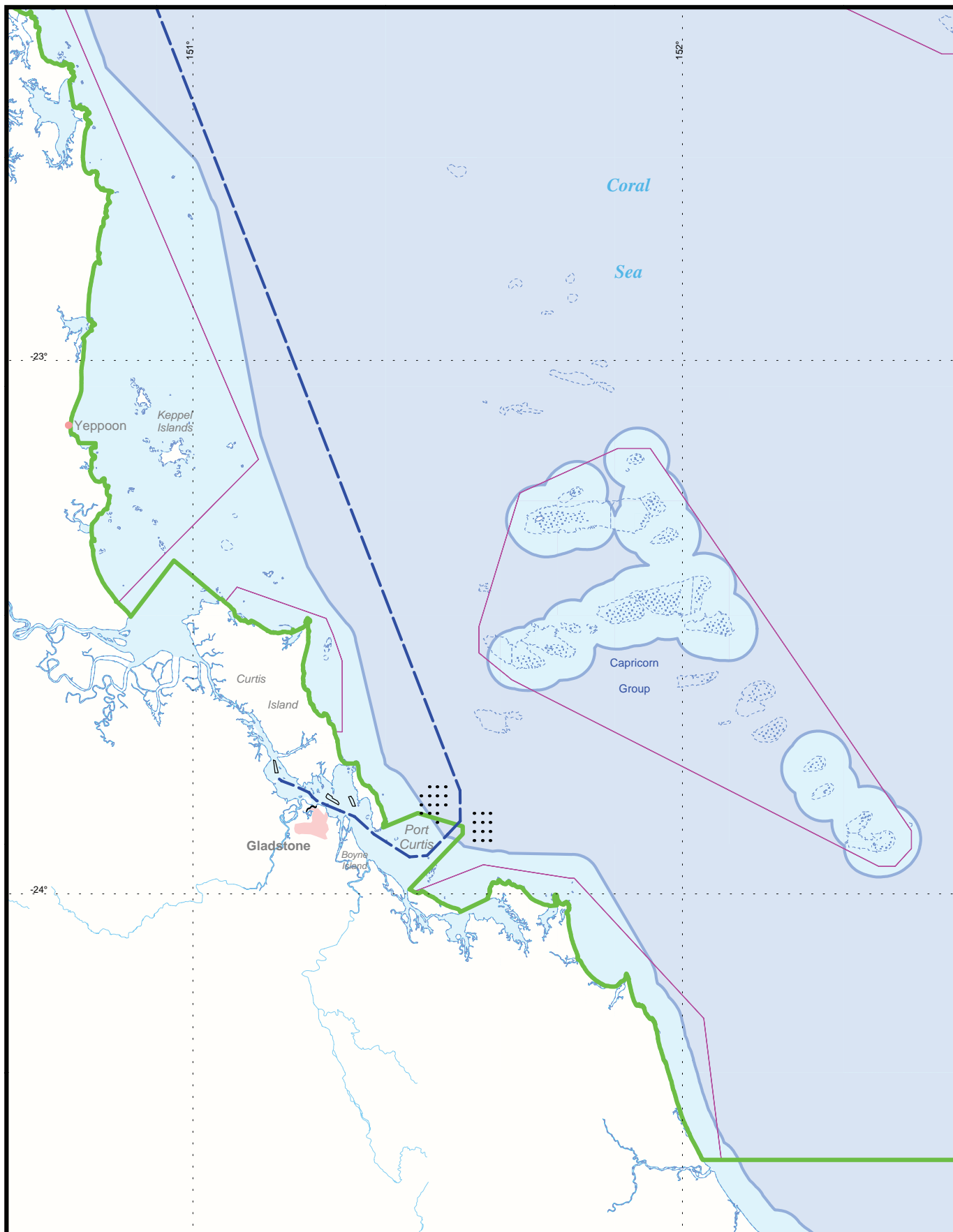
Date: 06/09/2012

**RioTinto Alcan**

- City / Town
- River
- Reef Flat
- Indicative Reef Boundary
- Great Barrier Reef Marine Park
- Commonwealth Marine Area
- Designated Shipping Area
- Bauxite Shipping Route

NOTE: Alternative Routes may be used in the event of emergency or by instruction from the Australian Maritime Safety Authority.





South of Embley Project

**Fig. 10-1h: Shipping in Commonwealth Marine Area (Gladstone)**



10 0 10 20 30km

Datum/Projection: GDA94, Lat/Long

Date: 06/09/2012

Rio Tinto Alcan

- City / Town
- River
- Reef Flat
- Indicative Reef Boundary
- Great Barrier Reef Marine Park
- Commonwealth Marine Area
- Designated Shipping Area
- Bauxite Shipping Route
- Large Vessel Anchorage
- Small Vessel Anchorage

NOTE: Alternative Routes may be used in the event of emergency or by instruction from the Australian Maritime Safety Authority.

## 10.2 Values

### 10.2.1 Bioregional Planning

Marine bioregional plans have been developed for the CMA to support the decision-making process for marine-based industries under the EPBC Act. As part of this process, new Commonwealth marine reserves have been identified by DSEWPaC for the conservation of marine ecosystems and biodiversity of Australia's oceans. These reserves are intended to meet Australia's commitments to establish a National Representative System of Marine Protected Areas.

Five marine regions have been identified as part of the bioregional planning process, including South-west, North-west, North, East (Temperate East and Coral Sea) and South-east Marine Regions (refer **Figure 10-2**). The North Marine Region is the only region relevant to the Project and is covered by *The Marine Bioregional Plan for the North Marine Region* (DSEWPaC 2012f).

The North Marine Region covers the CMA within the Gulf of Carpentaria, Arafura Sea and the Timor Sea as far west as the Northern Territory-Western Australian border. The Northern Marine Region has an area of approximately 625,000km<sup>2</sup>.

The Gulf of Carpentaria Basin and the Gulf of Carpentaria Coastal Zone identified as key ecological features in the Commonwealth Marine Environment Report Card: supporting the *Marine Bioregional Plan for the North Marine Region* (DSEWPaC 2012f) are within areas where Project Related activities (predominantly shipping) would occur. Marine debris from land based activities, fishing boats, shipping and other vessels is identified as an "of concern" pressure for both these key ecological features in DSEWPaC (2012f). Changes in sea temperature and ocean acidification (both relating to climate change) are identified in DSEWPaC (2012f) as "of potential concern" pressures.

### 10.2.2 Marine Protected Areas

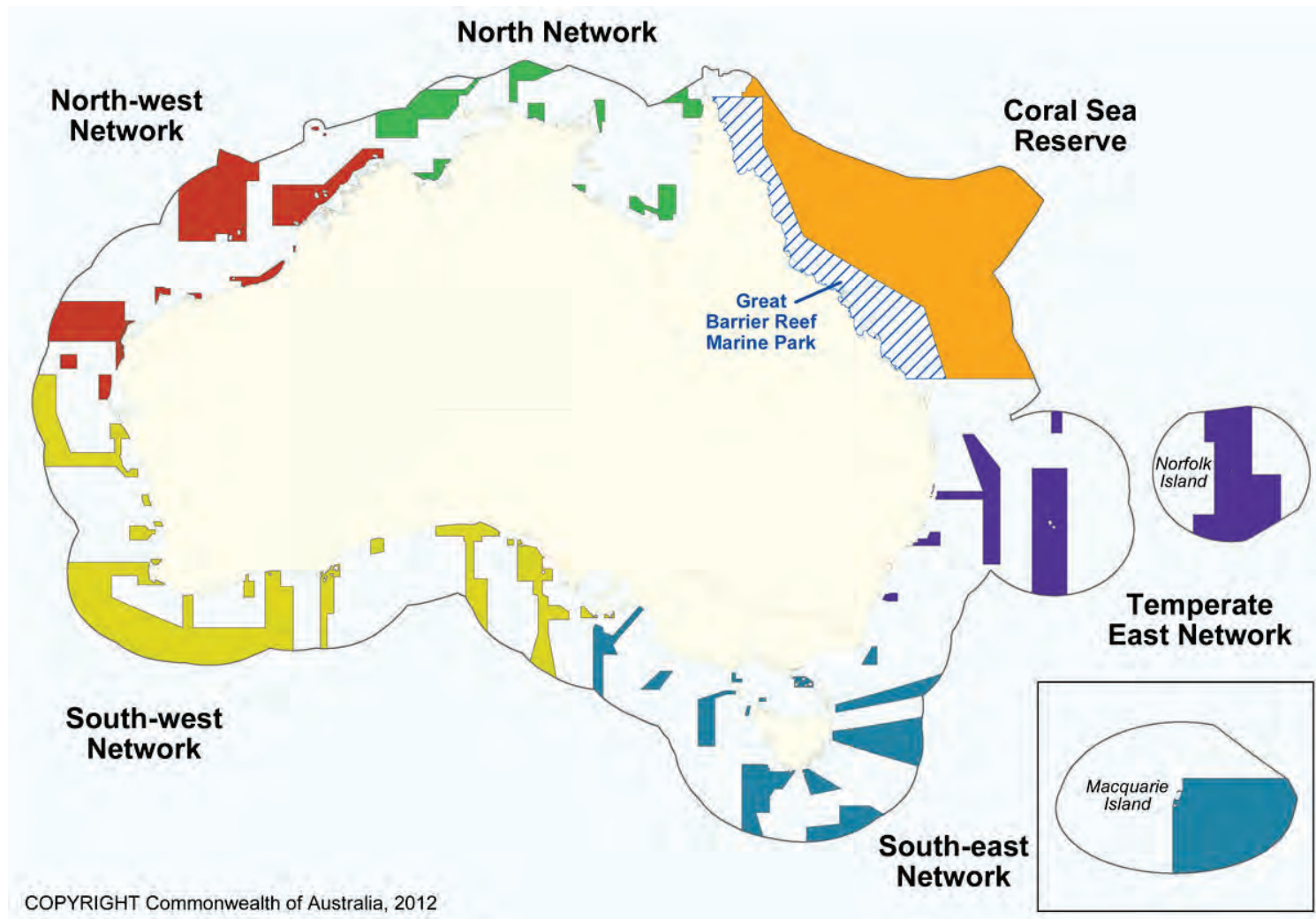
DSEWPaC manages a number of existing Commonwealth reserves or conservation zones under the EPBC Act. Those reserves/conservation zones which are nearest to Project-related shipping activities include:

- GBRMP, managed by the GBRMPA;
- Coral Sea Conservation Zone;
- Coringa Herald National Nature Reserve (in the Coral Sea); and,
- Lihou Reef National Nature Reserve (in the Coral Sea).

Apart from the GBRMP, these reserves/conservation zones are located to the east of the GBRMP (refer **Figure 10-3**) where no Project-related shipping activities are proposed and therefore are not included in this assessment. A detailed assessment of potential Project-related shipping impacts on the GBRMP is provided in **Section 11**.

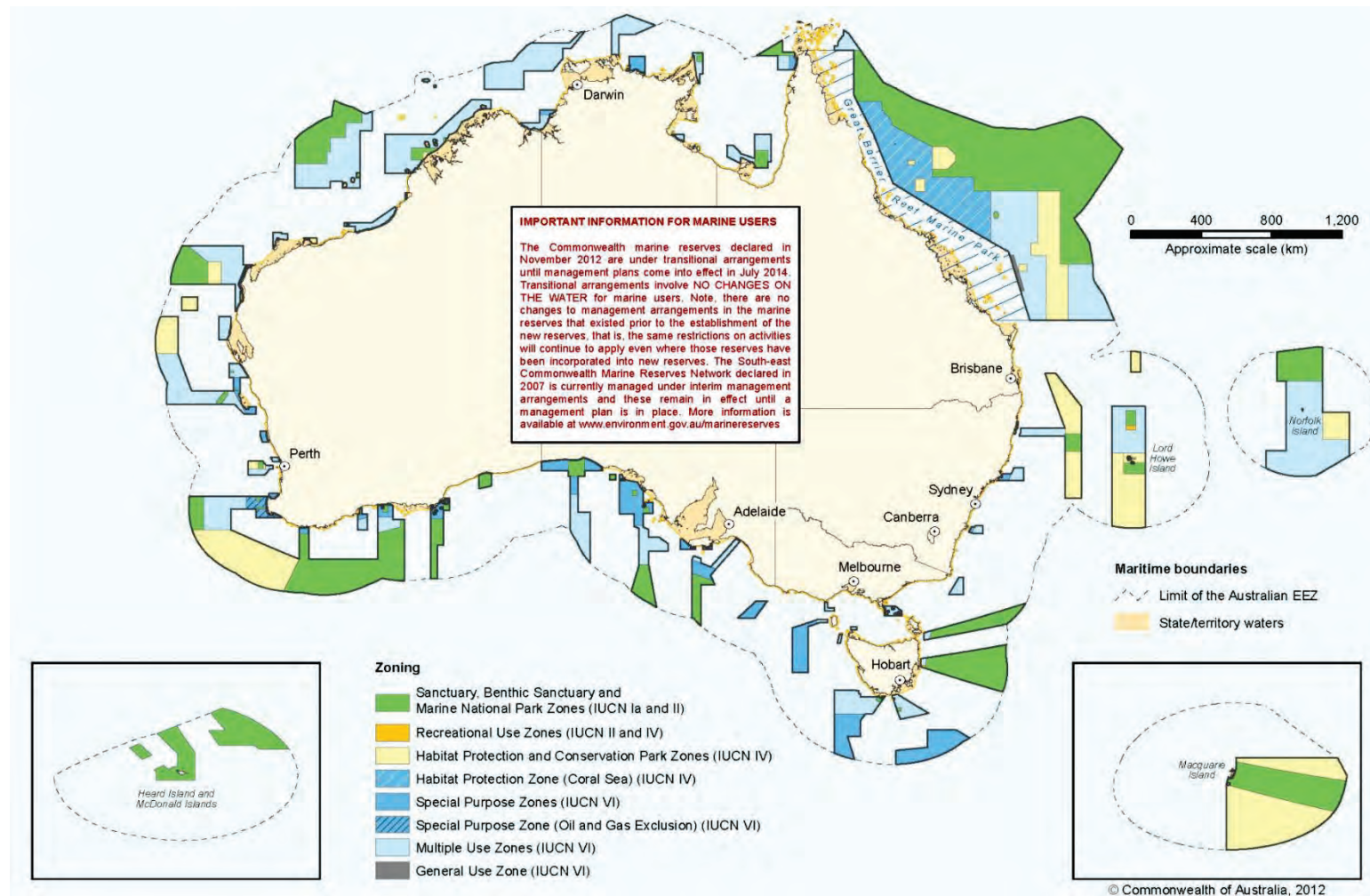
A number of additional reserves in the CMA were declared on the 16 November 2012 and came into effect on the 17 November 2012. No 'on water' changes for users in these reserves will occur until July 2014 once management plans are finalised. The Draft North Commonwealth Marine Reserves Network Management Plan: 2014-2024 (Director of National Parks 2013) was advertised for public comment in January 2013 and subsequently amended based on public comment. The final management plan was tabled in parliament on 12 March 2013. This management plan provides for the continued allowance of commercial shipping through the area in accordance with plan prescriptions and without the need of a permit or class approval.

Figure 10-2 Commonwealth Marine Regions



Source: DSEWPac (2012c)

Figure 10-3 Commonwealth Marine Reserves and Conservation Zones



Source: DSEWPac (2012g)



These additional reserves include the West Cape York Commonwealth Marine Reserve and the Gulf of Carpentaria Commonwealth Marine Reserve. Only the West Cape York Commonwealth Marine Reserve is relevant to the Project as Project-related bauxite and cargo shipping activities are planned to pass through this reserve (refer **Figure 10-4**). The Gulf of Carpentaria Commonwealth Marine Reserve is located over 240km south, south-west of the proposed spoil ground and Port.

The West Cape York Commonwealth Marine Reserve covers an area of approximately 16,012km<sup>2</sup> and consists of three zones including a Marine National Park Zone, adjacent to the tip of Cape York Peninsula and the Torres Strait Islands, a Special Purpose Zone and Multiple Use Zone adjacent to the north-western side of Cape York Peninsula (refer **Figure 10-4**).

The reserve is located over approximately 130km from the proposed Port and proposed new spoil ground. Project-related bauxite and cargo shipping would pass through the reserve. The nautical chart map for the reserve provides a recommended shipping track that traverses the Multiple Use Zone and Marine National Park Zone (refer **Figure 10-4**).

The conservation values of the West Cape York Commonwealth Marine Reserve have been identified as follows (Director of National Parks 2013):

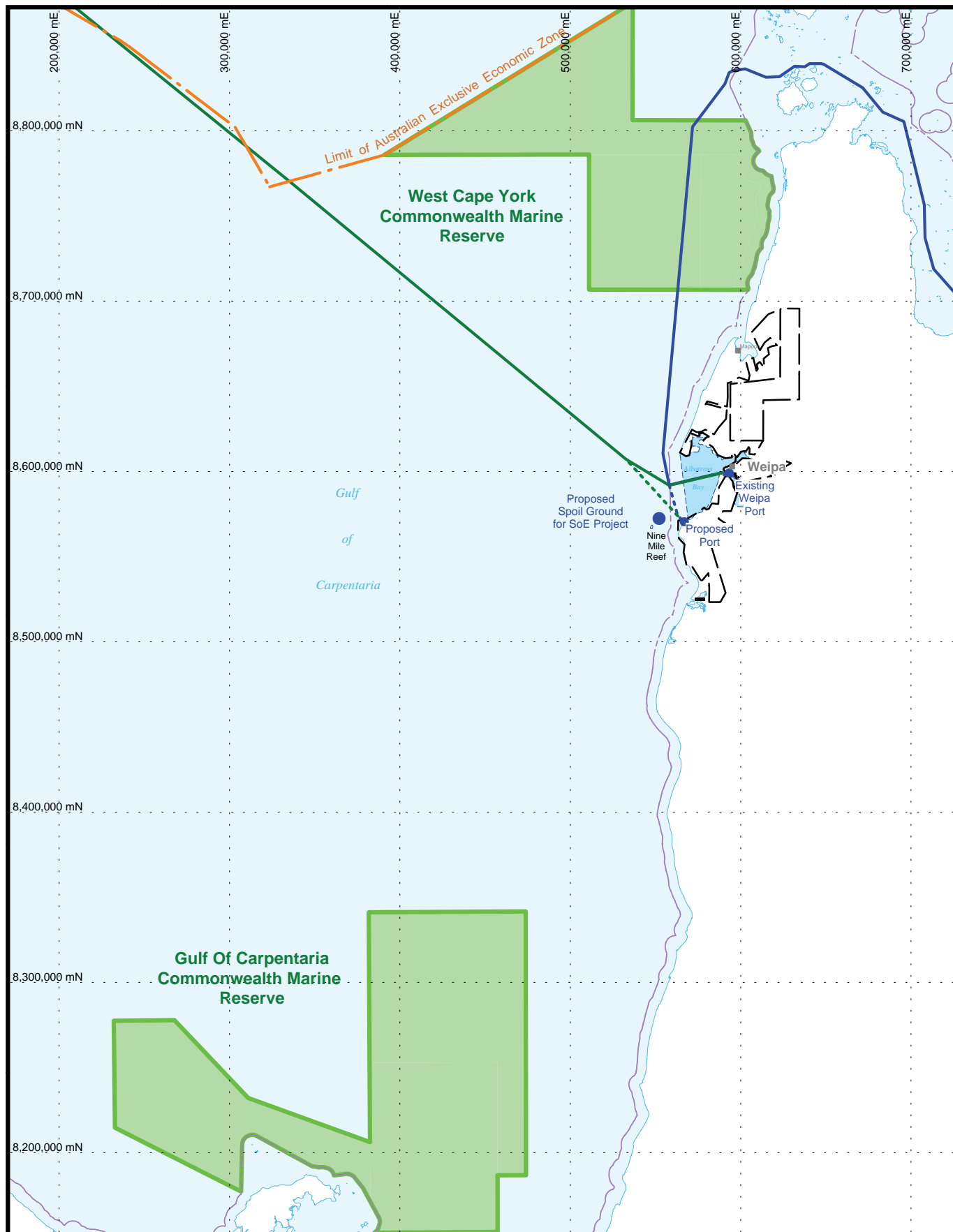
- Important resting area for turtles between egg laying (internesting area) for the threatened:
  - Flatback Turtle;
  - Hawksbill Turtle; and,
  - Olive Ridley Turtle.
- Important roosting area for aggregations of the migratory Lesser Frigate Bird;
- Examples of the ecosystems of two provincial bioregions: the Northern Shelf Province (which includes the Carpentaria and West Cape York mesoscale bioregions) and the Northeast Shelf Transition Province (which includes the Torres Strait meso-scale bioregion); and,
- Includes two key ecological features:
  - Gulf of Carpentaria coastal zone (high productivity; biodiversity and endemism; aggregations of marine life); and,
  - Gulf of Carpentaria basin (biodiversity; aggregations of marine life).

Although the West Cape York Commonwealth Marine Reserve is identified as an important roosting area for aggregations of the migratory Lesser Frigate Bird, the Lesser Frigate Bird roosts on land and the only Project-related activities which would occur within the Marine Reserve would be Project-related shipping through the waters of the Marine Reserve.

### 10.2.3 Assessable Criteria

The *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (DEWHA 2009c) outlines criteria to assess whether an action is likely to have a significant impact on the environment of the CMA. According to the criteria, an action is likely to have a significant impact on the CMA environment if there is a real change or possibility that the action would:

- result in a known or potential pest species becoming established in the CMA;
- modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity in a CMA results;
- have a substantial adverse effect on a population of a marine species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution;



Rio Tinto Alcan

- RTA Mining Lease boundary
- Township
- Drainage
- Road/track
- Weipa Port Limits
- Limit Coastal Waters boundary
- Commonwealth Marine Reserve
- Existing Bauxite shipping route (Domestic)
- Existing Bauxite shipping route (International)

**South of Embley Project**  
**Fig. 10-4: GoC**  
**Commonwealth Marine**  
**Reserves**



50      0      50      100km

Datum/Projection: GDA94/MGA Zone 54

Date: 21/03/2013

- result in a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological integrity; social amenity or human health;
- result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely affected; or,
- have a substantial adverse impact on heritage values of the CMA, including damage or destruction of an historic shipwreck.

These criteria are a useful reference point for the assessment of "relevant impacts" of the Project activities on the CMA (this assessment is in **Section 10.4**), including those of the proposed West Cape York Commonwealth Marine Reserve.



## 10.3 Project-Related Activities in the CMA

### 10.3.1 Mine, Port and Other Infrastructure

**Figure 3-8** illustrates that the proposed new spoil ground, approximately nine nautical miles (approximately 17km) from the proposed Port, is located within the CMA. Sediments associated with dredging the proposed Port and spoil disposal at the existing Albatross Bay spoil ground outside of the CMA have the potential to enter into the CMA (refer **Appendix 7-B**). A detailed description of the mine, Port and associated infrastructure is provided in **Section 3.3**.

### 10.3.2 Shipping

Project-related bauxite and cargo shipping routes would traverse the CMA as illustrated by **Figure 10-1**. Fuel shipping would traverse the CMA towards Darwin. A detailed description of all Project-related bauxite, cargo and fuel shipping activities is provided in **Section 3.9**. A summary of the Project-related bauxite, cargo and fuel shipping activities as they relate to the CMA is provided in the following sections.

**Section 10.3.2.1** and **Section 10.3.2.2** provide relevant details on bauxite shipping and cargo and fuel shipping respectively.

#### 10.3.2.1 Bauxite Shipping

Bauxite has been transported by bulk carrier from the Port of Weipa along the same route to the Port of Gladstone for over 40 years. It is currently shipped from the Lorim Point terminal at the Port of Weipa. In 2015, prior to the commencement of shipments from the proposed Boyd Port, it is predicted that there would be approximately 430 bauxite shipments per annum from the Port of Weipa depending on international market demand and vessel size. Of these, on average 270 shipments per annum would be sailing from the Port of Weipa to the Port of Gladstone (i.e. 540 bauxite ship movements through the GBR per annum), with the remaining shipments likely to be to international ports (refer **Section 3.9.2.2**).

Vessels currently transporting bauxite from the Port of Weipa include a mix of vessels owned and operated by Rio Tinto Marine (the Rio Tinto fleet) and chartered vessels. The Rio Tinto fleet consists of seven DPPV (five existing vessels of approximately 90,000dwt and two new vessels of approximately 88,000dwt). The oldest vessel in the Rio Tinto fleet entered into service in 2007 with the newest vessel due for delivery in 2013.

The existing Rio Tinto fleet is 100% owned by Rio Tinto Shipping. The port of registry for all Rio Tinto ships is London and they are flagged in the United Kingdom. All vessels in the Rio Tinto fleet are classified by Lloyd's Register of Shipping. The vessels are all Japanese built bulk carriers with minor modifications to the cargo spaces, rudder and hull form to suit the specific requirements of the bauxite trade.

In addition to the Rio Tinto fleet, Rio Tinto charts Panamax vessels (typically 75,000 to 88,000dwt) as required. In future Rio Tinto would also charter Cape size vessels if required for the transport of bauxite internationally. Chartered vessels are mostly less than five years old, and service both the domestic coastal (Panamax) and the international export trade (Cape size). Chartered vessels are required to develop their own environmental protection policy. Flag states for chartered vessels include Panama, Liberia, China and South Korea. Currently over 60% of the shipments between the Port of Weipa and Port of Gladstone are made using the Rio Tinto fleet, with the remainder made by

chartered vessels. All bauxite ships that would travel between the proposed Port and the Port of Gladstone would be Panamax or DPPV as larger ships cannot navigate the Torres Strait. Larger ships would be used for export. The most common ports of departure for export ships en route to Weipa would be in Asia (between China and Singapore).

The Port of Gladstone is managed by the Gladstone Ports Corporation (GPC) and provides for supervision of ships within the port limits, including scheduling, anchorage, pilotage and towage services as well as bunkering and sewage waste disposal.

Bauxite is unloaded within the Port of Gladstone using existing ship unloading infrastructure at Fisherman's Landing, servicing the Rio Tinto Alcan Yarwun alumina refinery, and South Trees Wharf, servicing the Queensland Alumina Limited alumina refinery.

**Table 10-1** shows the estimated number of bauxite bulk carriers that would use the proposed Port including an assumption of the use of Cape size vessels. Cape size vessels would be used only for international customers as they have a sailing draft too deep for passage of the Torres Strait. The actual number of Cape size vessels would depend on market conditions and actual sales of bauxite.

**Table 10-1 Estimated Shipments from the Proposed Port**

Production Scenario	Likely Mix of Vessels <sup>1</sup> (Shipments/Annum)	Likely Mix of Vessels <sup>2</sup> (Shipments/Annum)
22.5Mdtpa	260 Panamax, DPP, Cape size	320 Panamax and DPP
50Mdtpa	540 Panamax, DPP, Cape size	700 Panamax and DPP

Note: all figures approximate

1. Number of shipments would vary depending on market conditions, actual production and size of vessels

2. Based on Panamax/DPP vessels only

Bauxite shipping for the Project would be expected to commence in or about 2016 (or approximately 3 years after the commencement of construction) subject to the grant of relevant environmental or other regulatory approvals, the determination of internal investment approvals for the Project by Rio Tinto and the construction schedule. The volume of bauxite shipping using the Port of Weipa would over time decrease as reserves north of the Embley are depleted and bauxite shipping from the proposed Port replaces much of this demand.

Under the maximum production scenario (50Mdtpa) up to 700 bauxite ships per year are predicted to be loaded at the proposed Port and approximately 400 of these would be bound for export markets, not passing through the GBR. The remaining balance of an average of 300 shipments per year (600 ship movements) is required to supply bauxite to two existing alumina refineries in Gladstone. The bauxite shipments through the GBR following commencement of production would continue to be the shipments required to meet the needs of the existing Gladstone refineries and would use the same inner GBR Designated Shipping Area as is used at present. If the maximum production scenario (50Mdtpa) was reached by 2020, the potential fluctuation in bauxite shipment numbers beyond that occurring prior to the commencement of the Project would be an average of 60 GBR bauxite ship movements annually. This includes possible fluctuations in the future of shipment numbers due to variation in bauxite grade quality and in alumina production at the Gladstone refineries, within the scope of the existing approvals for the refineries.

All bauxite shipping vessels are regarded as ships under the GBRMP Regulations (refer **Section 11.2.1**).

### *10.3.2.2 Cargo and Fuel Shipping*

#### *Construction Phase*

Construction shipping requirements are outlined in **Section 3.9.1.1**. It is currently estimated that 1,000,000 Revenue Tons of cargo shipping would be required for construction. Of this, approximately 580,000 Revenue Tons of shipping volume would originate from domestic ports (most likely the Port of Cairns) to the Port of Weipa, with the remaining volume originating from international ports (predominantly in Asia). Construction shipping would be provided by third parties.

The existing weekly service performed by the Cairns to Weipa barge (104 shipments per annum on average) is assumed to have no free capacity. It is anticipated that an annual average of 43 additional barge deliveries would be required from Cairns or other east coast domestic ports during the construction period for the Project. In addition, an average of 11 barge deliveries per annum during construction from international ports would also be required.

For the purposes of this assessment, it is assumed that all construction related cargo movements required for the Project would be undertaken by vessels greater than 50m in total length, and, therefore, regarded as ships under the GBRMP Regulations.

An annual average of 16 additional fuel deliveries would be required during the construction period. All fuel deliveries currently originate from Darwin however, the source may change in future to another port depending upon arrangements managed by the supplier.

#### *Operations*

**Section 3.9.1.2** and **Table 3-10** provides a summary of the deliveries of fuel and cargo that are estimated to be required during operations. Up to 12 shipments per annum of fuel is estimated to be required at maximum production in addition to the approximately 10 shipments per annum of existing fuel deliveries. Up to 26 cargo shipments per annum is estimated to be required at maximum production in addition to the approximately 104 cargo shipments annum of existing deliveries. In addition it is estimated that approximately 20 barge deliveries per annum would be required to support the town of Weipa, including predicted population increase as a result of the Project, at maximum production.

For the purposes of this assessment, it has been conservatively assumed that all cargo movements are by vessels defined as ships under the GBRMP Regulations. Furthermore, cargo movements are all conservatively assumed to originate from the Port of Cairns and would traverse the same route as the Cairns to Weipa barge service described in **Section 10.3.2.1**. Fuel deliveries would originate from Darwin; however this would be at the discretion of the third party supplier.

Cargo and fuel shipping during operations would be provided by third parties.

### **10.3.3 Shipping Route**

Project-related bauxite shipping would enter the CMA after loading at the proposed Port (which is located outside of the CMA). Cargo shipping would enter the CMA at the Port of Cairns (based on the above assumption that they all originate from the Port of Cairns). Fuel shipments would traverse the CMA in the Gulf of Carpentaria between Darwin and Weipa.

International cargo shipping would traverse the CMA in generally a north-westerly direction and exit the CMA at the Exclusive Economic Zone in the Arafura Sea.



The domestic bauxite and cargo shipping route traverses the CMA almost parallel to the western side of Cape York Peninsula, and through the West Cape York Commonwealth Marine Reserve, along the same route it has followed for over 40 years. Domestic bauxite and cargo shipping would enter/exit the CMA near Torres Strait and re-enter/exit the CMA within the inner GBR Designated Shipping Area. The shipping route through the GBR would traverse in and out of the CMA at various locations towards the Port of Cairns and Port of Gladstone where it would exit the CMA (or other east-coast Ports in the case of cargo shipping).

### 10.3.4 Existing Shipping Activity

The TMR *Port Procedures and Information for Shipping Port of Weipa* (TMR 2012) notes that the principal export from the Port of Weipa is bauxite from RTA. Some 436 ships were reported to call at the port in 2007/2008 (TMR 2012) which equates to 872 movements in 2007/2008 assuming each call results in two movements.

As discussed in **Section 10.3.1** and **Section 10.3.2**, some 860 ship movements per annum (430 shipments) of bauxite, 208 ship movements per annum (104 shipments) of cargo and 20 ship movements per annum (10 shipments) of fuel are predicted to be generated by the existing Weipa operations north of the Embley River prior to the commencement of the SoE Project in 2015. This equates to a total of 1088 predicted movements per annum prior to the commencement of the SoE Project.

### 10.3.5 Additional Shipping Activity

The publically available information on the cumulative number of potential bulk carrier movements in the CMA for the Gulf of Carpentaria, assuming all projects proceed, is summarised in **Table 10-2**.

**Table 10-2 Potential Cumulative Bulk Carrier Port Calls in the Gulf of Carpentaria Area**

	Prior to SoE Project commencing	22.5Mdtpa Production at SoE Project (ships / year)	Maximum Production at SoE Project (ships / year)
Boyd Port*	0	260 - 320	540 -700
Port of Weipa*	420-450	125-150	0
Aurukun Bauxite Project (discontinued)	0	95	95
Pisolite Hills Project	0	54-98	0#
Bauxite Hills Project	0	49-126	0#
Urquhart Point	0	4	0
Karumba Port	52	0	0#
Bing Bong Port**	38	61	94
Groote Eylandt***	120-150	120-150	120-150
Total	<b>630-690</b>	<b>868-1,004</b>	<b>855-1,005</b>

\* Number of ships would vary depending on actual production rates and size of vessels.

\*\* Includes estimate for McArthur River Mine expansion to 5.5Mt (approved by NT Government in July 2012) and proposed Roper Bar Iron Ore Project.

\*\*\* Estimate based on production of 4Mt and use of handy size bulk carriers.

# Short term project or nearing end of mine life, assumed complete by the time SoE Project reaches full production.

Bauxite shipping would be expected to commence in or about 2016 (or approximately three years after the commencement of construction) subject to the grant of relevant environmental or other regulatory approvals, the determination of internal investment approvals for the Project by Rio Tinto and the construction schedule. As production from SoE increases there would be a decrease in the shipments from the north of Embley River Weipa reserves as mining operations there reduce. If all potential projects in the Gulf of Carpentaria area were to proceed, the number of ships through the Gulf of Carpentaria would increase. The potential net average annual increase in bauxite shipping from RTA at maximum production would range between 90 and 280 ships (depending on the size of ship used for export and market conditions) in the Gulf of Carpentaria. While these increases appear significant, the increase in absolute terms is minor and the shipping movements through the Gulf of Carpentaria, inclusive of those predicted to be generated by the Project, would remain at relatively low levels. In addition, given the Bing Bong and Groote Eylandt Ports are on the western side of the Gulf of Carpentaria the shipping routes would have limited interaction with the proposed SoE Project shipping routes. Several of the other projects, including Pisolite Hills, Bauxite Hills and Urquhart Point, are of relatively short duration and if they progress under the proposed timeframes, are likely to be completed by the time the SoE Project reaches maximum production (which would only occur if market conditions allow). The Century Zinc Mine, which ships from the Kurumba Port, is nearing the end of mine life and is also unlikely to be shipping at the same time that the SoE Project is at maximum production.

## 10.4 Potential Impacts

The following subsections provide an assessment of the relevant impacts of the Project activities identified in **Section 10.3** on the CMA. The *Significant Impact Guidelines* for the CMA (refer **Section 10.2.3**) have been used as a reference point for framing this assessment although the assessment has not been limited to the criteria specified in the Guidelines.

The potential impacts associated with Project-related bauxite and cargo shipping on parts of the CMA that are within the GBRMP are assessed in **Section 11**. Therefore, Project-related bauxite and cargo shipping in the CMA on the east coast is not considered further in this section.

An environmental management plan outline for the CMA which summarises safeguards, avoidance and measures is provided in **Appendix 10-A**.

### 10.4.1 Marine Pest Establishment

In relation to marine pest establishment, the *Significant Impact Guidelines* (DEWHA 2009c) requires an assessment of the potential for the Project to:

*“...result in a known or potential pest species becoming established in the CMA...”*

#### 10.4.1.1 Potential Project-related Impacts

Marine pest species may be introduced to the CMA through the following mechanisms:

- disposal of spoil material in the CMA from capital dredging through pests originating in-situ or introduced by the dredge;
- disposal of spoil material in the CMA from maintenance dredging through pests introduced from shipping or from the dredge; and/or,
- bauxite, cargo and fuel shipping activities such as discharge of ballast water or hull fouling.

No marine pest species are known to occur within the undisturbed footprint of the proposed Port. Capital dredging for the proposed Port may require the services of internationally sourced dredges.

NQBP currently manages the Port of Weipa and carries out maintenance dredging and spoil disposal at the existing Albatross Bay spoil ground. All current shipping has originated or terminated (respectively) at the Port of Weipa for over 40 years. Surveys for introduced marine pests have been undertaken since 1999 in accordance with methodologies established by the Centre for Research on Introduced Marine Pest Species (NQBP 2011b). Surveys have been modified to also target the Black-stripe Mussel since its detection at the Port of Darwin in 1999 and 2000 and also the Asian Green Mussel in 2006. No introduced marine pests have been recorded to date at the Port of Weipa (NQBP 2011b) from existing shipping.

Relocating the loading and shipping of bauxite from the Port of Weipa approximately 45km south-west to the proposed Port and the small potential increase in Project-related bauxite, cargo and fuel shipping, that would continue to traverse the same routes through CMA as existing Weipa bauxite, cargo and fuel shipping, is not likely to significantly increase the risk of introducing marine pests to the CMA, including the West Cape York Commonwealth Marine Reserve.

It is unlikely that persistent organic chemicals, heavy metals, or other potentially harmful chemicals from Project-related bauxite, cargo and fuel shipping would accumulate in the CMA to the extent that they would impact on biodiversity, ecological integrity, social amenity or human health as these chemicals are absent from the natural sediments. Antifouling paint historically contained the biocide TBT however this product is now banned in Australia and most parts of the world.

Based on the above assessment, the potential unmitigated impacts associated with Project-related shipping activities on the CMA would be negligible and long term.

#### 10.4.1.2 *Safeguards, Avoidance and Mitigation Measures*

Although no specific safeguards, avoidance and mitigation measures are required as the unmitigated impact of Project-related bauxite, cargo and fuel shipping activities has been assessed as negligible, there are a number of measures that are used for existing Weipa bauxite, cargo and fuel shipping activities that would continue to be used for Project-related bauxite, cargo and fuel shipping. These are described as follows:

- all shipping (such as deliveries of construction materials and the cargo barge) would be required to comply with the *Australian Ballast Water Management Requirements* (DAFF 2011a) and the *International Convention for the Control and Management of Ships Ballast Water and Sediments* (IMO 2004);
- bauxite ships are required to manage ballast water through a Ballast Water Management Plan which would comply with Australian mandatory requirements (the *Australian Ballast Water Management Requirements* (DAFF 2011a)) and the *International Convention for the Control and Management of Ships Ballast Water and Sediments* (IMO 2004);
- all ships arriving from outside Australian waters are required under to the *Quarantine Act 1908* to release 95% of ballast water outside the Australian territorial sea, as far as possible from land and in water exceeding 200m depth, where possible;
- all ships are prohibited from discharging ballast water (and sediment in ballast tanks) in Australian waters by AQIS where it has been derived from ports or coastal waters outside Australian waters;
- for bauxite ships, anti-fouling coating systems would be applied to exposed surfaces, biofouling resistant materials for piping and unpainted components and marine growth prevention systems for sea chests and internal seawater cooling systems;
- a relatively new bauxite shipping fleet would be maintained with hull inspections and surveys, hull cleaning and renewal of antifouling coating systems every 2½ years as part of class requirements (all hull cleaning and dry-docking would be undertaken overseas);
- once a bauxite vessel is at berth it would be loaded/unloaded without delay except for unplanned events;
- the bauxite shipping schedule would be managed as best as possible to minimise queuing and delay at anchor; and,
- regular mussel trap monitoring would be undertaken in the vicinity of the proposed Port when overseas bulk carriers are used.

#### 10.4.2 *Ecosystem Function or Integrity*

In relation to ecosystem function or integrity, the *Significant Impact Guidelines* (DEWHA 2009c) requires an assessment of the potential for the Project to:

*“...modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity in a CMA results...”*



#### **10.4.2.1 Potential Project-related Impacts**

The total volume of capital dredging required for Stage 1 of the proposed Port to construct the wharf is 6.5 million cubic metres, however, this would be completed in phases and no individual capital dredging campaign would exceed 2.6 million cubic metres (refer **Sections 3.8.1.1** and **7.3.5.1**).

Subsequent capital and maintenance dredging would be undertaken as required under separate Sea Dumping Permits. The initial capital dredge volume for the proposed Port (2.6 million cubic metres) would require (on average) annual maintenance dredging of approximately 490,000m<sup>3</sup> to maintain under keel clearance for ships. Based on the maximum 6.5 million cubic metres of capital dredging for Stage 1 of the wharf, average annual maintenance dredging of approximately 890,000m<sup>3</sup> is expected to be required. Once the wharf is extended (Stage 2), an extra 2.4 million cubic metres of capital dredging and 280,000m<sup>3</sup> of average annual maintenance dredging would be required.

Material dredged during the maintenance programs at the proposed Port would be disposed of at the proposed new spoil ground west of Boyd Point. The dredge material would be deposited over an approximately 1km radius from the centre of disposal with a thickness up to 4m for capital dredging and up to 0.4m for maintenance dredging.

The footprint of the proposed new spoil ground contains unvegetated soft sediment habitats (refer **Section 7.2**). These habitats are consistent with the Gulf of Carpentaria basin described in Schedule 2.1.2 of the *Bioregional Marine Plan for the North Marine Region* (DSEWPaC 2012f). These soft sediment habitats are common throughout the Gulf of Carpentaria and are not considered to be sensitive marine habitats or areas of high importance. Modelling predicts (**Appendix 7-A**) that dredge spoil disposal would result in smothering of benthic infauna within the proposed new spoil ground footprint, however the deposition above background rates (0.5 - 2mg/cm<sup>2</sup>/day) would not extend beyond 4km outside the proposed new spoil ground area for either dredging methodology that is proposed (**Appendix 7-C**). Therefore the increase in deposition outside the proposed new spoil ground area is expected to be negligible and short term compared to the mean ambient conditions in the area.

Nine Mile Reef is located approximately 6km southwest of the proposed new spoil ground and is estimated to cover an area of approximately 287ha, based on available bathymetry information and video inspection (refer **Section 7.2.3**). Its structure contains mixed sponge and soft coral assemblages developing a low profile reef system in depths approximately –22m to –25m LAT, arising from a silty sand substrate and occasional rock outcrops. Zoanthid colonies are known to occur at some locations attached to the rock structure. The reef is accessed frequently by recreational fishers targeting species such as mackerel, cobia, tuna, finger mark and trevally.

There would be no direct disturbance of an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity in the CMA would result from Project-related shipping activities or spoil disposal at the proposed new spoil ground.

Potential indirect impacts could occur from Project-related shipping activities or disposal of dredged material at the proposed new spoil ground. Sampling and analysis of the sediment material at the proposed Port has been undertaken on several occasions in accordance with a sediment sampling and analysis plan approved by DSEWPaC. The assessment, including elutriate and dilute acid extraction (bioavailability) testing, indicated that all sediment to be dredged at the proposed Port area are considered clean and suitable for unconfined sea disposal (Worley Parsons 2012). The sediment characterisation results show there would be negligible and long term impact on water quality at the proposed spoil ground resulting from disposal of sediments dredged from the proposed Port area.

**Appendix 7-A** provides the results of modelling of the disposal of dredged material at the proposed new spoil ground and the potential impacts of the associated turbidity plume. The modelling found that a median TSS concentration of approximately 2mg/L above background and a maximum of 13mg/L above background at the proposed new spoil ground. These concentrations at the proposed new spoil ground are relatively low due to an increased dilution within the water column (i.e. depth averaged concentration), low duration (disposal approximately every four hours) and prevailing southerly currents providing dispersion. The disposal plumes would tend to disperse along a south-southeast trajectory due to tidal currents. This means that any resultant turbidity plume would not reach habitat at Nine Mile Reef, which is located approximately 6km southwest of the proposed new spoil ground.

The potential for indirect impacts on water quality from dredging at the proposed Port, river facilities and disposal of dredge spoil at Albatross Bay, all well outside the CMA, is considered in **Section 10.4.4**.

The potential for Project-related bauxite, cargo or fuel shipping activities (including additional shipping movements at maximum production) to impact upon the marine ecosystem function or integrity of the CMA would be from the physical effects of collision or grounding. However, in over 40 years of bauxite shipping from the Port of Weipa to the Port of Gladstone, there has been no reported collision or grounding incidents associated with Weipa bauxite, cargo or fuel shipping that has resulted in environmental harm. The small potential increase in bauxite, cargo and fuel shipping would continue to traverse the same routes through CMA.

A new pilot disembarkation area for Cape Size vessels would be established in deeper water west of the Port of Weipa (refer **Figure 3-8**) in the CMA. Anchorage is generally not required for pilot disembarkation; however anchorage in the CMA may be required from time to time (e.g. if directed by the Regional Harbour Master). The anchorage area off the Port of Weipa does not contain, and is not close to any reef communities, contains no seagrass beds, and is not shallow in nature (refer **Section 7.2.8**).

Based on the above assessment, the potential unmitigated impacts associated with Project on ecosystem function or integrity within the CMA would be negligible and long term.

#### *10.4.2.2 Safeguards, Avoidance and Mitigation Measures*

The Project is not likely to disturb an important or substantial area of habitat or cause significant impacts on ecosystem functioning or integrity in the CMA, including that of Nine Mile Reef. However, to minimise potential impacts of turbidity from Project-related dredge spoil disposal, mitigation measures would be implemented in accordance with the DMP's to be approved by DSEWPaC and EHP to reduce loss of bulk material into the marine environment. The draft DMPs for initial capital dredging (refer **Appendix 7-C** and **7-D**) include measures such as:

- mechanical devices, such as turbidity-reducing valves within overflow pipes on the TSHD would be used;
- hopper doors would be kept in good condition to minimise loss of sediment during transport;
- the TSHD would be equipped with below keel discharge of tail waters via an anti-turbidity control valve;
- accurate positioning systems to ensure dredging and disposal occur in approved areas;
- water quality monitoring and trigger levels, as well as coral health monitoring (if required); and,

- adaptive management measures would be implemented as required depending on the level of impact and may include:
  - moving the dredge operations and vessels to other areas within the development footprint to reduce potential impacts on the affected corals;
  - reducing or ceasing overflow during periods when the dredge plume is considered likely to lead to further impacts; or,
  - reducing dredging activities from 24 hours a day to a period timed to reduce impacts (e.g. to 12 hours/day or night).

DMP's for subsequent capital and maintenance dredging activities would be developed and submitted to EHP and DSEWPaC when required. DMP's for maintenance dredging would also include relevant mitigation measures.

Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related bauxite, cargo and fuel shipping activities on marine ecosystem function or integrity of the CMA has been assessed as negligible, there are a number of measures that are used for existing Weipa bauxite, cargo and fuel shipping that would continue to be used for Project-related bauxite, cargo and fuel shipping. These include:

- using existing shipping routes;
- use of pilotage, where required. Compulsory pilotage is estimated to reduce the risk of a shipping incident by a factor of 30.3 (DNV 2011);
- fatigue management guidelines to ensure the crew remains alert (for bauxite shipping);
- using the ReefVTS mandatory ship reporting system by vessels of 50m or greater in the northern part of the CMA near Torres Strait. The ReefVTS compiles timely and accurate traffic imaging of shipping throughout the region and generates ship encounter predictions, which are disseminated to ships;
- maintaining a modern fleet of bauxite vessels in a good state of repair and subject to regular inspections to minimise the risk of a ship being disabled; and,
- the use of two tugs at all times for vessels greater than 100m in length during berthing operations.

DMP's submitted for subsequent maintenance dredging activities would include similar mitigation measures where appropriate.

### 10.4.3 Marine Species

For marine species in the CMA, the *Significant Impact Guidelines* (DEWHA 2009c) requires an assessment of the potential for the Project to:

*"...have a substantial adverse effect on a population of a marine species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution..."*

#### 10.4.3.1 Potential Impacts

An assessment of the potential for significant impacts on listed threatened terrestrial species and listed migratory species associated with the mine, Port and infrastructure area is provided in **Section 4.4.2**.

An assessment of the potential for significant impacts on listed threatened species and listed migratory species associated with Project-related shipping activities is provided in **Section 4.5.2.8**

and **Section 4.5.2.9** respectively. This assessment determined that the potential for impacts on listed threatened terrestrial species and listed migratory species associated with Project-related shipping activities would be rare, unlikely and that any that if any impact was to occur on these species it would be negligible. Therefore no further detailed assessment on listed threatened terrestrial species and listed migratory species associated with Project-related shipping activities is required.

The listed threatened marine and listed migratory species associated with the mine, Port and infrastructure area subject to detailed assessment that may be associated with Project-related bauxite, cargo and fuel shipping activities in the CMA and the relevant section of the EIS where they are assessed is provided in **Table 10-3**.

**Table 10-3 Listed Threatened or Migratory Species Subject to Detailed Assessment**

Category	Species	Assessment Section
Estuarine and Marine	Hawksbill Turtle ( <i>Eretmochelys imbricata</i> ) Flatback Turtle ( <i>Natator depressus</i> ) Olive Ridley Turtle ( <i>Lepidochelys olivacea</i> ) Leatherback Turtle ( <i>Dermochelys coriacea</i> ) Loggerhead Turtle ( <i>Caretta caretta</i> ) Green Turtle ( <i>Chelonia mydas</i> ) Dwarf Sawfish ( <i>Pristis clavata</i> ) Green Sawfish ( <i>Pristis zijsron</i> ) Freshwater Sawfish ( <i>Pristis microdon</i> ) Spear-tooth Shark ( <i>Glyphis sp. A</i> )	<b>Section 7.3 and Section 7.4.</b>
Avian Migratory	Clamorous Reed-Warbler ( <i>Acrocephalus stentoreus</i> ) Common Sandpiper ( <i>Actitis hypoleucos</i> ) Fork-tailed Swift ( <i>Apus pacificus</i> ) Great Egret, White Egret ( <i>Ardea alba</i> ) Sharp-tailed Sandpiper ( <i>Calidris acuminata</i> ) Red Knot ( <i>Calidris canutus</i> ) Curlew Sandpiper ( <i>Calidris ferruginea</i> ) Red-necked Stint ( <i>Calidris ruficollis</i> ) Great Knot ( <i>Calidris tenuirostris</i> ) Oriental Cuckoo ( <i>Cuculus saturates</i> ) Oriental Plover ( <i>Charadrius veredus</i> ) Eastern Reef Egret ( <i>Egretta sacra</i> ) Sarus Crane ( <i>Grus Antigone</i> ) White-bellied Sea-Eagle ( <i>Haliaeetus leucogaster</i> ) Grey-tailed Tattler ( <i>Heteroscelus brevipes</i> ) White-throated (Needletail <i>Hirundapus caudactus</i> ) Barn Swallow ( <i>Hirundo rustica</i> ) Bar-tailed Godwit ( <i>Limosa lapponica</i> ) Rainbow Bee-eater ( <i>Merops omatus</i> ) Satin Flycatcher ( <i>Myiagra cyano-leuca</i> ) Marsh Sandpiper ( <i>Tringa stagnatilis</i> ) Black-faced Monarch ( <i>Monarcha melanopsis</i> ) Greater Sand Plover ( <i>Charadrius eschenaultii</i> ) Lesser Sand Plover ( <i>Charadrius mongolus</i> )	<b>Section 8.4</b>



Category	Species	Assessment Section
	Lesser Frigatebird ( <i>Fregata ariel</i> ) Great Frigatebird ( <i>Fregata minor</i> ) Latham's Snipe, Japanese Snipe ( <i>Gallinago hardwickii</i> ) Asian Dowitcher ( <i>Limnodromus semipalmatus</i> ) Black-tailed Godwit ( <i>Limosa limosa</i> ) Eastern Curlew ( <i>Numenius madagascariensis</i> ) Little Curlew, Little Whimbrel ( <i>Numenius minutus</i> ) Whimbrel ( <i>Numenius phaeopus</i> ) Eastern Osprey ( <i>Pandion cristatus</i> ) Glossy Ibis ( <i>Plegadis falcinellus</i> ) Pacific Golden Plover ( <i>Pluvialis fulva</i> ) Grey Plover ( <i>Pluvialis squatarola</i> ) Rufous Fantail ( <i>Rhipidura rufifrons</i> ) Little Tern <i>Sterna (albifrons)</i> Common Greenshank ( <i>Tringa nebularia</i> ) Terek Sandpiper ( <i>Xenus cinereus</i> )	
Non-Avian Migratory	Estuarine Crocodile ( <i>Crocodylus porosus</i> ) Dugong ( <i>Dugong dugon</i> ) Australian Snubfin Dolphin ( <i>Orcaella heinsohni</i> ) Indo-Pacific Humpback Dolphin ( <i>Sousa chinensis</i> ) Bryde's Whale ( <i>Balaenoptera edeni</i> )	<b>Section 9.3.3, Section 9.3.4, Section 9.4.3, Section 9.4.4, Section 9.5.3 and Section 9.5.4.</b>

The assessment of potential impacts on threatened estuarine and marine species (marine turtles and elasmobranch (sawfish) species) was found to be negligible to minor. The same conclusion would apply to the CMA including for marine turtle species identified in the conservation values of the West Cape York Commonwealth Marine Reserve.

The assessment of potential impacts on avian migratory species was found to be negligible and the same conclusion would apply to the CMA including for the frigatebird species identified in the conservation values of the West Cape York Commonwealth Marine Reserve.

The assessment of potential impacts on non-avian migratory species was found to be negligible to minor. The same conclusion would apply to the CMA.

The potential for indirect impacts from Project-related shipping activities on threatened marine species and marine migratory species from artificial lighting on ships, acoustic impacts and vessel strike were assessed in **Section 4.5.3** and also for the GBRMP and GBRWHA in **Section 11.4.2** and **Section 12.4.3** respectively. The impacts assessed in these sections would equally apply to the CMA. These assessments determined that Project-related shipping activities including the potential small increase in shipping at maximum production are not likely to significantly impact on threatened marine species or marine migratory species. A number of marine species that are not threatened are also listed in the Protected Matters Search (refer **Appendix 10-B**) or are known to occur in the area. These broadly include species from sea snakes, bony fish and nekto-benthic marine invertebrates groups.

With respect to sea snakes, a total of 16 species have been recorded in the Weipa region (Redfield *et al.* 1978, Porter *et al.* 1997). These include *Acalyptophis peronei*, *Aipysurus duboisii*, *Aipysurus laevis*, *Aipysurus eydouxii*, *Astrotia stokesii*, *Disteira kingie*, *Disteira major*, *Enhydrina schistosa*, *Hydrelaps darwiniensis*, *Hydrophis coggeri*, *Hydrophis elegans*, *Hydrophis inornatus*, *Hydrophis ornatus*,

*Hydrophis pacificus*, *Lapemis curtus*, *Lapemis hardwickii* and *Acrochordus granulatus*. Porter *et al.* (1997) determined that most specimens captured of *Acrochordus granulatus* occurred along the edge of sea grass beds on the southern side of the Hey/Embley River estuary from opposite Lorim Point to near the mouth of the estuary, however no Hydrophiidae species were found in this area. *Acrochordus granulatus* was also frequently encountered in open water in the Hey and Embley Rivers. Adult specimens of *Enhydrina schistosa* were generally captured in depths of 8 to 8.5m of water, with juvenile specimens captured at approximately 6m depth. Only juveniles of *Enhydrina schistosa* were captured within 100m of the existing Lorim Point Wharf, with all being caught late at night. Porter *et al.* (1997) indicated that the diversity of sea snakes in the Hey/Embley River was high and the high representation of juveniles of some species of sea snakes in this study (*Aipysurus eydouxii*, *Enhydrina schistosa*, and *Lapemis hardwickii*) was suggested to mean that some estuarine environments act as breeding grounds and/or nurseries although the author did not suggest that the Hey/Embley River constituted an important breeding ground. This was further evidenced by the lack of juveniles collected in adjacent Gulf trawls and the high proportion of juveniles observed in other estuarine studies.

Ukuwela *et al.* (2012) describes a new species of sea snake (Rough Scaled Sea Snake (*Hydrophis donaldi*)) that was found in the Gulf of Carpentaria. All specimens of this species were described as being caught in Albatross Bay at the mouths of "Hay's Creek" and the Mission River. The Mission River flows to Albatross Bay and is outside the Project area. "Hay's Creek" is taken to be a reference to the Hey River. All specimens in this study were captured in shallow water (<10m) over seagrass beds, however exact locations of where they were captured was not specified. Ukuwela *et al.* (2012) hypothesise that the species' habitat preference may be the reason it has not been identified previously as most other sea snake studies have focussed on open water or have been based on bycatch from commercial fisheries which do not enter estuaries. The main threat to sea snakes in general is identified in this study as being from prawn trawling.

The North Marine Bioregional Plan identifies sea snakes as a conservation value and a priority for conservation in the North Marine Region (DSEWPac 2012f). The *Species Group Report Card – Marine Reptiles* (DSEWPac 2012n) which supports the North Marine Bioregional Plan reports an analysis of pressures on 19 species of sea snakes in the North Marine Region. The results of the analysis identified pressures as "of concern" and "of potential concern" namely:

- *of concern*: by catch (commercial fishing); and,
- *of potential concern*: climate change (change in sea temperature and ocean acidification) and physical habitat modification (dredging and/or dredge spoil).

DSEWPac (2012n) assesses by catch from commercial fishing *of concern* for 11 sea snake species and *of potential concern* for eight sea snakes species. This pressure is associated with commercial fishing activities in trawl fisheries, and particularly the Northern Prawn Fishery. In 2009, 7,369 sea snakes were reported in logbook records as caught in the Northern Prawn Fishery (DSEWPac (2012n)).

Physical habitat modification (dredging and/or dredge spoil) was identified as *of potential concern* to sea snakes based on a pressure analysis (DSEWPac 2012n). Potential impacts identified in DSEWPac 2012n associated with dredging and/or dredge spoil on sea snakes may include:

- increased turbidity impacting on species that rely on vision for feeding;
- removal of habitat of prey species;
- the covering of foraging habitat with dredge spoil; and,
- physical entrainment in equipment.

Sea snakes generally occur in shallow waters and are more likely to occur in coastal waters than in the CMA. The proposed capital dredging program for the Project's river facilities would involve small volumes and short durations at each of three sites (maximum 11 weeks across the three sites) in the Embley and Hey Rivers (refer **Table 7-9**). Whilst this may cause a very short-term and transient above average elevation of turbidity in the Embley and/or Hey Rivers, it is expected that these elevations would be within the long term background range for the area and short-lived when compared to the frequent and naturally occurring elevated turbidity in the Embley and Hey Rivers and estuary (Carter *et al.* 2012). In addition;

- there would be a three day pause in capital dredging for the river facilities after 14 consecutive days dredging;
- the small area of capital dredging for the river facilities would not result in the removal of any significant habitat for potential sea snake prey species resulting in negligible entrainment compared to the ongoing impact of the trawl fishery in the north Marine Region;
- there would be no dredging within seagrass meadows; and,
- the capital dredging volume for the river facilities (approximately 110,000m<sup>3</sup>) would be approximately 10% of the current NQBP annual maintenance volume for the Port of Weipa.

Based on the above assessment it is considered unlikely that sea snakes that may inhabit the Embley and Hey Rivers and estuary would be impacted by Project-related activities.

Albatross Bay supports diverse fish assemblages with 344 fish species being recorded (RTA 2011). Although not well studied, the reef habitats in Albatross Bay support a diverse assemblage of demersal and pelagic species. Three species of sygnathids (pipefish and seahorses) that are listed marine species under the EPBC Act (section 248) *Hippichthys heptagonus* (Big Belly Seahorse), *Hippocampus kuda* (Spotted Seahorse) and *Hippocampus whitei* (White's Seahorse) are confirmed to occur in Albatross Bay (Blaber *et al.* 1990). As the distribution and abundance of sygnathids are poorly known, it is highly likely that other species of sygnathids also occur in Albatross Bay.

Albatross Bay is also known to be an important nursery area for the juvenile tiger and banana prawns that are the principal target species in the Northern Prawn Fishery area. Banana prawns migrate from estuarine areas into the Gulf of Carpentaria for spawning from September to November and March to May. At low tide, juvenile and sub-adult prawns are most abundant in small tidal creeks and gutters that drain from mangrove forests (Vance *et al.* 1998, Kenyon *et al.* 2004).

The Brown Tiger Prawn (*Penaeus esculentus*) and the Grooved Tiger Prawn (*Penaeus semisulcatus*) are abundant in the Gulf of Carpentaria. Brown Tiger Prawns spawn throughout the year, with peak spawning occurring from August to September (Kenyon *et al.* 2004).

Grooved Tiger Prawns' spawning peaks between August and October, with a minor peak in the months of January and February (Rothilsberg *et al.* 2005). Juvenile tiger prawns are generally associated with vegetated habitats (particularly large seagrass beds) in the vicinity of estuaries (Haywood *et al.* 1995). Other prawn species that occur in abundance in Albatross Bay are Endeavour Prawns (*Metapenaeus endeavouri* and *Metapenaeus ensis*) and Eastern King Prawns (*Penaeus plebejus*).

The cephalopod (squid and cuttlefish) assemblage in the Gulf of Carpentaria is diverse and abundant, with at least 21 species occurring. The numerically dominant species of squid and cuttlefish recorded are *Photololgo chinensis* and *Photololgo edulis*, and *Sepia elliptica* and *Sepia pharaonis* respectively (Dunning *et al.* 1994). There are no specific studies that have examined the squid and cuttlefish assemblage at the sites of the proposed marine infrastructure. Mud crabs are common in the creeks and rivers of Albatross Bay.

Albatross Bay is located over 12km from the CMA at its closest point. Nine Mile Reef is located in the CMA and contains habitat suitable for fish to aggregate. An assessment of potential impacts on Nine Mile Reef is provided in **Section 10.4.2.1** and was determined to be negligible.

A number of cetacean species that are not threatened or migratory are also listed in the Protected Matters Search or are known to occur in the area. During field surveys of the Project area two cetacean species from the Protected Matters Search were confirmed as present. This includes at least one species of the Bottlenose Dolphin (most probably the inshore form *Tursiops truncatus*) at the Hey/Embley estuary and the proposed Port as well as the Pantropical Spotted Dolphin (*Stenella attenuata*) at the Hey/Embley estuary. An anecdotal report from a local Weipa resident identified the Striped Dolphin (*Stenella coeruleoalba*) as being present in inshore waters at the mouth of Norman Creek. The report was confirmed by the trained MMO during the 2012 cetacean survey. The Striped Dolphin was not listed in the Protected Matters Search as the Gulf of Carpentaria is not included in the distribution of the species (DSEWPaC 2012q). These cetacean species were not observed within the CMA. Impacts to listed cetacean species confirmed to be present would be comparable to those assessed for marine migratory species.

Based on the above assessment, the potential unmitigated impacts associated with Project-related activities associated with the CMA on marine species in the CMA would be negligible to minor and long term.

#### **10.4.3.2 Safeguards, Avoidance and Mitigation Measures**

Mitigation measures for the minor unmitigated impacts on listed threatened and migratory species are provided in the following sections:

- Estuarine and marine species – **Section 7.3.6** and **Section 7.4.6**;
- Avian migratory species – **Section 8.5**; and,
- Non-avian migratory species – **Section 9.3.5**, **Section 9.4.5** and **Section 9.5.5**.

These measures would equally apply to the CMA and other marine species.

A draft DMP for the proposed Port is included in **Appendix 7-C** and for the River Facilities in **Appendix 7-D**. The draft DMPs propose environmental management and monitoring strategies for dredging and spoil disposal activities. The environmental management and monitoring strategies that would be implemented will be in accordance with the final DMP's to be approved by DSEWPaC and EHP.

#### **10.4.4 Changes in Air Quality**

In relation to changes in air quality, the *Significant Impact Guidelines* (DEWHA 2009c) requires an assessment of the potential for the Project to:

*"...result in a substantial change in air quality... (including temperature) which may adversely impact on biodiversity, ecological integrity, social amenity or human health..."*

##### **10.4.4.1 Potential Impacts**

An assessment of potential impacts on air quality from the mine, Port and associated infrastructure is provided in **Section 14**.

During construction, dust emissions would result from the clearing of construction sites and the burning of cleared vegetation. In addition there would be heavy vehicle movements on unpaved roads. These emissions would generally be localised, of relatively short duration and would not impact on the airspace of the CMA.

During operations, the main sources of dust would be the progressive clearing of areas to be mined, topsoil stripping and rehabilitation, bauxite extraction and hauling by dump trucks, beneficiation, stockpiling and ship-loading. Minor amounts of particulates, sulphur oxides (SO<sub>x</sub>) and nitrous oxides (NO<sub>x</sub>) would be emitted from the diesel-fired power station, vehicles and shipping vessels.

Modelling of dust emissions from the mine, Port and associated infrastructure found highest emissions closest to the source of emissions that reduce over distance to the extent that they do not extend significantly beyond the limit of mining and therefore would not impact on CMA airspace as the distance to the CMA is greater than 3km from proposed mining operations.

Greenhouse gas (GHG) emissions from the Project were assessed in RTA (2011). The GHG emissions from all Project components at 50Mdtpa production were estimated to be 508kt CO<sub>2-e</sub> per annum. The previous assessment noted the GHG emissions in Australia were estimated to be 537,000kt CO<sub>2-e</sub> in 2009 and 181,000kt CO<sub>2-e</sub> from Queensland in 2007. These emissions would not change the temperature of the CMA.

The exhaust from ships includes particulates and SO<sub>x</sub> and NO<sub>x</sub>, generated by the ship engines. The small potential increase in Project-related bauxite, cargo and fuel shipping activities at maximum production would create negligible additional emissions.

Based on the above assessment, the potential unmitigated impacts associated with air emissions on the CMA would be negligible and long term.

#### *10.4.4.2 Safeguards, Avoidance and Mitigation Measures*

Given air emissions generated by the Project would have negligible impact on the CMA, no additional control measures beyond those implemented at the mine, Port and infrastructure areas, or currently in use for Project-related bauxite, cargo or fuel shipping activities, are proposed.

The bauxite shipping fleet that would be used for the Project is modern therefore emissions of NO<sub>x</sub> would be lower than for an older fleet. Project-related bauxite shipping would also utilise heavy fuel oil with a sulphur content not exceeding 3.5%.

#### **10.4.5 Changes in Water Quality**

In relation to changes in water quality, the *Significant Impact Guidelines* (DEWHA 2009c) requires an assessment of the potential for the Project to:

*".....result in a substantial change in ...water quality (including temperature) which may adversely impact on biodiversity, ecological integrity, social amenity or human health..."*



#### **10.4.5.1 Potential Impacts**

Water quality in the CMA has the potential to change as a consequence of the following Project activities:

1. disposal of dredge material from the proposed Port at the proposed new spoil ground located within the CMA;
2. dredging activities at the proposed Port;
3. disposal of dredge material from Embley and Hey Rivers at the existing Albatross Bay spoil ground, over 12km from the CMA; and,
4. bauxite, cargo and fuel shipping activities through the CMA.

The potential impact on water quality in the CMA from items 1 and 4 above were discussed in **Section 10.4.2** and determined to be negligible and long term.

With respect to item 2, during dredging activities at the proposed Port, some sediment would become mobilised from the dredge head and from the barge into the water column. These sediments would migrate and disperse from the point of disturbance subject to prevailing hydrodynamic conditions. The migration and dispersion of turbid plumes during initial capital dredging at the proposed Port and disposal at the proposed new spoil ground has been modelled. Results of this modelling are presented in **Appendix 7-A**.

Modelling of turbidity from initial capital dredging at the proposed Port indicates that the turbid plume would generally extend parallel to the coast, to beyond Pera Head and Thud Point in the south (migrating during flood tide) and to Boyd Point in the north (migrating during ebb tide). The 80th percentile of TSS above background over the entire initial capital dredge campaign at Boyd Point has been modelled at between 2mg/L and 5mg/L and between 3mg/L and 7.5mg/L at Pera Head, depending on the dredge method used. It is predicted that the turbidity plume from initial capital dredging at the proposed Port would not enter the CMA.

With respect to item 3, minor volumes of material would be dredged at Hornibrook terminal (57,600m<sup>3</sup>), Humbug terminal (15,600m<sup>3</sup>) and Hey River terminal (37,380m<sup>3</sup>). This material would be disposed of at the existing Albatross Bay spoil ground approximately 12km from the CMA. Annual maintenance dredging activities have been undertaken in the Embley River by NQBP, formerly Ports Corporation of Queensland (PCQ), for more than 30 years and are a regular feature of existing port operations. Periodic capital dredging is also undertaken. The proposed spoil disposal for the river facilities equates to approximately 10% of the average annual volume of material currently disposed of at Albatross Bay spoil ground. As the CMA is over 12km from the Albatross Bay spoil ground, potential impacts on water quality would be negligible and long term.

#### **10.4.5.2 Potential Project-related Shipping Impacts**

Potential impacts on water quality in the CMA from Project-related bauxite, cargo and fuel shipping activities may include:

- spills of cargo or oil/fuels from ship collision or grounding;
- propeller wash; and/or,
- anchorage.

### *Spills of cargo or oil/fuel*

In over 40 years of bauxite, cargo and fuel shipping to and from Weipa through the CMA, there has been no reported collision or grounding incidents in the CMA that have resulted in environmental harm. Project-related bauxite, cargo and fuel shipping activities including the small potential increase in shipping associated with the Project at maximum production is not likely to increase the risk of collision or grounding in the CMA.

The AMSA commissioned study *Assessment of the Risk of Pollution from Marine Oil Spills in Australian Ports and Waters* (DNV 2011) identified that shipping on the western side of Cape York Peninsula has a low environmental sensitivity index and moderate environmental risk indices. Darwin is located in an area with both a moderate environmental sensitivity index and environmental risk index, with the fuel shipping route between Darwin and Weipa having a low to very low environmental sensitivity index and moderate to low environmental risk index. Conversely, the Port of Gladstone is located in an area with a very high environmental sensitivity index and high environmental risk indices.

Project-related shipping through the CMA would be in deep water, and even in the unlikely event of a spill, it is highly unlikely that hydrocarbon concentrations in the water column would be sufficient to result in accumulation in marine sediments.

Further information on oil and fuel spills associated with Project-related shipping is provided in **Section 4.5.3** with the modelling report provided in **Appendix 4-D**. The spill modelling outlined in **Appendix 4-D** reflects a situation where a spill is assumed to have occurred and the model estimates the probability of a spill reaching a particular location. The model does not estimate the probability of a spill occurring. The probability of a spill occurring is related to the number of vessels currently utilising the Port of Gladstone, including RTA shipping. The modelled results in **Appendix 4-D** of a 25.25m<sup>3</sup> spill suggested that there would be up to 2% and up to 6% possibility of 0.01mm or thicker water-surface slicks entering the GBRMP from a spill at Fisherman's Landing and South Trees Wharf respectively if such a spill occurred. For the modelled cells within the GBRMP that have a possibility for oil on water, there is a maximum probability of 2% and 6% for a slick to occur from a spill at Fisherman's Landing and South Trees Wharf respectively. The model results for a 5 m<sup>3</sup> spill at both Fisherman's Landing and South Trees Wharf would not result in any water-surface oil slicks of 0.01mm or thicker being transported into the CMA. Based on the DNV (2011) estimate of the annual probability of a spill (> 10t) in the GBRMP being 0.0511, the probability of an oil spill greater than 10t from a Project-related vessel (bauxite or cargo) traversing the GBR is 0.0174 (1.74%) and the increase in the annual probability of a spill due to the predicted increase in Project-related shipping is estimated to be 0.0058 (or 0.58%). Given a similar increase in spill probability in the Port of Gladstone, the small potential increase in Project-related shipping at maximum production would only increase the risk of an oil or fuel spill entering the CMA to a negligible extent.

Bauxite is a benign material that does not leach contaminants in either seawater or freshwater that would result in a substantial change in water quality (refer **Section 3.5.4**). Bauxite is not classified as a dangerous good or marine pollutant, and is a Class C substance under the International Maritime Solid Bulk Cargo (IMBSC) code. Due to its large particle size (gravel), its density and its lack of solubility, any bauxite spilled into the sea would be expected to settle to the sea floor. Any bauxite spilled during ship loading or unloading, or as a result of hull damage caused by collision or grounding, would not result in a substantial change in water quality. It should be noted that bauxite naturally occurs in the sediment in the vicinity of the proposed Port, having been derived from the adjacent cliff areas through natural erosion processes (RTA 2011, Section 6.9.2.9).

### *Propeller wash*

Project-related bauxite, cargo and fuel ships are unlikely to elevate turbidity in the CMA as these ships would continue to utilise the same route (with exception of bauxite shipping departing/arriving from the proposed Port, approximately 45km to the south of the Port of Weipa) and travel in deep water. Therefore, the potential unmitigated impacts associated with propeller wash from Project-related bauxite, cargo or fuel shipping activities on water quality within the CMA would be negligible and long term.

### *Anchorage*

A new pilot disembarkation area for Cape Size vessels would be established in deeper water west of the Port of Weipa (refer **Figure 3-8**) in the CMA. Anchorage is generally not required for pilot disembarkation; however, anchorage in the CMA may be required from time to time (e.g. if directed by the Regional Harbour Master). The anchorage area off the Port of Weipa does not contain, and is not close to any reef communities, contains no seagrass beds, and is not shallow in nature (refer **Section 7.2.9**).

Based on the above assessment, the potential unmitigated impacts associated with Project-related bauxite shipping activities on water quality in the CMA would be negligible and long term.

#### *10.4.5.3 Safeguards, Avoidance and Mitigation Measures*

The Project is unlikely to change water quality to the extent that the biodiversity, ecological integrity, social amenity or human health values of the CMA would be significantly impacted. Draft DMP's for initial capital dredging for each of the proposed Port and river facilities have been prepared (refer **Appendix 7-C** and **Appendix 7-D** respectively). The draft DMPs propose environmental management strategies for the initial capital dredging and spoil disposal activities. The environmental management that would be implemented will be in accordance with the final DMP's to be approved by DSEWPaC and EHP. DMP's for subsequent capital and maintenance dredging activities would be developed and submitted to EHP and DSEWPaC when required. DMP's for maintenance dredging would also include relevant environmental management strategies.

No specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related bauxite, cargo and fuel shipping activities on water quality in the CMA has been assessed as negligible. However, a number of existing measures discussed in **Section 10.4.1.2** would continue to be implemented.

#### **10.4.6 Accumulation of Potentially Harmful Chemicals**

In relation to accumulation of potentially harmful chemicals, the *Significant Impact Guidelines* (DEWHA 2009c) requires an assessment of the potential for the Project to:

*"...result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely affected..."*

#### **10.4.6.1 Potential Impacts**

**Section 10.4.2.1** provides an overview of the sediment characterisation reports that have been prepared for dredging activities associated with the proposed Port. Sediments that would be dredged have been tested and determined to be free of contaminants and are suitable for unconfined disposal at sea.

With respect to Project-related bauxite, cargo and fuel shipping, the only contaminants that could potentially be introduced to the CMA would be associated with oil/fuel spills or antifouling paints from vessels. An assessment of oil/fuel spills and antifouling paints was undertaken for the CMA in **Section 10.4.1.1** and **Section 10.4.5.1**. These contaminants would be unlikely to be present in concentrations sufficient to impact on the CMA.

Based on the above assessment, the potential impacts associated with the Project on the CMA from accumulation of potentially harmful chemicals would be negligible and long term.

#### **10.4.6.2 Safeguards, Avoidance and Mitigation Measures**

An assessment of avoidance, enhancement measures and residual impacts for oil/fuel spills and antifouling paints was undertaken in **Section 11.4.1.2** and **Section 11.4.5.2** respectively. These would equally apply to the CMA.

### **10.4.7 Heritage Values of the CMA**

In relation to heritage values of the CMA, the *Significant Impact Guidelines* (DEWHA 2009c) requires an assessment of the potential for the Project to:

*"...have a substantial adverse impact on heritage values of the CMA, including damage or destruction of an historic shipwreck."*

#### **10.4.7.1 Potential Impacts**

Several shipwrecks are known to occur in the general vicinity but not within the shipping routes or dredge areas. Any shipping hazards are recorded on navigation charts. With the exception of bauxite ships embarking/disembarking from the proposed Port approximately 45km south of existing Port of Weipa, the majority of the Project-related bauxite, cargo and fuel shipping would traverse the same shipping routes as existing Weipa bauxite, cargo and fuel shipping.

The potential unmitigated impacts from Project activities on the heritage values of the CMA would be negligible and long term.

#### **10.4.7.2 Safeguards, Avoidance and Mitigation Measures**

No specific safeguards, avoidance or mitigation measures are required as the potential unmitigated impact from Project-related bauxite, cargo or fuel shipping activities on the heritage values of the CMA has been assessed as negligible.

## 10.5 Offset Measures

Under the *EPBC Act Environmental Offsets Policy* (DSEWPaC 2012b), offsets are not required where the residual impact is not likely to be significant (when assessed against the *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (DEWHA 2009c).

**Section 10.4** of this report documents the results of the impact assessment process and concludes that the unmitigated impacts associated with Project-related bauxite, cargo and fuel shipping activities on the CMA would be negligible to minor and therefore not significant. The residual impacts with mitigation would be negligible. As such, offsets relating to the CMA are not required under the Commonwealth offsets policy.

## 10.6 Conclusion and Summary of Residual Impacts

The proposed new spoil ground located within the CMA does not contain any sensitive features. Hydrodynamic modelling predicted that any turbidity plume from the proposed new spoil ground would not extend to the nearest potentially sensitive habitat, Nine Mile Reef, located approximately 6km south-southwest of the proposed new spoil ground.

Dredging and spoil disposal would be carried out in accordance with the DMPs prepared for both the proposed Port and river facilities to be approved by DSEWPaC and EHP.

Project-related bauxite, cargo and fuel shipping would continue to traverse the CMA via the same routes as existing Weipa bauxite, cargo and fuel shipping for the most-part. The exception would be a change in location for embarking/disembarking at the proposed Port, approximately 45km to the south of the Port of Weipa.

The small potential increase in bauxite, cargo and fuel shipping movements at maximum production associated with the Project in the CMA relative to existing and forecast levels is assessed as having a minor to negligible impact on the CMA. While no safeguards, avoidance or mitigation measures are specifically required, there are a number of control measures used by existing bauxite, cargo and fuel shipping activities that would continue to be used for the Project.

Based on the above assessment, the Project is unlikely to significantly impact on any of the values of the CMA.





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