

## Section 11

### Great Barrier Reef Marine Park







## 11 Great Barrier Reef Marine Park

### 11.1 Introduction

This section addresses the Great Barrier Reef Marine Park (GBRMP) aspects of the Tailored EIS Guidelines. The GBRMP was identified as one of the controlling provisions for the Project (refer **Section 4.5.2**).

It is noted that DSEWPaC's Significant Impact Guidelines (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 GBRMP has been made in accordance with the Tailored EIS Guidelines.

The GBR is the world's largest coral reef system, located on the east coast of Queensland, from Cape York in the north to past Lady Elliott Island in the south (refer **Figure 2-3**), covering approximately 34,870,000ha (DSEWPaC 2012d).

A Marine Park was declared over large parts of the GBR in 1975 under the *Great Barrier Reef Marine Park Act 1975* (GBRMP Act). The Marine Park is referred to as the GBRMP under the GBRMP Act and covers an area of the GBR referred to as the Great Barrier Reef Region (as defined in Schedule 1 of the GBRMP Act).

As illustrated in **Figure 2-3**, the GBRMP is slightly smaller (one percent) than the GBRWHA. The main difference in size is that the GBRMP does not include islands, waters of any bay, gulf, estuary, river, creek, port or harbour that are within the limits of Queensland in accordance with the *Commonwealth Seas and Submerged Lands Act 1973*. However, these features are included in the GBRWHA. An assessment of the GBRWHA is provided in **Section 12**.

The GBRMP was integrated into the EPBC Act through legislative changes that took effect on 25 November 2009. These changes established the GBRMP as a matter of NES under the EPBC Act. The changes were intended to simplify, streamline and consolidate permission requirements, so that the approval process under the GBRMP Act and the EPBC Act is handled consistently. In this regard, the effect of Section 43 of the EPBC Act is that where permission is not required for undertaking shipping activities within designated zones under the GBRMP Act, an approval is not required under Part 9 of the EPBC Act to authorise those shipping activities.

Under the *Great Barrier Reef Marine Park Zoning Plan 2003* (Zoning Plan), commercial ships do not require a permit to transit through General Use Zones and Designated Shipping Areas. Information on zoning under the GBRMP Act is contained in **Section 11.2.1**. All Project-related shipping bound for Australian east coast ports would remain within the GBR Designated Shipping Areas. In this regard, the effect of Section 43 of the EPBC Act is that approval is not required under the EPBC Act to authorise the proposed shipping activities within the Designated Shipping Areas in the GBRMP.

### 11.1.1 General Structure of the Section

The Tailored EIS Guidelines require the following to be considered for the assessment of the GBRMP:

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

This section is structured to address these requirements as follows:

- **Section 11.2** provides an overview of the values of the GBRMP;
- **Section 11.3** describes the construction and operational aspects of the proposed action that are relevant to the GBRMP;
- **Section 11.4** assesses the potential impacts within the GBRMP using the significant impact criteria detailed in the *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (DEWHA 2009c) and proposed safeguards, avoidance and mitigation measures as a reference; and,
- **Section 11.5** provides a summary of any residual impacts and draws conclusions from the assessment.

### 11.1.2 General Approach to Impact Assessment

The mine, Port and associated infrastructure areas are located approximately 370km from the GBRMP (by line of shipping route). Due to this distance the only potential impacts on the GBRMP from the Project are considered to be those associated with domestic shipping activities. Therefore the assessment of potential impacts on the values of the GBRMP (as outlined in **Section 11.2**) is based on the Project's domestic shipping activities. A description of Project-related shipping activities associated with the GBRMP is provided in **Section 11.3**.

A detailed discussion of other potential impacts associated with Project-related shipping activities is provided in **Section 4.5.2**. Potential cumulative and consequential impacts on the GBRMP are discussed in **Section 18.4**.

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

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



## 11.2 Values

### 11.2.1 Zoning

The GBRMP is a large area of approximately 346,000km<sup>2</sup> with multiple uses. The GBRMP Act establishes zones to manage these uses in the GBRMP and protect its values. These zones are defined in the Zoning Plan and provide for a range of recreational, commercial and research opportunities and for the continuation of traditional activities. The zones establish rules for the activities, and define those activities that are prohibited or require a permit.

It should be noted that the Zoning Plan uses the term 'Amalgamated Great Barrier Reef Section' as representing the current area of the Marine Park that has been progressively increased from its original area in 1983. The term GBRMP is used collectively in this document as the current area of the Marine Park at the time of assessment.

Preface C, item 18 of the Zoning Plan divides the GBRMP into eight zones as follows:

1. General Use Zone;
2. Habitat Protection Zone;
3. Conservation Park Zone;
4. Buffer Zone;
5. Scientific Research Zone;
6. Marine National Park Zone;
7. Preservation Zone; and,
8. Commonwealth Island Zone.

In addition to these zones, the Zoning Plan provides for three kinds of Designated Areas within zoned areas. These include Shipping Areas, Special Management Areas and Fisheries Experimental Areas.

According to Preface C, item 24 of the Zoning Plan, Shipping Areas are intended to facilitate passage through the GBRMP by ships. The Designated Areas - Shipping Areas is referred to throughout this document as Designated Shipping Area.

Ships for the purpose of the Zoning Plan are defined in Section 31 of the *Great Barrier Reef Marine Park Regulations 1983* (GBRMP Regulations) as a vessel that is:

- a) 50 metres or more in overall length; or
  - b) an oil tanker (within the meaning given by the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973), regardless of its length; or
  - c) a chemical carrier or liquefied gas carrier, regardless of its length; or
  - d) a ship to which the INF Code applies, regardless of its length; or
  - e) a vessel that is adapted to carry oil or chemicals in bulk in cargo spaces; or
  - f) a vessel engaged in towing or pushing another vessel or vessels if any of paragraphs (a) to (e) applies to the towed or pushed vessel, or the total length of the tow, from the stern of the towing vessel to the after end of the tow, is greater than 150 metres;
- but does not include:
- g) a vessel of the Defence Force; or
  - h) a vessel of the armed service of another country, if the vessel is in Australian waters with the consent of Australia; or
  - i) a super-yacht (that is, a vessel more than 50 metres in overall length used for private recreational activities).

Existing and proposed bauxite bulk carriers exceed 50m in length (corresponding to part (a) above) and are therefore regarded as ships for the purposes of the Zoning Plan.

The Cairns to Weipa barges are typically 35 to 50m in length with a combined tug and barge length up to 120m. Vessels of less than 50m in length do not meet the ships definition under the GBRMP Regulations and are required to hold a commercial permit to operate in the GBRMP. Longer barges or cargo shipments may be required depending on the supplier. For the purposes of this assessment, it is assumed that all cargo barge movements required for the SoE Project would be greater than 50m and regarded as ships under the GBRMP Regulations.

The term ship used throughout this section refers to a vessel that meets the GBRMP Regulations definition, whereas a vessel is used broadly for all types of ships/vessels/boats.

Ships may navigate through the GBRMP through the Designated Shipping Area, subject to pilotage and vessel reporting and monitoring requirements. Other vessels that do not meet the ships definition under the GBRMP Regulations and that traverse the GBRMP for commercial purposes require a permit to operate in the GBRMP.

According to the GBRMPA (GBRMPA 2004), the Designated Shipping Area takes into account past and forecast vessel usage patterns in the inner and outer shipping routes of the GBR. **Figure 11-1** illustrates the Designated Shipping Area in relation to other zones identified in the Zoning Plan.

### 11.2.2 Great Barrier Reef Marine Park Authority Risk Assessment

Section 54 of the GBRMP Act requires GBRMPA to prepare a report referred to as the Great Barrier Reef Outlook Report (Outlook Report) every five years. The first Outlook Report was given to the Minister for Environment, Heritage and the Arts by the Chairman and Chief Executive of the GBRMPA on 30 June 2009 (GBRMPA 2009b).

Section 54(3)(d) requires the report to include an assessment of the risks to the ecosystem within the Great Barrier Reef Region. An assessment of risks to the GBR was undertaken by the GBRMPA and included in the Section 8 of GBRMPA (2009b).

The risk assessment sought input from a wide range of stakeholders including reef scientists, industry partners, regulators and communities. The GBRMPA's 11 regionally based Local Marine Advisory Committees and four issues-based Reef Advisory Committees participated in a detailed process to identify and rank threats to the GBR ecosystem. Broader community views were also sought through an attitudinal survey. The risk assessment followed the procedures outlined in the Australian Standard for risk assessment (AS/NZ 4360:2004).

The GBRMPA (2009b) assessment identified 41 threats to the GBR. A summary of the results of GBRMPA (2009b) is provided in **Figure 11-2**.

Threats with high or very high risks were determined to be associated with climate change, catchment runoff, coastal development and fishing. None of the high or very high risks identified in this assessment are associated with the shipping activities.

Threats related to commercial shipping activities were all assessed as a medium risk and included:

- large oil spills;
- grounding of large vessels;
- vessel strike;
- introduction of exotic species; and,
- vessel waste discharge.



For the medium risks associated with commercial shipping activities, the assessment concluded:

*"Given current management arrangements, few of the threats considered likely or certain to occur are predicted to have moderate consequences for the Region's ecosystem and none will have catastrophic consequences. Some unlikely threats (large chemical or oils spills) may have major consequences for the Region's ecosystem" (GBRMPA 2009b).*

The risk of threats associated with commercial shipping activities occurring were assessed as unlikely, which reflects the low level of historical shipping incidents in the GBR as outlined in Section 4.5.3 of the Outlook Report as follows:

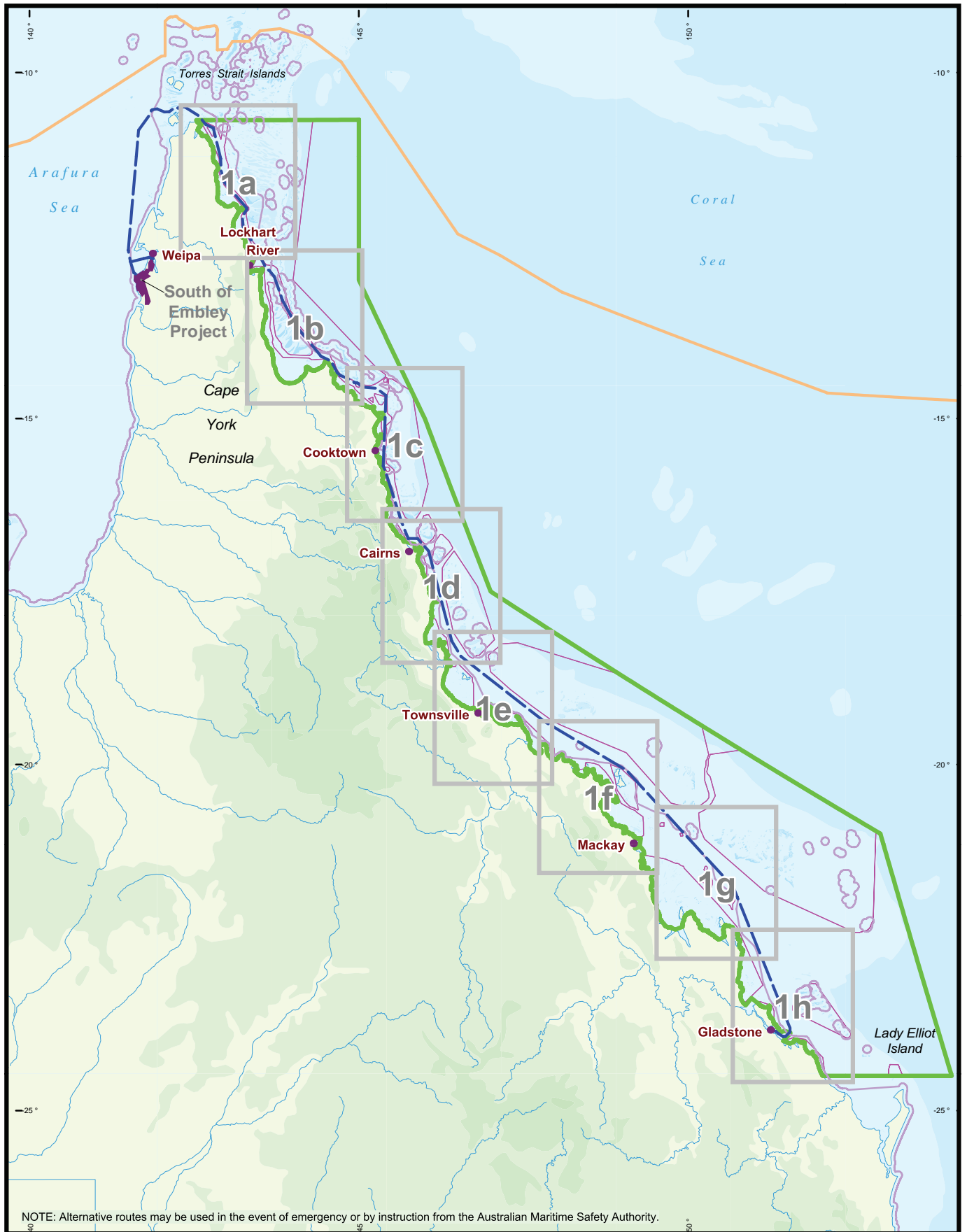
*"Almost all ships travel safely along the designated shipping routes of the Great Barrier Reef with little if any impact. In the last 10 years there have been three or fewer major shipping incidents each year and, despite the increase in shipping traffic, the number of major incidents has been stable over that period..."*

### 11.2.3 Assessable Criteria

The *EPBC Act Policy Statement 1.1 - Significant Impact Guideline* (DEWHA 2009c) outlines the following criteria to assess whether an action is likely to have a significant impact on the environment of the GBRMP. The criteria are based on whether there is a real chance or possibility that the action will:

- modify, destroy, fragment, isolate or disturb an important, substantial, sensitive or vulnerable area of habitat or ecosystem component such that an adverse impact on marine ecosystem health, functioning or integrity in the GBRMP results;
- have a substantial adverse effect on a population of a species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution;
- have a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological health or integrity or social amenity or human health;
- result in a known or potential pest species being introduced or becoming established in the GBRMP;
- result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, or social amenity or human health may be adversely affected; or,
- have a substantial adverse impact on heritage values of the GBRMP, including damage or destruction of an historic ship wreck.

These criteria are a useful reference point for the assessment of "relevant impacts" of the Project activities on the GBRMP (this assessment is in **Section 11.4**).



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

South of Embley Project

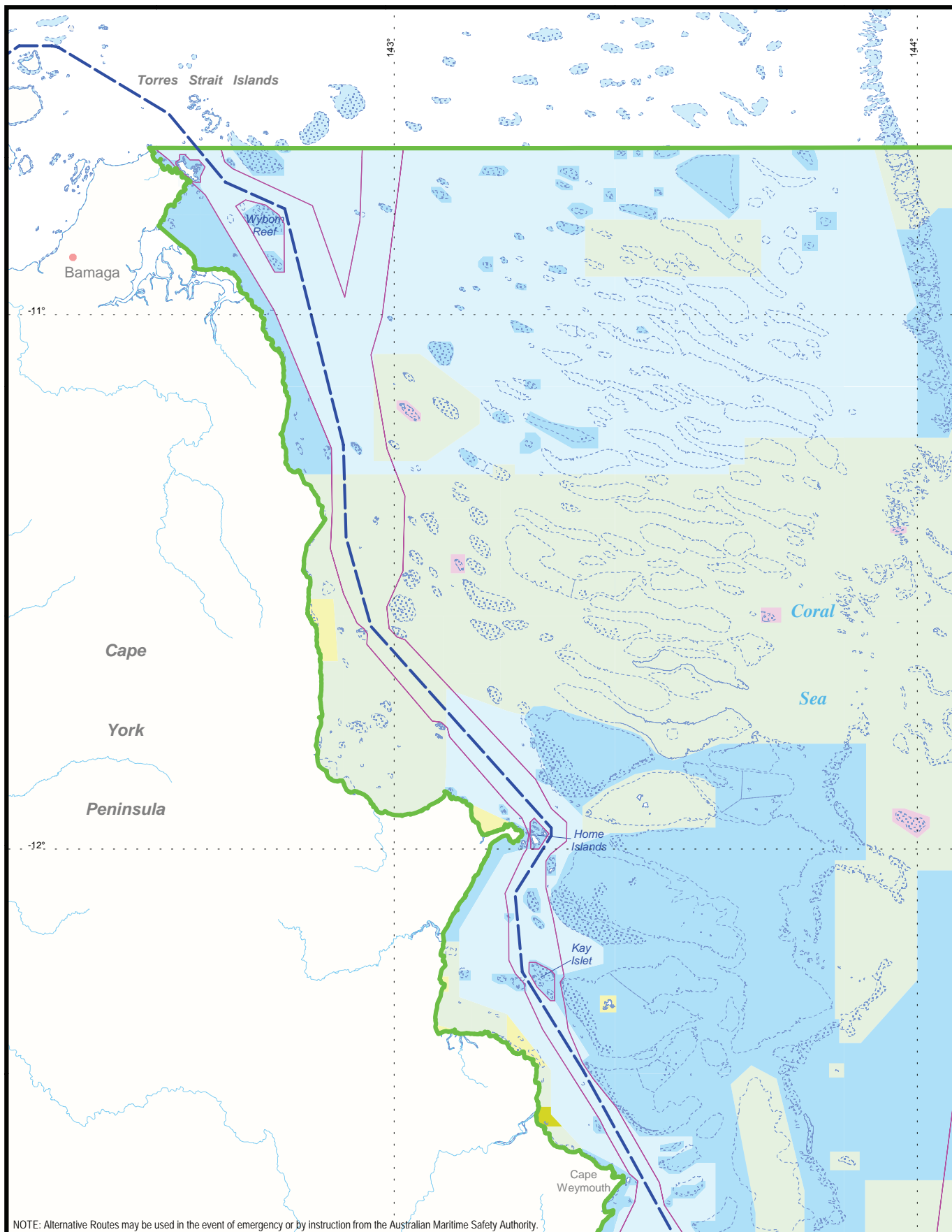
**Fig. 11-1: Shipping in Great Barrier Reef Marine Park**



100 0 100 200km

Datum/Projection: GDA94, Lat/Long Date: 23/08/2012





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
- Designated Shipping Area
- Bauxite Shipping Route

#### GBRMPA Zoning

- General Use Zone
- Habitat Protection Zone
- Conservation Park Zone
- Buffer Zone
- Scientific Research Zone
- Marine National Park Zone
- Preservation Zone

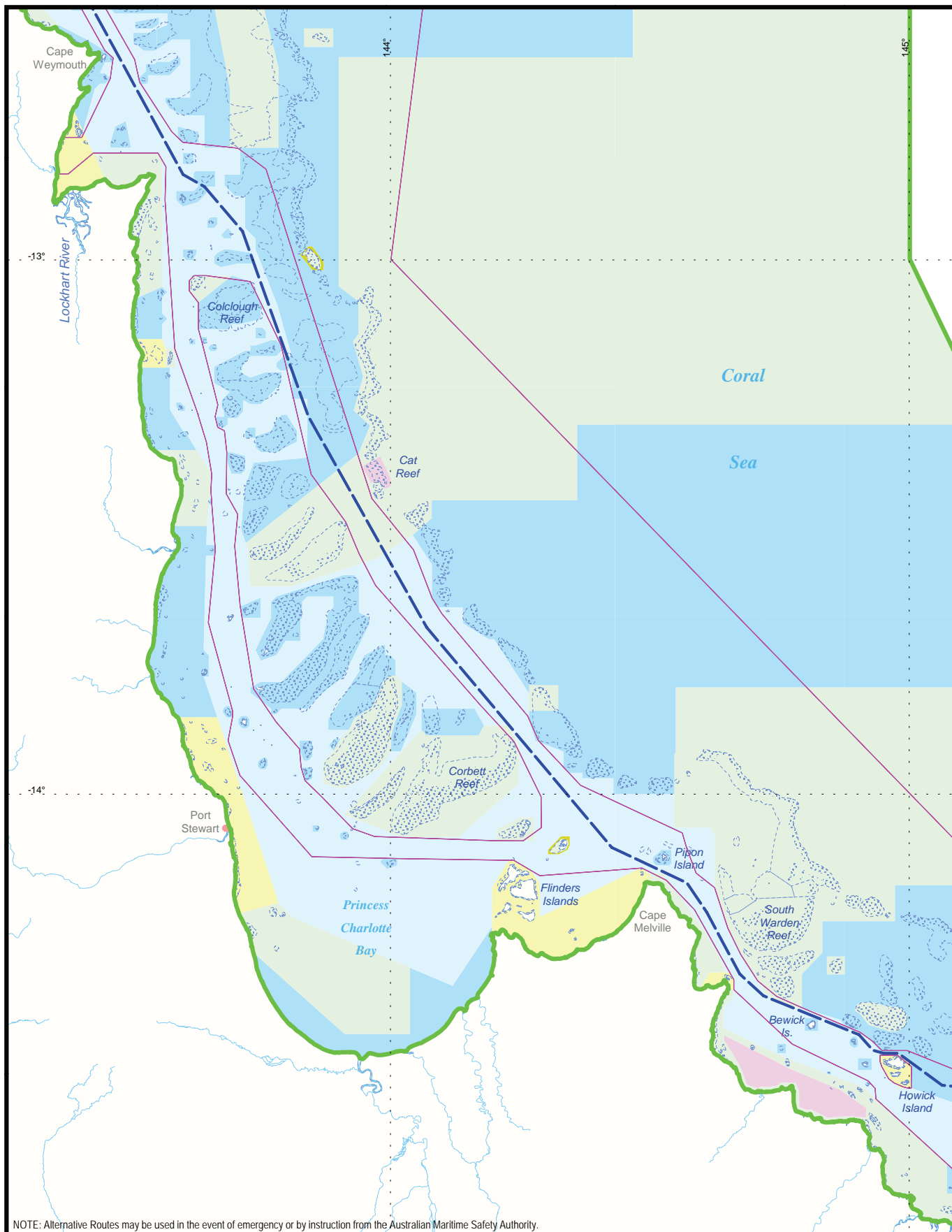
South of Embley Project  
**Fig. 11-1a: Shipping in  
 Great Barrier Reef  
 Marine Park  
 (Cape York)**



20 0 20 Km

Datum/Projection: GDA94, Lat/Long

Date: 23/08/2012



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
- Designated Shipping Area
- Bauxite Shipping Route

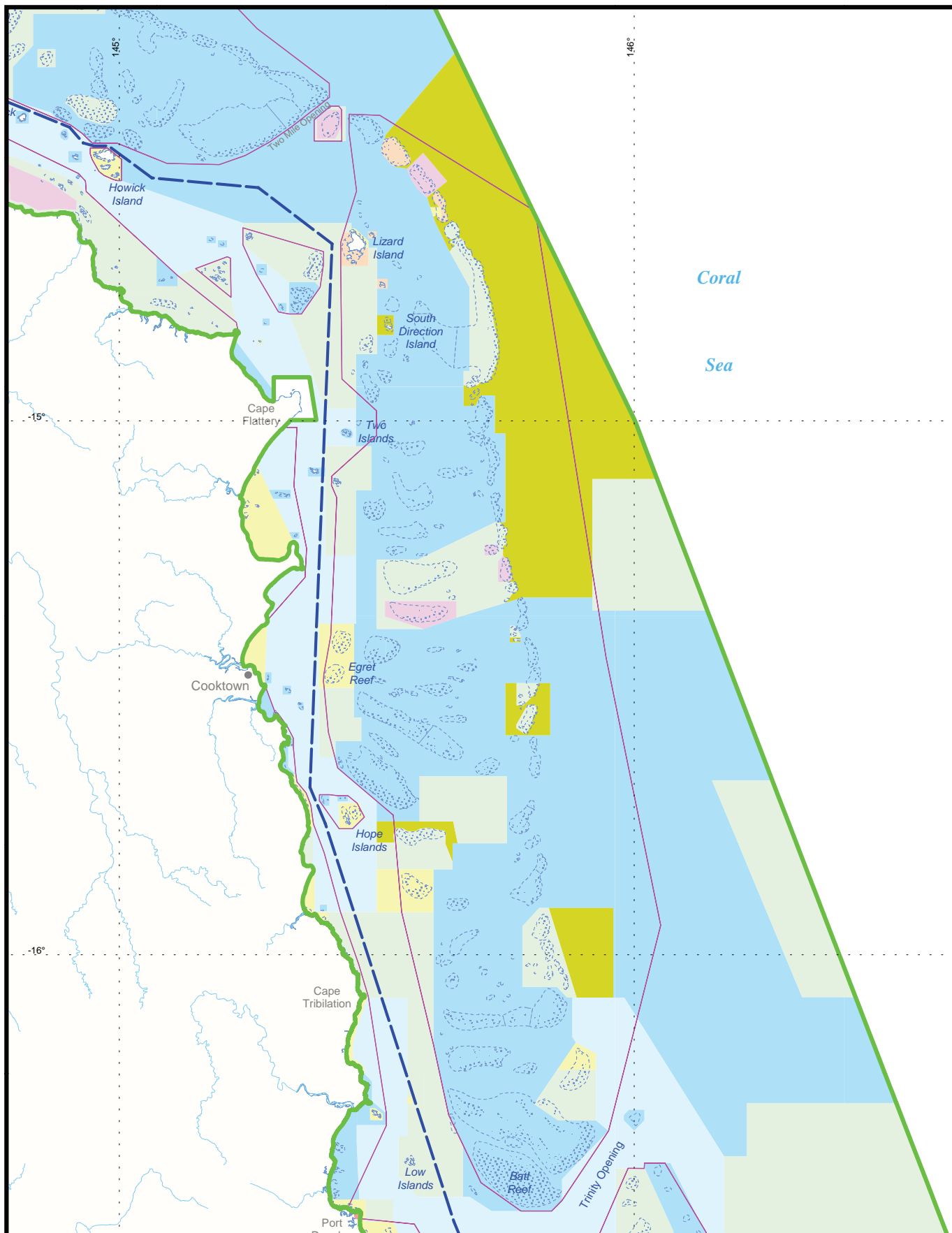
#### GBRMPA Zoning

- General Use Zone
- Habitat Protection Zone
- Conservation Park Zone
- Buffer Zone
- Scientific Research Zone
- Marine National Park Zone
- Preservation Zone

South of Embley Project  
Fig. 11-1b: Shipping in  
Great Barrier Reef  
Marine Park  
(Lockhart River)







South of Embley Project  
**Fig. 11-1c: Shipping in  
 Great Barrier Reef  
 Marine Park  
 (Cooktown)**

**Rio Tinto Alcan**

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

**GBRMPA Zoning**

- General Use Zone
- Habitat Protection Zone
- Conservation Park Zone
- Buffer Zone
- Scientific Research Zone
- Marine National Park Zone
- Preservation Zone

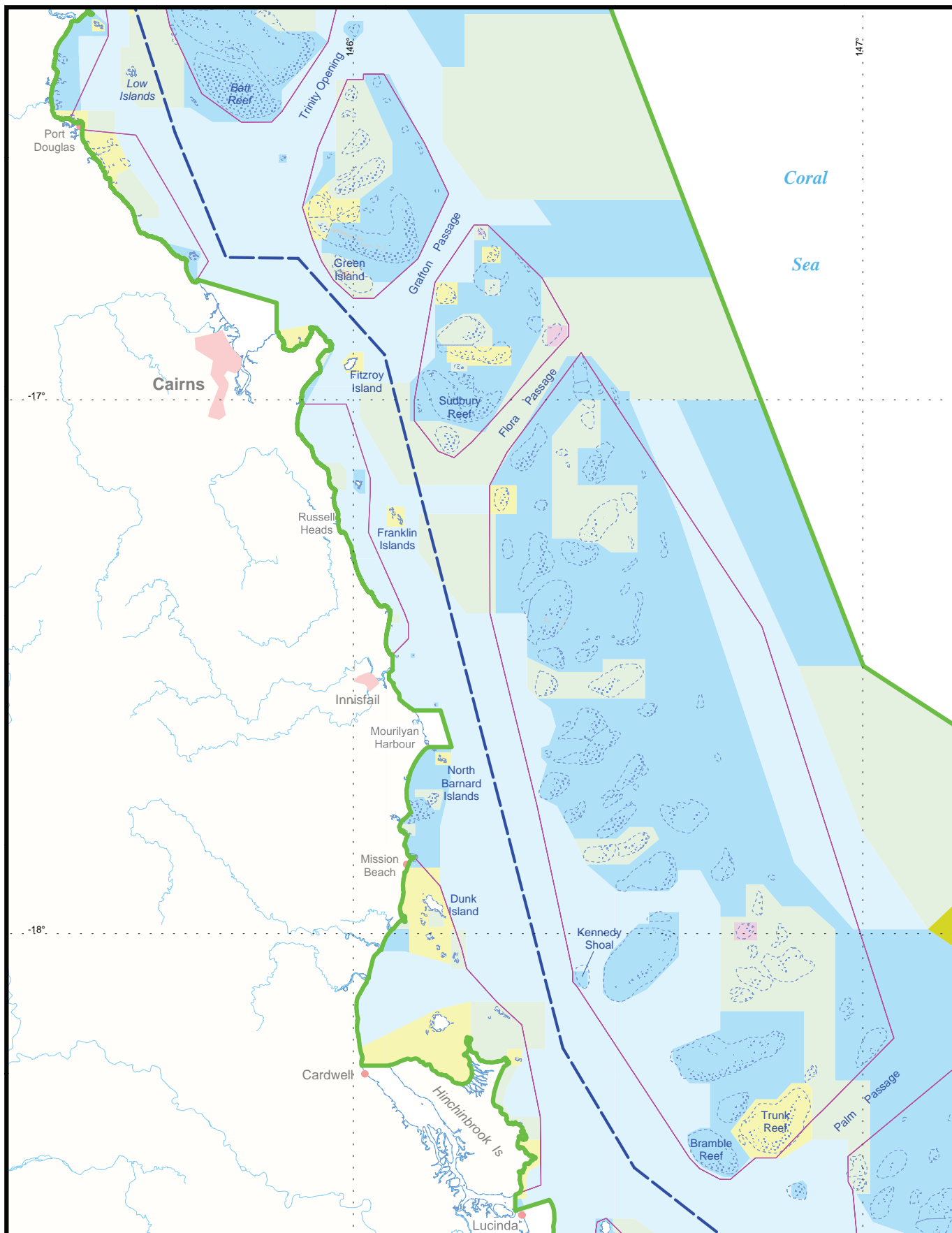


20 0 20 Km

Datum/Projection: GDA94, Lat/Long

Date: 23/08/2012

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



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

**GBRMPA Zoning**

- General Use Zone
- Habitat Protection Zone
- Conservation Park Zone
- Buffer Zone
- Scientific Research Zone
- Marine National Park Zone
- Preservation Zone

South of Embley Project

**Fig. 11-1d: Shipping in  
Great Barrier Reef  
Marine Park  
(Cairns)**



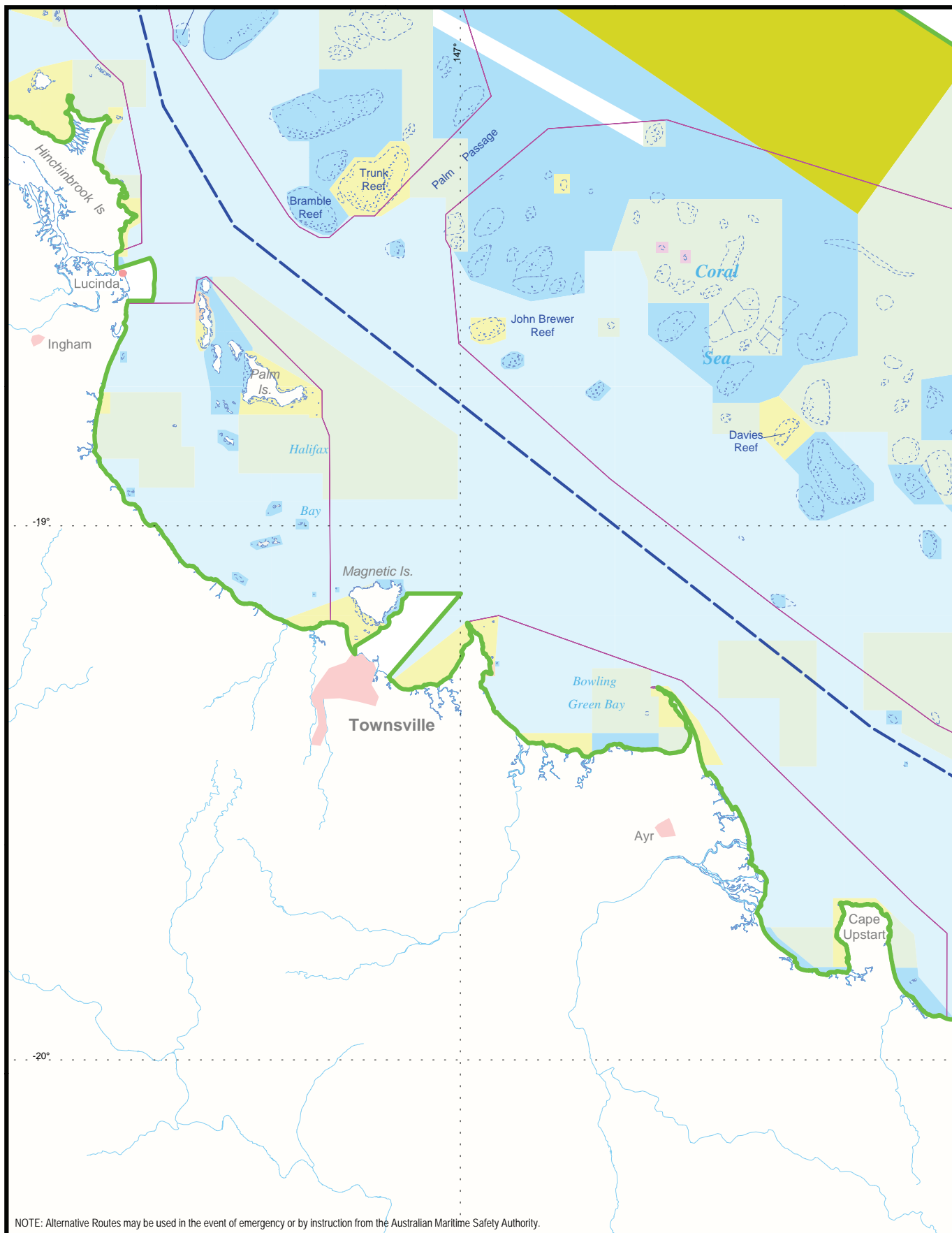
20 0 20 Km

Datum/Projection: GDA94, Lat/Long

Date: 23/08/2012

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





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
- Designated Shipping Area
- Bauxite Shipping Route

#### GBRMPA Zoning

- General Use Zone
- Habitat Protection Zone
- Conservation Park Zone
- Buffer Zone
- Scientific Research Zone
- Marine National Park Zone
- Preservation Zone

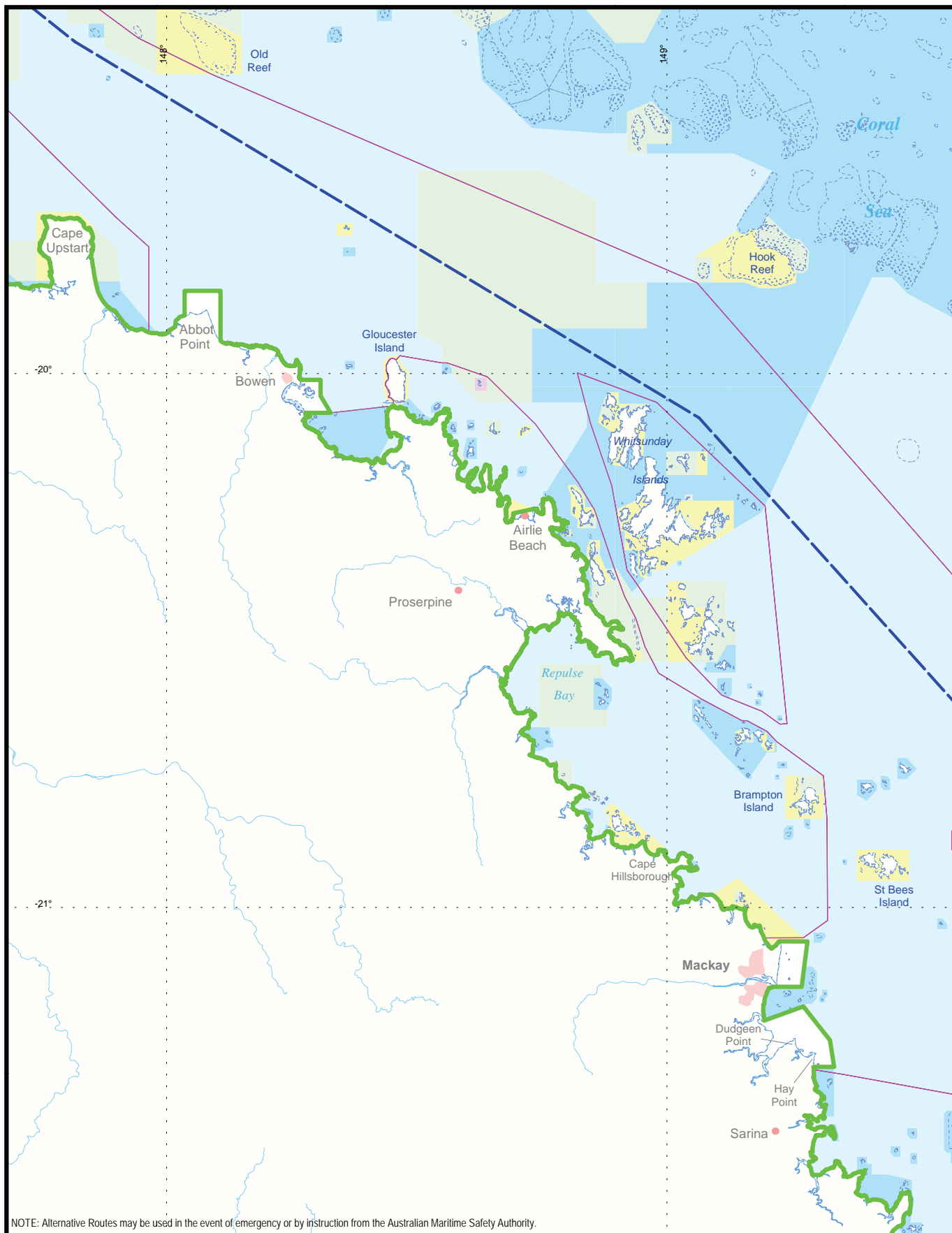
South of Embley Project  
Fig. 11-1e: Shipping in  
Great Barrier Reef  
Marine Park  
(Townsville)



20 0 20 Km

Datum/Projection: GDA94, Lat/Long

Date: 23/08/2012



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
- Designated Shipping Area
- Bauxite Shipping Route

#### GBRMPA Zoning

- General Use Zone
- Habitat Protection Zone
- Conservation Park Zone
- Buffer Zone
- Scientific Research Zone
- Marine National Park Zone
- Preservation Zone

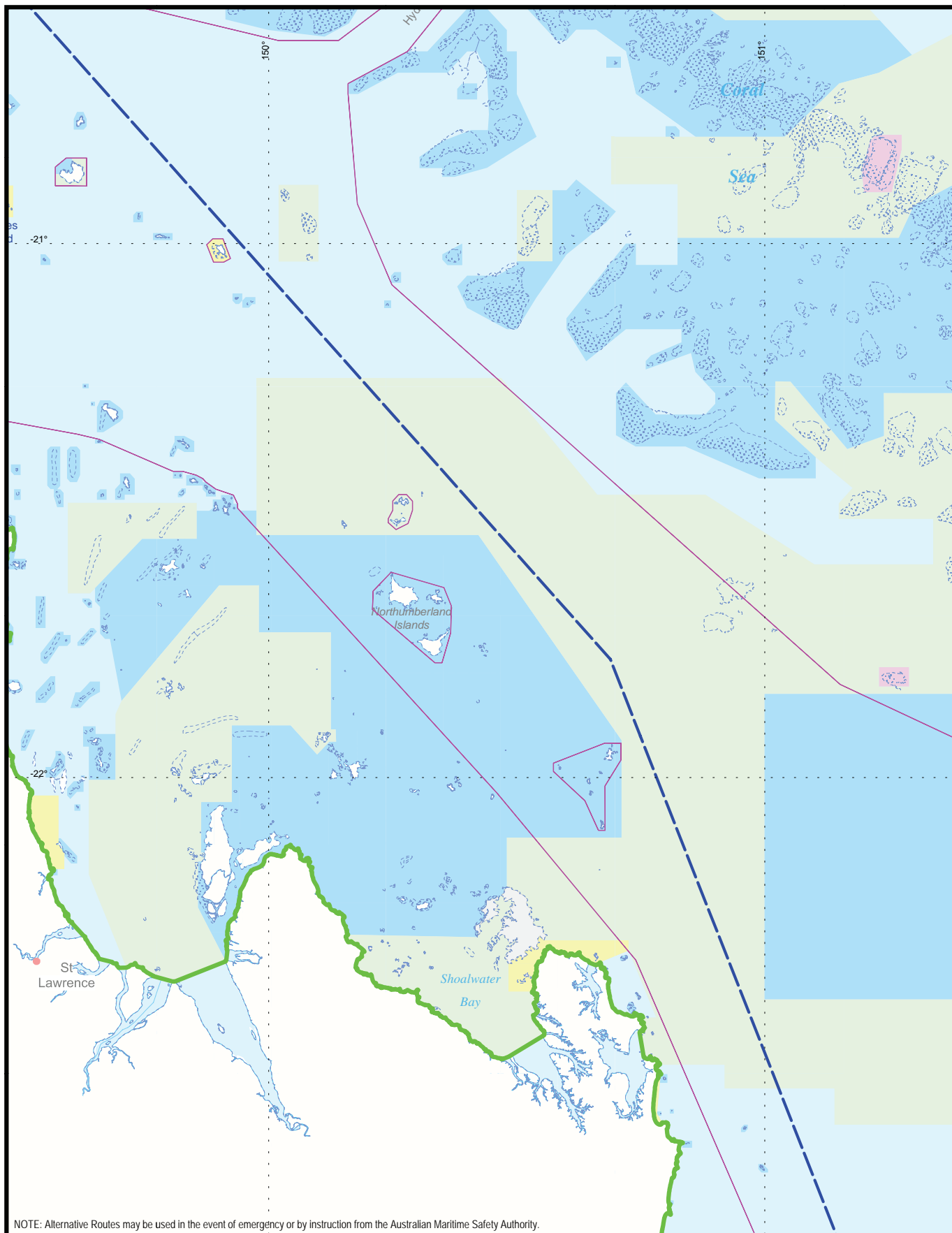
South of Embley Project  
Fig. 11-1f: Shipping in  
Great Barrier Reef  
Marine Park  
(Mackay)



20 0 20 Km

Datum/Projection: GDA94, Lat/Long

Date: 23/08/2012



Rio Tinto Alcan

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

#### GBRMPA Zoning

- General Use Zone
- Habitat Protection Zone
- Conservation Park Zone
- Buffer Zone
- Scientific Research Zone
- Marine National Park Zone
- Preservation Zone

South of Embley Project  
**Fig. 11-1g: Shipping in  
 Great Barrier Reef  
 Marine Park  
 (Shoalwater Bay)**

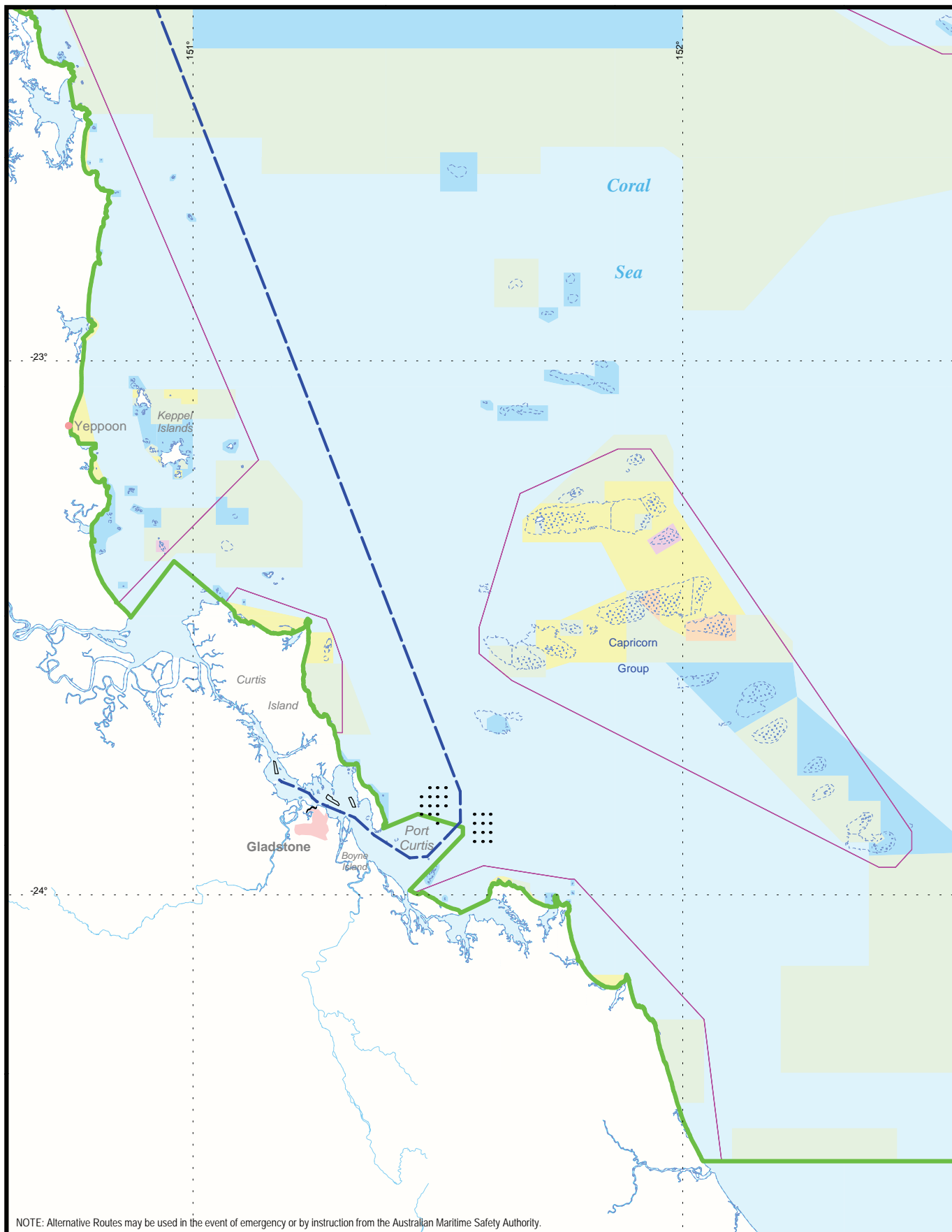


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Datum/Projection: GDA94, Lat/Long

Date: 23/08/2012





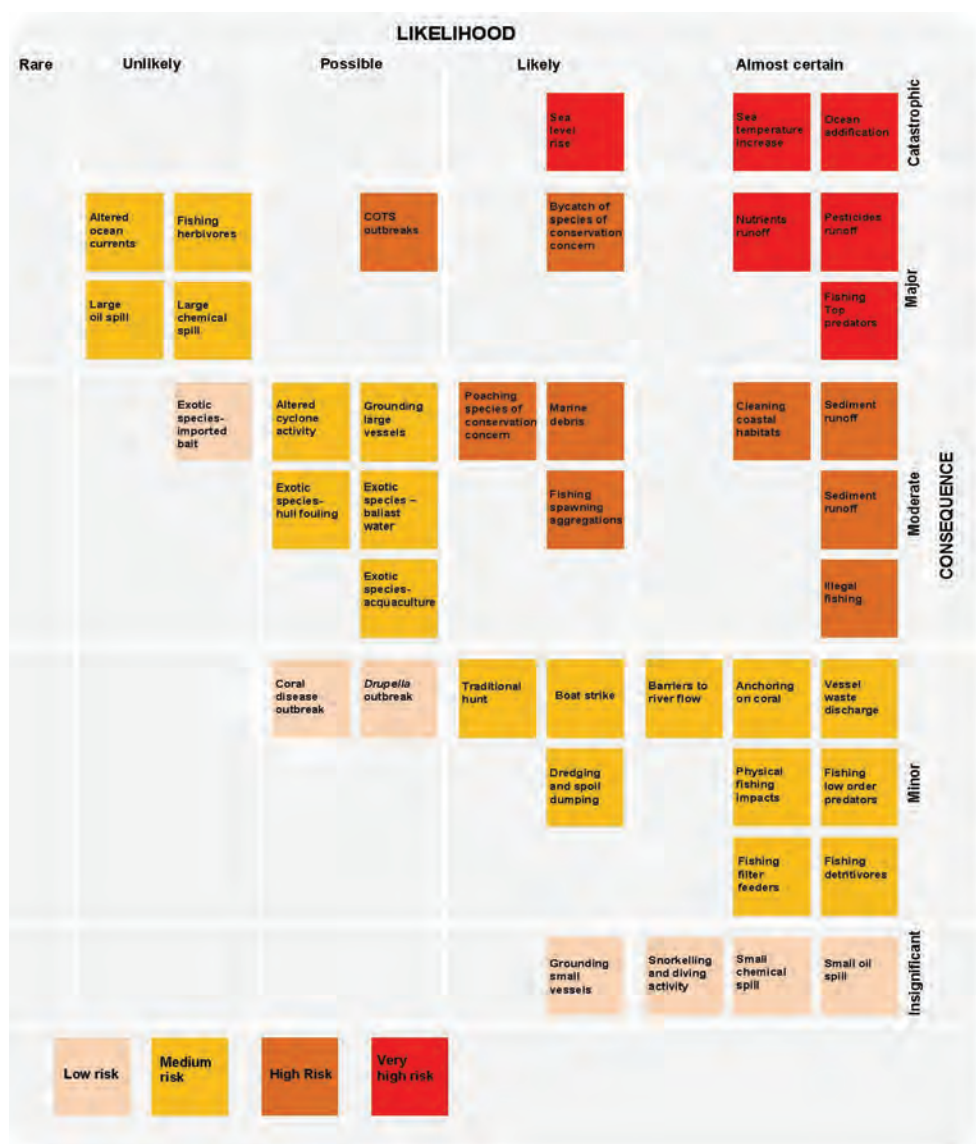
Rio Tinto Alcan

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• City / Town</li> <li>— River</li> <li>— Reef Flat</li> <li>— Indicative Reef Boundary</li> <li>— Great Barrier Reef Marine Park</li> <li>— Designated Shipping Area</li> <li>— Bauxite Shipping Route</li> <li>• Large Vessel Anchorage</li> <li>□ Small Vessel Anchorage</li> </ul> | <p><b>GBRMPA Zoning</b></p> <ul style="list-style-type: none"> <li>— General Use Zone</li> <li>— Habitat Protection Zone</li> <li>— Conservation Park Zone</li> <li>— Buffer Zone</li> <li>— Scientific Research Zone</li> <li>— Marine National Park Zone</li> <li>— Preservation Zone</li> </ul> |
|---|--|

South of Embley Project  
Fig. 11-1h: Shipping in  
Great Barrier Reef  
Marine Park  
(Gladstone)



**Figure 11-2 Risk Assessment of Threats to the Great Barrier Reef Ecosystem**



Source: GBRMPA (2009b)

## 11.3 Project-related Shipping Activities in the GBRMP

The only potential impacts on the GBRMP from the Project are considered to be those associated with domestic shipping activities, given the large distance from the Project area as described in **Section 11.1.2**. Export shipping activities would not enter the GBRMP and therefore are not further assessed. A detailed description of all Project-related shipping activities is provided in **Section 3.9**. A summary of the relevant Project-related shipping activities as they relate to the GBRMP is provided in the following sections.

### 11.3.1 Bauxite Shipping

Bauxite has been transported by bulk carrier from the Port of Weipa along the same shipping route to the Port of Gladstone for over 40 years. In 2015, prior to the commencement of shipments from the proposed 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 will be sailing from the Port of Weipa to the Port of Gladstone (i.e. 540 bauxite ship movements through the GBRMP per annum), with the remaining shipments likely to be to international ports (refer **Section 3.9.2.2**).

Bulk carriers from the Port of Weipa currently traverse the GBRMP from Cape York in the north to the Port of Gladstone in the south and follow the inner GBR Designated Shipping Area as illustrated in **Figure 11-1**. Alternative routes may be used in the event of emergency or by instruction from the Australian Maritime Safety Authority (AMSA).

All bulk carriers travelling between the Port of Weipa and the Port of Gladstone are Panamax or DPPV, as larger ships cannot navigate the Torres Strait. The Port of Gladstone is managed by the Gladstone Ports Corporation 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 aluminium refinery, and South Trees Wharf, servicing the Queensland Aluminium Limited aluminium refinery.

Under the maximum production scenario (50Mdtpa), up to 700 ships per annum are predicted to be loaded at the proposed Port and approximately 400 of these are predicted to be bound for export markets, not passing through the GBR. The remaining balance of an average of 300 predicted shipments per year (600 ship movements) is required to supply bauxite to the above-mentioned existing alumina refineries in Gladstone. The shipments through the GBRMP following commencement of Project bauxite 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. The maximum production scenario (50Mdtpa) would require a potential increase of 30 shipments per annum on average through the GBRMP (60 bauxite ship movements per annum), which 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 is regarded as ships under the GBRMP Regulations (refer **Section 11.2.1**).

## 11.3.2 SoE Other Shipping

### 11.3.2.1 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 would be required for construction. Of this, approximately 580,000 Revenue Tons of cargo 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).

Cargo deliveries required for construction would result in an annual average of 43 additional barge deliveries between Cairns and the Port of Weipa during the 30 to 36 month construction period. The Cairns to Weipa barge service traverses the GBRMP from the Port of Cairns in the south to Cape York in the north and follows the inner GBR Designated Shipping Area. The barge is owned and operated by a third party. An estimated 30 international chartered ship voyages (on average 11 per annum) are currently planned to offload at the Port of Weipa or direct to the Boyd Port area during the construction period. These would originate from the Asia Pacific region, and would not transit the GBR area. The balance of international freight would be shipped as containers and/or break bulk to major domestic ports utilising the existing services, and have not been treated as additional ocean traffic. There are no Project chartered shipments planned to arrive at the Port of Cairns at this stage.

The Cairns to Weipa barges are typically greater than 50m and are therefore regulated under the GBRMP Regulations. For the purposes of this assessment, it is assumed that all construction related cargo movements required for the Project would be greater than 50m and regarded as ships under the GBRMP Regulations.

Fuel supplies are likely to continue from the Port of Darwin and would not travel through the GBRMP; however, the source may change in future to another port depending upon arrangements managed by the supplier.

The Port of Cairns is located at 16°55.5'S latitude and 145°47'E longitude (outside GBRMP) and is operated by the Cairns Port Authority (CPA). Sea transport out of the Port of Cairns is used to provide vital supplies to the coastal communities north of Cairns as well as the Torres Strait Islands and the Gulf of Carpentaria, particularly during the wet season. The CPA provides services such as bunkering and sewage waste disposal.

### 11.3.2.2 Operations

**Section 3.9.1.2** and **Table 3-10** provide a summary of the deliveries of fuel, cargo and equipment that is estimated to be required during operations. Up to 26 cargo barge shipments per annum are estimated to be required at maximum production plus an estimated additional 20 shipments a year to provide for the predicted associated population increase, in addition to the approximately 104 cargo barge shipments per annum of existing deliveries.

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

## 11.3.3 Existing Shipping Activity

### 11.3.3.1 Inner GBR Designated Shipping Area

Approximately 9,700 ship movements from major GBR ports were reported to utilise the GBR shipping channels, with some 65-75% of these ship movements utilising the GBR inner Designated Shipping Area as at 2007 (GBRMPA 2009b). This equates to approximately 6,305 to 7,275 existing ship

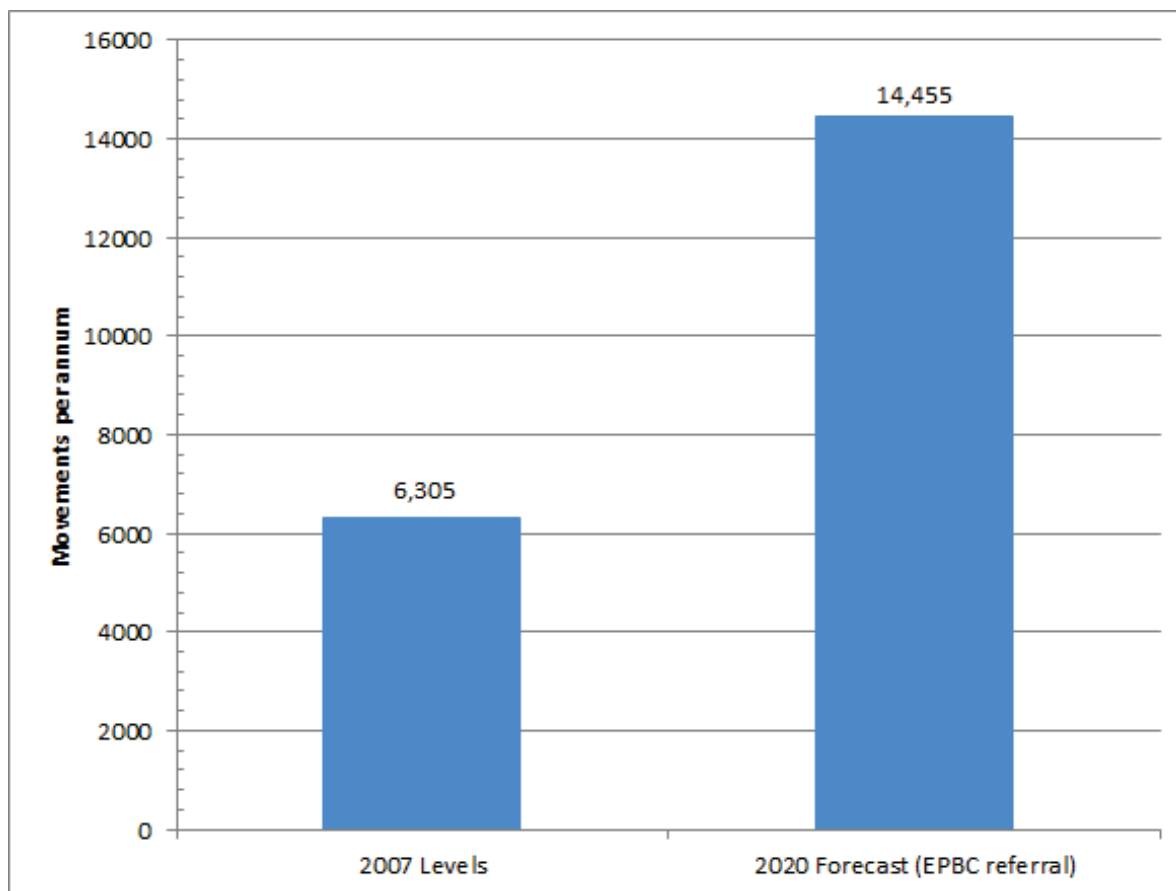


movements per annum in the inner GBR Designated Shipping Area. For the purposes of this assessment, the existing 2007 shipping levels utilising the inner GBR Designated Shipping Area is conservatively assumed at 6,305 movements per annum. The assumption is conservative in that the increment due to the Project is proportionally higher when the lower estimate for existing shipping is adopted.

Based on EPBC Act referral applications to DSEWPac for the Abbot Point, Hay Point, Gladstone and Townsville ports (Multiple Cargo Facility excluded), the *Ports and Shipping Information Sheet* (GBRMPA 2012b) provides a predicted shipping number of 11,119 shipments from these four ports through the GBR at 2020. For the purposes of this assessment, it is assumed that each of these vessels are regarded as ships under the GBRMP Regulations, each ship visits only one port adjacent to the GBR, each shipment results in two movements and 65% of ship movements utilise the inner GBR Designated Shipping Area (GBRMPA 2009a). Therefore, it is estimated that 14,455 ship movements per annum would utilise the inner GBR Designated Shipping Area at 2020, based on the above-mentioned assumptions.

The 2007 and predicted shipping levels through the GBRMP are illustrated in **Figure 11-3**. Based on this projection, the average annual growth from 2007 to 2020 would be 6.6%. Another recent projection by PGM Environment (2012) for the *Abbot Point Cumulative Impact Assessment* (Eco Logical and Open Lines 2012) estimated a combined annual growth rate of approximately 4.8% between 2012 and 2032 for all vessels calling at GBR ports.

Figure 11-3 Inner GBR Designated Shipping Area - Shipping Movements Per Annum



### 11.3.3.2 Port of Gladstone and Port of Cairns

MSQ reports some 3,000 vessel movements per annum (1,500 shipments per annum) utilising the Port of Gladstone (MSQ 2012).

The CPA reports some 30,000 vessel movements (of unspecified size) per annum in the Port of Cairns (CPA 2012).

## 11.3.4 Additional Shipping Activity

### 11.3.4.1 Construction Phase

A summary of the predicted average annual shipping movements through the GBRMP required during the construction phase of the Project is provided in **Table 11-1**.

**Table 11-1 Summary of Project Predicted Average Annual Shipping Movements on East Coast Queensland – Construction Phase**

Ship Movements	Other Shipping		Bauxite	Total
	Cargo Barge	Fuel*		
Existing – before Project	208	0	540	748
Additional – Construction Related Shipping	86	0	0	86
Total	294	0	540	834

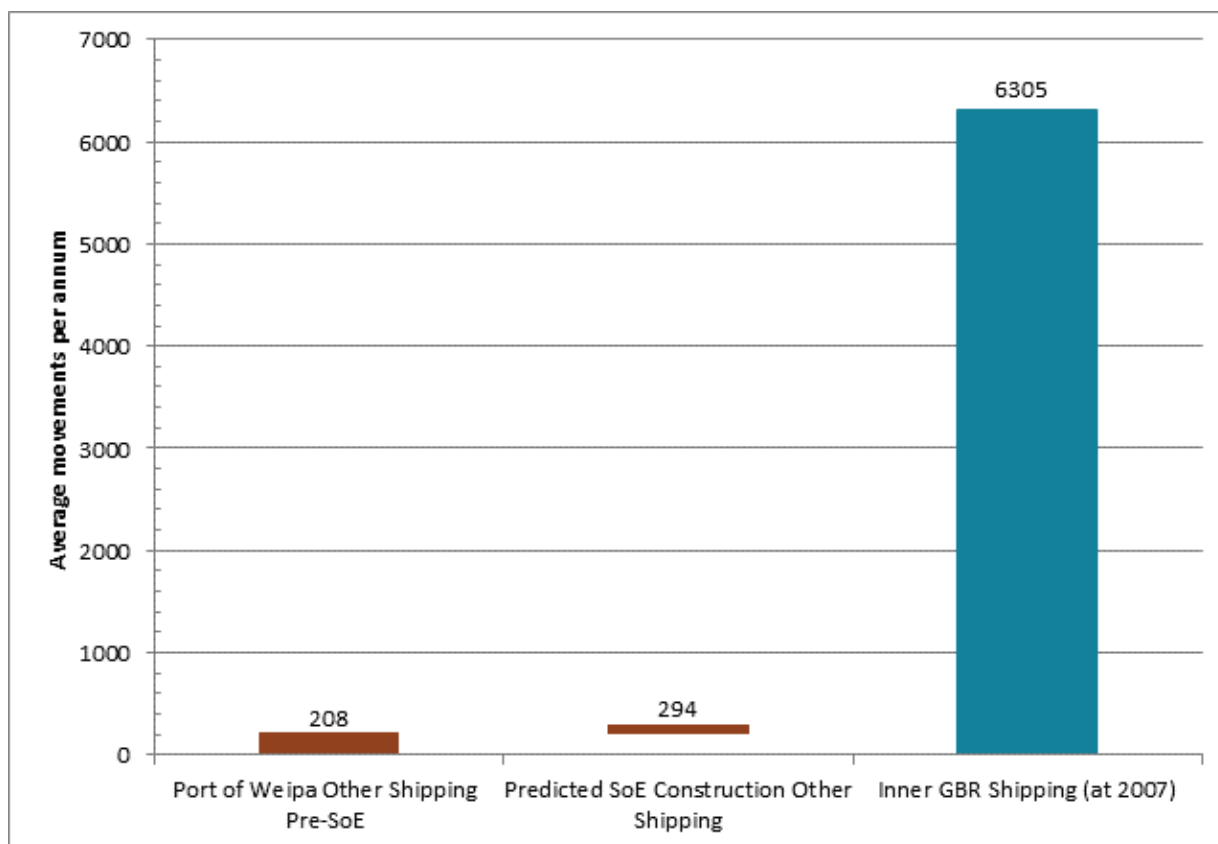
\* Existing fuel deliveries are from Darwin and do not travel through the GBR, it is assumed that the contractor continues to source fuel from Darwin.

Note: Actual shipping movements would depend on market conditions and size of ships.

Predicted cargo shipping movements associated with the Project during the construction phase compared to 2007 shipping levels in the inner GBR Designated Shipping Area are illustrated in **Figure 11-4**. The predicted additional construction-related shipping (an annual average of 86 additional cargo shipping movements per annum during construction) equates to approximately 1.4% of 2007 shipping levels in the inner GBR Designated Shipping Area.

Conservatively assuming all of the construction-related shipping originated from the Port of Cairns, the predicted additional construction shipping would represent approximately 0.3% of the CPA vessel movement figures in the Port of Cairns as at 2012.

Figure 11-4 Construction Other Shipping Movements Compared to 2007 levels



#### 11.3.4.2 Operations

A summary of the predicted average annual shipping movements required through the GBRMP during the operational phase of the Project is provided in **Table 11-2**.

Table 11-2 Summary of Project Predicted Average Annual Shipping Movements on East Coast Queensland – Operations

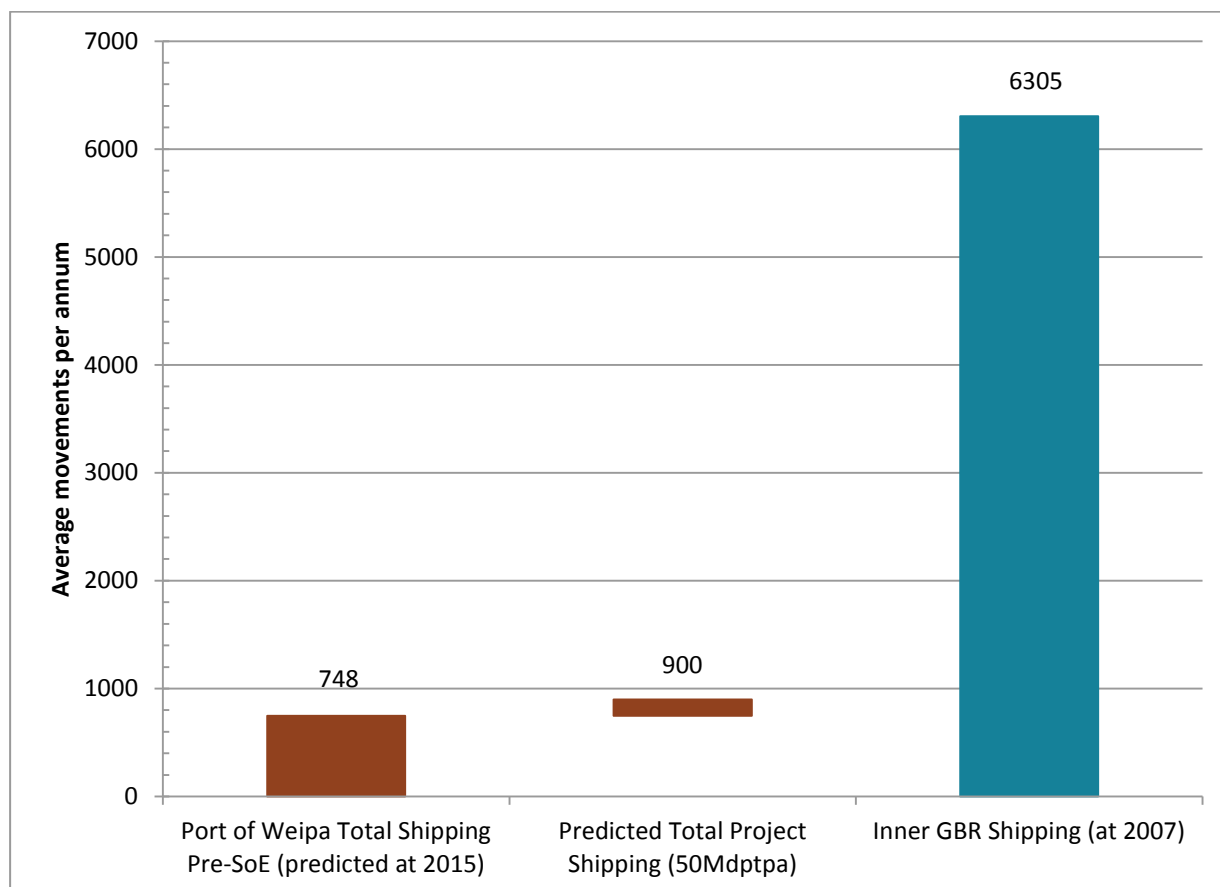
Ship Movements	Other Shipping		Bauxite	Total
	Cargo Barge	Fuel*		
Existing – before Project	208	0	540	748
Additional – Project Maximum Production	92	0	60	152
Total	300	0	600	900

\* Existing fuel deliveries are from Darwin and do not travel through the GBR, it is assumed that the contractor continues to source fuel from Darwin.

Note: Actual shipping movements would depend on market conditions and size of ships

Predicted operational bauxite and cargo shipping movements associated with the Project compared to 2007 shipping levels in the inner GBR Designated Shipping Area are illustrated in **Figure 11-5**. The predicted additional operational shipping (152 movements per annum) equates to approximately 2.4% of 2007 shipping levels in the inner GBR Designated Shipping Area. The predicted additional bauxite shipping (60 movements per annum) equates to approximately 1% of 2007 shipping levels in the inner GBR Designated Shipping Area.

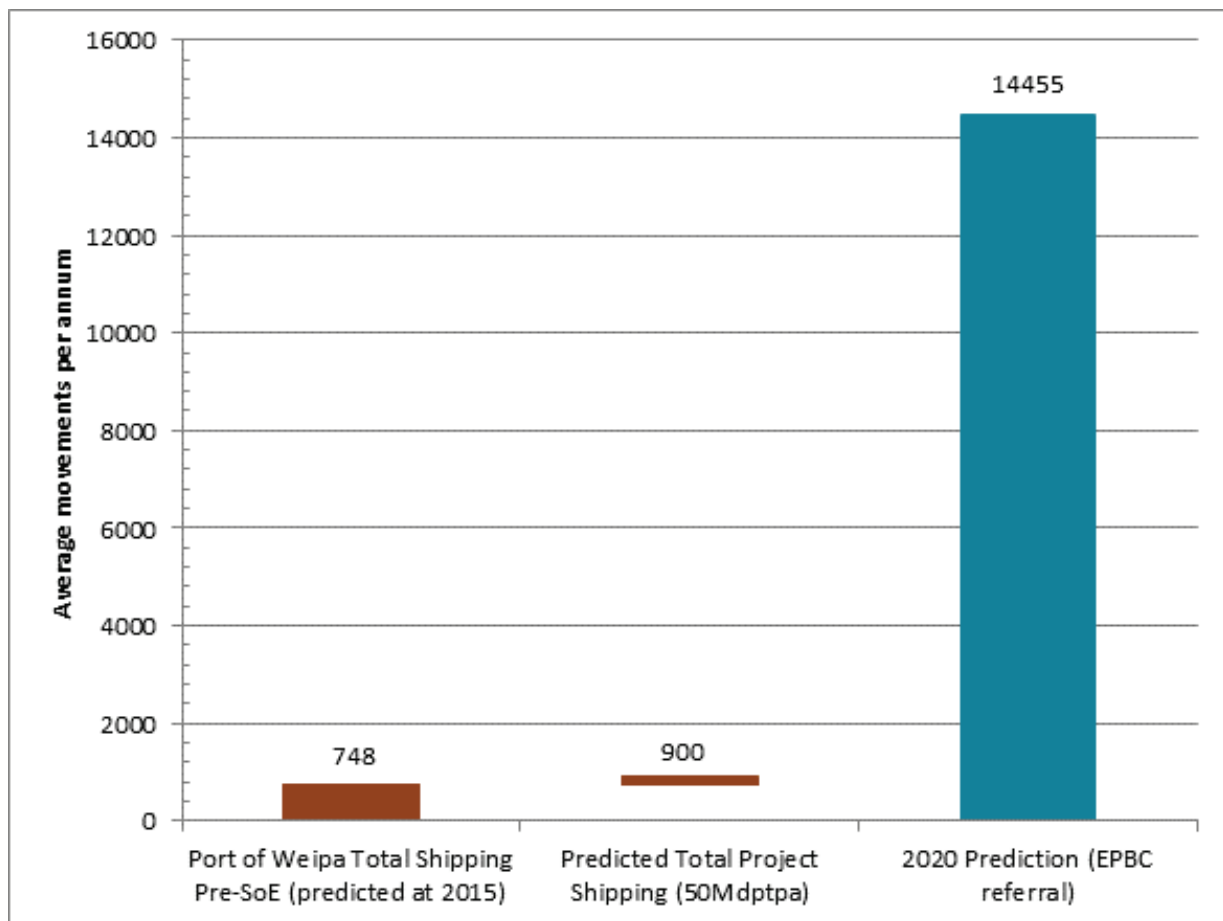
**Figure 11-5 Total Operational Shipping Movements Compared to 2007 Levels**



Predicted operational bauxite and cargo shipping movements associated with the SoE Project compared to predicted shipping numbers at 2020 (GBRMPA 2012b) in the inner GBR Designated Shipping Area are illustrated in **Figure 11-6**. The predicted additional operational bauxite and cargo shipping (152 movements per annum) equates to approximately 1.0% of the estimated 14,455 ship movements in 2020 in the inner GBR Designated Shipping Area. The additional predicted bauxite shipping would represent approximately 0.4% of estimated shipping movements in the inner GBR Designated Shipping Area at 2020. The Project's total predicted ship movements (bauxite and cargo) of 900 would represent 6.2% of the estimated 2020 ship movements through the inner GBR Designated Shipping Area.



Figure 11-6 Total Operational Shipping Movements Compared to Long Term Forecast



Conservatively assuming all of the cargo barges originated from the Port of Cairns (300 movements per annum), the predicted additional operational bauxite and cargo shipping would represent approximately 0.9% of the CPA vessel movement figures in the Port of Cairns as at 2012.

The additional predicted bauxite ship movements (60 movements per annum) are all destined for the Port of Gladstone. The additional predicted operations shipping would represent approximately 2% of the MSQ vessel movement figures in the Port of Gladstone as at 2012.

## 11.4 Potential Impacts

The following subsections provide an assessment of the relevant impacts of the Project activities identified in **Section 11.3** on the GBRMP. The *Significant Impact Guidelines* (refer **Section 11.2.3**) 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.

An environmental management plan outline for the GBRMP which summarises safeguards, avoidance and measures is provided in **Appendix 11-A**.

### 11.4.1 Marine Ecosystem Health, Function or Integrity

In relation to marine ecosystem health function or integrity, the Significant Impact Guidelines requires an assessment of the potential for an activity to:

*“Modify, destroy, fragment, isolate or disturb an important, substantial, sensitive or vulnerable area of habitat or ecosystem component such that an adverse impact on marine ecosystem health, functioning or integrity in the GBRMP results...”*

#### 11.4.1.1 Potential Project-related Shipping Impacts

Project-related bauxite and cargo shipping would continue to use the existing inner GBR Designated Shipping Area utilised by existing Weipa bauxite and cargo shipping.

No listed threatened ecological communities are likely or known to occur within the inner GBR Designated Shipping Area (refer **Section 4.5.2**). While the GBRMP contains many areas of important, substantial, sensitive or vulnerable areas, the inner GBR Designated Shipping Area is defined in the Zoning Plan to enable this important economic activity to coexist within the GBRMP.

Bauxite shipping would only use existing designated anchorage areas when waiting for berthing at the Port of Gladstone. The designated anchorage area is mostly located within the GBRMP (refer **Figure 3-10**) and partly within the Port of Gladstone limits. The designated anchorage area within the GBRMP is located entirely within the inner GBR Designated Shipping Area.

The potential for Project-related shipping activities (including additional shipping movements at maximum production) to directly modify, destroy or fragment an important habitat and impact upon the marine ecosystem health, function or integrity of the GBRMP would be from the physical effects of collision or grounding. However, in over 40 years of bauxite shipping from Weipa to Gladstone, there has been no reported collision or grounding incidents that have resulted in environmental harm in the GBRMP. The proponent is not aware of any incidents that have resulted in environmental harm in the GBRMP associated with third party ships that would be used for cargo shipping.

An assessment of the potential increase in risk of collision or grounding associated with the potential small increase in Project-related shipping movements against the shipping related threats and existing risks of these threats identified by GBRMPA (2009b) is provided in **Section 18.4.2.3**. The grounding of a large vessel has been assessed by GBRMPA as being a medium risk of impact to the GBR ecosystem on the basis that it would have moderate consequences and possible likelihood (GBRMPA 2009b). However, it is noted that since the introduction of ReefVTS in 1996, groundings in the GBR have reduced from an average rate of 1 per year to 0.16 per year, which includes vessels of all sizes, despite increases in shipping traffic over that period.

The conclusion made in **Section 18.4.2.3** was that the small potential increase in Project-related shipping compared to existing shipping levels and continued use of existing control measures would

not change the likelihood or consequence of grounding of a large vessel as assessed by GBRMPA. Accordingly, the small potential increase in shipping movements is not likely to increase the GBRMPA risk assessment risk category of collision or grounding.

The potential for indirect impacts from fuel spills and waste disposal associated with Project-related shipping activities is discussed in **Section 11.4.4**.

Based on the above assessment, the potential unmitigated impacts associated with Project-related shipping activities on marine ecosystem health, function or integrity of the GBRMP would be negligible and long term.

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

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

- using the existing shipping route which traverses the Designated Shipping Area of the GBRMP;
- for vessels over 70m in length using a pilot when transiting through the inner route of the GBRMP to the north of Cairns and the compulsory pilotage areas of the Torres Strait. All ships would have a minimum of one local pilot on board through the Port of Gladstone, with pilotage commencing at the Fairway Buoy. 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 (bauxite shipping);
- using a real-time global positioning system referred to as the AIS for vessels over 50m, which is integrated with the ReefVTS. The ReefVTS compiles timely and accurate traffic imaging of shipping throughout the region and generates ship encounter predictions, which are disseminated to ships; and,
- maintaining a modern fleet of bauxite ships 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 during berthing operations.

The ReefVTS was implemented in 1996 to increase navigational safety within the area north of Gladstone to the Torres Strait. Under this system, all ships over 50m in length, special product carriers, and certain ships under tow, have systems requiring mandatory position reporting at specific points along the inner GBR Designated Shipping Area and automated position reporting via satellite. The reporting system is integrated with a system of navigation aids including VHF radio, radar monitoring and a network of differential global positioning systems and Automatic Identification System stations situated throughout the GBRMP. Automated Position Reporting via Inmarsat C is now the primary means for ships to provide position reports.

Since the introduction of ReefVTS in 1996, groundings in the GBRMP have reduced from an average rate of one per year to 0.16 per year.

In addition, any relevant requirements associated with the 'best practice guidance for shipping management' proposed in the Commonwealth Government's report to the WHC (Australian Government 2013, refer **Section 4.5.1.2**) outlining the state of the GRB would be implemented once this guidance has been produced.

### 11.4.2 Marine Species

For marine species in the GBRMP, the Significant Impact Guidelines requires an assessment of the potential for the activity to:

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

#### 11.4.2.1 Potential Project-related Shipping Impacts

The Project-related bauxite and cargo shipping would continue to use the existing inner route through the GBRMP via the Designated Shipping Area utilised by existing Weipa bauxite and cargo shipping.

An assessment of the likelihood of significant impacts on listed threatened marine species and migratory species associated with Project-related shipping activities is provided in **Section 4.5.3**. The assessment determined the likelihood of impacts to each identified listed threatened marine and migratory species from Project-related shipping activities would be either rare or unlikely and therefore no further assessment is required.

Notwithstanding this, the following aspects of Project-related shipping within the GBRMP have the potential to impact on listed threatened marine and migratory species:

- artificial lighting on ships;
- acoustic impacts from shipping noise; and/or,
- vessel strike.

The potential impacts on listed threatened marine species and migratory species in the GBRMP associated with these aspects are assessed in the following sections.

#### *Artificial lighting*

Ships must display lighting at night to ensure they are visible to other shipping traffic. This includes lighting that indicates the travelling direction of the ship and manoeuvrability. The requirements for ship lighting including colour, intensity and location, are prescribed in the International Regulations for *Preventing Collisions at Sea 1972* (COLREGS) and are given effect in Queensland through the *Transport Operations (Marine Safety) Regulations 2004*.

Artificial lighting has the potential to impact on marine fauna that are active at night through disorientation, attraction or repulsion, disruption to natural foraging and/or breeding behaviour patterns.

With the exception of anchorage, Project-related bauxite and cargo shipping would be mobile while within the GBRMP. Therefore, the majority of lighting associated with predicted Project-related bauxite and cargo shipping movements would be offshore and not in close proximity to marine turtle rookeries or shallow water breeding areas. After they enter the water, marine turtle hatchlings are increasingly influenced by wave motion and magnetic fields, meaning that lighting from ships offshore are unlikely to cause disorientation of hatchlings.

As discussed in **Section 11.4.1**, anchorage would be provided at the existing designated anchorage area at the Port of Gladstone for bauxite shipping. This anchorage is mostly located within the GBRMP. Where it is within the GBRMP, it is entirely located within the inner GBR Designated Shipping Area. The Project would involve a small potential increase in the number of bauxite shipping movements (30 shipments per annum) at maximum production within the Port of Gladstone (which



had 1,500 shipments per annum as at 2012). This small potential increase is unlikely to significantly impact on marine species from lighting from ships.

Based on the above assessment, the potential unmitigated impacts associated with artificial lighting from Project-related bauxite or cargo shipping activities on marine species within the GBRMP would be negligible and long term.

### *Underwater Noise*

Low frequency noise (5-500Hz) from shipping has the potential to elevate ambient underwater noise levels. Minimal data is available relating to the sensitivity of marine species to shipping noise.

Dugongs are reported to produce relatively low-level underwater vocalisations, producing sounds (described as whistles, chirps and chirp-squeaks) in middle-range frequencies (1kHz to 8kHz) (Richardson *et al.* 1995). The hearing capabilities of marine turtles are also poorly understood. Hearing measurements made for a limited range of species indicate that marine turtles generally hear best at low frequencies and that the upper frequency limit of their hearing is likely to be about 1kHz.

Similar to lighting, Project-related bauxite and cargo shipping would be mobile through the GBRMP, traversing the inner GBR Designated Shipping Area (with the exception of anchorage). Any noise emissions from Project-related bauxite and cargo shipping activities in the GBRMP would be of short duration and not significantly contribute to noise emissions from existing shipping movements. Anchorage would occur at the dedicated anchorage locations. Noise levels at anchorage would generally be limited to above-water.

Based on the above assessment, the potential unmitigated impacts associated with noise from Project-related bauxite and cargo shipping activities on marine species within the GBRMP would be negligible and long term.

### *Vessel strikes*

Ships have the potential to collide with marine fauna during transit. The type of marine species potentially impacted by vessel strike can be categorised into shallow water or pelagic species and deep water species.

Shallow water and pelagic species, such as marine turtles and Dugongs are typically found in higher densities in shallow areas where there is suitable feeding substrate such as algae growing on coral reefs, seagrasses and for breeding. Dugongs are also associated with shallow seagrass areas.

The QPWS stranding database recorded three Dugongs being struck in the GBR between 1996 and 2001 (GBRMPA 2012a). The QPWS stranding and mortality database annual reports 2002 to 2010 recorded a further seven Dugongs with evidence of vessel strike in the region. These seven Dugongs generally washed ashore or were discovered floating dead so it is not possible to locate precisely where the incident occurred. Conservatively assuming that these incidents occurred in the GBR, this would equate to a frequency of 0.66 Dugong strikes per annum during this period in the GBR (a larger area than the GBRMP).

Deep water species include larger cetaceans such as whales and dolphins. Humpback Whales migrate each winter into the GBR. Whales, including cow and calf pairs, may rest in the Whitsundays, Hervey Bay, Moreton Bay, the Swain Reefs complex, Bell Cay and the Palm Island Group. In the GBR, Dwarf Minke Whales have been recorded from north of Lizard Island to the Swains Reefs, with 80% of sightings in June and July. Usually only one or two cow and calf pairs are seen in the GBR per

season. Dwarf Minke Whales are highly manoeuvrable, and can jump from the water and swim in bursts of 12 knots (CRC Reef Research Centre 2002).

The International Whaling Commission (IWC) maintains a database of whale strikes which lists a total of 38 reported vessel strikes of whale species in Australia between 1988 and 2009. Based on the descriptions of the 11 reported strikes which occurred within the GBRWHA boundary (a slightly larger area than the GBRMP) during these years, nine could be attributed to faster moving recreational, tourism vessels or other vessels less than 50ft in length. The remaining two strikes list the vessel type as unknown and a large commercial vessel. Conservatively assuming the unknown vessel strike was a large commercial vessel, there were two strikes in 21 years between 1988 and 2009, which equates to approximately 0.095 whale strikes per annum from large commercial vessels in the GBRWHA. The IWC notes that most reports of collisions involve large whales as collisions often either go unnoticed or unreported for the smaller species. The QPWS stranding and mortality database recorded 11 strikes or sightings of cetaceans with boat injuries in the GBR in the period 2000 to 2007. The difference in numbers between the databases is likely due to the IWC database containing only records reported by the striking vessel, where the QPWS database contains reports of all cetaceans (live and dead) with evidence of vessel strike. Although the location of cetacean sightings does not necessarily correlate with the location of the strike, it has been conservatively assumed that the strikes occurred in the GBR. This would equate to a frequency of 1.38 cetacean strikes per annum during this period in the GBR.

Other smaller cetaceans such as dolphins are highly mobile. Dolphin species in particular co-exist with coastal development including extensive port facilities (Hale *et al.* 1998). For example, the most important area for Indo-Pacific Humpback Dolphins in Moreton Bay is the Port of Brisbane (Hale *et al.* 1998). Indo-Pacific Humpback Dolphins and Australian Snubfin Dolphins are also associated with port infrastructure at Cleveland Bay, Townsville (Parra 2006). Bottlenose Dolphins inhabit inshore areas where significant amounts of recreational vessel and commercial water-based activities occur, including Moreton Bay (Chilvers *et al.* 2005), Richmond and Clarence Rivers (NSW) (Fury and Harrison 2008), Port Stephens and Jervis Bay (NSW) (Moller *et al.* 2002).

The risk of large bauxite ships and cargo barges colliding with dolphins is considered unlikely as dolphins are highly manoeuvrable. The risk of large bauxite ships and cargo barges colliding with whales is greater because whales less manoeuvrable and reported strikes that cause fatal or serious whale injuries are mostly associated with larger ships. However, most injuries to marine species involve collisions with vessels less than 45m (Laist *et al.* 2001).

Vessel strikes generally occur when there is a large number of fast, small vessels (e.g. less than six metres long) operating in shallow water where avoidance behaviour by marine fauna is effectively reduced. Speed appears to be a key issue affecting the frequency of incidents. Laist *et al.* (2001) determined that 89% of vessel strikes examined involved vessels travelling in excess of 14 knots.

Project-related bauxite and cargo shipping activities have the potential to interact with deep water species in the GBRMP. The type of shipping to be used to carry construction materials, general cargo, fuel and bauxite has travelled to/from Weipa via the same route since 1963 and there have been no reported incidents of vessel strike in over 40 years of shipping. Slow moving displacement ships such as bulk carriers, barges and tugs pose a low vessel strike risk.

Based on the above assessment, the potential unmitigated impacts associated with vessel strike from Project-related shipping activities on marine species within the GBRMP would be negligible and long term.

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

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

- using the Designated Shipping Area of the inner GBRMP;
- vessels, including on board machinery and equipment, would be maintained to a high standard and any source of excessive underwater noise would be investigated and remedied;
- continued use of bulk carriers, barges and tugs which are slow moving; and,
- the ship master of bauxite vessels has the ability to take avoidance action, such as reducing speed, if marine megafauna such as whales are spotted or reported in their path. Any incident involving a bauxite ship striking a marine mammal would be investigated and reported to EHP as required.

#### **11.4.3 Changes in Air Quality**

In relation to changes in air quality, the Significant Impact Guidelines requires an assessment of the potential for the activity to:

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

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

Cargo barges would carry cargo in containers. Bulk carriers transport bauxite as a covered cargo. Loading of bauxite occurs near Weipa, over 270km from the GBRMP. Unloading of bauxite occurs at the Port of Gladstone, outside the GBRMP. This would continue to be the case for bauxite shipping. Therefore dust emissions from loading/unloading of bauxite ships would not directly or indirectly impact on the GBRMP.

The exhaust from bulk carriers includes particulates and SO<sub>x</sub> and NO<sub>x</sub>, generated by the ship engines.

The small potential increase in cargo barge and bauxite ship movements in the GBRMP would create negligible additional emissions.

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

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

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

The shipping fleet that would be used for bauxite shipping is modern; therefore emissions of NO<sub>x</sub> would be lower than an older fleet. New build ships would be required to meet the limits imposed by IMO based on the year they were constructed.

The sulphur content of ship exhausts varies considerably based on the fuel type used. The *International Convention on Prevention of Pollution from Ships 1973/1978* (MARPOL) Annex VI – Air was amended over recent years to include provisions for progressive reduction in the allowable concentration of sulphur in bunker fuels. From 1 January 2012, the sulphur content of fuel oil is not to exceed 3.5%. Ships used for bauxite shipping (including those that would be utilised by the Project) utilise heavy fuel oil with a sulphur content not exceeding 3.5%.

The ship operation plans for bauxite shipping (including those that would be utilised by the Project) include the requirement for notification of the engine room if any excessive funnel smoke is observed so that immediate action may be taken to rectify the situation.

The deliberate emission of ozone depleting substances, such as certain refrigerant gases, is entirely prohibited under MARPOL Annex VI. Refrigerated cargo spaces are not used on bauxite ships (including those that would be utilised by the Project) and therefore there would not be any accidental discharge of ozone depleting substances.

#### 11.4.4 Changes in Water Quality

In relation to changes in water quality, the Significant Impact Guidelines requires an assessment of the potential for the project to:

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

##### 11.4.4.1 Potential Project-related Shipping Impacts

As discussed in **Section 11.4.3**, the cargo transported in bauxite and cargo shipping would be contained or covered. Loading and unloading of bauxite would continue to occur outside the GBRMP. No discharges of any garbage, bilge water or sewage from Project-related bauxite shipping would occur in the GBR.

Potential impacts on water quality in the GBRMP as a result of Project-related bauxite and cargo shipping activities may include:

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

The potential impacts on water quality in the GBRMP associated with these aspects are assessed in the following sections.

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

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 in the GBRMP that have resulted in environmental harm. Project-related shipping activities including the small potential increase in bauxite ship and cargo barge movements associated with the Project at maximum production is not likely to increase the risk of collision or grounding in the GBRMP (refer **Section 11.4.1.1**).

The GBRMPA's region wide assessment of risks to the GBR identified the risk of large oil spills as a medium risk but unlikely to occur (refer **Section 11.2.2**). Existing management arrangements and the use of Designated Shipping Areas have resulted in very few incidents. Project-related shipping through the GBRMP 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 from Project 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 existing 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 5m<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 GBRMP. 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%) (refer to **Section 11.3.4.2** for Project operational shipping numbers through the GBRMP). 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 GBRMP 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 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 (**Section 6.9.2.9** of the Queensland EIS (RTA 2011)).

Based on the above information it is considered that the potential unmitigated impact on the GBRMP from a cargo, oil or fuel spill associated with Project-related bauxite and cargo shipping activities would be negligible and short term.

### *Propeller wash*

Project-related bauxite and cargo ships are unlikely to elevate turbidity in the GBRMP as Project-related bauxite and cargo ships would continue to utilise the inner GBR Designated Shipping Area. Therefore, the potential unmitigated impacts associated with propeller wash from Project-related bauxite and cargo shipping activities on water quality within the GBRMP would be negligible and long term.

## *Anchorage*

Existing Weipa bauxite shipping takes anchorage at the Port of Gladstone at the designated anchorage area located partly within the GBRMP and the Designated Shipping Area. The small potential increase in bauxite shipping at maximum production would continue to use this designated anchorage area. Potential impacts on water quality in the GBRMP are considered to be negligible and long term given the area is already widely used.

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

No specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related bauxite and cargo shipping activities on water quality in the GBRMP has been assessed as negligible. However, a number of existing measures as discussed in **Section 11.4.4.1** would continue to be used.

## **11.4.5 Marine Pest Establishment**

In relation to marine pest establishment, the Significant Impact Guidelines requires an assessment of the potential for the activity to:

*"...result in a known or potential pest species being introduced or becoming established in the GBRMP..."*

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

Existing Weipa bauxite and cargo shipping have traversed the same route for over 40 years. The Project would relocate the origin of bauxite shipments from the Port of Weipa to the proposed Port between Boyd Point and Pera Head (refer **Figure 3-8**). There would be the potential for a small increase in bauxite ship and cargo barge movements in the GBRMP at maximum production (refer **Section 11.3**).

No marine pest species have become established at the Port of Weipa (PCQ 2007). Therefore the translocation of marine pests to the GBRMP from Project-related shipping activities is considered to be a low risk.

Ships without cargo typically take on ballast to keep the ship upright. Some or all of this ballast is discarded when the cargo is loaded. The release of ballast would typically occur at the proposed Port, which is a considerable distance from the GBRMP. The risk of introducing marine pests from ballast discharged from Project-related ships into the GBRMP is therefore considered negligible.

Loaded construction-related cargo barges would travel in the opposite direction to loaded bauxite ships. Ballast from these vessels would typically be released at port outside the GBRMP. No introduced species have been found outside of ports along the GBR coastline (GBRMPA 2009b).

No international shipping or fuel shipping associated with the Project would traverse the GBRMP.

Based on the above assessment, the potential unmitigated impacts associated with Project-related shipping activities on marine pest establishment in the GBRMP would be negligible and long term.

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

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

- all bauxite shipping would 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);
- the majority of ships travelling through Torres Strait and the GBRMP would travel only on domestic routes, and would not be collecting ballast water outside Australia or being exposed to foreign species that may foul the ship hull;
- under amendments to the *Quarantine Act 1908* (Cth) in 2001, ships are required to exchange a minimum of 95% of ballast water outside the Australian territorial sea, as far as possible from land and in water exceeding 200m depth, where possible;
- discharge of ballast water (and sediment in ballast tanks) within the territorial sea of Australia is prohibited by AQIS where it has been derived from ports or coastal waters outside Australian territorial waters;
- anti-fouling coating systems would be applied to exposed surfaces of bauxite vessels, 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; and,
- the bauxite shipping schedule would be managed as best as possible to minimise queuing and delay at anchor.

In addition, any relevant requirements associated with the 'best practice guidance for shipping management' proposed in the Commonwealth Government's report to the WHC (Australian Government 2013, refer **Section 4.5.1.2**) outlining the state of the GRB would be implemented once this guidance has been produced.

#### 11.4.6 *Accumulation of Potentially Harmful Chemicals*

In relation to accumulation of potentially harmful chemicals, the Significant Impact Guidelines requires an assessment of the potential for the activity to:

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

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

It is unlikely that persistent organic chemicals, heavy metals, or other potentially harmful chemicals from Project-related shipping would accumulate in the GBRMP 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. The only contaminants that could potentially be introduced to the GBRMP



might be associated with oil/fuel spills or antifouling paints from Project-related ships. However, these contaminants would be unlikely to be present in concentrations sufficient to cause environmental harm.

An assessment of oil/fuel spills was undertaken in **Section 11.4.1**. Antifouling paint historically contained the biocide TBT however this product is now banned in Australia and most parts of the world.

The potential unmitigated impacts from Project-related bauxite and cargo shipping activities on the accumulation of potentially harmful chemicals within the GBRMP would be negligible and long term.

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

No specific safeguards, avoidance or mitigation measures are required as the potential unmitigated impact from Project-related bauxite and cargo shipping activities on the accumulation of potentially harmful chemicals within the GBRMP has been assessed as negligible. However, there are a number of mitigation measures that are used for existing Weipa bauxite and cargo shipping activities outlined in **Sections 11.4.1.2** and **11.4.5.2** that would continue to be used for Project-related bauxite and cargo shipping activities which would further reduce these potential impacts.

### **11.4.7 Heritage Values of Great Barrier Reef Marine Park**

In relation to heritage values of the GBRMP, the Significant Impact Guidelines requires an assessment of the potential for the activity to:

*“...have a substantial adverse impact on heritage values of the GBRMP, including damage or destruction of an historic ship wreck.”*

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

The heritage values of the GBRMP are assessed in **Section 12** and **Section 13**. Several shipwrecks are known to occur in the general vicinity but not within the shipping route. Any shipping hazards are recorded on navigation charts.

The Designated Shipping Area was dedicated under the Zoning Plan in recognition of the importance of shipping within the inner GBRMP and to avoid its most sensitive areas. The potential additional shipping associated with the Project at maximum production represents a small percentage of the total ship movements in the GBRMP.

The potential unmitigated impacts from Project-related shipping activities on the heritage values of the GBRMP would be negligible and long term.

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

No specific safeguards, avoidance or mitigation measures are required as the potential unmitigated impact from Project-related bauxite and cargo shipping activities on the heritage values of the GBRMP has been assessed as negligible. Existing Weipa bauxite and cargo shipping traverses the GBRMP through the inner GBR Designated Shipping Area. Project-related bauxite and cargo shipping would continue to use this route. Sophisticated real-time monitoring systems are used to track ships over 50m traversing the inner GBR Designated Shipping Area, referred to as ReefVTS. The use of such measures is a proactive tool to prevent ships travelling off-course and to avoid collisions from other ships. These systems would continue to be used on Project-related bauxite and cargo shipping.

## 11.5 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 11.4** of this report documents the results of the impact assessment process and concludes that the unmitigated impacts associated with Project-related shipping activities on the GBRMP would be negligible (the residual impacts with mitigation would remain the same) and therefore not significant. As such, offsets relating to the GBRMP are not required under the Commonwealth offsets policy.

## 11.6 Conclusion and Summary of Residual Impacts

Project-related bauxite and cargo shipping would continue to traverse the GBRMP via the same route through inner GBR Designated Shipping Area as existing Weipa bauxite and cargo shipping. The small proportion of total Project-related shipping movements, particularly taking into consideration the small potential increase in Project-related bauxite and cargo shipping movements at maximum production, in the GBRMP relative to existing and forecast levels is assessed as having a negligible impact on the GBRMP. Given this, short and long term impacts do not require further consideration and no offsets are required.

While no safeguards, avoidance or mitigation measures are specifically required, there are a number of control measures used by existing shipping activities that would continue to be used for Project-related bauxite and cargo shipping.