

Section 12

World Heritage Area





12 World Heritage Area

12.1 Introduction

This section addresses the World Heritage property aspects of the Tailored EIS Guidelines. The Great Barrier Reef World Heritage Area (GBRWHA) was identified as one of the controlling provisions for the Project (refer **Section 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 GBRWHA has been made in accordance with the Tailored EIS Guidelines.

The GBRWHA was the first coral reef ecosystem in the world to be inscribed on the World Heritage List in 1981, due to its "Outstanding Universal Values" (OUV). A property included in the World Heritage List is a declared World Heritage Property under Section 13(1) of the EPBC Act.

The GBRWHA is slightly larger (one per cent) than the GBRMP (refer **Section 11.1**). As shown in **Figure 2-3**, the main difference 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 *Seas and Submerged Lands Act 1973* (Cth). The boundaries of the GBRWHA are shown in **Figure 12-1**.

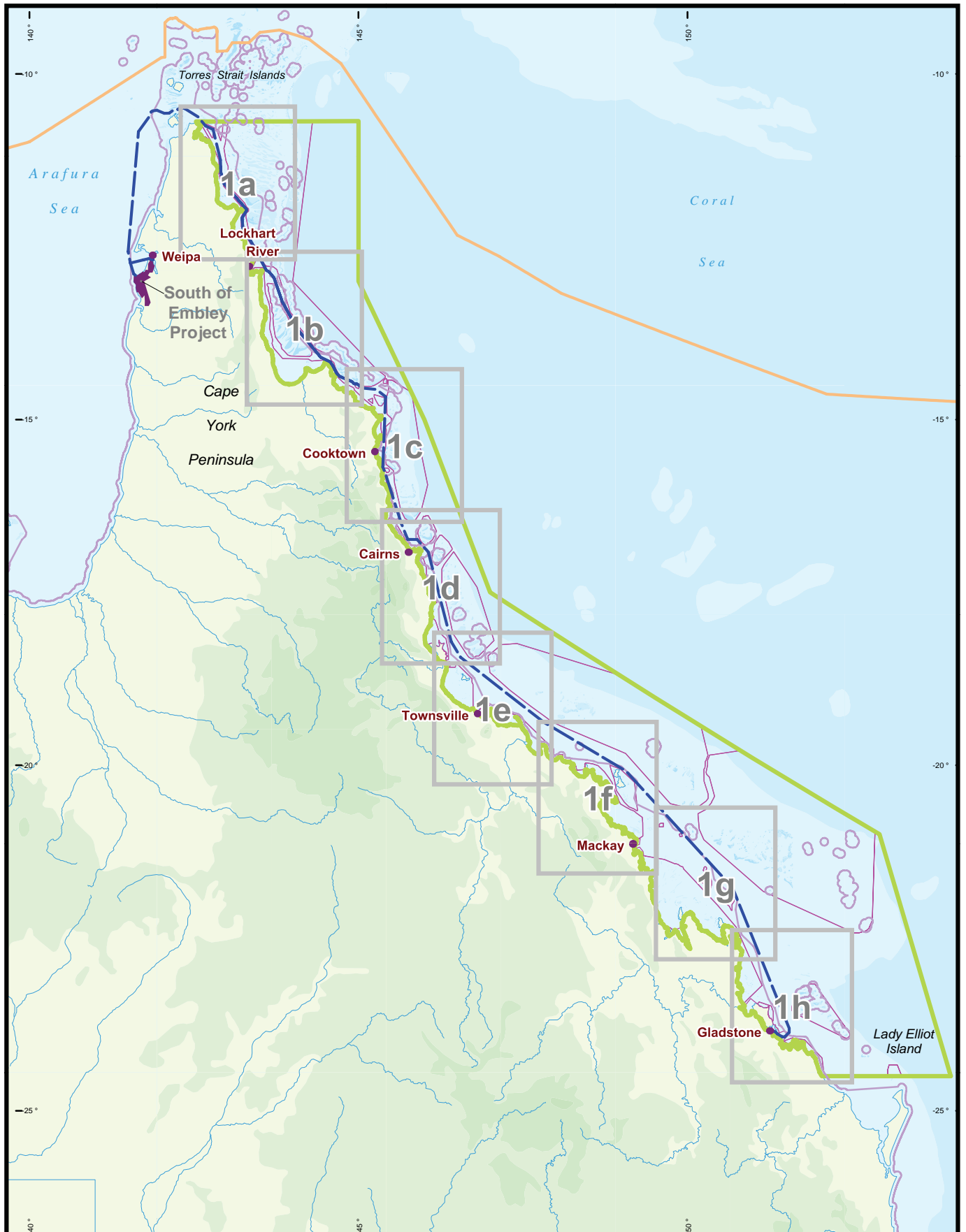
12.1.1 General Structure of the Section

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

- a description of the World Heritage property;
- identification of those aspects of the World Heritage property likely to be impacted by the proposal;
- 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 to address these requirements as follows:

- **Section 12.2** provides an overview of the values of the GBRWHA;
- **Section 12.3** describes the construction and operational aspects of the proposed action that are relevant to the GBRWHA;
- **Section 12.4** assesses the potential impacts of the proposal on the values of the GBRWHA; and,
- **Section 12.5** provides a summary of any residual impacts and draws conclusions from the assessment.



Rio Tinto Alcan

- Project Area
 - City / Town
 - River
 - Great Barrier Reef World Heritage Area
 - Coastal Waters (3 nautical mile limit)
 - Exclusive Economic Zone (200 nautical mile limit)
 - Designated Shipping Area
 - Bauxite Shipping Route
- 1a MapSheet Index

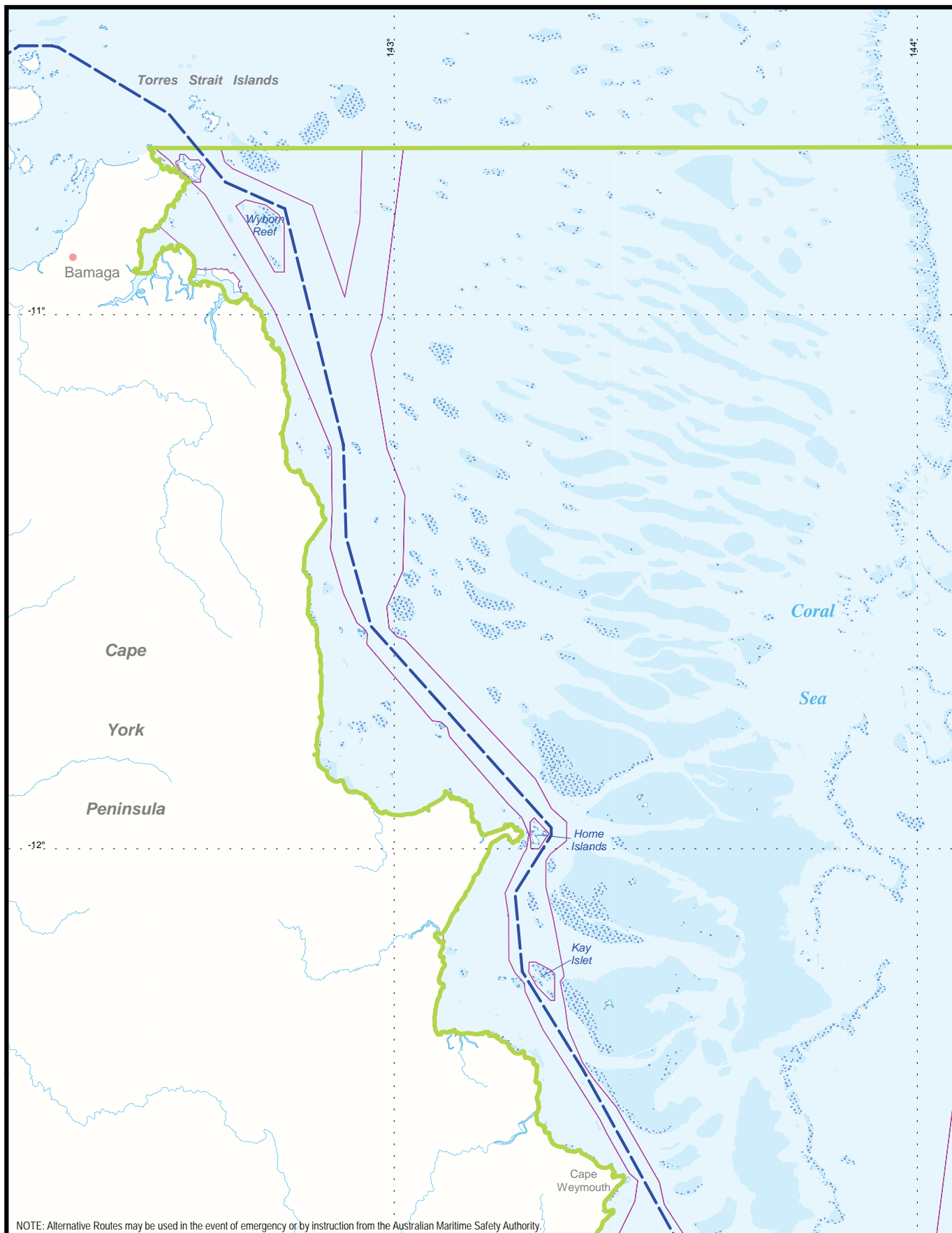
South of Embley Project

Fig. 12-1: Shipping in Great Barrier Reef World Heritage Area



100 0 100 200km

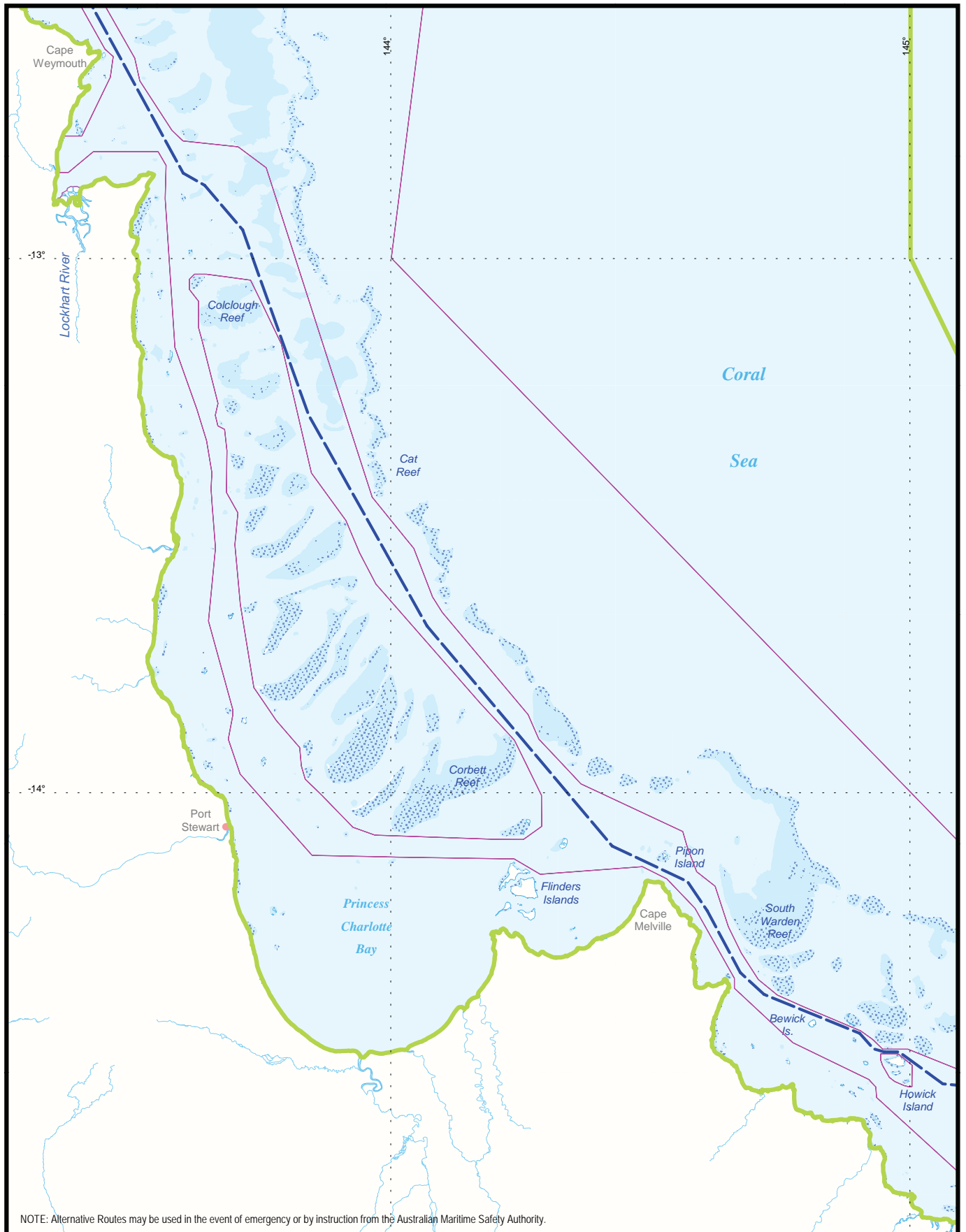
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- City / Town
- River
- ▨ Reef Flat
- Indicative Reef Boundary
- Great Barrier Reef World Heritage Area
- Designated Shipping Area
- - - Bauxite Shipping Route

South of Embley Project
Fig. 12-1a: Shipping in
Great Barrier Reef
World Heritage Area
(Cape York)

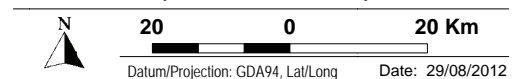


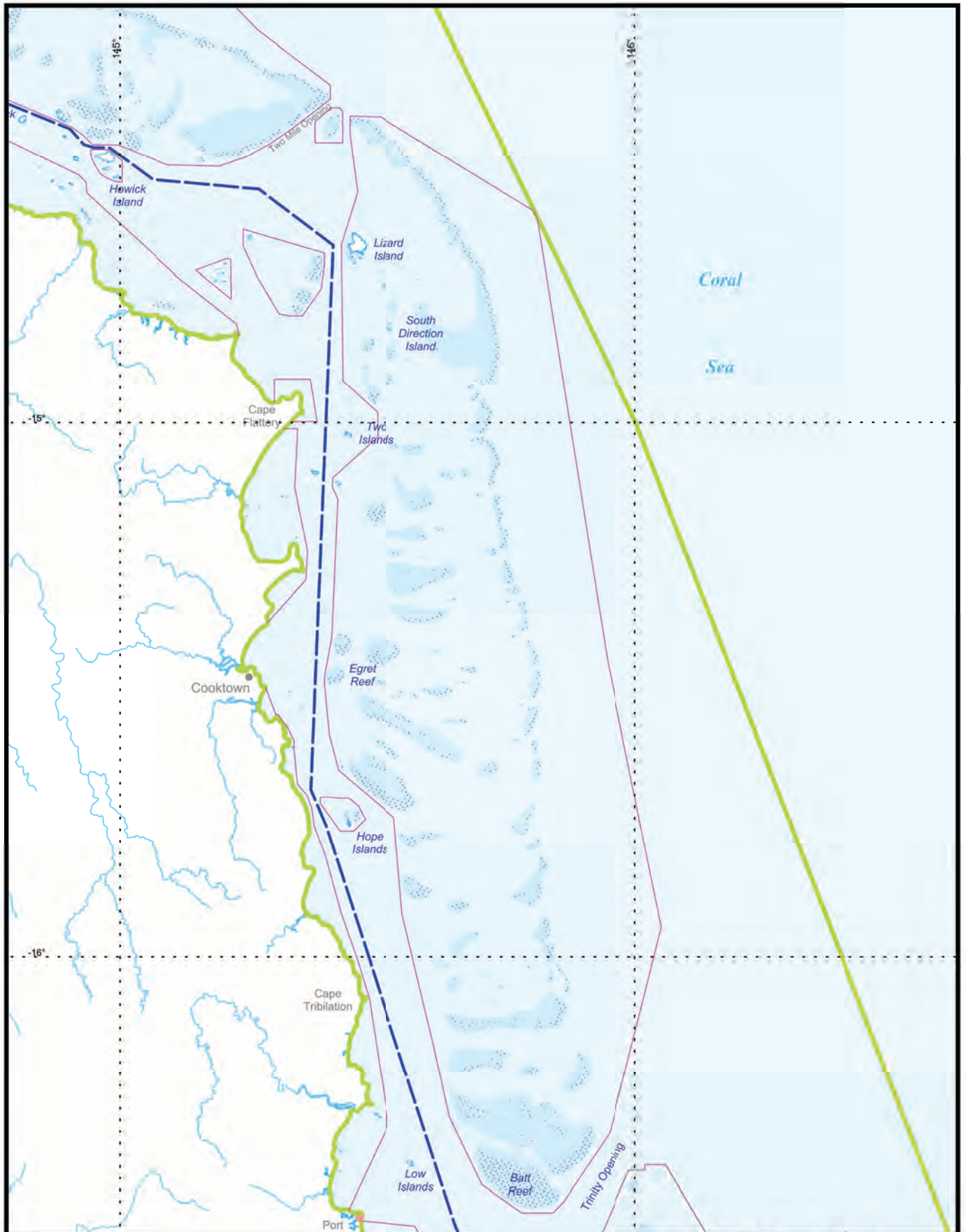


Rio Tinto Alcan

- City / Town
- River
- ▨ Reef Flat
- ▨ Indicative Reef Boundary
- ▨ Great Barrier Reef World Heritage Area
- ▨ Designated Shipping Area
- Bauxite Shipping Route

South of Embley Project
**Fig. 12-1b: Shipping in
 Great Barrier Reef
 World Heritage Area
 (Lockhart River)**



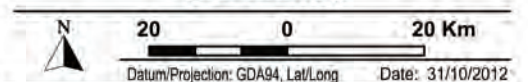


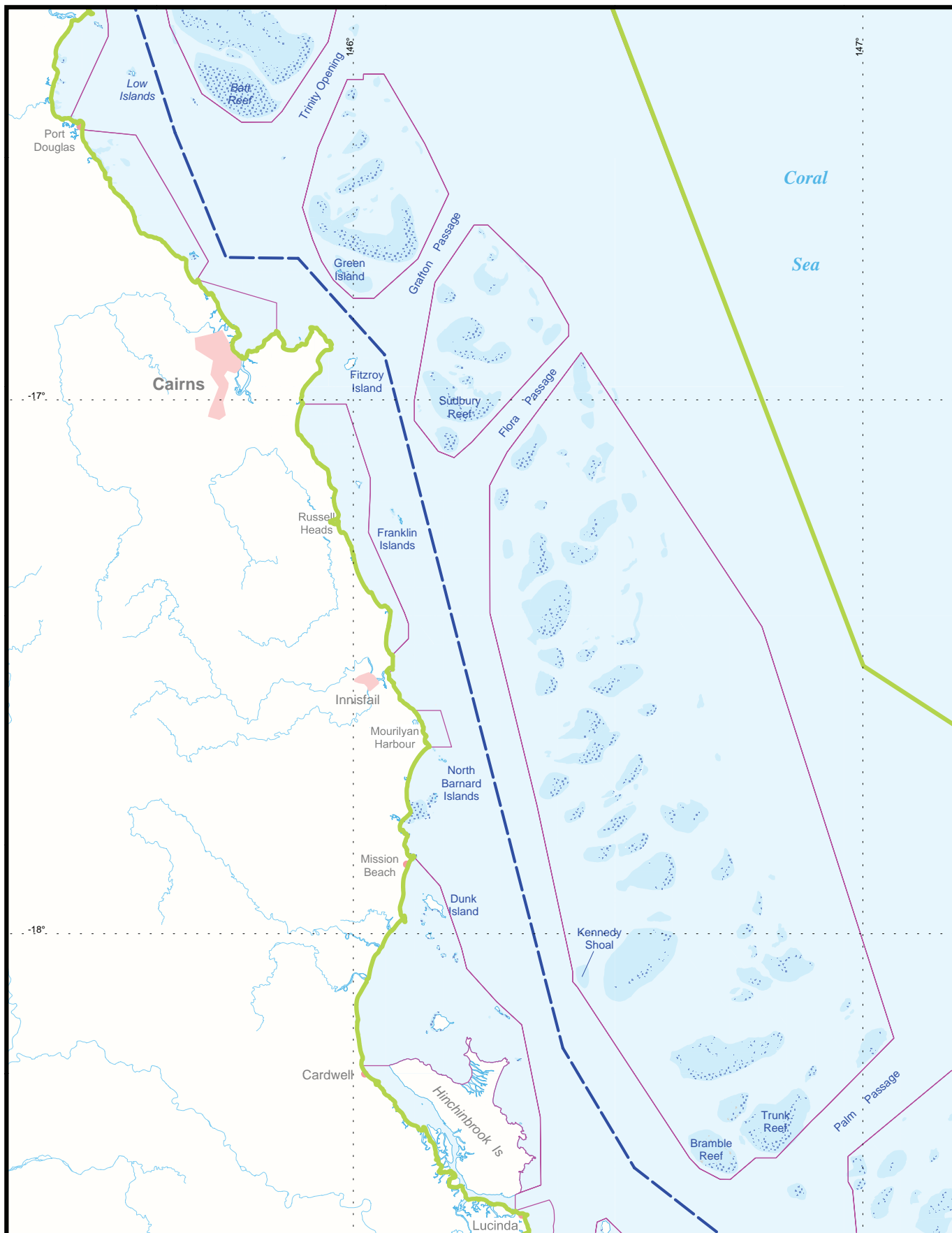
Rio Tinto Alcan

- City / Town
- River
- ▨ Reef Flat
- Indicative Reef Boundary
- Great Barrier Reef World Heritage 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. 12-1c: Shipping in
Great Barrier Reef
World Heritage Area
(Cooktown)





South of Embley Project
**Fig. 12-1d: Shipping in
 Great Barrier Reef
 World Heritage Area
 (Cairns)**

Rio Tinto Alcan

- City / Town
- River
- ▤ Reef Flat
- ▤ Indicative Reef Boundary
- ▤ Great Barrier Reef World Heritage Area
- ▤ Designated Shipping Area
- ▤ Bauxite Shipping Route

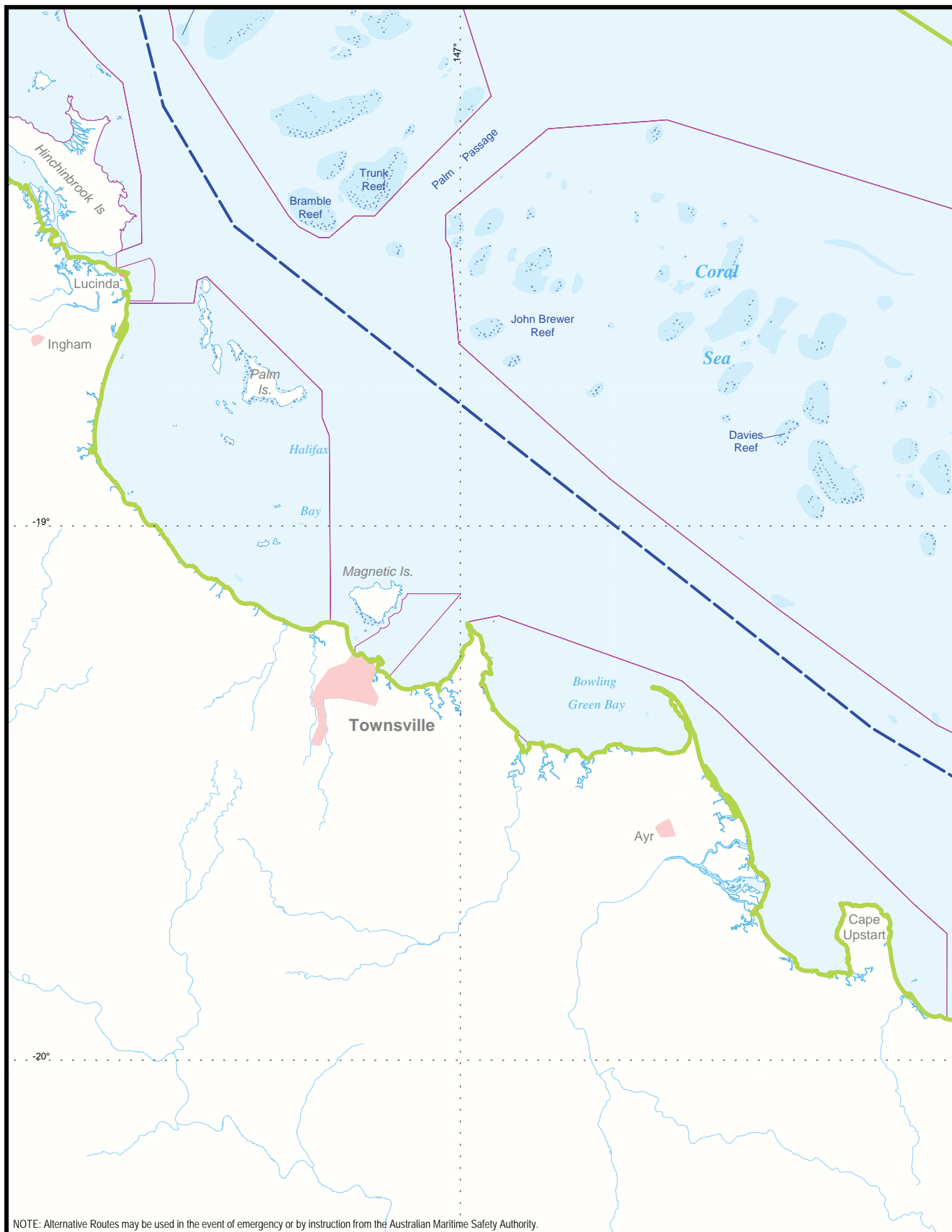
NOTE: Alternative Routes may be used in the event of emergency or by instruction from the Australian Maritime Safety Authority.



20 0 20 Km

Datum/Projection: GDA94, Lat/Long

Date: 29/08/2012



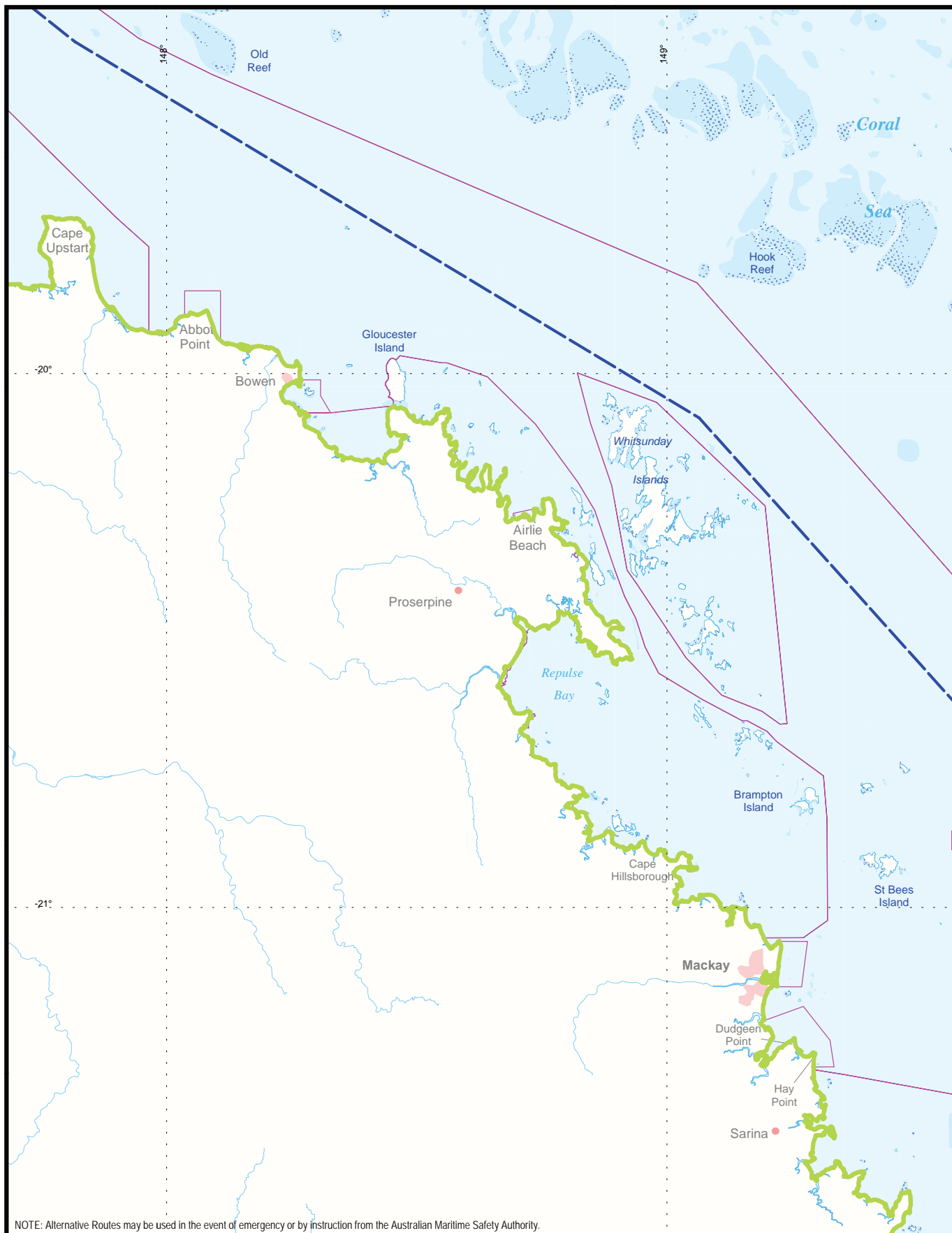
NOTE: Alternative Routes may be used in the event of emergency or by instruction from the Australian Maritime Safety Authority.

Rio Tinto Alcan

- City / Town
- River
- ▤ Reef Flat
- ▤ Indicative Reef Boundary
- ▤ Great Barrier Reef World Heritage Area
- ▤ Designated Shipping Area
- Bauxite Shipping Route

South of Embley Project
**Fig. 12-1e: Shipping in
 Great Barrier Reef
 World Heritage Area
 (Townsville)**

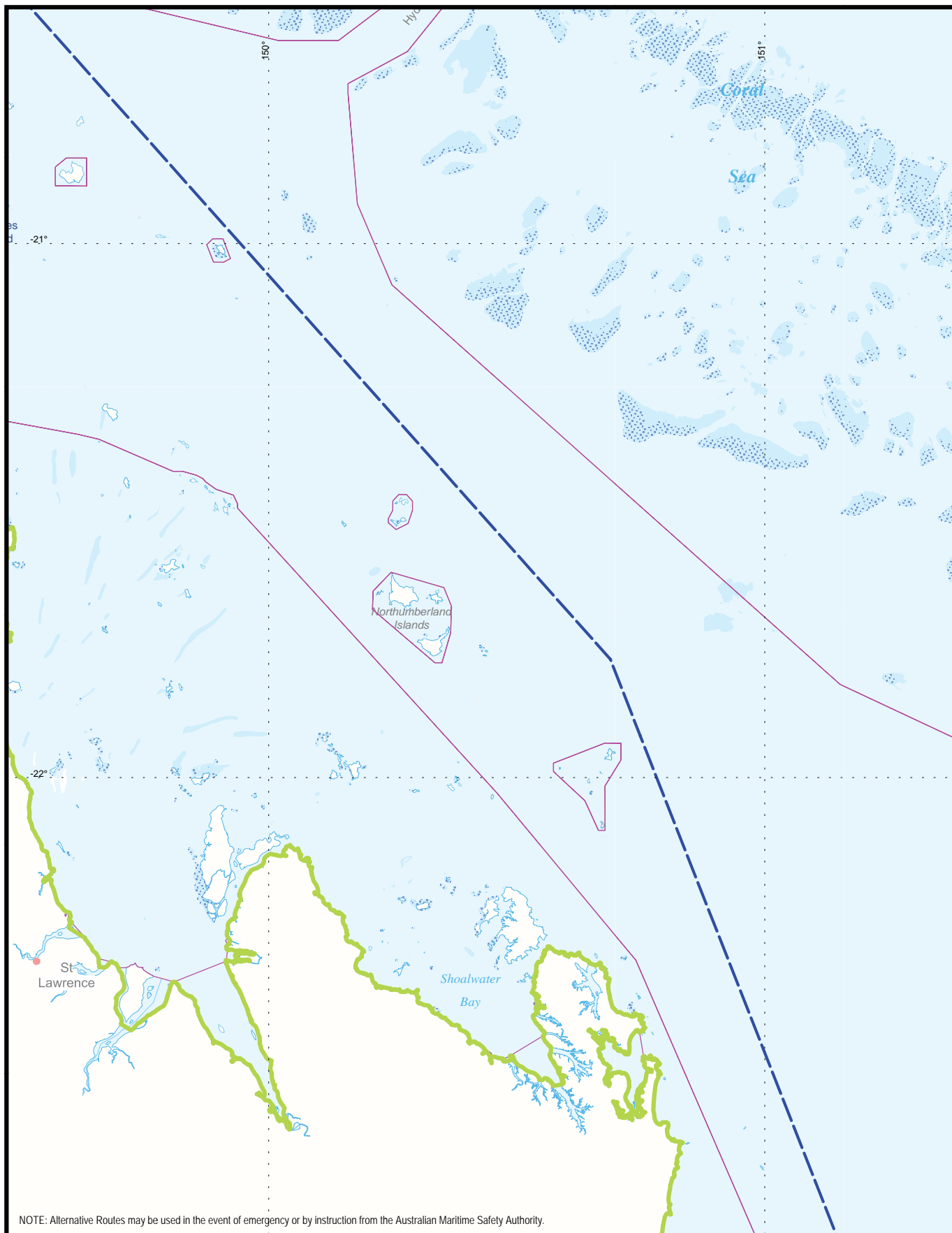


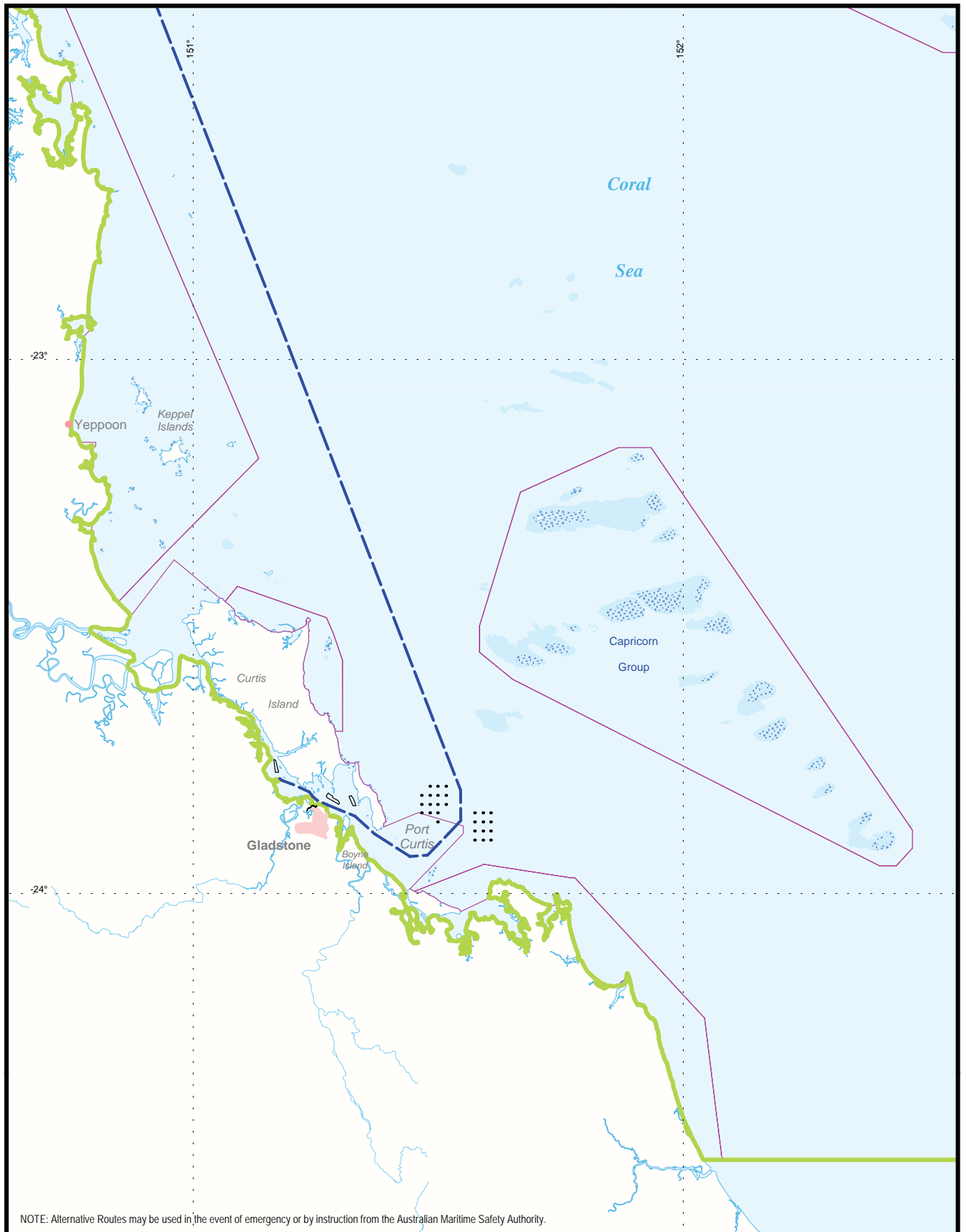


- City / Town
- River
- ▨ Reef Flat
- Indicative Reef Boundary
- Great Barrier Reef World Heritage Area
- Designated Shipping Area
- - - Bauxite Shipping Route

South of Embley Project
Fig. 12-1f: Shipping in
Great Barrier Reef
World Heritage Area
(Mackay)







12.1.2 General Approach to Impact Assessment

The mine, Port and associated infrastructure areas are located approximately 370km from the GBRWHA (by line of shipping route). Due to this distance the only potential impacts on the GBRWHA from the Project are considered to be those associated with domestic shipping activities. Therefore the assessment of potential impacts on the values of the GBRWHA (as outlined in **Section 12.2**) is based on the Project's domestic shipping activities. A description of Project-related shipping activities associated with the GBRWHA is provided in **Section 12.3**.

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

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

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

12.2 Values

12.2.1 World Heritage Criteria

The GBRWHA is included on the World Heritage List. To be included on the World Heritage List, sites must be of OUV and meet at least one of 10 selection criteria, as outlined in Operational Guidelines for the Implementation of the World Heritage Convention (WHC 2012).

The GBRWHA was listed based on the following criteria (in GBRMPA (1981) order):

1. World Heritage Criteria VIII – Outstanding example representing the major stage of the earth's evolutionary history.
2. World Heritage Criteria IX – Outstanding example representing significant ongoing geological processes, biological evolution and man's interaction with his natural environment.
3. World Heritage Criteria VII – Contain unique, rare and superlative natural phenomena, formations and features and areas of exceptional natural beauty.
4. World Heritage Criteria X – Provide habitats where populations of rare or endangered species of plants and animals still survive.

A *Statement of Outstanding Universal Value* (SoOUV), an official statement about the World Heritage property, encapsulates specific values and attributes relevant to the World Heritage List criteria and details why the property is considered to be of OUV. At the time of the GBRWHA inscription, a SoOUV was not required by the UNESCO World Heritage Committee (WHC). However, the Australian Government submitted a draft retrospective statement to the World Heritage Committee in 2012 for the property. The retrospective statement details the specific values and attributes of the GBRWHA against each of the four listing criteria, are outlined in **Sections 12.2.1.1 to 12.2.1.4**.

12.2.1.1 World Heritage Criteria VIII – Outstanding Example of Earth's Evolutionary History

The GBRWHA, extending 2,000km along Queensland's coast, is stated as representing a globally outstanding example of an ecosystem that has evolved over millennia. The area has been exposed and flooded by at least four glacial and interglacial cycles, and over the past 15,000 years, reefs have grown on the continental shelf. The extensive range of inshore and exposed outer reefs provides examples of all stages of reef development (WHC 2012).

The values and attribute examples relevant to this criterion, as outlined by GBRMPA (GBRMPA 2011), are:

- forms the world's largest coral reef ecosystem, extending over 14 degrees of latitude;
- globally outstanding example of an ecosystem that has evolved over millennia;
- environmental history recorded in the reef structure, for example, climatic conditions over many hundreds of years can be seen in old massive coral cores;
- comprises about 3,000 separate coral reefs, ranging from inshore fringing reefs to mid shelf reefs and shoals, exposed outer reefs and deep water reefs, including examples of all stages of reef development; and,
- deep water features of the adjoining continental shelf including canyons, channels, plateaux and abyssal plains.

12.2.1.2 World Heritage Criteria IX – Example of Significant Ongoing Geological Processes, Biological Evolution and Man's Interaction with his Natural Environment

The ongoing erosion and accretion of coral reefs, sand banks and coral cays is recognised as an OUV of the GBRWHA. These geomorphological processes are combined with the unique biological diversity of the GBRWHA, reflecting the maturity of an ecosystem that has evolved over millennia. The establishment of vegetation on the cays and continental islands exemplifies the important role of birds, such as the Pied Imperial Pigeon, in processes such as seed dispersal and plant colonisation.

The values and attribute examples relevant to this criterion, as outlined in GBRMPA (2011), are:

- globally significant diversity of reef and island morphologies reflecting on-going geomorphic, oceanographic and environmental processes;
- complex cross-shelf, longshore and vertical connectivity influenced by dynamic oceanic currents and ongoing ecological processes such as upwellings, larval dispersal and migration;
- over 900 islands and cays; around 600 are continental (high) islands, 300 are coral cays in various stages of geomorphic development, with the remaining islands comprising mangrove islands that provide important ecological services;
- an ecosystem that has evolved over millennia with evidence of the evolution of hard corals and other fauna;
- globally significant marine faunal groups include over 4,000 species of molluscs, over 1,500 species of fish, plus a great diversity of sponges, anemones, marine worms, crustaceans, and many others; and,
- man's interaction with the natural environment illustrated by strong ongoing links between Aboriginal and Torres Strait Islanders and their sea country, including numerous shell deposits (middens) and fish traps, plus the application of story places and marine totems.

12.2.1.3 World Heritage Criteria VII – Rare Natural Phenomena Formations and Exceptional Natural Beauty

The GBRWHA is recognised for its superlative natural beauty above and below the water. The draft retrospective SoOUV describes the Whitsunday Islands as a “magnificent vista of green vegetated islands and spectacular sandy beaches spread over azure waters” (WHC 2012). This contrasts with the vast mangrove forests in Hinchinbrook Channel, and the rugged vegetated mountains and lush rainforest gullies that are periodically cloud-covered on Hinchinbrook Island. On some continental islands, large aggregations of over-wintering butterflies periodically occur. The internationally renowned Cod Hole near Lizard Island is one of many significant tourist attractions.

The values and attribute examples relevant to this criterion, as outlined in GBRMPA (2011), are:

- vast mosaic patterns of reefs providing an unparalleled aerial panorama of seascapes and landscapes for example, Whitehaven Beach, Whitsunday islands, Hinchinbrook Island;
- one of the few living structures visible from space;
- beneath the ocean surface, there is an abundance of shapes, sizes and colours, including spectacular coral assemblages (hard and soft corals) and more than 1,500 species of fish;
- globally important breeding colonies of seabirds and marine turtles, including Raine Island, the world's largest Green Turtle breeding area; and,
- superlative natural phenomena include the annual coral spawning, migrating whales, and significant spawning aggregations of many fish species.

12.2.1.4 World Heritage Criteria X – Habitats where Populations of Rare or Endangered Species Survive

The significant size and diversity of the GBRWHA provides habitat for populations of rare or endangered species. The reefs contain some 400 species of corals in 60 genera. The shallower marine areas support half the world's diversity of mangroves and many seagrass species.

As well as the world's largest Green Turtle breeding site at Raine Island, the GBRWHA also includes many regionally important marine turtle rookeries. Some 242 species of birds have been recorded in the GBRWHA. Twenty-two seabird species breed on cays and some continental islands, and some of these breeding sites are globally significant. Other seabird species also utilise the area. The continental islands support thousands of plant species, while the coral cays also have their own distinct flora and fauna.

The values and attribute examples relevant to this criterion, as outlined in GBRMPA (2011), are:

- one of the richest and most complex natural ecosystems on earth, and one of the most significant for biodiversity conservation;
- amazing diversity supports tens of thousands of marine and terrestrial species, many of which are of global conservation significance;
- some 39 species of mangroves comprising 54% of the world's mangrove diversity;
- approximately 43,000km² of seagrass meadows in both shallow and deep water areas, including 23% of known global species diversity;
- habitat for one of the world's most important Dugong populations and six of the world's seven species of marine turtle;
- a breeding area for Humpback Whales, with at least 30 other species of whales and dolphins also identified;
- 70 bioregions (broad-scale habitats) identified comprising 30 reef bioregions and 40 non-reefal bioregions, including algal and sponge gardens, sandy and muddy bottom communities, continental slopes and deep ocean troughs;
- the reef bioregions contain one third of the world's soft coral and sea pen species (80 species);
- 2,000 species of sponges equalling 30% of Australia's diversity in sponges; and,
- 630 species of echinoderms (for example sea stars) equalling 13% of the known global diversity.

12.2.2 UNESCO Reactive Monitoring Mission

In response to the approval of an LNG processing plant on Curtis Island, the WHC and IUCN requested that the GBR be considered at the 35th session of the WHC. The WHC sought, and obtained, further information on the LNG project from Australia (WHC 2011). The WHC urged Australia to undertake a strategic assessment, requested that Australia invite a reactive monitoring mission and requested a report by 1 February 2012.

On 19 January 2012, Australia submitted the State Party report, and on 14 March 2012, a list of all proposed developments was also submitted.

The monitoring mission visited Australia from the 6 to 14 of March 2012. UNESCO released a report in June 2012 (UNESCO 2012) on the reactive monitoring mission. The objective of the mission was to assess the state of conservation of the GBRWHA and contribute to the strategic assessment process, as requested by the WHC. The mission included an inspection of the GBRWHA and discussions with many relevant government, industry and community stakeholders.

The mission's report concluded that the GBRWHA continues to demonstrate its OUVs which were part of the basis of its listing as a World Heritage property. The report describes the property as iconic as it is the world's largest coral reef ecosystem of which the size, beauty, composition and biodiversity remain exceptional. The property is one of the largest multiple use marine areas included on the World Heritage List. The report notes that the efforts to conserve the area as a whole over the 31 years it has been inscribed on the World Heritage List have been remarkable. Threats that are reported as having been dealt with effectively include oil and gas development inside the property, recreation, fishing, tourism, and water quality from catchment run-off. The planning framework for surveillance, and the monitoring and evaluation of the property are noted as being highly sophisticated.

The report noted that the rapid increase in new port development, expansion of port export capacities, associated dredging and dumping of dredged material as well increased shipping, is of high concern to the conservation of the property.

A consensus amongst stakeholders was noted in the report that any new port developments within the GBRWHA should be located within existing major ports along the Queensland coast, such as the Port of Gladstone, but excluding Port Alma / north of Curtis Island. The report concluded that fewer, well managed 'mega' ports, would pose less risk to the OUV of the property.

The predicted growth in port activity was identified in the report as leading to increased shipping within the property which has the potential to create a range of issues. These include dredging, dredge disposal and the regulation of shipping traffic including 'the very noticeable "boat parks" where large vessels sit at anchorage waiting for cargo near ports'.

However, the report noted that the mission received strong evidence of competent and effective systems and regulations for managing shipping activities, including:

- the ReefVTS and related systems for reporting and compulsory pilotage of shipping that is transiting or taking on cargo in the ports within the property; and,
- the Australian Government's active role in pursuing international regulation of shipping activities, and the possibilities to manage vessel traffic, including through the use of international instruments such as the IMO Particularly Sensitive Sea Area (PSSA) scheme.

The report noted that the specific impacts of shipping on the GBRWHA require increased attention within the planning and assessment process and that the Commonwealth's Strategic Assessment would consider this. However, it noted that the revised and adaptive strategy to the management of shipping within the GBR minimises the risks originating from shipping to the property. Consolidating infrastructure was also noted to limit the marine footprint within the property (including in relation to shipping routes, boat parks, dredging and reclamation).

Based on these findings, the mission provided the following recommendation for shipping:

"Develop a fully integrated approach to the planning, regulation and management of ports and shipping activity affecting the property, including via Shipping Policy for the property, the proposed Ports Strategy of Queensland, and individual Port Plans, that will ensure that ports and shipping activity does not negatively impact the OUV, including the integrity, of the property, and meets the highest international standards in its planning, regulation, assessment and operation."

Following the report, the WHC decided (among other things) to request that Australia submit a report by 1 February 2013 on the state of conservation of the property, which would be considered a 37th session in 2013.

The Commonwealth Government provided a report to the WHC in February 2013 outlining the state of conservation of the GBRWHA as well as the implementation of the recommendations made by the WHC (Australian Government 2013). With regards to shipping in the GBRWHA, this report commits to the following:

- Development of a North-East Shipping Management Plan (NESMP) to assess the effectiveness of the existing safety control measures that apply to shipping activities in the GBR, Coral Sea and Torres Strait regions. The NESMP will assess the effectiveness of existing management arrangements and identify additional or enhanced measures that may be required in the future in light of expected increased shipping movements and vessel sizes.
- Development of best practice guidance for shipping management in the GBR region.
- Conducting an independent review of Gladstone Harbour and Curtis Island that considers the governance arrangements and environmental performance of consented development. The review will then provide advice on improved practices based on expert scientific advice. This will help ensure that future planning and development in the Port of Gladstone is based on cutting-edge performance standards for protecting the GBRWHA. The findings of the review will also help inform the government's consideration of future port developments and operations within the GBR region. The terms of reference for this independent review have been finalised with the review panel scheduled to report back to the Australian government by 30 June 2013.
- Implementation of the National Ports Strategy which aims to encourage best practice in long term integrated master planning for ports precincts and to guide future planning for, and development of, freight and port infrastructure.
- Development of the Queensland Government's Great Barrier Reef Ports Strategy which will restrict significant port development, within and adjoining the GBRWHA, to within existing port limits for the next 10 years. Public consultation on the Great Barrier Reef Ports Strategy closed on 14 December 2012 following a six week consultation period.
- Preparation of a Ports Position Statement by GBRMPA which aims to establish ecologically sustainable management frameworks and incorporate best practice management techniques to minimise environmental impacts from ports.
- Development a "whole-of-GBR receiving waters model", to place the local models used for assessing the impacts of ports and other developments into a whole-of-GBR context. The model will also make it possible to begin assessing the cumulative impacts of a range of port developments occurring at or around the same time.
- Continuation of publishing the Ports and Shipping Information Sheet to inform stakeholders and the general public about the role of ports and shipping in the GBR region and how GBRMPA is meeting the challenges of managing an ecologically sustainable multiple-use Marine Park.
- Implementation by AMSA of the recommendations outlined in the Australian Transport Safety Bureau's report into *Queensland Coastal Pilotage* by 2013 including assigning overall responsibility of risk management of pilotage to pilotage providers.

12.2.3 Assessable Criteria

The *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (DEWHA 2009c) outlines the following criteria to assess whether an action is likely to have a significant impact on the World Heritage values of a declared World Heritage property if there is a real chance or possibility that the action would result in:

- one or more of the World Heritage values to be lost;
- one or more of the World Heritage values to be degraded or damaged; or,
- one or more of the World Heritage values to be notably altered, modified, obscured, or diminished.

These criteria are a useful reference point for the assessment of "relevant impacts" of Project-related shipping activities on the GBRHWA (refer **Section 12.4**).

12.3 Project-related Shipping Activities in the GBRWHA

The only potential impacts on the GBRWHA 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 12.1.2**. Export shipping activities would not enter the GBRWHA and are therefore not further assessed. A detailed description of all Project-related shipping activities is provided in **Section 3.9**.

The potential impacts from Project-related shipping on the GBRWHA would be the same as those assessed for the GBRMP in **Section 11.4**, but also include Project-related shipping activities in the Port of Gladstone and Port of Cairns by third parties, which are located within the GBRWHA. **Section 12.3.1** and **Section 12.3.2** provide details on bauxite shipping and cargo shipping respectively.

12.3.1 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 would be sailing from the Port of Weipa to the Port of Gladstone (i.e. 540 bauxite ship movements through the GBRWHA 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 GBRWHA 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 12-1**. Alternative routes may be used in the event of emergency or by instruction from the 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 alumina refinery, and South Trees Wharf, servicing the Queensland Alumina Limited alumina 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 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 the above-mentioned existing alumina refineries in Gladstone. The shipments through the GBRWHA 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 GBRWHA (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**).

12.3.2 Cargo Shipping

12.3.2.1 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 30-36 month construction period. The Cairns to Weipa barge service traverses the GBRWHA 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. 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 GBRWHA; 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 and operated by the 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.

12.3.2.2 Operations

Section 3.9.1.2 and **Table 3-10** provides 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 approximately 104 cargo barge shipments per annum of existing deliveries.

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 operational related cargo movements required for the Project would be greater than 50m and regarded as ships under the GBRMP Regulations.

The cargo barge 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 12.3.2.1**.

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

12.3.3 Existing Shipping Activity

12.3.3.1 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 2009b). 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.

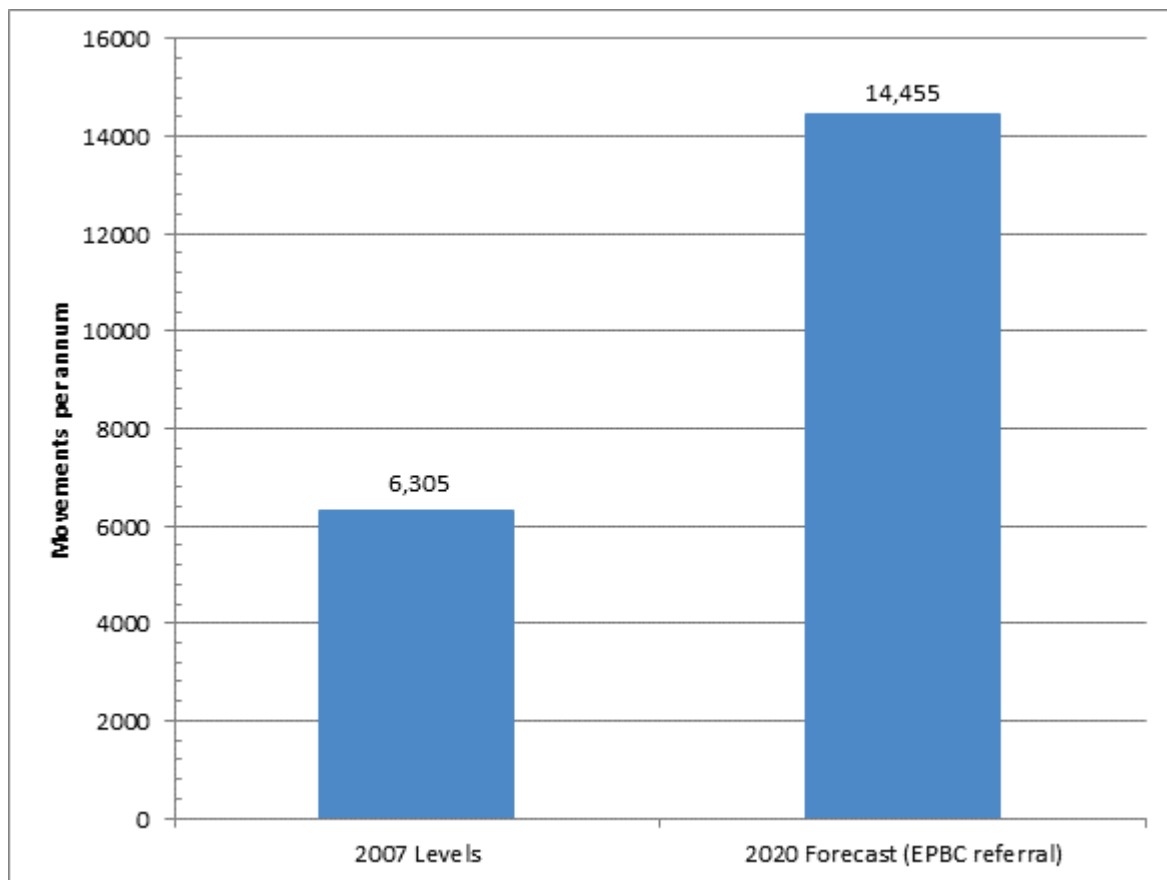
The 2007 and predicted shipping levels through the GBRMP are illustrated in **Figure 12-2**. Based on this projection, the average annual growth from 2007 to 2020 would be 6.6%. Another recent projection by PGM Environment (2012) for the *Abbot Point Cumulative Impact Assessment* (Eco Logical and Open Lines 2012) estimated a combined annual growth rate of approximately 4.8% between 2012 and 2032 for all vessels calling at GBR ports.

12.3.3.2 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).

Figure 12-2 Inner GBR Designated Shipping Area - Shipping Movements Per Annum



12.3.4 Additional Shipping Activity in the Inner GBR Designated Shipping Area

12.3.4.1 Construction Phase

A summary of the annual shipping movements through the GBRWHA required during the construction phase of the Project is provided in **Table 12-1**.

Table 12-1 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

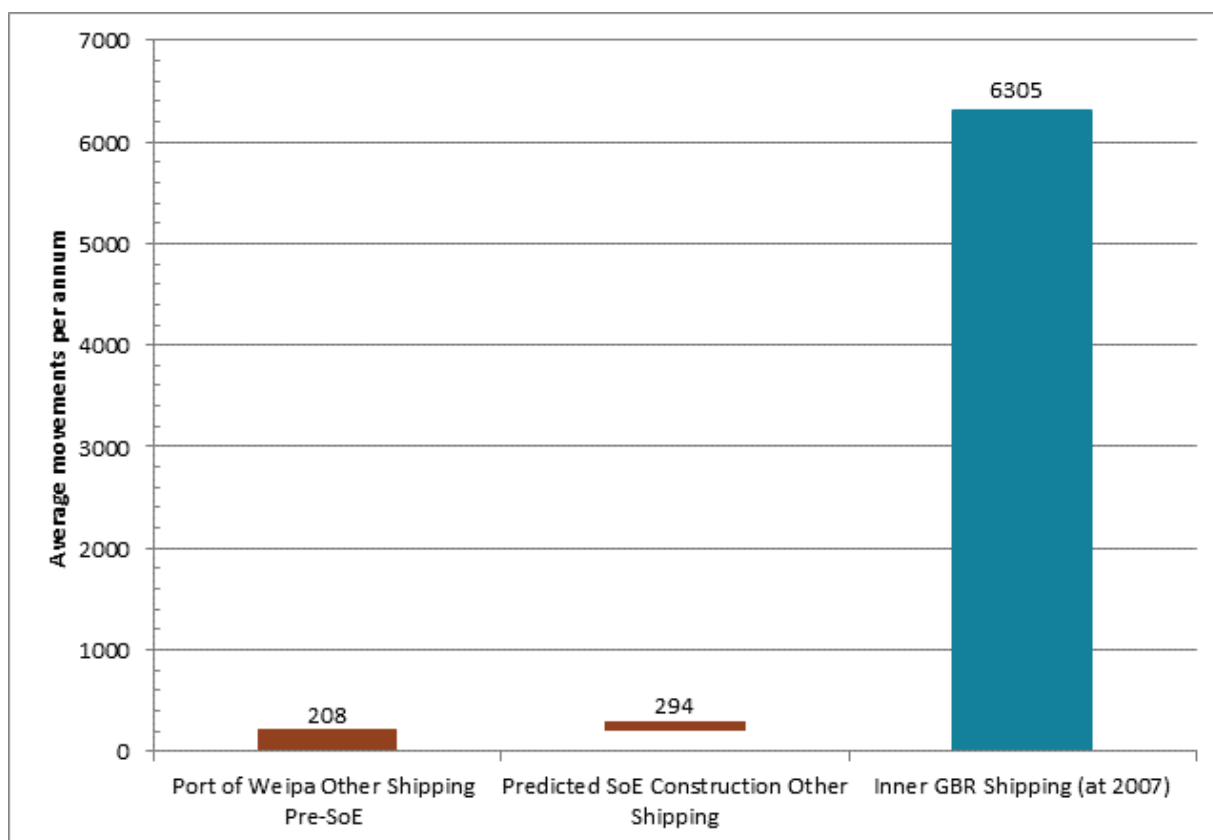
*Existing fuel deliveries are from Darwin and do not travel through the GBR, it is assumed that the contractor continues to source fuel from Darwin.

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 12-3**. The additional construction-related shipping (an annual average of 86 additional cargo shipping movement 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 additional construction shipping would represent approximately 0.286% of the CPA vessel movement figures in the Port of Cairns as at 2012.

Figure 12-3 Construction Other Shipping Movements in the Inner GBR Designated Shipping Area Compared to 2007 Levels



12.3.4.2 Operations

A summary of the predicted annual average shipping movements through the GBRWHA required during the operational phase of the SoE Project is provided in **Table 12-2**.

Table 12-2 Summary of Project Predicted Average Annual Shipping Movements on East Coast Queensland – Operations

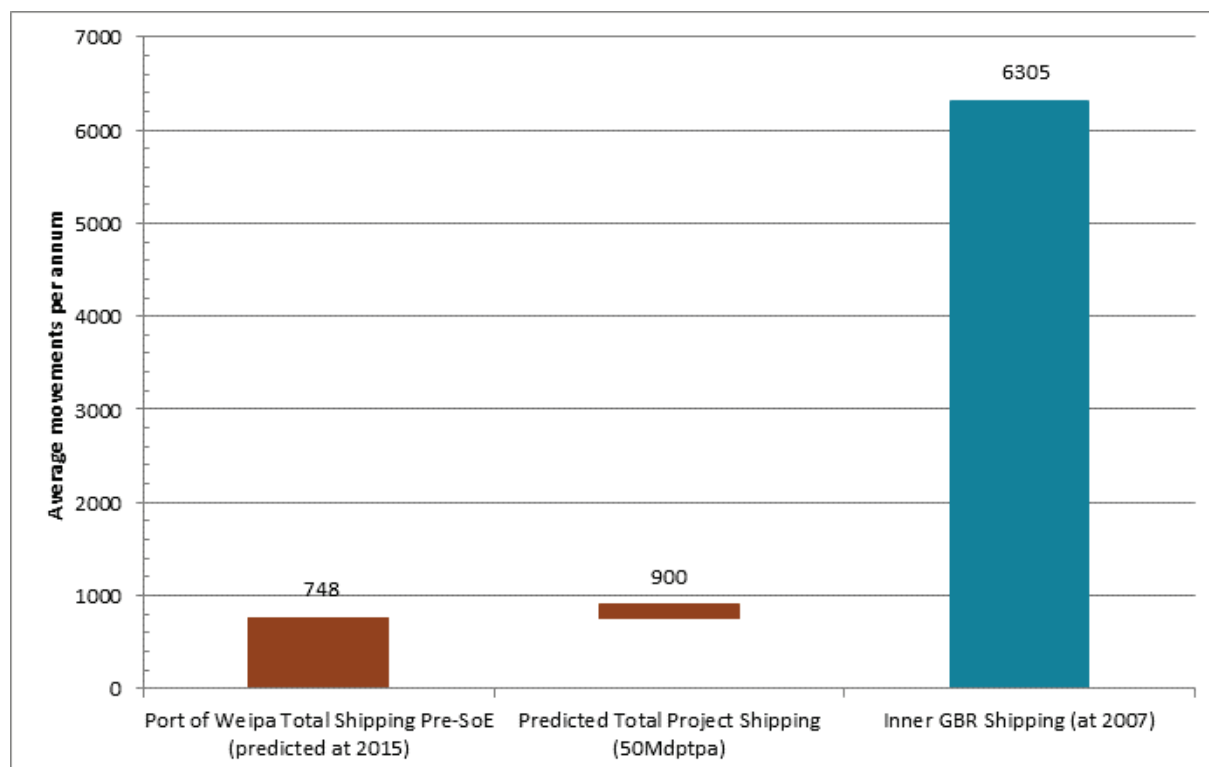
Ship Movements	Other Shipping		Bauxite	Total
	Cargo Barge	Fuel*		
Existing – before Project	208	0	540	748
Additional – Project Maximum Production	92	0	60	152
Total	300	0	600	900

* 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.

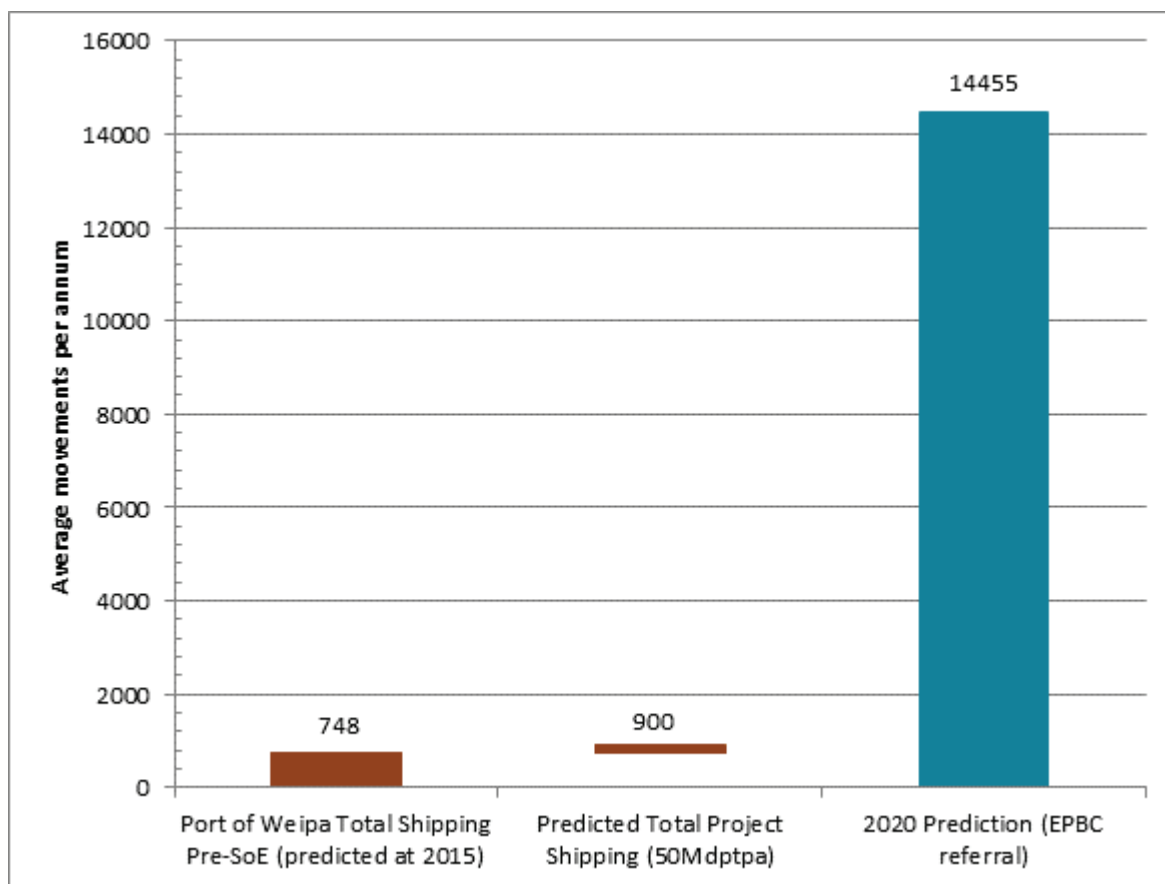
Predicted operational bauxite and cargo shipping movements associated with the Project compared to 2007 shipping levels in the inner GBR Designated Shipping Area are illustrated in **Figure 12-4**. The predicted additional operational shipping (152 movements per annum) equates to approximately 2.4% of 2007 shipping levels in the inner GBR Designated Shipping Area. The additional predicted bauxite shipping (60 movements per annum) equates to approximately 1.0% of 2007 shipping levels in the inner GBR Designated Shipping Area.

Figure 12-4 Total Operational Shipping Movements in the Inner GBR Designated Shipping Area 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 12-5**. The additional predicted operational bauxite and cargo shipping (152 movements per annum) equates to approximately 1.0% of estimated 14,455 ship movements 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 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 12-5 Total Operational Shipping Movements in the Inner GBR Designated Shipping Area Compared to Long Term Forecast



Conservatively assuming all of the cargo barges originated from the Port of Cairns (92 movements per annum), the additional operational shipping would represent approximately 0.3% of the CPA vessel movement figures in the Port of Cairns as at 2012.

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

12.4 Potential Impacts

The following subsections provide an assessment of the relevant impacts of the Project activities identified in **Section 12.3** on the OUVs of the GBRWHA, in order of the listing (Lucas *et al.* 1983). The *Significant Impact Guidelines* for the GBRWHA (refer **Section 12.2.3**) 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, GBRWHA and GBRNHP which summarises safeguards, avoidance and measures is provided in **Appendix 11-A**.

12.4.1 World Heritage Criteria VIII – Outstanding Example of Earth’s Evolutionary History

An assessment of each of GBRWHA’s attributes for this criterion is provided in **Table 12-3**. Based on the assessment in **Table 12-3**, the potential unmitigated impacts associated with Project-related shipping activities on World Heritage Criteria VIII would be negligible and long term.

Although no specific safeguards, avoidance and mitigation measures are required as the unmitigated impact of Project-related bauxite and cargo shipping activities 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 include:

- using the existing shipping route which traverses the inner GBR Designated Shipping Area;
- for vessels over 70m in length using a pilot when transiting through the inner GBR Designated Shipping Area 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 GPS referred to as the AIS for vessels over 50m, this 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. 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 GBRWHA. 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 GBRWHA have reduced from an average rate of 1 per year to 0.16 per year;
- 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;
- the use of two tugs at all times during berthing operations; and,
- in the unlikely event of an incident that lead to an oil spill, the oil spill would be responded to in accordance with the Australian National Oil Spill Contingency Plan and ReefPlan, including the removal of visible oiling from beaches.

12.4.2 World Heritage Criteria IX – Example of Significant Ongoing Geological Processes, Biological Evolution and Man's Interaction with his Natural Environment

An assessment of each of GBRWHA's attributes for this criterion is provided in **Table 12-4**.

Based on the assessment in **Table 12-4**, the potential unmitigated impacts associated with Project-related shipping activities on World Heritage Criteria IX would be negligible and long term.

Although no specific safeguards, avoidance and mitigation measures are required as the unmitigated impact of Project-related bauxite and cargo shipping activities 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 (refer **Section 12.4.1**).

12.4.3 World Heritage Criteria VII – Rare Natural Phenomena Formations and Exceptional Natural Beauty

An assessment of each of GBRWHA's attributes for this criterion is provided in **Table 12-5**.

Based on the assessment in **Table 12-5**, the potential unmitigated impacts associated with Project-related shipping activities on World Heritage Criteria VII would be negligible and long term.

Although no specific safeguards, avoidance and mitigation measures are required as the unmitigated impact of Project-related shipping activities 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 (refer **Section 12.4.1**). In addition the following existing measures would also be implemented to further reduce impacts of Project-related shipping activities on World Heritage Criteria VII:

- 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 GBRWHA to Gladstone/from Cairns would only travel 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* in 2001, ships are required 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;
- discharge of ballast water (and sediment in ballast tanks) is prohibited by AQIS where it has been derived from ports or coastal waters outside Australian territorial waters;
- for the RTA owned 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;
- for the RTA owned bauxite ships, a relatively new shipping fleet would be maintained with hull inspections and surveys, hull cleaning and renewal of antifouling coating systems every 2 ½ 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.

12.4.4 World Heritage Criteria X – Habitats where Populations of Rare or Endangered Species Survive

An assessment of each of GBRWHA's attributes for this criterion is provided in **Table 12-6**.

Based on the assessment in **Table 12-6**, the potential unmitigated impacts associated with Project-related shipping activities on World Heritage Criteria X would be negligible and long term.

Although no specific safeguards, avoidance and mitigation measures are required as the unmitigated impact of Project-related bauxite and cargo shipping activities 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 (refer **Section 12.4.3**).

Table 12-3 Assessment of Potential Impacts - World Heritage Criteria VIII

Attribute	Assessment of Potential Impacts to GBRWHA
<p>1. <i>Forms the world's largest coral reef ecosystem, extending over 14 degrees of latitude</i></p>	<p>This value relates to the physical extent of the GBR. Collisions and grounding, spills of oil or cargo, operational discharges and marine species introduction have the potential to impact on the health of localised areas of the reef. These were assessed for the GBRMP (refer Section 11.4.1 and Section 11.4.5) as having a negligible impact and the same conclusion would apply to the GBRWHA. This is because the small potential increase in bauxite and cargo shipping would continue to traverse the same routes through GBRWHA as existing Weipa bauxite and cargo shipping via the inner GBR Designated Shipping Area, Port of Gladstone and Port of Cairns (by third parties). Therefore, the potential impacts associated with Project-related shipping activities on the size, extent, part, element or feature of the coral reef ecosystem would be negligible and long term.</p> <p>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 GBRWHA 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 (refer Section 12.4.1).</p>
<p>2. <i>Globally outstanding example of an ecosystem that has evolved over millennia</i></p>	<p>The extent and diversity of the GBRWHA is not likely to be significantly impacted as a result of Project-related shipping activities or the small potential increase in shipping activities at maximum production for the same reasons in item 1. The potential unmitigated impacts associated with Project-related shipping activities on the extent and diversity of the GBRWHA would be negligible and long term.</p> <p>Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related shipping activities the extent and diversity of the GBRWHA has been assessed as negligible, there are a number of measures that are used for existing Weipa bauxite shipping and cargo shipping activities that would continue to be used for Project-related bauxite and cargo shipping as outlined in Section 12.4.1.</p>
<p>3. <i>Environmental history recorded in the reef structure; for example, climatic conditions over many hundreds of years can be seen in old massive coral cores</i></p>	<p>There would be no direct impact on reef structure associated with Project-related shipping activities. This is because the small potential increase in bauxite and cargo shipping at maximum production would continue to traverse the same routes through GBRWHA as existing Weipa bauxite and cargo shipping via the inner GBR Designated Shipping Area, Port of Gladstone and Port of Cairns (by third parties). All Project-related bauxite and cargo shipping would utilise existing Port infrastructure within the GBRWHA.</p> <p>Potential impacts on reef structure could only occur indirectly, at a localised scale as a consequence of ship grounding. The GBRMPA's region wide assessment of risks to the GBR (GBRMPA 2009b) identified very few historical shipping incidents in the GBR as outlined in Section 4.5.3 of the Outlook Report as follows:</p> <p><i>"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..."</i></p> <p>In more than 40 years of Weipa bauxite shipping and cargo shipping, there have been no reported incidents within the GBRWHA that have resulted in environmental harm. The small potential increase in Project-related bauxite and cargo shipping at maximum production 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 (refer Section 18.4.2.3).</p> <p>Accordingly, the small potential increase in shipping movements at maximum production is not likely to increase the GBRMPA risk assessment risk category of collision or grounding in the GBRWHA. If a Project vessel was grounded in the GBRWHA, only where the feature is completely lost, e.g. where an area of the reef has been damaged by grounding or is subject to erosion following coral mortality, would the evolutionary record be lost.</p> <p>However, the environmental history of the region is replicated in old massive corals throughout the reef, so the information would not be compromised in the unlikely event of a loss of an individual reef feature. The potential unmitigated impacts associated with Project-related shipping activities on the reef structure of the GBRWHA would be negligible and long term.</p>

Attribute	Assessment of Potential Impacts to GBRWHA
	Although no specific safeguards, avoidance or mitigation measures are required, 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 as outlined in Section 12.4.1 .
<p>4. <i>Comprises about 3,000 separate coral reefs, ranging from inshore fringing reefs to mid shelf reefs and shoals, exposed outer reefs and deep water reefs, including examples of all stages of reef development</i></p>	<p>In relation to coral reefs, domestic shipping activities associated with the Project would travel through the inner GBR Designated Shipping Area (refer Section 12.3.1 and Section 12.3.2). The potential impacts on the GBRWHA from predicted Project-related bauxite ship and cargo barge movements are therefore confined to a limited area of the reef along the inner GBR Designated Shipping Area, and any impacts such as from groundings, spills or other interactions with other shipping activities would therefore be localised.</p> <p>The reefs most vulnerable to impacts would be shallow water fringing reefs and shoals. Deeper water reefs are unlikely to be impacted directly by vessel grounding or oil spills. In shallower areas of the GBRWHA from Cape York to Cairns, vessel movements would be under pilotage to prevent grounding. The small potential increase in shipping movements at maximum production relative to existing shipping levels is not likely to increase the likelihood category of significant impact occurring upon coral reefs.</p> <p>The potential impacts associated with predicted Project-related bauxite ship and cargo barge movements on the size, extent, part, element or feature of the coral reef ecosystem would be negligible and long term. Although no specific safeguards, avoidance or mitigation measures are required, 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 as outlined in Section 12.4.1.</p>
<p>5. <i>Deep water features of the adjoining continental shelf includes canyons, channels, plateaux and abyssal plains</i></p>	<p>The deep water features of the GBRWHA is not likely to be significantly impacted as a result of predicted Project-related bauxite ship and cargo barge movements or the small potential increase in Project-related shipping activities at maximum production for the same reasons as in item 3. Anchorage would only typically occur at the existing designated anchorage area at the Port of Gladstone within previously disturbed areas. Anchorage is not likely to be required by third party shipping in the shallower waters of the Port of Cairns and would likely utilise existing berthing infrastructure. The potential unmitigated impacts associated with predicted Project-related bauxite ship and cargo barge movements on deep water features of the GBRWHA would be negligible and long term.</p> <p>Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of predicted Project-related bauxite ship and cargo barge movements on deep water features of the GBRWHA 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 as outlined in Section 12.4.1.</p>

Table 12-4 Assessment of Potential Impacts - World Heritage Criteria IX

Attribute	Assessment of Potential Impacts to GBRWHA
<p>1. <i>Globally significant diversity of reef and island morphologies reflecting on-going geomorphic, oceanographic and environmental processes</i></p>	<p>There would be no direct impact on the diversity of reef and island morphologies associated with Project-related shipping activities. This is because the small potential increase in Project-related bauxite shipping and cargo shipping at maximum production would continue to traverse the same routes through GBRWHA as existing Weipa bauxite and cargo shipping via the inner GBR Designated Shipping Area, Port of Gladstone and Port of Cairns (by third parties). All Project-related shipping would utilise existing Port infrastructure within the GBRWHA.</p> <p>Potential impacts on the diversity of reef and island morphologies within the GBRWHA could only occur indirectly, at a localised scale as a consequence of a ship grounding. The GBRMPA's region wide assessment of risks to the GBR (GBRMPA 2009b) identified very few historical shipping incidents in the GBR as outlined in Section 4.5.3 of the Outlook Report as follows:</p> <p><i>"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..."</i></p> <p>In more than 40 years of Weipa bauxite and cargo shipping, there have been no reported incidents within the GBRWHA that have resulted in environmental harm. The small potential increase in Project-related shipping at maximum production 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 (refer Section 18.4.2.3). Accordingly, the small potential increase in shipping movements at maximum production is not likely to increase the GBRMPA risk assessment risk category of collision or grounding in the GBRWHA. If a Project vessel was grounded in the GBRWHA, only where the feature is completely lost, e.g. where an area of the reef has been damaged by grounding or is subject to erosion following coral mortality, would the evolutionary record be lost. However, the environmental history of the region is replicated in old massive corals throughout the reef, so the information would not be compromised in the unlikely event of a loss of an individual reef feature. The potential unmitigated impacts associated with predicted Project-related bauxite ship and cargo barge movements on the diversity of reef and island morphologies with the GBRWHA would be negligible and long term.</p> <p>Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of predicted Project-related bauxite ship and cargo barge movements on the diversity of reef and island morphologies within the GBRWHA has been assessed as negligible, there are a number of measures that are used for existing bauxite and cargo shipping activities that would continue to be used for Project-related bauxite and cargo shipping (refer Section 12.4.2).</p>
<p>2. <i>Complex cross-shelf, longshore and vertical connectivity influenced by dynamic oceanic currents and ongoing ecological processes such as upwellings, larval dispersal and migration</i></p>	<p>Predicted Project-related bauxite ship and cargo barge movements would not impact on oceanic currents or upwellings. Localised impacts on larval dispersal may potentially occur in the event of an oil spill during the coral spawning period, where coral gametes or larval stages are exposed to surface oil or elevated hydrocarbons in the water column.</p> <p>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. Existing management arrangements and the use of the inner GBR Designated Shipping Area have resulted in very few incidents. Predicted Project-related bauxite ship and cargo barge movements through the GBRWHA would typically 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. In shallower areas of the GBRWHA from Cape York to Cairns, vessel movements would be under pilotage to prevent grounding. The small potential increase in bauxite ship and cargo barge movements at maximum production relative to existing shipping levels is not likely to increase the likelihood category of significant impact occurring upon coral reefs.</p> <p>The spill modelling outlined in Appendix 4-D and discussed in Section 4.5.3 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 25.25m³ 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</p>

Attribute	Assessment of Potential Impacts to GBRWHA
	<p>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 5t 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 waters of the GBRWHA. Based on the DNV (2011) estimate of the annual probability of a spill (> 10t) in the GBR 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 waters of the GBRWHA to a negligible extent.</p> <p>The potential unmitigated impacts associated with predicted Project-related bauxite ship and cargo barge movements on widespread larval dispersal and migration within the GBRWHA would be negligible and long term. Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related shipping activities on the extent and diversity of the GBRWHA 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 as outlined in Section 12.4.2.</p>
<p>3. <i>Over 900 islands and cays; around 600 are continental (high) islands, 300 are coral cays in various stages of geomorphic development, with the remaining islands comprising mangrove islands that provide important ecological services</i></p>	<p>Project-related bauxite ships and cargo barges would only travel through the GBRWHA via the inner GBR Designated Shipping Area and within the limits of the Port of Gladstone and Port of Cairns (by third parties). The inner GBR Designated Shipping Area was developed under the <i>Great Barrier Reef Zoning Plan 2003</i> to avoid the most sensitive areas of the GBR (refer Section 11.2.1). When in the Port of Gladstone, vessels would operate in accordance with the requirements of the Regional Harbour Master. Gladstone Ports Corporation operates under an Environmental Management System which is internationally recognised under AS/NZS14001:2004. Vessels would be escorted by two tugs at all times during berthing within the Port of Gladstone. Third party cargo vessels operating out of the Port of Cairns would operate under the conditions of a commercial permit from the GBRMPA.</p> <p>In more than 40 years of Weipa bauxite and cargo shipping, there have been no reported incidents within the GBRWHA that have resulted in environmental harm. The small potential increase in Project-related bauxite ship and cargo barge movements at maximum production is not likely to increase the risk category of incidents. The potential unmitigated impacts associated with Project-related bauxite and cargo shipping activities on islands and cays of the GBRWHA would be negligible and long term.</p> <p>The spill modelling outlined in Appendix 4-D and discussed in Section 4.5.3 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 suggest that there would be a range of probabilities of 0.001mm or thicker oiling on shores within Gladstone Harbour (including Curtis and Facing Island) which are within the GBRWHA resulting from the modelled spill scenarios at Fisherman's Landing and South Trees Wharf. Appendix 4-D also notes that the probability of shore oiling decreases with distance from the spill location. Based on the DNV (2011) estimate of the annual probability of a spill (> 10t) in the GBR 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 oiling the shores of the GBRWHA to a negligible extent.</p> <p>Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related shipping activities on islands and cays of the GBRWHA 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 as outlined in Section 12.4.2.</p>

Attribute	Assessment of Potential Impacts to GBRWHA
<p>4. <i>An ecosystem that has evolved over millennia with evidence of the evolution of hard corals and other fauna</i></p>	<p>The potential impacts on reef features or habitat within the GBRWHA from predicted Project-related bauxite ship and cargo barge movements would be negligible for the same reasons as in item 1. The potential unmitigated impacts associated with predicted Project-related bauxite ship and cargo barge movements on the evolution of hard corals and other fauna in the GBRWHA would be negligible and long term.</p> <p>Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of predicted Project-related bauxite ship and cargo barge movements on the evolution of hard corals and other fauna in the GBRWHA 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 as outlined in Section 12.4.2.</p>
<p>5. <i>Globally significant marine faunal groups include over 4,000 species of molluscs, over 1,500 species of fish, plus a great diversity of sponges, anemones, marine worms, crustaceans, and many others</i></p>	<p>As discussed in Section 7.3, Section 7.4, Section 9.3, Section 9.4 and Section 9.5 residual impacts of Project-related shipping activities on threatened and migratory marine fauna are considered to be negligible to minor. The same assessment would apply to other marine species including benthic and pelagic species as they would be impacted by the same potential impact mechanisms.</p> <p>Any unlikely, localised mortality of an individual fish or invertebrate as a result of Project-related shipping activities would not impact on population levels, particularly for species that generally have widespread dispersal of gametes and larvae.</p> <p>The potential impacts on the assemblage or diversity of marine faunal groups within the GBRWHA from predicted Project-related bauxite ship and cargo barge movements would be negligible. This is due to the small potential increase in shipping at maximum production that would continue to use the existing inner GBR Designated Shipping Area, Port of Gladstone and Port of Cairns (by third parties).</p> <p>Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of predicted Project-related bauxite ship and cargo barge movements on marine species in the GBRWHA 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 as outlined in Section 12.4.2.</p>
<p>6. <i>Man's interaction with the natural environment illustrated by strong ongoing links between Aboriginal and Torres Strait Islanders and their sea country, including numerous shell deposits (middens) and fish traps, plus the application of story places and marine totems</i></p>	<p>As domestic shipping activities associated with the Project would be confined to the inner GBR Designated Shipping Area, the only potential for impact on this value would be in the unlikely event of an oil spill and oil were to subsequently strand on an inshore area where cultural heritage items were present. However, as discussed above in item 2, there would be a negligible increase in the probability of an oil spill as a result of the small potential increase in Project-related shipping at maximum production reaching shorelines of the GBRWHA.</p> <p>The potential impacts on the interaction between man and the environment within the GBRWHA from predicted Project-related bauxite ship and cargo barge movements would be negligible. This is due to the small potential increase in bauxite shipping at maximum production that would continue to use the existing inner GBR Designated Shipping Area, Port of Gladstone and Port of Cairns (by third parties).</p> <p>The potential unmitigated impacts associated with predicted Project-related bauxite ship and cargo barge movements on the interaction between man and the environment within the GBRWHA would be negligible and long term for the same reasons as in item 2. Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related shipping activities on the interaction between man and the environment within the GBRWHA 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 as outlined in Section 12.4.2.</p>

Table 12-5 Assessment of Potential Impacts - World Heritage Criteria VII

Attribute	Assessment of Potential Impacts to GBRWHA
<p>1. <i>Vast mosaic patterns of reefs providing an unparalleled aerial panorama of seascapes and landscapes for example, Whitehaven Beach, Whitsunday Islands, Hinchinbrook Island</i></p>	<p>The inner GBR Designated Shipping Area is aligned adjacent to and on the ocean side of both the Whitsunday Islands and Hinchinbrook Island. Project-related shipping activities close to the Whitsunday Islands would occur with a separation distance which excludes Project vessels from compulsory pilotage. In the event of a marine oil spill where oil stranded on beaches, or where a vessel ran aground, there may be a temporary impact on this attribute. However as discussed in Section 4.5.2, Section 11.4.1 and Section 11.4.4, it is considered that the increase in probability on shore oiling from an oil spill as a result of the small potential increase in Project-related shipping would be negligible.</p> <p>The potential impacts on the panorama of seascapes and landscapes within the GBRWHA from Project-related shipping activities would be negligible and long term. This is due to the small potential increase in shipping at maximum production that would continue to use the existing inner GBR Designated Shipping Area, Port of Gladstone and Port of Cairns (by third parties).</p> <p>Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related shipping activities on the panorama of seascapes and landscapes within the GBRWHA 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 (refer Section 12.4.3).</p>
<p>2. <i>One of the few living structures visible from space</i></p>	<p>Project-related shipping activities would not impact on the ability to see the structure of the GBRWHA from space.</p>
<p>3. <i>Beneath the ocean surface, there is an abundance of shapes, sizes and colours, including spectacular coral assemblages (hard and soft corals) and >1,500 species of fish</i></p>	<p>As discussed previously, the only potential for impacts to reef structures associated with Project-related shipping activities would be highly localised and would not impact on the biodiversity of corals on the reef. Potential impacts on fish would likewise not be at a population level.</p> <p>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. Existing management arrangements and the use of the inner GBR Designated Shipping Area have resulted in very few incidents. Project-related bauxite and cargo shipping activities through the GBRWHA 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.</p> <p>The potential unmitigated impacts associated with Project-related shipping activities on the abundance of shapes, sizes and colours, including spectacular coral assemblages and species of fish within the GBRWHA would be negligible and long term. Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related shipping activities on the abundance of shapes, sizes and colours, including spectacular coral assemblages and species of fish within the GBRWHA 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 as outlined in Section 12.4.3.</p>

Attribute	Assessment of Potential Impacts to GBRWHA
<p>4. <i>Globally important breeding colonies of seabirds and marine turtles, including Raine Island, the world's largest Green Turtle breeding area</i></p>	<p>The South End of Curtis Island within the Port of Gladstone is known to support a medium density nesting population of the Flatback Turtle (<i>Natator depressus</i>). Raine Island is located in the outer GBR, approximately 100km from the inner GBR Designated Shipping Area that would be used by Project-related bauxite and cargo shipping.</p> <p>There would be no direct impact on marine turtles or seabirds associated with Project-related shipping through the GBRWHA. Potential impacts on marine turtles or seabirds could occur indirectly as a consequence of an oil spill from vessel collision or grounding. The potential for indirect impacts on marine ecosystems from Project-related bauxite and cargo shipping would be similar to that assessed within the GBRMP as follows:</p> <ul style="list-style-type: none"> • Collisions/grounding leading to spills - Section 4.5.2, Section 11.4.1, Section 11.4.4 and Section 11.4.5. • Artificial lighting, vessel noise and vessel strike – Sections 4.5.2 and Section 11.4.2. <p>The potential impacts associated with spills of cargo or fuel/oil from Project-related shipping activities was determined to be negligible and long term due to the low frequency of occurrence. The potential impacts associated artificial lighting and noise was determined to be negligible and long term as any exposure of marine species to lighting or noise from Project-related shipping activities in the inner GBR r Designated Shipping Area would be of short duration. The potential impacts associated with vessel strike were determined to be negligible and long term due to the low number of incidents from large ships which are slow moving. Bauxite and cargo shipping travel at speeds typically less than 14 knots.</p> <p>There would be no changes proposed to the location and method of existing ship unloading infrastructure/activities within the Port of Gladstone. Therefore there would be no impact on marine turtle or Dugong habitat in the vicinity of the Port of Gladstone as a result of Project-related shipping activities. Similarly no changes to cargo/ship loading infrastructure at the Port of Cairns for third party shipping are anticipated as a result of the Project.</p> <p>Anchorage would only typically occur at the existing designated anchorage area at the Port of Gladstone within previously disturbed areas. Anchorage is not likely to be required by third party shipping in the shallower waters of the Port of Cairns and would likely utilise existing berthing infrastructure.</p> <p>The potential unmitigated impacts associated with Project-related shipping activities on globally important breeding colonies of seabirds and marine turtles within the GBRWHA would be negligible and long term. Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related shipping activities on globally important breeding colonies of seabirds and marine turtles within the GBRWHA 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 as outlined in Section 12.4.3.</p>
<p>5. <i>Superlative natural phenomena include the annual coral spawning, migrating whales, and significant spawning aggregations of many fish species</i></p>	<p>Project-related shipping would be confined to the inner GBR Designated Shipping Area which is outside known aggregation areas for migrating whales. The aspects of Project-related shipping activities that have the potential to impact on annual coral spawning and significant spawning aggregations of fish species in the GBRWHA include:</p> <ul style="list-style-type: none"> • collisions and grounding leading to spills; • artificial lighting, vessel noise and vessel strike; • changes in water quality from release of bilge water, dumping of garbage and propeller wash; • marine pest establishment; and, • accumulation of potentially harmful chemicals. <p>Items (a) and (b) are discussed in World Heritage Criteria VII (4). Potential impacts associated with items (c), (d) and (e) are assessed for the GBRMP in Sections 11.4.4, Section 11.4.5 and Section 11.4.6 and are also applicable to the GBRHWA.</p>

Attribute	Assessment of Potential Impacts to GBRWHA
	<p>The potential impacts associated with changes in water quality was determined to be negligible and long term given that bauxite shipping activities following commencement of production would continue to be the shipments required to meet the needs of the existing Gladstone refineries, with the potential for only a small increase in shipping movements at maximum production using the existing inner GBR Designated Shipping Area, Port of Gladstone and Port of Cairns (by third parties).</p> <p>Project-related vessels are unlikely to elevate turbidity in the GBRWHA by maintaining the shipping route through the inner GBR Designated Shipping Area as there would be no direct disturbance of the seabed. Project-related shipping would utilise existing infrastructure at the Port of Gladstone and Port of Cairns, including berthing, ship-loading and anchorage areas (in the case of Port of Gladstone). Third party shipping out of the Port of Cairns is not likely to require anchorage.</p> <p>The potential impacts associated with marine pest establishment were determined to be negligible and long term. No pest species have become established as a result of Weipa bauxite and cargo shipping for over 40 years. The potential impacts associated with harmful chemicals were determined to be negligible and long term. Antifouling paint historically contained the biocide TBT however this product is now banned in Australia and most parts of the world.</p> <p>The potential unmitigated impacts associated with Project-related shipping activities on migrating whales, coral and fish spawning within the GBRWHA would be negligible and long term. Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related shipping activities on migrating whales, coral and fish spawning within the GBRWHA 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 as outlined in Section 12.4.3.</p>

Table 12-6 Assessment of Potential Impacts - World Heritage Criteria X

Attribute	Assessment of Potential Impacts
1. <i>One of the richest and most complex natural ecosystems on earth, and one of the most significant for biodiversity conservation</i>	The assessment in World Heritage Criteria VIII (1) (refer Table 12-3) indicates the potential unmitigated impact on reef ecosystems from Project-related shipping activities would be negligible and long term. Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related shipping activities on reef ecosystems of the GBRWHA 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 (refer Section 12.4.4).
2. <i>Amazing diversity supports tens of thousands of marine and terrestrial species, many of which are of global conservation significance</i>	The assessment in World Heritage Criteria VII (4) and (5) (refer Table 12-5) indicates the potential impact on marine species from Project-related shipping activities would be negligible and long term. There would be no impact on terrestrial species in the GBRWHA as shipping occurs in the ocean. Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related shipping activities on marine species of the GBRWHA has been assessed as negligible, there are a number of measures that are used for existing Weipa bauxite shipping and cargo shipping activities that would continue to be used for Project-related bauxite and cargo shipping as outlined in Section 12.4.4 .

Attribute	Assessment of Potential Impacts
<p>3. <i>Some 39 species of mangroves comprising 54% of the world's mangrove diversity</i></p>	<p>There would be no direct impact on mangroves associated with Project-related bauxite and cargo shipping. Project-related shipping including the small potential increase in ship movements at maximum production would utilise the existing inner GBR Designated Shipping Area, Port of Cairns (by third parties) and Port of Gladstone. Existing port infrastructure would be utilised within the Port of Gladstone and by third party shipping in the Port of Cairns.</p> <p>Potential impacts on mangroves could only occur indirectly as a consequence of a spill from a ship collision or grounding. The assessment of World Heritage Criteria VII (4) and (5) (refer Table 12-5) indicates the potential impact on marine ecosystems within the GBRWHA from Project-related bauxite and cargo shipping would be negligible and long term.</p> <p>Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related shipping activities on mangroves within the GBRWHA 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 as outlined in Section 12.4.4.</p>
<p>4. <i>~43,000km² of seagrass meadows in both shallow and deep water areas, including 23 per cent of known global species diversity</i></p>	<p>Seagrass meadows (which are also potential Dugong foraging habitat) are known to occur within the Port of Gladstone and coexist with these port facilities.</p> <p>Similar to item 3, there would be no direct impact on seagrass meadows associated with Project-related shipping. Project-related shipping including the small potential increase in ship movements at maximum production would utilise the existing inner GBR Designated Shipping Area, Port of Cairns (by third parties) and Port of Gladstone. Existing port infrastructure would be utilised within the Port of Gladstone and by third party shipping in the Port of Cairns. No additional dredging would be required at the Port of Gladstone or Port of Cairns.</p> <p>Potential impacts on seagrass could only occur indirectly as a consequence of a spill from a ship collision or grounding. However, the assessment of World Heritage Criteria VII (4) and (5) indicates the potential impact on marine ecosystems from Project-related shipping would be negligible and long term.</p> <p>Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related shipping activities on seagrass meadows within the GBRWHA 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 as outlined in Section 12.4.4.</p>
<p>5. <i>Habitat for one of the world's most important Dugong populations and six of the world's seven species of marine turtle</i></p>	<p>Item 4 outlines the seagrasses that are known to occur in the Port of Gladstone. These areas are also zoned as a Special Management Areas under the <i>Great Barrier Reef Marine Park Regulations 1983</i> for Dugong protection.</p> <p>Similar to item 4, there would be no direct impact on Dugong or marine turtle habitat associated with Project-related shipping. Project-related shipping including the small potential increase in ship movements at maximum production would utilise the existing inner GBR Designated Shipping Area, Port of Cairns (by third parties) and Port of Gladstone. Existing port infrastructure would be utilised within the Port of Gladstone and by third party shipping in the Port of Cairns. No additional dredging would be required at the Port of Gladstone or Port of Cairns.</p> <p>Potential impacts from vessel strike on marine species such as Dugong is discussed in Section 11.4.4.2 and World Heritage Criteria VII (4). The QPWS stranding database recorded ten Dugongs being struck in the GBR, or found within the area with vessel strike injuries between 1996 and 2010 (GBRMPA 2012b). This equates to a frequency of 0.66 Dugong vessel strikes per annum during this period in the GBR.</p> <p>In the operational phase of the Project, bulk carriers such as those used for bauxite transport would be used. Bulk carriers are large and slow moving (14 knots being the usual cruising speed) and would be travelling more slowly and under pilotage in shallow or confined marine areas where Dugongs are more commonly found. Bauxite has been shipped from the Port of Weipa to the Port of Gladstone via the inner GBR Designated Shipping Area for over 40 years, and there have been no reported incidents of vessel strike on marine fauna by these vessels.</p> <p>Therefore, Project-related shipping (including the small potential increase at maximum production) is not considered to significantly increase the risk of vessel strike on</p>

Attribute	Assessment of Potential Impacts
	<p>Dugongs and the potential impacts associated with vessel strike on Dugongs were determined to be negligible and long term.</p> <p>The potential unmitigated impacts associated with Project-related shipping activities on Dugongs and marine turtles within the GBRWHA would be negligible. Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related bauxite and cargo shipping activities on Dugongs and marine turtles within the GBRWHA 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 as outlined in Section 12.4.4.</p>
<p>6. <i>A breeding area for Humpback Whales, with at least 30 other species of whales and dolphins also identified</i></p>	<p>The GBR complex and the Kimberley Region are considered important breeding and calving grounds for Humpback Whales (DSEWPac 2012q). Hervey Bay and the Whitsundays appear to be important resting grounds for mothers and calves of the east coast population on their southward migration (DSEWPac 2012q).</p> <p>Similar to item 4, there would be no direct impact on a breeding area for Humpback Whales associated with Project-related bauxite and cargo shipping. This is because the small potential increase in bauxite and cargo shipping at maximum production would continue to traverse the same routes through GBRWHA as existing Weipa bauxite and cargo shipping via the inner GBR Designated Shipping Area, Port of Gladstone and Port of Cairns (by third parties).</p> <p>Potential impacts from vessel strike on marine species such as Humpback Whales are discussed in Section 11.4.2 and World Heritage Criteria VII (4) (refer Table 12-5). The International Whaling Commission (IWC) maintains a database of strikes on whales. The IWC database 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 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.</p> <p>The potential impacts associated with vessel strike were determined in Section 11.4.2 and World Heritage Criteria VII(4) (refer Table 12-5) to be negligible and long term due to the small potential increase in shipping movements at maximum production and low number of incidents from large ships which are slow moving. Bauxite and cargo shipping travel at speeds typically less than 14 knots.</p> <p>The potential unmitigated impacts associated with Project-related shipping activities on a breeding area for Humpback Whales within the GBRWHA would be negligible. Although no specific safeguards, avoidance or mitigation measures are required as the unmitigated impact of Project-related shipping activities on a breeding area for Humpback Whales within the GBRWHA 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 as outlined in Section 12.4.4.</p>

Attribute	Assessment of Potential Impacts
<p>7. <i>70 bioregions (broad-scale habitats) identified comprising 30 reef bioregions and 40 non-reefal bioregions; including algal and sponge gardens, sandy and muddy bottom communities, continental slopes and deep ocean troughs. The reef bioregions contain one third of the world's soft coral and sea pen species (80 species). 2,000 species of sponges equalling 30 per cent of Australia's diversity in sponges 630 species of echinoderms (for example sea stars) equalling 13 per cent of the known global diversity</i></p>	<p>There would be no direct impact on reef bioregions associated with Project-related shipping. Project-related shipping including the small potential increase in ship movements at maximum production would utilise the existing inner GBR Designated Shipping Area, Port of Cairns (by third parties) and Port of Gladstone. Existing port infrastructure would be utilised within the Port of Gladstone and by third party shipping in the Port of Cairns. No additional dredging would be required at the Port of Gladstone or Port of Cairns.</p> <p>Potential impacts on reef bioregions could occur indirectly, at a localised scale, from accidental ship grounding. However, the assessment of World Heritage Criteria VIII (1) (refer Table 12-3) indicates the potential unmitigated and mitigated impacts from Project-related shipping are both considered to be negligible and long term. A number of measures that are used for existing Weipa bauxite and cargo shipping activities would continue to be used for Project-related bauxite and cargo shipping as outlined in Section 12.4.4.</p>

12.5 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 12.4 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 GBRWHA would be negligible to minor. The residual impacts with mitigation would remain the same and therefore not significant. As such, offsets relating to the GBRWHA are not required under the Commonwealth offsets policy.

12.6 Conclusion and Summary of Residual Impacts

Project-related bauxite and cargo shipping would continue to traverse the GBRWHA via the same route through the inner GBR Designated Shipping Area as existing Weipa bauxite shipping and cargo shipping. The small proportion of total Project-related shipping movements, particularly taking into consideration the small potential increase in Project-related shipping movements at maximum production, in the GBRWHA relative to existing and forecast levels is assessed as having a negligible to minor impact on the GBRWHA. 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 the Project.

