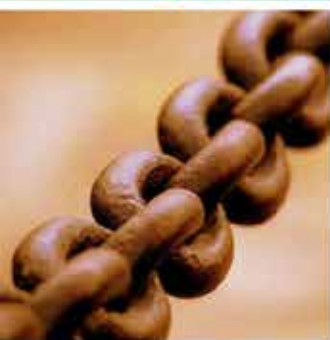




# Ship Anchorage Management in the Great Barrier Reef World Heritage Area

Synthesis Report

July 2013



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## **Reliance statement**

*This Report for Ship Anchorage Management in the Great Barrier Reef World Heritage Area (“Report”):*

- *has been prepared by GHD Pty Ltd (“GHD”) for the Great Barrier Reef Marine Park Authority on behalf of the Commonwealth of Australia (“the Client”);*
- *is subject to, and prepared in accordance with, the provisions of a contract between GHD and the Client dated 18 September 2012 as varied on 17 June 2013 (the Contract); and,*
- *was prepared for the purpose of informing Ship Anchorage Management in the Great Barrier Reef World Heritage Area.*

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- *was restricted to work that could be achieved within the project timeframes; and*
- *did not include exhaustive consultation or detailed field assessments, instead published information and consultation within the bounds of project timeframes have been utilised.*

*The opinions, conclusions and any recommendations in this Report are based on assumptions and qualifications made by GHD when undertaking services and preparing the Report (“Assumptions”). The Assumptions are described in the body of the Report and include, but are not limited to:*

- *information published by third parties, provided to GHD by the Client and relied upon by GHD in preparing this Report was reflective of current site conditions and shipping forecasts; and*
- *stakeholders involved in consultation on the drafts of this Report shared information of relevance freely with GHD and did not withhold any content of material relevance.*

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## EXECUTIVE SUMMARY

### Introduction to the project

The Great Barrier Reef (the Reef) is the world's largest coral reef ecosystem, spanning more than 348,000 kilometres squared (km<sup>2</sup>) of the continental shelf of Queensland. The Reef has significant value which is recognised by its inclusion as a Marine Park, a World Heritage Area, a National Heritage Place and a Commonwealth Marine Area. The recognition of these significant values carries an obligation and responsibility to protect and conserve the values for the future.

The Australian and Queensland Governments are working together on a comprehensive strategic assessment (the Strategic Assessment) of the Great Barrier Reef World Heritage Area (World Heritage Area) and adjacent coastal zone. The Strategic Assessment will include an overall assessment of the effectiveness of management arrangements to protect the environmental, social, cultural and heritage values of the World Heritage Area and other matters of national environmental significance (MNES) protected under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). The goal is to ensure these matters, including the World Heritage values of the Reef, are protected while creating a long-term plan for sustainable development in the region.

The Strategic Assessment comprises two elements: The Great Barrier Reef Coastal Zone Strategic Assessment to be undertaken by the Queensland Government; and the Great Barrier Reef Marine Strategic Assessment of the marine component to be undertaken by the Great Barrier Reef Marine Park Authority (GBRMPA). The marine component will examine the values, the condition and trend of those values, impacts on those values, what is being done to protect those values (i.e. current management arrangements) and the effectiveness of the management arrangements. Once this is established the likely condition and trend of values will be estimated and future management arrangements will be identified. Ports and shipping are two such activities where concern about impacts on the values has been expressed.

The study reported here supports the marine component of the Strategic Assessment by completing works to achieve the identification of impacts and proposed management strategies associated with "*Ship Anchorage Management in the Great Barrier Reef World Heritage Area*". Three phases of work have been completed in delivering this project:

1. Identification of the environmental, social, cultural and heritage impacts of anchoring associated with the five major ports in the World Heritage Area: Cairns, Townsville, Abbot Point, Hay Point, and Gladstone.
2. Socio-economic costs and benefits associated with different anchorage strategies.
3. Anchorage management strategies that could be used to avoid, mitigate, offset or adaptively manage identified impacts.



This document synthesises the findings across three phases of work completed for this project. The detailed studies are appended in full to this report. The project findings complement other projects delivered in support of the Strategic Assessment, including development of improved information upon which to base decisions in relation to dredge spoil management, amongst others.

### **Project study area**

Under predicted population growth and industrial expansion in coming years ship calls across all ports within or adjacent to the Great Barrier Reef Marine Park or World Heritage Area are predicted to increase from around 4000 per annum currently to over 10, 000 per annum by 2032 (PGM 2012).

Over the next 10 years these predicted shipping increases are driven primarily by bulk commodity exports from ports located between Cairns and Gladstone. Accordingly, to inform the Strategic Assessment, this project is considering the risks from trading vessel anchorages associated with the five major ports namely:

- Port of Cairns
- Port of Townsville
- Port of Abbot Point
- Port of Hay Point
- Port of Gladstone

As the project requires investigation of impacts associated with anchorages of the five major ports a key step has been to define the existing areas being used for anchorage by trading vessels working to each of the nominated ports. This was achieved through consultation with each port's Regional Harbour Master to confirm designated anchorages defined by navigational charts and, for locations without chartered anchorages, to define an area within which vessels are known or directed to anchor. Where specific anchor drop points are mapped a conservative approach of considering the entire area across which anchor drop may occur has been used to define the anchorage area of a port. This has provided an envelope of seabed adjacent each of the five ports within which anchorage currently occurs. These spatial areas provide the footprint of investigation adjacent to each port that has been addressed by this study. This approach enables the project to take into account direct impacts from anchor drop in addition to indirect impacts that can be experienced by designating a network of drop points, such as habitat fragmentation or impact to habitat continuity/integrity.

### **Project methodology**

In delivering all components of work completed under this project information has been sourced from online databases, scientific literature, protected species databases and grey literature. Consultation with targeted stakeholder groups was conducted as part of the impact assessment and economic phases of the project.

The project has only used desktop study of existing information; no fieldwork to ground truth desktop information was included as part of the project. Traditional Owners were invited to participate in the stakeholder consultant, however, were unavailable to participate within the project delivery timeframes. Further, full consultation with a broad suite of stakeholders, including commercial and

recreational fishers and the public was not possible within the Project timeframes. These limitations of the project scope are acknowledged and have informed development of findings.

## **Key Findings**

There is a range of sensitive environmental, social, cultural and heritage values of relevance to the Reef's listing as a World Heritage Area that are consistent to all five anchorage areas and which could be affected by area use. Four of the five anchorage areas being assessed, Abbot Point being the exception, are within close proximity to populated areas. Commercial and recreational fishers accessing the World Heritage Area, and tourism operators, among others have the potential of being influenced by the presence of the anchorage areas.

Although seagrasses have only been recorded to characterise two anchorage areas, all of the areas are known to provide some habitat value to marine megafauna and species (including fish) dependent on seagrasses. Accordingly use of the anchorages has the potential to both directly and indirectly affect megafauna, fisheries assemblages and those accessing these resources.

Coral reefs are not located within the anchorage areas but are environmental features of adjacent habitats at varying distances from the anchorage areas and have the potential to be indirectly affected from use of the anchorage areas. The inner anchorage area at Port of Gladstone supports rocky reef habitat with all other anchorage areas located in open soft sediment habitats.

Actual and potential impacts of anchorages that may be experienced at each of the five major ports were identified using a risk based Environmental Impact Assessment (EIA) desk top study. That process considered information available from published literature, grey literature and consultation to identify sensitive environmental, social, cultural and heritage values of relevance to the Reef's listing as a World Heritage Area which could be affected by anchorage use. Impacts on these values could also be seen to have an impact on the Outstanding Universal Value of the World Heritage Area. The primary impacts that may be realised on a frequent basis from ship anchorage were identified to be:

- Disturbance to seabed and supported biodiversity from anchor drop and chain drag
- Minor releases of emissions or pollutants/wastes from ships
- A reduction or alteration of the aesthetic value of the coastal vista
- Interference with other users access to resources within the World Heritage Area
- Potential for marine pest introduction
- Interference with species behaviour.

Of these a reduction in the aesthetic values has a high risk rating. Of all other potential chronic impacts, release of marine pest species is the only activity considered to be of high risk to the values of the World Heritage Area. The change of a pest being introduced is, however, considered unlikely to rare given the existing management measures controlling this risk.

The EIA findings indicate that current anchorages are generally located in areas that have little effect on the majority of the biodiversity values for which the Reef is recognised. They are located in open seabed systems and anchor drop or chain drag do not, therefore, impact on sensitive habitats such as coral reef systems.

A socio-economic Cost Benefit Analysis (CBA) was completed using an economic appraisal model developed for the project. This considered environmental, commercial and social costs and benefits associated with anchorage demand and management under current and future development scenarios out to 2032. Information developed by the EIA supported the analysis in conjunction with additional desktop review, consultation and modelling. Data which informed the project included recently released forecasts of shipping within Queensland to estimate future anchorage demand requirements (out to 2032). Maritime Safety Queensland anchor movement records were also used to inform existing patterns of ship movements' and average anchor waiting times for each of the ports.

The CBA identified that the anchorage areas (assessed by this project) in use across the five major ports are able to support current demand requirements and, with the exception of Hay Point, are predicted to be able to support future demand requirements.

Findings also identified that there are opportunities across all port anchorages to improve management of anchorages, reduce impact potential and achieve environmental benefits.

Information developed by the EIA and CBA has informed the development of an Environmental Management Strategy (EMS) for the five ship anchorages that could be used to avoid, mitigate, offset or adaptively manage identified impacts, particularly under future shipping demand. The strategy has been designed to enable improved management of anchorages to protect and minimise identified impacts on environmental values during the next 25 years as shipping demand increases.

### **Environmental ship anchorage management strategy**

The environmental ship anchorage management strategy and the underpinning actions are driven by an overarching objective to minimise environmental and social impacts associated with anchorage use while maintaining efficient port operation. The strategy, therefore, provides for improvements in environmental management of the existing port anchorages which also realise social benefits.

Outcomes to achieve objectives and how each of the objectives addresses the identified impacts are prescribed below.

Objective 1: Manage existing anchorages with the aim of protecting environmental values

*Outcome 1-1:* Provide guidance and education for key stakeholders in environmental management of anchorages and ships while at anchor for improved environmental outcomes

It is recommended that the GBRMPA develop environmental guidelines relating specifically to ships at anchor within the World Heritage Area which could then be used to communicate with ship owners and masters of ship. The environmental management measures described in the guideline should aim at minimising the following impacts identified as relevant to anchoring activities, including:

- Disturbance to seabed and supported biodiversity
- Release of emissions or pollutants/wastes
- Altered aesthetic value (or perception thereof)
- Interference with access to resources
- Marine pest introduction
- Interference with species behaviour.

*Outcome 1-2:* Obtain better understanding of environmental condition of anchorages and their use near ports to enable adaptive management under changing conditions

Targeted, regular environmental monitoring of the areas used for anchoring will improve understanding of the environmental condition and enable adaptive management intervention to be considered if controls are found to be ineffective. It is recommended that the GBRMPA monitor the environmental conditions of anchorages at appropriate intervals for the following parameters:

- Biodiversity and presence of marine pests
- Seabed conditions (habitat type, rugosity)
- Sediment type and quality
- Underwater noise
- Air quality
- Waste accumulation

*Outcome 1-3:* Further enhance environmental performance at ship anchorages for improved environmental outcomes

To enhance environmental performance, including marine pest species management and an understanding of aesthetic impacts, at ship anchorages it is suggested that environmental inspection and audit programs for ships at anchor in the Marine Park be developed in collaboration with ports, the shipping industry, AMSA, AQIS and MSQ.

Objective 2: Optimise use of existing anchorages in the Marine Park

*Outcome 2-1:* Restrict shipping industry users of the Marine Park to anchor only in designated anchorage areas

Designated anchorage can enable more efficient management and habitat impact controls. Reducing the footprint of the anchorage area also reduces the extent of the Reef exposed to habitat impacts and pollutant risk. It also facilitates a response to any incident or audit and inspection of ships at anchor.

*Outcome 2-2:* Minimise the need for further anchorages in the Marine Park

Improved whole of supply chain management, including scheduled vessel arrivals with designated anchorages and a Vessel Arrival System (VAS), would result in more efficient movement of commodities from the mine to the terminal to the destination port. This may reduce the need for further anchorage points, enable more efficient use of existing anchorages and potentially facilitate a reduction in the number of existing anchorages.

Objective 3: Minimise environmental impacts from future anchorages and anchorage relocations

*Outcome 3-1: Ensure environmental criteria are considered when selecting future anchorages*

Outcome 3-1 will provide anchorage site selection criteria that include environmental considerations where new designations, expansion or relocation of anchorages cannot be avoided. The environmental considerations should address the primary impacts identified by this project including disturbance to seabed and supported biodiversity, pollutants/wastes, aesthetic values, access to resources, marine pest introduction and interference with species behaviour.

For successful implementation of the management strategy proposed in this document, it is recommended that the GBRMPA work with other relevant agencies to:

- Develop implementation plans for each of the actions, including resource requirements, schedules and key milestones
- Review the management strategies in the context of existing programs and proposed initiatives and adjust timeframes, where required
- Identify resource availability (personnel and finance)
- Develop a framework for stakeholder engagement, including identification of stakeholders for each of the actions and mode of engagement (e.g. through industry groups or directly)
- Engage with stakeholders comprehensively and early to identify where opportunities for collaboration or shared resources exist

### **Summary of findings**

A summary of key findings from the project for each of the five ports is provided in table E-1. The summary addresses:

- Current and future use of anchorages
- Existing management of anchorages
- Adequacy of existing anchorages to meet future demand for anchorages
- Management options to be considered in order to meet the current and future needs for environmental protection of the Reef
- Environmental ship anchorage management strategy objectives and outcomes relevant at each port

Ongoing communication and education regarding potential environmental impacts from anchorage use, how these influence the values of the Reef and opportunities to ameliorate or minimise impacts will support sustainable use of the World Heritage Area.

The environmental ship anchorage management strategy provided here aims to be applicable to the current and future use of the port anchorages and underpin ongoing sustainable use of the anchorages in the World Heritage Area without putting at risk the values for which the area is recognised. This strategy has been developed using information available at the time of the project's delivery. As new science is published and environmental management practices are continuously reviewed and adapted it is expected that this strategy will also be reviewed and adapted by the GBRMPA to remain relevant.

**Table E-1:** Summary of the current and future use of anchorage areas, current management, management options and management strategy objectives and outcomes (\*as assessed with regard to the anchorage area studied by this project, \*\*as assessed by the CBA (Appendix B) of this study)

	<b>Cairns</b>	<b>Townsville</b>	<b>Abbot Point</b>	<b>Hay Point</b>	<b>Gladstone</b>
<b>Current Anchorage use</b>	Multi commodity port	Multi commodity port	Single commodity port	Single commodity port	Multi commodity port
	500 ship arrivals per year	730 ship arrivals per year	180 ship arrivals per year	800 ship arrivals per year	1,500 ship arrivals per year
	Less than one ship call per day to anchor	One ship call per day to anchor	Less than one ship call per day to anchor	Two to three ship calls per day to anchor	Three ship calls per day to anchor
	Average time at anchor – 12 hours	Average time at anchor – three days	Average time at anchor – three days	Average time at anchor – 19 days	Average time at anchor – four days
<b>Current Management of Anchorages</b>	Sufficient physical capacity Environmental impacts from existing anchorage practices considered to be not significant Designated anchorages.	Sufficient physical capacity* Environmental impacts from existing anchorage practices considered to be not significant. No designated anchorages.	Sufficient physical capacity* Environmental impacts from existing anchorage practices considered to be not significant. No designated anchorages.	Sufficient physical demand even though high demand for anchorages, nearly all ships (99%) proceed directly to anchor from sea to await a berth. Environmental impacts from existing anchorage practices considered to be not significant. Designated anchorages.	Sufficient physical capacity. Environmental impacts from existing anchorage practices considered to be not significant. Designated anchorages.

	<b>Cairns</b>	<b>Townsville</b>	<b>Abbot Point</b>	<b>Hay Point</b>	<b>Gladstone</b>
<b>Future Demand** (next 20 years)</b>	Low growth in ship calls to port (2% p.a.)	Low growth in ship calls to port (2% p.a.)	Significant growth in future ship calls to port (11% p.a.)	Moderate growth in future ship calls to port (5-6% p.a.)	Moderate growth in future ship calls to port (3-4% p.a.)
	No change to ship calls per day to anchor	Less than two ship calls per day to anchor	2.5 ship calls per day to anchor	6.5 ship calls per day to anchor	Six ship calls per day to anchor
<b>Future adequacy** (prediction)</b>	No need to expand anchorage	No need to expand anchorage*	No need to expand anchorage*	Requirement for expansion of anchorages by around 30% if no change in management	No need to expand anchorage
<b>Management Options</b>	Continue current practices of ship anchoring	Continue current practices of ship anchoring	Continue current practices of ship anchoring	Consider more efficient use of existing anchorages	Continue current practices of ship anchoring
	Adopt additional actions to improve current anchorage management practices	Adopt additional actions to improve current anchorage management practices	Adopt additional actions to improve current anchorage management practices	Adopt additional actions to improve current anchorage management practices	Adopt additional actions to improve current anchorage management practices
	Optimise the use of existing anchorages	Consider implementing designated anchorage areas	Consider implementing designated anchorage areas	Further investigate impacts of ship anchorages on aesthetic values at the Port of Hay Point	Optimise the use of existing anchorages
	Investigate impacts of ship anchorages on aesthetic values at the Port of Cairns	Investigate impacts of ship anchorages on aesthetic values at the Port of Townsville	Consider scheduled ship arrivals if and when anchorage demand dictates	Consider scheduled arrivals in combination with (existing) designated	Investigate impacts of ship anchorages on aesthetic values at the Port of Gladstone If waiting times



	Cairns	Townsville	Abbot Point	Hay Point	Gladstone
				anchorage areas to avoid need to expand anchorage areas	increase beyond four days, consider redesignating some anchorages as coal ship anchorages, and consider feasibility of scheduled ship arrivals
<b>Objective and Outcome</b>	<p>Objective 1: Protecting environmental values</p> <p>Outcome 1-1: Guidance and education for stakeholders</p> <p>Outcome 1-2: Environmental condition monitoring</p> <p>Outcome 1-3: Enhanced environmental performance</p> <p>Objective 2: Optimise use</p> <p>Outcome 2-1:</p>	<p>Objective 1: Protecting environmental values</p> <p>Outcome 1-1: Guidance and education for stakeholders</p> <p>Outcome 1-2: Environmental condition monitoring</p> <p>Outcome 1-3: Enhanced environmental performance</p> <p>Objective 2: Optimise use</p> <p>Outcome 2-1: Restrict users to designated</p>	<p>Objective 1: Protecting environmental values</p> <p>Outcome 1-1: Guidance and education for stakeholders</p> <p>Outcome 1-2: Environmental condition monitoring</p> <p>Objective 2: Optimise use</p> <p>Outcome 2-1: Restrict users to designated anchorage areas</p>	<p>Objective 1: Protecting environmental values</p> <p>Outcome 1-1: Guidance and education for stakeholders</p> <p>Outcome 1-2: Environmental condition monitoring</p> <p>Objective 2: Optimise use</p> <p>Outcome 2-1: Restrict users to designated anchorage areas</p> <p>Outcome 2-2: Minimise the need for further</p>	<p>Objective 1: Protecting environmental values</p> <p>Outcome 1-1: Guidance and education for stakeholders</p> <p>Outcome 1-2: Environmental condition monitoring</p> <p>Objective 2: Optimise use</p> <p>Outcome 2-1: Restrict users to designated anchorage areas</p> <p>Outcome 2-2:</p>

<b>Cairns</b>	<b>Townsville</b>	<b>Abbot Point</b>	<b>Hay Point</b>	<b>Gladstone</b>
Restrict users to designated anchorage areas	<p>anchorage areas</p> <p>Objective 3: Environmental criteria for anchorages</p> <p>Outcome 3-1: Environmental criteria for anchorage site selection</p>	<p>Outcome 2-2: Minimise the need for further anchorages</p> <p>Objective 3: Environmental criteria for anchorages</p> <p>Outcome 3-1: Environmental criteria for anchorage site selection</p>	<p>anchorages</p> <p>Objective 3: Environmental criteria for anchorages</p> <p>Outcome 3-1: Environmental criteria for anchorage site selection</p>	Minimise the need for further

## ACRONYMS

<b>Acronym</b>	<b>Term</b>
AMSA	Australian Maritime Safety Authority
AQIS	Australian Quarantine and Inspection Service
ASA	Australian Ship Owners Association
CBA	Cost Benefit Analysis
DAFF	Department of Agriculture, Fisheries and Forestry
DSA	Designated Shipping Area
DSDIP	Department of State Development, Infrastructure and Planning
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EAM	Environmental Assessment and Management
EIA	Environmental Impact Assessment
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EMS	Environmental Management Strategy
GBRMPA	Great Barrier Reef Marine Park Authority
ha	hectares
IMO	International Maritime Organisation
km	kilometres
km <sup>2</sup>	square kilometres
MNES	Matters of National Environmental Significance
MSQ	Maritime Safety Queensland
NIMPCG	National Introduced Marine Pests Coordination Group
OUV	Outstanding Universal Value
PSSA	Particularly Sensitive Sea Area
RHM	Regional Harbour Master
VAS	Vessel Arrival System
National System	National System for the Prevention and Management of Marine Pest Incursions
the Marine Park	the Great Barrier Reef Marine Park
the Reef	the Great Barrier Reef
World Heritage Area	Great Barrier Reef World Heritage Area

## GLOSSARY

<b>Term</b>	<b>Meaning</b>
Aesthetics	a set of principles concerned with the nature and appreciation of beauty
Anchorage	an area where vessels (ships) let down anchor
Bathymetry	the depth and topography of the seabed or seafloor relief
Biodiversity	the variety of plant and animal life in the world or in a particular habitat
Bulk commodity exports	commodities that are exported from Australia unpackaged via shipping. Include coal, ore, grain
Bunkering	the act or process of supplying a ship with fuel
Cumulative impacts	changes to the biophysical, social, economic, and cultural environments caused by the combination of past, present and potential future actions. The impacts can be positive or negative
Ecosystem processes	the physical, chemical and biological actions or events that link organisms and their environment
Ecologically sustainable	a capacity of ecosystems to maintain their essential functions and processes, and retain their biodiversity in full measure over the long-term
Environment	ecosystems and their constituent parts, natural and physical resources; and the qualities and characteristics of locations, places and areas, that contribute to their biodiversity and ecological integrity.
Geomorphic	relating to the form of the landscape and other natural features of the earth's surface
Grey literature	comprises scientific and technical reports, patent documents, conference papers, internal reports, government documents, newsletters, factsheets and theses, which are not readily available through commercial or public access channels
Matters of National Environmental Significance	flora, fauna, ecological communities and heritage places that are protected under Commonwealth legislation (EPBC Act)
Mitigate	to make something less severe, serious or lessen the gravity of
Protected species	species' provided protection under policies, legislation or laws
Q2	second quarter
Q4	fourth quarter

<b>Term</b>	<b>Meaning</b>
Rugosity	an indicator of the amount and complexity of habitat available for colonisation by benthic organisms (those attached to the seafloor), or as shelter and foraging area for mobile organisms
Ship arrivals	ships arriving to a port area
Ship calls	the number of ships arriving to a port
Socio-economic	relating to or concerned with the interaction of social and economic factors
Sustainability	conserving an ecological balance by avoiding depletion of natural resources
Totem species	an object, usually an animal or plant, that is revered by members of a particular social group because of a mystical or ritual relationship that exists with that group

# 1. INTRODUCTION

## 1.1 Relationship of this project to the comprehensive Strategic Assessment

The Great Barrier Reef Marine Park Authority (GBRMPA) is the principal advisor to the Commonwealth Government on the conservation, care and utilisation of the Great Barrier Reef Marine Park (the Marine Park). The Marine Park is a multiple-use marine park that supports a range of activities, industries, communities and businesses. The GBRMPA's goal is to provide for the long-term protection, ecologically sustainable use, understanding and enjoyment of the Great Barrier Reef (the Reef) for all Australians and the international community through the care and development of the Marine Park.

The Australian and Queensland Governments are working together on a comprehensive Strategic Assessment of the Great Barrier Reef World Heritage Area (World Heritage Area) and the nearby coastal zone. The Strategic Assessment is an overall assessment of the effectiveness of management arrangements to protect the environmental values of the World Heritage Area. The goal is to ensure the World Heritage values of the Reef are protected while creating a long-term plan for sustainable development in the region.

The Strategic Assessment will identify planned and potential future development that could impact on the World Heritage Area's Outstanding Universal Value (OUV) and inform long-term planning for sustainable development. The Strategic Assessment will examine the pressures, including the cumulative impacts of actions, such as shipping, on the World Heritage Area, other relevant matters of national environmental significance (MNES), and the management arrangements to deal with such impacts.

The Strategic Assessment comprises two elements: The Great Barrier Reef Coastal Zone Strategic Assessment to be undertaken by the Queensland Government; and the Great Barrier Reef Marine Strategic Assessment to be undertaken by the GBRMPA.

The marine assessment will examine the uses of the Marine Park and the impacts of these uses. In addition, the controls on those uses and policies will be examined and the effectiveness of those controls assessed. Of the activities in the Marine Park, ports and shipping is one area where concern about impacts has been expressed (GBRMPA 2009a). This project supports the marine component of the Strategic Assessment by completing works to achieve the identification of impacts and proposed management strategies associated with "*Ship Anchorage Management in the Great Barrier Reef World Heritage Area*". Findings from the project will inform the comprehensive strategic assessment of the Reef and associated Sustainable Regional Development program.

## 1.2 Background to this project

There is a predicted increase in shipping traffic within the Marine Park and World Heritage Area. Over the next 10 years this is primarily driven by bulk commodity exports. This increase is focused around existing and future port expansions at Queensland ports between Cairns and Gladstone. The proposed

port expansions may have far reaching and long-lasting implications for the health of the Marine Park and in particular the in-shore biodiversity of the Great Barrier Reef Region depending on how well they are managed (GBRMPA 2013).

The International Maritime Organisation (IMO) designated the Reef as a Particularly Sensitive Sea Area (PSSA) in 1990. A PSSA is an area that needs special protection through action by IMO because of its significance for recognised ecological, socio-economic, or scientific attributes where such attributes may be vulnerable to damage by international shipping activities. With this declaration, the Australian Government was able to implement a number of measures to protect the Reef, including ship routing, traffic management, shore based monitoring, emergency response arrangements and pilotage.

The *Great Barrier Reef Marine Park Zoning Plan 2003* designates where ships may navigate; which is only within the Designated Shipping Areas (DSA) and the General Use Zone. The definition of navigate includes moor, or anchor, in the course of navigation. This indicates that ships are allowed to navigate (including anchor) in the DSA and the General Use Zone in the Marine Park.

The projected increase in shipping has the potential to increase both the number and size of anchorage areas adjacent to ports. The management of shipping anchorage associated with port activities in the Great Barrier Reef Region is achieved by a number of agencies responsible for safe operation of shipping within the Region. The Queensland Department of Transport and Main Roads, through Maritime Safety Queensland (MSQ), provide guidance to mariners to ensure orderly management of shipping in areas adjacent to ports, with the focus on safety and navigation. Environmental and multiple-use considerations for those areas are not a required consideration as part of the process, however, every effort is made to minimise shipping impacts within the Reef and maintain equitable access for all users where it is safe to do so.

### 1.3 The project

The current project develops understanding of the environmental impacts, risks, costs and benefits of ship anchorage adjacent to major ports operating in the Reef and synthesises relevant strategies for managing anchorage to reduce potential impacts. Through this, the project will provide information to support best practice environmental management of ship anchoring in the Reef and inform future policy and planning outcomes, including the Strategic Assessment, Sustainable Regional Development and the North East Shipping Management Plan.

The project will directly inform the following Strategic Assessment deliverables, as set out under the Terms of Reference for the Great Barrier Reef Region Strategic Assessment:

- Item 3.1 Assessment of actual and potential impacts including direct, indirect, consequential and cumulative impacts
- Item 4.1.1 (c) Consider environmental, social, cultural and economic issues
- Item 4.1.1 (d) Avoid, mitigate, offset and adaptively manage impacts
- Item 4.1.1 (e) Address uncertainty and risk

- Item 4.1.1 (f) Provide certainty regarding where uses may occur etc.
- Item 5 Describe projected condition of relevant matters of national environmental significance
- Item 6 Recommendations for changes to the Program

Key benefits of the project are identified to be:

1. Assist the GBRMPA and the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) in providing high level scientific and environmental advice and strategies for improved ship anchorage management for the Great Barrier Reef Region.
2. Assist with addressing potential environmental issues related to anchoring, including cumulative impacts, due to increases in ports and shipping activities in the Great Barrier Reef Region (i.e. port expansions and associated increases in shipping volumes).
3. Assist in the identification of improved management and protective measures to protect values that underpin MNES (such as the Marine Park) and those values identified in the GBRMPA Outlook Report 2009 (GBRMPA 2009a), which include biodiversity, ecosystem health, heritage values, human use and aesthetics.
4. Improved guidance for ports and mariners concerning anchoring arrangements and selection of future anchoring areas that support the orderly management of shipping through safety, navigation, environmental and multiple-use considerations.
5. Likely administrative reductions for the GBRMPA, other regulatory agencies and ports due to improved guidance and through the development of policies that streamline environmental assessment processes.
6. The project's expected outputs have potential to support the interests of other commercial and non-commercial users of the Marine Park by reducing the risk of user conflict.

The project will complement other projects being delivered in support of the Strategic Assessment, including development of improved information upon which to base decisions in relation to dredge spoil management.

#### 1.4 **The structure of this report**

This report presents a synthesis of work completed to identify impacts and propose management strategies associated with ship anchorage use at the five major ports. Elements of work completed under this project have included an assessment of impacts to values of the World Heritage Area from ship anchorage activities and a Cost Benefit Analysis (CBA) of different anchorage management strategies under existing and future demand scenarios. From this information the project has identified potential future environmental management strategies of relevance to minimising impacts from anchorage activities over the next 25 years.

Information from all phases of work has been synthesised here to provide a comprehensive standalone report for the project that brings together all elements of work to support key recommendations. The findings are presented



with regard to each of the five major ports. However, the general flow of information reported adopts a classic structure as described following:

- Executive summary – provides a comprehensive, summarised, account of the project and its outcomes.
- Introduction –introduces the requirement and intent of this project and describes the relationship of this project to the overarching Strategic Assessment.
- Methods – describes the research approach used to complete the various works conducted under the project.
- Results – for each of the five major ports describes the existing environment, potential impacts and suggested management strategies of relevance.
- Conclusions – provides concluding remarks and recommendations.
- References – identifies literature relied upon within the report.
- Appendices. – provides information supportive of the report, including complete reports produced at successive stages of project delivery.

This report, therefore, provides a clear and concise summary of all content relevant to the understanding of outcomes from the project across all elements of the project. This report has been developed using information available at each phase of the project's delivery. As new science is available and environmental management practices are continuously reviewed and adapted it is expected that information reported here may be superseded. Information regarding review and adaptation of findings reported in this project is also provided to maintain relevancy and currency of this project.

## 2. METHODS

### 2.1 Phases of project

The project has been delivered across three phases of work:

1. Identification of the environmental impacts of anchoring associated with the five major ports in the World Heritage Area: Cairns, Townsville, Abbot Point, Hay Point, and Gladstone.
2. Socio-economic costs and benefits associated with different anchorage strategies.
3. Anchorage management strategies that could be used to avoid, mitigate, offset or adaptively manage identified impacts.

All of these work phases have developed stand alone reports which provide a detailed account of the works completed by each phase. All aspects of the project have, however, been targeted at providing information on how ship anchorages across the five major ports can be managed for environmental protection over the next 25 years. As noted under section 1.4 this report provides a synthesis across those work phases to summarise relevant information from each phase of delivery in conjunction with the environmental management strategies developed under the project. Results are presented across all work phases for each of the major ports.

### 2.2 Study area

#### 2.2.1 Great Barrier Reef Region

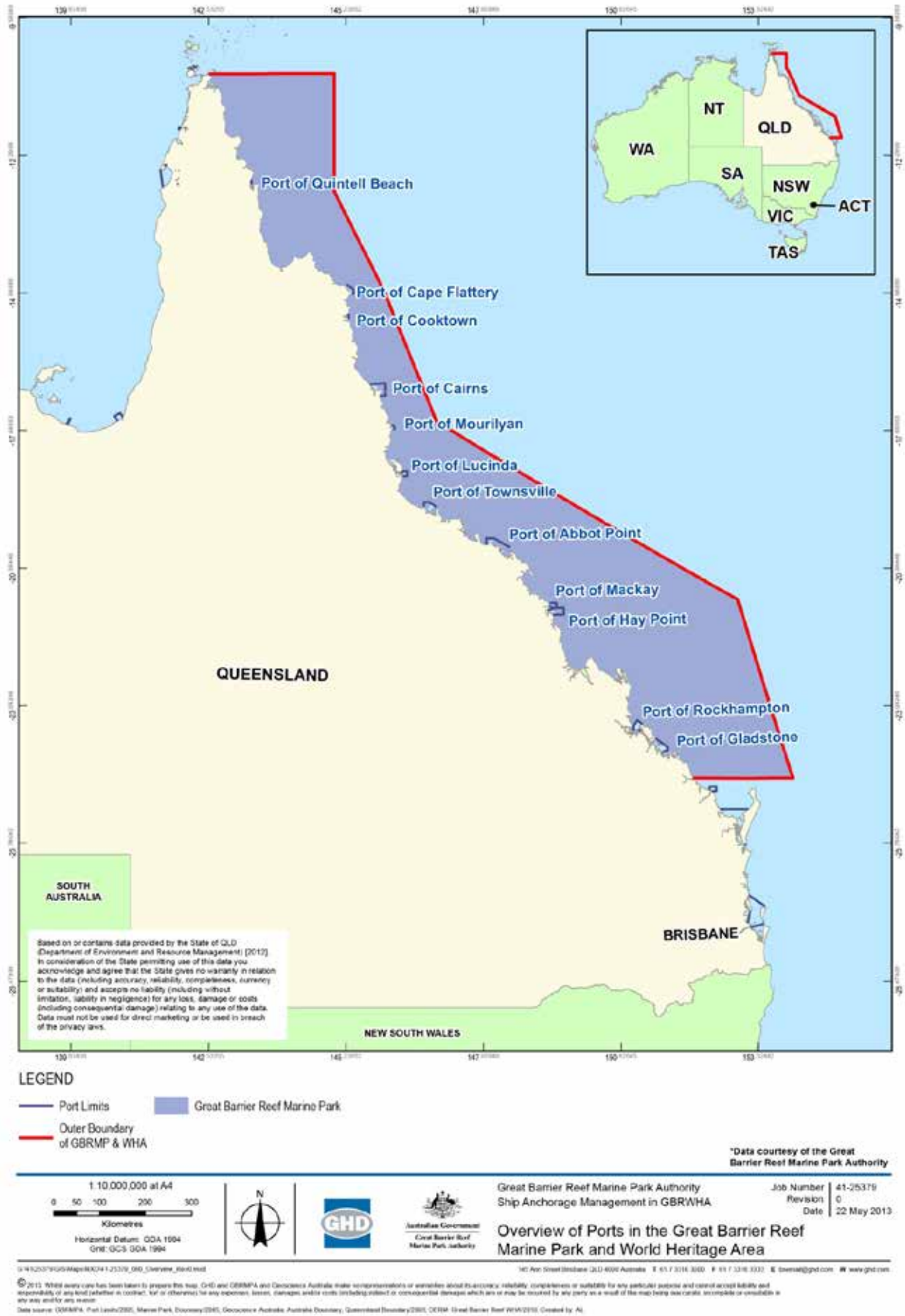
In 1975 the Great Barrier Reef Region was established and today provides for the long-term protection and conservation of the environment, biodiversity and heritage values of the Great Barrier Reef Region. Australia's Reef is the largest coral reef ecosystem on earth, with the Great Barrier Reef Region extending more than 2300 kilometres (km) along the Queensland coastline and covering 346,000 square kilometres (km<sup>2</sup>).

In 1981 the area was listed as a World Heritage property for its OUV and in 2007 it was listed as a National Heritage property. The property was the first coral reef ecosystem in the world to be nominated on the basis of all four natural criteria. The Great Barrier Reef Region and World Heritage Area have the same outer boundary. However, the Great Barrier Reef Region does not include internal waters of Queensland or Queensland islands, which are included in the World Heritage Area.

The Marine Park was declared in sections (between 1979 and 2001) and today covers the majority (99.5 per cent) of the Great Barrier Reef Region (or just under 99 per cent of the World Heritage Area). As sections of the Marine Park were declared, various ports and harbours were not included; today 13 ports are not part of the Marine Park but are within the World Heritage Area (figure 2-1).

**Table 2-1: Great Barrier Reef Region vs Marine Park vs World Heritage Area**

<b>Great Barrier Reef Region</b>	<b>Marine Park</b>	<b>World Heritage Area</b>
Proclaimed 1975	Declared in sections between 1979 and 2001; made into one amalgamated section in 2004	Inscribed 1981
346,000 km <sup>2</sup>	344,400 km <sup>2</sup>	348,000 km <sup>2</sup>
Great Barrier Reef Region does not include: <ul style="list-style-type: none"><li>• Internal waters of Queensland</li><li>• 980 Queensland islands</li></ul>	Marine Park does include 70 Commonwealth owned islands  Marine Park does not include: <ul style="list-style-type: none"><li>• Internal waters of Queensland</li><li>• 980 Queensland islands</li><li>• 13 ports in 12 exclusion areas</li></ul>	Does include: <ul style="list-style-type: none"><li>• All islands within outer boundary (1050)</li><li>• All waters seaward of low water mark of coast (including internal waters of Queensland and port waters)</li></ul>



**Figure 2-1: Overview of ports in the Great Barrier Reef Marine Park and World Heritage Area**

### **2.2.1 Anchorage areas studied**

This project is considering the risks from trading vessel anchorage associated with the five major Queensland ports:

- Port of Cairns
- Port of Townsville
- Port of Abbot Point
- Port of Hay Point
- Port of Gladstone.

Anchorage areas are designated on navigational charts for only three of these locations; Cairns, Hay Point and Gladstone. Vessels may also anchor outside of designated areas at the discretion of the ship's Master as long as they are compliant with relevant zoning and legislative protection measures for the World Heritage Area. Management and direction for anchorage for each of the ports is provided to bulk cargo and other trading vessels by the Regional Harbour Master (RHM).

To facilitate assessment the existing areas being used for anchorage by trading vessels working to each of the nominated ports has been defined. This was achieved through consultation with each port's RHM to confirm designated areas and, for locations without designated anchorages (Townsville and Abbot Point), to define an area within which vessels are known or directed to anchor.

Where specific anchor drop points are mapped a conservative approach of considering the entire area across which anchor drop may occur has been used to define the anchorage area of a port. This has provided an envelope of seabed adjacent each of the five ports within which anchorage currently occurs. This approach enables the project to take into account direct impacts from anchor drop in addition to indirect impacts that can be experienced by designating a network of drop points, such as habitat fragmentation or impact to habitat continuity/integrity.

The bounds of the ship anchorage areas (Global Positioning System coordinates) at each of the ports and the total area (in hectares (ha)) of each ship anchorage are provided in table 2-2.

These spatial areas provide the footprint of investigation adjacent to each port addressed by this study.

**Table 2-2:** Bounds (latitude and longitude) and area (in ha) of the anchorage investigation areas used by this project at each of the five major ports (latitudes and longitudes are provided by point number. Point 1 is top left corner, Point 2 is top right corner, Point 3 is bottom left corner and Point 4 is bottom right corner of a bounded area)

<b>Port</b>	<b>Point 1</b>	<b>Point 2</b>	<b>Point 3</b>	<b>Point 4</b>	<b>Area (ha)</b>
Cairns (figure 3-1)	-16.809302 145.77560	-16.75466 145.86635	-16.97995 145.96195	-16.95247 146.01798	24,118
Townsville (figure 3-2)	-19.01963 146.80780	-19.02737 147.03623	-19.13087 146.90595	-19.13266 147.06002	23,762
Abbot Point (figure 3-3)	-19.65923 147.98337	-19.67425 148.28264	-19.81606 147.98092	-19.87983 148.22934	58,818
Hay Point (figure 3-4)	-21.17225 149.31492	-20.97303 149.81436	-21.29850 149.31236	-21.29862 149.95951	157,284
Gladstone inner anchorage (figure 3-5)	-23.83373 151.29568	-23.82218 151.31167	-23.87902 151.35518	-23.86798 151.36551	1403
Gladstone outer anchorage (figure 3-5)	-23.83195 151.42357	-23.76377 151.49485	-23.94741 151.59231	-23.87346 151.66395	22,722

### 2.3 Environmental Impact Assessment

An Environmental Impact Assessment (EIA) has been completed as part of this project using information collated from desktop review of existing literature, outputs of online database searches and stakeholder consultation (conducted in late 2012). Through this process the existing environmental, social, cultural and heritage conditions of each anchorage area were described and were subject to impact assessment analysis using the GBRMPA Environmental Assessment and Management (EAM) Risk Management Framework (refer Appendix A, GBRMPA 2009b). This applies a risk-based assessment which considers the source of each environmental risk, the potential consequences of that risk occurring and the likelihood that identified consequences will be realised. This approach is consistent with the Australian and New Zealand Standard for Risk Management (AS/NZS ISO 31000:2009).

In completing this assessment consideration has been given to whether any actions associated with use of the vessel anchorages result in significant impacts upon the values of the anchorage areas. This was achieved by giving consideration to relevant Significant Impact Guidelines criteria (DSEWPaC 2009). These criteria define the actions that lead to significant impact upon listed threatened or migratory species or communities. In summary, the Significant Impact Guidelines criteria provide guiding principles against which assessment can ascertain whether the values for which a protected matter was recognised are materially altered by any potentially impacting action.

A significant impact upon a protected matter would be considered to occur if:

- the value for which the protected matter was recognised was lost, degraded or damaged to be notably altered or diminished by an impact
- important populations of protected species were interfered with to the extent that the species distributional range was reduced or the species ability to persist as a recognised population with resilient genetic diversity was reduced
- habitat critical to the survival of a protected species for breeding, roosting, foraging or ecological functioning was interfered with such that the species was detrimentally affected.

Following identification of potential impacts and consequences, the probability of occurrence was estimated and an assessment of the likelihood of the consequences of an event occurring is undertaken.

The EIA identified actual and potential impacts on the values of the World Heritage Area and MNES and their significance. Findings from the impact assessment were reported in November 2012 and support definition of environmental management strategies of relevance to the protection and management of the anchorage areas under future demand. The full EIA report is presented in Appendix A. Content is summarised within this document as required to provide support to the recommendations provided by this report.

## 2.4 Cost Benefit Analysis

A CBA completed as part of this project considered the socio-economic costs and benefits associated with different anchorage management options for the five major ports. A discrete set of (potential) ship anchorage management options were identified from desktop literature review and consultation. These options were modelled using an excel based economic appraisal model. This enabled identification of any incremental benefits and costs of alternative anchorage management strategies for those ports where future shipping demands indicate a need to physically expand the current anchorage area. The analysis considered a 30 year future time-horizon (2012-2042) where economic data was available for quantification of benefits and costs.

Future demand for each of the identified anchorage areas (identified in section 2.1) was based on PGM Environment's "probable" forecasts for each of the five ports. This demand value was adjusted for any assessed changes in direct ship calling to berths versus anchoring for the period 2012-2032. The ten years from 2032-2042 were maintained at the same levels as for year 2032 (PGM Environment 2012).

Within the CBA, where benefits could not be quantified (evidenced and monetised) then the Economic Appraisal took the form of a Cost Effectiveness Analysis (CEA) in which the lowest cost for a desired outcome (for this study, Reef environment protection or net environmental gain) is estimated. Those costs or benefits which are identified as (possibly) occurring but could not be quantified or monetised are treated as qualitative impacts for assessment against a calculated net monetised benefit. For example, the 'aesthetics' of a natural panorama being changed by the construction or enlargement of a manmade object is difficult to financially quantify.

The assignment of the weighting of qualitative impacts compared with a net monetised benefit to arrive at an overall result for decision-making depends on the goals of the project and/or the proponents of the project. In the case of this study, the CBA has taken account of the net environmental gain of a change option versus the current practice, i.e. a positive result is one in which a change option produces both a net monetised benefit and a net environmental gain.

The CBA brings together information from the EIA, the forecasts of future anchorage demand, and the results of the assessment of the relevance of various ship anchorage management options, together with stakeholder consultation information on social issues for each of the five main ports in the study area.

Findings from the CBA were reported in early 2013 (Appendix B) and clarify which environmental management strategies have relevance to future shipping demands and offer beneficial options for the five major ports. This analysis, therefore, refined the comparative relevance of different environmental management strategies for the protection and management of the anchorage areas under future demand. The full CBA report is attached as Appendix B. Content is summarised within this document as required to provide support to the recommendations provided by this report.



## 2.5 **Defining Environmental Management Strategies**

The Environmental Management Strategy (EMS) component of this project used EIA and CBA findings in conjunction with detailed desktop review to identify environmental ship anchorage management strategies that could be used to avoid, mitigate, offset or adaptively manage identified impacts, particularly under future shipping demand. The guiding principle for this has been to define a strategy which enables improved management of anchorages to protect and minimise impacts on environmental values during the next 25 years as shipping demand increases.

This aspect of the project used information from the EIA and CBA in conjunction with desktop review of existing anchorage management requirements, legislation and current anchorage management strategies.

To support development of the EMS three explicit objectives were outlined.

Objective 1: Manage existing anchorages with the aim of protecting environmental values

Objective 2: Optimise use of existing anchorages in the Marine Park

Objective 3: Minimise environmental impacts from future anchorages and anchorage relocations

Review and analysis enabled definition of explicit actions targeted at achieving each objective. The EMS is, therefore, reported in a structure that presents the outcomes for each of the Objectives, the action plans which support achievement of those outcomes and the timeframes within which the action plans are to be achieved. The relevance of each of the Objectives to the management of each of the five port anchorages is also discussed. Given vessels may anchor anywhere within the Marine Park General Use Zone, this strategy has been deliberately structured to achieve each of the desired Objectives to provide relevancy to those vessels that may not be making use of port prescribed anchorages. The full EMS report with all supporting information is provided in Appendix C; the key actions that define the EMS are presented here in support of the recommendations provided by this report.

## 2.6 **Literature review**

In delivering all components of work completed under this project information has been sourced from online databases, scientific literature, protected species databases and grey literature. Grey literature includes information sourced by GHD from locations including the GBRMPA library and as provided directly by parties consulted during the project.

Literature reviewed supports findings of the project and is referenced throughout the document where appropriate. A full list of the literature referenced within this report is provided as section 5. GHD note that not all references provided are publically available. Information referenced within this report is used with permission and, if a reference is not publically available, we have included the source for completeness.

Two studies commissioned by NQBP became available to the project during delivery but are, as yet, not available publically. These studies have informed risk

rankings and relate to investigations into the impacts of ship anchorages on aesthetic values and the impacts of anchoring on seabed biodiversity for the Port of Hay Point (refer Cardno Chenoweth 2013 and WorleyParsons 2012).

Whether the use of anchorages by ships creates an impact to the vista of the reef is subjective. Investigation of the impacts of ship anchorages on aesthetic values at the Port of Hay Point noted that visual impacts on coastal and ocean scenic values at this location will be limited and are considered minor under proposed future ship movements (Cardno Chenoweth 2013). However, that study also reported that Hay Point anchorage does not express or represent any of the World Heritage aesthetic values for which the Reef is recognised. This area was, therefore, considered to be unlike more scenic coastline sections. This has, along with other information reported by Cardno Chenoweth (2013), informed this project.

The investigation of seabed biodiversity completed by WorleyParsons (2012) at Hay Point indicates anchoring may have a low potential of impacting the seabed. The study compared the presence of macrobenthos from areas where anchoring occurs to reference sites. Findings concluded that the seabed biota associated with anchorage areas was no different to that in adjacent habitats where anchoring does not occur. Temporal assessment or comparison of the Hay Point conditions with other ports was not reported. Findings from the study have informed this project.

## 2.7 Stakeholder Consultation

Consultation with stakeholder groups was conducted as part of the EIA and CBA phases of the project. The EIA workshop was held to inform the potential impacts that may occur from use of the identified project anchorage areas by vessels anchoring.

A EIA workshop with held on 25 September 2012 in Townsville to allow selected stakeholders to inform the identification of issues associated with anchorages in the World Heritage Area. Representatives from the GBRMPA, the Australian Maritime Safety Association, North Queensland Bulk Ports, Ports North, Gladstone Ports Corporation Limited, Maritime Safety Queensland and Port of Townsville Limited attended.

The workshop included an open forum to identify issues and a discussion around the feasibility, benefits and negatives of potential impact management strategies. Opinions were sought on the key drivers for the location of anchorage areas, the values of the World Heritage Area, and the impacts of ship anchoring on those values, including giving consideration to the actual and potential perception of these impacts.

A structured impact assessment was then completed that took account of workshop information to identify the likelihood and consequence of any potential impacts occurring on World Heritage Values for which the Reef is recognised as a consequence of anchoring activities.

Consultation activities completed in support of developing the CBA completed under this project included a project specific CBA workshop in addition to one-on-one interviews with targeted key stakeholders. A CBA workshop was conducted in

Brisbane at GHDs office on 16 October 2012. Targeted stakeholders were identified to be relevant to this phase of works in consultation with the GBRMPA and through suggestions of other stakeholder representatives. Those targeted stakeholders were invited to attend the CBA workshop. Participants who were able to attend the workshop included representatives from the Association of Marine Park Tourism Operators, the Australian Maritime Safety Association, the Department of Agriculture, Fisheries and Forestry, the Department of Transport and Main Roads, DSEWPaC, GBRMPA, Maritime Safety Queensland, and North Queensland Bulk Ports.

For the purpose of informing the CBA, selected targeted stakeholders were also consulted outside of the workshop forum with the aim of improving understanding of the social implications, costs and benefits of various ship anchorage management strategies.

The CBA framework brought together the stakeholder consultation information on social issues for each of the five main ports in the study area, with various findings from the EIA, the forecasts of future anchorage demand and the results of the assessment of the relevance of various ship anchorage management options.

The timeframes within which the project was completed did not provide for a broad and extensive consultation process to be completed across a wide socio-economic group. In particular, public consultation and the views of Traditional Owners were unable to be included in the project. In order to support the project in the absence of this consultation GHD was able to draw upon relevant and available information provided to GBRMPA as a consequence of other projects, previous consultations or submissions covering the general subject matter of the shared use of the study area. The lack of extensive consultation is, however, acknowledged as a restriction of the project.

## 2.8 **Project Limitations and Qualifications**

A number of limitations exist for the project, including:

- the project was based on a desktop study of existing information
- no fieldwork to ground truth desktop information was included as part of the project
- no comprehensive social impact assessment was conducted as part of the project
- Traditional Owners were invited to participate in the stakeholder consultant, however, were unavailable to participate within the project delivery timeframes
- full consultation with a broad suite of stakeholders, including commercial and recreational fishers and the public was not possible within the project timeframes
- information published by third parties, provided to GHD by the Client and relied upon by GHD in preparing this Report was reflective of current site conditions and shipping forecasts
- stakeholders involved in consultation on the drafts of this Report shared information of relevance freely with GHD and did not withhold any content of material relevance.

The implementation of the management strategies and recommendations identified during the course of delivering this project does not form part of the scope of the project.

Data which informed the project included recently released forecasts of shipping within Queensland prepared by PGM Environmental (PGM 2012) to estimate future anchorage demand requirements (out to 2032). Maritime Safety Queensland anchor movement records from 2009 to September 2012 were also used to inform existing patterns of ship movements' average anchor waiting times for each of the ports. Data beyond September 2012 were not available for inclusion in the project at the time of data analyses.

The phases of the project have been developed using information available at the time of the delivery of each work phase. The EIA was delivered from August to November 2012, the CBA was delivered from October 2012 to March 2013, the EMS was delivered from March 2013 to May 2013 and this synthesis report has been delivered from May to June 2013. As new science is published, new grey literature becomes available and environmental management practices are continuously reviewed and adapted information available to this project has evolved during delivery. Each phase of works has taken account of data available to it at the time of reporting. This synthesis report has attempted to take into consideration any information of relevance to earlier work phases unavailable at the time of their delivery. It is expected that this strategy will be reviewed and adapted by the GBRMPA to remain relevant into the future to take account of future information of relevance.

As the project requires investigation of impacts associated with anchorages of the five major ports a key step has been to define the existing areas being used for anchorage by trading vessels working to each of the nominated ports. This was achieved through consultation with each port's Regional Harbour Master to confirm designated anchorages defined by navigational charts and, for locations without designated anchorages (Townsville and Abbot Point), to define an area within which vessels are known or directed to anchor.

Where specific anchor drop points are mapped a conservative approach of considering the entire area across which anchor drop may occur has been used to define the anchorage area of a port. This has provided an envelope of seabed adjacent to each of the five ports within which anchorage currently occurs. These spatial areas provide the footprint of investigation adjacent to each port that has been addressed by this study. This approach enables the project to take into account direct impacts from anchor drop in addition to indirect impacts that can be experienced by designating a network of drop points, such as habitat fragmentation or impact to habitat continuity/integrity.

The risk assessment methodology used in the EIA was a mixed model, applying a semi-quantitative process for determining risk. The process followed in completing this risk assessment is defined in the GBRMPA EAM Risk Management Framework (GBRMPA 2009b). The semi-quantitative process estimates the severity of the consequence and likelihood of impacts and assigns a score to each. The assigned scores for consequence and likelihood are not linearly related to each other, or to the level of environmental impact, but are weighted descriptors.

It is not possible to directly compare the impacts from a diverse range of project aspects (for example, comparing air quality impacts with water quality impacts). As such, relative consequences have been judged according to different criteria. The GBRMPA EAM Risk Management Framework provides a Hazard Risk Calculator and scales for assessing likelihood and consequence of any risk to the environment being realised. An important feature of the GBRMPA EAM Risk Management Framework is that risks are analysed in the context of existing controls being in place.

All five port anchorage areas have the potential to alter the aesthetic value of the World Heritage Area and Reef. The distance of each anchorage from viewpoints on land, the presence of residential coastal development and the level of vessel visitation influence the impact potential across each of the ports. Aesthetic impacts are also considered to be subjective to interpretation. Attempt has been made to capture the uncertainty regarding aesthetic impacts during the risk assessment completed in the EIA.

The uncertainty and lack of robust technical information regarding aesthetic impacts underpins the rating of this issue as a high risk. This matter is therefore considered to be of a moderate consequence and has a high risk of continuing to affect the values of the Reef across all of the anchorage areas.

Given the importance of access to the Reef from a tourism perspective, the aesthetic values as visible from tourist vessels and aircraft in transit must also be considered. There is, however, limited knowledge regarding how the presence of ships at anchor affects the aesthetics of the World Heritage Area and whether or not impacts are consistent across all of the five port anchorage areas. Due to this uncertainty, aesthetic impacts are considered to have a likelihood of affecting the environmental values of the Reef across all of the anchorage areas.

Industry have been progressing a number of investigations into aesthetic impacts in parallel with this project. The findings of those studies, as available at time of reporting, have informed this report. Reference is made to those studies where relevant.

### 3. RESULTS

#### 3.1 Port of Cairns

##### 3.1.1 Environment

###### **Size and location of Port of Cairns anchorage area**

The Port of Cairns is located 1750 km north of Brisbane and 11 km to the west of Cape Grafton. The ships utilising the port are predominantly importing refined fuel products, fertilizers and general cargo and exporting raw sugar, molasses, frozen beef and tallow. Cairns is also a regular port of call for large cruise ships and a base for Royal Australian Navy patrol boats and a large fishing fleet.

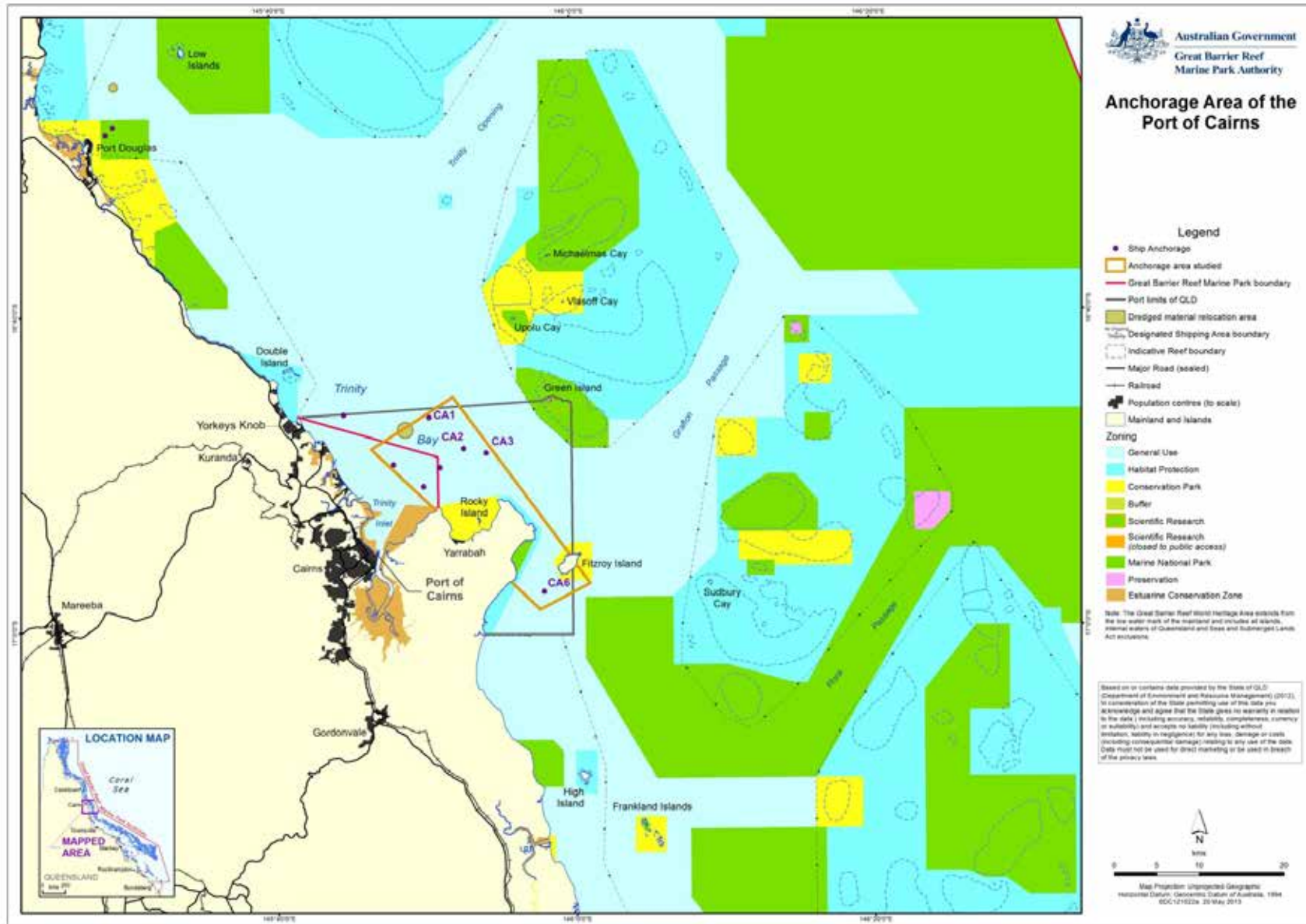
The Cairns anchorage area defined for this project covers 24,118 ha and encompasses an area to the north and south of Cape Grafton (figure 3-1). This study area is larger than the actual footprint of the anchorages and provides a conservative approach of considering the entire area across which anchor drop may occur. This approach takes into account direct impacts from anchor drop in addition to indirect impacts that can be experienced by designating a network of spatially disparate drop points, such as habitat fragmentation or impact to habitat continuity/integrity.

There are a number of designated anchorage points for ships servicing the port. The designated anchorages used by large ships include Cairns Anchorages 1, 2 and 3 (figure 3-1) located at the mouth of Trinity Inlet and Anchorage 6 located approximately 3 km south-west of Fitzroy Island. Anchorage 6 is, however, rarely used (Captain Michael Barnett (Cairns RHM), pers. comm., 27 September 2012), therefore reducing the effective anchorage area to approximately half the size.

The anchorage area is situated within a Marine Park General Use Zone and other management zones are located nearby offering further protection to the Reef. These protection zones are presented in figure 3-1.

###### **Social, cultural and heritage values**

The scenic features surrounding the anchorage area could be considered remarkable, exceptional or unique in the context of the World Heritage Area listing, in terms of scenic vistas. Located within sight of the city of Cairns, ships using the designated anchorages may be visible to residents and visitors to the city and surrounding islands, and as such may alter the aesthetic values of the World Heritage Area.



**Figure 3-1:** Map of the current anchorage area of the Port of Cairns

Approximately 2 km to the south of the anchorage area is the Yarrabah Aboriginal community. Indigenous community links to sea country encompassing the anchorage area have been recognised since the anchorage area may support totem species (primarily dugong and marine turtles). As Traditional Owners were unable to be consulted during the delivery of this project (refer section 2.8) complete understanding of the cultural value of the sea country associated with the Cairns anchorage area is acknowledged to be a knowledge gap of the project.

Cairns supports large tourism and fishing industries and the anchorage area is transited by commercial and recreational fishing vessels and a high volume of tourism vessels accessing the Reef and islands within the World Heritage Area.

### **Environmental values**

The anchorage area of Cairns is located in deep water and supports open seabed habitat characterised by soft sediments and clays (Neil et al. 2003a, Pitcher et al. 2007, WorleyParsons 2010). This habitat is known to support low diversity macroalgae and invertebrate populations and patchy distributions of sea pens, solitary corals and seagrass (Neil et al. 2003a, b, WorleyParsons 2010, Fairweather et al. 2011). No sensitive ecosystems such as coral reefs or seagrass meadows are known to be present within the anchorage area. Nonetheless, species of cultural and environmental value are known to occur within or transit the anchorage area including migratory wetland and marine birds, marine reptiles, dugong, dolphins and whales, as well as a range of pelagic fish targeted by commercial, charter and recreational fishers (Limpus 2008, WorleyParsons 2010, DAFF 2012, DSEWPaC 2012a).

It is not considered to provide highly valued habitat or geomorphic features that are integral to the ongoing maintenance of ecosystem processes or core feeding or breeding habitat critical for the persistence of any protected species.

### **3.1.2 Impacts**

#### **Existing conditions**

As described under section 2.3 the actual and potential impacts that may be realised to the values of the Port of Cairns anchorage area have been considered by this project using a risk based analysis. The full assessment process and findings are provided in Appendix A. The potential environmental impacts and their significance, as determined by that process, are summarised in table 3-1.

. These impacts have potential to affect the World Heritage Area values of the Reef, including the aesthetics, presence of diverse ecological communities, natural beauty and species of conservation significance.



**Table 3-1:** Potential environmental impacts at the Port of Cairns anchorage area and their significance

<b>Potential environmental Impacts</b>	<b>Significance</b>
Disturbance to seabed and supported biodiversity	Open soft sediment habitat, low diversity Low potential for impact
Minor releases of pollutants/wastes from ships	Low frequency of anchorage use Low potential for impact
A reduction in the aesthetic value of the coastal vista	Anchorage within 2 km of Yarrabah Aboriginal community High potential for impact
Preclusion of other users of the World Heritage Area	Currently concern for impact is low
Introduction of marine pest species	Low frequency of anchorage use Low potential for introduction
Interference with species behaviour	Anchorage adjacent to species habitat Low potential for impact

The majority of the biodiversity values for which the Reef is recognised are little affected by the Cairns anchorage area. Studies to date indicate the open seabed system (Pitcher et al. 2007) does not demonstrate long-term impacts (Rasheed et al. 2003) from anchor drop or chain drag (Neil et al. 2003a, WorleyParsons 2010). Further investigation which includes field observations is needed to fully understand the impacts of anchorages to the open seabed system.

Tourism, as well as commercial and recreational fishing and boating are popular pastimes for residents and visitors of Cairns. While other users are not precluded from using the anchorage area there is the opportunity to consider application of measures to ameliorate a low level of chronic impact and manage potential safety concerns (Appendix A and Appendix B).

Concerns were raised during the consultation period regarding the interaction between anchored vessels and commercial fishing activities, typically trawling because of the risk of collision and fishing gear becoming entangled with anchored vessels. Safety is also of concern in areas where vessels have previously anchored due to possible changes in bathymetry which compromise the safe and optimal operation of trawl equipment. There are also safety concerns for maritime users where the perceived safe operating distance around anchored ships is greater than the direct physical dimensions and the swing distance of an anchored ship.

There is high potential for impacts to the aesthetic values of Cairns from anchorage use (Appendix A). To date there have been no technical studies to validate this, nonetheless, the presence of anchored vessels has potential to detract from the natural state of the vista.

### **Future demand requirements**

Currently the Port of Cairns supports approximately 500 ship arrivals per year. Around 15 per cent of these proceed directly to anchor (MSQ 2012). Anchorage use is, therefore, low with on average less than one ship call per day using the anchorages for typically short stays of up to several hours (MSQ 2012). This reflects the general use of the anchorages at the Port of Cairns for either short cruise-ship visits or for ships waiting for tidal assistance to access port berths. Vessels with draft restrictions are required to wait at anchor for appropriate tide conditions to enter the port. Future plans to improve channel and port access (yet to be assessed) would likely reduce the current demand for anchorage.

Analysis of future demand scenarios (refer section 2.4 and Appendix B) predicted that ship call numbers are forecast to increase at the Port of Cairns only by two per cent (between one and two ships calling per day), over the next 25 years (PGM Environment 2012, DSDIP 2012). The anchorage area assessed by this project has sufficient physical capacity to safely support that future demand. Analysis also indicated that the current practices of ship anchoring were considered to have minimal future impact for the environment and other users beyond that which has already occurred.

The majority of identified impacts of relevance to anchoring activities in Cairns were considered to have a low potential of having a significant impact to the environment (table 3-1 and Appendix B). However, assessment also indicated that opportunities exist to implement new, or adapt and improve existing anchorage management actions to avoid further impacts on the World Heritage Area, particularly under future shipping demand. This has been the focus for definition of management strategies of relevance to the Port of Cairns anchorage area.

### **3.1.3 Management**

This section describes an environmental management strategy for Cairns which will enable improved management of anchorages to protect and minimise impacts on environmental values if deemed practicable and necessary.

This environmental ship anchorage management strategy and the underpinning actions are driven by an overarching objective to minimise environmental and social impacts associated with anchorage use. This is achievable by minimising the number of vessels that sit at anchor while maintaining efficient operation of port import and export requirements. To achieve this for the Port of Cairns anchorage under future demand actions have been devised to support the key objectives of:

Objective 1: Manage existing anchorages with the aim of protecting environmental values

Objective 2: Optimise use of existing anchorages in the Marine Park

The action plans which support achievement of these objectives are described following.

### **3.1.3.1 Objective 1: Manage existing anchorages with the aim of protecting environmental values**

Information regarding potential to impact on aesthetic values of the World Heritage Area from anchoring off Cairns is limited. Objective 1 will improve current anchorage management practices by strengthening the understanding of, and management options available for, activities that cause or have the potential to cause environmental impacts within ship anchorages.

The implementation of actions under this objective will achieve the following outcomes:

**Outcome 1-1:** Provide guidance and education for key stakeholders in environmental management of anchorages and ships while at anchor for improved environmental outcomes

**Outcome 1-2:** Obtain better understanding of environmental condition of anchorages and their use near ports to enable adaptive management under changing conditions

**Outcome 1-3:** Further enhance environmental performance at ship anchorages for improved environmental outcomes

#### **Action Plan for Outcome 1-1: Guidance and education for stakeholders**

Although the existing anchorage of Cairns is located in open, soft seabed environment, with low biodiversity (refer section 3.1.1) these habitats are of value to the continuity and integrity of the World Heritage Area. Reducing risk of environmental impacts from ships at anchor is desirable for best environmental management. To achieve this ships seeking to anchor within the World Heritage Area require access to information about how best to protect the values for which the area is recognised.

#### **Environmental management guidelines**

Review to date indicates there is no specific environmental guideline relating to ships at anchor within the World Heritage Area. It is recommended that the GBRMPA develop environmental guidelines relating specifically to ships at anchor within the World Heritage Area which could then be used to communicate with ship owners and masters of ships. These environmental guidelines could also be extended to ships anchoring outside of the Cairns anchorage within the northern Great Barrier Reef.

The guidelines should make reference to relevant Conventions and legislation that are applicable across Queensland ports for environmental protection, thus strengthening the implementation of legislation. The guidelines would address:

- A description of environmental values to be protected during anchoring
- Activities while anchoring that may impact on the environmental values
- Potential and actual environmental impacts from anchoring
- Best practice for anchoring with least environmental impact

- Waste management procedures while at anchor
- Light spill and noise considerations for ships while at anchor
- Biofouling and ballast water management of relevance to anchorage use
- Storage and management of hazardous substances while at anchor.

The environmental management measures should aim at minimising the following impacts identified as relevant to anchoring activities:

- Disturbance to seabed and supported biodiversity
- Release of emissions or pollutants/wastes
- Altered aesthetic value (or perception thereof)
- Interference with access to resources
- Marine pest introduction
- Interference with species behaviour.

The guidelines should be developed in collaboration with key stakeholders, including port authorities, MSQ and Australian Maritime Safety Authority (AMSA) to capture and cross reference all relevant jurisdictional requirements.

Details of the guidelines may be incorporated in port notices, which are legally binding under the *Transport Infrastructure Act 1994*. This would require negotiations with and approval by the port authorities.

If a legislative approach is found to be not desired or practicable, the guidelines should be communicated to ship owners, shipping agents and ship masters via an education and public awareness program. This program may include online distribution (via GBRMPA and other management agency websites), pre-entry notification to international ship traffic via existing portals, such as AQIS or the REEFVTS or similar, presentations to the key stakeholders (e.g. Shipping Australia) and media publicity.

### **Action Plan for Outcome 1-2: Environmental condition monitoring**

The environmental condition of anchorage sites is not currently subject to routine monitoring to understand whether existing management actions are being effective, to confirm that transient sensitive habitats (e.g. seagrasses or corals) are not at risk from anchoring activities, or identify whether adaptive and improved management is needed. This is likely because current management is not specifically targeted at environmental objectives. Targeted, regular environmental monitoring of the areas used for anchoring will improve understanding of the environmental condition and enable adaptive management intervention to be considered if controls are found to be ineffective.

#### ***Environmental monitoring program at ship anchorage sites***

It is recommended that the GBRMPA monitor the environmental conditions of the Cairns anchorage at appropriate intervals for the following parameters:

- Biodiversity and presence of marine pests
- Seabed conditions (habitat type, rugosity)

- Sediment type and quality
- Underwater noise
- Air quality
- Waste accumulation.

To achieve this, the GBRMPA will need to design a port specific monitoring program of relevance to the Port of Cairns anchorage. Considerations during design should be given to anchorage use patterns (both current and future), environmental risks at each port, dredge disposal activities and sampling intensity needed to have confidence of detecting any change in conditions. Consideration should also be given to identify what other parameters would need to be assessed to detect drivers of change.

In designing the program the GBRMPA should take into account monitoring programs already in operation that may be of relevance to the Port of Cairns anchorage site conditions. There may be opportunities for sharing information or for minor amendments to existing programs to achieve the desired outcomes. Collaboration with research centres and industry may play an important role in the success of the program.

The GBRMPA should review findings from ongoing monitoring to provide important information on changes in environmental conditions and efficiency of existing management arrangements. Data can be interpreted to provide an early warning system to implement corrective actions in a timely manner if environmental site condition degradation is identified.

Undetected releases of small waste materials may occur year round within the World Heritage Area (e.g. Wilson 2011) and, as such, this activity is considered to be a low level chronic impact. Cumulative effects do not appear to be well understood (Eco logical Australia and Open Lines 2012). Monitoring may also provide information on whether small scale releases of pollutants from ships at anchor occur and, if so, whether they impact on the environment in a cumulative sense.

Reporting from this monitoring program should be used by the GBRMPA to inform the Outlook Report, DSEWPaC, Shipping Australia and other industry bodies and the IMO. This would support ongoing review and improvement of the international conventions and legislative tools that govern activities which have the potential to impact upon the World Heritage Area.

### **Action Plan for Outcome 1-3: Enhanced environmental performance**

To support review of relevancy of current environmental controls for anchorages it is appropriate to audit adherence of vessels to the controls they are required to abide by. This should be achieved in conjunction with measuring environmental conditions (Outcome 1-2) to enable differentiation between natural and anthropogenic drivers of change which may be observed during monitoring of anchorage sites.

To achieve Outcome 1-3 it is recommended that the GBRMPA:

- Develop and implement environmental inspection and audit programs for ships at anchor in the Marine Park in collaboration with ports, the shipping industry, AMSA, AQIS and MSQ.
- Provide reports of audit findings to industry and management bodies to support initiatives that aim at reducing air emissions from shipping, such as switch to low emission fuels used while at anchor.
- Determine the impact of anchorage areas on aesthetic values by considering how different stakeholder groups value a vista which does and does not include ships at anchor.

### ***Inspection program for ships at anchor to monitor environmental performance***

Review and consultation completed under this project did not identify any dedicated audit program that is targeted at taking record of the different impacts associated with vessels anchoring in the World Heritage Area across criteria including emissions to air, management of hazardous substances and waste releases at the Port of Cairns. Vessels are required to adhere to legislative requirements and only through reporting are incidents recorded and investigated.

It is recommended that the GBRMPA review current ship inspection programs to consider whether they adequately validate and demonstrate vessels adherence to legislative environmental management requirements. If current inspection programs do not address all relevant management requirements, the GBRMPA should consider what additional information is needed and whether existing inspection programs are able to be adapted to collate that information or whether additional programs are required. Existing inspection activities may only target quarantine matters and may not facilitate collection of data of relevance to anchorages and management of the environmental values of those locations.

If current inspections are found to lack in their ability to detect whether vessels adhere to required environmental management requirements while at anchor with regard to wastes, emissions and hazardous substances the GBRMPA should consider mechanisms to address this gap in collaboration with relevant stakeholders. It is anticipated these stakeholders would include AMSA, AQIS, MSQ, and other parties involved in vessel entry control and management.

The action plan for an inspection program should include:

- A desktop review of current inspection programs conducted at the Port of Cairns
- Discussions with port authorities, AMSA, AQIS and MSQ on the scope, frequency, and record keeping of inspections that are currently being conducted for ships at anchor and in anchorage areas
- Discussions with shipping industry representatives regarding what environmental inspections are being conducted by the shipping industry or what environmental data is collated by the shipping industry for ships while at anchor

- Gap analysis to determine adequacy and consistent implementation of current inspection programs
- Identification of key improvements to existing inspection programs and a mechanism for implementing those improvements
- Communication and collaboration with key stakeholders on changes to existing inspection programs and how any improvements may be able to be implemented.

It is likely that the shipping industry would, through daily vessel management and logbook reporting, collate information that demonstrates adherence to environmental legislative requirements. Accordingly, adaptation of how information is reported may be required to achieve this outcome.

***Provide reports of audit findings to industry and management bodies***

Following the implementation of the improved inspection program, the GBRMPA may want to regularly audit to the extent to which stakeholders adhere to the implementation of the inspection program, such as

- Checking that inspections are being completed at the intervals proposed
- Records are being kept and managed in the proposed way
- Any non-conformances identified during the inspections are dealt with in the agreed manner.

Information from this program would support the review of data collected under Outcome 1-2: Environmental Condition Reporting.

***Determine impacts of anchorage areas on aesthetic values***

Assessments completed by this project found that the relative impact of ships at anchor on the aesthetic values of the World Heritage Area is unquantified, except at the Port of Hay Point (Appendix A). To adequately manage potential impacts to the World Heritage Area it is necessary to benchmark conditions and measure deviations and drivers of change through on-going monitoring.

It is, therefore, recommended that the GBRMPA design and conduct a targeted assessment which seeks to identify how the presence of vessels visible at anchor influences the aesthetic value of the World Heritage Area across geographies including the major population centres, the port anchorage area and minor population centres. This could include development of standards for aesthetic value assessment and impact analysis in consultation with experts and stakeholders.

The outcomes of these investigations could provide a standard framework for aesthetic value impact analysis and inform GBRMPA's position on site selection criteria for any proposed expansions or relocations of anchorage sites. It will also provide key information regarding a sustainable level of visible anchorage which does not denigrate the aesthetic experience of the World Heritage Area. This information will be of use (aligned with other environmental and economic data) in defining the maximum number and arrangement of vessels able to be sustained at anchor. Findings should be shared with industry for improved management of anchorage areas.

Consideration should also be given to establishing on-going monitoring of potential impacts on aesthetic values. The need for this, including frequency, would be informed by baseline assessment. Outcomes could be used to demonstrate whether aesthetic values are improved by any management actions. As aesthetic values can be subjective, information provided through education and awareness may provide opportunity to positively influence perceptions of level of impact to aesthetic values from anchorage use.

### **3.1.3.2 Objective 2: Optimise use of existing anchorages in the Marine Park**

Current predictions are that the existing anchorage of Cairns can support future demand requirements. The area assessed within this project was, however, not restricted to the designate anchor drop points but covered a much wider geography. There is potential that these existing anchor drop points may need to be relocated, or added to, in future. Implementing Objective 2 will optimise the use of existing anchorages and minimise the need to designate new anchorage areas in future.

The implementation of actions under this objective will achieve the following outcome:

**Outcome 2-1:** Restrict shipping industry users of the Marine Park to anchor only in designated anchorage areas

#### **Action Plan for Outcome 2-1: Restrict users to designated anchorage areas**

Designated anchorages can enable more efficient management of anchorages at ports, not only from an environmental point of view but also with regards to safety. Environmental considerations should also be embedded in key decision making processes with respect to the management of anchorages and ships while at anchor, especially, as the GBRMPA is not directly involved in making decisions regarding ship anchorage.

#### **Assign designated anchorages in each port**

Minimising fragmentation of habitats is currently achieved for the anchorage area at the Port of Cairns through the use of designated anchor drop points as this reduces the overall area of seabed affected by chronic anchor disturbance. Predictions indicate additional anchorages will not be required to support future demand requirements. Not all designated anchorages at Cairns are used and there is potential to improve management of the existing anchorages.

#### **Investigate options to reduce footprint of existing anchorages**

The use of designated anchor drop points in Cairns minimises the area of seabed affected by anchoring. These anchor drop points are, however, spread across a wide area. Not all designated anchorages are currently used to support movement of ships accessing the Port. There is, therefore potential to consider which anchorage drop points are required and whether the footprint of the anchorage could be reduced. Reducing the footprint of existing anchorages reduces the extent of the Reef exposed to habitat impacts and pollutant risk. It also facilitates a



response to any incident or audit and inspection of ships at anchor. This provides improved efficiencies and cost effectiveness for inspection or audit programs.

It is recommended that the GBRMPA work with the port and shipping industry, including the maritime safety authorities, to identify the minimum anchorage footprint required for the Port of Cairns under future shipping demand scenarios. To identify the minimum anchorage footprint required for safe and efficient ship operation and navigation the future anchorage use (demand) requirements should be considered. The sites which can be used with the least environmental impacts and which anchorage areas should be designated as emergency use options only should be identified. This study should also be completed with regard to the actions proposed to achieve Outcome 2-2: Minimise the need for further anchorages.

## 3.2 Port of Townsville

### 3.2.1 Environment

#### Size and location of Port of Townsville anchorage area

The Port of Townsville is situated 1,360 km north of Brisbane. Townsville is a regular port of call for large commercial ships, as well as cruise ships and naval vessels. The main imports through the Port of Townsville are refined fuel products, nickel ore, motor vehicles, cement and general cargo. Exports include raw sugar, copper and zinc concentrates refined lead, copper, zinc and nickel, bulk fertiliser, molasses, frozen beef and live cattle.

The Townsville anchorage area defined for this project is 23,762 ha and is located approximately 17 km north-east of the city of Townsville, and adjacent to Magnetic Island (figure 3-2). Currently, the anchorage area for Townsville is not charted and there are no designated anchorage drop points. This project has, therefore, defined an area for study (as described under section 2.2.1) which uses a conservative area for assessment that encompasses the entire area across which anchor drop may occur. As noted elsewhere in this report, this area is likely larger than the actual footprint of individual anchor drop points being used by vessels accessing Townsville Port. This takes into account direct impacts from anchor drop in addition to indirect impacts that can be experienced by designating a network of spatially disparate drop points, such as habitat fragmentation or impact to habitat continuity/integrity.

The anchorage area is situated in a General Use Zone of the Marine Park and other management zones are located nearby offering further protection to the Reef. These protection zones are presented in figure 3-2.

#### Social, cultural and heritage values

The coastal proximity of the anchorage area means anchored ships are visible to residents and visitors alike to Townsville and Magnetic Island. As such, the anchorage area has the potential to alter the aesthetic values for which the Reef is designated a World Heritage Area, such as scenic vistas.

The anchorage area has cultural value as it is recognised as potentially supporting totem species (dugong and marine turtles) of Indigenous importance. As Traditional Owners were unable to be consulted during the delivery of this project (refer section 2.8) complete understanding of the cultural value of the sea country associated with the Townsville anchorage area is acknowledged to be a knowledge gap of the project.

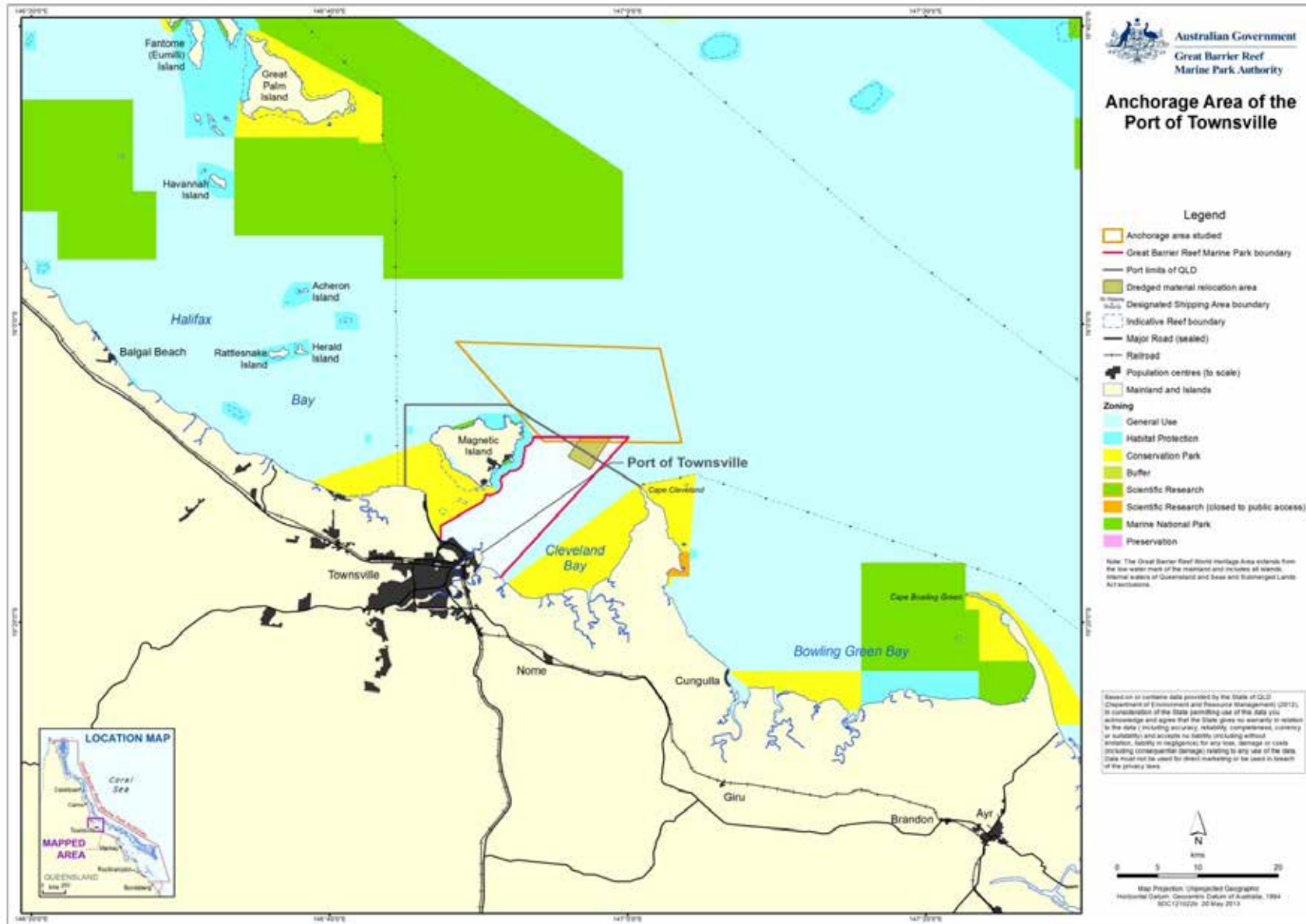
Similar to Cairns, Townsville has an important tourism and fishing industry. The anchorage area of Townsville is transited by commercial and recreational fishing vessels and tourism operators accessing the Reef and World Heritage Area islands.

Concerns were raised during the consultation period regarding the interaction between anchored vessels and commercial fishing activities, typically trawling because of the risk of collision and fishing gear becoming entangled with anchored vessels. Safety is also of concern in areas where vessels have previously anchored due to possible changes in bathymetry which compromise the safe and optimal operation of trawl equipment. There are also safety concerns for maritime users where the perceived safe operating distance around anchored ships is greater than the direct physical dimensions and the swing distance of an anchored ship.

### **Environmental values**

Situated in deepwater, the Townsville anchorage area seabed habitat type is mainly comprised of soft silt and mud, supporting low diversity macrobenthic invertebrate communities (Cruz-Motta and Collins 2004, Pitcher et al. 2007, GHD 2011a). While significant ecosystems integral to the ecological functioning of the Reef are not a feature of the anchorage area, seagrass has been previously recorded within the area (Rasheed and Taylor 2008). These seagrasses were described as being patchy, low biomass seagrass meadows, and their ongoing persistence has not been more recently confirmed. Additionally, some solitary corals are sparsely distributed throughout the anchorage area and fringing coral reefs having higher coral diversity do occur in close proximity, at Magnetic Island.

These habitats are not considered critical to the survival of marine fauna, however the anchorage area is known to be transited by a range of conservation significant species'. These include the Australian snubfin dolphin, inshore bottle nosed dolphin, marine turtles, humpback whales and sharks (GHD 2012a). The area is also known to provide habitat for migratory wetland and marine birds and important fishery species (GHD 2009a, DAFF 2012, DSEWPaC 2012a) (Appendix A).



**Figure 3-2:** Map of the current anchorage area of the Port of Townsville

### 3.2.2 Impacts

#### Existing conditions

As described under section 2.3 the actual and potential impacts that may be realised to the values of the Port of Townsville anchorage area have been considered by this project using a risk based analysis. The full assessment process and findings are provided in Appendix A. The potential environmental impacts and their significance, as determined by that process, are summarised in table 3-2. These impacts have potential to affect the World Heritage Area values of the Reef, including the aesthetics, presence of diverse ecological communities, natural beauty and species of conservation significance.

**Table 3-2:** Potential environmental impacts at the Port of Townsville and their significance

Potential environmental Impacts	Significance
Disturbance to seabed and supported biodiversity	Open soft sediment habitat, low diversity Low potential for impact
Minor releases of pollutants/wastes from ships	Low frequency of anchorage use Low potential for impact
A reduction in the aesthetic value of the coastal vista	Anchorage within 2 km of Magnetic Island High potential for impact
Preclusion of other users of the World Heritage Area	Currently concern for impact is low
Introduction of marine pest species	Low frequency of anchorage use Low potential for introduction
Interference with species behaviour	Anchorage overlaps with species habitat Moderate potential for impact

A number of the values for which the Reef is recognised are little affected by the Townsville anchorage area. There is, however, a high potential to significantly impact on the aesthetic values of the World Heritage Area (Appendix A). This rating is supported by consultation findings that identified this as of concern and underpinned by a lack of research to validate the actual impact from anchoring on aesthetic values in this region.

Tourism, as well as commercial and recreational fishing and boating are popular pastimes for residents and visitors of Townsville. While other users are not precluded from using the anchorage area there is the opportunity to consider application of measures to ameliorate a low level of chronic impact and manage

potential safety concerns (Appendix A and Appendix B). This would include opportunity for managing the potential for negative interactions between anchored vessels and commercial fishing vessels.

There is considered to be a moderate potential to indirectly impact megafauna and avifauna species using the anchorage area (e.g. noise impacts, avoidance and light impacts) (Appendix A). At present, commercial vessels at anchor are considered to co-exist with marine megafauna and avifauna accessing these marine habitats and, as such, these impacts are considered minor (reported in GHD 2012a, Smith et al. 2012). Furthermore, no controls are currently available to restrict potential impacts to species from anchored ships due to light spill or noise. The existing impacts are a result of the anchored vessels maintaining safe operational lighting and these impacts are, therefore, unable to be ameliorated.

### **Future demand requirements**

Data for the Port of Townsville indicates that 55 to 60 per cent of ship arrivals, which are currently around 730 annually, proceed directly to anchor (MSQ 2012). This amounts to one ship call per day using the anchorages for stays that typically last several days.

Analysis of future demand scenarios (refer section 2.4 and Appendix B) predicted that ship call numbers are forecast to increase at the Port of Townsville only by two per cent per year over a 25 year period (PGM Environment 2012, DSDIP 2012). This equates to less than two ship calls per day requiring the use of anchorage. The anchorage area assessed by this project has sufficient physical capacity to support that future demand. Analysis also indicated that the current practices of ship anchoring were considered to have minimal future impact for the environment and other users beyond that which has already occurred. Opportunities to realise environmental, economic and social benefits were, however, identified through adoption of improved anchorage management strategies.

### **3.2.3 Management**

This section describes an environmental management strategy for Townsville which will enable improved management of anchorages to protect and minimise impacts on environmental values.

This environmental ship anchorage management strategy and the underpinning actions are driven by an overarching objective to minimise environmental and social impacts associated with anchorage use. This is achievable by minimising the number of vessels that sit at anchor while maintaining efficient operation of port import and export requirements. To achieve this for the Port of Townsville anchorage under future demand actions have been devised to support the key objectives of:

- Objective 1: Manage existing anchorages with the aim of protecting environmental values
- Objective 2: Optimise use of existing anchorages in the Marine Park
- Objective 3: Minimise environmental impacts from future anchorages and anchorage relocations

The action plans which support achievement of these objectives are described following.

### **3.2.3.1 Objective 1: Manage existing anchorages with the aim of protecting environmental values**

Information regarding potential to impact on aesthetic values of the World Heritage Area from anchoring off Townsville is limited. Objective 1 will improve current anchorage management practices by strengthening the understanding of, and management options available for, activities that cause or have the potential to cause environmental impacts within ship anchorages.

The implementation of actions under this objective will achieve the following outcomes:

**Outcome 1-1:** Provide guidance and education for key stakeholders in environmental management of anchorages and ships while at anchor for improved environmental outcomes

**Outcome 1-2:** Obtain better understanding of environmental condition of anchorages and their use near ports to enable adaptive management under changing conditions

**Outcome 1-3:** Further enhance environmental performance at ship anchorages for improved environmental outcomes

#### **Action Plan for Outcome 1-1: Guidance and education for stakeholders**

Although the existing anchorage of Townsville is located in open, soft seabed environment, with low biodiversity (refer section 3.2.1) these habitats are of value to the continuity and integrity of the World Heritage Area. Minimising fragmentation of these habitats and reducing risk of environmental impacts from ships at anchor is desirable for best environmental management.

Current anchorage management practices are improved by strengthening the understanding of shipping agents, ship masters, RHM, MSQ and other relevant parties of how anchoring may impact the environment and what management measures are available for impact mitigation. Current anchoring controls in ports described by port notices and in port manuals relate to the safe operation of ports or anchorages. While these controls have an objective of environmental management they do not prescriptively consider best practice management of the environment of the anchorages. Information available to the shipping industry in regards to anchorage use from Australian Quarantine and Inspection Service (AQIS), port control officers or RHM addresses quarantine requirements or anchoring safe operation and navigational requirements.

It is recommended to:

- Develop an environmental management guideline for anchorages in the Marine Park
- Develop port specific environmental management guidelines for anchorage use in the Marine Park and adjacent areas.

### ***Environmental management guidelines***

Review to date indicates there is no specific environmental guideline relating to ships at anchor within the World Heritage Area. It is recommended that the GBRMPA develop environmental guidelines relating specifically to ships at anchor within the World Heritage Area which could then be used to communicate with ship owners and masters of ships. These environmental guidelines could also be extended to ships anchoring outside of the Townsville anchorage within the Great Barrier Reef.

The guidelines should make reference to relevant Conventions and legislation that are applicable across Queensland ports for environmental protection, thus strengthening the implementation of legislation. The guidelines would address:

- A description of environmental values to be protected during anchoring
- Activities while anchoring that may impact on the environmental values
- Potential and actual environmental impacts from anchoring
- Best practice for anchoring with least environmental impact
- Waste management procedures while at anchor
- Light spill and noise considerations for ships while at anchor
- Biofouling and ballast water management of relevance to anchorage use
- Storage and management of hazardous substances while at anchor.

The environmental management measures should aim at minimising the following impacts identified as relevant to anchoring activities:

- Disturbance to seabed and supported biodiversity
- Release of emissions or pollutants/wastes
- Altered aesthetic value (or perception thereof)
- Interference with access to resources
- Marine pest introduction
- Interference with species behaviour.

The guidelines should be developed in collaboration with key stakeholders, including port authorities, MSQ and Australian Maritime Safety Authority (AMSA) to capture and cross reference all relevant jurisdictional requirements.

Details of the guidelines may be incorporated in port notices, which are legally binding under the *Transport Infrastructure Act 1994*. This would require negotiations with and approval by the port authorities. However, a significant portion of the anchorage area at Port of Townsville is outside port limits and therefore, any ships at anchor outside port limits would not be subject to compliance with port requirements under port notices.

For areas which are not covered under the above legislative approach,, the guidelines should be communicated to ship owners, shipping agents and ship masters via an education and public awareness program. This program may include online distribution (via GBRMPA website), pre-entry notification to international ship traffic via existing portals, such as AQIS or the REEFVTS or

similar, presentations to the key stakeholders (e.g. Shipping Australia) and media publicity.

### **Action Plan for Outcome 1-2: Environmental condition monitoring**

The environmental condition of anchorage sites is not currently subject to routine monitoring to understand whether existing management actions are being effective, to confirm that transient sensitive habitats (e.g. seagrasses or corals) are not at risk from anchoring activities, or identify whether adaptive and improved management is needed. This is likely because current management is not specifically targeted at environmental objectives. Targeted, regular environmental monitoring of the areas used for anchoring will improve understanding of the environmental condition and enable adaptive management intervention to be considered if controls are found to be ineffective.

#### ***Environmental monitoring program at ship anchorage sites***

It is recommended that the GBRMPA monitor the environmental conditions of the Townsville anchorage at appropriate intervals for the following parameters:

- Biodiversity and presence of marine pests
- Seabed conditions (habitat type, rugosity)
- Sediment type and quality
- Underwater noise
- Air quality
- Waste accumulation.

To achieve this, the GBRMPA will need to design a port specific monitoring program of relevance to the Port of Townsville anchorage. Considerations during design should be given to anchorage use patterns (both current and future), environmental risks at each port, dredge disposal activities and sampling intensity needed to have confidence of detecting any change in conditions. Consideration should also be given to identify what other parameters would need to be assessed to detect drivers of change.

In designing the program the GBRMPA should take into account monitoring programs already in operation that may be of relevance to the Port of Townsville anchorage site conditions. There may be opportunities for sharing information or for minor amendments to existing programs to achieve the desired outcomes. Collaboration with research centres and industry may play an important role in the success of the program.

The GBRMPA should review findings from ongoing monitoring to provide important information on changes in environmental conditions and efficiency of existing management arrangements. Data can be interpreted to provide an early warning system to implement corrective actions in a timely manner if environmental site condition degradation is identified.

Undetected releases of small waste materials may occur year round within the World Heritage Area (e.g. Wilson 2011) and, as such, this activity is considered to be a low level chronic impact. Cumulative effects do not appear to be well understood (Eco logical Australia and Open Lines 2012). Monitoring may also



provide information on whether small scale releases of pollutants from ships at anchor occur and, if so, whether they impact on the environment in a cumulative sense.

Reporting from this monitoring program should be used by the GBRMPA to inform the Outlook Report, DSEWPaC, Shipping Australia and other industry bodies and the IMO. This would support ongoing review and improvement of the international conventions and legislative tools that govern activities which have the potential to impact upon the World Heritage Area.

### **Action Plan for Outcome 1-3: Enhanced environmental performance**

To support review of relevancy of current environmental controls for anchorages it is appropriate to audit adherence of vessels to the controls they are required to abide by. This should be achieved in conjunction with measuring environmental conditions (Outcome 1-2) to enable differentiation between natural and anthropogenic drivers of change which may be observed during monitoring of anchorage sites.

To achieve Outcome 1-3 it is recommended that the GBRMPA:

- Develop and implement environmental inspection and audit programs for ships at anchor in the Marine Park in collaboration with ports, the shipping industry, AMSA, AQIS and MSQ.
- Provide reports of audit findings to industry and management bodies to support initiatives that aim at reducing air emissions from shipping, such as switching to low emission fuels used while at anchor.
- Determine the impact of anchorage areas on aesthetic values by considering how different stakeholder groups value a vista which does and does not include ships at anchor.

### ***Inspection program for ships at anchor to monitor environmental performance***

Review and consultation completed under this project did not identify any dedicated audit program which is targeted at taking record of the different impacts associated with vessels anchoring in the World Heritage Area across criteria including emissions to air, management of hazardous substances and waste releases at each of the five ports. Vessels are required to adhere to legislative requirements and only through reporting are incidents recorded and investigated.

It is recommended that the GBRMPA review current ship inspection programs to consider whether they adequately validate and demonstrate vessels adherence to legislative environmental management requirements. If current inspection programs do not address all relevant management requirements, the GBRMPA should consider what additional information is needed and whether existing inspection programs are able to be adapted to collate that information or whether additional programs are required. Existing inspection activities may only target quarantine matters and may not facilitate collection of data of relevance to anchorages and management of the environmental values of those locations.

If current inspections are found to lack in their ability to detect whether vessels adhere to required environmental management requirements while at anchor with

regard to wastes, emissions and hazardous substances the GBRMPA should consider mechanisms to address this gap in collaboration with relevant stakeholders. It is anticipated these stakeholders would include AMSA, AQIS, MSQ, and other parties involved in vessel entry control and management.

The action plan for an inspection program should include:

- A desktop review of current inspection programs conducted at each of the Port of Townsville
- Discussions with port authorities, AMSA, AQIS and MSQ on the scope, frequency, and record keeping of inspections that are currently being conducted for ships at anchor and in anchorage areas
- Discussions with shipping industry representatives regarding what environmental inspections are being conducted by the shipping industry or what environmental data is collated by the shipping industry for ships while at anchor
- Gap analysis to determine adequacy and consistent implementation of current inspection programs
- Identification of key improvements to existing inspection programs and a mechanism for implementing those improvements
- Communication and collaboration with key stakeholders on changes to existing inspection programs and how any improvements may be able to be implemented.

It is likely that the shipping industry would, through daily vessel management and logbook reporting, collate information that demonstrates adherence to environmental legislative requirements. Accordingly, adaptation of how information is reported may be required to achieve this outcome.

### ***Provide reports of audit findings to industry and management bodies***

Following the implementation of the improved inspection program, the GBRMPA may want to regularly audit to what extent the stakeholders adhere to the implementation of the inspection program, such as

- Checking that inspections are being completed at the intervals proposed
- Records are being kept and managed in the proposed way
- Any non-conformances identified during the inspections are dealt with in the agreed manner.

Information from this program would support the review of data collected under Outcome 1-2: Environmental condition monitoring.

### ***Determine impacts of anchorage areas on aesthetic values***

Assessments completed by this project found that the relative impact of ships at anchor on the aesthetic values of the World Heritage Area is unquantified, except at the Port of Hay Point (Appendix A). To adequately manage potential impacts to the World Heritage Area it is necessary to benchmark conditions and measure deviations and drivers of change through on-going monitoring.

It is, therefore recommended that the GBRMPA design and conduct a targeted assessment which seeks to identify how the presence of vessels visible at anchor influences the aesthetic value of the World Heritage Area across geographies including the major population centres, the port anchorage area and minor population centres. This could include development of standards for aesthetic value assessment and impact analysis in consultation with experts and stakeholders.

The outcomes of these investigations could provide a standard framework for aesthetic value impact analysis and inform GBRMPA's position on site selection criteria for any proposed expansions or relocations of anchorage sites. It will also provide key information regarding a sustainable level of visible anchorage which does not denigrate the aesthetic experience of the World Heritage Area. This information will be of use (aligned with other environmental and economic data) in defining the maximum number and arrangement of vessels able to be sustained at anchor. Findings should be shared with industry for improved management of anchorage areas.

Consideration should also be given to establishing on-going monitoring of potential impacts on aesthetic values. The need for this, including frequency, would be informed by baseline assessment. Outcomes could be used to demonstrate whether aesthetic values are improved by any management actions. As aesthetic values can be subjective; information provided through education and awareness may provide opportunity to positively influence perceptions of level of impact to aesthetic values from anchorage use.

### **3.2.3.2 Objective 2: Optimise use of existing anchorages in the Marine Park**

Current predictions are that the existing anchorage of Townsville can support future demand requirements. The area assessed within this project was, however, a conservative area. Townsville does not currently have a designated anchorage area or designated anchor drop points. There is potential to define an area for anchorage and designate anchor drop points to achieve a number of benefits including:

- Optimal efficient use of anchorages for the Port of Townsville
- Minimising habitat fragmentation which occurs from anchoring in different areas
- Minimising the area of seabed affected by anchoring
- Reduced potential need to designate new anchorage areas in future.

These benefits can be achieved through implementing Objective 2, which seeks to optimise the use of the existing anchorage and minimise the need to expand anchorage areas or designate new anchorage areas under increased demand.

The implementation of actions under this objective will, therefore, achieve the following outcome:

**Outcome 2-1:** Restrict shipping industry users of the Marine Park to anchor only in designated anchorage areas

## **Action Plan for Outcome 2-1: Restrict users to designated anchorage areas**

Designated anchorages can enable more efficient management of anchorages at ports, not only from an environmental point of view but also with regards to safety. Environmental considerations should also be embedded in key decision making processes with respect to the management of anchorages and ships while at anchor, especially, as the GBRMPA is not directly involved in making decisions regarding ship anchorage.

### ***Assign designated anchorages in each port***

The anchorage of Townsville does not have designated anchor drop points and, therefore, there are no designated habitat impact controls for anchoring at this location.

Townsville anchorage is managed by the RHM with regard to safe navigation and operation of vessels moving into/out of and sitting at anchor. Without use of designated ship anchor drop points there is increased potential of seabed fragmentation and potential for impacts to be realised across a larger spatial footprint than if the anchorage area was designated.

Currently, anchorages are managed by MSQ. Therefore, the GBRMPA should collaborate with port authorities and MSQ to designate anchorages in Townsville. Consideration of minimising potential environmental impacts which can result from ship anchorage could be achieved by giving regard to minimising the area needed for safe anchorage, minimising the number of vessels that are required to anchor and using defined anchor drop points to minimise the area of seabed affected by anchoring. Anchor drop points and the anchorage area should be designated with regard to providing the highest level of protection to the OUV of the World Heritage Area and should take into account existing zoning and other measures in place for environmental protection. Designation of anchorages does not preclude ships from being able to anchor within the General Use Zone or DSA, but does provide opportunity to minimise area of chronic impact.

### ***Investigate options to reduce footprint of existing anchorages***

Reducing the footprint of the existing anchorage reduces the extent of the Reef exposed to habitat impacts and pollutant risk. It also facilitates a response to any incident or audit and inspection of ships at anchor. This provides improved efficiencies and cost effectiveness for inspection or audit programs.

It is recommended that the GBRMPA work with the port and shipping industry, including the maritime safety authorities, to identify the minimum anchorage footprint required for the Port of Townsville under future shipping demand scenarios. To identify the minimum anchorage footprint required for safe and efficient ship operation and navigation the future anchorage use (demand) requirements should be considered. The sites which can be used with the least environmental impacts and which anchorage areas should be designated as emergency use options only should be identified. This study should also be completed with regard to the actions proposed to achieve Outcome 2-2: Minimise the need for further anchorages.

### **3.2.3.3 Objective 3: Minimise environmental impacts from future anchorage designations, including as a consequence of anchorage relocations**

Shipping within the World Heritage Area is forecast to increase in the next 25 years and, accordingly, anchorage demand is also forecast to increase. Ships accessing the port will require anchorage and strategies in the preceding sections seek to minimise the need to expand existing anchorages. There may, however, be need to relocate anchorages or designate additional anchorages for reasons other than future demand. For instance, new port developments or tourism operations may require designation of anchorages over and above those currently identified. Anchorage drop points could be designated for the Port of Townsville to improve environmental management of anchorage use at those locations. Implementing Objective 3 will minimise the environmental risk associated with the declaration of future new anchorages.

The implementation of actions under this objective will achieve the following outcome:

**Outcome 3-1:** Ensure environmental criteria are considered when selecting future anchorages

#### **Action Plan for Outcome 3-1: Environmental criteria for anchorage site selection**

Environmental impacts from new anchorages can be minimised if they are appropriately sited to reduce impacts to critical habitat, decrease interactions with other users and restrict the chance of interaction with protected species. It is therefore recommended to develop site selection criteria for anchorages that include environmental considerations, where new designations, expansion or relocation of anchorages cannot be avoided.

It is recommended that the GBRMPA in collaboration with MSQ and the port authorities develop a set of site selection criteria and embed them into current management practices. These could include, but not be limited to:

- Minimising the spatial footprint required for safe and efficient operation of the anchorage
- Considering the needs of all users to access marine resources
- Protecting seabed biodiversity and sediment conditions (including understanding of site conditions before designation of an anchorage area)
- Considering impacts on aesthetic values
- Considering proximity to sensitive receptors with regards to noise, light and other potential pollution sources
- Maintaining the integrity of the World Heritage Area and adjacent coastal environments.

The site selection criteria could be integrated into existing management processes used by the port authorities, such as environmental management plans, the RHM or the GBRMPA for reference during identification and review of any proposed new anchorages.

It is also recommended that the GBRMPA develop guiding principles regarding anchorage site selection in the Marine Park, including risk assessment and impact assessment guidelines. These would provide guidance on the information that would be needed to support any submission for anchorage declaration.

### 3.3 Port of Abbot Point

#### 3.3.1 Environment

##### **Size and location of Port of Abbot Point anchorage area**

The Port of Abbot Point is situated 25 km north of Bowen and is a single commodity port, comprising facilities for coal export. The anchorage area servicing the port (see figure 3-3) is located approximately 5 km north-north-west and does not have any designated anchorage points. The ship anchorage area defined for this project covers 58,818 ha and is the second largest anchorage of those assessed by this project (Appendix A). As there are currently no anchorages designated for Abbot Point it is likely that this study area is larger than the actual footprint of individual anchor drop points being used by vessels accessing Abbot Point. As noted elsewhere in this report, this approach of using a conservative area for assessment enables consideration of the entire area across which anchor drop may occur. This takes into account direct impacts from anchor drop in addition to indirect impacts that can be experienced by designating a network of spatially disparate drop points, such as habitat fragmentation or impact to habitat continuity/integrity.

The anchorage area is located in a General Use Zone of the Marine Park and further Marine Park zones are situated over 9 km away (figure 3-3) (Appendix A).

##### **Social, cultural and heritage values**

The only facilities present at Abbot Point are associated with the operation of the existing port. The nearest residential centre is Bowen, approximately 30 km south of Abbot Point (figure 3-3). While the anchorage area does not have a high level of visibility to residents and visitors to Bowen, the scenic vista surrounding the anchorage area may still be considered important in the context of the World Heritage Area listing. The Port of Abbot Point Cumulative Impact Assessment (ELA and Open Lines 2013) did complete a comprehensive assessment of the overall heritage values of the Abbot Point area with regards to its World Heritage Area listing, including aesthetics. It concluded that Abbot Point is not an area of exceptional natural beauty; it is representative of broad-scale coastal features impacted by both industrial and agricultural development. These industrial and agricultural impacts are principally (within the exception of shipping) land based impacts and currently the seascape maintains limited impact. The persistence of these broad-scale coastal features without further impacts (including to the seascape) are, therefore, considered to be an important element for maintaining the intactness of the World Heritage Area.

Primarily, the anchorage area is transited by commercial vessels servicing the Port of Abbot Point in addition to fishing vessels returning to ports north or south of

Abbot Point. Since there is no residential centre at Abbot Point, tourism operators do not typically access the Reef via the anchorage area.

Sites of significant cultural value have been identified to occur onshore at Abbot Point in the form of shell middens and rock fish traps (GHD 2012b). Moreover, Indigenous community links to the anchorage area have been recognised as being present, in relation to the support of totem species, such as dugong and marine turtles (Eco logical Australia and Open Lines 2012). As Traditional Owners were unable to be consulted during the delivery of this project (refer section 2.8) complete understanding of the cultural value of the sea country associated with the Abbot Point anchorage area is acknowledged to be a knowledge gap of the project.

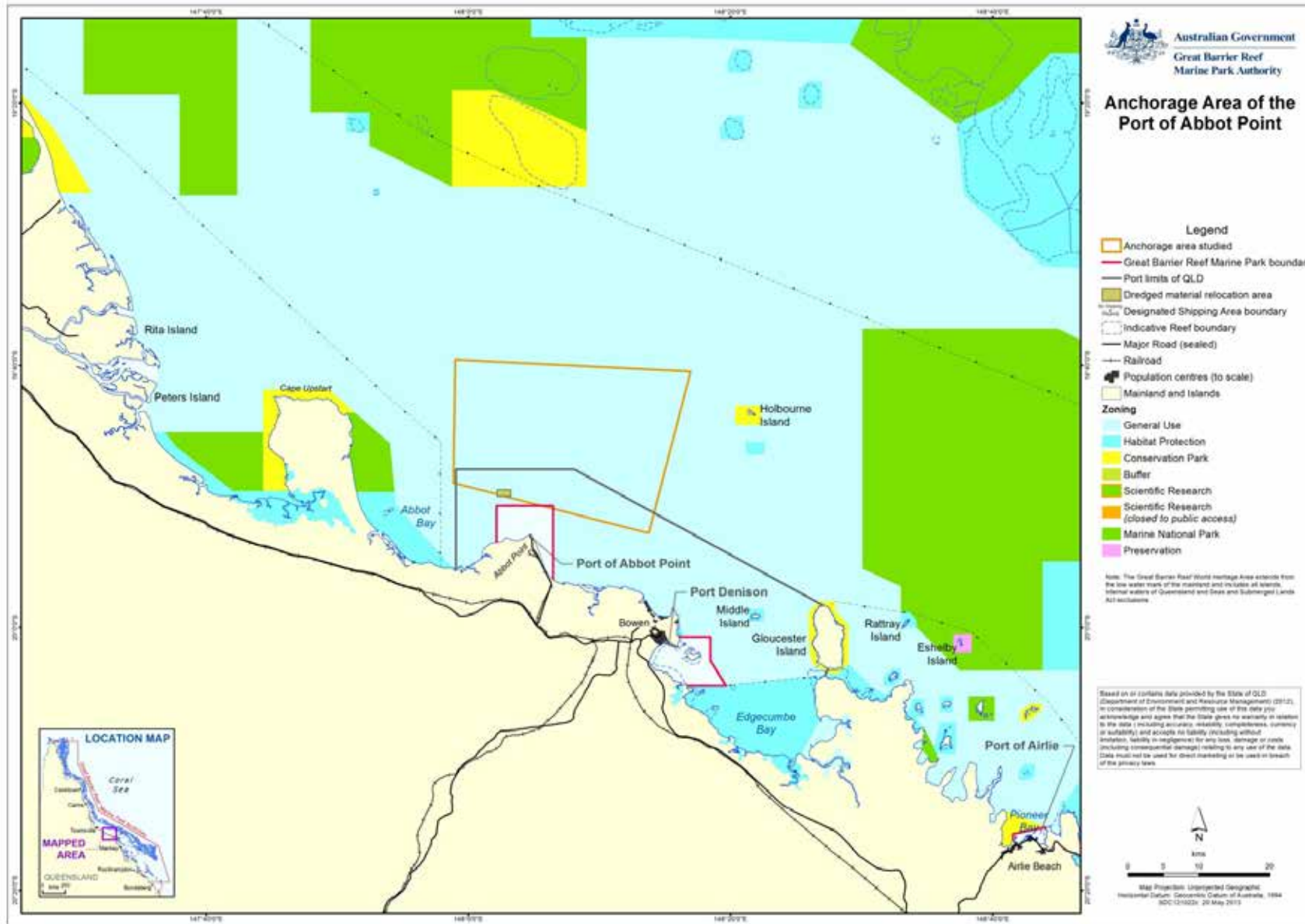
### **Environmental values**

The anchorage area of the Port of Abbot Point is located in deepwater and supports open sand and silt seabed. This habitat is known to support sparsely distributed epibenthic macroinvertebrates (Pitcher et al. 2007, GHD 2012b).

No sensitive ecosystems, such as coral reefs or seagrass meadows, are known to be present within the anchorage area. Nonetheless, species of cultural and environmental value such as corals and algae may occur at low numbers (Pitcher et al. 2007, McKenna et al. 2008).

Important wetlands, coral reefs and extensive seagrass meadows surround the anchorage area at varying distances (indicated by Marine Park zoning, figure 3-3) (Rasheed et al. 2005). The Caley Valley Wetland, listed under the Directory of Important Wetlands in Australia (Environment Australia 2001), is located at Abbot Point approximately 10 km south of the anchorage area. This system provides nursery habitat for a number of marine species (DSEWPaC 2012e), including important fishery species which are known to occur within the anchorage area (DAFF 2012, DSEWPaC 2012a).

These ecosystems provide habitat for species of cultural and environmental value known to occur within or transit the anchorage area including include marine turtles, dugong, cetaceans, marine reptiles, elasmobranchs and migratory wetland and marine avifauna (GHD 2009b, 2010, BMT WBM 2012a, DSEWPaC 2012a) (Appendix A).



**Figure 3-3:** Map of the current anchorage area of the Port of Abbot Point



### 3.3.2 Impacts

#### Existing conditions

As described under section 2.3 the actual and potential impacts that may be realised to the values of the Port of Abbot Point anchorage area have been considered by this project using a risk based analysis. The full assessment process and findings are provided in Appendix A. The potential environmental impacts and their significance, as determined by that process, are summarised in table 3-3. These impacts have potential to affect the World Heritage Area values of the Reef, including the aesthetics, presence of diverse ecological communities, natural beauty and species of conservation significance.

**Table 3-3:** Potential environmental impacts at the Port of Abbot Point and their significance

Potential environmental Impacts	Significance
Disturbance to seabed and supported biodiversity	Open soft sediment habitat, low diversity Low potential for impact
Minor releases of pollutants/wastes from ships	Low frequency of anchorage use Low potential for impact
A reduction in the aesthetic value of the coastal vista	Anchorage approximately 30 km from Bowen Low potential for impact
Preclusion of other users of the World Heritage Area	Currently concern for impact is low
Introduction of marine pest species	Low frequency of anchorage use Low potential for introduction
Interference with species behaviour	Anchorage overlaps with species habitat Moderate potential for impact

The Cumulative Impact Assessment for Abbot Point was completed after this project had completed its EIA. That process indicated limited risk of impacting upon species behaviours as a consequence of light spill (ELA and Open Lines 2013) and that ships at anchor are unlikely to cause significant underwater noise. The assessment completed for this project EIA (and therefore the rankings presented) has also taken into account noise generated during dropping and retrieving anchor and the limited information regarding how shipping noise and light spill affect species behaviours.

The majority of the biodiversity values for which the Reef is recognised are little affected by the Port of Abbot Point anchorage area. Potential indirect impacts to

megafauna and avifauna species transiting the anchorage area include noise, avoidance or light impacts. Studies to date indicate that commercial vessels at anchor co-exist with marine megafauna and avifauna within the anchorage area (reported in GHD 2012a, Smith et al. 2012).

The Cumulative Impact Assessment for Abbot Point noted that as an existing industrial port the area does not display exceptional natural beauty (Ecological Australia and Open Lines 2012). Current or future shipping activities were not considered to pose an unacceptable risk to the Reef or its natural and World Heritage values (Ecological Australia and Open Lines 2012, PGM 2012).

### **Future demand requirements**

Currently the Port of Abbot Point supports 180 ship arrivals per year. An average of less than one ship call per day uses the anchorage area for a typical stay of several days (MSQ 2012).

Analysis of future demand scenarios (refer section 2.4 and Appendix B) predicted that ship call numbers are forecast to increase at the Port of Abbot Point by three to four ship calls per day over the next 20 years (PGM Environment 2012, DSDIP 2012). The anchorage area assessed by this project has sufficient physical capacity to safely support that future demand.

The majority of identified impacts of relevance to anchoring activities at the Port of Abbot Point were considered to have a low potential of having a significant impact to the environment (table 3-3 and Appendix B). However, growth in future ship calls of around 11 per cent per year indicates that opportunities exist to implement new, or adapt and improve existing anchorage management actions to avoid further impacts on the World Heritage Area. This has been the focus for definition of management strategies of relevance to the Port of Abbot Point anchorage area.

### **3.3.3 Management**

This section describes an environmental management strategy for the Port of Abbot Point which will enable improved management of anchorages to protect and minimise impacts on environmental values.

This environmental ship anchorage management strategy and the underpinning actions are driven by an overarching objective to minimise environmental and social impacts associated with anchorage use. This is achievable by minimising the number of vessels that sit at anchor while maintaining efficient operation of port import and export requirements. To achieve this for the Port of Abbot Point anchorage under future demand, actions have been devised to support the key objectives of:

Objective 1: Manage existing anchorages with the aim of protecting environmental values

Objective 2: Optimise use of existing anchorages in the Marine Park

Objective 3: Minimise environmental impacts from future anchorages and anchorage relocations

The action plans which support achievement of these objectives are described following.

### **3.3.3.1 Objective 1: Manage existing anchorages with the aim of protecting environmental values**

Objective 1 will improve current anchorage management practices by strengthening the understanding of, and management options available for, activities that cause or have the potential to cause environmental impacts within ship anchorages.

The implementation of actions under this objective will achieve the following outcomes:

**Outcome 1-1:** Provide guidance and education for key stakeholders in environmental management of anchorages and ships while at anchor for improved environmental outcomes

**Outcome 1-2:** Obtain better understanding of environmental condition of anchorages and their use near ports to enable adaptive management under changing conditions

**Outcome 1-3:** Further enhance environmental performance at ship anchorages for improved environmental outcomes

#### **Action Plan for Outcome 1-1: Guidance and education for stakeholders**

Although the existing anchorage at the Port of Abbot Point is located in open, soft seabed environment, with low biodiversity (refer section 3.3.1) these habitats are of value to the continuity and integrity of the World Heritage Area. Reducing risk of environmental impacts from ships at anchor is desirable for best environmental management. To achieve this, ships seeking to anchor within the World Heritage Area require access to information about how best to protect the values for which the area is recognised.

#### **Environmental management guidelines**

Review to date indicates there is no specific environmental guideline relating to ships at anchor within the World Heritage Area. It is recommended that the GBRMPA develop environmental guidelines relating specifically to ships at anchor within the World Heritage Area which could then be used to communicate with ship owners and masters of ships. These environmental guidelines could also be extended to ships anchoring outside of the Port of Abbot Point anchorage within the northern Great Barrier Reef.

The guidelines should make reference to relevant Conventions and legislation that are applicable across Queensland ports for environmental protection, thus strengthening the implementation of legislation. The guidelines would address:

- A description of environmental values to be protected during anchoring
- Activities while anchoring that may impact on the environmental values
- Potential and actual environmental impacts from anchoring
- Best practice for anchoring with least environmental impact
- Waste management procedures while at anchor
- Light spill and noise considerations for ships while at anchor
- Biofouling and ballast water management of relevance to anchorage use

- Storage and management of hazardous substances while at anchor.

The environmental management measures should aim at minimising the following impacts identified as relevant to anchoring activities:

- Disturbance to seabed and supported biodiversity
- Release of emissions or pollutants/wastes
- Altered aesthetic value (or perception thereof)
- Interference with access to resources
- Marine pest introduction
- Interference with species behaviour.

The guidelines should be developed in collaboration with key stakeholders, including port authorities, MSQ and AMSA to capture and cross reference all relevant jurisdictional requirements.

Details of the guidelines may be incorporated in port notices, which are legally binding under the *Transport Infrastructure Act 1994*. This would require negotiations with and approval by the port authorities. However, a significant portion of the anchorage area at Port of Abbot Point is outside port limits and therefore, any ships at anchor outside port limits would not be subject to compliance with port requirements under port notices.

For areas which are not covered under the above legislative approach, the guidelines should be communicated to ship owners, shipping agents and ship masters via an education and public awareness program. This program may include online distribution (via GBRMPA and other management agency websites), pre-entry notification to international ship traffic via existing portals, such as AQIS or the REEFVTS or similar, presentations to the key stakeholders (e.g. Shipping Australia) and media publicity.

### **Action Plan for Outcome 1-2: Environmental condition monitoring**

The environmental condition of anchorage sites is not currently subject to routine monitoring to understand whether existing management actions are being effective, to confirm that transient sensitive habitats (e.g. seagrasses or corals) are not at risk from anchoring activities, or identify whether adaptive and improved management is needed. This is likely because current management is not specifically targeted at environmental objectives. Targeted, regular environmental monitoring of the areas used for anchoring will improve understanding of the environmental condition and enable adaptive management intervention to be considered if controls are found to be ineffective.

#### ***Environmental monitoring program at ship anchorage sites***

It is recommended that the GBRMPA monitor the environmental conditions of the Port of Abbot Point anchorage at appropriate intervals for the following parameters:

- Biodiversity and presence of marine pests
- Seabed conditions (habitat type, rugosity)

- Sediment type and quality
- Underwater noise
- Air quality
- Waste accumulation.

To achieve this, the GBRMPA will need to design a port specific monitoring program of relevance to the Port of Abbot Point anchorage. Considerations during design should be given to anchorage use patterns (both current and future), dredge disposal activities and environmental risks at each port and sampling intensity needed to have confidence of detecting any change in conditions. Consideration should also be given to identify what other parameters would need to be assessed to detect drivers of change.

In designing the program the GBRMPA should take into account monitoring programs already in operation that may be of relevance to the Port of Abbot Point anchorage site conditions. There may be opportunities for sharing information or for minor amendments to existing programs to achieve the desired outcomes. Collaboration with research centres and industry may play an important role in the success of the program.

The GBRMPA should review findings from ongoing monitoring to provide important information on changes in environmental conditions and efficiency of existing management arrangements. Data can be interpreted to provide an early warning system to implement corrective actions in a timely manner if environmental site condition degradation is identified.

Undetected releases of small waste materials may occur year round within the World Heritage Area (e.g. Wilson 2011) and, as such, this activity is considered to be a low level chronic impact. Cumulative effects do not appear to be well understood (Eco logical Australia and Open Lines 2012). Monitoring may also provide information on whether small scale releases of pollutants from ships at anchor occur and, if so, whether they impact on the environment in a cumulative sense.

Reporting from this monitoring program should be used by the GBRMPA to inform the Outlook Report, other government stakeholders including DSEWPaC, Shipping Australia and other industry bodies and the IMO. This would support ongoing review and improvement of the international conventions and legislative tools that govern activities which have the potential to impact upon the World Heritage Area.

### **Action Plan for Outcome 1-3: Enhanced environmental performance**

To support review of relevancy of current environmental controls for anchorages it is appropriate to audit adherence of vessels to the controls they are required to abide by. This should be achieved in conjunction with measuring environmental conditions (Outcome 1-2) to enable differentiation between natural and anthropogenic drivers of change which may be observed during monitoring of anchorage sites.

To achieve Outcome 1-3 it is recommended that the GBRMPA:

- Develop and implement environmental inspection and audit programs for ships at anchor in the Marine Park in collaboration with ports, the shipping industry, AMSA, AQIS and MSQ.
- Provide reports of audit findings to industry and management bodies to support initiatives that aim at reducing air emissions from shipping, such as switch to low emission fuels used while at anchor.
- Determine the impact of anchorage areas on aesthetic values by considering how different stakeholder groups value a vista which does and does not include ships at anchor.

### ***Inspection program for ships at anchor to monitor environmental performance***

Review and consultation completed under this project did not identify any dedicated audit program which is targeted at taking record of the different impacts associated with vessels anchoring in the World Heritage Area across criteria including emissions to air, management of hazardous substances and waste releases at each of the five ports. Vessels are required to adhere to legislative requirements and only through reporting are incidents recorded and investigated.

It is recommended that the GBRMPA review current ship inspection programs to consider whether they adequately validate and demonstrate vessels adherence to legislative environmental management requirements. If current inspection programs do not address all relevant management requirements, the GBRMPA should consider whether existing inspection programs are able to be adapted to collate that information or whether additional programs are required. Existing inspection activities may only target quarantine matters and may not facilitate collection of data of relevance to anchorages and management of the environmental values of those locations.

If current inspections are found to lack in their ability to detect whether vessels adhere to required environmental management requirements while at anchor with regard to wastes, emissions and hazardous substances the GBRMPA should consider mechanisms to address this gap in collaboration with relevant stakeholders. It is anticipated these stakeholders would include AMSA, AQIS, MSQ and other parties involved in vessel entry control and management.

The action plan for an inspection program should include:

- A desktop review of current inspection programs conducted at the Port of Abbot Point
- Discussions with port authorities, AMSA, AQIS and MSQ on the scope, frequency, and record keeping of inspections that are currently being conducted for ships at anchor and in anchorage areas
- Discussions with shipping industry representatives regarding what environmental inspections are being conducted by the shipping industry or what environmental data is collated by the shipping industry for ships while at anchor

- Gap analysis to determine adequacy and consistent implementation of current inspection programs
- Identification of key improvements to existing inspection programs and a mechanism for implementing those improvements
- Communication and collaboration with key stakeholders on changes to existing inspection programs and how any improvements may be able to be implemented.

It is likely that the shipping industry would, through daily vessel management and logbook reporting, collate information that demonstrates adherence to environmental legislative requirements. Accordingly, adaptation of how information is reported may be required to achieve this outcome.

### ***Provide reports of audit findings to industry and management bodies***

Following the implementation of the improved inspection program, the GBRMPA may want to regularly audit to what extent the stakeholders adhere to the implementation of the inspection program, such as

- Checking that inspections are being completed at the intervals proposed
- Records are being kept and managed in the proposed way
- Any non-conformances identified during the inspections are dealt with in the agreed manner.

Information from this program would support the review of data collected under Outcome 1-2: Environmental condition monitoring.

### ***Determine impacts of anchorage areas on aesthetic values***

Assessments completed by this project found that the relative impact of ships at anchor on the aesthetic values of the World Heritage Area is unquantified, except at the Port of Hay Point (Appendix A). To adequately manage potential impacts to the World Heritage Area it is necessary to benchmark conditions and measure deviations and drivers of change through on-going monitoring.

It is, therefore recommended that the GBRMPA design and conduct a targeted assessment which seeks to identify how the presence of vessels visible at anchor influences the aesthetic value of the World Heritage Area across geographies including the major population centres, the port anchorage area and minor population centres. This could include development of standards for aesthetic value assessment and impact analysis in consultation with experts and stakeholders.

The outcomes of these investigations could provide a standard framework for aesthetic value impact analysis and inform GBRMPA's position on site selection criteria for any proposed expansions or relocations of anchorage sites. It will also provide key information regarding a sustainable level of visible anchorage which does not denigrate the aesthetic experience of the World Heritage Area. This information will be of use (aligned with other environmental and economic data) in defining the maximum number and arrangement of vessels able to be sustained at anchor. Findings should be shared with industry for improved management of anchorage areas.

Consideration should also be given to establishing on-going monitoring of potential impacts on aesthetic values. The need for this, including frequency, would be informed by baseline assessment. Outcomes could be used to demonstrate whether aesthetic values are improved by any management actions. As aesthetic values can be subjective; information provided through education and awareness may provide opportunity to positively influence perceptions of level of impact to aesthetic values from anchorage use.

### **3.3.3.2 Objective 2: Optimise use of existing anchorages in the Marine Park**

Current predictions are that the existing anchorage at the Port of Abbot Point can support future demand requirements. The area assessed within this project was, however, a conservative area. The Port of Abbot Point does not currently have a designated anchorage area or designated anchor drop points. There is potential to define an area for anchorage and designate anchor drop points to achieve a number of benefits including:

- Optimal efficient use of anchorages for the Port of Abbot Point
- Minimising habitat fragmentation which occurs from anchoring in different areas
- Minimising the area of seabed affected by anchoring and
- Reduced potential need to designate new anchorage areas in future.

The implementation of actions under this objective will achieve the following outcomes:

**Outcome 2-1:** Restrict shipping industry users of the Marine Park to anchor only in designated anchorage areas

**Outcome 2-2:** Minimise the need for further anchorages in the Marine Park

#### **Action Plan for Outcome 2-1: Restrict users to designated anchorage areas**

Designated anchorages can enable more efficient management of anchorages at ports, not only from an environmental point of view but also with regards to safety. Environmental considerations should also be embedded in key decision making processes with respect to the management of anchorages and ships while at anchor, especially as the GBRMPA is not directly involved in making decisions regarding ship anchorage.

#### **Assign designated anchorages in each port**

The anchorage at Abbot Point does not have designated anchor drop points and, therefore, there are no designated habitat impact controls for anchoring at these locations.

The Abbot Point anchorage is managed by the RHM with regard to safe navigation and operation of vessels moving into/out of and sitting at anchor. Without use of designated ship anchor drop points there is increased potential of seabed fragmentation and potential for impacts to be realised across a larger spatial footprint than if the anchorage area was designated.



Currently, anchorages are managed by MSQ. Therefore, the GBRMPA should collaborate with port authorities and MSQ to designate anchorages for Abbot Point. Consideration of minimising potential environmental impacts which can result from ship anchorage could be achieved by giving regard to minimising the area needed for safe anchorage, minimising the number of vessels that are required to anchor and using defined anchor drop points to minimise the area of seabed affected by anchoring. Anchor drop points and the anchorage area should be designated with regard to providing the highest level of protection to the OUV of the World Heritage Area and should take into account existing zoning and other measures in place for environmental protection. Designation of anchorages does not preclude ships from being able to anchor within the general use zone or DSA, but does provide opportunity to minimise area of chronic impact.

### ***Investigate options to reduce footprint of existing anchorages***

Reducing the footprint of the anchorage area reduces the extent of the Reef exposed to habitat impacts and pollutant risk. It also facilitates a response to any incident or audit and inspection of ships at anchor. This provides improved efficiencies and cost effectiveness for inspection or audit programs.

It is recommended that the GBRMPA work with the port and shipping industry, including the maritime safety authorities, to identify the minimum anchorage footprint required for efficient ongoing management of the environment and port at Abbot Point. To identify the minimum anchorage footprint required for safe and efficient ship operation and navigation the future anchorage use (demand) requirements should be considered. The sites which can be used with the least environmental impacts and which anchorage areas should be designated as emergency use options only should be identified. This study should also be completed with regard to the actions proposed to achieve Outcome 2-2: Minimise the need for further anchorages.

### **Action Plan for Outcome 2-2: Minimise need for further anchorages**

Improvements in supply chain management at the single commodity ports, including scheduled vessel arrivals with designated anchorages, could minimise the need for future anchorages at the Port of Abbot Point.

### ***Further investigate improvements in whole of supply chain management for single commodities, especially coal***

The whole of supply chain includes a single exporter fully controlling an integrated supply-chain from mine to terminal to overseas port with the exporter also controlling the shipping (on Cost Insurance and Freight sales terms, meaning all the way to the destination port).

Improvements in whole of supply chain management may lead to a more efficient use of existing anchorage sites. For instance, ships may not be required to anchor if they can proceed direct to loading/unloading berths on arrival in the port. Alternatively time spent at anchor may be reduced if supply chain logistics are aligned to provide the most efficient operation. These improvements could negate the need to increase anchorages in the future, improve opportunity to reduce existing number of required anchorages and set up mechanisms to achieve optimal use of designated anchorages. Given the complexity of supply chain

logistics, improvements in efficiency are most likely to be achieved by focusing on supply chain management of a single commodity, such as coal.

It is recommended that the GBRMPA collaborate with the exporter (mine), port and shipping industry, including the maritime safety authorities, to conduct a study of supply chain management for coal export from the Port of Abbot Point. The study should focus on optimising anchorage use in the near future with a regular review process as opposed to catering for increased demand over the next 30 years. Findings would inform anchorage designation requirements.

The study can then be used to identify what changes could be made to further optimise use of anchorages. Any changes would require involvement of key stakeholders, including port authorities, infrastructure owners and coal companies.

### ***Further investigation of vessel arrivals systems***

In order to prevent the need for additional anchorages with increasing ship calls, single commodity ports may benefit most from a scheduled vessel arrival system (VAS) (in combination with designated anchorages). A VAS provides an avenue for improved supply chain management. Elsewhere use of VAS enables ships to call straight to berth upon arrival in a port or minimises time spent at anchor. This management option is expected to reduce demand for anchorages and may realise economic benefits for exporters and shipowners. The Port of Newcastle currently operates a VAS and provides a case study (which is outlined in Appendix B) from which lessons of relevance to the Marine Park could be obtained.

The possible benefits of a VAS to the Port of Abbot Point and the environment include:

- Instead of having to expand anchorages to meet demand, with possible subsequent incremental negative environmental impacts, anchorage demand can be contained to existing areas
- Economic benefits for coal exporters (less demurrage) and shipowners (reduced fuel costs and improved ship productivity)
- Reduced ship fuel greenhouse gas and other emissions.

The main issues of implementing a VAS are:

- Potential flow-on risks to ship safety and the environment in other locations outside of the coal ports, including across borders (beyond the Marine Park/World Heritage Area and nationally)
- Queensland's complexity of coal ports owned/managed by different entities or ports handling coal ships in addition to other trades (not a current concern for Abbot Point)
- Likely need for regulatory approval and legislation which would enable the requirements of any VAS to be designated and enforced at any location – this is likely a one-time but detailed process which would require agreement between a number of government and management authorities regarding the operational and management arrangements of any VAS to be implemented
- Cost of managing a VAS for one or more ports (note – the existence of the ship monitoring systems operated for the Reef may provide some capability required for a VAS; this requires further investigation).

However, during this project a number of concerns with scheduled VAS have been raised, including the flow-on effects on ship safety and the environment (e.g. ships anchoring at distance from ports, making emergency response more difficult). The project also found that cost and governance of such a system within the multi-jurisdictional environment of the World Heritage Area would require further investigation.

Implementing a VAS is considered to be a preferential outcome than expanding anchorage areas to support future demand requirements. Ultimately, a VAS forms part of a complex process of whole of supply chain management which involves a number of stakeholders, including the exporter (mine), port authorities, third party owners of port infrastructure, ship owners and buyers. Adopting a VAS is, therefore, likely to be most easily implemented where a single agency has control over the entire supply chain: mine supply, rail delivery, export berth and destination.

Any changes to existing systems would require strong drivers, such as economic incentives or regulatory changes. It is considered that the GBRMPA has only limited influence on these processes and, as such, should work closely with other regulators and industry to achieve the required outcomes of sustainable use of the World Heritage Area. Corporations who have mine interests and are seeking to operate whole of supply chain export operations in Queensland (e.g coal companies) should, therefore, be consulted during this process. Currently the direct influence the GBRMPA has on ship anchoring in the Marine Park is via the Zoning Plan. Ships are able to anchor within General Use Zones and DSA. The GBRMPA could seek to influence ship anchoring in the Marine Park by limiting the availability of anchorages within the Marine Park designated under the Zoning Plan, however, this would need careful consideration and may not be in the interest of the overall protection of the Reef.

A change in the current Zoning Plan would have significant implications for the port, maritime and shipping industry and flow on effects to port customers. Extensive consultation with all relevant stakeholders in the industry, including State and Commonwealth government and political representatives would be required to change the current zoning arrangements in the Marine Park.

Collaboration across relevant agencies during review of change management requirements and risks involved in VAS implementation will support identification of the best outcomes for environmental benefit.

It is recommended that the GBRMPA conduct further investigations to better understand the risks involved in the introduction of a VAS in the context of marine safety and environmental protection of the Reef. The investigations could include:

- Identification of flow-on risks to ship safety and the environment in locations outside of the coal ports and potentially across jurisdictional borders
- Identification of controls for any flow-on risks identified
- Steps to be taken for the implementation of a VAS across current regulatory and management arrangements of the existing anchorages
- Impediments to the implementation of a VAS across regulatory, current management arrangements of existing anchorages

- Estimation of costs of managing a VAS for one or more ports and responsibility for servicing the costs
- Capacity of current vessel movement monitoring systems to be adopted for VAS
- Legislative and management responsibilities for adoption of a VAS at each of the relevant ports.

The investigation into a VAS for the Port of Abbot Point should be conducted in collaboration with key stakeholders, including the ports, ship owner and shipping agents representatives, and exporting mining/coal companies. The outcomes of the investigations will provide further direction on whether a VAS is a feasible anchorage management option for coal export through Abbot Point.

### **3.3.3.3 Objective 3: Minimise environmental impacts from future anchorage designations, including as a consequence of anchorage relocations**

Shipping within the World Heritage Area is forecast to increase in the next 25 years and, accordingly, anchorage demand is also forecast to increase. Ships accessing the port will require anchorage and strategies in the preceding sections seek to minimise the need to expand existing anchorages. There may, however, be need to relocate anchorages or designate additional anchorages for reasons other than future demand. For instance, new port developments or tourism operations may require designation of anchorages over and above those currently identified. Anchorage drop points could be designated for the Port of Abbot Point to improve environmental management of anchorage use at those locations. Implementing Objective 3 will minimise the environmental risk associated with the declaration of future new anchorages.

The implementation of actions under this objective will achieve the following outcome:

**Outcome 3-1:** Ensure environmental criteria are considered when selecting future anchorages

#### **Action Plan for Outcome 3-1: Environmental criteria for anchorage site selection**

Environmental impacts from new anchorages can be minimised if they are appropriately sited to reduce impacts to critical habitat, decrease interactions with other users and restrict the chance of interaction with protected species. It is therefore recommended to develop site selection criteria for anchorages that include environmental considerations, where new designations, expansion or relocation of anchorages cannot be avoided.

It is recommended that the GBRMPA in collaboration with MSQ and the port authorities develop a set of site selection criteria and embed them into current management practices. These could include, but not be limited to:

- Minimising the spatial footprint required for safe and efficient operation of the anchorage
- Considering the needs of all users to access marine resources

- Protecting seabed biodiversity and sediment conditions (including understanding of site conditions before designation of an anchorage area)
- Considering impacts on aesthetic values
- Considering proximity to sensitive receptors with regards to noise, light and other potential pollution sources
- Maintaining the integrity of the World Heritage Area and adjacent coastal environments.

The site selection criteria could be integrated into existing management processes used by the port authorities, such as environmental management plans, the RHM or the GBRMPA for reference during identification and review of any proposed new anchorages.

It is also recommended that the GBRMPA develop guiding principles regarding anchorage site selection in the Marine Park, including risk assessment and impact assessment guidelines. These would provide guidance on the information that would be needed to support any submission for anchorage declaration.

## 3.4 Port of Hay Point

### 3.4.1 Environment

#### Size and location of Port of Hay Point anchorage area

The Port of Hay Point is situated 40 km south of Mackay and over 10 km north of Sarina and solely exports coal. The anchorage area servicing the port is the largest of the five major ports, totalling an area of 157,284 ha, and is located immediately adjacent to the port terminals (see figure 3-4). This study area is larger than the actual footprint of the anchorages and provides a conservative approach of considering the entire area across which anchor drop may occur. This approach takes into account direct impacts from anchor drop in addition to indirect impacts that can be experienced by designating a network of drop points, such as habitat fragmentation or impact to habitat continuity/integrity.

The Port of Hay Point has the highest requirement of the five ports for anchoring reflecting the nature of the coal trade at the port and the connecting coal supply chains from mine to port. The designated anchorages are used by large commercial ships waiting for either the Hay Point Coal Terminal or Dalrymple Bay Coal Terminal. These include the North and South anchorages and the Offshore anchorage, a larger area situated outside port limits (see figure 3-4).

Aurecon (2012) notes that on average only 37 of these anchorages are currently used. Remaining anchorages facilitate management of peak demand requirements when ship arrivals exceed availability of coal or terminal capacity.

Located in a General Use Zone of the Marine Park, the anchorage area at Hay Point is also surrounded by protected habitat at varying distances including a number of Habitat Protection Zones encompassing fringing coral reefs (see figure 3-4) (Appendix A).

## **Social, cultural and heritage values**

The only facilities present at Hay Point are associated with the operation of the existing port. The nearest residential centre is Sarina, approximately 10 km south of Hay Point (figure 3-4). While the anchorage area does not have a high level of visibility from Sarina, the scenic vista surrounding the anchorage area may still be considered remarkable, exceptional or unique in the context of the World Heritage Area listing.

Indigenous community links to the anchorage area have been recognised as the anchorage area represents sea country and may provide habitat for totem species (such as dugong and marine turtles). As Traditional Owners were unable to be consulted during the delivery of this project (refer section 2.8) complete understanding of the cultural value of the sea country associated with the Hay Point anchorage area is acknowledged to be a knowledge gap of the project.

Compared to locations such as Cairns, the anchorage area is transited by a low volume of tourism operators accessing the Reef and islands within the World Heritage Area. The anchorage area is, however, transited by commercial and recreational fishing vessels operating out of centres north and south of the port.

Concerns were raised during the consultation period regarding the interaction between anchored vessels and commercial fishing activities, typically trawling because of the risk of collision and fishing gear becoming entangled with anchored vessels. Safety is also of concern in areas where vessels have previously anchored due to possible changes in bathymetry which compromise the safe and optimal operation of trawl equipment. There are also safety concerns for maritime users where the perceived safe operating distance around anchored ships is greater than the direct physical dimensions and the swing distance of an anchored ship. These concerns have been taken into account during the impact assessment.

## **Environmental values**

The anchorage area of the Port of Hay Point is located immediately adjacent the port in deepwater. The seabed is predominantly comprised of sand and muddy silt sediments (Pitcher et al. 2007, BMA 2011) and supports benthic macroinvertebrate assemblages typical of those described from deepwater open seabed areas within the Reef (Thomas and Rasheed 2011). Surveys of seagrass completed within port limits since 2004 have noted that coastal and deepwater meadows are transient at Hay Point (Thomas et al. 2012, Thomas and Rasheed 2011).

No solitary corals are known to occur within the anchorage area; however seagrass meadows and algae are known to be present at low density (Pitcher et al. 2007, Thomas and Rasheed 2011). Prudhoe and Derwent Islands, which support sensitive ecosystems, occur approximately 5 km away from the anchorage area (figure 3-4).

A range of species of cultural and environmental value, including fish, migratory wetland and marine birds, and marine megafauna, transit the anchorage area (DAFF 2012, DSEWPaC 2012a) (Appendix A). Additionally, the presence of seagrasses, even if transient, may provide feeding habitat for dugong and marine turtles.

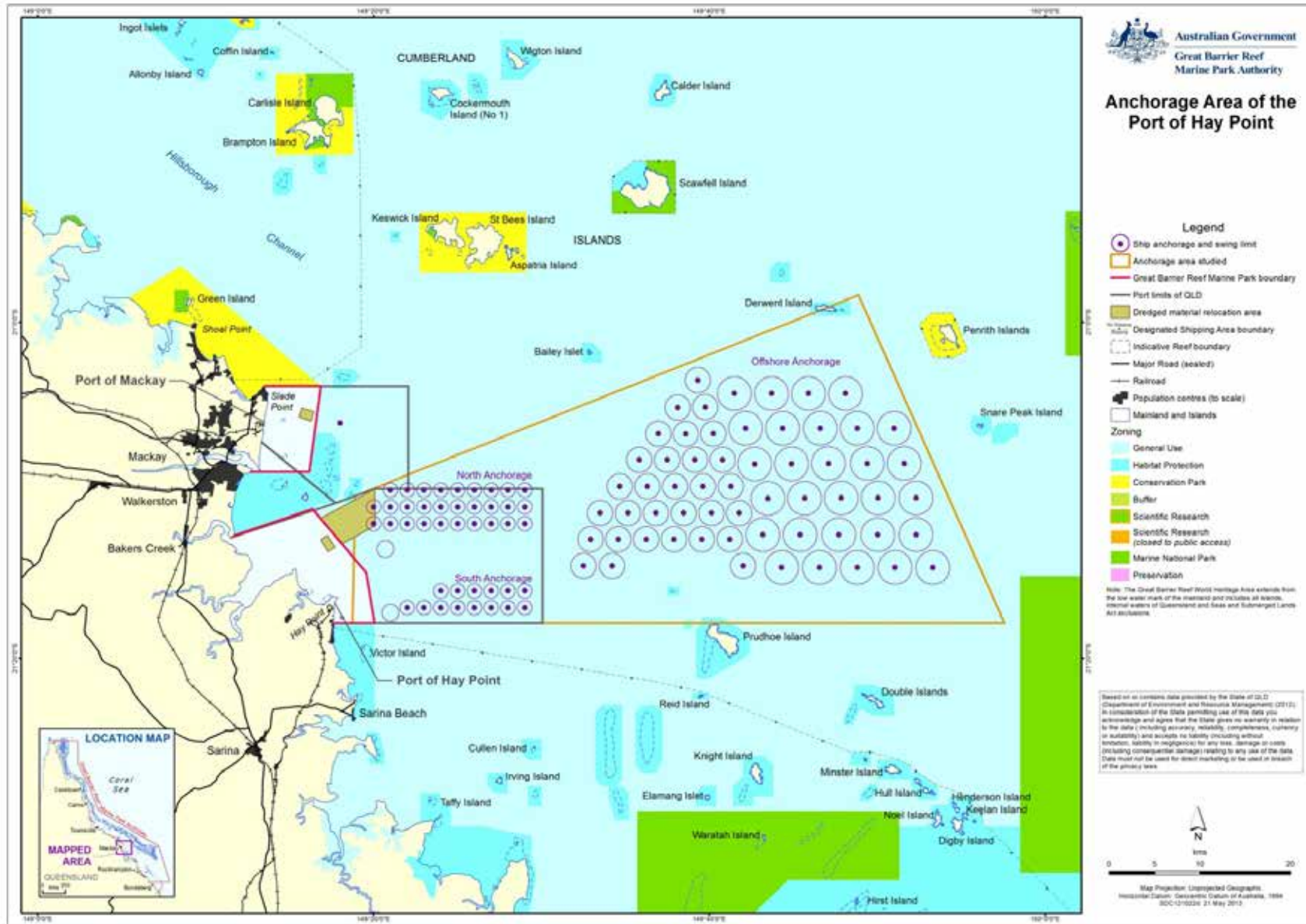


Figure 3-4: Map of the current anchorage area of the Port of Hay Point

### 3.4.2 Impacts

#### Existing conditions

As described under section 2.3 the actual and potential impacts that may be realised to the values of the Port of Hay Point anchorage area have been considered by this project using a risk based analysis. The full assessment process and findings are provided in Appendix A. The potential environmental impacts and their significance, as determined by that process, are summarised in table 3-4. These impacts have potential to affect the World Heritage Area values of the Reef, including the aesthetics, presence of diverse ecological communities, natural beauty and species of conservation significance.

**Table 3-4:** Potential environmental impacts at the Port of Hay Point and their significance

Potential environmental Impacts	Significance
Disturbance to seabed and supported biodiversity	Open soft sediment habitat, low diversity Low potential for impact
Minor releases of pollutants/wastes from ships	High frequency of anchorage use High potential for impact
A reduction in the aesthetic value of the coastal vista	Anchorage less than 10 km from Sarina Moderate potential for impact
Preclusion of other users of the World Heritage Area	Potential navigational impacts currently exist
Introduction of marine pest species	High frequency of anchorage use High potential for introduction
Interference with species behaviour	Anchorage overlaps with species habitat High potential for impact

The anchorage area at Hay Point is located in an area that has little effect on the majority of biodiversity values for which the reef is recognised. It is situated over open seabed systems so does not result in anchor drop or chain drag impacts on sensitive habitats such as coral reef systems or seagrasses.

Due to its proximity to the coast, the anchorage area has a moderate potential to impact on the aesthetic values of the locality and to preclude other users of the Marine Park. Investigation of the impacts of ship anchorages on aesthetic values at the Port of Hay Point noted that visual impacts on coastal and ocean scenic



values at this location will be limited and are considered minor under proposed future ship movements (Cardno Chenoweth 2013). However, that study also reported that Hay Point anchorage does not express or represent any of the World Heritage aesthetic values for which the Reef is recognised. This area was, therefore, considered to be unlike more scenic coastline sections of the Reef.

The potential for vessels to release pollutants, introduce marine pest species and interfere with marine species behaviour is considered high. Surveys to date (e.g. port water quality monitoring or marine pest monitoring) have not detected any impacts.

### **Future demand requirements**

Currently the Port of Hay Point supports around 800 bulk carrier vessel arrivals per year. Ninety nine per cent of these proceed directly to anchor to await berth (MSQ 2012). On average two to three ship calls per day use the anchorage area, with ships spending on average 19 days at anchor. Ships have been recorded at anchor for one to two months. Demand and anchor use at Hay Point reflects the nature of the coal trade at the port and the connecting supply chains from the mine to the port. This extended anchor time also reflects ships moving into and out of anchor to load different coal products.

Hay Point has the highest requirement for anchorage of the areas assessed by this project. This is driven by the presence of two terminal operations at Hay Point, each requiring anchorage. This is expected to increase to include a third and fourth terminal in the next 25 years, both of which will also require anchorage.

Analysis of future demand scenarios (refer section 2.4 and Appendix B) predicted that ship call numbers are forecast to increase at the Port of Hay Point by five to six per cent per year (PGM Environment 2012, DSDIP 2012). This would put pressure on the existing capacity of the anchorage area (PGM Environment 2012, DSDIP 2012). As such, the existing anchorage area is predicted to require expansion of around 30 per cent by 2032, if no management changes are made (PGM Environment 2012).

### **3.4.3 Management**

This section describes an environmental management strategy for the Port of Hay Point which will enable improved management of anchorages to protect and minimise impacts on environmental values.

This environmental ship anchorage management strategy and the underpinning actions are driven by an overarching objective to minimise environmental and social impacts associated with anchorage use. This is achievable by minimising the number of vessels that sit at anchor while maintaining efficient operation of port import and export requirements. To achieve this for the Port of Hay Point anchorage under future demand; actions have been devised to support the key objectives of:

Objective 1: Manage existing anchorages with the aim of protecting environmental values

Objective 2: Optimise use of existing anchorages in the Marine Park

Objective 3: Minimise environmental impacts from future anchorages and anchorage relocations

The action plans which support achievement of these objectives are described following.

#### **3.4.3.1 Objective 1: Manage existing anchorages with the aim of protecting environmental values**

Objective 1 will improve current anchorage management practices by strengthening the understanding of, and management options available for, activities that cause or have the potential to cause environmental impacts within ship anchorages.

The implementation of actions under this objective will achieve the following outcomes:

**Outcome 1-1:** Provide guidance and education for key stakeholders in environmental management of anchorages and ships while at anchor for improved environmental outcomes

**Outcome 1-2:** Obtain better understanding of environmental condition of anchorages and their use near ports to enable adaptive management under changing conditions

**Outcome 1-3:** Further enhance environmental performance at ship anchorages for improved environmental outcomes

#### **Action Plan for Outcome 1-1: Guidance and education for stakeholders**

Although the existing anchorage at the Port of Hay Point is located in open, soft seabed environment, with low biodiversity (refer section 3.4.1) these habitats are of value to the continuity and integrity of the World Heritage Area. Reducing risk of environmental impacts from ships at anchor is desirable for best environmental management. To achieve this, ships seeking to anchor within the World Heritage Area require access to information about how best to protect the values for which the area is recognised.

#### ***Environmental management guidelines***

Review to date indicates there is no specific environmental guideline relating to ships at anchor within the World Heritage Area. It is recommended that the GBRMPA develop environmental guidelines relating specifically to ships at anchor within the World Heritage Area which could then be used to communicate with ship owners and masters of ships. These environmental guidelines could also be extended to ships anchoring outside of the Port of Hay Point anchorage within the northern Great Barrier Reef.

The guidelines should make reference to relevant Conventions and legislation that are applicable across Queensland ports for environmental protection, thus strengthening the implementation of legislation. The guidelines would address:

- A description of environmental values to be protected during anchoring
- Activities while anchoring that may impact on the environmental values
- Potential and actual environmental impacts from anchoring

- Best practice for anchoring with least environmental impact
- Waste management procedures while at anchor
- Light spill and noise considerations for ships while at anchor
- Biofouling and ballast water management of relevance to anchorage use
- Storage and management of hazardous substances while at anchor.

The environmental management measures should aim at minimising the following impacts identified as relevant to anchoring activities:

- Disturbance to seabed and supported biodiversity
- Release of emissions or pollutants/wastes
- Altered aesthetic value (or perception thereof)
- Interference with access to resources
- Marine pest introduction
- Interference with species behaviour.

The guidelines should be developed in collaboration with key stakeholders, including port authorities, MSQ and AMSA to capture and cross reference all relevant jurisdictional requirements. Details of the guidelines may be incorporated in port notices, which are legally binding under the *Transport Infrastructure Act 1994*. This would require negotiations with and approval by the port authorities. However, a significant portion of the anchorage area at Port of Hay Point is outside port limits and therefore, any ships at anchor outside port limits would not be subject to compliance with port requirements under port notices.

For areas which are not covered under the above legislative approach,, the guidelines should be communicated to ship owners, shipping agents and ship masters via an education and public awareness program. This program may include online distribution (via GBRMPA website), pre-entry notification to international ship traffic via existing portals, such as AQIS or the REEFVTS or similar, presentations to the key stakeholders (e.g. Shipping Australia) and media publicity.

### **Action Plan for Outcome 1-2: Environmental condition monitoring**

The environmental condition of anchorage sites is not currently subject to routine monitoring to understand whether existing management actions are being effective, to confirm that transient sensitive habitats (e.g. seagrasses or corals) are not at risk from anchoring activities, or identify whether adaptive and improved management is needed. This is likely because current management is not specifically targeted at environmental objectives. Targeted, regular environmental monitoring of the areas used for anchoring will improve understanding of the environmental condition and enable adaptive management intervention to be considered if controls are found to be ineffective.

### ***Environmental monitoring program at ship anchorage sites***

It is recommended that the GBRMPA monitor the environmental conditions of the Port of Hay Point anchorage at appropriate intervals for the following parameters:

- Biodiversity and presence of marine pests
- Seabed conditions (habitat type, rugosity)
- Sediment type and quality
- Underwater noise
- Air quality
- Waste accumulation.

To achieve this, the GBRMPA will need to design a port specific monitoring program of relevance to the Port of Hay Point anchorage. Considerations during design should be given to anchorage use patterns (both current and future), environmental risks at each port, dredge disposal activities and sampling intensity needed to have confidence of detecting any change in conditions. Consideration should also be given to identify what other parameters would need to be assessed to detect drivers of change.

In designing the program the GBRMPA should take into account monitoring programs already in operation that may be of relevance to the Port of Hay Point anchorage site conditions. There may be opportunities for sharing information or for minor amendments to existing programs to achieve the desired outcomes. Collaboration with research centres and industry may play an important role in the success of the program.

The GBRMPA should review findings from ongoing monitoring to provide important information on changes in environmental conditions and efficiency of existing management arrangements. Data can be interpreted to provide an early warning system to implement corrective actions in a timely manner if environmental site condition degradation is identified.

Undetected releases of small waste materials may occur year round within the World Heritage Area (e.g. Wilson 2011) and, as such, this activity is considered to be a low level chronic impact. Cumulative effects do not appear to be well understood (Ecological Australia and Open Lines 2012). Monitoring may also provide information on whether small scale releases of pollutants from ships at anchor occur and, if so, whether they impact on the environment in a cumulative sense.

Reporting from this monitoring program should be used by the GBRMPA to inform the Outlook Report, DSEWPaC, Shipping Australia and other industry bodies and the IMO. This would support ongoing review and improvement of the international conventions and legislative tools that govern activities which have the potential to impact upon the World Heritage Area.

### **Action Plan for Outcome 1-3: Enhanced environmental performance**

To support review of relevancy of current environmental controls for anchorages it is appropriate to audit adherence of vessels to the controls they are required to abide by. This should be achieved in conjunction with measuring environmental conditions (Outcome 1-2) to enable differentiation between natural and anthropogenic drivers of change which may be observed during monitoring of anchorage sites.

To achieve Outcome 1-3 it is recommended that the GBRMPA:

- Develop and implement environmental inspection and audit programs for ships at anchor in the Marine Park in collaboration with ports, the shipping industry, AMSA, AQIS and MSQ.
- Provide reports of audit findings to industry and management bodies to support initiatives that aim at reducing air emissions from shipping.
- Further investigate impacts of ship anchorages on aesthetic values at the Port of Hay Point considering different anchorage management strategies, building off the recently completed study, that noted visual impacts on coastal and ocean scenic values will be limited and are considered minor under proposed future ship movements (Cardno Chenoweth 2013).
- Determine the impact of anchorage areas on aesthetic values by considering how different stakeholder groups value a vista which does and does not include ships at anchor.

### ***Inspection program for ships at anchor to monitor environmental performance***

Review and consultation completed under this project did not identify any dedicated audit program which is targeted at taking record of the different impacts associated with vessels anchoring in the World Heritage Area across criteria including emissions to air, management of hazardous substances and waste releases at each of the five ports. Vessels are required to adhere to legislative requirements and only through reporting are incidents recorded and investigated.

It is recommended that the GBRMPA review current ship inspection programs to consider whether they adequately validate and demonstrate vessels adherence to legislative environmental management requirements. If current inspection programs do not address all relevant management requirements, the GBRMPA should consider what additional information is needed and whether existing inspection programs are able to be adapted to collate that information or whether additional programs are required. Existing inspection activities may only target quarantine matters and may not facilitate collection of data of relevance to anchorages and management of the environmental values of those locations.

If current inspections are found to lack in their ability to detect whether vessels adhere to required environmental management requirements while at anchor with regard to wastes, emissions and hazardous substances the GBRMPA should consider mechanisms to address this gap in collaboration with relevant stakeholders. It is anticipated these stakeholders would include AMSA, AQIS, MSQ, and other parties involved in vessel entry control and management.

The action plan for an inspection program should include:

- A desktop review of current inspection programs conducted at the Port of Hay Point
- Discussions with port authorities, AMSA, AQIS and MSQ on the scope, frequency, and record keeping of inspections that are currently being conducted for ships at anchor and in anchorage areas
- Discussions with shipping industry representatives regarding what environmental inspections are being conducted by the shipping industry or what environmental data is collated by the shipping industry for ships while at anchor
- Gap analysis to determine adequacy and consistent implementation of current inspection programs
- Identification of key improvements to existing inspection programs and a mechanism for implementing those improvements
- Communication and collaboration with key stakeholders on changes to existing inspection programs and how any improvements may be able to be implemented.

It is likely that the shipping industry would, through daily vessel management and logbook reporting, collate information that demonstrates adherence to environmental legislative requirements. Accordingly, adaptation of how information is reported may be required to achieve this outcome.

#### ***Provide reports of audit findings to industry and management bodies***

Following the implementation of the improved inspection program, the GBRMPA may want to regularly audit to what extent the stakeholders adhere to the implementation of the inspection program, such as

- Checking that inspections are being completed at the intervals proposed
- Records are being kept and managed in the proposed way
- Any non-conformances identified during the inspections are dealt with in the agreed manner.

Information from this program would support the review of data collected under Outcome 1-2: Environmental condition monitoring.

#### ***Determine impacts of anchorage areas on aesthetic values***

Assessments completed by this project found that the relative impact of ships at anchor on the aesthetic values of the World Heritage Area is unquantified, except at the Port of Hay Point (Appendix A). Investigation of the impacts of ship anchorages on aesthetic values at the Port of Hay Point noted that visual impacts on coastal and ocean scenic values at this location will be limited and are considered minor under proposed future ship movements (Cardno Chenoweth 2013).

Further investigation into the impacts of ship anchorages on aesthetic values at the Port of Hay Point, building on the recently completed study, is needed to consider how different stakeholder groups value a vista which does and does not include ships at anchor.

It is, therefore, recommended that the GBRMPA design and conduct a targeted assessment which seeks to identify how the presence of vessels visible at anchor influences the aesthetic value of the World Heritage Area across geographies including the major population centres, the port anchorage area and minor population centres. This could include development of standards for aesthetic value assessment and impact analysis in consultation with experts and stakeholders.

The outcomes of these investigations could provide a standard framework for aesthetic value impact analysis and inform GBRMPA's position on site selection criteria for any proposed expansions or relocations of anchorage sites. It will also provide key information regarding a sustainable level of visible anchorage which does not denigrate the aesthetic experience of the World Heritage Area. This information will be of use (aligned with other environmental and economic data) in defining the maximum number and arrangement of vessels able to be sustained at anchor. Findings should be shared with industry for improved management of anchorage areas.

Consideration should also be given to establishing on-going monitoring of potential impacts on aesthetic values. The need for this, including frequency, would be informed by baseline assessment. Outcomes could be used to demonstrate whether aesthetic values are improved by any management actions. As aesthetic values can be subjective; information provided through education and awareness may provide opportunity to positively influence perceptions of level of impact to aesthetic values from anchorage use.

#### **3.4.3.2 Objective 2: Optimise use of existing anchorages in the Marine Park**

Current predictions are that the existing anchorage at the Port of Hay Point would not meet future demand requirements without further management actions. Implementing Objective 2 will optimise the use of existing anchorages and minimise the need to expand anchorage areas or designate new anchorage areas under increased demand.

The implementation of actions under this objective will achieve the following outcomes:

**Outcome 2-1:** Restrict shipping industry users of the Marine Park to anchor only in designated anchorage areas

**Outcome 2-2:** Minimise the need for further anchorages in the Marine Park

#### **Action Plan for Outcome 2-1: Restrict users to designated anchorage areas**

Designated anchorages can enable more efficient management of anchorages at ports, not only from an environmental point of view but also with regards to safety. Environmental considerations should also be embedded in key decision making processes with respect to the management of anchorages and ships while at anchor, especially, as the GBRMPA is not directly involved in making decisions regarding ship anchorage.

### ***Assign designated anchorages in each port***

Minimising fragmentation of habitats is currently achieved for the anchorages of Hay Point through the use of designated anchor drop points as this reduces the overall area of seabed affected by chronic anchor disturbance. Predictions indicate additional anchorages would need to be designated to accommodate peak future demand requirements unless alternative, additional, anchorage management strategies are adopted. This was recognised under master planning for the port (Aurecon 2012). A number of potential beneficial management strategies that would avoid need for future anchorage expansion are identified here.

### ***Investigate options to reduce footprint of existing anchorages***

At 157,285 ha Hay Point has the largest anchorage area of the five major ports and has 102 designated anchorage points (figure 3-4). Aurecon (2012) however notes that on average only 37 of these anchorages are currently used. Remaining anchorages facilitate management of peak demand requirements when ship arrivals exceed availability of coal or terminal capacity. The spatial footprint of the anchorage has been defined taking account of vessel visitation drivers, such as product being traded by the port, in conjunction with navigational safety needs. As noted above, it is predicted that the peak anchorage demand over the period 2012-2032 at Hay Point will not be able to be accommodated by the current anchorage area. To accommodate peak demand anchorage at the Port of Hay Point is predicted to require expansion by around 30 per cent by 2032 unless more efficient use is made of current anchorages.

In defining how to make more efficient use of designation anchorages consideration could also be given to whether the footprint of the anchorage could be reduced. The average shipping demand for anchorage at Hay Point is not predicted to exceed future capacity, however, peak demand requirements in future are. As such there may be potential to designate some anchorages as peak demand use areas only and minimise the footprint used on a frequent basis to support average demand. Reducing the footprint of the anchorage (area encompassing all anchor drop points) or the frequency with which some area is exposed to regular anchoring (segregating peak demand anchorages) reduces the extent of the Reef exposed on a regular basis to habitat impacts and pollutant risk. It also facilitates a response to any incident or audit and inspection of ships at anchor. This provides improved efficiencies and cost effectiveness for inspection or audit programs.

It is recommended that the GBRMPA work with the port and shipping industry, including the maritime safety authorities, to assess whether the anchorage area at Hay Point can be reduced; taking into account future demand requirements and additional management strategies beyond those currently applied. To identify the minimum anchorage footprint required for safe and efficient ship operation and navigation the future anchorage use (demand) requirements should be considered. The sites that can be used with the least environmental impacts, and which anchorage areas should be designated as emergency use or peak demand use options only should be identified. This study should also be completed with regard to the actions proposed to achieve Outcome 2-2: Minimise the need for further anchorages.



## **Action Plan for Outcome 2-2: Minimise need for further anchorages**

Improvements in supply chain management at the single commodity ports, including scheduled vessel arrivals with designated anchorages and a Vessel Arrival System (VAS), could minimise the need for additional anchorages at the Port of Hay Point.

### ***Further investigate improvements in whole of supply chain management for single commodities, especially coal***

Improved whole of supply chain management would result in more efficient movement of commodities from the mine to the terminal to the destination port. This may reduce the need for further anchorage points, enable more efficient use of existing anchorages and potentially facilitate a reduction in the number of existing anchorages. Given the complexity of supply chain logistics, improvements are most likely to be achieved by focusing on a single commodity, such as coal.

It is recommended that the GBRMPA collaborate with the exporters (mines), port and shipping industry, including the maritime safety authorities, to study the existing supply chain management of coal exported through the Port of Hay Point. The study can be used to identify opportunities to optimise and rationalise use of anchorages. Any changes would require involvement of all key stakeholders, including port authorities, infrastructure owners and mining companies.

### ***Further investigation of vessel arrivals systems***

Implementation of a VAS (in combination with designated anchorages) is a tool for improving whole of supply chain management. A VAS would enable ships to proceed directly to berth on arrival into port or minimise time spent at anchor by improving the coordination of vessel movements. The Port of Newcastle currently operates a successful VAS (which is outlined in Appendix B) would could be used as a prototype for a similar system at Hay Point.

The possible benefits of a VAS to the Port of Hay Point include:

- More efficient use of existing anchorages so that additional (or as many) anchorages are not required
- Possible reduction of the number of anchorages required as anchorage use is optimised
- Economic benefits for coal exporters (less demurrage) and shipowners (reduced fuel costs and improved ship productivity)
- Reduced emissions from shipping including of greenhouse gas.

It is recommended that the GBRMPA conduct further investigations into the introduction of a VAS at the Port of Hay Point. This strategy may already be under consideration by industry given findings reported in the master planning for the Port (Aurecon 2012). Accordingly, the GBRMPA investigations should be conducted in collaboration with key stakeholders, including the ports, ship owners, shipping agents representatives and coal companies, and address the key issues as follows:

- Identification of flow-on risks to ship safety and the environment in locations outside of the coal ports and potentially across jurisdictional borders

- Identification of controls for any flow-on risks identified
- Steps for the implementation of a VAS across existing complex regulatory and management arrangements which would enable the requirements of any VAS to be designated and enforced at any location – this is likely a one-time but detailed process which would require agreement between a number of government and management authorities regarding the operational and management arrangements of any VAS to be implemented
- Estimation of costs of managing a VAS for one or more ports and responsibility for servicing the costs
- Capacity of current vessel movement monitoring systems to be adopted for VAS
- Legislative and management responsibilities for adoption of a VAS at Hay Point.

#### **3.4.3.3 Objective 3: Minimise environmental impacts from future anchorage designations, including as a consequence of anchorage relocations**

Shipping within the World Heritage Area is forecast to increase in the next 25 years and, accordingly, anchorage demand is also forecast to increase. Ships accessing the port will require anchorage and strategies in the preceding sections seek to minimise the need to expand existing anchorages. There may, however, be need to relocate anchorages or designate additional anchorages for reasons other than future demand. For instance, new port developments or tourism operations may require designation of anchorages over and above those currently identified. Currently the future peak demand requirements for the anchorage at Hay Point are predicted to exceed the available number of anchorages indicating a need to expand the anchorage unless there is a change in management. Implementing Objective 3 will minimise the environmental risk associated with the declaration of future new anchorages.

In the short term, Objective 3 is most applicable to the Ports of Townsville and Abbot Point which do not have designated anchorages. However, it could be applied to any new or relocation of anchorages at the other ports.

The implementation of actions under this objective will achieve the following outcome:

**Outcome 3-1:** Ensure environmental criteria are considered when selecting future anchorages

#### **Action Plan for Outcome 3-1: Environmental criteria for anchorage site selection**

Environmental impacts from new anchorages can be minimised if they are appropriately sited to reduce impacts to critical habitat, decrease interactions with other users and restrict the chance of interaction with protected species. It is therefore recommended to develop site selection criteria for anchorages that include environmental considerations, where new designations, expansion or relocation of anchorages cannot be avoided.

It is recommended that the GBRMPA in collaboration with MSQ and the port authorities develop a set of site selection criteria and embed them into current management practices. These could include, but not be limited to:

- Minimising the spatial footprint required for safe and efficient operation of the anchorage
- Considering the needs of all users to access marine resources
- Protecting seabed biodiversity and sediment conditions (including understanding of site conditions before designation of an anchorage area)
- Considering impacts on aesthetic values
- Considering proximity to sensitive receptors with regards to noise, light and other potential pollution sources
- Maintaining the integrity of the World Heritage Area and adjacent coastal environments.

The site selection criteria could be integrated into existing management processes used by the port authorities, such as environmental management plans, the RHM or the GBRMPA for reference during identification and review of any proposed new anchorages.

It is also recommended that the GBRMPA develop guiding principles regarding anchorage site selection in the Marine Park, including risk assessment and impact assessment guidelines. These would provide guidance on the information that would be needed to support any submission for anchorage declaration.

## 3.5 Port of Gladstone

### 3.5.1 Environment

#### **Size and location of Port of Gladstone anchorage area**

The Port of Gladstone is located 160 km north of Hervey Bay and 525 km north of Brisbane (figure 3-5). The main imports include bauxite and industrial inputs, while exports include coal, alumina and aluminium. The majority of anchorages servicing the Port of Gladstone are located outside of the port limits in an area east-south-east of Facing Island, referred to as the 'outer anchorage area', which includes the North and East Anchorage (see figure 3-5). A smaller anchorage area, referred to as the 'inner anchorage', is located to the west of Facing Island within Gladstone Harbour (figure 3-5). Industry has identified during the delivery of this project that the inner anchorage consists of two zones, the Quoin Channel (rarely used) and the South Trees Emergency anchorage, used infrequently for emergencies and bunkering only, the latter being infrequent and phased out.

The combined anchorage area at the Port of Gladstone covers an area of 24,125 ha, comprising 1,403 ha for the Inner Anchorage and 22,722 ha for the outer anchorage area. This study area is larger than the actual footprint of the anchorages and provides a conservative approach of considering the entire area across which anchor drop may occur. This approach takes into account direct impacts from anchor drop in addition to indirect impacts that can be experienced by designating a network of spatially disparate drop points, such as habitat

fragmentation or impact to habitat continuity/integrity. The designated anchorages used by large vessels at the Port of Gladstone include the Inner Anchorage and the East and North Anchorages, situated in the outer anchorage area.

The Inner Anchorage is located outside the Marine Park, while the outer anchorage area is located in a General Use Zone of the Marine Park. Further Marine Park protection zones are located to the north and south of the outer anchorage area (figure 3-5) (Appendix A).

### **Social, cultural and heritage values**

The Port of Gladstone directly adjoins the city of Gladstone (see figure 3-5). The Inner Anchorage is visible to residents and visitors to Gladstone, while the outer anchorage area is further offshore and less visible. The scenic vista surrounding the anchorage areas could be considered remarkable, exceptional or unique in the context of the World Heritage Area listing. As such, the presence of ships at anchor would impact on these values.

Culturally significant sites were identified in the vicinity of the anchorage area including sites on Facing Island and a number of shipwrecks along the coast (figure 3-5) (DSEWPaC 2012d,e). Additionally, Indigenous community links to the anchorage area have been recognised as being present, as it provides habitat for totem species (primarily dugong and marine turtles). As Traditional Owners were unable to be consulted during the delivery of this project (refer section 2.8) complete understanding of the cultural value of the sea country associated with the Gladstone anchorage area is acknowledged to be a knowledge gap of the project.

Both anchorage areas are used by large commercial ships servicing the Port of Gladstone. Commercial and recreational fishing vessels and a small number of tourism operators accessing the Reef and islands within the World Heritage Area also use the port. Concerns were raised during the consultation period regarding the interaction between anchored vessels and commercial fishing activities, typically trawling because of the risk of collision and fishing gear becoming entangled with anchored vessels. Safety is also of concern in areas where vessels have previously anchored due to possible changes in bathymetry which compromise the safe and optimal operation of trawl equipment. There are also safety concerns for maritime users where the perceived safe operating distance around anchored ships is greater than the direct physical dimensions and the swing distance of an anchored ship. These concerns have been taken into account during the impact assessment.

### **Environmental values**

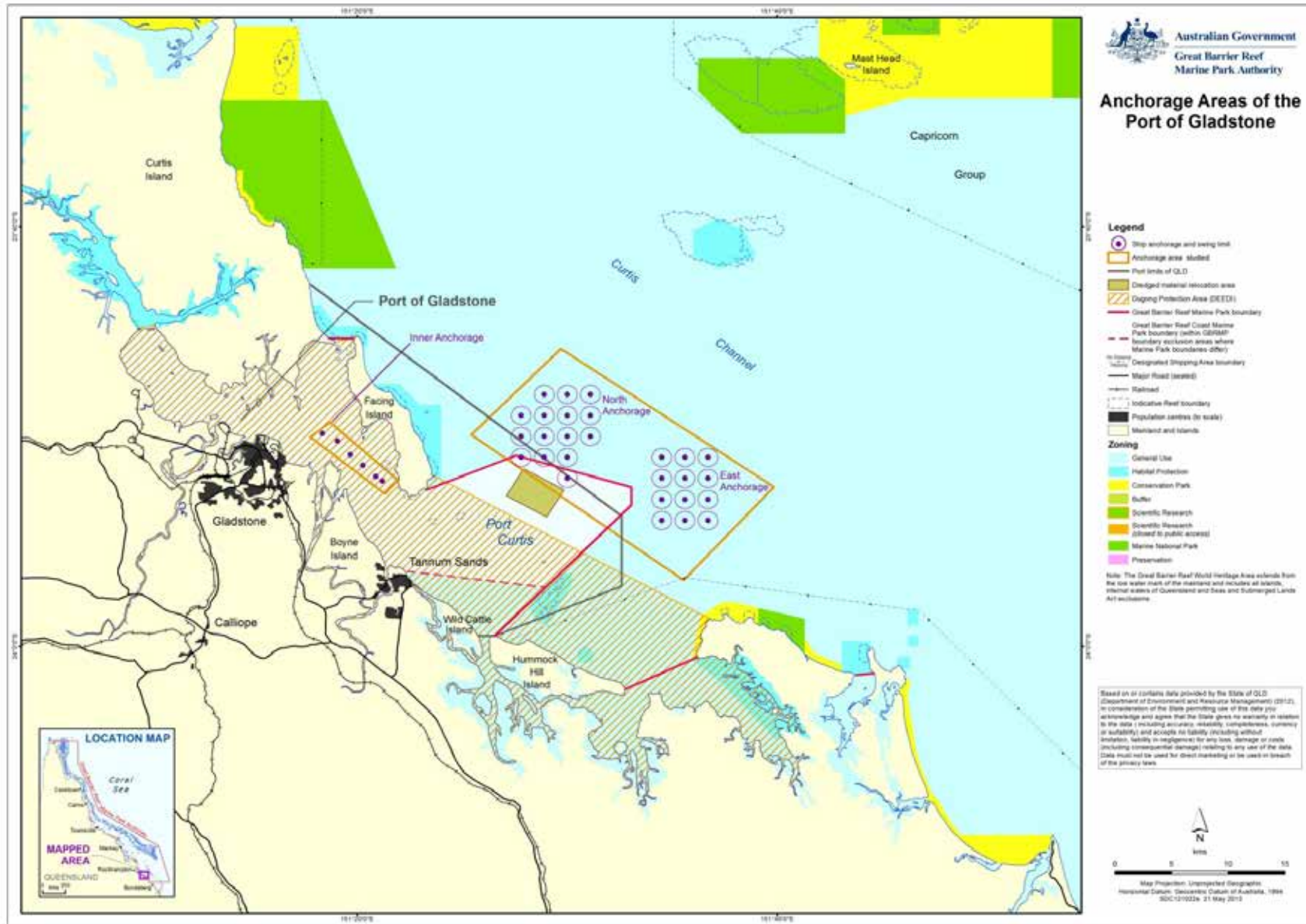
The outer anchorage area of the Port of Gladstone does not contain core feeding or breeding habitat for any protected species. However, it is part of a matrix of habitat and environmental features which supports the diversity for which the Reef is recognised.

The outer anchorage area is located outside of the port limits in an area of open seabed comprised of soft sediment habitat with sparsely distributed solitary corals and low density benthic macroinvertebrates (Rasheed et al. 2003). The inner anchorage is characterised by rocky, rubble habitat that supports some soft corals,

sponges and live rock (Rasheed et al. 2003). This habitat is considered to be well represented in adjacent areas and is not unique to the anchorage.

Sensitive marine environments, such as seagrasses, are not known to occur in the inner anchorage (Rasheed et al. 2003, Pitcher et al. 2007). However, algae and deep water seagrasses have previously been reported in the outer anchorage area (Pitcher et al. 2007, QGC 2009, Thomas et al. 2010). Following extensive flooding during 2011 it is not known if they still persist (Chartrand et al. 2011).

Marine environments with conservation significance are located within or close to the anchorage area. The Port Curtis area supports wetland habitat of national importance and includes all tidal areas in the vicinity of Gladstone (DSEWPaC 2012e). A Dugong Protection Area extends the full length of Port Curtis, and overlaps the Inner Anchorage (figure 3-5). The anchorage areas themselves also provide habitat for fish species, migratory wetland and marine birds, and marine megafauna (GHD 2009c, QGC 2009, GHD 2011b, DAFF 2012, DSEWPaC 2012a).



**Figure 3-5:** Map of the current anchorage area of the Port of Gladstone

### 3.5.2 Impacts

#### Existing conditions

As described under section 2.3 the actual and potential impacts that may be realised to the values of the Port of Gladstone anchorage area have been considered by this project using a risk based analysis. The full assessment process and findings are provided in Appendix A. The potential environmental impacts and their significance, as determined by that process, are summarised in table 3-5. These impacts have potential to affect the World Heritage Area values of the Reef, including the aesthetics, presence of diverse ecological communities, natural beauty and species of conservation significance.

**Table 3-5:** Potential environmental impacts at the Port of Gladstone and their significance

Potential environmental Impacts	Significance Inner Anchorage	Significance Outer Anchorage
Disturbance to seabed and supported biodiversity	Rocky reefal habitat, moderate diversity Moderate potential for impact	Open soft sediment habitat, low diversity Low potential for impact
Minor releases of pollutants/wastes from ships	Moderate frequency of anchorage use Moderate potential for impact	Moderate frequency of anchorage use Moderate potential for impact
A reduction in the aesthetic value of the coastal vista	Anchorage within 2 km of Gladstone High potential for impact	Anchorage approximately 20 km from Gladstone Low potential for impact
Preclusion of other users of the World Heritage Area	Potential navigational impacts of minor concern currently exist	Currently concern for impact is low
Introduction of marine pest species	Moderate frequency of anchorage use Moderate potential for introduction	Moderate frequency of anchorage use Moderate potential for introduction

<b>Potential environmental Impacts</b>	<b>Significance Inner Anchorage</b>	<b>Significance Outer Anchorage</b>
Interference with species behaviour	Anchorage adjacent species habitat Moderate potential for impact	Anchorage adjacent species habitat Moderate potential for impact

The presence of anchored vessels at the Port of Gladstone inner anchorage was considered to have high potential for impact on the aesthetic values of the World Heritage Area (Appendix A). There is also a moderate potential for impacts from seabed disturbance, release of pollutants and introduction of marine pests.

Potential indirect impacts to megafauna and avifauna species transiting the anchorage area have been identified (e.g. noise impacts, avoidance and light impacts). However, commercial vessels at anchor currently co-exist with marine megafauna and avifauna accessing these marine habitats and, as such, these impacts are considered minor (reported in GHD 2012a, Smith et al. 2012). Furthermore, no controls are currently available to restrict potential impacts to species from anchored ships due to light spill or noise. The existing impacts are a result of the anchored vessels maintaining safe operational lighting and these impacts are, therefore, unable to be ameliorated.

In general, the potential for impacts at the outer anchorage area was low and less than that predicted for the inner anchorage.

### **Future demand requirements**

The Port of Gladstone currently experiences 1,500 ship arrivals per year. Around 80 per cent of these proceed directly to anchor (MSQ 2012). On average, three ship calls per day use the anchorages for a period of four days (MSQ 2012).

Analysis of future demand scenarios (refer section 2.4 and Appendix B) predicted that ship call numbers are forecast to increase at the Port of Gladstone by seven ships calling per day (PGM Environment 2012, DSDIP 2012). The anchorage area assessed by this project has sufficient physical capacity to safely support that future demand.

### **3.5.3 Management**

This section describes an environmental management strategy for Gladstone which will enable improved management of anchorages to protect and minimise impacts on environmental values.

This environmental ship anchorage management strategy and the underpinning actions are driven by an overarching objective to minimise environmental and social impacts associated with anchorage use. This is achievable by minimising the number of vessels that sit at anchor while maintaining efficient operation of port import and export requirements. To achieve this for the Port of Gladstone anchorage under future demand; actions have been devised to support the key objectives of:



Objective 1: Manage existing anchorages with the aim of protecting environmental values

Objective 2: Optimise use of existing anchorages in the Marine Park

Objective 3: Minimise environmental impacts from future anchorages and anchorage relocations

The action plans which support achievement of these objectives are described following.

### **3.5.3.1 Objective 1: Manage existing anchorages with the aim of protecting environmental values**

Objective 1 will improve current anchorage management practices by strengthening the understanding of, and management options available for, activities that cause or have the potential to cause environmental impacts within ship anchorages.

The implementation of actions under this objective will achieve the following outcomes:

**Outcome 1-1:** Provide guidance and education for key stakeholders in environmental management of anchorages and ships while at anchor for improved environmental outcomes

**Outcome 1-2:** Obtain better understanding of environmental condition of anchorages and their use near ports to enable adaptive management under changing conditions

**Outcome 1-3:** Further enhance environmental performance at ship anchorages for improved environmental outcomes

#### **Action Plan for Outcome 1-1: Guidance and education for stakeholders**

Although the existing anchorage at the Port of Gladstone is located in open, soft seabed environment, with low biodiversity (refer section 3.5.1) these habitats are of value to the continuity and integrity of the World Heritage Area. Gladstone Inner Anchorage is also known to support rocky reef habitat, which is considered of value but well represented within the region. Reducing risk of environmental impacts from ships at anchor is desirable for best environmental management. To achieve this, ships seeking to anchor within the World Heritage Area require access to information about how best to protect the values for which the area is recognised.

#### ***Environmental management guidelines***

Review to date indicates there is no specific environmental guideline relating to ships at anchor within the port of the World Heritage Area. In addition, the ships at anchor may not be familiar with current jurisdictions and environmental management controls available to them whilst at anchor in the World Heritage Area.

It is recommended for the GBRMPA to develop environmental guidelines relating specifically to ships at anchor which could then be used to communicate with ship

owners and masters of ships. These environmental guidelines could also be extended to ships other than those accessing the five major port anchorages.

The guidelines should make reference to relevant Conventions and legislation that are applicable across Queensland ports for environmental protection, thus strengthening the implementation of legislation. The guidelines would address:

- A description of environmental values to be protected during anchoring
- Activities while anchoring that may impact on the environmental values
- Potential and actual environmental impacts from anchoring
- Best practice for anchoring with least environmental impact
- Waste management procedures while at anchor
- Light spill and noise considerations for ships while at anchor
- Biofouling and ballast water management of relevance to anchorage use
- Storage and management of hazardous substances while at anchor.

The environmental management measures should aim at minimising the following impacts identified as relevant to anchoring activities:

- Disturbance to seabed and supported biodiversity
- Release of emissions or pollutants/wastes
- Altered aesthetic value (or perception thereof)
- Interference with access to resources
- Marine pest introduction
- Interference with species behaviour.

The guidelines should be developed in collaboration with key stakeholders, including port authorities, MSQ and AMSA to capture and cross reference all relevant jurisdictional requirements.

Details of the guidelines may be incorporated in port notices, which are legally binding under the *Transport Infrastructure Act 1994*. This would require negotiations with and approval by the port authorities. However, a significant portion of the anchorage area at Port of Gladstone is outside port limits and therefore, any ships at anchor outside port limits would not be subject to compliance with port requirements under port notices.

For areas which are not covered under the above legislative approach,, the guidelines should be communicated to ship owners, shipping agents and ship masters via an education and public awareness program. This program may include online distribution (via GBRMPA website), pre-entry notification to international ship traffic via existing portals, such as AQIS or the REEFVTS or similar, presentations to the key stakeholders (e.g. Shipping Australia) and media publicity.

### **Action Plan for Outcome 1-2: Environmental condition monitoring**

The environmental condition of anchorage sites is not currently subject to routine monitoring to understand whether existing management actions are being

effective, to confirm that transient sensitive habitats (e.g. seagrasses or corals) are not at risk from anchoring activities, or identify whether adaptive and improved management is needed. This is likely because current management is not specifically targeted at environmental objectives. Targeted, regular environmental monitoring of the areas used for anchoring will improve understanding of the environmental condition and enable adaptive management intervention to be considered if controls are found to be ineffective.

### ***Environmental monitoring program at ship anchorage sites***

It is recommended that the GBRMPA monitor the environmental conditions of the Port of Gladstone anchorage at appropriate intervals for the following parameters:

- Biodiversity and presence of marine pests
- Seabed conditions (habitat type, rugosity)
- Sediment type and quality
- Underwater noise
- Air quality
- Waste accumulation.

To achieve this, the GBRMPA will need to design a port specific monitoring program of relevance to the Port of Gladstone anchorage. Considerations during design should be given to anchorage use patterns (both current and future), environmental risks at each port, dredge disposal activities and sampling intensity needed to have confidence of detecting any change in conditions. Consideration should also be given to identify what other parameters would need to be assessed to detect drivers of change.

In designing the program the GBRMPA should take into account monitoring programs already in operation that may be of relevance to the Port of Gladstone anchorage site conditions. There may be opportunities for sharing information or for minor amendments to existing programs to achieve the desired outcomes. Collaboration with research centres and industry may play an important role in the success of the program.

The GBRMPA should review findings from ongoing monitoring to provide important information on changes in environmental conditions and efficiency of existing management arrangements. Data can be interpreted to provide an early warning system to implement corrective actions in a timely manner if environmental site condition degradation is identified.

Undetected releases of small waste materials may occur year round within the World Heritage Area (e.g. Wilson 2011) and, as such, this activity is considered to be a low level chronic impact. Cumulative effects do not appear to be well understood (Eco logical Australia and Open Lines 2012). Monitoring may also provide information on whether small scale releases of pollutants from ships at anchor occur and, if so, whether they impact on the environment in a cumulative sense.

Reporting from this monitoring program should be achieved by the GBRMPA to inform the Outlook Report, DSEWPaC, Shipping Australia and other industry bodies and the IMO. This would support ongoing review and improvement of the

international conventions and legislative tools that govern activities which have the potential to impact upon the World Heritage Area.

### **Action Plan for Outcome 1-3: Enhanced environmental performance**

To support review of relevancy of current environmental controls for anchorages it is appropriate to audit adherence of vessels to the controls they are required to abide by. This should be achieved in conjunction with measuring environmental conditions (Outcome 1-2) to enable differentiation between natural and anthropogenic drivers of change which may be observed during monitoring of anchorage sites.

To achieve Outcome 1-3 it is recommended that the GBRMPA:

- Develop and implement environmental inspection and audit programs for ships at anchor in the Marine Park in collaboration with ports, the shipping industry, AMSA, AQIS and MSQ.
- Provide reports of audit findings to industry and management bodies to support initiatives that aim at reducing air emissions from shipping, such as switching to low emission fuels used while at anchor.
- Determine the impact of anchorage areas on aesthetic values by considering how different stakeholder groups value a vista which does and does not include ships at anchor.

### ***Inspection program for ships at anchor to monitor environmental performance***

Review and consultation completed under this project did not identify any dedicated audit program which is targeted at taking record of the different impacts associated with vessels anchoring in the World Heritage Area across criteria including emissions to air, management of hazardous substances and waste releases at each of the five ports. Vessels are required to adhere to legislative requirements and only through reporting are incidents recorded and investigated.

It is recommended that the GBRMPA review current ship inspection programs to consider whether they adequately validate and demonstrate vessels adherence to legislative environmental management requirements. If current inspection programs do not address all relevant management requirements, the GBRMPA should consider what additional information is needed and whether existing inspection programs are able to be adapted to collate that information or whether additional programs are required. Existing inspection activities may only target quarantine matters and may not facilitate collection of data of relevance to anchorages and management of the environmental values of those locations.

If current inspections are found to lack in their ability to detect whether vessels adhere to required environmental management requirements while at anchor with regard to wastes, emissions and hazardous substances the GBRMPA should consider mechanisms to address this gap in collaboration with relevant stakeholders. It is anticipated these stakeholders would include AMSA, AQIS, MSQ, and other parties involved in vessel entry control and management.

The action plan for an inspection program should include:

- A desktop review of current inspection programs conducted at the Port of Gladstone
- Discussions with port authorities, AMSA, AQIS and MSQ on the scope, frequency, and record keeping of inspections that are currently being conducted for ships at anchor and in anchorage areas
- Discussions with shipping industry representatives regarding what environmental inspections are being conducted by the shipping industry or what environmental data is collated by the shipping industry for ships while at anchor
- Gap analysis to determine adequacy and consistent implementation of current inspection programs
- Identification of key improvements to existing inspection programs and a mechanism for implementing those improvements
- Communication and collaboration with key stakeholders on changes to existing inspection programs and how any improvements may be able to be implemented.

It is likely that the shipping industry would, through daily vessel management and logbook reporting, collate information that demonstrates adherence to environmental legislative requirements. Accordingly, adaptation of how information is reported may be required to achieve this outcome.

#### ***Provide reports of audit findings to industry and management bodies***

Following the implementation of the improved inspection program, the GBRMPA may want to regularly audit to what extent the stakeholders adhere to the implementation of the inspection program, such as

- Checking that inspections are being completed at the intervals proposed
- Records are being kept and managed in the proposed way
- Any non-conformances identified during the inspections are dealt with in the agreed manner.

Information from this program would support the review of data collected under Outcome 1-2: Environmental condition monitoring.

#### ***Determine impacts of anchorage areas on aesthetic values***

Assessments completed by this project found that the relative impact of ships at anchor on the aesthetic values of the World Heritage Area is unquantified, except at the Port of Hay Point (Appendix A). To adequately manage potential impacts to the World Heritage Area it is necessary to benchmark conditions and measure deviations and drivers of change through on-going monitoring.

It is, therefore, recommended that the GBRMPA design and conduct a targeted assessment which seeks to identify how the presence of vessels visible at anchor influences the aesthetic value of the World Heritage Area across geographies including the major population centres, the five major ports and minor population centres.

The outcomes of these investigations could provide a standard framework for aesthetic value impact analysis and inform GBRMPA's position on site selection criteria for any proposed expansions or relocations of anchorage sites. It will also provide key information regarding a sustainable level of visible anchorage which does not denigrate the aesthetic experience of the World Heritage Area. This information will be of use (aligned with other environmental and economic data) in defining the maximum number and arrangement of vessels able to be sustained at anchor. Findings should be shared with industry for improved management of anchorage areas.

Consideration should also be given to establishing on-going monitoring of potential impacts on aesthetic values. The need for this, including frequency, would be informed by baseline assessment. Outcomes could be used to demonstrate whether aesthetic values are improved by any management actions. As aesthetic values can be subjective; information provided through education and awareness may provide opportunity to positively influence perceptions of level of impact to aesthetic values from anchorage use.

### **3.5.3.2 Objective 2: Optimise use of existing anchorages in the Marine Park**

Current predictions are that the existing anchorage at the Port of Gladstone can support future demand requirements. The area assessed within this project was, however, not restricted to the designate anchor drop points but covered a much wider geography. There is potential that these existing anchor drop points may need to be relocated, or added to, in future. Implementing Objective 2 will optimise the use of existing anchorages and minimise the need to designate new anchorage areas in future.

The implementation of actions under this objective will achieve the following outcomes:

**Outcome 2-1:** Restrict shipping industry users of the Marine Park to anchor only in designated anchorage areas

**Outcome 2-2:** Minimise the need for further anchorages in the Marine Park

#### **Action Plan for Outcome 2-1: Restrict users to designated anchorage areas**

Designated anchorages can enable more efficient management of anchorages at ports, not only from an environmental point of view but also with regards to safety. Environmental considerations should also be embedded in key decision making processes with respect to the management of anchorages and ships while at anchor, especially, as the GBRMPA is not directly involved in making decisions regarding ship anchorage.

#### ***Assign designated anchorages in each port***

Minimising fragmentation of habitats is currently achieved for the anchorages of Gladstone through the use of designated anchor drop points as this reduces the overall area of seabed affected by chronic anchor disturbance. Predictions indicate additional anchorages may not be required to support future demand requirements, however, this is dependent on wait times at anchor not increasing. There is a risk that the anchorage area of Gladstone will need to increase to

support future demand requirements. A number of potential beneficial management strategies that would avoid need for future anchorage expansion are identified here.

### ***Investigate options to reduce footprint of existing anchorages***

The use of designated anchor drop points at Gladstone minimises the area of seabed affected by anchoring. These anchor drop points are, however, spread across a wide area. Reducing the footprint of the anchorage (area encompassing all anchor drop points) reduces the extent of the Reef exposed to habitat impacts and pollutant risk. It also facilitates a response to any incident or audit and inspection of ships at anchor. This provides improved efficiencies and cost effectiveness for inspection or audit programs.

It is recommended that the GBRMPA work with the port and shipping industry, including the maritime safety authorities, to identify the minimum anchorage footprint required for the Port of Gladstone under future shipping demand scenarios. To identify the minimum anchorage footprint required for safe and efficient ship operation and navigation the future anchorage use (demand) requirements should be considered. The sites which can be used with the least environmental impacts and which anchorage areas should be designated as emergency use options only should be identified. This study should also be completed with regard to the actions proposed to achieve Outcome 2-2: Minimise the need for further anchorages.

### **Action Plan for Outcome 2-2: Minimise need for further anchorages**

Improvements in supply chain management at the single commodity ports, including scheduled vessel arrivals with designated anchorages and a Vessel Arrival System (VAS), could minimise the need for future anchorages at the Port of Gladstone.

### ***Further investigate improvements in whole of supply chain management for single commodities, especially coal***

The whole of supply chain includes a single exporter fully controlling an integrated supply-chain from mine to terminal to overseas port with the exporter also controlling the shipping (on Cost Insurance and Freight sales terms, meaning all the way to the destination port).

Improvements in whole of supply chain management may lead to a more efficient use of existing anchorage sites. For instance, ships may not be required to anchor if they can proceed direct to loading/unloading berths on arrival in the port. Alternatively time spent at anchor may be reduced if supply chain logistics are aligned to provide the most efficient operation. These improvements could negate the need to increase anchorages in the future, improve opportunity to reduce existing number of required anchorages and set up mechanisms to achieve optimal use of designated anchorages. Given the complexity of supply chain logistics, improvements in efficiency are most likely to be achieved by focusing on supply chain management of a single commodity, such as coal.

The Port of Gladstone handles multiple commodities. There are, however, opportunities to consider whether anchorages could be designated for single

commodity export management to apply a partial system of scheduled arrivals across the Port.

It is recommended that the GBRMPA collaborate with the exporter (mine), port and shipping industry, including the maritime safety authorities, to conduct a study of supply chain management for the Port of Gladstone for coal export. The study should focus on optimising anchorage use in the near future with a regular review process as opposed to catering for increased demand over the next 30 years. Complexities of designating a partial scheduled arrivals management strategy for the Port should be considered.

The study can then be used to identify what changes could be made to further optimise use of anchorages. Any changes would require involvement of key stakeholders, including port authorities, infrastructure owners and coal companies.

### ***Further investigation of vessel arrivals systems***

In order to prevent the need for additional anchorages with increasing ship calls, single commodity ports may benefit most from a scheduled vessel arrival system (VAS) (in combination with designated anchorages). A VAS provides an avenue for improved supply chain management. Elsewhere use of VAS enables ships to call straight to berth upon arrival in a port or minimises time spent at anchor. This management option is expected to reduce demand for anchorages and may realise economic benefits for exporters and shipowners. The Port of Newcastle currently operates a VAS and provides a case study (which is outlined in Appendix B) from which lessons of relevance to the Marine Park could be obtained.

As the Port of Gladstone handles multiple commodities implementing a VAS may only be feasible for those berths managing coal export. This may require that some anchorage drop points be designated for the exclusive use of ships exporting coal from Gladstone. The possible benefits of a VAS to the Port of Gladstone and the environment include:

- Instead of having to expand anchorages to meet demand, with possible subsequent incremental negative environmental impacts, anchorage demand can be contained to existing areas
- Economic benefits for coal exporters (less demurrage) and shipowners (reduced fuel costs and improved ship productivity)
- Reduced ship fuel greenhouse gas and other emissions.

The main issues of implementing a VAS are:

- Potential flow-on risks to ship safety and the environment in other locations outside of the coal ports, including across borders (beyond the Marine Park/World Heritage Area and nationally)
- Queensland's complexity of coal ports owned/managed by different entities or ports handling coal ships in addition to other trades
- Likely need for regulatory approval and legislation which would enable the requirements of any VAS to be designated and enforced at any location – this is likely a one-time but detailed process which would require agreement between a number of government and management authorities regarding the operational and management arrangements of any VAS to be implemented



- Cost of managing a VAS for one or more ports (note – the existence of the ship monitoring systems operated for the Reef may provide some capability required for a VAS; this requires further investigation).

However, during this project a number of concerns with scheduled VAS have been raised, including the flow-on effects on ship safety and the environment (e.g. ships anchoring at distance from ports, making emergency response more difficult). The project also found that cost and governance of such a system within the multi-jurisdictional environment of the World Heritage Area would require further investigation.

Implementing a VAS is considered to be a preferential outcome than expanding anchorage areas to support future demand requirements. Ultimately, a VAS forms part of a complex process of whole of supply chain management which involves a great number of stakeholders, including the exporter (mine), port authorities, third party owners of part infrastructure, ship owners and buyers. Adopting a VAS is, therefore, likely to be most easily implemented where a single agency has control over the entire supply chain: mine supply, rail delivery, export berth and destination.

Any changes to existing systems would require strong drivers, such as economic incentives or regulatory changes. It is considered that the GBRMPA has only limited influence on these processes and, as such, should work closely with other regulators and industry to achieve the required outcomes of sustainable use of the World Heritage Area. Corporations who have mine interests and are seeking to operate whole of supply chain export operations in Queensland (e.g coal companies) should, therefore, be consulted during this process. Currently the direct influence the GBRMPA has on ship anchoring in the Marine Park is via the Zoning Plan. Ships are able to anchor within General Use Zones and DSA. The GBRMPA could seek to influence ship anchoring in the Marine Park by limiting the availability of anchorages within the Marine Park designated under the Zoning Plan, however, this would need careful consideration and may not be in the interest of the overall protection of the Reef. Collaboration across relevant agencies during review of change management requirements and risks involved in VAS implementation will support identification of best outcome for environmental benefit.

A change in the current Zoning Plan would have significant implications for the port, maritime and shipping industry and flow on effects to port customers. Extensive consultation with all relevant stakeholders in the industry, including State and Commonwealth government and political representatives would be required to change the current zoning arrangements in the Marine Park.

It is recommended that the GBRMPA conduct further investigations to better understand the risks involved in the introduction of a VAS in the context of marine safety and environmental protection of the Reef. The investigations could include:

- Identification of flow-on risks to ship safety and the environment in locations outside of the coal ports and potentially across jurisdictional borders
- Identification of controls for any flow-on risks identified
- Steps to be taken for the implementation of a VAS across current regulatory and management arrangements of the existing anchorages

- Impediments to the implementation of a VAS across regulatory, current management arrangements of existing anchorages
- Estimation of costs of managing a VAS for one or more ports and responsibility for servicing the costs
- Capacity of current vessel movement monitoring systems to be adopted for VAS
- Legislative and management responsibilities for adoption of a VAS at each of the relevant ports.

For the Port of Gladstone this will also need to consider the ability to split implementation of a VAS across multiple commodities managed by the Port or implement a partial VAS for the Port.

The investigation into a VAS should be conducted in collaboration with key stakeholders, including the ports, ship owner and shipping agents representatives, and coal companies. The outcomes of the investigations will provide further direction on whether a VAS is a feasible management option for the coal export ports in Queensland.

The Port of Newcastle's VAS for coal ships provides a case study (described in the CBA report, Appendix B) on the operation of such anchorage management systems of relevance to Queensland ports. The review of the Port of Newcastle's VAS highlighted some issues, and provided guidance, on how such a strategy could be applied to the management of anchorages at the main coal ports in Queensland if future demand is demonstrated to outstrip anchorage availability.

## 3.6 **Implementation**

### 3.6.1 **Timeframes and evaluation**

Given vessels may anchor anywhere within the Marine Park General Use Zone, the EMS has been deliberately structured to achieve each of the desired Objectives to provide relevancy to vessels using the identified port anchorages as well as having relevance to vessels that may not be making use of port prescribed anchorages. Accordingly, the management actions and outcomes prescribed under sections 3.1 through 3.5 can be aggregated into a single EMS for implementation. That EMS would include all actions identified in preceding sections, as summarised in table 3-6. This summary also provides timeframes for completion in support of implementation and key indicators which will demonstrate achievement of actions for each of the Objectives.

**Table 3-6:** Targets for achieving actions

Action	Completion by	Evidence achieved
<b>Outcome 1-1:</b> Provide guidance and education for key stakeholders in environmental management of anchorages and ships while at anchor		
Develop overarching environmental management guidelines for existing anchorages in the Marine Park	Q4 2014	Guidelines available online via GBRMPA website
Develop port specific environmental management guidelines for anchorages	Q4 2014	Guidelines available online via GBRMPA website Guidelines linked to via port authorities' website or documentation (e.g. ports manual)
<b>Outcome 1-2:</b> Obtain better understanding of environmental condition of anchorages and their use near ports		
Develop and implement environmental port specific monitoring program to monitor conditions of anchorages in the vicinity	Q2 2014	Port specific environmental monitoring program implemented.
<b>Outcome 1-3:</b> Further enhance environmental performance at ship anchorages		
Develop and implement environmental inspection and audit programs for ships at anchor	Q2 2014	Environmental inspection program implemented.
Determine impacts of anchorage areas on aesthetic values	Q4 2013	Assessment report on impacts on aesthetic values
<b>Outcome 2-1:</b> Restrict shipping industry users of the Marine Park to anchor only in designated anchorage areas		
Collaborate with port authorities and MSQ to review, investigate and assign designated anchorages for all ports.	Q4 2014	Anchorage areas that give regard to environmental, socio-economic impacts as well as safety designated for all ports.

<b>Action</b>	<b>Completion by</b>	<b>Evidence achieved</b>
Investigate options to reduce footprint of existing anchorages. Designate reduced areas of anchorage at ports as appropriate	Q4 2014	Designated anchorages occupy least environmental footprint with regard to safe operation
<b>Outcome 2-2:</b> Minimise the need for further anchorages in the Marine Park		
Further investigate and identify improvements in supply chain management for single commodities, especially coal to identify what, how and when improvements can be implemented.	Q4 2014	Report that defines the supply chain logistics and improvement strategies of relevance to reduced anchorage demand.
Further investigation into vessel arrival system for the Port of Hay Point, Abbot Point and Gladstone to define when and how a VAS could be implemented at these locations	Q4 2015	Report that defines the structure of a VAS of relevance to identified ports, when and how it could be implemented.
<b>Outcome 3-1:</b> Ensure environmental criteria are considered when selecting future anchorages		
Develop site selection criteria for new anchorages in collaboration with safety authorities (AMSA and MSQ) and Queensland port authorities for each port.	Q2 2014	Selection criteria and minimum required information to support anchorage site designation within the Marine Park defined and accessible through GBRMPA website

### **3.6.1 Process**

For successful implementation of the management strategies proposed in this document, it is recommended that the GBRMPA:

- Develop implementation plans for each of the actions, including resource requirements, delivery risk management, schedules and key milestones.
- Review the management strategies in the context of existing programs, newly available science and supporting information and proposed initiatives and adjust timeframes, where required.

- Identify resource availability (personnel and finance).
- Develop a framework for stakeholder engagement, including identification of stakeholders for each of the actions and mode of engagement (e.g. through industry groups or directly).
- Engage with stakeholders early (e.g. within the next six months) to identify where opportunities for collaboration or shared resources exist.
- Engage with stakeholders comprehensively.

The key stakeholders that should be engaged in the implementation of the ship anchorage management strategy are identified following.

The GBRMPA should review progress on the proposed action plans that underpin this EMS at regular intervals. Progress on the implementation of the actions is recommended to be reported at six monthly intervals.

Reporting of findings from the action plans and how they support the EMS for improved management of anchorages within the World Heritage Area should also be included in the Great Barrier Reef Outlook Report.

### **3.6.2 Key stakeholders**

#### **North-East Shipping Management Group**

North-East Shipping Management Group aim to facilitate the efficient coordination of diverse maritime activities and uses of water space within the Reef, Torres Strait and the Coral Sea.

The North-East Shipping Management Group is comprised of representatives from:

- Australian Maritime Safety Authority
- Maritime Safety Queensland
- Great Barrier Reef Marine Park Authority
- Australian Government Department of Infrastructure and Transport
- Australian Government Department of Sustainability, Environment, Water, Population and Communities
- Australian Government Department of Resources, Energy and Tourism
- Australian Government Department of Agriculture, Fisheries and Forestry.

This group is working closely with industry and other stakeholders to ensure that decisions about the safety of shipping into the future will meet the expectations of the Australian public, including protecting the marine environment and supporting sustainable economic growth.

AMSA is leading the development of the North-East Shipping Management Plan which assesses the effectiveness of current safety and management measures in the Reef with a view to identifying additional or enhanced measures that may be needed in the future. The GBRMPA contributes to the development of this plan.

### **Australian Ship Owners Association**

The ASA represents Australian companies who own or operate international and/or domestic trading ships, cruise ships, domestic towage and salvage tugs, scientific research vessels and offshore oil and gas support vessels (ASA 2013).

The ASA Environment Panel was established with the key aim to develop and promote environmental initiatives within the industry and to keep members ahead of emerging environmental issues.

### **Shipping Australia Limited**

Shipping Australia Limited is a peak industry body representing shipowners and shipping agents in areas of shipping policy, environmentally sustainable practices and safe ship operation. Steering groups liaise closely with AMSA on a broad range of issues, including environmental management.

### **National Introduced Marine Pests Coordination Group**

The National Introduced Marine Pests Coordination Group (NIMPCG) is an Australian Government group which sits within the DAFF. It was formed under the National System for the Prevention and Management of Marine Pest Incursions. The National System aims to prevent new marine pests arriving, guide responses when a new pest does arrive and minimise the spread and impact of pests already established in Australia.

Under the National System, a number of management guidelines have been developed, including those aiming at management of biofouling on commercial fishing vessels and commercial vessels. Other publications include:

- National control plans for specific marine pests
- Australian emergency marine pest plan
- Australian marine pest monitoring manual and guidelines.

### **Other industry or interests parties**

A number of non-shipping related groups may also be key stakeholders whom could be targeted during consultation identified by this project. For instance, commercial, charter or recreational fishers may be parties interested in designation of new anchorage drop points. Aesthetic value impacts may be informed by consultation with residents that have vistas overlooking port anchorage areas.

The GBRMPA already has a number of advisory committees that support involvement of local communities or key stakeholders in the management, sustainable use and conservation of the World Heritage Area. In particular, the Reef Advisory Committees advise the GBRMPA in relation to actions that can be taken to address the risks to the Reef. Consultation with these advisory committees would enable the GBRMPA to engage parties not directly linked to shipping or port management industry to inform implementation of any future anchorage management strategies.

## 4. CONCLUSION

The Australian and Queensland Governments are working together on a comprehensive Strategic Assessment of the Great Barrier Reef World Heritage Area and the nearby coastal zone. The Strategic Assessment will identify planned and potential future development that could impact on the World Heritage Area's OUV and inform long-term planning for sustainable development. The Strategic Assessment comprises two elements: The Great Barrier Reef Coastal Zone Strategic Assessment to be undertaken by the Queensland Government; and the Great Barrier Reef Marine Strategic Assessment to be undertaken by the GBRMPA.

The current project develops understanding of the environmental impacts, risks, costs and benefits of ship anchorage adjacent to major ports operating in the Reef and provides strategies for managing anchorage to reduce potential impacts. From this information, the project has identified potential future environmental management strategies of relevance to minimising impacts from anchorage activities over the next 25 years.

The project will provide information to support best practice environmental management of ship anchoring in the Reef and inform future policy and planning outcomes, including the Strategic Assessment, Sustainable Regional Development program and the North East Shipping Management Plan.

The project study area encompasses the anchorage areas servicing the five major Queensland ports:

- Port of Cairns
- Port of Townsville
- Port of Abbot Point
- Port of Hay Point
- Port of Gladstone.

The project has been delivered across three phases of work:

1. Identification of the environmental impacts of anchoring associated with the five major ports (EIA).
2. Socio-economic costs and benefits associated with different anchorage strategies (CBA).
3. Anchorage management strategies that could be used to avoid, mitigate, offset or adaptively manage identified impacts (EMS).

This document synthesises the findings across three phases of work completed for this project. The detailed studies are appended in full to this report. The project delivery timeframes and scope did not provide for field investigations or detailed consultation with groups including Traditional Owners. Information has been developed from targeted consultation and desktop assessment of information available at the time of delivery. The main findings of the project for each port are summarised in the following sections.

#### 4.1 Port of Cairns

The Port of Cairns anchorage area is located in an open seabed system and desktop review indicates that biodiversity values are little affected by the anchorage area. The scenic vistas surrounding the Cairns anchorage area are considered to have high aesthetic value in relation to the World Heritage Area listing of the Reef.

The Port of Cairns anchorage area has the potential to impact on the OUV of the World Heritage Area through:

- A reduction in the aesthetic value of the coastal vista
- Preclusion of other users of the World Heritage Area
- Minor releases of pollutants/wastes from ships
- Generation of small turbidity plumes from anchor drop and chain drag
- Disturbance to seabed biodiversity from anchor drop and chain drag
- Introduction of marine pest species.

The current practices of ship anchoring are considered to have minimal future impact on the environment and other users beyond that which has already occurred. Additionally, the Cairns anchorage area assessed is considered to have sufficient physical capacity to cope with predicted future demand. There is no need to expand the existing anchorage area; however opportunities exist to improve future management activities by:

- Continuing the current practices of ship anchoring
- Improving the current anchorage management practices to protect environmental values
- Optimising the use of existing anchorages
- Investigating the impacts of ship anchorages on aesthetic values at the Port of Cairns.

Two explicit objectives outlined in the EMS support the strategy to improve future management of ship anchorages at the Port of Cairns and actions are designed to achieve each of these objectives:

**Objective 1: Manage existing anchorages with the aim of protecting environmental values**

*Outcome 1-1:* Provide guidance and education for key stakeholders in environmental management of anchorages and ships while at anchor for improved environmental outcomes

*Outcome 1-2:* Obtain better understanding of environmental condition of anchorages and their use near ports to enable adaptive management under changing conditions

*Outcome 1-3:* Further enhance environmental performance at ship anchorages for improved environmental outcomes



Objective 2: Optimise use of existing anchorages in the Marine Park

*Outcome 2-1:* Restrict shipping industry users of the Marine Park to anchor only in designated anchorage areas

#### 4.2 Port of Townsville

The scenic vista surrounding the Port of Townsville anchorage area is considered to have high aesthetic value in relation to the World Heritage Area listing of the Reef. Significant ecosystems integral to the ecological functioning of the Reef are not a feature of the anchorage area. However seagrass has previously been recorded within the area. These seagrass habitats are not considered critical to the survival of marine fauna that are known to transit the anchorage area.

The location and management of anchorage areas at the Port of Townsville has the potential to impact on the OUV of the World Heritage Area through:

- A reduction in the aesthetic value of the coastal vista
- Preclusion of other users of the World Heritage Area
- Minor releases of pollutants/wastes from ships
- Generation of small turbidity plumes from anchor drop and chain drag
- Disturbance to seabed biodiversity from anchor drop and chain drag
- Introduction of marine pest species.

The current practices of ship anchoring are considered to have minimal future impact on the environment and other users beyond that which has already occurred. Environmental, economic and social benefits may, however, be realised if anchorage areas were designated at this port. The Port of Townsville anchorage area assessed by this project is able to support future demand so there is no foreseeable need for expansion. There are, however, opportunities to realise benefits by implementing improved management of the anchorage area use.

Opportunities to improve future management activities at the Port of Townsville include:

- Continuing the current practices of ship anchoring
- Improving the current anchorage management practices to protect environmental values
- Considering the implementation of designated anchorage areas, particularly recognising that future ship call growth will possibly be by bulk carriers requiring anchorage
- Investigating the impacts of ship anchorages on aesthetic values at the Port of Townsville.

Two explicit objectives outlined in the EMS support the strategy to improve future management of ship anchorages at the Port of Townsville and actions are designed to achieve each of these objectives:

Objective 1: Manage existing anchorages with the aim of protecting environmental values

*Outcome 1-1:* Provide guidance and education for key stakeholders in environmental management of anchorages and ships while at anchor for improved environmental outcomes

*Outcome 1-2:* Obtain better understanding of environmental condition of anchorages and their use near ports to enable adaptive management under changing conditions

*Outcome 1-3:* Further enhance environmental performance at ship anchorages for improved environmental outcomes

Objective 2: Optimise use of existing anchorages in the Marine Park

*Outcome 2-1:* Restrict shipping industry users of the Marine Park to anchor only in designated anchorage areas

Objective 3: Minimise environmental impacts from future anchorage designations, including as a consequence of anchorage relocations

*Outcome 3-1:* Ensure environmental criteria are considered when selecting future anchorages

#### 4.3 **Port of Abbot Point**

Significant ecosystems integral to the ecological functioning of the Reef are not a feature of the anchorage area servicing the Port of Abbot Point. Seabed species represented in the anchorage area are not unique and are well represented locally outside of the anchorage area. Marine megafauna are known to frequent Abbot Point and transit through the anchorage area. This is the only major port located away from coastal residents.

OUV of the World Heritage Area that have the potential to be impacted by anchorage activities at the Port of Abbot Point include:

- A reduction in the aesthetic value of the coastal vista
- Preclusion of other users of the World Heritage Area
- Minor releases of pollutants/wastes from ships
- Generation of small turbidity plumes from anchor drop and chain drag
- Disturbance to seabed biodiversity from anchor drop and chain drag
- Introduction of marine pest species
- Interference with species behaviour.

The current practices of ship anchoring at the Port of Abbot Point have minimal impact on the environment and other users beyond that which has already occurred. There is sufficient physical capacity (within the anchorage area assessed) at the Port of Abbot Point to accommodate predicted future demand.

Environmental, economic and social benefits may, however, be realised if anchorage areas were designated at this port. Benefits may also be realised by implementing improved management of the anchorage area use.

Opportunities to improve future management activities at the Port of Abbot Point include:

- Continuing the current practices of ship anchoring
- Improving the current anchorage management practices to protect environmental values
- Considering the implementation of designated anchorage areas
- Considering scheduling of ship arrivals if and when anchorage demand dictates.

Two explicit objectives outlined in the EMS support the strategy to improve future management of ship anchorages at the Port of Abbot Point and actions are designed to achieve each of these objectives:

**Objective 1: Manage existing anchorages with the aim of protecting environmental values**

*Outcome 1-1:* Provide guidance and education for key stakeholders in environmental management of anchorages and ships while at anchor for improved environmental outcomes

*Outcome 1-2:* Obtain better understanding of environmental condition of anchorages and their use near ports to enable adaptive management under changing conditions

*Outcome 1-3:* Further enhance environmental performance at ship anchorages for improved environmental outcomes

**Objective 2: Optimise use of existing anchorages in the Marine Park**

*Outcome 2-1:* Restrict shipping industry users of the Marine Park to anchor only in designated anchorage areas

*Outcome 2-2:* Minimise the need for further anchorages in the Marine Park

**Objective 3: Minimise environmental impacts from future anchorage designations, including as a consequence of anchorage relocations**

*Outcome 3-1:* Ensure environmental criteria are considered when selecting future anchorages

#### **4.4 Port of Hay Point**

While the anchorage area of Hay Point does not have a high level of visibility from Sarina, the scenic vista surrounding the anchorage area may still be considered remarkable, exceptional or unique in the context of the World Heritage Area listing.

The anchorage area is located in deepwater supporting a matrix of open seabed and patchy habitat, which supports the diversity for which the Reef is recognised. These habitats are not unique within the anchorage area and are well represented elsewhere across the World Heritage Area. No core feeding or breeding habitat for any protected species is present within the anchorage area.

The location and management of anchorage areas at the Port of Hay Point has the potential to impact on the OUV of the World Heritage Area through:

- A reduction in the aesthetic value of the coastal vista
- Preclusion of other users of the World Heritage Area
- Minor releases of pollutants/wastes from ships
- Generation of small turbidity plumes from anchor drop and chain drag
- Disturbance to seabed biodiversity from anchor drop and chain drag
- Introduction of marine pest species
- Interference with species behaviour.

The anchorage at the Port of Hay Point is predicted to require expansion by around 30 per cent by 2032 to support peak use requirements unless more efficient use is made of current anchorages. Opportunities to improve future management activities at the Port of Hay Point include:

- Continuing the current practices of ship anchoring
- Improving the current anchorage management practices to protect environmental values
- Further investigating the impacts of ship anchorages on aesthetic values at the Port of Hay Point
- Considering scheduled arrivals in combination with designated anchorages to avoid the need to expand anchorage areas.

Three explicit objectives outlined in the EMS support the strategy to improve future management of ship anchorages at the Port of Hay Point and actions are designed to achieve each of these objectives:

Objective 1: Manage existing anchorages with the aim of protecting environmental values

*Outcome 1-1:* Provide guidance and education for key stakeholders in environmental management of anchorages and ships while at anchor for improved environmental outcomes

*Outcome 1-2:* Obtain better understanding of environmental condition of anchorages and their use near ports to enable adaptive management under changing conditions

*Outcome 1-3:* Further enhance environmental performance at ship anchorages for improved environmental outcomes

Objective 2: Optimise use of existing anchorages in the Marine Park

*Outcome 2-1:* Restrict shipping industry users of the Marine Park to anchor only in designated anchorage areas

*Outcome 2-2:* Minimise the need for further anchorages in the Marine Park

Objective 3: Minimise environmental impacts from future anchorage designations, including as a consequence of anchorage relocations

*Outcome 3-1:* Ensure environmental criteria are considered when selecting future anchorages

#### 4.5 Port of Gladstone

The scenic vista surrounding the Port of Gladstone anchorage area is considered to have high aesthetic value in relation to the World Heritage Area listing of the Reef.

The Port of Gladstone anchorage area (inner and outer) does not contain any significant geomorphic or physiographic features which are integral to the ongoing ecological functioning of the Reef. It does not support unique features or habitats requiring a higher level of management protection, or important feeding or breeding habitat critical for the persistence of any protected species. The Inner Anchorage at the Port of Gladstone does include rocky reef. However this is not a significant feature of the Reef at this location and is well represented outside of the anchorage area.

OUV of the World Heritage Area that have the potential to be impacted by anchorage activities at the Port of Gladstone include:

- A reduction in the aesthetic value of the coastal vista
- Preclusion of other users of the World Heritage Area
- Minor releases of pollutants/wastes from ships
- Generation of small turbidity plumes from anchor drop and chain drag
- Disturbance to seabed biodiversity from anchor drop and chain drag
- Introduction of marine pest species
- Interference with species behaviour.

The current practices of ship anchoring at the Port of Gladstone have minimal impact on the environment and other users beyond that which has already occurred. There is sufficient physical capacity at the Port of Gladstone to accommodate predicted future demand. Future demand is largely due to the growth of gas export trades which will increase scheduled arrivals from sea direct to berth.

Opportunities to improve future management activities at the Port of Gladstone include:

- Continuing the current practices of ship anchoring
- Improving the current anchorage management practices to protect environmental values
- Optimising the use of existing anchorages
- Investigating the impacts of ship anchorages on aesthetic values at the Port of Gladstone

- If waiting times increase beyond four days, implement strategies to manage existing anchorages to avoid the need to increase anchorages. This could include redesignating some anchorages as exclusive coal ship anchorages and adopting a VAS only for those anchorages.

Two explicit objectives outlined in the EMS support the strategy to improve future management of ship anchorages at the Port of Gladstone and actions are designed to achieve each of these objectives:

Objective 1: Manage existing anchorages with the aim of protecting environmental values

*Outcome 1-1:* Provide guidance and education for key stakeholders in environmental management of anchorages and ships while at anchor for improved environmental outcomes

*Outcome 1-2:* Obtain better understanding of environmental condition of anchorages and their use near ports to enable adaptive management under changing conditions

*Outcome 1-3:* Further enhance environmental performance at ship anchorages for improved environmental outcomes

Objective 2: Optimise use of existing anchorages in the Marine Park

*Outcome 2-1:* Restrict shipping industry users of the Marine Park to anchor only in designated anchorage areas

*Outcome 2-2:* Minimise the need for further anchorages in the Marine Park

#### 4.6 **Across all ports**

The environmental ship anchorage management strategy and the underpinning actions are driven by an overarching objective to minimise environmental and social impacts associated with anchorage use while maintaining efficient port operation. The strategy, therefore, provides for improvements in environmental management of the existing port anchorages which also realise social benefits.

How Outcomes achieve each of the identified management Objectives and how each of these objectives address the identified impacts are prescribed below.

Objective 1: Manage existing anchorages with the aim of protecting environmental values

*Outcome 1-1:* Provide guidance and education for key stakeholders in environmental management of anchorages and ships while at anchor for improved environmental outcomes

It is recommended that the GBRMPA develop environmental guidelines relating specifically to ships at anchor within the World Heritage Area which could then be used to communicate with ship owners and masters of ship. The environmental management measures described in the guideline should aim at minimising the following impacts identified as relevant to anchoring activities, including:

- Disturbance to seabed and supported biodiversity
- Release of emissions or pollutants/wastes
- Altered aesthetic value (or perception thereof)

- Interference with access to resources
- Marine pest introduction
- Interference with species behaviour.

*Outcome 1-2:* Obtain better understanding of environmental condition of anchorages and their use near ports to enable adaptive management under changing conditions

Targeted, regular environmental monitoring of the areas used for anchoring will improve understanding of the environmental condition and enable adaptive management intervention to be considered if controls are found to be ineffective. It is recommended that the GBRMPA monitor the environmental conditions of anchorages at appropriate intervals for the following parameters:

- Biodiversity and presence of marine pests
- Seabed conditions (habitat type, rugosity)
- Sediment type and quality
- Underwater noise
- Air quality
- Waste accumulation

*Outcome 1-3:* Further enhance environmental performance at ship anchorages for improved environmental outcomes

To enhance environmental performance, including marine pest species management and an understanding of aesthetic impacts, at ship anchorages it is suggested that environmental inspection and audit programs for ships at anchor in the Marine Park be developed in collaboration with ports, the shipping industry, AMSA, AQIS and MSQ.

Objective 2: Optimise use of existing anchorages in the Marine Park

*Outcome 2-1:* Restrict shipping industry users of the Marine Park to anchor only in designated anchorage areas

Designated anchorage can enable more efficient management and habitat impact controls. Reducing the footprint of the anchorage area also reduces the extent of the Reef exposed to habitat impacts and pollutant risk. It also facilitates a response to any incident or audit and inspection of ships at anchor.

*Outcome 2-2:* Minimise the need for further anchorages in the Marine Park

Improved whole of supply chain management, including scheduled vessel arrivals with designated anchorages and a Vessel Arrival System (VAS), would result in more efficient movement of commodities from the mine to the terminal to the destination port. This may reduce the need for further anchorage points, enable more efficient use of existing anchorages and potentially facilitate a reduction in the number of existing anchorages.

Objective 3: Minimise environmental impacts from future anchorages and anchorage relocations

*Outcome 3-1:* Ensure environmental criteria are considered when selecting future anchorages

Outcome 3-1 will provide anchorage site selection criteria that include environmental considerations where new designations, expansion or relocation of anchorages cannot be avoided. The environmental considerations should address the primary impacts identified by this project including disturbance to seabed and supported biodiversity, pollutants/wastes, aesthetic values, access to resources, marine pest introduction and interference with species behaviour.

For successful implementation of the management strategies proposed in this document for all five ports, it is recommended that the GBRMPA work with other agencies to:

- Develop implementation plans for each of the actions, including resource requirements, schedules and key milestones.
- Review the management strategies in the context of existing programs, newly available science and supporting information and proposed initiatives and adjust timeframes, where required.
- Identify resource availability (personnel and finance).
- Develop a framework for stakeholder engagement, including identification of stakeholders for each of the actions and mode of engagement (e.g. through industry groups or directly).
- Engage with stakeholders early to identify where opportunities for collaboration or shared resources exists.
- Engage comprehensively with stakeholders.

Ongoing communication and education regarding potential environmental impacts from anchorage use, how these influence the values of the Reef and opportunities to ameliorate or minimise impacts which support sustainable use of the World Heritage Area.

The environmental ship anchorage management strategy aims to be applicable to the current and future use of the port anchorages and underpins ongoing sustainable use of the anchorages in the World Heritage Area without putting at risk the values for which the area is recognised. This strategy has been developed using information available at the time of the project's delivery. As new information becomes available it is expected that this strategy will also be reviewed and adapted by the GBRMPA to remain relevant.



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# **Appendix A**

## **Ship Anchorage Management in the Great Barrier Reef World Heritage Area**

**July 2013**

### **Environmental Impact Assessment**

## **Appendix B**

# Ship Anchorage Management in the Great Barrier Reef World Heritage Area

July 2013

## Cost Benefit Analysis

## **Appendix C**

### **Ship Anchorage Management in the Great Barrier Reef World Heritage Area**

**July 2013**

### **Environmental Management Strategy**

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