

Priority port master planning

Evidence base documentation

# Infrastructure and supply chain analysis

## Priority Port of Gladstone

Queensland | Australia | July 2016



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# Priority Port of Gladstone Master Planning

## Infrastructure and Supply Chain Requirements Assessment

### FINAL REPORT

15 July 2016

PSA Reference: 0552





## Document Control

**Document:** Priority Port of Gladstone Port Master Planning – Infrastructure and Supply Chain Requirements Assessment - Final Report

This document has been prepared for:



This document has been prepared by:



## Revision History

VERSION	DATE	DETAILS	AUTHOR	AUTHORISATION
1	6 May 2016	Preliminary Draft	Nicole Boulton & Kate Burke	
2	9 June 2016	Revised Draft	Nicole Boulton & Kate Burke	
3	20 June 2016	Draft	Nicole Boulton & Kate Burke	
4	11 July 2016	Final Draft	Nicole Boulton	
5	15 July 2016	Final	Nicole Boulton	

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## EXECUTIVE SUMMARY

The Priority Port of Gladstone Infrastructure and Supply Chain Requirements Assessment (Infrastructure Study) has been commissioned by the Department of State Development (DSD) to inform the preparation of the Priority Port of Gladstone Master Plan (the Master Plan). The Master Plan is currently being prepared by DSD in accordance with the *Sustainable Ports Development Act 2015* (Ports Act). The Master Plan will be a strategic planning document for the Priority Port of Gladstone Master Planned Area (MPA) until 2050 to accord with the *Reef 2050 Long Term Sustainability Plan* (Reef 2050) prepared by the Commonwealth Government.

The purpose of this report is to inform the Master Plan about the existing and potential infrastructure and supply chains within the MPA.

Three growth scenarios have been prepared by DSD and relevant State agencies to model the potential growth of the MPA until 2050 (the master planning timeframe). For the purposes of this report, scenario three has been assumed. Scenario three assumes significant growth of industries within the MPA, channel development, and a maximum throughput of approximately 294 million tonnes per annum (Mtpa) through the port. Growth scenarios one and two envisage an annual throughput of approximately 151 and 230 Mtpa respectively.

To guide and inform this draft report, workshops were held with relevant stakeholders including industry representatives and government agencies. These workshops provided much of the information presented in this report, particularly with respect to the potential growth and long-term plans for development within the MPA. In this regard, there is a range of existing industries within the MPA, and a number of potential industries identified (each with a varying level of certainty).

The MPA is subject to comprehensive planning under a number of existing local and State planning documents, both strategic and statutory in nature. However, there has been less strategic planning undertaken for the marine component of the MPA.

In light of the background findings outlined throughout this report and the identification of potential infrastructure and supply chain requirements, the following observations can be made:

- There is currently a gap within the existing planning instruments in the formal identification of various infrastructure and supply chain needs within the marine-based component of the MPA. This could be addressed through the Master Plan text and precincts. For example, where areas for capital dredging and reclamation are proposed, these could potentially be acknowledged through the Master Plan, subject to other statutory approvals being obtained; and
- There are a number of potential land-based infrastructure items identified within this study, which would benefit from being specifically acknowledged through the Master Plan. Additionally, the existing planning documents, which cover the MPA, including the State Development Area Development Scheme, Strategic Port Land Use Plan and Gladstone Regional Council Planning Scheme, could be better aligned to the Master Plan, once in force, and be amended through future amendment processes.

Consequently, the primary recommendations of this report are to ensure existing and proposed marine-based facilities and infrastructure are recognised and protected. This report recommends that the Master Plan should focus on the following elements:

- The importance of shipping channels and the associated capital dredging;
- The benefits of reclamation;
- The protection of, and planning for, marine infrastructure, particularly through the development of precincts in the Master Plan and potentially through the port overlay; and
- The identification of other potential or indicative plans for land based road, rail or other infrastructure expansions over the master planning timeframe, through the Master Plan text.

It is further recommended that the MPA boundary be extended to include the additional rail infrastructure projects.

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## LIST OF ACRONYMS AND ABBREVIATIONS

APLNG	Australia Pacific LNG
BSL	Boyne Smelter Limited
DAF	Department of Agriculture and Fisheries
DSD	Department of State Development
DNRM	Department of Natural Resources and Mines
EEMBL	East End Mine Branch Line
EIS	Environmental Impact Statement
EMF	Environmental Management Framework
EDQ	Economic Development Queensland
Evidence Base	Evidence Base Report for the Proposed Gladstone Port Master Planned Area
GAWB	Gladstone Area Water Board
GLNG	Santos GLNG
GPC	Gladstone Ports Corporation Limited
GRC	Gladstone Regional Council
GRC Planning Scheme	Gladstone Regional Council Planning Scheme 2015
Infrastructure study	The Infrastructure and Supply Chain Requirements Assessment (This study)
km	kilometre
kph	Kilometre per hour
ktpa	Kilo tonne per annum
LNG	Liquid Natural Gas
LR1 and LR2	Long Range 1 and Long Range 2
LUP	Gladstone Ports Corporation Land Use Plan
m	metres
Master plan	Priority Port of Gladstone Master Plan
Master planning timeframe	Present day to 2050
MLARP	Moura Link Aldoga Rail Project
Mm <sup>3</sup>	Million cubic metres
MPA	Master Planned Area
MSL	Moura Short Line
Mtpa	Million tonnes per annum
NCL	North Coast Line
PSA	PSA Consulting (Australia)
QAL	Queensland Alumina Limited
QLNG	Queensland Curtis LNG
QER	Queensland Energy Resources
Reef 2050	Reef 2050 Long-Term Sustainability Plan
RGT	RG Tanna Coal Terminal
RTA Yarwun	Rio Tinto Alcan Yarwun
Ports Act	Sustainable Ports Development Act 2015
SBR	Surat Basin Railway
SDA	State Development Area
SPL	Strategic Port Land
TMR	Department of Transport and Main Roads
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WICET	Wiggins Island Coal Export Terminal Pty Ltd
WICT	Wiggins Island Coal Terminal
WIRP	Wiggins Island Rail Project

# 1 INTRODUCTION

The Department of State Development (DSD) has engaged PSA Consulting (Australia) (PSA) to prepare an *Infrastructure and Supply Chain Requirements Assessment* (Infrastructure Study) to inform the preparation of the Priority Port of Gladstone Master Plan (the Master Plan). DSD is seeking a comprehensive assessment and identification of the infrastructure and supply chain capacity and potential requirements for the Priority Port of Gladstone master planned area (MPA) until 2050 (the master planning timeframe) to accord with the Reef 2050 Long Term Sustainability Plan (Reef 2050) prepared by the Commonwealth Government. The results of this assessment will help to inform the Master Plan.

## 1.1 PURPOSE OF STUDY

The overall purpose of this study is to determine the existing and potential infrastructure and supply chain requirements for the MPA over the master planning timeframe. Specific tasks of this project are as follows:

- Comprehensively identify the infrastructure and supply chain network supporting both directly and indirectly, the MPA, including key nodes and corridors within the network (both land and marine);
- Recommend possible changes to the proposed MPA boundary, should this infrastructure and supply chain analysis identify key components outside of the MPA;
- Identify the range of infrastructure users that use land and marine supply chain infrastructure servicing the MPA, taking into account existing and potential projects and regional or State economic indicators, trades volumes and values, and industry trends and forecasting;
- Identify and discuss any potential improvements in infrastructure use and/or provision to support better management and productivity of the Priority Port of Gladstone. This may include activities directly or indirectly related to the business of the Port, and protection of urban encroachment from sensitive areas identified in the interface precincts;
- Identify any surplus capacity in existing infrastructure items and discuss potential uses that could utilise capacity to achieve optimisation of infrastructure, taking into account existing and potential projects, trade volumes and industry trends and forecasting;
- Using the capacity for growth scenarios provided, identify the capacity of the infrastructure and supply chains to accommodate these growth scenarios, potential trigger points for consideration of additional infrastructure and supply chain capacity, and discuss potential requirements to increase infrastructure and supply chain capacity;
- Using the capacity for growth scenarios provided, discuss potential increases in demand on local government infrastructure networks; and
- Recommend how the master planning process (including Master Plan and Port Overlay) could identify and protect infrastructure critical to the effective operation and future expansion of the Priority Port of Gladstone.

With consideration of the above tasks, the purpose of this report is to:

- Provide background information on the existing and potential infrastructure within the MPA;
- Review existing land use planning provisions;
- Report on the findings of workshops and meetings with stakeholders;
- Identify potential industries, trends and forecasts;
- Identify existing and potential infrastructure and supply chain corridors; and
- Identify potential implications for master planning based on identified gaps.

## 1.2 PRIORITY PORT OF GLADSTONE

The Priority Port of Gladstone is located in Central Queensland, immediately adjacent to Gladstone and is identified as a Priority port under the *Sustainable Ports Development Act 2015* (Ports Act). The Port is located within the Gladstone harbour, which is naturally deep. The Priority Port of Gladstone is managed and operated by the Gladstone Ports Corporation (GPC) and is a major bulk commodity Port with a throughput of over 100 million tonnes in 2014-15 representing approximately 30% of the State's total trade port throughput.

The main functions of the Port are to export Queensland resources, import raw material and export finished products from major industries within the MPA. By far the largest commodity transported through the Port is coal, which represents almost 71% of all cargo throughput<sup>1</sup>.

## 1.3 PORT OF GLADSTONE MASTER PLAN CURRENT STATUS

The Port of Gladstone was declared a Priority Port on 20 November 2015 under the Ports Act, and subsequently requires the preparation of a Master Plan. Port master planning is a port related commitment of Reef 2050 and is mandated under the Ports Act.

Port master planning requires consideration of issues beyond the traditional focus of strategic port land (SPL). Port master planning will require review and planning for marine and land-based impacts, port and supply chain capacity and connectivity, and environmental and community values.

Master planning should allow optimisation of infrastructure and address operational, economic, environmental and community relationships, as well as supply chains and interface with surrounding land uses. The government will lead port master planning and work closely with port authorities, local governments and other key stakeholders.

Master planning for each Priority Port will include:

- A long-term strategic vision and associated strategic objectives for the MPA;
- Articulation of the State interests in relation to the Priority ports and how those interests must be considered in all planning decisions made within the MPA; and
- An environmental management framework (EMF) for the MPA that reflects ecologically sustainable development.

The current proposed MPA boundary encompasses an area of approximately 75,000 hectares, and includes both land and marine components. The MPA generally includes the Gladstone State Development Area (Gladstone SDA); marine areas within the Port limits that are not Commonwealth or State Marine Parks, SPL; and small areas regulated by the local government planning scheme. This report also addresses proposed amendments to the MPA boundary, based on feedback received from stakeholders throughout the report drafting process.

Public consultation was conducted on the proposed MPA boundary from 9 June 2015 to 20 July 2015. Submissions received during the consultation period informed a review of the proposed boundary. The current proposed boundary is shown in Figure 1. The proposed boundary will be reviewed throughout the master planning process and will ultimately be approved by regulation after the Master Plan is finalised.

The Master Plan is currently being prepared by DSD and is expected to be completed in early 2017. The Infrastructure Study will directly inform the preparation of the Master Plan. In accordance with Section 14 of the Ports Act, the Master Plan will require review at least every 10 years.

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<sup>1</sup> AECOM, 2016, *Evidence Base Report for the Proposed Gladstone Port Master Planned Area*



### 1.3.1 Master Plan Precincts

DSD is considering potential precincts to be included in the Master Plan (refer to Appendix 1). These include:

- Environmental protection precinct;
- Marine industry and recreation precinct;
- Interface precinct;
- Port industry and supply chain precinct; and
- Marine precinct.

This study informs the further development of these Master Plan precincts.

### 1.3.2 Reference Documents

#### ***Evidence Base Report for the Proposed Gladstone Port Master Planned Area***

DSD commissioned the *Evidence Base Report for the Proposed Gladstone Port Master Planned Area* (the Evidence Base Report) to inform preparation of the Master Plan. This was prepared by AECOM in 2016. The evidence base includes a comprehensive overview of:

- The history and current function of the Priority Port of Gladstone;
- The regulatory and policy context within which the Port operates;
- Existing land uses and activities within the MPA;
- Environmental values;
- Social and cultural heritage values; and
- Economic factors affecting the future development of the MPA.

Of particular relevance to the Infrastructure Study is the overview of the current function of the Port, existing land uses and activities within the MPA, and economic factors affecting the future development of the MPA. The Evidence Base Report provides a base from which to commence the identification of existing and future industries operating within the Port or which link to the supply chain network to the Port.

#### ***Other Documents***

Other documents used as source material for this report include the following:

- *Port of Gladstone Information Handbook 2011* (GPC);
- *Port Procedures and Information for Shipping – Port of Gladstone 2012* (Transport and Main Roads);
- *Gladstone Ports Corporation Annual Report 2014-15*;
- *Aurizon Network Development Plan 2015*;
- *Independent Review of the Port of Gladstone Report on Findings July 2013*;
- *Gladstone Maintenance Dredging Report 2014*;
- Various planning documents and legislation (as per Section 2.2); and
- Various websites of Gladstone based industries.

## 1.4 GROWTH SCENARIOS

The Infrastructure Study is based on three growth scenarios prepared by DSD and relevant State agencies to model the potential growth of the MPA until 2050. The key assumptions of each scenario are presented below. For the purposes of this project, scenario three has been adopted/assumed to identify the full extent of potential infrastructure and supply chain needs of the MPA over the master planning timeframe.

### SCENARIO ONE

- There is very limited economic growth globally, as well as limited growth across the State and the Gladstone region.
- Growth is within capacity of existing facilities.
- There is a global shift away from the use of coal toward lower carbon intensive and renewable sources of energy to achieve improved emissions.
- There is no expansion of coal terminal capacity.
- There is minimal new industrial development.
- There is limited project-related capital dredging undertaken at the Priority Port of Gladstone.
- Price of coal remains weak (recognising there is uncertainty about the future of coal).
- The main shipping channel is not duplicated.
- Continuation of cruise shipping.
- Maximum Port throughput of 151Mtpa.

### SCENARIO TWO

- There is global economic growth, as well as growth across the State and the Gladstone region.
- There is a global shift away from the use of coal toward lower carbon intensive and renewable sources of energy to achieve improved emissions.
- Potential for technological change to enable ongoing thermal coal due to lower emissions.
- Strong price growth for relevant commodities.
- New industries would be developed within the master planned area.
- Limited duplication of the Port's shipping channel and associated dredge material placement.
- Capital dredged material from the Gatcombe and Golding channel duplication, Targinie Channel and the Clinton Bypass is beneficially reused or placed onshore.
- Continuation of cruise shipping.
- Maximum Port throughput of 230Mtpa.

### SCENARIO THREE

- There is significant global economic growth, as well as growth across the State and the Gladstone region.
- There is a global shift away from the use of coal toward lower carbon intensive and renewable sources of energy to achieve improved emissions.
- Potential for technological change to enable ongoing thermal coal due to lower emissions.
- Growth of coal exports supported by development of the Surat Basin linked to the Priority Port of Gladstone by the Surat Basin Railway.
- New major industries developed within the master planned area.
- Significant development through Fisherman's Landing expansion and at Hamilton Point.
- Additional major infrastructure including road and rail connection from Curtis Island to mainland instead of additional dredging.
- Strong price growth for relevant commodities.
- Duplication of shipping channels and associated dredge material placement.
- Capital dredged material from the Gatcombe and Golding channel duplication, Targinie Channel and the Clinton Bypass is beneficially reused or placed onshore.
- Continuation of cruise shipping.
- Maximum Port throughput of 294Mtpa.

## 2 PROJECT METHODOLOGY

This chapter outlines the project methodology undertaken for the Infrastructure Study.

### 2.1 BACKGROUND INVESTIGATION

Initial investigations were undertaken to document existing and potential industries within the MPA and how these industries currently use supply chains to move products through the MPA.

These investigations primarily involved a desktop literature review of publicly available information concerning industrial uses and infrastructure within the MPA. In particular, the Evidence Base Report provides a comprehensive overview of the Priority Port of Gladstone and a substantial starting point in identifying key industries within the MPA and surrounding areas that currently, or will potentially, influence Port operations.

In addition to this, the websites of proponents, GPC, Gladstone Regional Council (GRC) and industry groups were reviewed to obtain further information. Data was also obtained from relevant agencies and organisations to assist in the production of draft mapping for each of the industries, which were discussed at the workshops (see Section 2.3 for further information on the workshops).

The outcomes of the initial background investigations, including a review of the Evidence Base Report, revealed a number of industries/activities that are likely to have an influence on the infrastructure and supply chain requirements assessment for the MPA. These include:

- Shipping channels;
- Dredging;
- Reclamation areas;
- Wharves and berths;
- Coal;
- Gas;
- Petroleum products;
- Cement;
- Alumina and aluminium;
- Steel;
- Chemicals and explosives;
- Agriculture;
- Nickel;
- Road infrastructure;
- Rail infrastructure;
- Electricity;
- Water and sewerage; and
- Waste management (including industry waste storage and GRC waste management facilities).

The outcomes of these background investigations are presented in further detail in Section 2.3 of this report, which addresses the workshop findings and provides a preliminary view of the existing and potential infrastructure and supply chain requirements.

### 2.2 REVIEW OF PLANNING DOCUMENTS

In addition to the desktop literature review and background investigations, there are also a number of legislative requirements and land use planning documents that influence planning of the MPA. These are outlined below. It should be noted that this report does not address all legislation relating to development approvals. DSD is concurrently completing a risk assessment, which will address the extent of regulation within the MPA.

### 2.2.1 Reef 2050 Long Term Sustainability Plan (2015)

Reef 2050 is the overarching framework for protecting and managing the Great Barrier Reef from 2015 to 2050. The Plan is a key component of the Australian Government's response to the recommendations of the UNESCO World Heritage Committee. At the core of the Plan is an outcomes framework that will drive progress towards delivering the overarching vision:

*"To ensure the Great Barrier Reef continues to improve on its Outstanding Universal Value every decade between now and 2050 to be a natural wonder for each successive generation to come."*

Reef 2050 requires port master planning to be undertaken for the four Priority Ports of Gladstone, Hay Point/Mackay, Abbot Point and Townsville, in order to optimise infrastructure and address operational, economic, environmental and social relationships as well as supply chains and surrounding land uses.

### 2.2.2 Sustainable Ports Development Act (2015)

Port master planning for Priority Ports is mandated under the Ports Act. Section 7 of the Ports Act requires a Master Plan to be prepared for each Priority Port. The Master Plan for a Priority Port must identify the MPA for the Port and apply to all of the MPA. In addition, the Minister must be satisfied the Master Plan for the Priority Port adequately considers the principles of ecologically sustainable development.

Section 8 of the Ports Act outlines the content of a Master Plan as follows:

*(1) A Master Plan for a Priority Port must—*

*(a) State the strategic vision, objectives and desired outcomes for the master planned area; and*

*(b) Identify the State interests affected, or likely to be affected, by—*

*(i) existing uses at the port; and*

*(ii) future development at, or for, the port; and*

*(c) Include an environmental management framework that—*

*(i) identifies and maps environmental values in the master planned area and surrounding areas; and*

*(ii) identifies any impacts development in the master planned area may have on the environmental values; and*

*(iii) states objectives, and measures (the priority management measures), for managing the impacts identified under subparagraph (ii); and*

*(d) Include any other matter prescribed by regulation.*

The Master Plan will be informed by the Infrastructure Study and concurrent risk assessment in addressing these matters.

### 2.2.3 Gladstone Ports Corporation Land Use Plan (2012)

The *Gladstone Ports Corporation Land Use Plan 2012* (LUP) regulates development on SPL.

The LUP applies to all land, including all premises, roads, waterways and tidal areas within SPL boundaries. Any other land not identified in the LUP, which is owned or leased by GPC, is governed by the planning schemes of relevant local or state government authorities. The LUP also identifies and regulates reclamation areas.

SPL, which is also in the Gladstone State Development Area (SDA), is governed by the Coordinator-General under the Gladstone SDA Development Scheme.

In accordance with the *Transport Infrastructure Act 1994*, the LUP requires review at a minimum of every eight (8) years or as necessary to ensure that it responds to changes at local, regional and State level. The most recent amendments to the LUP were gazetted and took effect from 22 January 2016.

The purpose of the LUP is to provide a strategic framework for the management and assessment of development on SPL, through the identification of land use precincts, appropriate land uses and by defining the development outcomes sought to ensure sustainable growth and development to the port, based on coordinated planning across economic, environmental and social aspects. According to the LUP, land use planning and future development at the Port seeks to achieve:

- The sustainable expansion of Port areas to accommodate future growth;

- Efficient operation of Port infrastructure and the timely provision of identified new Port infrastructure;
- Responsible use of natural and capital resources; and
- An appropriate balance between economic, environmental and social issues.

The Master Plan must consider the LUP, insofar as it relates to current mandating of use on SPL. The LUP may need to be amended in the future to implement the Master Plan. Appendix 2 contains mapping of SPL land holdings (current and future) as identified by the LUP.

## 2.2.4 Gladstone Ports Corporation 50 Year Strategic Plan (2012)

The *Gladstone Ports Corporation 50 Year Strategic Plan 2012* (GPC Strategic Plan) has been prepared to support GPC's mission to responsibly manage, develop and operate Port facilities and services for the sustainable economic growth and social prosperity of the region, Queensland and Australia. It provides an overview of the strategic directions for future expansion of the Port and related infrastructure.

The GPC Strategic Plan is an important consideration for this assessment as it seeks to identify future needs for the Port of Gladstone. This study seeks to identify what the future infrastructure and supply chain requirements are, based on growth scenario three and the needs identified by industry and other key stakeholders for the master planning timeframe. The GPC Strategic Plan is not a statutory document, however it is an informative document that will assist in confirming the Port's plans for expansion into the future, from an infrastructure and supply chain requirements perspective.

## 2.2.5 Gladstone State Development Area Development Scheme (2015)

The Gladstone SDA Development Scheme applies to all land within the defined SDA boundary. Mapping of the planning instrument jurisdictions is shown in Figure 2 below.

According to the Gladstone SDA Development Scheme, development within the Gladstone SDA will:

- (a) Be consistent with the strategic vision for the Gladstone SDA, the development precincts and the precincts preferred development intent;*
- (b) Use land efficiently and minimise adverse impacts on infrastructure, infrastructure corridors and future development opportunities;*
- (c) Be adequately serviced by linear infrastructure and maximise the safe and efficient use of existing and future linear infrastructure;*
- (d) Privately fund linear infrastructure associated with the development;*
- (e) Ensure the integrity and functionality of the Gladstone SDA is maintained and protected from incompatible land uses;*
- (f) Avoid or minimise adverse impacts on surrounding uses;*
- (g) Recognise and manage impacts on environmental, cultural heritage and community values (this includes values for matters of national environmental significance including the outstanding universal value of the Great Barrier Reef World Heritage Area);*
- (h) Achieve appropriate levels of flood immunity and appropriately manage flood levels on adjoining land;*
- (i) Use water and energy efficiently and minimise potential impacts on water quality; and*
- (j) Manage impacts of air quality within the Gladstone SDA.*

The SDA Development Scheme may need to be amended to implement the Master Plan.

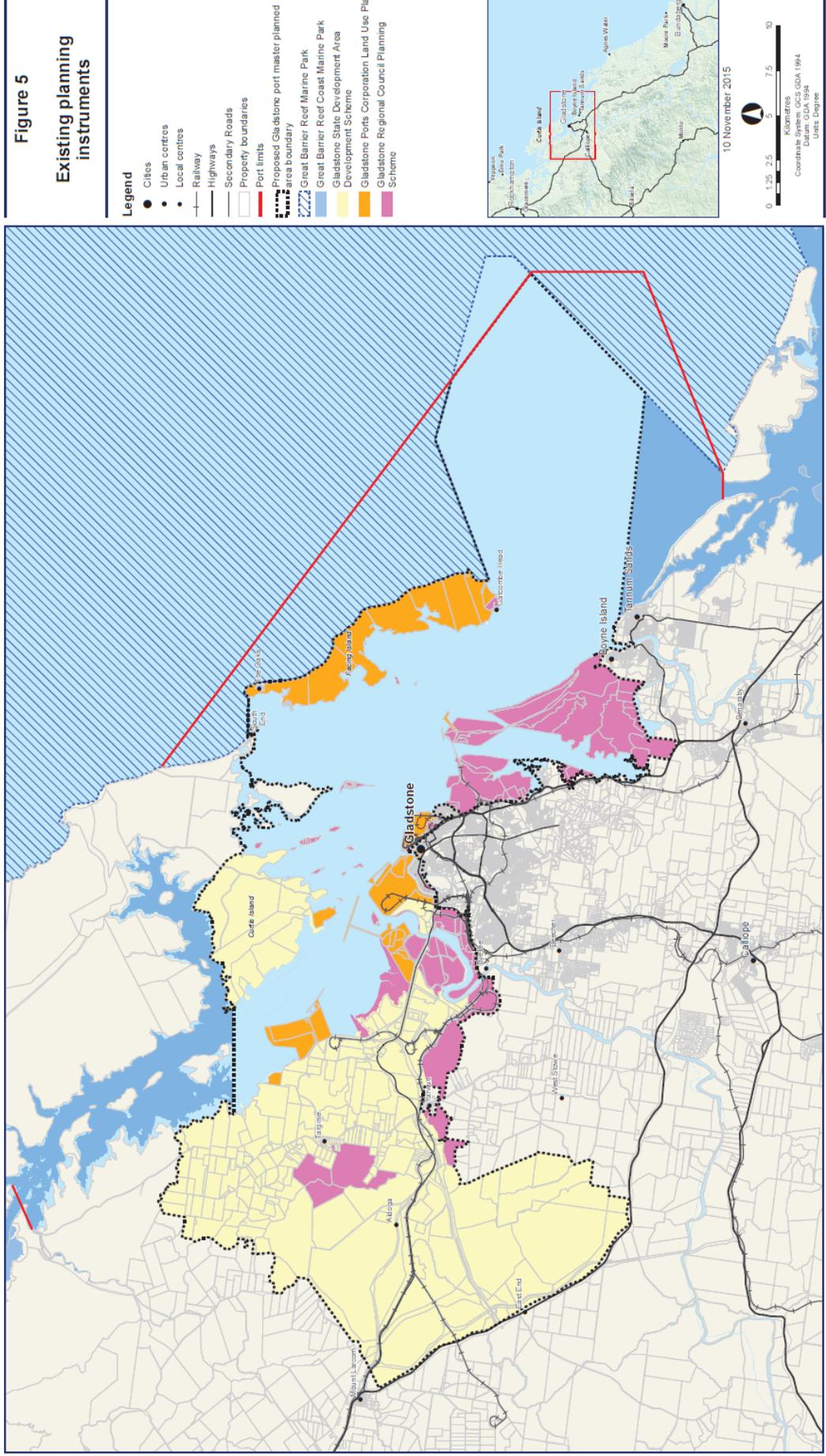


Figure 2: Existing Planning Instruments (AECOM, 2016)

## 2.2.6 Gladstone Regional Council Planning Scheme (2015)

The *Gladstone Regional Council Planning Scheme 2015* (GRC Planning Scheme) applies to all land within the proposed MPA boundary not covered by either the LUP for SPL, or the Gladstone SDA Development Scheme. Areas covered by the LUP or Gladstone SDA development scheme are zoned as ‘special purpose’ under the GRC planning scheme.

Land outside of these areas, and within the MPA, are mandated by the GRC Planning Scheme. The Planning Scheme may need to be amended in the future to implement the Master Plan.

Mapping contained in Appendix 3 indicates the extent of the Gladstone Regional Council Planning Scheme zoning as it relates to the MPA.

## 2.2.7 Summary of Planning Legislation and Land Use Planning Documents

Master planning should ensure that co-ordination of the statutory documents outlined above is achieved. It is also acknowledged that the above statutory documents may need to be amended in the future to implement the Master Plan.

All existing land-based planning instruments are considered to be up to date and provide for short to medium term infrastructure and supply chain requirements. This study addresses long-term land-based infrastructure requirements.

This study has identified gaps in planning for marine-based infrastructure and supply chain requirements over the master planning timeframe.

## 2.3 WORKSHOPS

A series of workshops with a range of key stakeholders were undertaken from 26-27 April 2016 to ascertain feedback from key stakeholders regarding the existing and potential infrastructure and supply chain requirements for the MPA. These workshops serve as an essential input into confirming the likely infrastructure needs and requirements to service the MPA over the master planning timeframe. The workshops were as follows:

- **Workshop 1:** ‘30 year Strategic Direction’ with DSD, GPC and GRC;
- **Workshop 2:** ‘Existing and Future Infrastructure and Supply Chain Requirements’ with industry and key stakeholders; and
- **Workshop 3:** ‘How to Make it Happen’ with government agencies.

Table 1 outlines the list of attendees for each workshop. DSD has undertaken a series of follow up meetings with stakeholders that were unable to attend the workshops (refer Section 2.4).

**Table 1: Workshop Attendees**

WORKSHOP	STAKEHOLDERS
<b>Workshop 1</b> <b>“30 year Strategic Direction”</b>	<ul style="list-style-type: none"> <li>• DSD;</li> <li>• GPC; and</li> <li>• GRC.</li> </ul>
<b>Workshop 2</b> <b>“Existing and Future Infrastructure and Supply Chain Requirements”</b>	<ul style="list-style-type: none"> <li>• Aurizon;</li> <li>• Boyne Smelter Limited (BSL);</li> <li>• Cement Australia;</li> <li>• CQG (representing Casper Energy);</li> <li>• DSD;</li> <li>• Ergon Energy;</li> <li>• Euroa Steel Plant Project;</li> <li>• Gladstone Area Promotion and Development Ltd;</li> <li>• Gladstone Industry Leadership Group;</li> <li>• GPC;</li> <li>• Graincorp;</li> <li>• NRG Gladstone Power Station;</li> <li>• Queensland Alumina Limited (QAL);</li> </ul>

WORKSHOP	STAKEHOLDERS
	<ul style="list-style-type: none"> <li>• Southern Oil Refining; and</li> <li>• Wiggins Island Coal Export Terminal Pty Ltd (WICET).</li> </ul>
<p><b>Workshop 3</b> “How to Make it Happen”</p>	<ul style="list-style-type: none"> <li>• Department of Agriculture and Fisheries (DAF);</li> <li>• DSD;</li> <li>• Department of Transport and Main Roads (TMR);</li> <li>• Economic Development Queensland (EDQ);</li> <li>• GPC;</li> <li>• GRC;</li> <li>• Queensland Parks and Wildlife Service; and</li> <li>• Office of the Coordinator-General.</li> </ul>

### 2.3.1 Summary of Workshop Discussions

A summary of the key issues raised in the workshops is provided in Table 2 below.

**Table 2: Themes from the Workshops**

WORKSHOP	THEME
<p><b>Workshop 1</b> “30 year Strategic Direction”</p>	<ul style="list-style-type: none"> <li>• Sufficient approval mechanisms are in place for works within the land component of the MPA. There are a range of land use plans and development schemes which outline the strategic and legislative direction for the land based component. The marine environment is primarily without long-term planning. Whilst the Master Plan will not add additional approvals, the Master Plan will present additional considerations in existing development assessment processes.</li> </ul>
<p><b>Workshop 2</b> “Existing and Future Infrastructure and Supply Chain Requirements”</p>	<ul style="list-style-type: none"> <li>• There is a long-term requirement for additional infrastructure, particularly to service new and emerging industries. This infrastructure would primarily link with existing infrastructure, such as extensions from existing railway lines.</li> <li>• Efficiency in the operation of the Port is not only controlled by additional capital development but also through adopting best practice for operation. These would be assisted by additional dredging and channel duplication to allow better logistic and movement of marine vessels through the harbour.</li> <li>• Industry strongly supports ongoing growth and development of the Port in the long-term, including capital dredging and reclamation.</li> <li>• Industry supports optimisation of existing infrastructure prior to significant investment in new facilities.</li> </ul>
<p><b>Workshop 3</b> “How to Make it Happen”</p>	<ul style="list-style-type: none"> <li>• There is a significant requirement for long-term capital dredging within the harbour to allow for Port expansion. Without capital dredging, the Port is unable to grow.</li> <li>• Locations for the placement of capital dredged material are limited due to the quality, amount and cost to transport dredged material. Disposal of capital dredged material in the marine environment is not allowed.</li> <li>• There are long-term capital upgrades to infrastructure required, such as roads within the MPA, however these have not been funded or committed to by the relevant State agencies.</li> </ul>

## 2.4 MEETINGS

Further to the workshops, DSD has separately met with a number of stakeholders who were either unable to attend the workshops or who requested follow up. DSD explained the background for both the Master Plan and the Infrastructure Study and sought to obtain feedback in relation to what the Master Plan and Infrastructure Study needed to consider in meeting stakeholders needs. These stakeholders include:

- Powerlink;
- Ergon Energy;
- Queensland Energy Resources (QER);
- Aurizon;
- Department of Natural Resources and Mines (DNRM); and
- DAF.

## 2.5 SUMMARY OF WORKSHOPS AND MEETINGS

The feedback and information gathered from the workshops and meetings with stakeholders has informed the identification of gaps within the infrastructure and supply chain networks for the MPA. It has also assisted in identifying future directions in relation to these gaps. Most apparent is the absence of clearly defined planning for the infrastructure and supply chain requirements associated with the marine components of the MPA. Additionally, there are some gaps in planning for land based infrastructure, particularly as it relates to the current extent of the proposed MPA boundary. This is discussed in further detail in the following chapter.

## 3 INFRASTRUCTURE AND SUPPLY CHAIN CORRIDORS

This chapter outlines the investigation into existing and potential infrastructure and supply chain requirements. It provides an overview of the background investigation findings (including the incorporation of feedback obtained from the workshops), with respect to the existing and potential infrastructure and supply chain corridors for the MPA, by industry type.

### 3.1 EXISTING PORT FACILITIES

#### 3.1.1 Wharves and Berths

The Priority Port of Gladstone currently has ten (10) main wharf centres owned by the State of Queensland, comprising 20 wharves as discussed in Table 3. The cargo and annual volume being shipped over that wharf is also shown. It should be noted that a wharf is the over water loading/unloading/mooring structure, whereas a berth or berth pocket is the water area where the ship lies adjacent to the wharf. A plan of the existing wharf centres and berths is provided in Appendix 4 Map 1.

**Table 3: Existing Wharf Centres**

WHARF CENTRE	WHARF DETAILS <sup>2</sup>	CURRENT USE	UTILISATION <sup>3</sup>
<b>Boyne</b>			
<b>Berth</b>	Owned by GPC and operated by BSL Berth depth 15.0m Berth is serviced by a gantry to load petroleum coke at approx 400 tonnes/hr Time from Fairway Buoy to berth is approx 1.5hrs Maximum vessel size - Panamax	Principal cargoes: - aluminium ingots; - petroleum coke; and - liquid pitch	659,562 tonnes (2014/15)
<b>South Trees</b>			
<b>Berth 1</b>	Owned and operated by QAL Berth depth 12.8m Berth is serviced by a gantry to load alumina at approx 1,200 tonnes/hr Time from Fairway Buoy to berth is approx 1.5hrs Maximum vessel size - Panamax	Primary cargoes: - alumina; and - caustic soda	3.711 million tonnes (2014/15)
<b>Berth 2</b>	Owned and operated by QAL Berth depth 12.8m Berth is serviced by two gantries with two clam shell grabs to discharge bauxite at approx 2,300 tonnes/hr Time from Fairway Buoy to berth is approx 1.5hrs	Primary cargo: - bauxite	9.658 million tonnes (2014/15)

<sup>2</sup> Gladstone Ports Corporation, Port of Gladstone Information Handbook November 2011, [http://www.gpcl.com.au/SiteAssets/Port%20Info%20Handbooks/Port\\_of\\_Gladstone\\_Information\\_Handbook\\_November\\_2011.pdf](http://www.gpcl.com.au/SiteAssets/Port%20Info%20Handbooks/Port_of_Gladstone_Information_Handbook_November_2011.pdf)

<sup>3</sup> Gladstone Ports Corporation, Annual Report 2014-15, [http://www.gpcl.com.au/SiteAssets/Annual%20Reports/GPC\\_Annual\\_Report\\_2014-15.pdf](http://www.gpcl.com.au/SiteAssets/Annual%20Reports/GPC_Annual_Report_2014-15.pdf)

WHARF CENTRE	WHARF DETAILS <sup>2</sup>	CURRENT USE	UTILISATION <sup>3</sup>
	Maximum vessel size - Panamax		
<b>Port Central (Barney Point)</b>			
<b>Berth</b>	Owned and operated by GPC Berth depth 15.0m Berth is serviced by a gantry to load bulk solids at 2,000 tonnes/hr Time from Fairway Buoy to berth is approx 1.75hrs Maximum vessel size - Panamax	Transitioning from coal to other products. Other products include calcite, woodchip, petroleum and magnetite (which currently uses Auckland Point wharf)	3.757 million tonnes of coal (2014/15)
<b>Port Central (Auckland Point)</b>			
<b>Berth 1</b>	Owned and operated by GPC Berth depth 11.3m Berth is serviced by two mobile gantries for loading calcite with a combined loading rate of 1,600 tonnes/hr. One gantry is used for magnesia at a rate of 400 tonnes/hr Time from Fairway Buoy to berth is approx 2hrs Maximum vessel size - Panamax	Auckland Point #1 wharf will shut to bulk loading by the end of 2016. Future use as cruise ship terminal and for general cargo	244,642 tonnes (2014/15)
<b>Berth 2</b>	Owned by GPC and operated by GrainCorp Berth depth is 11.3m Berth is serviced by a portable shiploader with a loading rate of 400 tonnes/hour and a travelling gantry with a capacity of 1,200 tonnes/hour Time from Fairway Buoy to berth is approx 2hrs Maximum vessel size - Panamax	Principal cargo: - grain	145,537 tonnes (2014/15)
<b>Berth 3</b>	Owned and operated by GPC Berth depth is 11.3m Berth is serviced by two petroleum cargo lines each with a capacity of approx 400 tonnes/hr Time from Fairway Buoy to berth is approx 2hrs Maximum vessel size - Panamax	Principal cargo: - petroleum products - LP gas; - caustic soda; and - general cargo	998,192 tonnes (2014/15)
<b>Berth 4</b>	Owned and operated by GPC	Multi user berth	425,440 tonnes (2014/15)

WHARF CENTRE	WHARF DETAILS <sup>2</sup>	CURRENT USE	UTILISATION <sup>3</sup>
	Berth depth is 11.4m Time from Fairway Buoy to berth is approx 2hrs Maximum vessel size - Panamax	Principal cargo: - general cargo; - containers; - gypsum; - magnetite; and - scrap metal	
<b>RG Tanna Coal Terminal (RGT)</b>			
<b>Berths 1, 2, 3, and 4</b>	Owned and operated by GPC Berth depth is 18.8m Berth is serviced by three gantries each with a loading rate of approx 6,000 tonnes/hr Time from Fairway Buoy to berth is approx 2.5hr Maximum vessel size - Capesize	Principal cargo: - coal	64.395 million tonnes (2014/15)
<b>Wiggins Island Coal Terminal (WICT)</b>			
<b>Berth 1</b>	Owned and operated by WICET Berth depth is 18.8m Currently has one berth used for coal export of up to 27Mtpa. Berth is serviced by a ship-loader with luffing boom with a loading rate of 8,000 tonnes/hr Time from Fairway Buoy to berth is approx 2.5hr Maximum vessel size - Capesize	Principal cargo: - coal	461,447 (2014/15)
<b>Fisherman's Landing</b>			
<b>Berth 1</b>	Owned and operated by Rio Tinto Alcan Yarwun (RTA Yarwun) Berth depth is 12.9m Berth is serviced by two travelling unloading gantry with a clam shell grab each with an average handling of 1,250 tonnes/hr Time from Fairway Buoy to berth is approx 2.75 hours Maximum vessel - Panamax	Principal cargo: - bauxite	11.093 million tonnes (2014/15) shared between berth 1 and 2
<b>Berth 2</b>	Owned by the State of Queensland (Department of State Development) and	Principal cargo: - alumina; and - caustic soda	11.093 million tonnes (2014/15) shared between berth 1 and 2

WHARF CENTRE	WHARF DETAILS <sup>2</sup>	CURRENT USE	UTILISATION <sup>3</sup>
	<p>leased to RTA Yarwun</p> <p>Berth depth is 12.9m</p> <p>Berth is serviced by:</p> <ul style="list-style-type: none"> <li>- a travelling gantry loader at 1,200 tonnes/hour</li> <li>- a 200m line for caustic soda at 1,000 tonnes/hour</li> </ul> <p>Time from Fairway Buoy to berth is approx 2.75 hours</p> <p>Maximum vessel size - Panamax</p>		
<b>Berth 4</b>	<p>Owned and operated by GPC</p> <p>Berth depth is 11.2m</p> <p>Berth is serviced by one pivotal radial arm shiploader</p> <p>Time from Fairway Buoy to berth is approx 2.75hrs</p> <p>Maximum vessel size - Handimax</p>	<p>Principal cargo:</p> <ul style="list-style-type: none"> <li>- cement clinker;</li> <li>- cement;</li> <li>- fly ash;</li> <li>- caustic soda; and</li> <li>- limestone</li> </ul>	1.697 million tonnes (2014/15)
<b>Berth 5</b>	<p>Owned and operated by GPC</p> <p>Berth depth is 11.2m</p> <p>Berth is serviced by two loading arms</p> <p>Time from Fairway Buoy to berth is approx 2.75hrs</p> <p>Maximum vessel size - Handimax</p>	<p>Principal cargo:</p> <ul style="list-style-type: none"> <li>- liquid ammonia</li> </ul>	392,648 tonnes (2014/15)
<b>Curtis Island</b>			
<b>QCLNG</b>	<p>Owned and operated by QCLNG</p> <p>Berth depth is 14m</p> <p>Berth is serviced by four loading arms</p> <p>Time from Fairway Buoy is approx. 3hrs</p> <p>Maximum vessel - Qmax</p>	<p>Principal cargo:</p> <ul style="list-style-type: none"> <li>- LNG</li> </ul>	1.611 million tonnes (2014/15)
<b>GLNG</b>	<p>Owned and operated by Santos GLNG (GLNG)</p> <p>Berth depth is 13m</p> <p>Berth is serviced by four loading arms with an average handling of 10,000m<sup>3</sup>/hr</p> <p>Time from Fairway Buoy is approx. 3hrs</p> <p>Maximum vessel - Qmax</p>	<p>Principal cargo:</p> <ul style="list-style-type: none"> <li>- LNG</li> </ul>	N/A
<b>APLNG</b>	<p>Owned and operated by APLNG</p>	<p>Principal cargo:</p> <ul style="list-style-type: none"> <li>- LNG</li> </ul>	N/A

WHARF CENTRE	WHARF DETAILS <sup>2</sup>	CURRENT USE	UTILISATION <sup>3</sup>
	Berth depth is 13m Berth is serviced by one LNG loading line, three LNG loading arms, two LPG unloading arms and one LNG vapour return loading arm Time from Fairway Buoy is approx. 3hrs Maximum vessel - Qmax		

### 3.1.2 Shipping Channels

The Priority Port of Gladstone has the following existing shipping channels and cuttings:

- Outer harbour channels (Gatcombe, Golding, Boyne and Wild Cattle cuttings);
- Auckland Channel Clinton Channel (servicing RGT and WICT);
- Clinton Bypass;
- Targinie Channel (servicing Fisherman’s Landing); and
- Jacobs Channel (servicing Curtis Island LNG berths).

Table 4 provides a summary of the existing channels, including their widths and depths. Appendix 4 Map 2 shows the existing channels.

**Table 4: Existing Channels**

CHANNEL	WIDTH (m)	DEPTH (m LAT)
<b>Outer Harbour</b>		
Gatcombe Channel	183	-16.1
Golding Cutting	183	-16.1
Boyne Cutting	183	-16.1
Wild Cattle Cutting	183	-16.1
<b>Inner Harbour</b>		
Auckland Channel	180	-15.8
Clinton Channel	180	-16.0
Clinton Bypass	200	-13.0
Targinnie Channel	120	-10.6
Jacobs Channel	200	-13.0

## 3.2 EXISTING INDUSTRIES

### 3.2.1 Coal

#### 3.2.1.1 Export Berths

Coal is currently exported through WICT and RGT. Coal is transported to the terminals via rail and stockpiled in designated areas. Conveyors and ship loaders are used at each of the berths to load the coal onto capesize vessels. Approximately 68.5 million tonnes of coal was exported from the Priority Port of Gladstone in 2014-15<sup>4</sup>.

WICT will be extended in two more stages in response to demand. Once fully commissioned as per current approvals, it will have a total coal export capacity of 84Mtpa. Each stage will require an additional balloon loop and conveyor.

RGT has a full capacity of 80Mtpa.

Under growth scenario three, it is assumed that both WICT and RGT are operating at full capacity resulting in a maximum throughput of 164Mtpa, over the master planning timeframe. Appendix 4 Map 3 shows the coal industry infrastructure.

#### 3.2.1.2 Coal Supply to Industry

Coal is currently supplied to four industrial users within the MPA, those being the Gladstone NRG Power Station, QAL Refinery, RTA Alumina Refinery and Cement Australia. Rail loops are located at each of the industrial users. Appendix 4 Map 3 shows the coal industry infrastructure.

### 3.2.2 LNG

Three LNG plants have been built on Curtis Island for the three gas proponents (QCLNG, GLNG and APLNG). Dedicated pipelines convey natural gas from the Bowen and Surat coal basins to the plants. Each of the proponents has one berth from which LNG is exported. Approximately 1.6 million tonnes of gas was exported from the Priority Port of Gladstone in 2014-15<sup>5</sup>. However, it should also be noted that all six approved LNG trains will be operational by October 2016 and this will result in a throughput of approximately 24Mtpa.

Under growth scenario three, it is assumed that the existing LNG plants are operating at full capacity resulting in a maximum throughput of 40Mtpa, over the master planning timeframe.

Appendix 4 Map 3 shows the LNG industry infrastructure and supply chains.

### 3.2.3 Petroleum Products

There are currently two bulk petroleum product terminals based in Gladstone. Fuel storage and import/distribution terminals are located at Auckland Point. Approximately 1.5 million tonnes of petroleum products was imported into the Priority Port of Gladstone in 2014/15<sup>6</sup>. This product was predominantly diesel to service the Central Queensland coal mines and agriculture. Given the high volumes of petroleum products being consumed and the waste product (transmission oil) produced, there are a number of existing industries within the MPA that either produce or use petroleum products. These include:

- Northern Oil Refinery;
- Transpacific;
- QER;
- NRG Power Station.

A summary of each of these companies is provided below. Appendix 4 Map 5 shows the petroleum industry infrastructure and supply chains.

#### 3.2.3.1 Northern Oil Refinery

Northern Oil Refinery is the owner and operator of the refinery located at Landing Road, Gladstone. The refinery receives waste oil from industries and mining operations across Queensland and processes this waste oil into base lubricant. All incoming waste oil and outgoing base lubricants produced is carried via road transport.

<sup>4</sup> Gladstone Ports Corporation Annual Report 2014/15, [http://gpcl.com.au/SiteAssets/Annual%20Reports/GPC\\_Annual\\_Report\\_2014-15.pdf](http://gpcl.com.au/SiteAssets/Annual%20Reports/GPC_Annual_Report_2014-15.pdf)

<sup>5</sup> ibid

<sup>6</sup> ibid

### 3.2.3.2 Transpacific Waste Management

Transpacific operates a liquid waste facility on a site adjoining Northern Oil Refinery. Transpacific uses only road transport. No plans for expansion are currently anticipated.

### 3.2.3.3 Queensland Energy Resources Oil Shale

QER has tenements over many oil shale deposits. Some of QER's tenements are geographically located within the Gladstone SDA boundary (refer Appendix 4 Map 5), however mining and petroleum activities are defined as excluded development under the Gladstone SDA Development Scheme. QER has successfully commissioned and operated a demonstration technology plant (New Fuels Development Centre) at its site for over two years. This demonstration plant has produced diesel, aviation fuel, naphtha and fuel oil for product testing. The demonstration plant, which is currently in care and maintenance, has capacity to service other industries within the MPA.

### 3.2.3.4 NRG Power Station

Whilst the NRG Power Station does not produce petroleum products, the power station is a large user of diesel for start up, which is currently delivered via road transport. There is the potential need for a pipeline from supply tanks at Auckland Point should larger quantities be required in the longer term.

## 3.2.4 Cement

Cement Australia has facilities located at both Landing Road and Fisherman's Landing. Cement Australia processes limestone, clay, silica sand and iron additives to produce cement, clinker and lime. Raw materials are transported via a 31km rail loop from the East End mine. The majority of the Cement Australia product is exported interstate by vessels. Minor volumes are exported by road and rail.

Locally, fly ash is delivered from the NRG Power Station via road transport. Excess fly ash from the power station is exported by vessel. Fisherman's Landing handles bulk cement clinker, cement and fly ash. Approximately 1.6 million tonnes of cement was exported through the Priority Port of Gladstone in 2014/15<sup>7</sup>.

Under growth scenario three, it is assumed that there will be no significant growth of the cement industry in the MPA over the master planning timeframe. A plan of the cement industry infrastructure and supply chains is provided in Appendix 4 Map 6.

## 3.2.5 Alumina and Aluminium

There are two alumina refineries within the MPA, those being QAL and RTA Yarwun. There is also one aluminium smelter, that being operated by BSL.

Both of the alumina refineries ship bauxite from Weipa. During 2014/15, 17.2 million tonnes of bauxite was imported.<sup>8</sup>

Alumina from QAL is transported via conveyor to either South Trees Wharf for export or to BSL for smelting to produce aluminium. Alumina from RTA is transported via conveyor to the Fisherman's Landing berth for export. Approximately 5.6 million tonnes of alumina was exported from the Priority Port of Gladstone in 2014/15.

Existing production at each of the plants is as follows:

- RTA Yarwun plant: 3.4Mtpa<sup>9</sup>;
- QAL: 3.95Mtpa<sup>10</sup>; and
- BSL: 570,000 tonnes per annum (570 ktpa)<sup>11</sup>

Appendix 4 Map 7 shows the alumina and aluminium industry infrastructure and supply chains.

## 3.2.6 Chemical and Explosives

Orica Australia Pty Ltd (Orica) operates a chemical production plant at Reid Road Yarwun, raw import facilities at Fisherman's Landing and storage tanks at Auckland Point. The Reid Road facility includes three nitric acid plants, two ammonium nitrate plants, an ammonium nitrate emulsion phase plant, a polystyrene plant and a sodium cyanide plant.

<sup>7</sup> Gladstone Ports Corporation Annual Report 2014/15, [http://gpcl.com.au/SiteAssets/Annual%20Reports/GPC\\_Annual\\_Report\\_2014-15.pdf](http://gpcl.com.au/SiteAssets/Annual%20Reports/GPC_Annual_Report_2014-15.pdf)

<sup>8</sup> ibid

<sup>9</sup> RTA Yarwun, [www.riotinto.com/aluminium/yarwun-4735.aspx](http://www.riotinto.com/aluminium/yarwun-4735.aspx)

<sup>10</sup> QAL, [www.qal.com.au/who-we-are/our-history.aspx](http://www.qal.com.au/who-we-are/our-history.aspx)

<sup>11</sup> BSL, [www.boynesmelters.com.au](http://www.boynesmelters.com.au)

Two pipelines are located between the Reid Road plant and Fisherman’s Landing Wharf, which transport caustic soda and ammonia. Orica currently has a trade waste disposal pipeline connecting its plant to Council’s trade waste facility. Material is currently stored at the explosives magazine at Bajool and is exported via Port Alma (outside the MPA). Bulk sulphuric acid is imported at Auckland Point, stored at Auckland Point and transported via truck to site. A plan of the chemicals and explosives industry infrastructure and supply chains is provided in Appendix 4 Map 8.

### 3.2.7 Agriculture

Grain is exported through Auckland Point Wharf #2. Graincorp operates grain silos at Auckland Point, which has a vertical capacity of 71,000 tonnes. In addition to the silos, the horizontal sheds have a capacity of 15,000 tonnes<sup>12</sup>. The Gladstone Graincorp facility can handle wheat, barley, sorghum, legumes and oilseeds, as well as the export of magnesia. Logs and woodchips are also stored and processed through the Port. While rail has been used in the past to bring these products to the wharf, the use of rail has decreased in recent years and agricultural product is now predominantly transported via road.

## 3.3 EXISTING INFRASTRUCTURE

### 3.3.1 Port Infrastructure

Refer to Section 3.1.

### 3.3.2 Road infrastructure

The existing road network is shown on Appendix 4 Map 9.

#### 3.3.2.1 Major Roads

The major roads within the MPA are the Bruce Highway, Gladstone-Mt Larcom Road, Dawson Highway, Gladstone-Benaraby Road, Calliope River Road, Hanson Road, Landing Road, Don Young Drive, Red Rover Road and Port Access Road. Each of these roads provide vehicular access to various parts of the MPA, including Port facilities.

#### 3.3.2.2 Port Access Road

The Port Access Road is the main heavy freight route to Port Central (Auckland Point and Barney Point). It is a two lane road and includes a bridge over the Auckland Point balloon loop and a small creek. The Port Access Road provides a direct link to the Dawson Highway, Gladstone-Mt Larcom Road/Port Curtis Way/Hanson Road, and Gladstone-Benaraby Road/Phillips Street/Glenlyon Road which connect the Bruce Highway to the port. These major roads are either State-controlled roads under the jurisdiction of TMR or roads controlled by GRC.

#### 3.3.2.3 Local Road Network

The publicly accessible local road network within the MPA is controlled by the GRC. There are other privately controlled roads throughout the MPA, including some publicly accessible roads controlled by the GPC.

### 3.3.3 Rail Infrastructure

The existing rail network is shown in Appendix 4 Map 10. The Blackwater and Moura rail systems are the major pieces of rail infrastructure within the MPA and are both owned and operated by Aurizon. Recently, the following rail infrastructure has also been commissioned within these systems:

- Blackwater duplications;
- Kabra and Aldoga holding yards; and
- WICT spur and balloon loops.

The Aurizon *Network Development Plan 2015* states that the current combined capacity of the two rail systems is 120Mtpa and “the Blackwater and Moura systems provide sufficient capacity to support contracted capacity”<sup>13</sup>.

Queensland Rail continue to own rail lines which service Fisherman’s Landing, RGT, Auckland Point and QAL.

<sup>12</sup> Graincorp, GrainCorp Gladstone factsheet, [www.graincorp.com.au](http://www.graincorp.com.au)

<sup>13</sup> Aurizon, *Network Development Plan 2015*,

<https://www.aurizon.com.au/~media/aurizon/files/what%20we%20do/network/planning%20and%20development/ndp/2015%20network%20development%20plan.ashx>

### 3.3.3.1 North Coast Line

The North Coast Line (NCL) is the principal regional freight and passenger line within the Queensland Rail network, stretching along the majority of the east coast of Queensland. The existing NCL north from Gladstone to Rockhampton has coal and non-coal coal traffic including rail freight and passenger services. With slower coal and general freight trains sharing the line with faster tilt train passenger services, this section of NCL is extremely busy.

North of Callemondah, the NCL crosses the Calliope River on two separate bridges and then runs as a parallel track alongside Reid Road from the Calliope River to the Mount Miller Container Yard. Coal trains from Blackwater currently use the NCL to service the RGT, NRG Gladstone Power Station, Barney Point Coal Terminal and other destinations in Gladstone. Trains destined for RGT and NRG Gladstone Power Station exit from the NCL at Callemondah and proceed through the yard and onto the power station loop or the balloon loops at RGT.

The *Aurizon Network Development Plan 2015* states that “The North Coast Line is the major constraint. The NCL is constrained due to the mix of operational traffic speeds between Callemondah and Rocklands. Triplication of this corridor would relieve this constraint.” The NCL between Callemondah and Rocklands has a capacity of between 0-5Mtpa<sup>14</sup>.

### 3.3.3.2 Moura Line

The Moura system services the Priority Port of Gladstone. Trains destined for Barney Point and Auckland Point use the Moura Short Line (MSL). The Moura system has a capacity of between 20-30Mtpa between Stowe and Callemondah (which feeds into the MPA from the south) and between 0-5Mtpa between Callemondah and Mt Miller (which provides a link between Fishermans Landing and RGT)<sup>15</sup>.

### 3.3.3.3 Blackwater Line

The Blackwater system services the Priority Port of Gladstone. The Blackwater system has a capacity of more than 60Mtpa between Blackwater and Rocklands. From Rocklands to the Priority Port of Gladstone, access is via the NCL, which has capacity issues as discussed above<sup>16</sup>.

### 3.3.3.4 Callemondah Rail Yards

The Callemondah Rail Yard is the holding yard for trains accessing the NRG Gladstone Power Station loop and the balloon loops at RGT. Other facilities at Callemondah include locomotive and wagon maintenance and locomotive provisioning.

## 3.3.4 Electricity

The Priority Port of Gladstone and various industries within the MPA are directly connected to the Ergon Energy and Powerlink high voltage networks.

NRG Gladstone Power Station is located within the MPA and produces electricity, which is then connected to the high voltage transmission grid. The power station utilises approximately 4Mtpa of coal which is transported to the site via rail<sup>17</sup>. Coal is stockpiled after unloading and the coal stockpiled on site is sufficient to operate the station for several weeks.

When required, coal is reclaimed via two stacker reclaimers at a rate of 800 tonnes/hr. The station requires 245 million litres of cooling water every hour, which is sourced from Auckland Inlet. The cooling water is then discharged into the Calliope River. Some fly ash is recycled from the power station and used in cement products.<sup>18</sup> The remaining fly ash is disposed of in ash placement areas within the MPA.

In addition to the conventional coal powered generation at NRG, the three LNG plants on Curtis Island each include co-generation plants producing electricity for their respective plants.

## 3.3.5 Water and Sewerage

GRC is responsible for reticulated sewerage within the MPA. Gladstone Area Water Board (GAWB) is responsible for supplying bulk water (both raw and treated) throughout the MPA. GRC is also a water authority and, in many cases, is the responsible entity for providing treated water supplies and mains within the MPA. Each of the wharf centres are supplied with reticulated treated water, with the exception of Fisherman’s Landing, which is supplied with only raw water. There

<sup>14</sup> Aurizon, *Network Development Plan 2015*,

<https://www.aurizon.com.au/~media/aurizon/files/what%20we%20do/network/planning%20and%20development/ndp/2015%20network%20development%20plan.ashx>

<sup>15</sup> *ibid*

<sup>16</sup> *ibid*

<sup>17</sup> NRG Gladstone Power Station, [http://www.nrggos.com.au/page/About\\_Us/The\\_Process/](http://www.nrggos.com.au/page/About_Us/The_Process/)

<sup>18</sup> *ibid*

are no plans to connect treated water to this location. Any such connections would need to be funded by industry. The fuel facilities at Port Central maintains its own water storage for fire fighting purposes (as per the relevant Australian Standard).

As a joint project, GAWB and GRC constructed three 14km long pipelines (water, sewerage and spare) from the mainland to Curtis Island to meet the needs of the LNG plants on Curtis Island. This was designed to remove the need to discharge waste into Gladstone Harbour. A plan of the pipelines is provided in Appendix 4 Map 11.

### **3.3.6 Waste Management**

GRC owns and manages a trade waste facility within the MPA. The sole business discharging into this facility is Orica, which may only discharge waste into the facility which has already been treated to a standard that allows for discharge into the harbour. The pipeline infrastructure connecting the facility is aging and in need of replacement and GRC intends to decommission this facility.

GRC owns and manages the Gladstone Sewerage Treatment Plant, the Yarwun Sewerage Treatment Plant and the presently decommissioned Aldoga Sewerage Treatment Plant.

Other waste management facilities within the MPA are privately owned and associated with major industry development. Residue storage areas are discussed in Section 3.2.5.

### **3.3.7 Gas**

The Jemena Pipeline supplies domestic market gas to the Gladstone region and some industries within the MPA.

### **3.3.8 Petroleum pipeline**

The petroleum product pipeline between QER's New Fuels Development Centre and Fisherman's Landing wharf is not currently in operation, however may be recommissioned in the future.

## 4 POTENTIAL INDUSTRY GROWTH AND SUPPORTING INFRASTRUCTURE AND SUPPLY CHAINS

### 4.1 POTENTIAL INDUSTRY GROWTH / PROJECTS

The continued growth of industrial development in the MPA, along with growth in exports and imports associated with those industries and others in surrounding areas, increases the need to expand the Priority Port of Gladstone. This will ensure the Port can accommodate the increased imports and exports that industries will be expecting the Priority Port of Gladstone to handle. This chapter examines the potential industries and growth in existing industries that the Port and associated supply chain infrastructure will need to have, to enable them to handle that level of movement through the Port.

#### 4.1.1 Coal

Existing approved capacity (156Mtpa) will satisfy throughput requirements under growth scenario three for the master planning timeframe. However, it is recognised that there may be further expansion of coal industry infrastructure within the MPA beyond the master planning timeframe, which are:

- An additional berth can be developed at RGT to allow five berths and four ship-loaders to operate;
- WICT: Stage 4 (not currently approved) would increase this terminal's total export capacity to 120Mtpa. The additional balloon loop required for Stage 4 is outside the approved project footprint; and
- New coal terminal: Existing planning provisions allow for a potential new coal terminal to be developed within the MPA.

The coal supply chain and infrastructure is shown in Appendix 4 Map 3.

#### 4.1.2 LNG

Under growth scenario three, an additional LNG facility would be needed to provide for the maximum throughput of 50Mtpa, over the master planning timeframe.

An additional two plants have been proposed within the MPA, namely the Gladstone LNG plant on the mainland and the Arrow plant on Curtis Island.

An additional berth has been planned for each of the three existing LNG proponents, as well as another two berths for Arrow (one of which is shared with GLNG). The Evidence Base Report states: *"The Arrow LNG project is not expected to go ahead in its current format as a greenfield development but could be developed as supply of gas or as part of an expansion of one or more of the existing facilities"*.<sup>19</sup>

If Arrow's plant on Curtis Island does proceed, it will require a new gas pipeline from the mainland. The pipeline could be co-located in a tunnel across the harbour that would take other services to the island from the mainland, such as electricity.

The potential LNG industry and infrastructure supply chains are shown on Appendix 4 Map 4.

#### 4.1.3 Petroleum

Under growth scenario three, import and export of petroleum products would continue to increase over the master planning timeframe. GPC anticipates an increased requirement for diesel over the next 5-10 years based on a number of coal mining, mineral and energy developments investigating expansion or new developments within the Central Queensland region. As a result, there is considerable interest in establishing a new petroleum terminal at Port Central, due to the opportunity to maximise use of existing facilities. In the event that the Galilee Basin coal projects proceed, there is the potential for a significant increase in petroleum imports into the Priority Port of Gladstone to meet demand.

The potential petroleum projects described below are shown on Appendix 4 Map 5.

##### 4.1.3.1 Biofuels

Southern Oil Refining has announced it plans to build the Northern Oil Advanced Biofuels Pilot Plant with the potential to create 12 regional primary processing plants to provide the liquid feed stock for the Gladstone facility. If proven viable,

<sup>19</sup> AECOM, 2016, *Evidence Base Report for the Proposed Gladstone Port Master Planned Area*

the pilot plant is to be expanded to a commercial-scale refinery producing 200 million litres of advanced biofuel annually including kerosene and diesel products that will be suitable for military, marine and aviation use. The plant would transport biomass crude via road from the 12 regional primary processing plants at centres across Queensland. Export product would be via road tankers and vessels. Any export to interstate or overseas markets through the Port would require a new pipeline, which would be directed to a yet-to-be-determined berth.

#### **4.1.3.2 Casper Energy**

Casper Energy is considering development of an oil refinery and terminal within the MPA. The project would involve refining crude oil into petroleum products including diesel for the Central Queensland market. Diesel and other fuels produced at the plant would be exported via rail, ship and truck. The plant could produce up to 63,000 barrels of fuel a day when fully operational. If the refinery proceeds, it is likely that berths would need to be constructed at Tide Island should LR2 carriers be used, with pipeline connections to the mainland for import crude and export product. If LR1 carriers are used, Fisherman's Landing could be suitable for berths.

#### **4.1.3.3 QER**

Based on the outcomes of the existing demonstration plant (see Section 3.2.3.3), QER has an active Environmental Impact Statement (EIS) process for an initial commercial scale plant. Additional future projects are also anticipated and it is likely that these will require product pipeline connections to Port facilities. The location of berths will depend on the type of vessel used. It is anticipated that LR1 vessels would use Fisherman's Landing and LR2 vessels would use Tide Island.

The mining areas depicted in Appendix 4 Map 5 are intended to show the areas where oil shale resource is known to occur and is available for processing. The actual mine footprint, at any point in time, will be substantially smaller than the mine areas depicted in Map 5. The mine pit will be progressively backfilled and rehabilitated (for example, restored for future industrial use) as development progresses.

Waterfront access, gas, electricity and water infrastructure are expected to be required for future oil shale processing facilities.

#### **4.1.4 Alumina and Aluminium**

Under growth scenario three, the throughput of alumina/aluminium exported through the Port increases to a maximum of 10Mtpa over the master planning timeframe.

RTA Yarwun has developed two stages and has approval for a third stage. Recent stage two developments has more than doubled production at the Yarwun refinery to 3.4Mtpa and RTA Yarwun plans to extend existing residue storage facilities (red mud dams) to cater for potential output.

The QAL refinery has a current annual production of 3.95Mtpa and the associated red mud dam has capacity for the next 40 years.

A plan showing the alumina/aluminium industry infrastructure and supply chains is provided in Appendix 4 Map 7.

#### **4.1.5 Agriculture**

Under growth scenario three, export of grain from the Port would increase over the master planning timeframe. In particular, wheat, chick peas and sorghum are expected to increase in export tonnages.

There is potential for other agricultural products, such as containerised agricultural products, horticulture, oil seed, cotton, meat, and live cattle to be exported through the Port. The Queensland Government is currently investigating supply chain requirements both within and outside of the MPA to determine the viability of future agricultural exports via the Priority Port of Gladstone.

#### **4.1.6 Nickel**

The MPA provides for large-scale industrial activities such as refineries. Growth scenario three envisages industries, such as a nickel refinery, to be developed within the MPA and new commodities, such as nickel, being traded through the Port.

Gladstone Pacific Nickel Limited is yet to proceed with its proposal for a nickel refinery within the MPA. The proposed facility involves a high pressure acid-leach plant with a projected annual production of 63,000 tonnes of nickel and 5,000 tonnes of cobalt (Stage 1). The project involves importing nickel ore and sulphur through a new berth at WICT with finished product either containerised and transported by rail to Brisbane or exported through Fisherman's Landing.

#### 4.1.7 Steel

Growth scenario three envisages industries, such as a steel plant, to be developed within the MPA, and new commodities associated with those facilities being traded through the Port.

The Euroa Steel Plant (formerly known as the Gladstone Steel Project and Boulder Steel), is a new industry proposed to be located at Aldoga within the MPA. The plant would produce steel in bloom and billet form for export internationally. The EIS process for the proposed project has commenced.

Should the project proceed, coal would be imported by rail to the Aldoga site via a balloon loop from the Blackwater rail line. Gas supply would need to be provided by the Jemena pipeline. Red mud from residue storage facilities within the MPA may also be used as an input to the plant. Transportation of the red mud from the RTA facility to the plant would likely be via pipeline. Similarly red mud from the QAL facility could be transported via a small dedicated ship or via pipeline.

Export of billets and slabs would likely be through Fisherman's Landing. Import of iron ore would also likely be through Fisherman's Landing (if panamax vessels are used), or WICT Berths #4 and #5 if the vessels are capesize. If WICT is used, a new off-road haulage route along Port Curtis Way would be required, along with a conveyor and storage area.

Potential supply chains and infrastructure requirements for a steel plant within the MPA is shown in Appendix 4 Map 12.

## 4.2 POTENTIAL EXPANSION OF PORT INFRASTRUCTURE

Dredging, reclamation and provision of additional berths emerged as a clear issue from the workshops, which has the potential to impact on the Port's ability to accommodate the growth and expansion of industry and to meet the capacity envisaged by the adopted growth scenario three. Documentation provided by GPC reveals several options for future dredging, reclamation and additional berths. Whilst it is recognised that these plans are not yet finalised, it is crucial that notional plans for dredging, reclamation and additional berths are included in the Master Plan, to provide confidence to industry and regulators and to ensure that this can be more effectively planned for in the future. This includes recognition of existing approvals for maintenance dredged material to be placed at sea at the identified East Banks sea disposal site as shown in Appendix 4 Map 13.

Clearly if the Priority Port of Gladstone itself cannot be maintained or developed to a standard capable of handling the necessary infrastructure and supply chain requirements, then the capacity for industries to grow, or new industries to emerge, will be limited. Based on the information gathered to date, this is one of the most critical components influencing Port expansion and supporting growth of existing and emerging industries over the life of the Master Plan.

Large ship movements in and out of the Priority Port of Gladstone will be limited should the existing channels and berths not be widened and deepened respectively.

The operation of capesize vessels in the main shipping channel is the primary control on the capacity of the Priority Port of Gladstone to grow in line with the potential for industrial growth. Capesize vessels at maximum draft are limited in the sailing windows available due to the requirement to operate at the top of the tide. Currently, deep draft capesize vessels are associated with the export of coal and are all associated with departing vessels. Modelling undertaken by GPC indicates that the growth of the coal trade to 130Mtpa would potentially trigger the demand for channel duplication.

The introduction of deep drafts capesize vessels for the import of products, (as would be associated with iron ore, nickel ore and crude oil), would result in conflicting demand for the shipping channels as these vessels also require tidal assistance to navigate through the harbour. As such, a full duplication of the outer harbour channels would be required for the import of products in deep draft capesize vessels.

### 4.2.1 Capital Dredging

Capital dredging is defined under the Ports Act as:

*(a) Means dredging carried out for the purpose of—*

*(i) Creating or enlarging a channel, basin, port, berth or other similar thing; or*

*(ii) Removing material that is unsuitable as a foundation for a port facility; or*

*(iii) Creating a trench for a pipe, cable or tube; or*

*(iv) An activity incidental to an activity mentioned in subparagraph (i) to (iii); but*

*(b) Does not include dredging carried out for the purpose of—*

- (i) Maintaining a channel, basin, port, berth or other similar thing for its intended use; or
- (ii) Protecting human life or property.

The Independent Review of the Port of Gladstone Report on Findings defines capital dredging as being: “often associated with major new developments. It involves dredging of new areas and/or depths (e.g. new channels, berth pockets, approach and departure paths). Capital dredging is also undertaken to deepen and/or widen existing channels and berth pockets to enable access for larger vessels, or for engineering purposes such as to create trenches for underwater pipelines and ancillary infrastructure”<sup>20</sup>.

The Reef 2050 and Ports Act restrict capital dredging works within ports along the Great Barrier Reef World Heritage Area. The Ports Act allows approved capital dredging to be undertaken at the Priority Port of Gladstone however “at sea” disposal is prohibited.

There are several different vessel types that access the berths and Port facilities at Gladstone. The larger of these vessels, being capesize and panamax, are used for coal export. The majority of the other imports and exports through the Port use panamax, handysize and coastal trader sized vessels.

Currently access and movements of capesize vessels are limited within the Port due to the channel depths, tidal influences and passing areas, as their draught can be >18.5m. The transit for the larger vessels from a berth through the harbour to the Fairway Buoy can be up to 2.5 hours.

With the exception of vessels using Targinie Channel, panamax and LNG carriers do not require tidal assistance to account for their draft requirements.

With passing only permitted using accepted bypass channels, a bypass has been established for the Clinton Channel. Gatcombe and Golding Channels are also approved bypass channels, both of which are naturally occurring. These bypass channels allow shallow draft vessels to safely pass.



**Figure 3: Example of a Capesize Vessel**

<sup>20</sup> Independent Review of the Port of Gladstone Report on Findings, 2013, Commonwealth of Australia



**Figure 4: Example of a Panamax Vessel**

The existing Priority Port of Gladstone is primarily a single channel operation of approximately 40km in length from the Fairway Buoy to Curtis Island.

Jacobs Channel is able to be accessed at all times to service the LNG industry due to the shallower draught of the LNG vessels. In the outer harbour, follow-on times of approximately 1 hour for capesize vessels and 30 minutes for panamax vessels are required to ensure safe distance arrangements so that vessels can respond to any incident with a preceding vessel<sup>21</sup>.

At present, there are no capesize vessels used to import materials into the Priority Port of Gladstone. However, in recent times three potential projects have been proposed, which if developed, would require the use of capesize vessels for import. These are:

- Casper Energy (see Section 4.1.3.2);
- Nickel refinery (see Section 4.1.6); and
- Euroa Steel (see Section 4.1.7).

Currently, capesize vessels depart and follow one after the other (2-3 vessels per tide), however imports using the same sized vessels would create further limitations. This would require import vessels to be reliant on the tidal system as well, which would be in direct conflict with the capesize vessels used for export. Without channel improvements, the imports using capesize vessels would result in inefficiencies in Port operations.

GPC's modelling indicates that all existing trade can be handled with the existing channel configuration. The coal industry can continue to grow exports up to 75Mtpa at RGT and 54Mtpa at WICT, without the need for outer harbour channel improvements. However, any additional increase in export tonnage and/or imports using capesize vessels would require additional capital dredging to deepen, widen and duplicate channels. Under growth scenario three, WICT and RGT exports are expected to grow to 84Mtpa and 80Mtpa respectively, which would result in the requirement for the development of channels within the outer harbour.

Since the commencement of operations at WICT, it has been identified that there is also a need to deepen the existing Clinton Bypass channel to allow the safe passage of capesize vessels passing the RGT. This would involve a deepening from 12m to 16m and would allow capesize vessels to use the channel without impacting upon vessels berthed at the RGT.

<sup>21</sup> Department of Transport and Main Roads, Port Procedures and Information for Shipping – Port of Gladstone

GPC is also seeking to duplicate the existing Gatcombe and Golding channels, which when combined, equate to around 40% of the overall outer harbour channel length. The duplicate channel is proposed to be developed adjacent to the existing channel. The channel duplication would be completed in two stages, the first down to a depth of 13.5m and the second down to a depth of 16m. Dredging to 13.5m would generate 6.3Mm<sup>3</sup> of material for disposal and dredging to a depth of 16m would generate a total of 12.6Mm<sup>3</sup> of material for disposal.

The duplication of the channels would allow the passing of light draft capesize or deep draft panamax vessels. Under growth scenario three, further channel development would be required to allow sufficient access to the Western Basin, including the existing Targinie and Jacobs Channels.

If the ultimate development is undertaken as per growth scenario three, including the channel duplication and Western Basin dredging, the dredged material disposal requirements would be in the order of 82Mm<sup>3</sup> (i.e. 68Mm<sup>3</sup> in-situ volume with a bulking factor of 1.2). As can be noted in Section 4.2.3 Reclamation, the best application for the capital dredged material is reclamation because it is unsuitable for any other beneficial reuse.

Mapping indicating approved and potential dredging locations can be found in Appendix 4 Map 13.

#### 4.2.2 Maintenance Dredging

Maintenance dredging is defined as “*dredging... undertaken to ensure existing defined areas are maintained at their designed operational dimensions. It is often undertaken at regular intervals in response to ongoing sedimentation. Maintenance dredging allows ports to remain operational and plays a critical part in overall environmental protection by facilitating the safe and efficient movement of vessels*”<sup>22</sup>.

Within the Priority Port of Gladstone, monitoring suggests that maintenance dredging and associated sea disposal does not result in changes to turbidity that would result in harm to the environment. Higher turbidity levels have been recorded outside of dredging campaigns due to spring tides combined with wind and wave action<sup>23</sup>. The current average maintenance dredging volume for the Priority Port of Gladstone is around 190,000m<sup>3</sup> per annum. Other Queensland ports have higher requirements for maintenance dredging by comparison (e.g. Townsville and Cairns ports undertake maintenance dredging of approximately 400,000m<sup>3</sup> per annum on average).

Of the maintenance dredging currently being undertaken in the MPA, approximately 60% is undertaken in the outer harbour and 40% in the inner harbour. Maintenance dredging is required for both shipping channels and berth pockets. Should the proposed channel duplication and other identified capital dredging projects proceed, it is anticipated that the maintenance dredging volume would increase. Any ongoing maintenance dredging would be undertaken under existing State and Commonwealth approval processes, which includes the disposal of maintenance dredge material at the East Banks sea disposal site (refer to Appendix 4 Map 13). A State-wide Queensland maintenance dredging strategy is currently being prepared by the Department of Transport and Main Roads.

#### 4.2.3 Reclamation

Due to prohibitions under the Ports Act, capital dredged material will need to be beneficially reused or placed onshore. Section 36 of the Ports Act offers three examples of how dredged material may be beneficially reused including land reclamation, beach nourishment or for environmental restoration purposes, such as creating or restoring wetlands or nesting islands. For the Priority Port of Gladstone, beneficial reuse of dredged material is limited to the purpose of reclamation due to the quality and type of the material (high clay contents).

The existing Fisherman’s Landing northern expansion area had a capacity of 40Mm<sup>3</sup> for material from the LNG projects. There is still approximately 23Mm<sup>3</sup> capacity in that area. The remaining capacity has been committed for the dredged material from the future channels in the Western Basin. GPC has been working with agencies to identify other potential reclamation areas associated with the long-term dredging requirements.

There are several potential new areas identified for reclamation (refer to Appendix 4 Map 13). These include:

- **Area 1:** Further extension of the Fisherman's Landing. The foreshore mangroves would be retained. This would provide for an additional 50Mm<sup>3</sup> of dredged material disposal;
- **Area 2:** Reclamation could be used to land back the potential Hamilton Point wharf utilising quarry material from Hamilton Point;
- **Area 3:** Reclamation could provide for placement of approximately 24Mm<sup>3</sup> of dredged material;

<sup>22</sup> Independent Review of the Port of Gladstone Report on Findings, 2013, Commonwealth of Australia

<sup>23</sup> GPC, 2015, Gladstone Maintenance Dredging Report 2014

- **Area 4:** An area associated with WICT could be used for reclamation providing for approximately 6Mm<sup>3</sup> of dredged material;
- **Area 5:** An area at Auckland Point could be utilised for reclamation;
- **Area 6:** Reclamation could occur between QAL and Barney Point/South Gladstone. It would comprise hills of up to 35m in height with the potential for 1-2 berths. The primary function would be to provide a visual and physical buffer between residential areas and QAL. It would enhance the lift of the QAL product and help with some of their discharges of caustic and other materials over time. Area 6 has the capacity for approximately 18Mm<sup>3</sup> of dredged material; and
- **Area 7:** There is the potential for reclamation to be undertaken on West Bank in the outer harbour. This reclamation would create an island with a gutter separating it from the mainland and in doing so, maintain the existing coastal environment. The island would be in close proximity to the channel and would be used for land backed Port facilities developed on the island. This could utilise approximately 46Mm<sup>3</sup> of dredged material.

#### 4.2.4 Berths and Wharf Centres

A summary of the potential expansion of Port facilities is provided in Table 5 below. Each of the berths and wharfs are shown in Appendix 4 Map 1.

**Table 5: Summary of the Potential Expansion of the Wharf Centres**

WHARF CENTRE	POTENTIAL EXPANSION
<b>Boyne Wharf</b>	Very limited potential for growth at Boyne Wharf, as the land immediately adjacent to the wharf is owned by BSL.
<b>South Trees</b>	No potential for growth as the berth is already at capacity.
<b>Port Central (Barney Point)</b>	Refer discussion below for Port Central (Auckland Point).
<b>Port Central (Auckland Point)</b>	GPC has had enquiries with respect to bringing fuel in on larger vessels. Fuel is currently brought in via a Coastal Trader vessel. With the closure of refineries elsewhere, there is interest to import fuel in using LR1 vessels (approximately 80,000 tonne of diesel) to service the coal industry.  An additional three wharves could be provided for panamax vessels between Auckland Point #4 wharf and Barney Point for clean cargo (containers, general cargo, break bulk and bulk products, including bulk petroleum, chemicals, etc).
<b>RGT</b>	There is potential for expansion of RGT. A berth is shown to the north, however this berth becomes isolated as the existing ship loaders cannot access it.  Expansion downstream would provide four ship loaders on five berths instead of the current three ship loaders on four berths.
<b>WICT</b>	WICT has an additional three berths proposed and approved, which will be built in stages in response to demand. This would result in a capability of 84Mtpa.  Two berths upstream were allocated to Gladstone Nickel (importing ore using capesize vessels). Given the nickel plant is unlikely to proceed, these berths may be reallocated to Euroa Steel or other industries using capesize vessels for import.  Wiggins Island is the limit within the harbour for reasonable dredging to provide access for capesize vessels.
<b>Fisherman's Landing</b>	There is capacity for a small berth between Wharves #2 and #4. Six additional berths (#6-#11) are proposed to the north of the existing development. These could potentially be used for: <ul style="list-style-type: none"> <li>• Bulk liquids, and/or</li> <li>• Euroa Steel for the import of ore (two berths) and access to a third berth for the export of the steel, and/or</li> <li>• A nickel project (two berths for the import, a third berth for sulphur). Nickel export would use containers.</li> </ul>

WHARF CENTRE	POTENTIAL EXPANSION
<b>Curtis Island</b>	Allowance has been made for a second berth for each of the three existing LNG plants should they be needed. There is potential for an additional wharf to be shared between Arrow (proposed plant) and GLNG (existing plant), as well as another solely for the proposed Arrow LNG plant.
<b>Hamilton Point</b>	Hamilton Point is located at the southern end of Curtis Island and has been identified as having the potential to be developed for Port facilities. If developed, Hamilton Point would be suitable as a general cargo wharf and would have capacity for multiple capesize vessels. Development of this facility would require a road and rail bridge from the mainland (refer to Section 4.3.1.3).
<b>Tide Island</b>	Tide Island has been identified as having potential for development for Port facilities due to natural deep water. Potential users of such facilities would be QER (export of crude or refined petroleum product) or Casper Energy (import of crude oil, export of refined petroleum product). Port facilities in this location would not be able to be land backed. It is likely that tankage at Hamilton Point would be linked to Tide Island via a submarine pipeline.
<b>West Bank</b>	West Bank has been identified as a potential reclamation area. In the long-term, the area could be developed into a new port facility.

## 4.3 POTENTIAL ADDITIONAL SUPPLY CHAIN AND INFRASTRUCTURE

### 4.3.1 Road Infrastructure

A plan showing potential road infrastructure is included in Appendix 4 Map 9. Three new road links are suggested to ensure the Port can service both industries within the MPA and sub-regionally, with strong dedicated freight routes that not only enhance Port accessibility, but that can also carry over-size and over-mass loads that are destined for central Queensland coal and gas fields.

#### 4.3.1.1 Port Access Road

Stage 1 of the Port Access Road currently connects Auckland Point and Barney Point with Glenlyon Road. The long-term need for extension of the Port Access Road (Stages 2 and 3) has been investigated by TMR, as a new alignment has the potential to improve transport efficiency and road safety within Gladstone by alleviating the impacts of heavy vehicles and hazardous goods from Hanson Road (refer to Appendix 4 Map 9).

#### 4.3.1.2 Gladstone SDA Link to the Bruce Highway

A new road connection between Gladstone - Mt Larcom Road and the Bruce Highway could provide advantages for heavy freight movements, including over-size and over-mass vehicles, through the MPA (refer to Appendix 4 Map 9). At present, these loads travel along Calliope River Road through the township of Yarwun. There is increasing residential development along Calliope River Road and therefore, an alternative route is required. In addition to providing a new east-west link from the Bruce Highway to the Priority Port of Gladstone, the new road opens up potential development fronts through the MPA.

#### 4.3.1.3 Curtis Island Road and Rail Bridge

A road and rail bridge to Curtis Island from Friend Point is a potential new piece of infrastructure to support the development of port facilities at Hamilton Point. This potential road and rail link has been identified in the *GPC 50 Year Strategic Plan*. However, existing planning instruments do not identify a potential road/rail link from the mainland to Curtis Island. A plan showing the potential road and rail bridge along with associated infrastructure is shown in Appendix 4 Maps 9 and 10.

### 4.3.2 Rail Infrastructure

It is anticipated that a significant additional throughput is anticipated via the Aurizon Blackwater and Moura systems, which would involve the following infrastructure<sup>24</sup>:

<sup>24</sup> Aurizon, *Network Development Plan 2015*, <https://www.aurizon.com.au/~media/aurizon/files/what%20we%20do/network/planning%20and%20development/ndp/2015%20network%20development%20plan.ashx>

- 30Mtpa to a fourth balloon loop at RGT from 2019 to 2020. This includes capacity from South Goonyella, Blackwater trunk, Rolleston and Moura branches;
- 30Mtpa to a second balloon loop at WICT in 2021 and 2022. Capacity is provided from South Goonyella, Rolleston and Blackwater trunk;
- A third loop at WICT in 2024-2025. This includes 24Mtpa from the Surat Basin Railway (SBR) and Moura systems and 6Mtpa from Blackwater trunk; and
- A further 30Mtpa from the SBR to a fourth loop at WICT in 2026 and 2027.

The *Aurizon Network Development Plan 2015* anticipates that by 2027, the Blackwater and Moura systems would have a system throughput of 230Mtpa<sup>25</sup>. A plan showing potential rail infrastructure is included in Appendix 4 Map 10.

#### **4.3.2.1 Aldoga Bank**

The area referred to as 'Aldoga Bank' (refer to Appendix 4 Map 10) is a strip of steep undulating terrain to the north of the township of Yarwun within the Gladstone SDA extending from the Calliope River Road crossing under the NCL west for a distance of approximately three km to the eastern end of the proposed Aldoga Rail Yard.

The Aldoga Bank Deviation is one component of the Moura Link Aldoga Rail Project (MLARP). It includes a 'shared' corridor for roads, services and rail.

The planning for the Aldoga Bank by Aurizon is currently considering two options for a proposed deviation to address topographical constraints:

- Aldoga Bank Deviation Option A (full deviation) – This involves the provision of four new narrow gauge tracks on an improved horizontal and vertical (deviation) alignment to the north of the NCL, with provision for a future additional two tracks. This option would involve the existing NCL tracks in that section being decommissioned upon completion of the new tracks; and
- Aldoga Bank Deviation Option B (partial deviation) – This involves retention of the two existing NCL tracks and provision of two new tracks on an improved horizontal and vertical deviation alignment to the north of the existing NCL, with provision for a future additional two tracks that is, eventual quadruplicating of the deviation.

The preferred option is unknown at this stage.

#### **4.3.2.2 North Coast Line bypass**

Planning for the NCL Bypass is at an early stage and only to a level of detail necessary to identify conceptual land requirements. The NCL Bypass area identified on Appendix 4 Map 10 provides for two narrow gauge, electrified rail tracks north of the existing NCL rail corridor and the proposed Aldoga Yard. The proposed bypass is linked to the development of the Aldoga Yard. The Euroa Steel project, should it proceed, could potentially connect via a balloon loop to the proposed NCL Bypass, although no formal access request has been made to date. As previously discussed, there are limitations on coal exports should the capacity of the NCL not be substantially upgraded.

#### **4.3.2.3 Aldoga Rail Yards**

The proposed Aldoga Yard is one component of the MLARP. The site for the Aldoga Yard is located to the north of the Gladstone-Mount Larcom Road, and parallel to the NCL, between the towns of Mount Larcom and Yarwun (refer Appendix 4 Map 10).

The planning for the proposed Aldoga Yard by Aurizon intends to deliver a facility which provides provisioning services (fuel, sand, water, decanting) and inspection and maintenance services for trains travelling between the Blackwater and Moura mines (and potentially mine/s in the Surat Basin) to the WICT as well as servicing all domestic and coal export facilities supplied by the Blackwater and Moura (and potentially Surat Basin) coal rail systems.

The proposed Aldoga Yard will have capacity to service rail traffic in the Aldoga and Gladstone areas, as well as to provide capacity relief to Aurizon's Callemondah Rail Yard in Gladstone.

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<sup>25</sup> Aurizon, *Network Development Plan 2015*, <https://www.aurizon.com.au/~media/aurizon/files/what%20we%20do/network/planning%20and%20development/ndp/2015%20network%20development%20plan.ashx>

#### **4.3.2.4 Moura Link**

The proposed Moura Link is the major component of the MLARP. The location of the proposed Moura Link is shown in Appendix 4 Map 10. The Moura Link component of the MLARP proposes the construction of a new rail link west of Gladstone between the existing Moura Short Line (MSL), NCL and East End Mine Branch Line (EEMBL), partly within the Gladstone SDA (north of the Bruce Highway) and partly within the GRC local government area.

The proposed rail link is intended to carry trains from the Moura rail system (and potentially from mine/s in the Surat Basin via the Surat Basin Rail corridor) arriving via the Moura Short Line (MSL) from the south-west to the existing NCL south-east of the Mount Larcom township to connect to the WICT and other rail within the MPA.

Multiple route options have been investigated for the portion of the proposed Moura Link between the existing MSL and the Bruce Highway. During the preparation of the EIS for MLARP, consultation with the Queensland Government identified the potential Castle Hope Dam site on the Calliope River as a significant constraint for the identification of a preferred alignment for the Moura Link.

An options study confirmed two alignment options, those being Moura Link Eastern Option and Moura Link Western Option. Appendix 4 Map 10 identifies the location of these two alignment options. The Eastern Option is the preferred alignment reflecting a significant saving in regard to capital investment as compared to the Western Option. The Western Option is an alternative alignment that avoids the Castle Hope Dam footprint.

#### **4.3.2.5 WICT**

The approval of the WICT by the Coordinator-General in 2008 included the proposal for the supporting rail infrastructure to be constructed in stages in parallel with the coal terminal staging.

The future stages of the Wiggins Island Rail Project (WIRP) include three balloon loops, each feeding a coal unloading station, and multiple approach tracks for holding trains on the loops prior to the coal unloading stations. The location of the future stages of the WICT rail infrastructure is illustrated in Appendix 4 Map 10.

#### **4.3.2.6 East End Mine Branch Duplication**

The proposed duplication of the East End Mine Branch Line is one component of the MLARP. The location of the proposed duplication is illustrated in Appendix 4 Map 10.

Conceptual planning for the purposes of identification of a study area for the MLARP EIS has been undertaken. The duplication is planned to carry rail traffic from Moura/Surat in association with the initial stage of the Moura Link between the MSL and the EEMBL providing connection to the NCL.

#### **4.3.2.7 Euroa Steel Rail**

Should the Euroa Steel project proceed, a rail connection to the steel plant will be required. Two rail loop options are being considered to connect the project to the NCL.

#### **4.3.2.8 Link to West Bank**

Should the West Bank reclamation area be developed, a rail corridor to the north of the QAL red mud dam would be required.

#### **4.3.2.9 Rail link to Curtis Island, through Fisherman's Landing**

A rail link is being considered to link between the existing rail network and Curtis Island. It is envisaged an integrated road and rail bridge would be constructed across the harbour. This corridor will need to consider impacts on the QER tenements in the Friend Point/Fishermans Landing area, as any rail extension is likely to traverse that general area.

#### **4.3.2.10 Callemondah Rail Yard**

The Callemondah Rail Yard is close to capacity, and any new significant increase in tonnage will require a new facility to be constructed. The length of the Callemondah Rail Yard is not sufficient to accommodate the proposed coal trains to service Blackwater, Surat and the WICT. Aurizon is proposing to extend the Callemondah rail yards to allow increased capacity to load and unload longer rail wagons within the rail yard. An increase to the rail yard would likely require an extension of the MPA to include the yard extension.

### 4.3.3 Electricity

Both Powerlink and Ergon continually monitor energy usage and demand to ensure networks are maintained to meet demand. Any major development (with associated energy needs) could require further augmentation to existing electricity networks.

There is potential for a new gas fired power station in the MPA that could utilise coal seam gas. If it comes to fruition, it would require easements for high voltage transmission lines and gas pipelines.

There is also potential for alternative energy sources within the MPA, such as solar or wind farms.

### 4.3.4 Water

The GAWB has proposed a 115km Gladstone-Fitzroy water pipeline to enable the transfer of 30,000 megalitres of water per annum from the lower Fitzroy River to Gladstone. The pipeline is proposed to join GAWB's existing raw water network in Gladstone. The pipeline has been approved by the Coordinator-General, subject to conditions. The project will only commence when one or both pre-defined triggers for demands or drought are met. Construction of the pipeline would take 24 months to complete.

### 4.3.5 Waste Management

Within the master planning timeframe, there is potential for a regional waste management facility to provide for the requirements of GRC and/or Rockhampton Regional Council. Existing planning instruments provide for such facilities to be located at Aldoga within the MPA. Refer to potential waste management facilities in Appendix 4 Map 11.

Potential residue storage areas associated with major industry development are discussed in Section 4.1.4.

### 4.3.6 Gas

The existing capacity of the Queensland gas pipeline, owned and operated by Jemena, is able to be expanded in response to future demand.

### 4.3.7 Bulk Liquids

Pipelines may be required to connect industries with Fisherman's Landing and/or Tide Island to provide for import and export of bulk liquids.

## 5 SUMMARY OF ASSESSMENT FINDINGS

The key findings from the study assessments are summarised below.

### 5.1 IMPLICATIONS FOR MASTER PLANNING

As an outcome of this study, a number of key issues have been identified for the MPA. Recommendations that should be considered in the drafting of the Master Plan follow.

#### 5.1.1 Master Plan Text

It is recommended that the following be considered in preparing the Master Plan:

- Infrastructure requirements should be addressed in individual precincts;
- The Master Plan should where possible, identify the extent of potential placement of capital dredged material and the long-term use of these areas. Potential placement areas for dredged material are identified in Appendix 4 Map 13;
- A section outlining long-term maintenance dredging requirements should be included in the Master Plan;
- Master planning should acknowledge and consider potential conflicts between infrastructure requirements and underlying resources, including extractive resources and quarry materials;
- Potential or indicative plans for land based road, rail or other infrastructure expansions over the master planning timeframe should be recognised through the Master Plan text only. This includes acknowledgement of those matters identified in Section 4 of the Infrastructure Study; and
- The most appropriate precinct should include all potential berths and wharf centres as indicated in Appendix 4 Map 1.

#### 5.1.2 Precincts

It is recommended that the Master Plan develops a range of precincts to protect:

- Existing and future channels;
- Potential reclamation areas; and
- Marine infrastructure crossings.

##### 5.1.2.1 Channels

Protection of existing and future channels could be achieved by an additional precinct that would provide for additional shipping channel capacity and access for larger vessels. The purpose of such a precinct should consider the following:

- Environmental impacts;
- Geophysical properties of the sea bed;
- Port expansion requirements;
- Beneficial reuse in reclamation areas or disposal onshore within appropriate locations; and
- The need for maintenance dredging to be undertaken in accordance with operational requirements.

##### 5.1.2.2 Potential Reclamation Areas

The Master Plan should recognise requirements for placement of dredged material from capital and maintenance dredging, noting that maintenance dredging is currently disposed of at East Banks. This could include applicable text accompanied with mapping/identification of potential dredged material placement areas within precincts of the Master Plan.

##### 5.1.2.3 Marine Infrastructure Crossings

Identification of marine infrastructure crossings within the Master Plan would provide for harbour crossings for infrastructure from the mainland to other parts of the harbour, such as new bridges for road and rail, submarine pipelines or other infrastructure such as electricity transmission and distribution lines.

This could be achieved by an additional precinct to benefit development of the Port in the longer term, such as improving access to new Port facilities at Hamilton Point or in providing pipelines to Tide Island for the purpose of export of petroleum products.

The purpose of such a precinct should consider the following:

- Impacts on operations of the Port and harbour (beyond the construction period), including no interference with existing shipping channels and future development of shipping channels and berths; and
- Environmental impacts.

### 5.1.3 Master Plan Mapping

It is recommended that consideration be given to amending the MPA boundary and that any changes to the proposed boundary consider:

- Potential rail projects, which currently sit outside of the MPA boundary. Where the MPA boundary is being extended, it is recommended that any immediately adjoining precinct be applied to the newly included area. MPA boundary considerations are shown in Appendix 4 Map 14;
- Extension of the Port Access Road, to provide for further development of Port Central (refer to Appendix 4 Map 9); and
- The most appropriate precinct to include all potential berths and wharf centres as indicated in Appendix 4 Map 1.

### 5.1.4 Port Overlay

It is acknowledged throughout this report that the land based planning covering the MPA is largely sufficient and is well established through the LUP, Gladstone SDA Development Scheme and GRC Planning Scheme. The Master Plan text should acknowledge some potential land based infrastructure within the MPA, which may be critical to its future development. However, there may be some gaps in existing land-based planning to be addressed through the Port Overlay.

With respect to the marine infrastructure and facilities, it is recommended that preparation of the Port Overlay considers existing and proposed marine activities to be recognised and protected. These marine activities include:

- Capital and maintenance dredging;
- Marine and submarine pipelines;
- Shipping channels and berth pockets; and
- Reclamation.

All of the above have been identified within Section 4 of this report.

## 6 CONCLUSION

PSA Consulting (Australia) has been engaged by DSD to undertake this Infrastructure Study to assist in the development of the Master Plan.

Specifically, this draft report recommends that preparation of the Master Plan consider the following:

- The importance of shipping channels;
- The importance of capital dredging;
- The benefits of reclamation;
- The importance of maintenance dredging and sea disposal of maintenance dredged material;
- The protection of and planning for marine based and infrastructure, particularly through precincts in the Master Plan and potentially through the Port Overlay; and
- The identification of other potential or indicative plans for land based road, rail or other infrastructure expansions over the master planning timeframe, through the Master Plan text.

The primary recommendations of this report are to ensure existing and proposed marine-based facilities and infrastructure are recognised and protected, both through appropriate mapping and through the Master Plan text. These facilities include:

- Marine and submarine pipelines and other marine crossings;
- Shipping channels, berths and swing basins;
- Reclamation areas;
- Maintenance dredging sea disposal area; and
- Proposed road and rail bridge to Curtis Island.

It is recommended that the MPA boundary be extended to include the additional rail infrastructure projects identified by Aurizon, as well as the Port Access Road Stages 2 and 3. Appendix 4 Map 14 indicates the extent of the proposed MPA boundary extension. Additionally, potential or indicative plans for land based road, rail or other infrastructure expansions over the master planning timeframe should also be acknowledged, where known.

The importance of dredging and reclamation cannot be overstated. Capital dredging underpins the medium and long-term growth of the Port, as well as industries within the MPA. Current industries are reliant on the growth of Port facilities to significantly increase their import, export and production. The restrictions on shipping within the harbour (e.g. restrictions on harbour depth and an inability for certain size vessels to pass), effectively caps the increase of shipping movements, as well as where capesize and some panamax vessels can manoeuvre within the harbour. New industries are unlikely to be able to develop without additional Port facilities being provided.

Long-term reclamation would:

- Allow development of additional Port facilities and associated supply chain linkages;
- Provide definable community benefits (e.g. area 5 as shown in Appendix 4 Map 13); and
- Resolve the placement of capital dredged material which is limited to beneficial reuse as per the Ports Act.

Capital dredging and reclamation must therefore be acknowledged and identified through the Master Plan (where known), in order to clearly establish with some degree of certainty, the intention to pursue the necessary approvals for dredging and reclamation to support the Port's future expansion. This will also be necessary to meet growth scenario three in terms of capacity.

Maintenance dredging is essential to ensuring existing Port capacity and any future growth of the Port is maintained. Failure to maintain the depth and width of channels or berths could constrain loading capacity of ships or restrict ship size, which would be detrimental to the State and region's long-term economic development. New industries would be unlikely to develop without the certainty of port facilities being adequately maintained. The Ports Act does not prohibit sea disposal of maintenance dredged material which has benefits for industry and the Port. Therefore, maintenance dredging and sea disposal should be acknowledged and identified within the Master Plan.

There is also a need to adequately protect and plan for both the land and marine based assets for the Priority Port of Gladstone. This study has found that in particular, there is currently an identified gap in the protection or recognition of marine based infrastructure requirements such as pipelines, shipping channels, capital dredging, future reclamation areas and maintenance dredging and sea disposal areas, within the statutory planning documents that apply to the MPA. This may only be in instances where the need for the potential infrastructure is known and where it may reasonably require protection through the Port Overlay. Further, an option exists to identify these matters within the Master Plan itself through, for example, suitable text within the precinct intents.

The following precincts should be considered for inclusion in the Master Plan:

- **Channels**

Protection of existing and potential channels could be achieved by an additional precinct that would provide for additional shipping channel capacity and access for larger vessels. The purpose of such a precinct should consider the following:

- Environmental impacts;
- Geophysical properties of the sea bed;
- Port expansion requirements;
- Beneficial reuse in reclamation areas or disposal onshore within appropriate locations; and
- The need for maintenance dredging to be undertaken in accordance with operational requirements.

- **Potential Reclamation Areas**

The Master Plan should recognise requirements for placement of dredged material from capital and maintenance dredging, noting that maintenance dredging is currently disposed of at East Banks. This could include text content but may also include mapping/identification of potential dredged material placement areas within precincts of the Master Plan.

- **Marine Infrastructure Crossings**

Identification of marine infrastructure crossings within the Master Plan would provide for harbour crossings for infrastructure from the mainland to other parts of the harbour, such as new bridges for road and rail, submarine pipelines or other infrastructure such as electricity transmission and distribution lines. This could be achieved by an additional precinct to benefit development of the Port in the longer term, such as improving access to new Port facilities at Hamilton Point or providing pipelines to Tide Island for the purpose of export of petroleum products.

The purpose of such a precinct should consider the following:

- Impacts on operations of the Port and harbour beyond the construction period, including no interference with shipping channels or future development of shipping channels and berths; and
- Environmental impacts.

In addition to the identified gap in long-term planning for the marine based components of the MPA, consideration should be given to where the current land based planning for the Priority Port of Gladstone potentially needs to be amended in the future, to better reflect some of the potential infrastructure and supply chain requirements identified through this Infrastructure Study.

In light of the background findings outlined throughout this report and the identification of potential infrastructure and supply chain requirements, the following observations are made:

- There is currently a gap within the existing planning instruments, in the formal identification of various infrastructure and supply chain needs within the marine-based component of the Priority Port of Gladstone MPA. This needs to be addressed through the Master Plan, either through proposed precinct amendments and/or through the Port Overlay. For example, where areas for dredging and reclamation are known and confirmed, these could potentially be acknowledged through both the Master Plan generally and through the regulatory Port Overlay, subject to other statutory approvals being obtained.
- There are a number of potential land-based infrastructure items identified within this study, which would benefit from being specifically acknowledged through the Master Plan. In addition, the existing planning documents which cover the MPA, including the SDA development scheme, LUP and GRC Planning Scheme should consider the Master Plan in any future review.