

Priority port master planning

# Draft master plan

## Priority Port of Gladstone

Queensland | Australia | 2017



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# 1 Introduction

## 1.1 Master planning for the priority Port of Gladstone

In accordance with the *Sustainable Ports Development Act 2015* (Ports Act), the Queensland Government has delivered a master plan for the priority Port of Gladstone. The master plan is a significant milestone in the delivery of Queensland's commitments under the *Reef 2050 Long-Term Sustainability Plan* (Reef 2050).

The priority Port of Gladstone operates in the Great Barrier Reef World Heritage Area (GBRWHA). Through master planning the Queensland Government will establish a long-term vision for the future development of priority ports consistent with the principles of ecologically sustainable development (ESD). Long-term planning for priority ports will provide a strategic and coordinated approach to managing economic and environmental values, including natural, cultural and social values in the GBRWHA.

The priority Port of Gladstone is a major bulk-commodity port critical to the state's economy. It supports a number of associated industry sectors, including resources, energy and agriculture, and its growth will enable expansion of the state's trade and investment opportunities.

The Queensland Government recognises the port as an important economic hub that contributes significantly to regional employment opportunities. Through master planning, the government has demonstrated a commitment to support the port's ongoing sustainable development and in turn, support jobs growth in the entire region.

The master plan for the priority Port of Gladstone is the first prepared under the Ports Act and considers issues beyond strategic port land (SPL), including marine and land-based impacts, port and supply chain infrastructure capacity and connectivity, and economic, community and environmental interests.

The master plan for the priority Port of Gladstone outlines the strategic vision, objectives and desired outcomes for the port and the land and marine areas vital for its future development (the master planned area). The master plan takes into consideration state interests associated with the port, including managing port-related development, economic, community or environmental interests.

Under the Ports Act, the master plan includes an environmental management framework (EMF) which identifies and maps environmental values, and states the objectives and measures to minimise impacts from port operations and development consistent with the principles of ESD.

Through the master plan, the Queensland Government will ensure that the Outstanding Universal Value (OUV) of the GBRWHA is an intrinsic consideration in managing port-related development.

The implementation of the master plan for the priority Port of Gladstone will be through a port overlay, a statutory instrument required by the Ports Act which will operate in the regulatory planning framework for priority ports.

Through the master plan, the Queensland Government has set out a path for the sustainable development of the priority Port of Gladstone through a long-term planning focus and with a view to optimise infrastructure and addressing operational, economic, environmental and community relationships, as well as supply chains and surrounding land uses.

## 1.2 The priority Port of Gladstone

The priority Port of Gladstone is located 525 kilometres north of Brisbane (refer Figure 1). The port is just south of the Tropic of Capricorn at latitude 23°49.61´S, longitude 151°34.6´E, immediately adjacent to the Gladstone central business district, and within the GBRWHA.

The port's major functions are to facilitate:

- the export of Queensland resources
- the import of raw material and breakbulk
- the export of finished products from major industry established in Gladstone.

In 2015-16 financial year, the priority Port of Gladstone had a total throughput of 115.9 million tonnes, with over 1800 vessels visiting the port.

## 1.3 Key elements of the master plan

In accordance with the Ports Act, the minister has made a master plan for the priority Port of Gladstone.

The master plan:

- identifies a **master planned area**—the area which the master plan applies to (refer Figure 2), including precincts (refer Figures 3 and 4)
- states the **strategic vision** for the master planned area—this establishes the long-term vision that considers the capacity for growth in conjunction with principles of ESD
- states the **objectives** for the master planned area—these clarify how the strategic vision will be achieved
- states the **desired outcomes** for the master planned area—these are more detailed and will contribute to achieving the objectives and strategic vision
- identifies the **state interests** affected, or likely to be affected, by existing uses within the master planned area, and future development at, or for, the port—this includes matters relating to managing port-related development and infrastructure, sustainable economic growth, minimising impacts from development on the OUV of the GBRWHA, and the wellbeing of the community of the Gladstone region
- includes an **EMF** which:
  - identifies and maps environmental values within the master planned area and surrounding areas (refer Appendix C)
  - identifies the impacts from development in the master planned area on the environmental values
  - states objectives and priority management measures (PMMs) for managing the impacts on environmental values.

Master planning for priority ports considers the long-term planning horizon until the year 2050 to be consistent with actions required under Reef 2050.

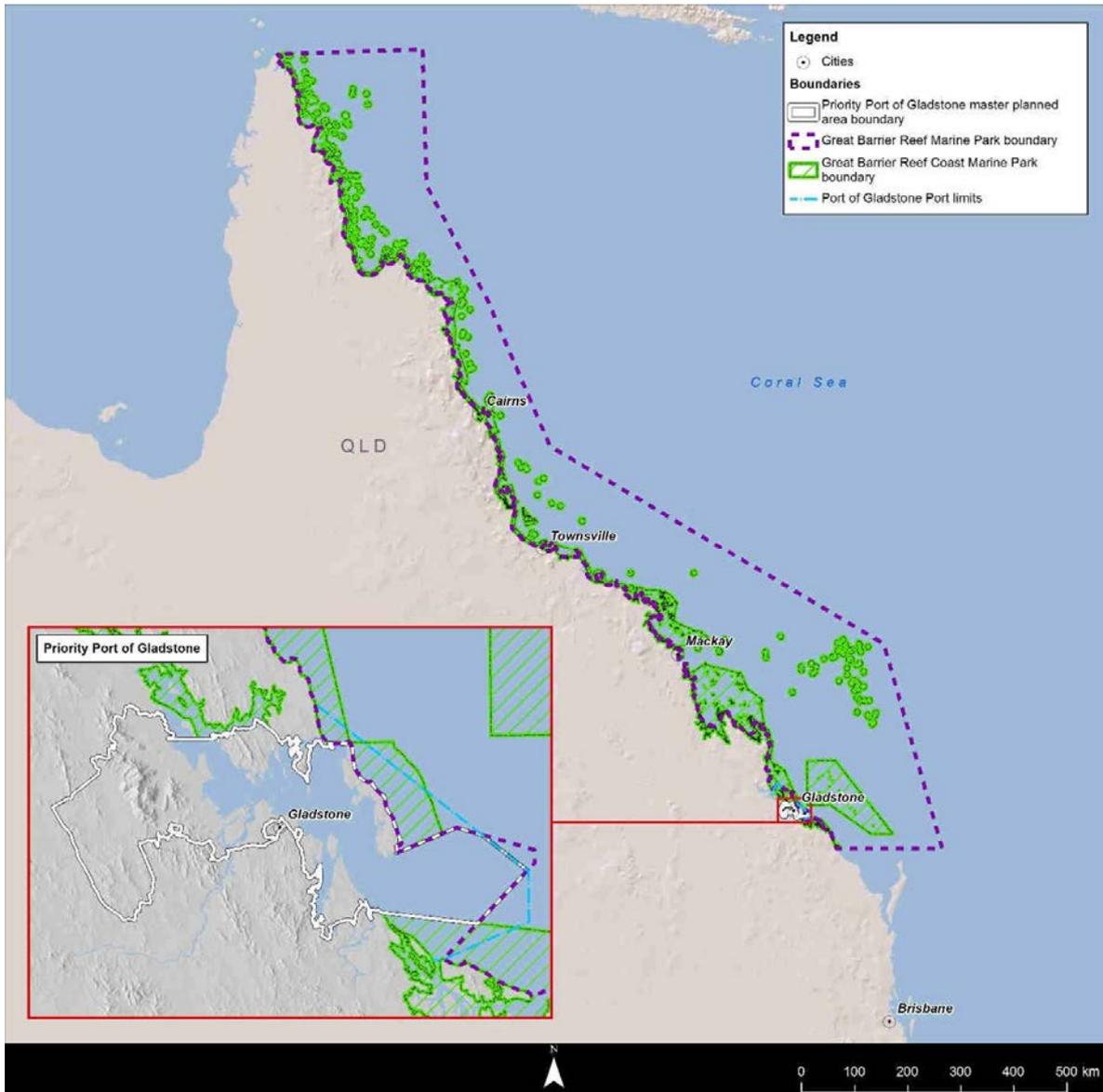


Figure 1 – Priority Port of Gladstone locality plan

## 2 Background on master planning for priority ports

### 2.1 Priority ports within Queensland

The Queensland Government is implementing master planning for the priority ports of Gladstone, Abbot Point, Townsville and Hay Point/Mackay in accordance with the Ports Act, and to meet its commitments under Reef 2050. Priority port master planning takes into consideration leading practice port planning as identified in the *National Ports Strategy 2012*.

### 2.2 Reef 2050 Long-Term Sustainability Plan

Reef 2050 is a comprehensive plan developed to secure the health and resilience of the Great Barrier Reef and protect the OUV of the GBRWHA. Released by the Australian and Queensland Governments on 21 March 2015, Reef 2050 presents actions to protect the values, health and resilience of the Reef.

Priority port master planning is a port-related action for the Queensland Government under Reef 2050:

*Introduce a guideline for port master planning for the ports of Gladstone, Hay Point/Mackay, Abbot Point and Townsville that optimises infrastructure and considers operational, economic, environmental and social relationships as well as supply chains and surrounding land uses (Reef 2050, EBA3, page 47).*

Priority port master planning is being undertaken with regard to the best practice principles identified in the Independent Review of the Port of Gladstone which was commissioned by the Australian Government in 2013 to examine the environmental management arrangements and governance of the Port of Gladstone. Reef 2050 requires:

*Adopt the best practice principles identified in the Gladstone Independent Review reports and integrate into port planning and development (Reef 2050, EBA4, page 47).*

The priority port master planning process takes into consideration the *Reef 2050 Policy Guideline for Decision Makers* which assists in implementing the objectives of the Reef 2050.

### 2.3 Sustainable Ports Development Act 2015

The Ports Act, which commenced on 20 November 2015, provides a legislative framework for sustainable port development in Queensland. The purpose of the Ports Act:

*... is to provide for the protection of the Great Barrier Reef World Heritage Area through managing port-related development in and adjacent to the area (Part 1, Section 2(1)).*

The Ports Act purpose is achieved by:

- (a) *prohibiting particular future development in the Great Barrier Reef World Heritage Area; and*

- (b) *providing for the development of master plans that establish a long-term vision for the future development of priority ports consistent with the principles of ecologically sustainable development; and*
- (c) *implementing master plans through port overlays that regulate development in and surrounding priority ports (Part 1, Section 2(2)).*

The Ports Act identifies a number of ways to achieve its purpose, including:

- long-term planning for priority ports
- concentrating port development in priority ports
- recognising the diverse functions of the port network, including trade and tourism
- efficiently using port and supply chain infrastructure
- expanding port and supply chain capacity in a staged and incremental way
- identifying and protecting land and infrastructure critical to the effective operation of the port network (Part 1, Section 2(3)).

Under the Ports Act, the outcomes of master planning for the priority Port of Gladstone include:

- a long-term strategic vision, objectives and desired outcomes for the port master planned area
- identification of the state interests affected or likely to be affected by existing uses at the port and future development, at or, for the port
- an EMF that states PMMs for managing impact development in the master planned area may have on the environmental values.

# 3 Principles for priority port master planning

## 3.1 Evidence-based planning

In accordance with Reef 2050, master planning for the priority Port of Gladstone has been undertaken with consideration of a comprehensive evidence base.

*Ensure Great Barrier Reef ports planning incorporates evidence-based measures to support protection, restoration and management of coastal ecosystems that contribute to Reef health and resilience (Reef 2050, EHA25, page 37).*

The evidence base has been prepared through an analysis of the master planned area and surrounding areas, with a focus on infrastructure, industries, markets, supply chains, the OUV of the GBRWHA and other environmental values.

The evidence base, prepared or commissioned by the Queensland Government, includes:

- *Master planning evidence base assessment – Priority Port of Gladstone (AECOM 2016)*
- *Infrastructure and supply chain analysis – Priority Port of Gladstone (PSA Consulting 2016)*
- *Risk Assessment – Priority Port of Gladstone (Aurecon 2016)*
- *Addendum to evidence base – Priority Port of Gladstone (Aurecon 2017).*

The evidence base has drawn on a considerable amount of existing environmental values monitoring data, studies and reports from a range of sources, including government, Gladstone Ports Corporation (GPC) and industries.

The key findings of the evidence base for incorporation into the master plan include:

- existing and future port and supply chain infrastructure is critical for the continuing operation and growth of the port
- efficient use and optimisation of port and supply chain infrastructure is critical to supporting sustainable, ongoing growth of the port
- capital and maintenance dredging and the placement of dredged material is an essential part of port operation and growth
- the OUV attributes that are locally expressed within and surrounding the master planned area need to be incorporated into the development assessment and management processes within the master planned area
- development activities within the master planned area have the potential to impact on the OUV of the GBRWHA and other environmental values
- planning instruments do not adequately or consistently address interface issues between port industry operations and adjoining sensitive land uses
- a consistent approach is required for the notification of the relevant Aboriginal party prior to a ground disturbance activity within the master planned area to ensure the cultural heritage duty of care is implemented

- information on environmental values within and surrounding the master planned area is required to be collected, analysed and reported to increase the understanding of the health and presence of environmental values, and inform the future planning and management of the master planned area
- a consistent approach is required for environmental assessment for development within the master planned area
- a consistent approach is required for land management practices for areas that are identified in planning instruments as predominantly having an environmental management purpose.

## 3.2 Transparency and stakeholder engagement

In preparing the master plan, targeted consultation has been undertaken with state and Commonwealth agencies, Gladstone Regional Council (GRC), GPC, peak industry bodies and key community groups through workshops, meeting and briefings.

A number of opportunities were provided for GPC, GRC and other key stakeholders to contribute to the master planning process, including:

- attending facilitated forums, held in Brisbane and in Gladstone, designed to gain direct feedback on key topics and documentation
- participating in one-on-one meetings with the Queensland Government project team
- providing information via telephone or correspondence on matters of interest
- providing comments on draft documentation
- providing formal submissions during public consultation programs
- access to finalised documentation supporting the master planning process.

The focus of stakeholder consultation was to gain relevant and accurate information and insights from those with an interest in the process and its outcomes. The outcome was a transparent process that involved meaningful engagement with stakeholders at the regional, state-wide and national levels.

Working with stakeholders to prepare the master plan for the priority Port of Gladstone, the Queensland Government has delivered a master plan that meets the requirements of the Ports Act and delivered on a key port-related action of Reef 2050, ensuring port planning that:

*...incorporates evidence-based measures to support protection, restoration and management of coastal ecosystems that contribute to Reef health and resilience (Reef 2050, EHA25, page 37).*

## 3.3 Ecologically sustainable development

In accordance with the Ports Act, the master plan establishes a long-term vision for the future development of the priority Port of Gladstone consistent with the principles of ESD, which are defined in accordance with Section 3A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as:

- a) *decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;*
- b) *if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;*

- c) the principle of inter-generational equity—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;*
- d) the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making;*
- e) improved valuation, pricing and incentive mechanisms should be promoted.*

These principles have been considered in the preparation of the master plan and are fundamental to sustainable port development.

## 4 Master planned area

The master planned area was determined through a comprehensive consultation process and informed by the evidence base.

The master planned area encompasses approximately 73,000 hectares. The land component is approximately 40,000 hectares and the marine component is approximately 33,000 hectares.

The master planned area includes:

- the Gladstone State Development Area (Gladstone SDA)
- Port of Gladstone SPL
- part of the GRC local government area
- marine areas within the Port of Gladstone port limits that are not Commonwealth or State marine parks
- part of the GBRWHA.

Figure 2 illustrates the master planned area boundary.

Appendix A contains the regulation map for the priority Port of Gladstone master planned area.

Section 6 contains details on the precincts within the master planned area.

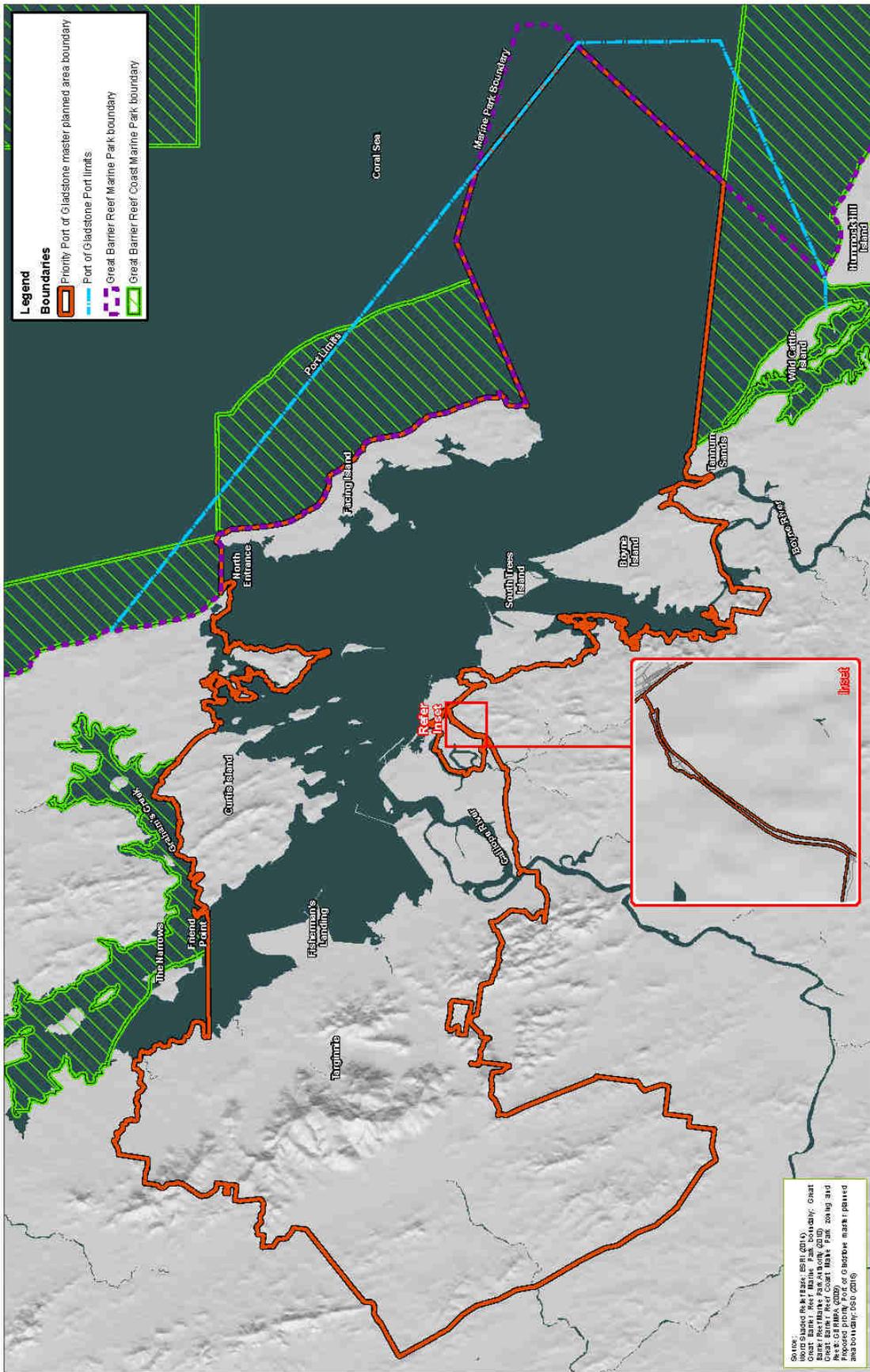


Figure 2 – Boundary for the priority Port of Gladstone master planned area

## **5 Strategic vision, objectives, desired outcomes and state interests for the master planned area**

The priority Port of Gladstone is Queensland's largest multi-commodity port and the fourth largest coal export terminal in the world (by throughput). Over 30 products are handled through the port, which are then transported to more than 30 countries.

The port has national significance as one of the few naturally sheltered and deep water ports on the east coast of Australia. The priority Port of Gladstone is a major centre for the import and export of products for the manufacturing, mining and processing industries.

A new liquid natural gas (LNG) export industry commenced at the priority port of Gladstone in 2014-15. Three LNG operations are located on Curtis Island and will add approximately 25 million tonnes of trade through the port each year.

The priority Port of Gladstone is strategically located to capture the economic growth associated with the expansion of the resource sector, including the coal seam gas and coal sectors. There is a significant opportunity for the priority Port of Gladstone to continue to develop as a logistical hub for both the import and export of a wide variety of commodities to and from the Fitzroy and Central Queensland region and beyond.

The port underpins the growth and prosperity of both the immediate Gladstone region and the broader Central Queensland region. The Fitzroy and Central Queensland region is endowed with natural resources and significant established regional transport networks that support market access, trade and regional exports. While the Bowen Basin coal reserves will be the dominant export commodity for the priority Port of Gladstone over the master planning timeframe, other new industries and the expansion of existing industries and associated import and export products will contribute to the growth of the port.

Three growth scenarios for economic development of the master planned area have been determined in consultation with key stakeholders (refer Table 1). The growth scenarios have been based on economic drivers, industry opportunities, physical influences and the state's ports network. Further detail on the three growth scenarios is provided in Appendix B.

Table 1 – Capacity for growth scenarios for economic development

### 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, and 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 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 151 million tonnes per annum.

### 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, and 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 major industries developed within the master planned area.
- Limited duplication of the port's shipping channel and associated dredged 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 230 million tonnes per annum.

### 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, and 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 Port of Gladstone by the Surat Basin Railway.
- New major industries developed within the master planned area.
- Significant development at Fisherman's Landing expansion and 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 dredged 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 294 million tonnes per annum.

## 5.1 Strategic vision

The Queensland Government's strategic vision for the master planned area relates to a long-term planning horizon to 2050 and is provided below.

The master planned area for the priority Port of Gladstone will enable Queensland's largest multi-commodity port and associated industrial area to develop in a sustainable manner. Development will provide for management of the local expression of the OUV of the GBRWHA, and any potential impacts on environmental values, community wellbeing and cultural heritage within and surrounding the master planned area.

## 5.2 Objectives

The objectives for the master planned area clarify how the strategic vision will be achieved. The objectives are to:

- facilitate the economic growth of the state and the Gladstone region
- enable the ongoing sustainable growth of trade through the priority Port of Gladstone
- continue to use and develop land and marine infrastructure efficiently where practicable
- minimise impact from development on the OUV of the GBRWHA
- recognise and minimise impact from development on environmental values, including the natural, social and cultural environments within and surrounding the master planned area
- maintain wellbeing for the community in the Gladstone region
- promote the safety and security of people and property
- provide for community use of public space.

## 5.3 Desired outcomes

The desired outcomes contribute to achieving the strategic vision and objectives for all of the master planned area and include:

- land and marine areas are available for the development of the port and associated industries, and other development that supports and/or does not compromise port-related activities
- provides for major industries of regional, state, national and global significance
- provides for adequate supply chain development and infrastructure, including connections between land and marine areas
- provides port and supply chain infrastructure that meets the needs of changing user requirements and has capacity to meet market demand
- use of port and supply chain infrastructure is optimised, depending on the economic, environmental and social context, prior to any expansion or development of infrastructure where practicable
- encroachment from incompatible uses on infrastructure corridors and nodes is avoided
- dredging is undertaken where necessary to support the ongoing operation and growth of the priority Port of Gladstone
- maintenance dredging is undertaken in accordance with the dredge management plan and guidelines developed under the *Maintenance Dredging Strategy for Great Barrier Reef World Heritage Areas Ports*

- material generated from capital dredging is beneficially reused or placed on land where it is environmentally safe to do so
- provides economic benefit and employment opportunities for the Gladstone region
- recognises the economic value of extractive resources and other minerals
- recognises the economic, recreational and environmental values of forest products (including within state forests)
- minimises impact from development on environmental values, including those that contribute to the OUV of the GBRWHA
- recognises existing Commonwealth and state offset legislation and policies
- minimises impact from development on sensitive uses within and surrounding the master planned area
- minimises impact from development on cultural heritage values, including listed cultural heritage sites
- minimises impact from development on the scenic amenity of land and marine areas
- provides appropriate public access to the waterfront and harbour where practicable having regard to existing and future port operational needs.

## 5.4 State interests

The master planning process for the priority Port of Gladstone has been conducted with a focus on identifying, balancing and delivering on the interests of the state.

State interests are matters that are affected, or likely to be affected by existing uses of the master planned area, and future development at, or for, the port. State interests will be consistently applied across the master planned area in order to implement the master plan. The state interests are:

- **managing port-related development**—operation of the priority Port of Gladstone and its growth and development
- **economic**—sustainable economic growth of the priority Port of Gladstone and the surrounding region
- **environment**—OUV of the GBRWHA and other environmental values
- **community**—wellbeing of the community of the Gladstone region.

## 5.5 Growth at the priority Port of Gladstone

Supply chain infrastructure, port optimisation, and capital and maintenance dredging are critical for the continuing operation and growth of the port.

### 5.5.1 Supply chain infrastructure

The identification and protection of land and infrastructure is critical to the effective operation of the priority Port of Gladstone, and ensuring the purpose of the Ports Act is achieved.

Infrastructure servicing the master planned area spans across multiple planning and environmental legislation jurisdictions. As a result, coordination across multiple jurisdictions is required for infrastructure and supply chain planning.

Land-based infrastructure requirements include above and below ground linear infrastructure (e.g. pipelines, conveyors, roads) and infrastructure nodes (e.g. power station, treatment plant, extractive resources, material placement area). Corridors and nodes for infrastructure require protection from encroachment of incompatible land uses to ensure ongoing efficiency of the supply chain network.

Marine-based infrastructure requirements include maritime infrastructure (jetties and wharves), the developing and maintaining of navigation channels and associated berth pockets and swing basins, which are critical for vessel access into and within the port. Marine-based infrastructure also includes linear infrastructure above the highest astronomical tide (HAT) (bridges for road and rail) and below the seafloor (subterranean pipelines and services).

It is essential that construction, operation, maintenance and decommissioning of such infrastructure supports safe and efficient vessel movements, which in turn ensures existing and potential port trade and economic growth for the region. It is also essential that marine infrastructure is coordinated with land-based infrastructure, including capacity, timing of upgrades and maintenance.

There are potential land and marine locations within the master planned area that may be suitable for the beneficial reuse or placement of dredged material, subject to compliance with Commonwealth and state legislation.

## **5.5.2 Port optimisation**

The efficient use of port and supply chain infrastructure is critical to supporting sustainable ongoing growth of port capacity in a manner that does not compromise the OUV of the GBRWHA and other environmental values. Reef 2050 includes a specific action requiring port master planning to address port optimisation (EBA3, page 47).

Optimisation is an act, process, or methodology of making something (a design, system or decision) as fully perfect, functional or effective as possible.

Parameters that may typically impact on port optimisation include:

- the extent of capital and maintenance dredging (i.e. navigation channels, swing basins and/or berth pockets)
- the number of port berths and ability to control allocations
- the distance between land-based facilities and associated marine infrastructure (port berths)
- compatibility of different commodities at wharves and cargo handling equipment
- the extent and location of land-based storage and facilities
- location of infrastructure corridors and connections
- land tenure and licence agreements
- environmental outcomes
- capital expenditure for a single proponent's project
- the operational efficiency of the supply chain
- the operational efficiency of the port in isolation.

Development may require different aspects of the infrastructure to be optimised, depending on the economic, environmental and social context. Regardless of the individual aspects, port optimisation requires a balance across all parameters, as well as a coordinated approach across the master planned area.

## 5.6 Dredging

Dredging involves the digging, excavating or removing of material from waterways to deepen channels, create harbours and maintain navigation channels and approaches to ports at defined depths to allow the safe passage of vessels. Dredging can either be capital dredging associated with new navigation channels, berth pockets and swing basins, or maintenance dredging that is necessary to maintain existing and approved seafloor profiles (TMR 2016).

### 5.6.1 Capital dredging

Capital dredging is an essential part of port operation and is required to create new, or improve existing navigation channels, berth pockets and swing basins.

Under the Ports Act capital dredging is defined 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 (Schedule 1).

The Ports Act prohibits major capital dredging for development of new or expansion of existing port facilities in the GBRWHA outside the priority ports.

The Ports Act allows capital dredging in the priority Port of Gladstone master planned area, however the material generated must not be deposited, or disposed of, in a restricted area unless the material is beneficially reused.

A restricted area is an area that is within the GBRWHA but outside the Commonwealth marine park.

Beneficial reuse is the practice of using dredged material for a purpose that provides social, economic or environmental benefits (or a combination of these). That is, dredged material is managed as a valuable resource rather than a product destined for disposal.

The beneficial reuse of capital dredged material may include:

- land reclamation (raising land above the high water mark)
- beach nourishment (replenishment of a beach system using imported material to balance erosion losses or to re-establish a wider dunal buffer zone)
- environmental restoration purposes, such as creating or restoring wetlands or nesting islands.

Areas for the beneficial reuse of capital dredged material within the master planned area are likely to be required within the timeframe of the master plan.

## 5.6.2 Maintenance dredging

Maintenance dredging involves dredging carried out for the purposes of removing sediments that have accumulated in the existing navigation channels, berth pockets, approaches and swing basins of a port in order to maintain an existing approved capital dredging seafloor profile.

Maintenance dredging at Queensland ports is regulated by a comprehensive regulatory approval system at both the Commonwealth and State Government levels.

In 2017, the Queensland Government released the *Maintenance Dredging Strategy for Great Barrier Reef World Heritage Area Ports* (Maintenance Dredging Strategy). This strategy was developed in direct response to the following Reef 2050 action:

*Develop a State-wide coordinated maintenance dredging strategy which:*

- *identifies each port's historical dredging volumes and likely future requirements and limits*
- *identifies appropriate environmental windows to avoid coral spawning, seagrass recruitment, turtle breeding and weather events*
- *examines opportunities for the beneficial reuse of dredge material or on-land disposal from maintenance activities*
- *establishes requirements for risk-based monitoring programs* (Reef 2050, WQA16, page 43).

Removal of sedimentation is critical to facilitating efficient passage of vessels, ensuring optimisation of operations and compliance with safety requirements. Without maintenance dredging, navigation channels would naturally become shallower over time and significantly impact the safe passage of vessels, and the operations of the port and associated supply chain.

It is a combination of both local coastal processes and the port configuration which dictates the sedimentation rates of a port. At the priority Port of Gladstone, sedimentation occurs naturally as a result of wave climate, tidal/wind induced currents and extreme weather events (cyclones and storms) (TMR 2016). As a result of the variability in each of these processes, maintenance dredging requirements vary seasonally and annually, and there are limitations in forecasting volumes.

At the priority Port of Gladstone, maintenance dredging is undertaken by the Trailing Suction Hopper Dredger Brisbane which was designed specifically for Queensland conditions to reduce environmental impacts. All maintenance dredging is undertaken in accordance with an approved Dredge Management Plan. GPC has an existing maintenance dredged material placement area north-east of East Banks within port limits (refer Figure 5). The establishment of this area was subject to relevant Commonwealth and state regulatory approvals, which included assessment of alternative placement options as per the *National Assessment Guidelines for Dredging 2009*.

Sea-based placement of maintenance dredged material is strictly regulated through legislation in accordance with international agreements, and Commonwealth and state regulatory requirements.

In accordance with the Maintenance Dredging Strategy, the Port of Gladstone is required to develop a Long-term Maintenance Dredging Management Plan (LMDMP) that:

- contributes to maintaining and enhancing the OUV of the GBRWHA
- is based on the best available science
- utilises the principles of ESD
- ensures continued efficient operation of the port
- is developed in consultation with key stakeholders.

The Port of Gladstone LMDMP is intended to ensure leading practice, consistent, transparent and accountable process is applied for the port's sediment management. It is intended to highlight the process undertaken at the port in undertaking risk assessments, identifying environmental values, applying environmental windows, assessing sediment management options, including beneficial reuse, and setting appropriate monitoring programs.

Through Reef 2050, an additional action included:

*Understand the port sediment characteristics and risks at the four major ports and how they interact and contribute to broader catchment contributions within the World Heritage Area (Reef 2050, WQA17, page 43).*

In addition to the Maintenance Dredging Strategy, GPC is currently working with other Queensland port authorities and Ports Australia to adopt principles of an *Environmental Code of Practice for Dredging and Dredged Material Placement* released by Ports Australia in September 2016.

## 6 Master planned area precincts

The evidence base and planning instruments have informed the identification of distinct precincts within the master planned area. Considerations in the identification of precinct boundaries are summarised in Table 2.

Table 2 – Evidence base considerations in the identification of precinct boundaries

Evidence base considerations	Precinct
Areas with identified environmental values, including those that contribute to the OUV of the GBRWHA, and identified in planning instruments as having a predominantly environmental management purpose, where development should be limited	Environmental management
Existing and planned infrastructure and supply chain corridors over land and marine areas, where not already adequately identified in planning instruments	Infrastructure and supply chain corridors
Areas where there are known or possible incompatible land use activities that are not adequately addressed in planning instruments	Interface
Existing and planned marine infrastructure corridors and nodes	Marine infrastructure
Marine areas identified as having environmental values, including those that contribute to the OUV of the GBRWHA, where development should be limited	Marine
Areas identified in planning instruments to provide for marine services and recreation	Marine services and recreation
Areas identified in planning instruments to predominantly provide for port operations, industry and commerce	Port, industry and commerce

The precincts are identified on the precinct map shown in Figures 3 and 4.

A long-term purpose is provided for each of the master planned area precincts.

All planning, management and development within each of the precincts is to be undertaken in a manner that supports the principles of ESD.

### 6.1 Environmental management precinct

The purpose of this precinct is to limit development and manage environmental values.

The precinct includes:

- Mount Larcom landform
- Aldoga reserve (Lot 87 SP144431)
- Facing Island
- part of Curtis Island
- other inshore islands.

Uses that do not compromise the environmental values of the area may be acceptable, including limited public access such as boardwalks or visitor centres. Limited development in the southern part of Quoin Island and existing townships on Facing Island may also be acceptable where the long-term purpose of the precinct is not compromised.

Necessary infrastructure such as telecommunications and electricity network infrastructure may be located in this precinct to service adjoining industry or residential development if no other alternative is available.

## 6.2 Infrastructure and supply chain corridors precinct

The purpose of this precinct is to allow for the development of critical land and marine supply chain infrastructure to and from the port, and within the master planned area.

This precinct includes:

- planned Port Access Road extension
- potential mainland to Curtis Island road and/or rail link.

Potential development within this precinct must ensure the safe and efficient operation and management of supply chain infrastructure. Development within this precinct is to be appropriately designed and located to accommodate the delivery of infrastructure.

## 6.3 Interface precinct

The purpose of this precinct is to manage the interface between sensitive land uses and adjoining port and industry operations.

Development within this precinct must not hinder the growth or development of port, industrial or supply chain activities. Development in the interface precinct must be appropriately designed and located to minimise potential impacts on sensitive land uses.

This precinct includes:

- areas of SPL at Auckland Point and Barney Point
- areas adjacent to SPL at Auckland Point and Barney Point within the GRC local government area.

## 6.4 Marine infrastructure precinct

The purpose of this precinct is to ensure port and shipping access to navigation channels and waterside areas, and provide for marine-based port infrastructure and operational requirements (e.g. navigation channels, port berths and wharves, jetties, floating pontoon facilities, conveyors, pipelines, material placement areas, emergency anchorages), appropriate recreational and commercial activities while minimising potential impacts from development on environmental values.

This precinct also includes areas that may be suitable for the beneficial reuse of dredged material, which are likely to be required within the timeframe of the master plan.

Figure 5 illustrates the location of the existing navigation channels, swing basins, berth pockets, and the existing East Banks maintenance dredged material placement area.

This precinct generally extends to the HAT and includes:

- intertidal and marine areas
- part of Calliope River
- part of Boyne River.

## 6.5 Marine precinct

The purpose of this precinct is to provide for limited port and industry development, and non-port-related marine activities, which minimise impacts on environmental values.

Uses that do not compromise the environmental values of the marine area may be acceptable, including small scale maritime infrastructure, boat ramps, pontoons and coastal protection structures, coastal rescue services, commercial, tourism and recreational uses. Development must be appropriately designed and located to minimise impacts on environmental values within and surrounding the master planned area.

Material placement areas for the placement of dredged material used for the creation of environmental benefits such as artificial wetlands could be undertaken within this precinct.

This precinct generally extends to the HAT and includes intertidal and marine areas adjoining the marine infrastructure precinct that are not critical to the operation or growth of the port and includes:

- intertidal and marine waters
- South Trees Inlet.

## 6.6 Marine services and recreation precinct

The purpose of this precinct is to provide for a range of maritime activities, associated marine industries and recreational areas.

Development within this precinct includes marina activities and associated marine industries, small boat harbour, coastal rescue services, commercial, light industry, educational facilities, public open space and public access to the waterfront and harbour.

The precinct will provide direct access to the harbour for tourism and recreational activities, including commercial fishing and facilities to support cruise ship passengers.

Within this precinct, public access to the waterfront and the harbour (including boat ramps, marina, open space and community facilities) will be provided and maintained where it does not compromise public safety or the security of port operations, or result in adverse impacts on environmental values.

This precinct includes:

- Gladstone marina facility and surrounds
- part of Auckland Inlet
- Auckland Inlet marine facilities
- Central Queensland University campus
- East Shores recreational hub.

## 6.7 Port, industry and commerce precinct

The purpose of this precinct is to provide for port operations, industry, port-related commercial activities and other supporting or related development.

A significant portion of this precinct incorporates the Gladstone SDA, which contains defined development precincts to manage and regulate industrial and port-related land uses within the SDA (refer Gladstone State Development Area Development Scheme). The Gladstone SDA contains important infrastructure corridors to connect industry to the Port of Gladstone via the Gladstone SDA.

Development within this precinct includes industries which are of regional, state, national and global economic significance, and supply chain infrastructure that supports the operation of the port and industry.

The precinct may also include associated infrastructure required for daily operations of the port such as security, customs and quarantine requirements, parking facilities, utility installations, and materials transportation infrastructure to support industry. Within this precinct, locations that accommodate safe, direct public access to the waterfront and harbour (such as boat ramps) are supported where they are located in areas that do not compromise industrial activity.

Development within this precinct provides for a range of industries, including uses that would benefit from being located in close proximity to the port. For example, uses in this precinct may include manufacturing industries, refineries, warehouses, wholesale trade, transport services, distribution centres and associated residue storage and waste management facilities. It also allows for commercial operations that do not compromise port-related activities, including storage of goods, and rural and agricultural uses that may act as a buffer to external sensitive receptors.

This precinct provides for extraction of extractive resources and minerals, and forestry. This precinct also includes areas that may be suitable for the beneficial reuse of dredged material which are likely to be required within the timeframe of the master plan.

This precinct includes:

- land within the Gladstone SDA
- land within the GRC local government area
- some existing SPL
- some future SPL.



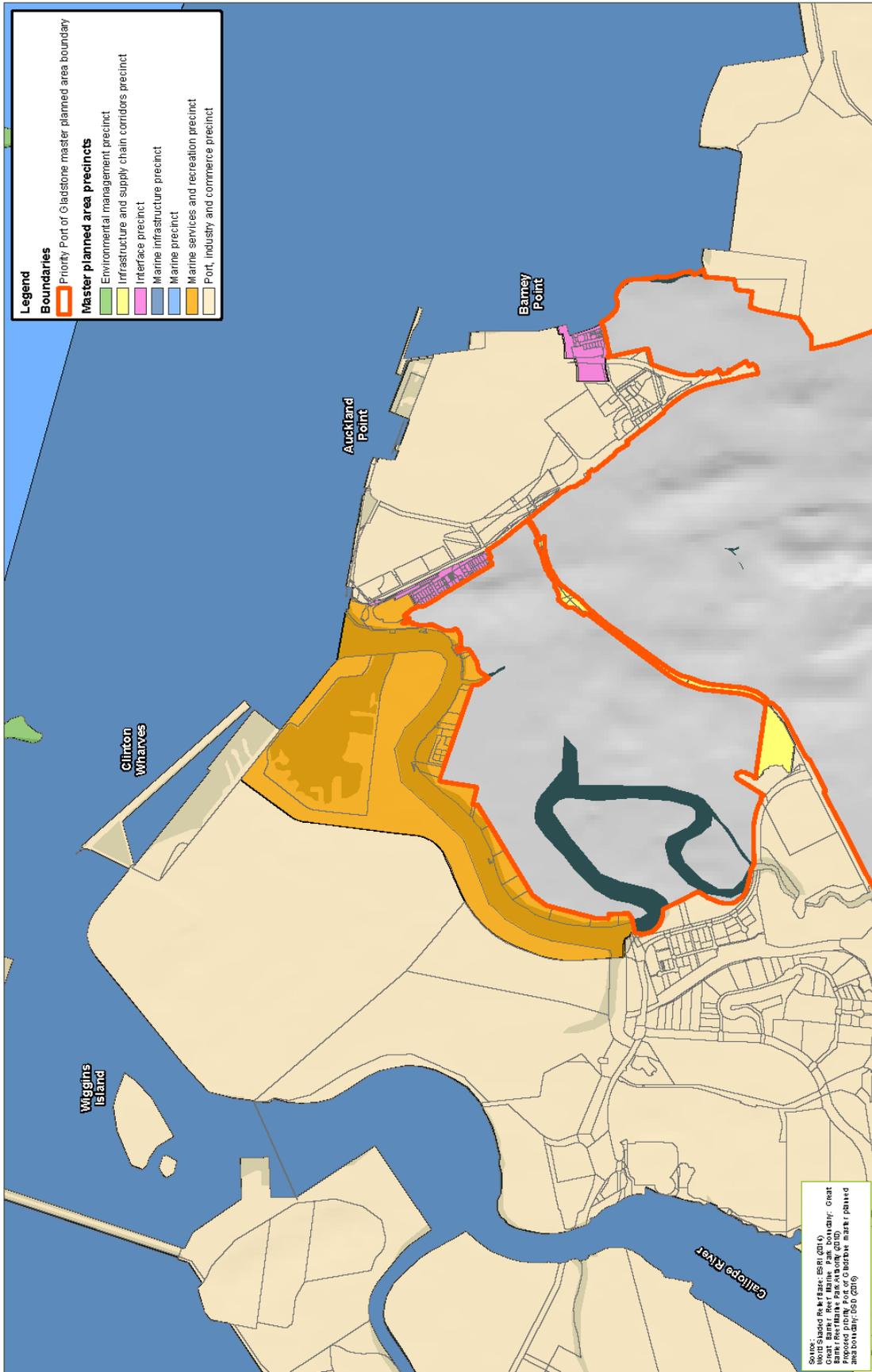


Figure 4 – Priority Port of Gladstone master planned area precincts (inset)



# 7 Environmental management framework

## 7.1 Summary of function

The Ports Act establishes a legislative framework for the development of an EMF for a priority port.

The EMF describes the port and port-related industries' interaction with environmental values, with a particular focus on the local expression of the OUV of the GBRWHA.

The function of the EMF includes:

- identifying and mapping OUV of the GBRWHA and other environmental values in the master planned area and surrounding areas
- identifying any impacts that development in the master planned area may have on the OUV of the GBRWHA and other environmental values
- stating the objectives and PMMs for managing the impacts that have been identified.

PMMs were identified considering the existing statutory requirements and operational environmental management and reporting arrangements, and have addressed current gaps, inconsistencies, uncertainties or opportunities for improvement based on the objectives for environmental values (refer Section 7.4).

Due to the comprehensive nature of existing statutory requirements and operational environmental management measures that are implemented within the master planned area, limited PMMs have been identified as part of the master plan EMF.

The minimisation of impacts from development within the master planned area will be achieved by implementing the environmental management hierarchy of avoid, mitigate and/or offset. In the first instance, development should avoid any potential impacts on environmental values. Where avoidance is not practicable (within the context of the principles of ESD), mitigation measures are implemented to reduce the extent, severity and/or duration of potential impacts on environmental values as a result of the development. If a development, after applying all practicable avoidance and mitigation measures, results in a significant residual impact on an environmental value, an offset may be required in accordance with Commonwealth and state legislation and policies.

## 7.2 Environmental values

### 7.2.1 Definition of environmental values

The EMF includes the OUV of the GBRWHA and other environmental values within and surrounding the master planned area as identified within the evidence base (refer Sections 7.2.2 and 7.2.3, and Appendix C).

The *Environmental Protection Act 1994* (EP Act) defines 'environment' which includes ecosystems, natural and physical resources, qualities and characteristics of locations, and the social, economic, aesthetic and cultural conditions that affect them.

'Environmental value' is defined under the EP Act as:

- a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety; or
- another quality of the environment identified and declared to be an environmental value under an environmental protection policy or regulation.

In accordance with the above definitions and the Ports Act, the master plan includes environmental values that relate to the natural, cultural and social environments. Some of the identified environmental values contribute to the OUV of the GBRWHA.

## 7.2.2 Outstanding Universal Value

The Great Barrier Reef was inscribed on the World Heritage List in 1981 in recognition of its OUV. OUV is the fundamental concept of the World Heritage Convention and underpins the listing of properties on the World Heritage List. For a World Heritage property to be considered to have OUV, it must:

- meet one or more of the ten criteria set out in the convention
- meet the conditions of integrity
- meet the conditions of authenticity for cultural heritage properties
- have an adequate system of protection and management to safeguard its future.

The World Heritage Committee listed the Great Barrier Reef for the following criteria:

- Criterion (vii)—contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance
- Criterion (viii)—be outstanding examples representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features
- Criterion (ix)—be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, freshwater, coastal; and marine ecosystems and communities of plants and animals
- Criterion (x)—contain the most important and significant natural habitats for in situ conservation of biological diversity, including those containing threatened species of OUV from the point of view of science or conservation.

The OUV of the GBRWHA must be an intrinsic consideration in all development and management within the master planned area. To achieve this objective for the OUV of the GBRWHA, the master plan:

- identifies the OUV local attributes, and associated environmental values, and their contribution classifications to the OUV of the GBRWHA relevant to the master planned area and surrounding areas
- identifies impacts from development in the master planned area on the OUV of the GBRWHA
- states EMF objectives to maintain the OUV of the GBRWHA
- proposes measures required to maintain the OUV of the GBRWHA
- contributes to wider actions under Reef 2050.

The contribution classifications for each OUV local attribute and associated environmental values have been determined as part of the evidence base. The contribution classifications are generally defined as:

- **Minor contribution (Min):** The attribute is present however it occurs in low abundance or singularly and is:
  - not essential to the sustainability of the attribute (e.g. substantial breeding population)
  - not recognised as a key feature of the GBRWHA
  - not included in the retrospective statement of OUV
  - not iconic, unique or a high quality example of the attribute.
- **Moderate contribution (Mod):** The attribute occurs in moderate abundance or across a moderately large area but is not the prime occurrence or representation of the attribute within the GBRWHA. The attribute does however represent a feature for which the Great Barrier Reef was listed as World Heritage.
- **Significant contribution (Sig):** The attribute represents locally important examples of the attribute relative to the nature of the attribute across the GBRWHA. Such an attribute may be specifically referred to within the retrospective statement of OUV for the GBRWHA or defined by other legislation, planning instrument or values assessment (e.g. Great Barrier Reef Outlook Report). The occurrence of the attribute locally is a prime example of the features mentioned in the retrospective statement of OUV (Adaptive Strategies et al. 2017).

Table 3 summarises the locally expressed OUV attributes within the master planned area and surrounding areas, and their contribution classifications relative to the OUV of the GBRWHA. Table 3 also includes a summary of the environmental values determined to be key contributors to the local expression of OUV (i.e. key environmental values). Other environmental values are recognised as locally contributing to the overall OUV of the GBRWHA and are identified in the addendum to the evidence base (Aurecon 2017).

Table 3 – Local attributes of the OUV of the GBRWHA within and surrounding the master planned area

Category	Local attribute	Relevant OUV criteria and contribution classifications <sup>1</sup>				Summary of the key environmental values
		vii <sup>2</sup>	viii <sup>3</sup>	ix <sup>4</sup>	x <sup>5</sup>	
Coral reefs	Fringing reefs	Min	Min	Min	Min	Fringing coral reefs
	Inshore turbid reefs	-	Min	Min	Min	Inshore turbid coral reefs
	Coral species diversity and extent	Min	Min	Min	Min	Various coral species
Marine water quality	Marine water quality	-	-	Mod	Mod	Marine water quality

Category	Local attribute	Relevant OUV criteria and contribution classifications <sup>1</sup>				Summary of the key environmental values
		vii <sup>2</sup>	viii <sup>3</sup>	ix <sup>4</sup>	x <sup>5</sup>	
Fish	Fish species and diversity	Min	-	Min	Min	Colosseum Inlet Fish Habitat Area Calliope River Fish Habitat Area Coral reefs, seagrass meadows, mangrove communities, hard and soft benthic substrates, beach habitats, estuaries, creeks and rivers
Marine megafauna	Dugong	-	-	-	Mod	Dugong species Seagrass meadows
	Species of whales	-	-	-	Min	Minke whales Sperm whales Humpback whales
	Migrating whales	Min	-	-	-	Humpback whales and calving habitat
	Species of dolphins	Min	-	-	Sig	Australian humpback dolphins
Marine turtles	Breeding colonies of marine turtles	Mod	-	-	Mod	Flatback turtle rookery on Curtis Island
	Green turtle breeding	Min	-	-	Min	Nesting beaches on Facing, Curtis and Wild Cattle Islands, Boyne Island Beach and Tannum Sands
	Marine turtle rookeries	Mod	-	-	Mod	
	Nesting turtles	Min	-	-	-	
Seagrass and macroalgae	Seagrass	Min	Min	Mod	Mod	Seagrass meadows
	Beds of <i>Halimeda</i> algae	-	-	Min	-	Beds of <i>Halimeda</i> algae
Shorebirds and migratory seabirds	Seabirds	Min	-	Min	Min	Potential foraging habitat
	Shorebirds and migratory birds	-	-	-	Sig	Threatened migratory shorebird species Shorebird habitat and important roost sites (note these vary from year to year)
Flora, fauna and ecological communities	Threatened and endangered flora and fauna species (including threatened ecological communities)	Min	-	-	Mod	Coastal Saltmarsh Threatened Ecological Community
	Vegetated mountains	Min	-	-	-	Mount Larcom landform
	Mangroves	Min	Min	Min	Min	Various mangrove species
	Mangrove species diversity	-	-	-	Min	Various mangrove species

Category	Local attribute	Relevant OUV criteria and contribution classifications <sup>1</sup>				Summary of the key environmental values
		vii <sup>2</sup>	viii <sup>3</sup>	ix <sup>4</sup>	x <sup>5</sup>	
	Vast mangrove forests	<b>Mod</b>	-	-	-	Mangrove sequences at The Narrows
Continental islands	Continental islands and green vegetated islands	<b>Mod</b>	<b>Mod</b>	-	-	Curtis Island
	Plant species diversity and endemism (species being unique to a defined geographic location)	-	-	-	<b>Sig</b>	Curtis Island
	Vegetation of the continental islands	-	-	<b>Sig</b>	<b>Sig</b>	Curtis Island
Geomorphology	Beaches	<b>Min</b>	-	-	-	Curtis Island beaches Facing Island beaches Boyne Island Beach
	Dune systems	<b>Min</b>	<b>Min</b>	-	-	Parabolic dunes Curtis Island
	River deltas	<b>Min</b>	<b>Min</b>	<b>Min</b>	<b>Min</b>	Marine tidal sand deltas (Curtis Island, Boyne River, Colosseum Inlet)
	Connectivity: cross-shelf, longshore and vertical	-	<b>Min</b>	<b>Min</b>	<b>Min</b>	The Narrows tidal passage
Cultural heritage values	Traditional Owner interaction with the natural environment	-	-	<b>Mod</b>	-	Indigenous cultural heritage sites and values
Marine fauna	Diversity supporting marine fauna species (global conservation significance)	<b>Min</b>	-	<b>Min</b>	<b>Mod</b>	A diverse range of marine fauna species
Total species diversity	Total species diversity	<b>Mod</b>	-	<b>Mod</b>	<b>Mod</b>	A diverse range of marine, intertidal and terrestrial flora and fauna species

**Table notes:**

- 1 Min Minor  
Mod Moderate  
Sig Significant
- 2 vii Aesthetic values and superlative natural phenomena
- 3 viii Ongoing geological processes
- 4 ix Ecological and biological processes
- 5 x Biodiversity conservation

### 7.2.3 Other environmental values

Separate to the OUV of the GBRWHA there are a number of other environmental values within the master planned area.

Table 4 summarises the other environmental values within and surrounding the master planned area that do not contribute to the OUV of the GBRWHA.

Table 4 – Other environmental values within and surrounding the master planned area

Environmental value	Description of environmental value
Fresh water and groundwater	Sources of fresh water and groundwater, their quality and the ecosystem services they support (e.g. watercourses providing habitat for flora and fauna species).
Flora and fauna	Flora and fauna species and ecological communities not contained within the GBRWHA or not considered to contribute to the OUV of the GBRWHA (e.g. vegetation communities or fauna habitat located outside of the Great Barrier Reef coastal zone, such as flora and fauna habitat surrounding Aldoga area).
Protected areas	A range of protected areas (e.g. National Parks and Conservation Parks) are present within the master planned area and surrounds as listed under the provisions of Commonwealth and state legislation.
Heritage properties	World, Commonwealth and National Heritage Places state and local heritage places.
Socio-economic factors	Community infrastructure and facilities, local workforce, housing and accommodation.
Social and community infrastructure	
Recreational opportunities and natural scenic amenity	Areas utilised for conservation, environmental management, tourism, open space, and sport and recreational uses. Also includes areas that provide natural scenic amenity.
Traditional owner interaction with the natural environment and Indigenous cultural heritage	Areas, interactions or sites that are culturally important and are considered not to contribute to the OUV of the GBRWHA (e.g. Indigenous cultural heritage sites that are located outside of the GBRWHA and associated Great Barrier Reef coastal zone, Indigenous Land Use Agreements and Native Title determination areas).

## 7.3 Potential impacts from development on environmental values

Development within the master planned area has the potential to impact (direct, indirect and cumulative) on environmental values (natural, cultural and social) in the master planned area and surrounding areas.

Each of the growth scenarios were subject to a risk assessment to determine the likelihood and consequence of potential impacts from development on the environmental values. The risk assessment considered the adequacy of the existing statutory requirements and operational management measures in minimising impact from development on environmental values.

For the purpose of the master plan, growth scenario three was selected to identify the potential impacts from development within each precinct on the environmental values within and surrounding the master planned area.

The potential impacts from development have been identified at a high level for the purpose of the master planning process due to the large spatial extent of the master planned area and the wide range of activities that could potentially occur within the precincts up to the year 2050.

Table 5 summarises the potential impacts from development within each precinct on environmental values within and surrounding the master planned area. Table 5 identifies six broad environmental value categories, these are:

- **terrestrial flora and fauna**—including flora and fauna species inhabiting land areas within the master planned area and surrounds, including on the continental and inshore islands
- **intertidal flora and fauna**—including flora and fauna species associated with intertidal habitats, including shorebirds and migratory birds, mangroves and Coastal Saltmarsh Threatened Ecological Community
- **marine flora and fauna**—including flora and fauna species inhabiting marine areas within the master planned area and surrounds, including coral reefs, fish, marine megafauna, marine turtles, seagrass and macroalgae
- **water quality**—including fresh water, groundwater and marine water quality
- **social**—including heritage properties, socio-economic factors, social and community infrastructure, recreational opportunities and natural scenic amenity
- **cultural heritage**—including cultural heritage sites and traditional owner interaction with the natural environment.

Geomorphological features (e.g. beaches, dunes and river deltas) and protected areas (e.g. National Parks and Regional Parks) have multiple environmental values (e.g. habitat for flora and fauna species, natural scenic amenity and cultural heritage values), as a result Table 5 addresses potential impacts on the component environmental values rather than on the geomorphological features and protected areas.

Table 5 – Potential impacts from development on environmental values for each of master planned area precincts

Potential impacts	Environmental management precinct	Infrastructure and supply chain corridors precinct	Interface precinct	Marine precinct	Marine infrastructure precinct	Marine services and recreation precinct	Port, industry and commerce precinct
<b>Terrestrial flora and fauna</b>							
Direct disturbance resulting in the loss, fragmentation or loss of connectivity values of terrestrial flora species, vegetation communities and/or fauna habitat	Yes	Yes	No	No	No	Yes	Yes
Direct mortality and/or injury to terrestrial fauna	Yes	Yes	No	No	No	No	Yes
Increase in noise, vibration, light and/or other disruption to behaviour/life-cycle of terrestrial fauna	Yes	Yes	No	Yes	Yes	Yes	Yes
Disruption to terrestrial fauna behaviour and/or life-cycle due to increased potential for human interaction	Yes	No	No	No	No	No	No
Increase in operational lighting impacting on terrestrial fauna	Yes	Yes	No	No	No	Yes	Yes
Increase in dust impacts on adjacent terrestrial vegetation communities and/or fauna habitat, reducing the condition and quality of adjacent habitats	Yes	Yes	No	Yes	Yes	Yes	Yes
Increased levels of waste materials resulting in reduced terrestrial fauna habitat condition and/or quality	Yes	No	No	No	No	No	Yes

Potential impacts	Environmental management precinct	Infrastructure and supply chain corridors precinct	Interface precinct	Marine precinct	Marine infrastructure precinct	Marine services and recreation precinct	Port, industry and commerce precinct
Increased edge effects on adjacent terrestrial vegetation communities and/or fauna habitat, reducing the condition and/or quality of adjacent environments	Yes	Yes	No	No	No	Yes	Yes
Introduction or spread of pest and weed species resulting in reduced condition and/or quality of terrestrial vegetation communities and/or fauna habitat	Yes	Yes	No	Yes	Yes	Yes	Yes
<b>Intertidal flora and fauna</b>							
Direct disturbance resulting in the loss, fragmentation or loss of connectivity values of intertidal flora species, vegetation communities and/or fauna habitat	Yes	Yes	No	Yes	Yes	Yes	Yes
Direct mortality and/or injury to intertidal fauna	Yes	Yes	No	Yes	Yes	Yes	Yes
Increase in noise, vibration, light and/or other disruption to behaviour/life-cycle of intertidal fauna	Yes	Yes	No	Yes	Yes	Yes	Yes
Disruption to intertidal fauna behaviour and/or life-cycle due to increased potential for human interaction	Yes	Yes	No	No	Yes	Yes	No
Increase in operational lighting impacting on intertidal fauna	Yes	Yes	No	Yes	Yes	Yes	Yes
Increase in dust impacts on adjacent intertidal vegetation communities and/or fauna habitat, reducing the condition and quality of adjacent habitats	Yes	Yes	No	Yes	Yes	Yes	Yes
Increased levels of waste materials resulting in reduced intertidal fauna habitat condition and/or quality	Yes	Yes	No	No	Yes	Yes	No
Increased edge effects on adjacent intertidal vegetation communities and/or fauna habitat, reducing the condition and/or quality of adjacent environments	Yes	Yes	No	Yes	Yes	Yes	Yes
Introduction or spread of pest and weed species resulting in reduced condition and/or quality of intertidal vegetation communities and/or fauna habitat	Yes	Yes	No	Yes	Yes	Yes	Yes
Increased edge effects and/or direct loss of important foraging/roosting habitat for shorebirds	Yes	Yes	No	Yes	Yes	Yes	Yes
<b>Marine flora and fauna</b>							
Direct disturbance resulting in the loss, fragmentation or loss of connectivity values of marine flora species, vegetation communities and/or fauna habitat (including benthic communities, coral reefs and seagrass meadows)	No	Yes	No	Yes	Yes	No	Yes
Direct mortality and/or injury to marine fauna	No	Yes	No	Yes	Yes	Yes	No
Increase in noise, vibration, light and/or other disruption to behaviour/life-cycle of marine fauna	No	Yes	No	Yes	Yes	Yes	Yes

Potential impacts	Environmental management precinct	Infrastructure and supply chain corridors precinct	Interface precinct	Marine precinct	Marine infrastructure precinct	Marine services and recreation precinct	Port, industry and commerce precinct
Increase in operational lighting impacting on marine fauna	Yes	Yes	No	Yes	Yes	Yes	Yes
Increase in dust impacts on adjacent marine vegetation communities and/or fauna habitat, reducing the condition and quality of adjacent habitats	No	Yes	No	Yes	Yes	Yes	Yes
Increased edge effects on adjacent marine vegetation communities and/or fauna habitat, reducing the condition and/or quality of adjacent environments	Yes	Yes	No	Yes	Yes	No	Yes
Introduction or spread of pest and weed species resulting in reduced condition and/or quality of marine vegetation communities and/or fauna habitat	No	Yes	No	Yes	Yes	No	Yes
Increased edge effects on important nesting habitat for marine turtles	Yes	No	No	No	Yes	No	Yes
Beneficial impact that increases the opportunities for establishment of benthic communities and associated marine fauna	No	Yes	No	Yes	Yes	No	No
<b>Water quality</b>							
Sedimentation and decreased water quality in terrestrial areas resulting in decreased condition and/or quality of environments and downstream areas	Yes	Yes	No	Yes	Yes	Yes	Yes
Sedimentation and decreased water quality in intertidal and/or marine areas resulting in decreased condition and/or quality of environmental values	Yes	Yes	No	Yes	Yes	Yes	Yes
Disturbance of acid sulfate soils decreasing water quality in intertidal and/or marine areas resulting in decreased condition and/or quality of environmental values	Yes	Yes	No	Yes	Yes	Yes	Yes
Alteration of groundwater levels and quality resulting in impacts to surrounding terrestrial environments	Yes	Yes	No	Yes	Yes	Yes	Yes
Alteration of groundwater levels and quality resulting in impacts to surrounding intertidal environments	Yes	Yes	No	Yes	Yes	Yes	Yes
Alteration of groundwater levels and quality resulting in impacts to surrounding marine environments	Yes	Yes	No	Yes	Yes	Yes	Yes
Changes to marine water velocities and potential erosion, sedimentation and decreased water quality impacts resulting in decreased condition and/or quality	No	Yes	No	Yes	Yes	No	Yes
<b>Social</b>							
Decrease in visual amenity for residents, recreational users and tourists	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Impacts on air quality resulting from dust, emissions and odour affecting surrounding areas	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Potential impacts	Environmental management precinct	Infrastructure and supply chain corridors precinct	Interface precinct	Marine precinct	Marine infrastructure precinct	Marine services and recreation precinct	Port, industry and commerce precinct
Restricting access to foreshore areas for residents and tourists	Yes	Yes	Yes	No	No	Yes	Yes
Increase in light, dust, noise and vibration impacts resulting in a decreased level of social amenity for residents and tourists	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Beneficial impact from an increase in public awareness of the OUV of the GBRWHA and other environmental values	Yes	No	No	Yes	No	No	No
Increase in the number of residents and/or tourists experiencing social amenity impacts as a result of construction and/or operation of industrial and port industries within the port, industry and commerce precinct	No	No	Yes	No	No	No	No
Increase in pressure on community infrastructure and services (e.g. airport; health and emergency services; food, water and electricity supply)	Yes	Yes	No	No	No	No	Yes
Increase in demand for rental/sale properties which may result in decrease in housing affordability if the demand exceeds the supply of housing	No	Yes	No	No	No	No	Yes
Decrease in social/community cohesion due to influx of temporary workforce, potentially leading to increased social and health related issues	No	Yes	No	No	No	No	Yes
<b>Cultural heritage</b>							
Direct impacts on cultural heritage sites during vegetation clearing and land disturbance	Yes	Yes	No	Yes	Yes	Yes	Yes
Loss of traditional owner access to land as a result of construction and/or operation of infrastructure	Yes	Yes	No	Yes	Yes	No	Yes

## 7.4 Objectives for managing the potential impacts

EMF objectives have been identified for each of the master planned area precincts to minimise potential impacts from development within the master planned area on environmental values, including the OUV of the GBRWHA, matters of national environmental significance (MNES) and matters of state environmental significance (MSES). The EMF objectives identify sustainable targets to inform PMMs and other port overlay content that will contribute to achieving the master plan's strategic vision, objectives, desired outcomes and state interests.

The EMF objectives for each of the master planned area precincts are outlined below.

### 7.4.1 Environmental management precinct

- Minimise potential impacts (direct, indirect and cumulative) from development within the precinct on the Facing Island environmental values. Particular attention must be given to avoiding impact on:
  - marine turtle nesting beaches and habitat
  - threatened ecological communities under the EPBC Act
  - Endangered and Of concern Regional Ecosystems under the *Vegetation Management Act 1999* (VM Act)
  - conservation significant fauna habitat under the EPBC Act and *Nature Conservation Act 1992* (NC Act) (including migratory species under the EPBC Act)
  - migratory shorebird habitat
  - coral reefs
  - island vegetation and fauna species diversity
  - natural scenic amenity values
  - dune systems and beaches.
  
- Minimise potential impacts (direct, indirect and cumulative) from development within the precinct on the Curtis Island environmental values. Particular attention must be given to avoiding impact on:
  - island vegetation and fauna species diversity
  - natural scenic amenity values
  - marine turtle nesting beaches and habitat
  - migratory shorebird habitat
  - threatened ecological communities under the EPBC Act
  - Endangered and Of concern Regional Ecosystems under the VM Act
  - conservation significant fauna habitat under the EPBC Act and NC Act (including migratory species under the EPBC Act)
  - coral reefs.
  
- Minimise potential impacts (direct, indirect and cumulative) from development within the precinct on the inshore islands, Mount Larcom landform and Aldoga reserve environmental values. Particular attention must be given to avoiding impact on:
  - threatened ecological communities under the EPBC Act
  - Endangered and Of concern Regional Ecosystems under the VM Act
  - conservation significant flora species and fauna species habitat under the EPBC Act and NC Act (including migratory species under the EPBC Act)
  - cultural heritage values
  - natural scenic amenity values.

- Increase the understanding of the presence and contribution of attributes that contribute to the local expression of the OUV of the GBRWHA, and habitat value for other EPBC Act and NC Act conservation significant fauna species and marine plants.
- Collect information that monitors changes to the environmental values and confirms the impact from development within the master planned area on the OUV of the GBRWHA and other environmental values.
- Limit future development within the precinct to low impact recreational and nature-based activities or necessary infrastructure (where no other alternative is available) that does not impact on the OUV of the GBRWHA and other environmental values.
- Maintain appropriate access to areas that provide Indigenous cultural heritage values and natural scenic amenity values to residents, recreational users and tourists that contribute to the OUV of the GBRWHA.

#### **7.4.2 Infrastructure and supply chain corridors precinct**

- Support development within the precinct that operates efficiently and effectively, in a manner that appropriately balances industrial, commercial, recreational and cultural activities, and potential impacts from development on the OUV of the GBRWHA and other environmental values.
- Minimise potential impacts (direct, indirect and cumulative) from development within the precinct on the following environmental values:
  - seagrass meadows and deep water seagrass meadows
  - mangroves and other intertidal marine plants
  - migratory shorebird habitat and populations
  - marine faunal groups diversity
  - marine water quality
  - cultural heritage values
  - natural scenic amenity values.

#### **7.4.3 Interface precinct**

- Ensure that residential development within the precinct incorporates design measures and other controls that minimise noise, light, visual amenity and air quality impacts from adjoining port and industrial land uses.
- Ensure port industry development within the precinct adjacent to sensitive land uses incorporates design measures and other controls that minimise noise, light, visual amenity and air quality impacts on adjoining sensitive land uses.

#### **7.4.4 Marine infrastructure precinct**

- Maintain port access to and continued development of shipping channels and waterside areas in a manner that appropriately balances industrial, commercial, recreational and cultural activities and potential impacts on the OUV attributes of the GBRWHA and other environmental values.
- Where practical, minimise direct disturbance from development within the precinct on the following environmental values:

- Facing Island and Quoin Island seagrass meadows
  - inshore turbid reefs and fringing reefs, including coral reefs associated with East Banks (East and West)
  - important shorebird roosting habitat at North Passage and South Passage Islands, Boyne Island Beach, shorebird habitat associated with Curtis Island, Facing Island and the other inshore islands.
- Minimise impacts (direct, indirect and cumulative) from development within the precinct on the following environmental values:
    - seagrass meadows and deep water seagrass meadows
    - mangroves and other intertidal marine plants
    - migratory shorebird habitat and populations
    - turtle nesting beaches
    - marine faunal groups diversity
    - marine water quality
    - cultural heritage values
    - natural scenic amenity values
    - ongoing sustainable use of the marine waters by marine turtles and other marine reptiles, dugongs, dolphins, seabirds, whales, coral reefs, benthic communities, fish and other nekton
    - ongoing sustainable use of marine waters and near shore intertidal areas for recreational and commercial fishing.
  - Increase the understanding of the presence and contribution of attributes that contribute to the local expression of the OUV of the GBRWHA, and habitat value for other EPBC Act and NC Act species and marine plants.
  - Collect information to monitor changes to the environmental values and confirm the impact from development within the precinct on the OUV of the GBRWHA and other environmental values.

#### **7.4.5 Marine precinct**

- Minimise impacts (direct, indirect and cumulative) from development within the precinct on environmental values. Particular attention must be given to avoiding impact on:
  - Pelican Banks North, Pelican Banks South, Facing Island and Quoin Island seagrass meadows
  - inshore turbid reefs and fringing reefs, including coral reefs on the seaward side of Curtis Island and Facing Island, coral reefs associated with Seal Rocks, Turtle Island Reef, Bushy Reef and Manning Reef
  - turtle nesting beaches
  - Kangaroo Island wetland and important shorebird roosting habitat at North Passage and South Passage Islands, South Trees Inlet, Boyne Island Beach, shorebird habitat associated with Curtis Island, Facing Island and other inshore islands.
- Minimise impacts (direct, indirect and cumulative) from development within the precinct on the following environmental values:
  - other seagrass meadows (i.e. excluding Pelican Banks Norths, Pelican Banks South, Facing Island and Quoin Island seagrass meadows addressed in the objective above)

- mangroves and other intertidal marine plants
  - migratory shorebird habitat and populations
  - marine faunal groups diversity
  - marine water quality
  - cultural heritage values
  - natural scenic amenity values
  - ongoing sustainable use of the marine waters by marine turtles and other marine reptiles, dugongs, dolphins, seabirds, whales, coral reefs, benthic communities, fish and other nekton
  - ongoing sustainable use of marine waters and near shore intertidal areas for recreational and commercial fishing.
- Increase the understanding of the presence and contribution of attributes that contribute to the local expression of the OUV of the GBRWHA, and habitat value for other EPBC Act and NC Act species and marine plants.
  - Collect information to monitor changes to the environmental values and confirm the impact from development within the precinct on the OUV of the GBRWHA and other environmental values.
  - Allow port development to occur where it is necessary to support development within the marine infrastructure precinct and/or the port, industry and commerce precinct in a manner that appropriately balances industrial, commercial, recreational and cultural activities, and potential impacts on the OUV of the GBRWHA and other environmental values.

#### **7.4.6 Marine services and recreation precinct**

- Minimise impacts (direct, indirect and cumulative) from development within the precinct on the following environmental values:
  - threatened ecological communities listed under the EPBC Act
  - habitat for conservation significant fauna species listed under the NC Act and/or EPBC Act
  - migratory shorebird habitat and populations
  - mangroves and other marine plants
  - wetlands
  - marine species diversity (flora and fauna)
  - marine water quality
  - cultural heritage values
  - natural scenic amenity values.
- Maintain safe access to the waterfront and harbour for commercial operations, residents, recreational users and tourists.

#### **7.4.7 Port, industry and commerce precinct**

- Minimise impacts (direct, indirect and cumulative) from development within the precinct on the following environmental values:
  - threatened ecological communities listed under the EPBC Act
  - Endangered and Of concern Regional Ecosystems listed under the VM Act

- conservation significant flora species and fauna species habitat listed under the EPBC Act and NC Act
  - migratory shorebird habitat and populations
  - natural scenic amenity values and recreational opportunities of the coastal zone
  - cultural heritage values.
- Increase the understanding of the importance of habitat for the long-term conservation of species protected under the EPBC Act, NC Act, marine plants and fish.
  - Maintain appropriate access to areas that provide Indigenous cultural heritage values and natural scenic amenity values to residents, recreational users and tourists that contribute to the OUV of the GBRWHA.
  - Minimise impacts (direct, indirect and cumulative) from development within the precinct on cultural heritage and social values.

## 7.5 Priority management measures

The evidence base assessed the existing statutory requirements and operational environmental management measures that apply to the master planned area for potential environmental impacts from development within the master planned area on environmental values. These include:

- Commonwealth and Queensland government regulatory approval processes
- statutory land use planning instruments and land use plans (i.e. GRC Planning Scheme, GPC Land Use Plan (GPC LUP) and the Development Scheme for the Gladstone SDA)
- existing operational management measures (e.g. environmental monitoring, environmental management plans).

PMMs have been identified to:

- address the gaps in the existing statutory requirements and operational environmental management measures to address potential impacts associated with development within the master planned area
- address inconsistencies in the implementation of existing statutory requirements and operational environmental management measures over the master plan timeframe
- secure the continuation of non-statutory measures (i.e. voluntary) over the master plan timeframe.

Due to the comprehensive nature of the existing statutory requirements and operational environmental management measures that are implemented within the master planned area, limited PMMs have been identified as part of the master plan EMF.

Table 6 provides the PMMs and the master planned area precinct/s that each PMM applies to.

PMMs identified in the master plan's EMF are implemented through the port overlay.

Table 6 – Priority management measures

Priority management measures		Environmental management precinct	Infrastructure and supply chain corridors precinct	Interface precinct	Marine precinct	Marine infrastructure precinct	Marine services and recreation precinct	Port, industry and commerce precinct
1	<p><b>Aboriginal cultural heritage notification</b></p> <p>Prior to undertaking any ground disturbance activities within the master planned area, proponents who are not already required to undertake notification under the provisions of the <i>Aboriginal Cultural Heritage Act 2003</i>, an Indigenous Land Use Agreement registered under the <i>Native Title Act 1993</i>, or an agreement with an Aboriginal Party made in accordance with the <i>Native Title Act 1993</i> and other agreements under the <i>Aboriginal Cultural Heritage Act 2003</i>, will notify the relevant Aboriginal party prior to the works being undertaken</p>	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	<p><b>Environmental values monitoring and reporting program</b></p> <p>Prepare an environmental values monitoring and reporting program for the environmental values within and surrounding the master planned area that will be impacted by development within the master planned area</p>	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	<p><b>Environmental assessment guideline</b></p> <p>Prepare an environmental assessment guideline for development likely to have a significant adverse impact on the environmental values that contribute to the OUV of the GBRWHA to ensure that environmental assessment processes are appropriately and consistently applied across the master planned area for matters relating to the OUV of the GBRWHA and other environmental values</p>	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	<p><b>Land management plan guideline</b></p> <p>Prepare and implement a land management plan guideline to ensure that the OUV of the GBRWHA and other environmental values are consistently identified and managed within the environmental management precinct of the master planned area</p>	Yes	No	No	No	No	No	No
5	<p><b>Facing Island land management plan</b></p> <p>Prepare and implement a land management plan for the Facing Island land management plan area in accordance with the land management plan guideline</p>	Yes	No	No	No	No	No	No
6	<p><b>Inshore islands land management plan</b></p> <p>Prepare and implement a land management plan for the Inshore islands land management plan area in accordance with the land management plan guideline</p>	Yes	No	No	No	No	No	No

Priority management measures		Master planned area precinct to which the PMM applies						
		Environmental precinct	Infrastructure and supply chain corridors precinct	Interface precinct	Marine precinct	Marine infrastructure precinct	Marine services and recreation precinct	Port, industry and commerce precinct
7	<b>Mount Larcom landform land management plan</b> Prepare and implement a land management plan for the Mount Larcom landform land management plan area in accordance with the land management plan guideline	Yes	No	No	No	No	No	No
8	<b>Aldoga reserve land management plan</b> Prepare and implement a land management plan for the Aldoga reserve land management plan area in accordance with the land management plan guideline	Yes	No	No	No	No	No	No
9	<b>Curtis Island land management plan</b> Prepare and implement a land management plan for the Curtis Island land management plan area in accordance with the land management plan guideline	Yes	No	No	No	No	No	No

## 8 Implementation of the master plan

The master plan is a strategic document that will be implemented through the port overlay for the master planned area. The port overlay provides regulatory effect for the master plan under the Ports Act to ensure that the strategic vision, objectives, desired outcomes, state interests and EMF are achieved.

Figure 6 illustrates the relationship of the strategic vision, objectives, desired outcomes, state interests and EMF (which includes PMMs) within the master plan, and how they are implemented through the port overlay.

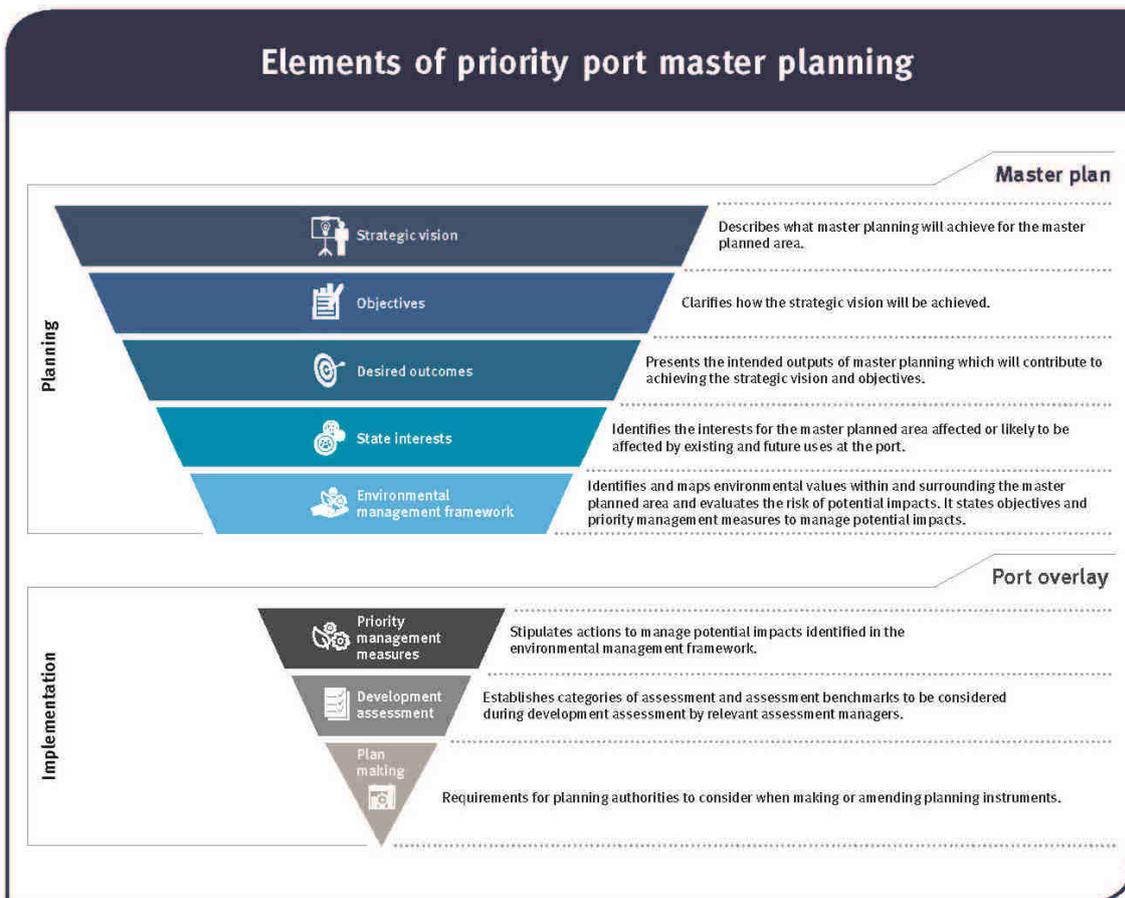


Figure 6 – Elements of the master planning process

The Queensland Government has coordinated the master planning process for the priority Port of Gladstone, working with the GPC, GRC and other regulatory entities, with a focus on implementation of the master plan.

The implementation of the master plan over the master planned area is through the port overlay. The port overlay recognises the autonomy of decision making for existing planning and other regulatory entities in relation to respective planning instruments and environmental legislation that applies within the master planned area.

Figure 7 provides an overview of the existing regulatory planning framework for priority ports and the relevant regulatory instrument for implementation of the master plan through the port overlay.

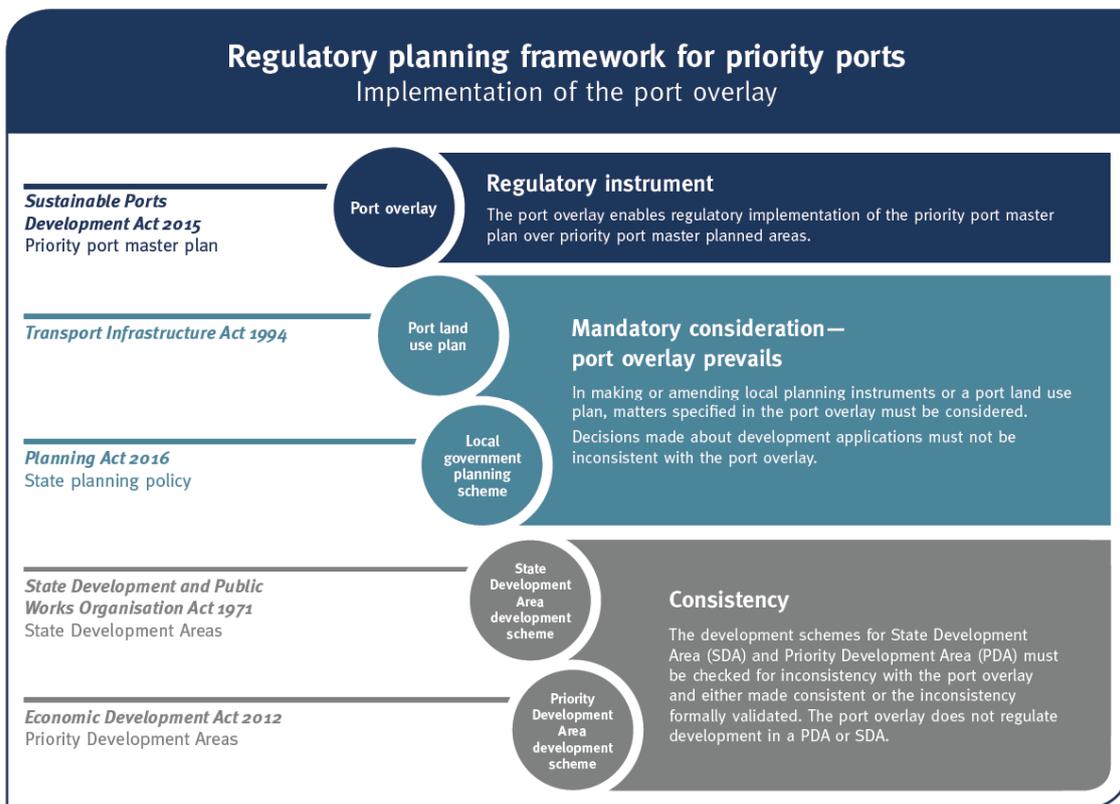


Figure 7 – Regulatory planning framework and implementation responsibilities of the port overlay

GPC will continue to be the assessment manager for development regulated by the GPC LUP for SPL within the master planned area.

GRC will continue to be the assessment manager for development regulated by the GRC Planning Scheme on land within the GRC local government area included in the master planned area.

The Coordinator-General will continue to be the assessment manager for development within the Gladstone SDA regulated by the Development Scheme for the Gladstone State Development Area 2015 (Development Scheme for the Gladstone SDA) on land within the Gladstone SDA included in the master planned area.

The relevant regulatory entity for assessable development within marine areas, where GRC, GPC or the Coordinator-General is not the assessment manager, will continue to be the assessment manager as defined under the *Planning Regulation 2017*.

Figure 8 illustrates the jurisdiction of each of the existing planning instruments within the master planned area.

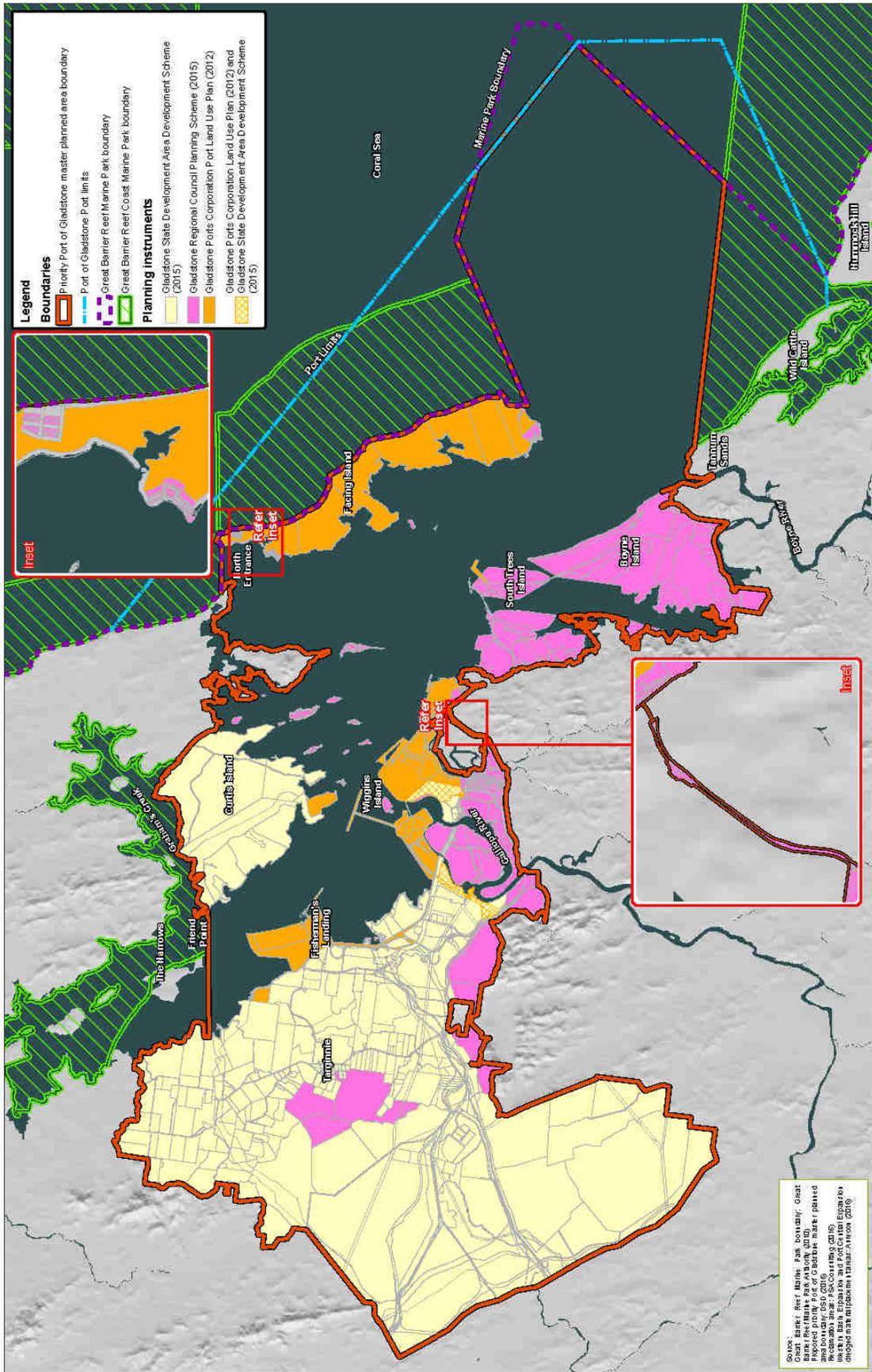


Figure 8 – Existing planning instruments within the priority Port of Gladstone master planned area

# **Appendix A: Priority Port of Gladstone master planned area regulation map**

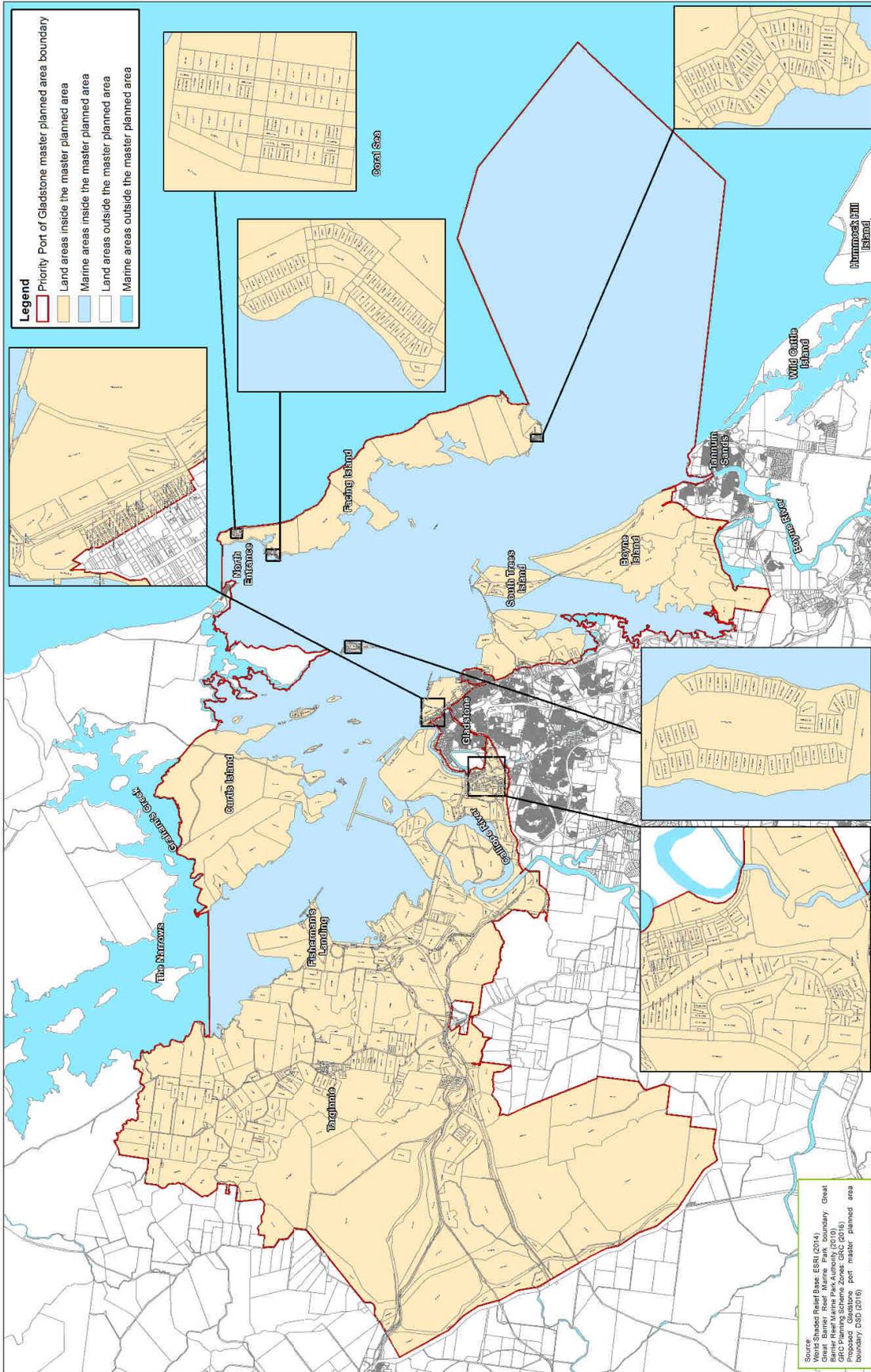


Figure A1 - Priority Port of Gladstone master planned area – regulation map

# Appendix B: Master planning for the priority Port of Gladstone master planned area – capacity for growth scenarios

As part of the overall evidence base to inform master planning processes for the priority Port of Gladstone, the Department of State Development has determined capacity for growth scenarios for the priority Port of Gladstone master planned area.

A range of capacity for growth scenarios associated with economic development exists for the Gladstone region. In identifying capacity for growth scenarios a number of assumptions have been considered relating to economic drivers, industry opportunities, physical influences and the state's ports network.

The master plan for the priority Port of Gladstone is a strategic document with a long-term outlook to the year 2050. In accordance with the *Sustainable Ports Development Act 2015* the minister must complete a review of the master plan at least every 10 years after the plan has effect.

The capacity for growth scenarios, identified and examined through consultation with key stakeholders will assist the Queensland Government in determining the suitable extent and location of development areas within the priority port master planned area.

Three 'capacity for growth' scenarios have been determined for the priority Port of Gladstone master planned area:

Note: The capacity for growth scenarios focus on variations in port capacity measured in millions of tonnes per annum (mtpa) and the resulting development impacts. All figures are based on a best estimate informed by available project related documentation.

### **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, and 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 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 151 million tonnes per annum.

### **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, and 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 major industries developed within the master planned area.
- Limited duplication of the port's shipping channel and associated dredged 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 230 million tonnes per annum.

### **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, and 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 Port of Gladstone by the Surat Basin Railway.
  - New major industries developed within the master planned area.
  - Significant development at Fisherman's Landing expansion and 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 dredged 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 294 million tonnes per annum.
-

# Scenario one

## Overall assumptions

- 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.
- The use of low carbon and renewable sources of energy to achieve improved emissions reduces the demand for traditional energy sources such as coal.
- There is no expansion of coal terminal capacity.
- There is minimal new industrial development.
- There is limited project-related capital dredging undertaken at the 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.

Scenario one

Industry	Assumptions	Maximum throughput	Implications
<b>Coal</b>	<ul style="list-style-type: none"> <li>• Demand for coal does not increase.</li> <li>• Surat Basin mines are not developed.</li> <li>• Surat Basin rail is not developed.</li> <li>• There is no expansion of coal terminal capacity:               <ul style="list-style-type: none"> <li>◦ RG Tanna coal terminal capacity remains at 75 mtpa.</li> <li>◦ Future stages of Wiggins Island Coal Terminal (WICT) are not constructed, and the capacity of the terminal remains at 27 mtpa.</li> <li>◦ Barney Point does not operate as a coal terminal.</li> </ul> </li> </ul>	102 mtpa	<ul style="list-style-type: none"> <li>• No additional coal facilities to be developed.</li> <li>• Actual throughput could be significantly less than maximum.</li> </ul>
<b>LNG</b>	<ul style="list-style-type: none"> <li>• Supply and demand for LNG remains stable.</li> <li>• There is no expansion of LNG capacity (APLNG—2 trains, 9mtpa; GLNG—2 train, 8 mtpa; QCLNG—2 trains, 8mtpa).</li> </ul>	25 mtpa	<ul style="list-style-type: none"> <li>• No additional LNG trains developed.</li> <li>• Surplus infrastructure following LNG construction activities (e.g. laydown areas/warehousing/workforce accommodation).</li> </ul>
<b>Bauxite Alumina Aluminium</b>	<ul style="list-style-type: none"> <li>• Demand for alumina/aluminium decreases due to a downturn in the global economy.</li> <li>• One of Gladstone's two alumina refineries closes. Remaining capacity in Gladstone for alumina/aluminium is approximately 4 mtpa.</li> <li>• The supply of bauxite decreases to 12 mtpa in-line with the reduced refining capacity (based on approximate 3:1 ratio of bauxite imports to alumina/aluminium exports, as per 2013/14 trade figures).</li> </ul>	16 mtpa	<ul style="list-style-type: none"> <li>• Opportunities for future redevelopment.</li> <li>• Potential road network upgrades required.</li> </ul>
<b>Other existing commodities and new industries</b>	<ul style="list-style-type: none"> <li>• The amount of other existing commodities (e.g. ammonium nitrate, magnesia, grain, limestone, petroleum coke) and general cargo (including containers) being imported/exported remains stable.</li> <li>• New industries are developed in the area to take advantage of lower entry costs e.g. waste management, gas-fired power, chemicals manufacture, meat processing.</li> <li>• There is some use of the port by the cruise shipping industry.</li> </ul>	8 mtpa	<ul style="list-style-type: none"> <li>• Existing supply chain infrastructure is adequate.</li> <li>• No additional major infrastructure required at the port.</li> <li>• May require a purpose built terminal for cruise shipping.</li> </ul>
		<b>151 mtpa</b>	

## Scenario two

### Overall assumptions

- 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, and toward lower carbon intensive and renewable sources of energy to achieve improved emissions.
- Potential for technological advances to enable ongoing demand for thermal coal due to lower emissions.
- Strong price growth for commodities.
- New major industries developed within the master planned area.
- Limited duplication of the port's shipping channel and associated dredged material placement.
- Beneficial reuse or land disposal of dredged material will be required.
- 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.

Industry	Assumptions	Maximum throughput	Implications
<b>Coal</b>	<ul style="list-style-type: none"> <li>• Demand for coal increases slightly.</li> <li>• Surat Basin mines are not developed.</li> <li>• Surat Basin rail is not developed.</li> <li>• There is some expansion of coal terminal capacity: <ul style="list-style-type: none"> <li>◦ RG Tanna coal terminal continues to operate and Stage 2 of Wiggins Island Coal Terminal (WICT) is constructed.</li> <li>◦ Barney Point does not operate as a coal terminal.</li> </ul> </li> </ul>	135 mtpa	<ul style="list-style-type: none"> <li>• Expansion of coal terminal capacity will take place only at WICT—additional coal terminals will not be required.</li> <li>• Additional berths may be required which would involve additional dredging (could be more than 1Mm<sup>3</sup>).</li> <li>• Barney Point Terminal may be used for other bulk commodities.</li> </ul>
<b>LNG</b>	<ul style="list-style-type: none"> <li>• Supply and demand for LNG increases.</li> <li>• The existing LNG plants are operating at maximum capacity (based on approvals: APLNG—4 trains, 18 mtpa; GLNG—3 trains, 10 mtpa; QCLNG—3 trains, 12 mtpa).</li> </ul>	40 mtpa	<ul style="list-style-type: none"> <li>• Additional trains may be required at the existing plants.</li> <li>• Two additional berths may be required which would involve additional dredging.</li> <li>• Surplus infrastructure following LNG construction activities (e.g. laydown areas/ warehousing/ workforce accommodation).</li> </ul>
<b>Bauxite Alumina Aluminium</b>	<ul style="list-style-type: none"> <li>• Demand for alumina/aluminium increases.</li> <li>• The supply of bauxite increases: <ul style="list-style-type: none"> <li>◦ The South of the Embley project delivers 50 mtpa of bauxite (as per EIS report), of which approximately half is sent to Gladstone (25 mtpa).</li> <li>◦ The Aurukun project delivers approximately 5 mtpa of bauxite (as per EIS report), all of which is sent to Gladstone.</li> </ul> </li> <li>• Refining processes continue at Gladstone and refineries and smelters are built or expanded as required.</li> <li>• 10 mtpa of alumina/aluminium is exported through the port (based on approximate 3:1 ratio of bauxite imports to alumina/aluminium exports, as per 2013/14 trade figures).</li> </ul>	40 mtpa	<ul style="list-style-type: none"> <li>• An additional refinery will need to be constructed in the master planned area, even if the existing refineries are expanded to maximum capacity.</li> <li>• An additional smelter may be required.</li> <li>• Tighter emission controls.</li> <li>• Additional energy supply may be required.</li> <li>• Additional residue storage facilities may be required.</li> <li>• Two additional berths may be required which would involve additional dredging.</li> <li>• Beneficial reuse or land disposal of dredged material will be required.</li> </ul>
<b>Other existing commodities and new industries</b>	<ul style="list-style-type: none"> <li>• The amount of other existing commodities (e.g. ammonium nitrate, magnesia, grain, limestone, petroleum coke) and general cargo (including containers) being imported/exported increases, but remains a relatively small proportion of overall trade.</li> <li>• New industries (e.g. steel plant, nickel refinery, fertilizer manufacture, fuel refinery, oil shale) are developed in the area and new commodities are traded through the port.</li> <li>• There is some use of the port by the cruise shipping industry.</li> </ul>	15 mtpa	<ul style="list-style-type: none"> <li>• No major port infrastructure required.</li> <li>• Potential use of Barney Point for bulk commodities other than coal.</li> <li>• Further development of Fisherman's Landing expansion area.</li> <li>• Potential road network upgrades required.</li> <li>• May require a purpose built terminal for cruise shipping.</li> </ul>

230 mtpa

# Scenario three

## Overall assumptions

- 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, and toward lower carbon intensive and renewable sources of energy to achieve improved emissions.
- Potential for technological advances to enable ongoing demand for thermal coal due to lower emissions.
- Growth of coal exports supported by development of the Surat Basin linked to the Port of Gladstone by the Surat Basin Railway.
- New major industries developed within the master planned area.
- Significant development at Fisherman's Landing expansion and Hamilton Point and 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 dredged 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.

Scenario three

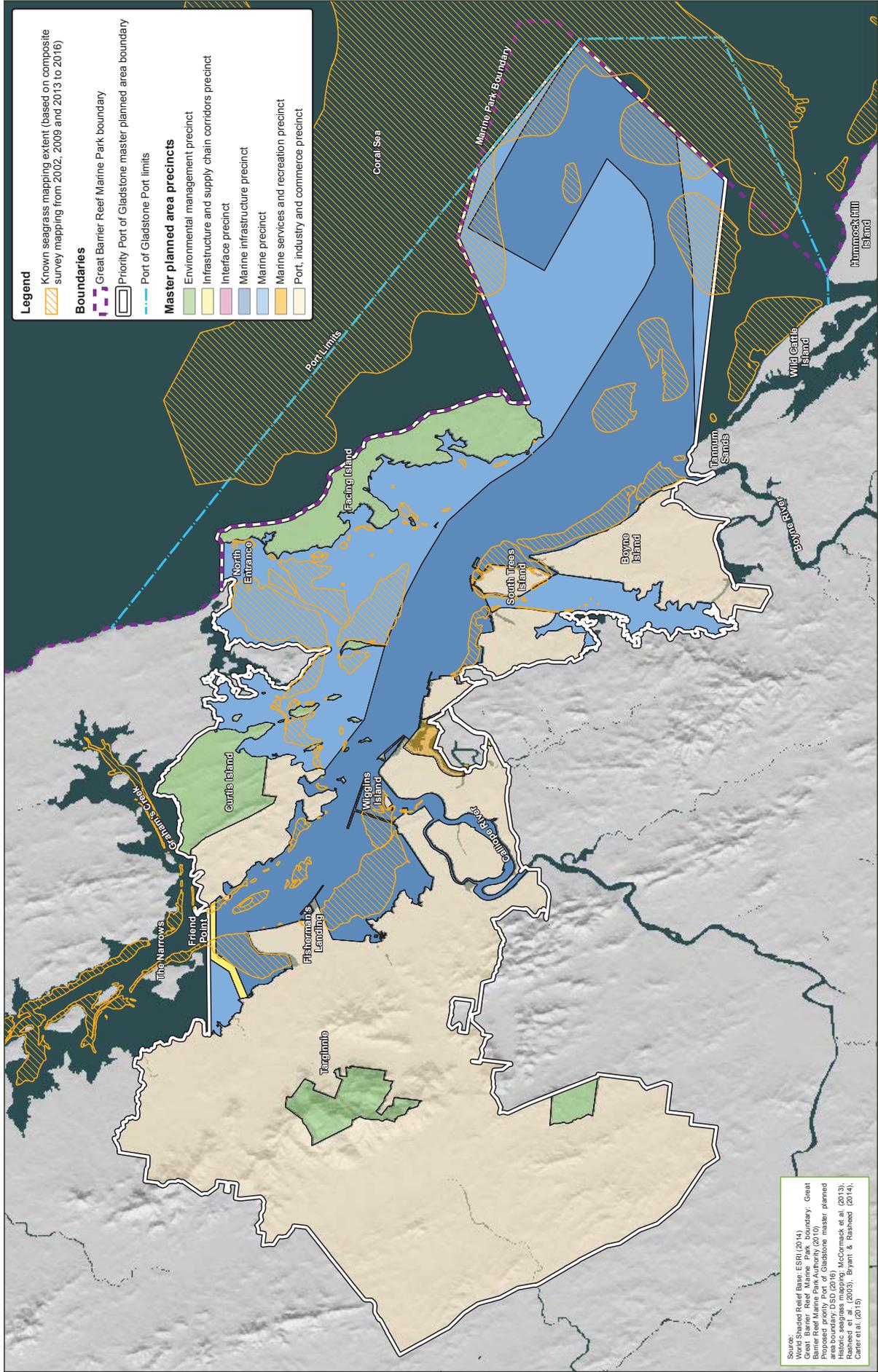
Industry	Assumptions	Maximum throughput	Implications
<b>Coal</b>	<ul style="list-style-type: none"> <li>• Supply and demand for coal increases.</li> <li>• Surat Basin mines are operational.</li> <li>• Surat Basin rail is operational.</li> <li>• RG Tanna coal terminal is operating at its full capacity (80 mtpa).</li> <li>• Wiggins Island Coal Terminal (WICT) is fully constructed and operating at full approved capacity (84 mtpa, as per EIS report).</li> <li>• Barney Point does not operate as a coal terminal but is used for other bulk commodities.</li> </ul>	164 mtpa	<ul style="list-style-type: none"> <li>• Expansion of coal terminal capacity will take place only at WICT and RG Tanna—additional coal terminals will not be required.</li> <li>• Additional berths may be required which would involve additional dredging.</li> </ul>
<b>LNG</b>	<ul style="list-style-type: none"> <li>• Supply and demand for LNG increases.</li> <li>• The existing LNG plants are operating at maximum capacity (based on approvals: APLNG—4 trains, 18 mtpa; GLNG—3 trains, 10 mtpa; QCLNG—3 trains, 12 mtpa).</li> <li>• An additional LNG plant is constructed with a capacity of 10 mtpa.</li> </ul>	50 mtpa	<ul style="list-style-type: none"> <li>• Additional trains required at the existing plants.</li> <li>• 2-3 additional berths may be required which would involve additional dredging.</li> <li>• Beneficial reuse or land disposal of dredged material will be required.</li> <li>• Development requires large module/equipment to be transported through the port.</li> </ul>
<b>Bauxite Alumina Aluminium</b>	<ul style="list-style-type: none"> <li>• Demand for alumina/aluminium increases.</li> <li>• The supply of bauxite increases:               <ul style="list-style-type: none"> <li>◦ The South of the Embley project delivers 50 mtpa of bauxite, of which approximately half is sent to Gladstone (25 mtpa).</li> <li>◦ The Aurukun project delivers approximately 5 mtpa of bauxite, all of which is sent to Gladstone.</li> </ul> </li> <li>• Refining processes continue at Gladstone and refineries and smelters are built or expanded as required.</li> <li>• 10 mtpa of alumina/aluminium is exported through the port (based on approximate 3:1 ratio of bauxite imports to alumina/aluminium exports, as per 2013/14 trade figures).</li> </ul>	40 mtpa	<ul style="list-style-type: none"> <li>• An additional refinery will need to be constructed in the master planned area, even if the existing refineries are expanded to maximum capacity.</li> <li>• An additional smelter may be required.</li> <li>• Additional residue storage facilities may be required.</li> <li>• Development requires large module/equipment to be transported through the port.</li> <li>• Additional energy supply may be required.</li> <li>• Two additional berths may be required which would involve additional dredging.</li> <li>• Beneficial reuse or land disposal of dredged material will be required.</li> </ul>

Industry	Assumptions	Maximum throughput	Implications
<b>Other existing commodities and new industries</b>	<ul style="list-style-type: none"> <li>The amount of other existing commodities (e.g. ammonium nitrate, magnesia, grain, limestone, petroleum coke) and general cargo (including containers) being imported/exported increases.</li> <li>New industries (e.g. steel plant, nickel refinery, fertilizer manufacture, fuel refinery, oil shale) are developed in the area and new commodities are traded through the port.</li> <li>There is increased development of industries supporting the resources sector.</li> <li>New port facilities are developed at Hamilton Point on Curtis Island.</li> <li>There is some use of the port by the cruise shipping industry.</li> </ul>	40 mtpa	<ul style="list-style-type: none"> <li>Additional berths may be required which would involve additional dredging.</li> <li>Beneficial reuse or land disposal of dredged material will be required.</li> <li>There is some use of the port by cruise shipping.</li> <li>Potential use of Barney Point for bulk commodities other than coal.</li> <li>Additional major infrastructure including road and rail connection between Hamilton Point and the mainland.</li> <li>Further development of Fisherman's Landing expansion area.</li> <li>Potential road network upgrades required.</li> <li>May require a purpose built terminal for cruise shipping.</li> <li>Construction activities may require large module/equipment to be transported through the port.</li> </ul>

294 mtpa

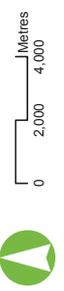
# **Appendix C: Mapping of the OUV of the GBRWHA and other environmental values**

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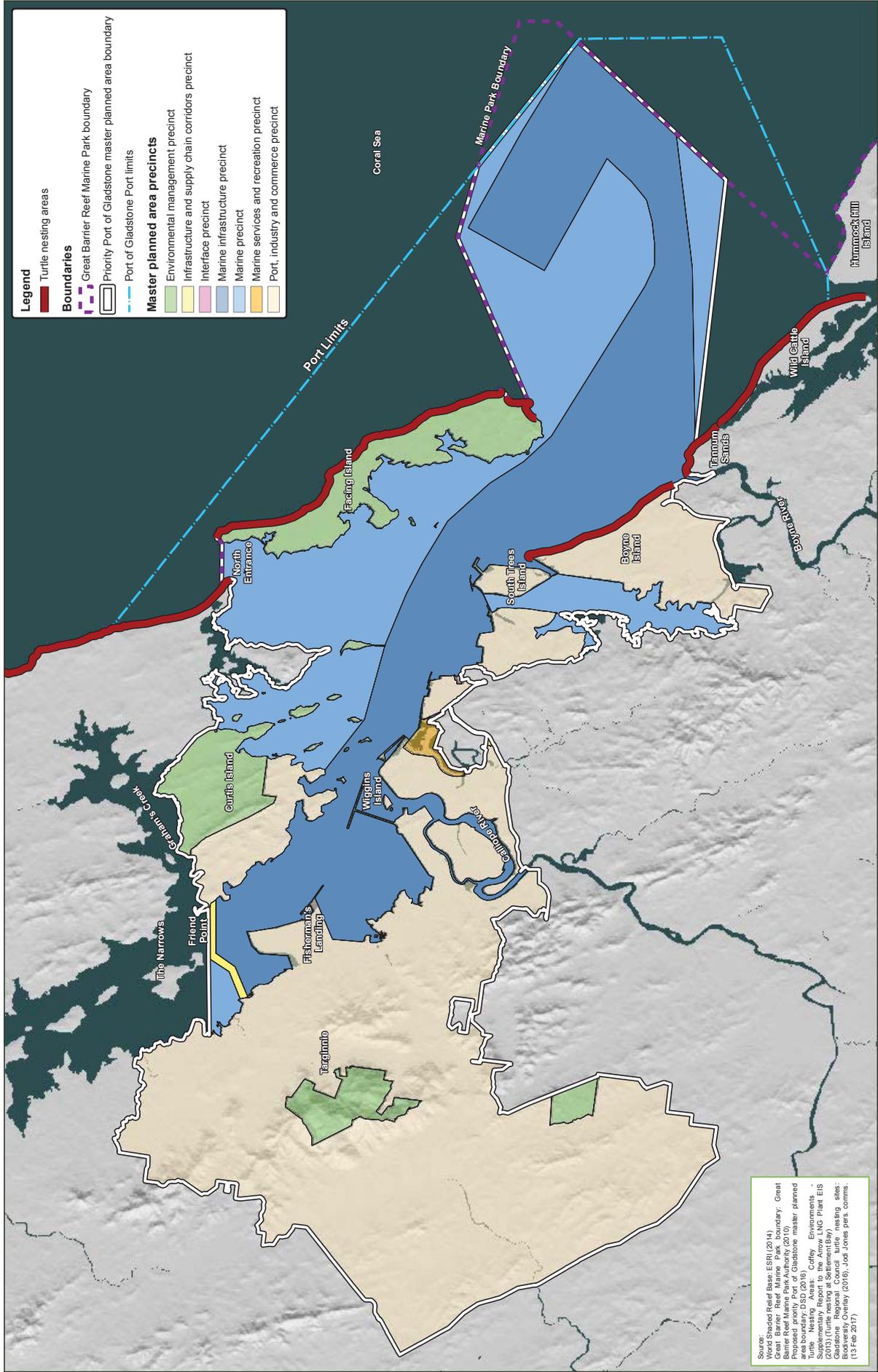


Priority Port of Gladstone master plan  
 Figure C1: Seagrass

Date: 16/05/2017 Version: 4 Job No: 253916  
 Coordinate system: GDA 1994 MGA Zone 56

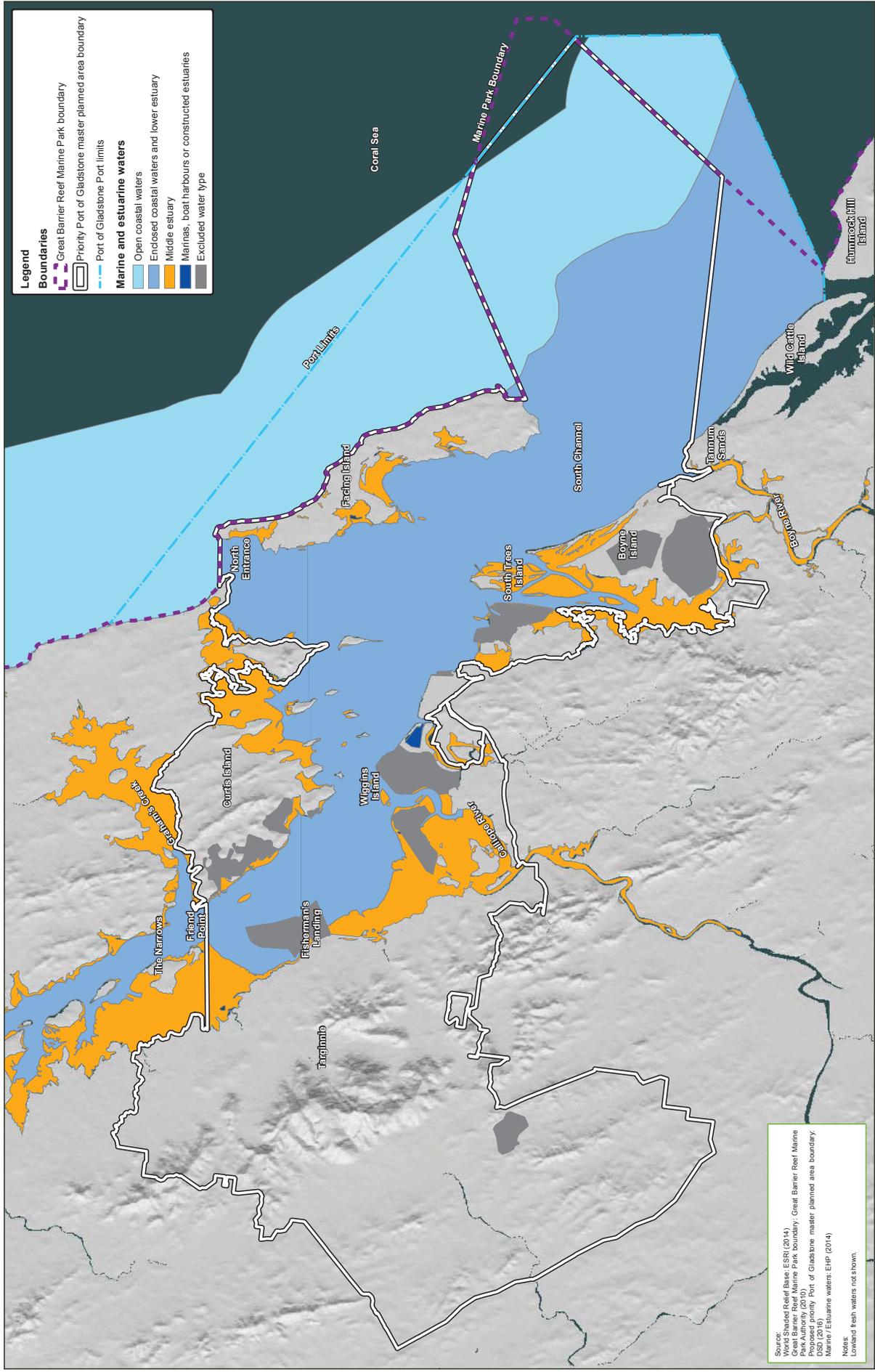




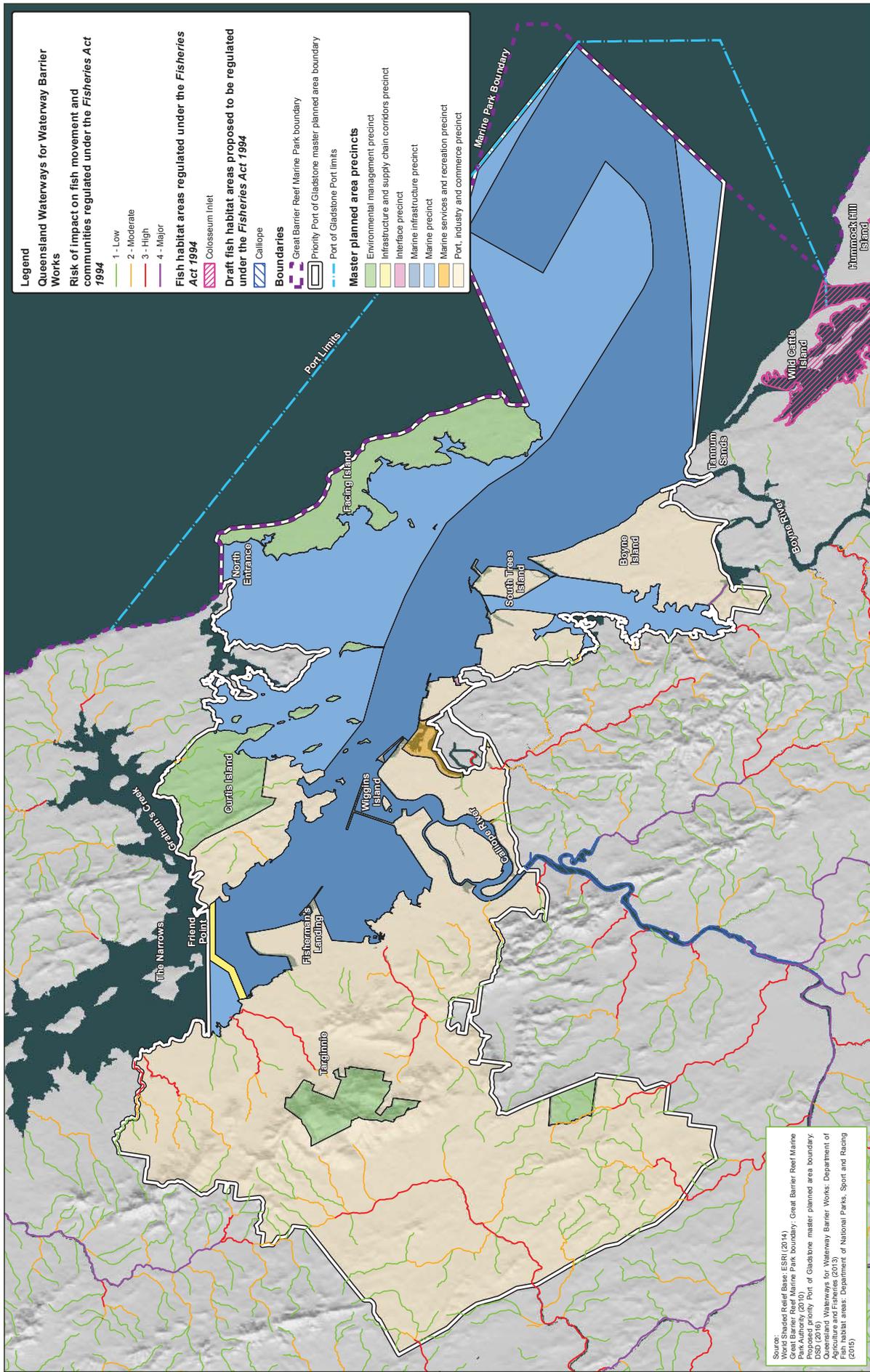


Priority Port of Gladstone master plan  
 Figure C3: Turtle nesting beaches

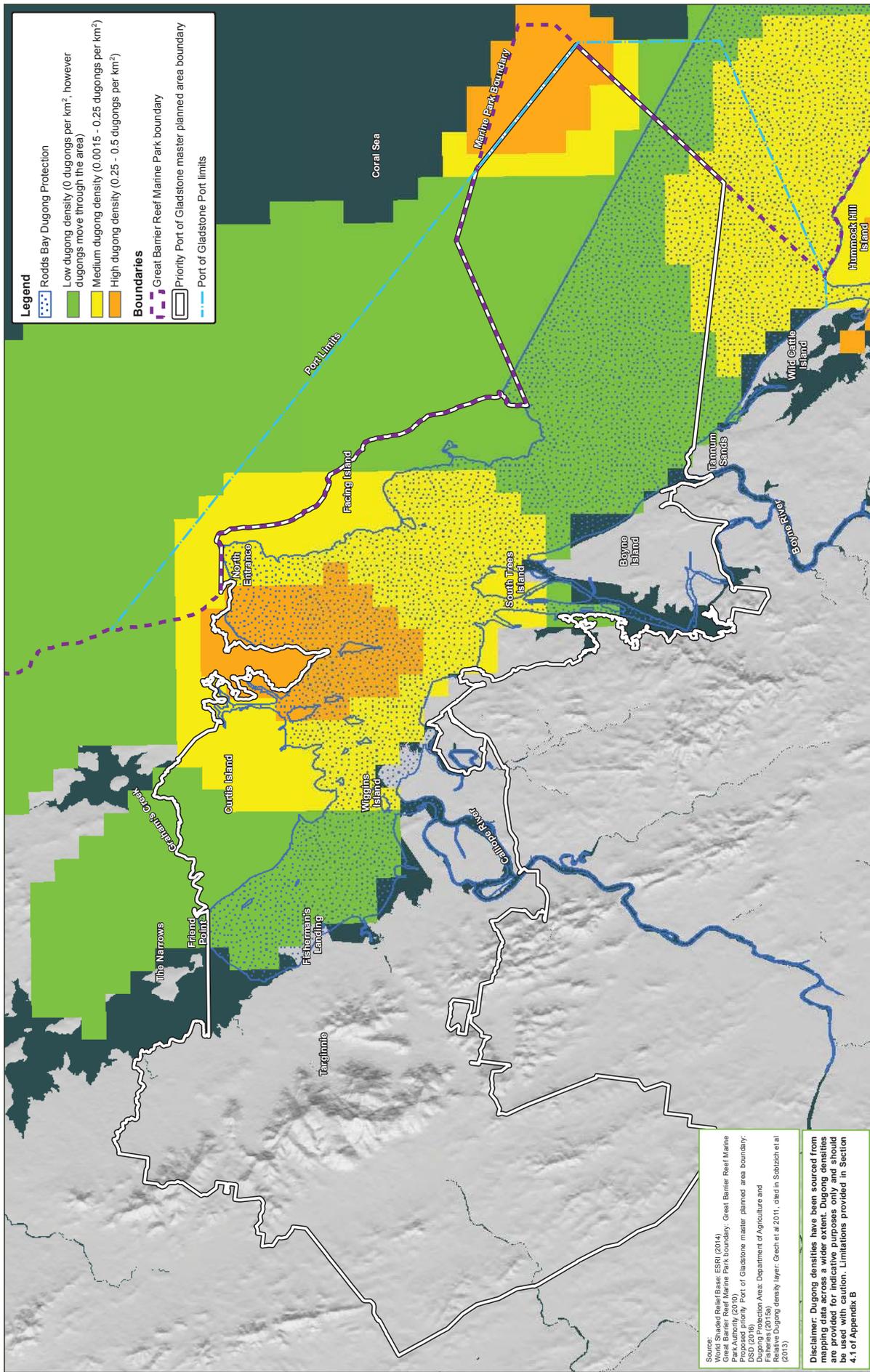




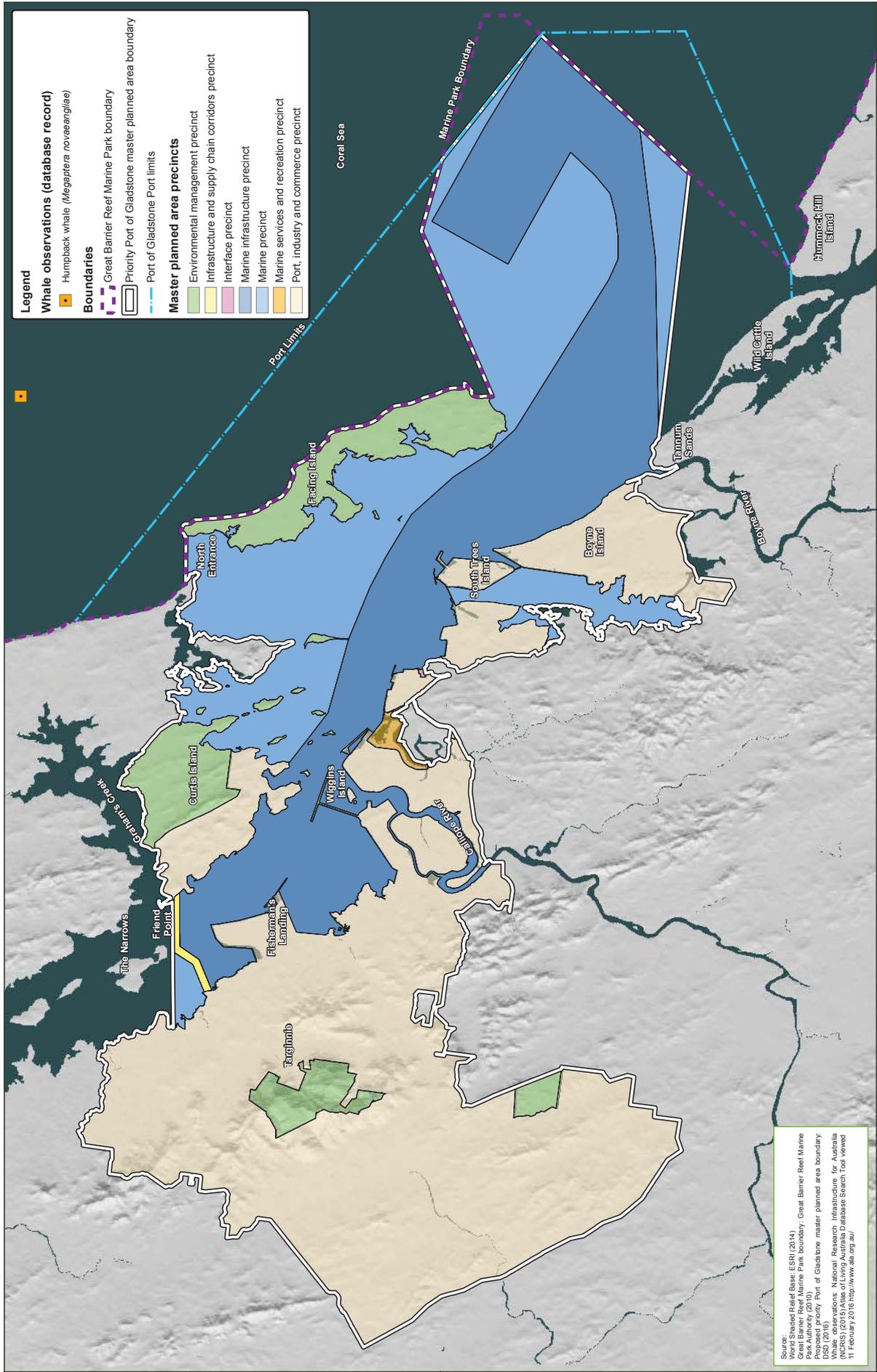
Priority Port of Gladstone master plan  
 Figure C5: Marine and estuarine water types



Priority Port of Gladstone master plan  
**Figure C6: Fish habitat areas and waterways providing for fish passage**



Priority Port of Gladstone master plan  
**Figure C7: Rodds Bay Dugong Protection Area and relative Dugong density based on aerial surveys (1986 to 2005)**



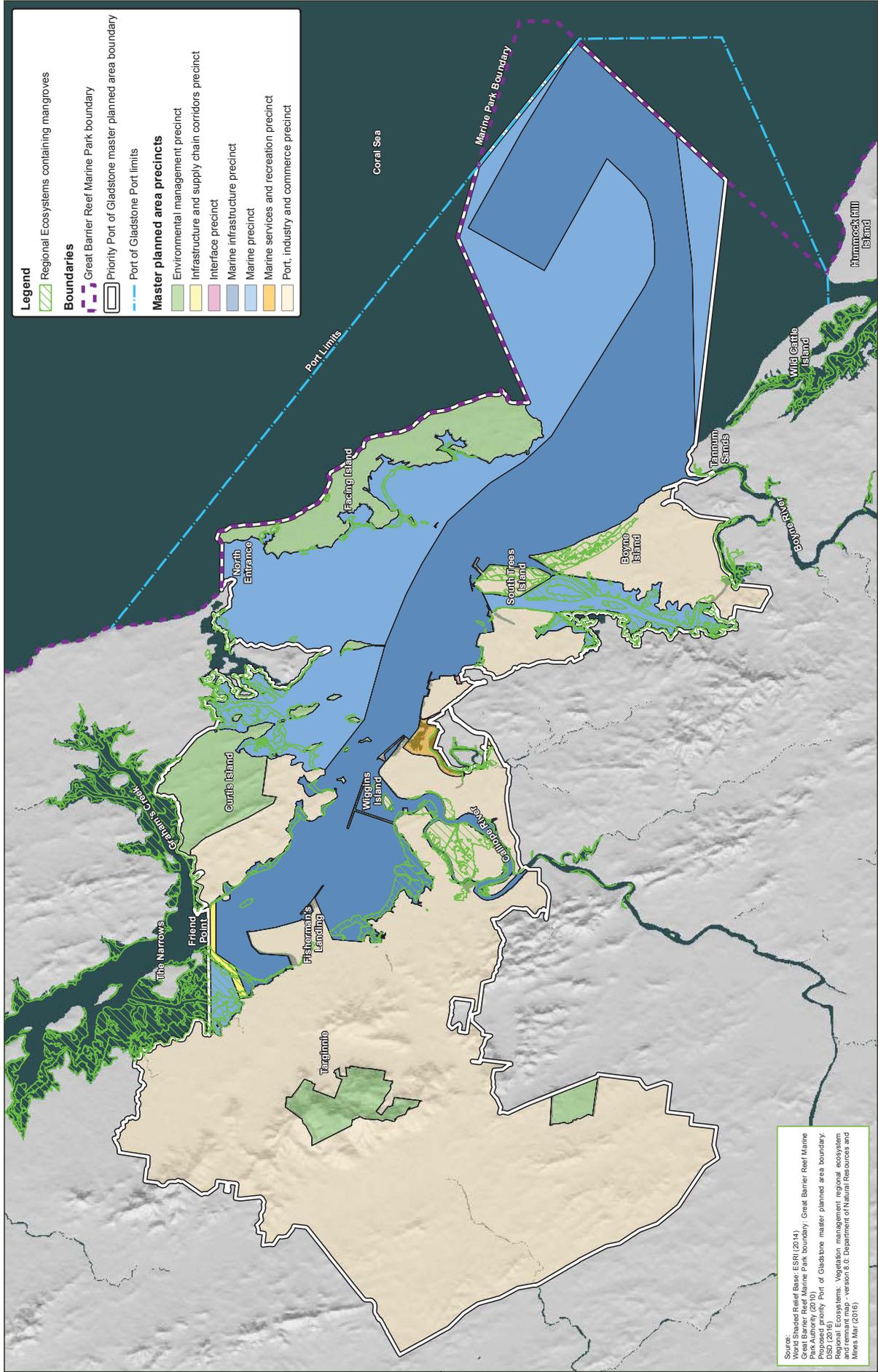
Priority Port of Gladstone master plan  
Figure C8: Migrating whales

Source:  
World Shaded Relief Base: ESRI (2014)  
Great Barrier Reef Marine Park boundary: Great Barrier Reef Marine Park Authority (2016)  
Priority Port of Gladstone master planned area boundary: DSD (2016)  
Whale observations: National Research Infrastructure for Australia (2016) <http://www.nria.gov.au/>  
11 February 2016 <http://www.ala.org.au/>

0 2,500 5,000 Meters  
Date: 16/05/2017 Version: 4 Job No: 253916  
Coordinate system: GDA 1994 MGA Zone 56

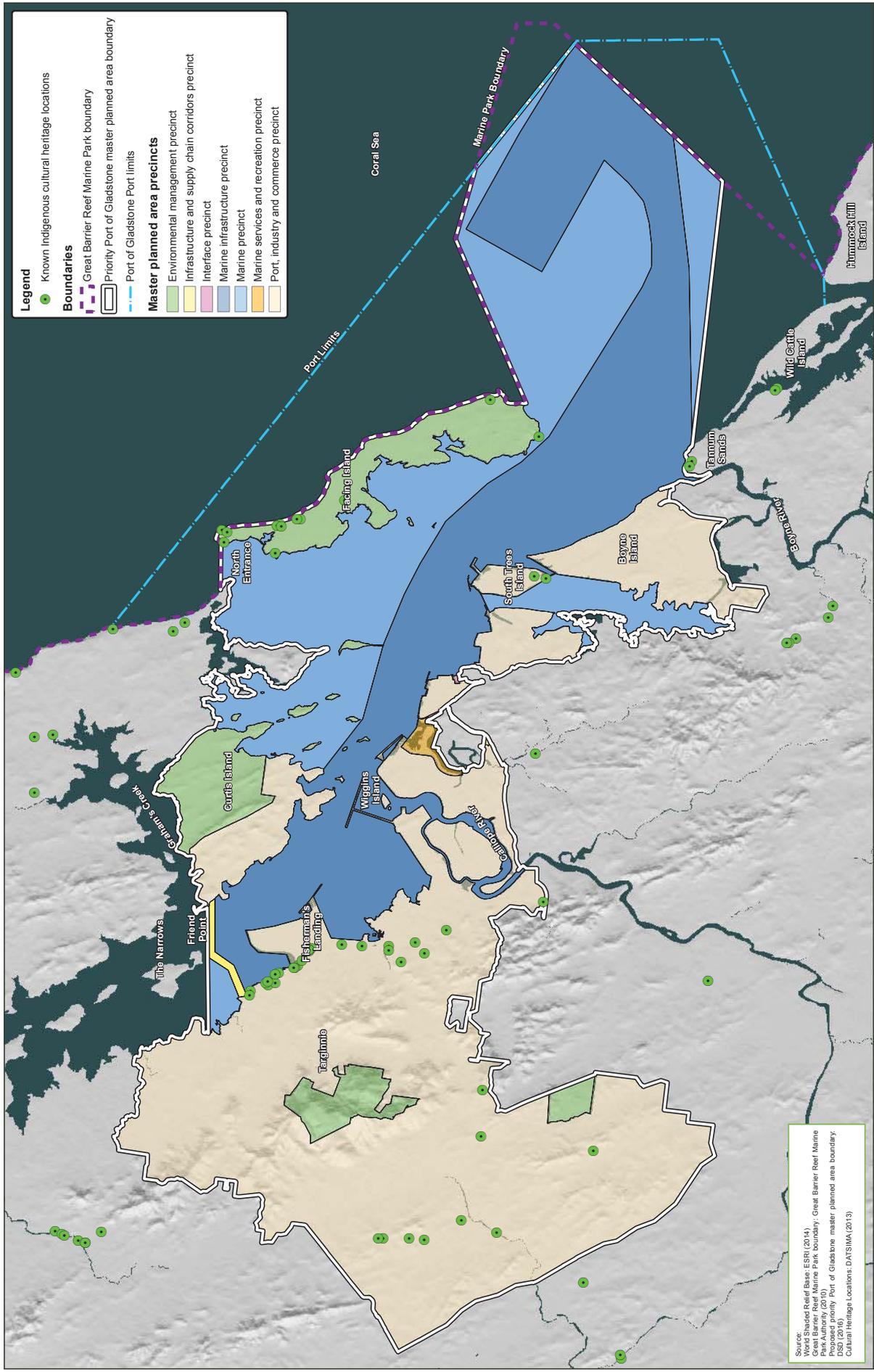
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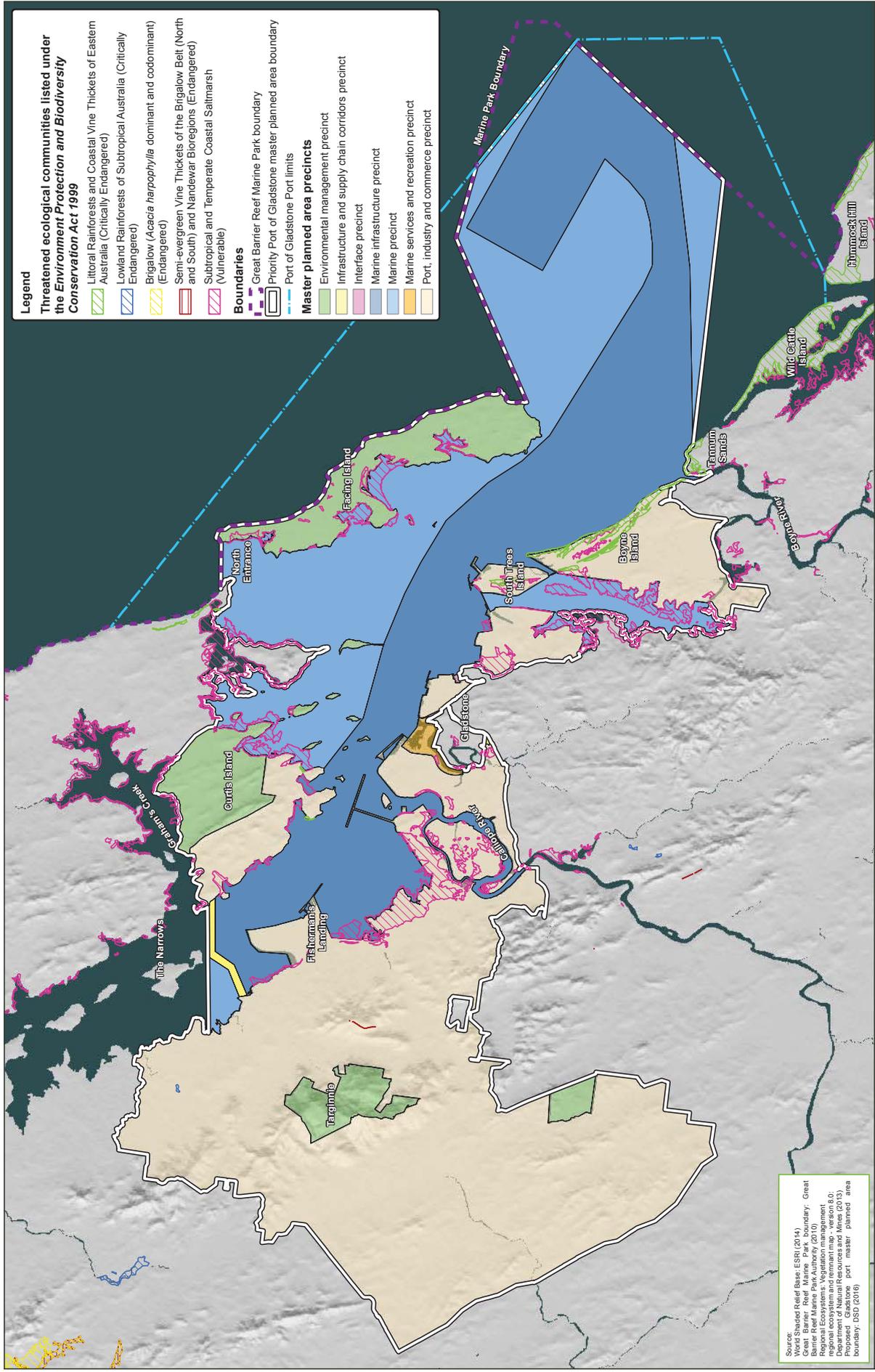
Priority Port of Gladstone master plan  
 Figure C10: Regional Ecosystems containing mangrove communities

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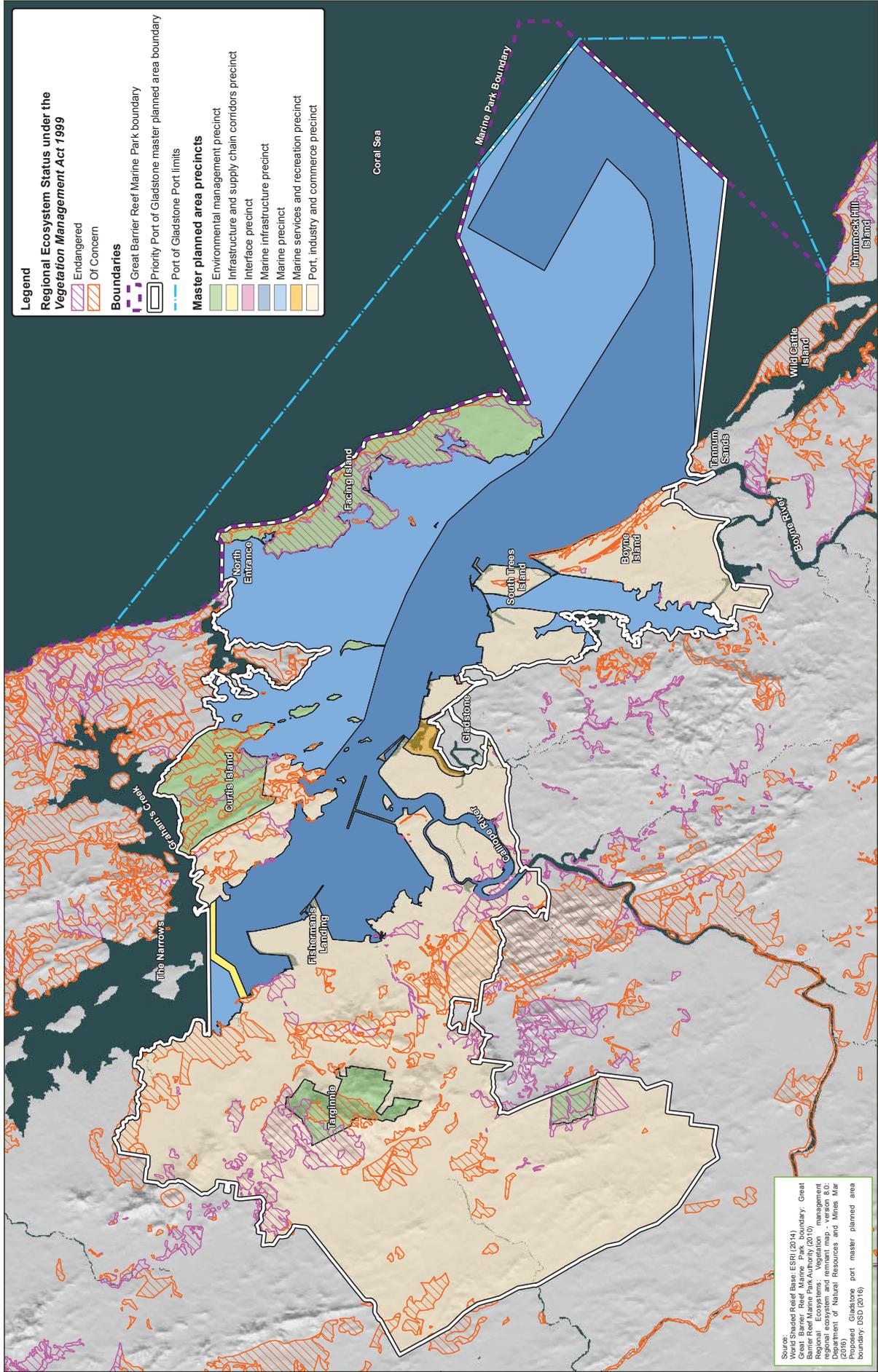


Priority Port of Gladstone master plan  
 Figure C11: Known Indigenous cultural heritage sites regulated under the Aboriginal Cultural Heritage Act 2003

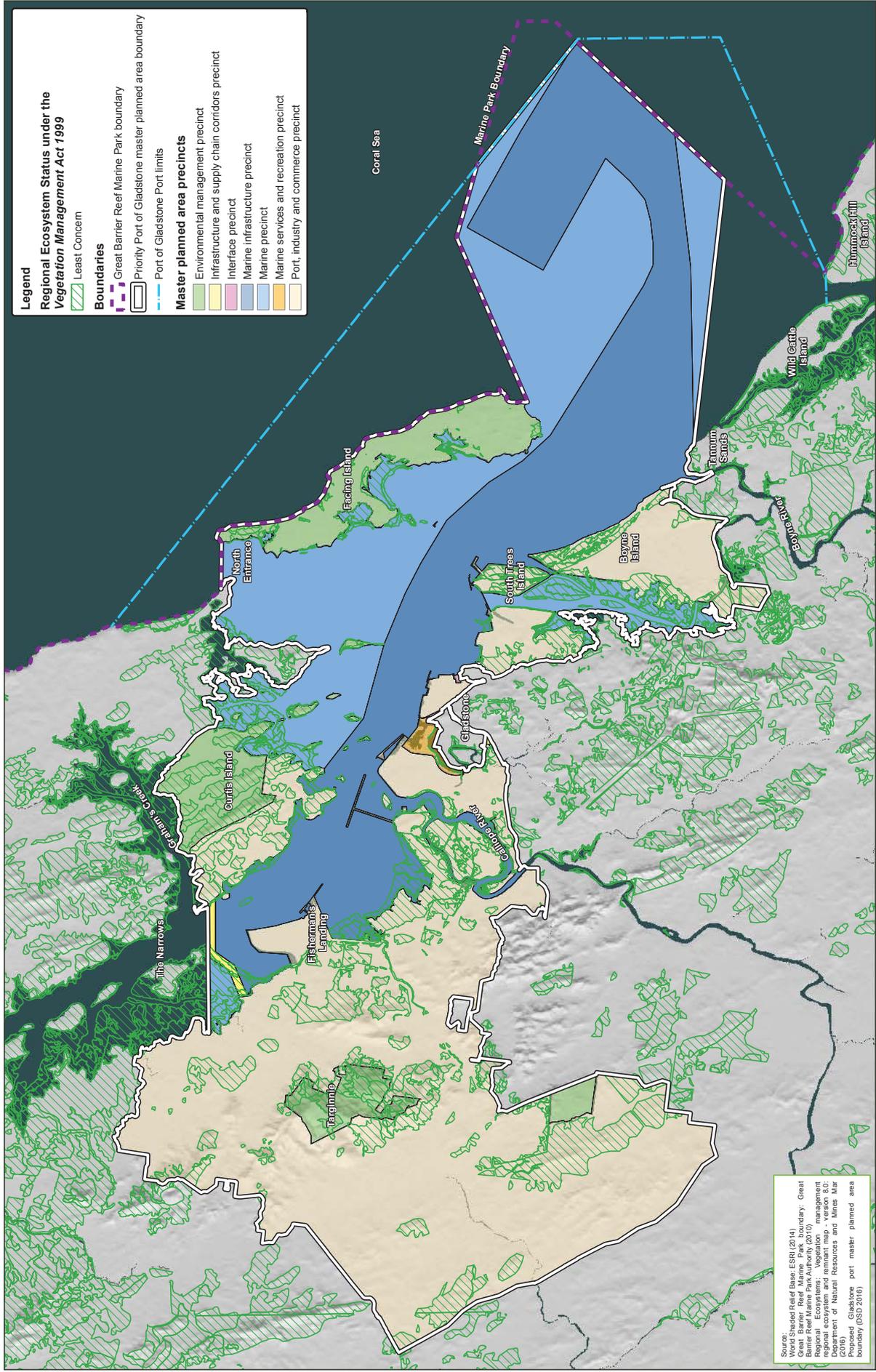




Priority Port of Gladstone master plan  
 Figure C13: Threatened ecological communities listed under the Environment Protection and Biodiversity Conservation Act 1999

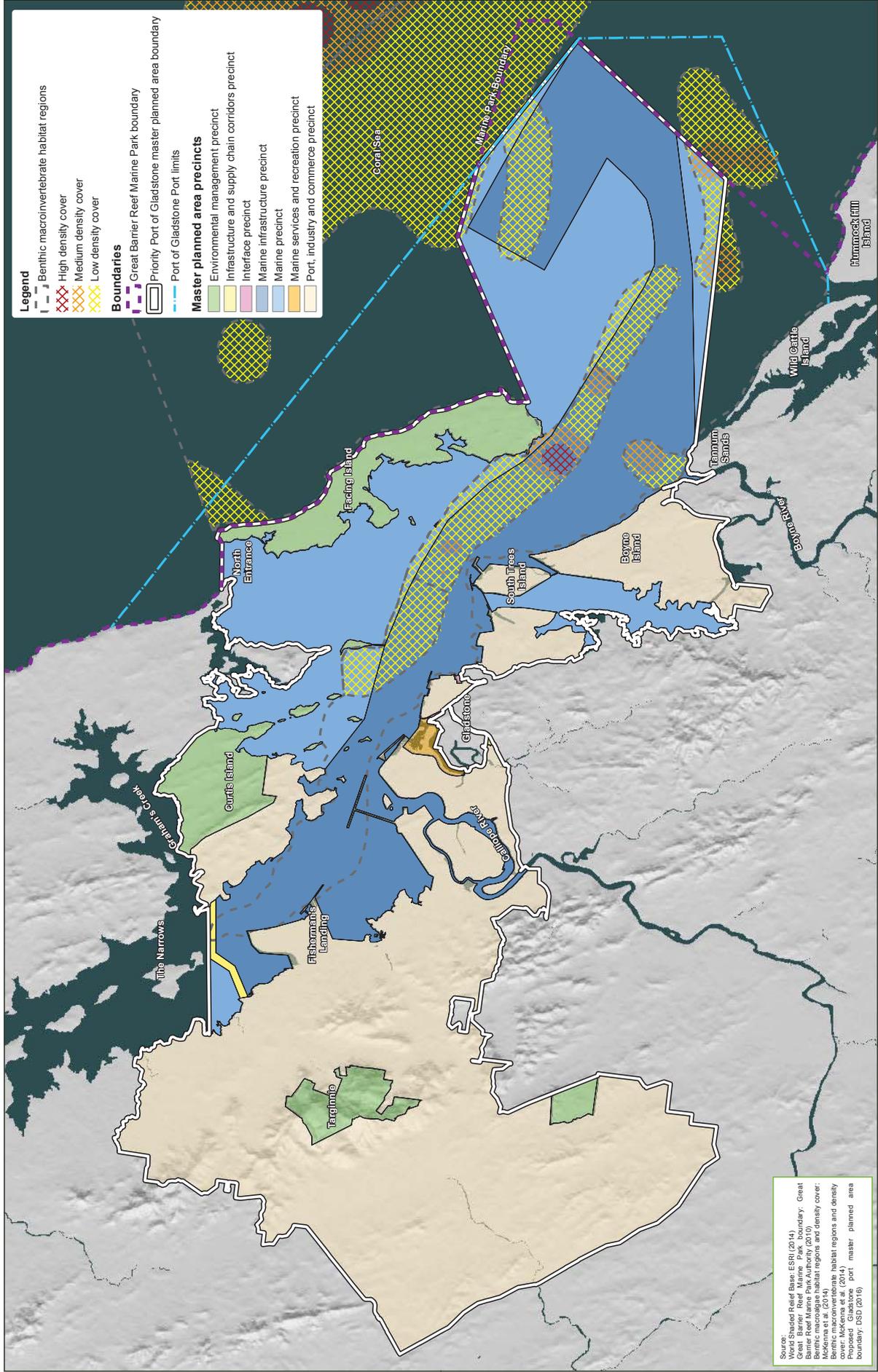


Priority Port of Gladstone master plan  
 Figure C-14: Endangered and Of concern Regional Ecosystems as listed under the Vegetation Management Act 1999

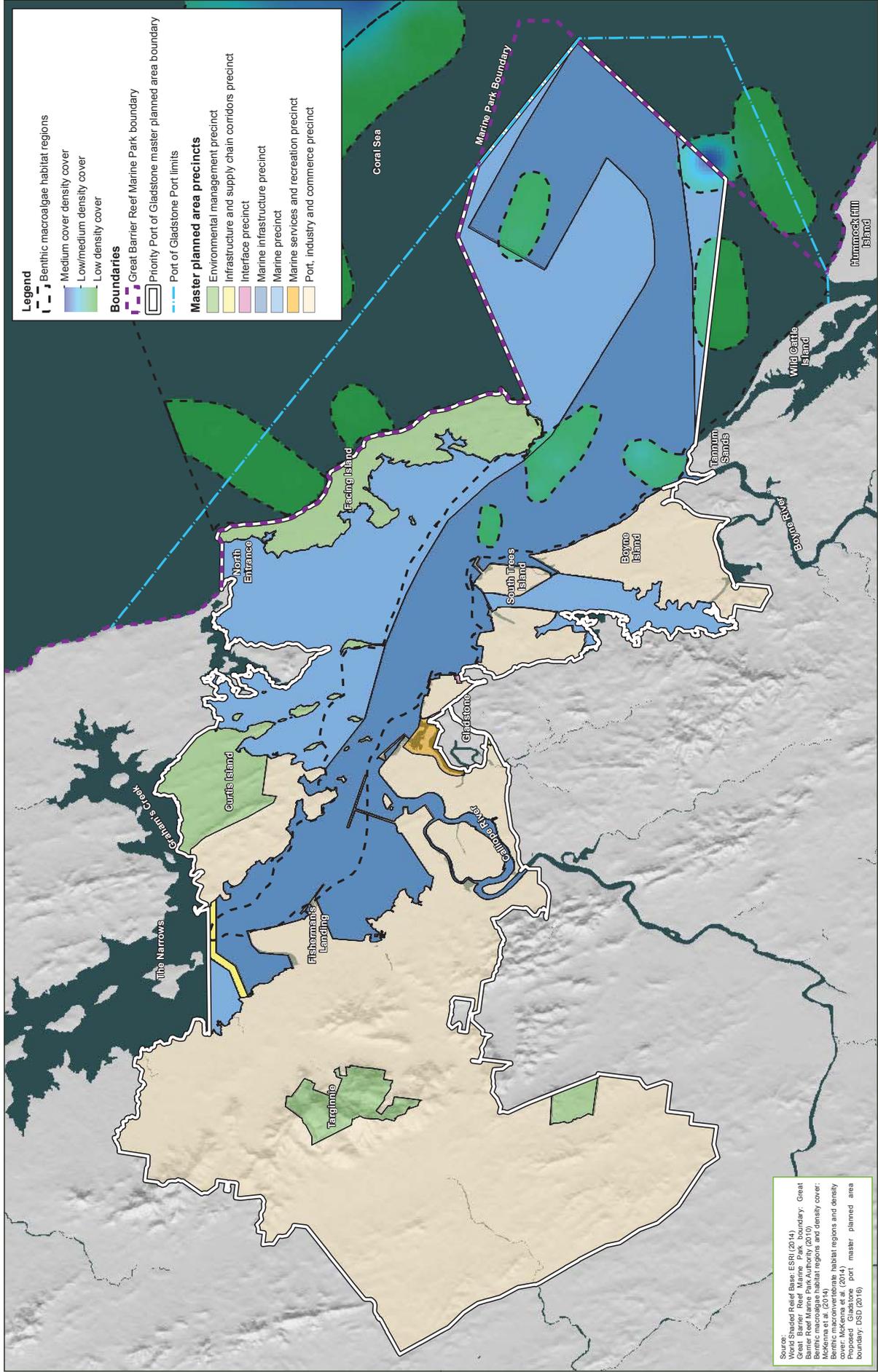


Priority Port of Gladstone master plan

Figure C-15: Least concern Regional Ecosystems as listed under the Vegetation Management Act 1999

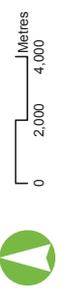


Priority Port of Gladstone master plan  
 Figure C16: Benthic macroalgae and macroinvertebrate distribution and density  
 Page 1 of 2



Priority Port of Gladstone master plan  
 Figure C16: Benthic macroalgae and macroinvertebrate distribution and density  
 Page 2 of 2

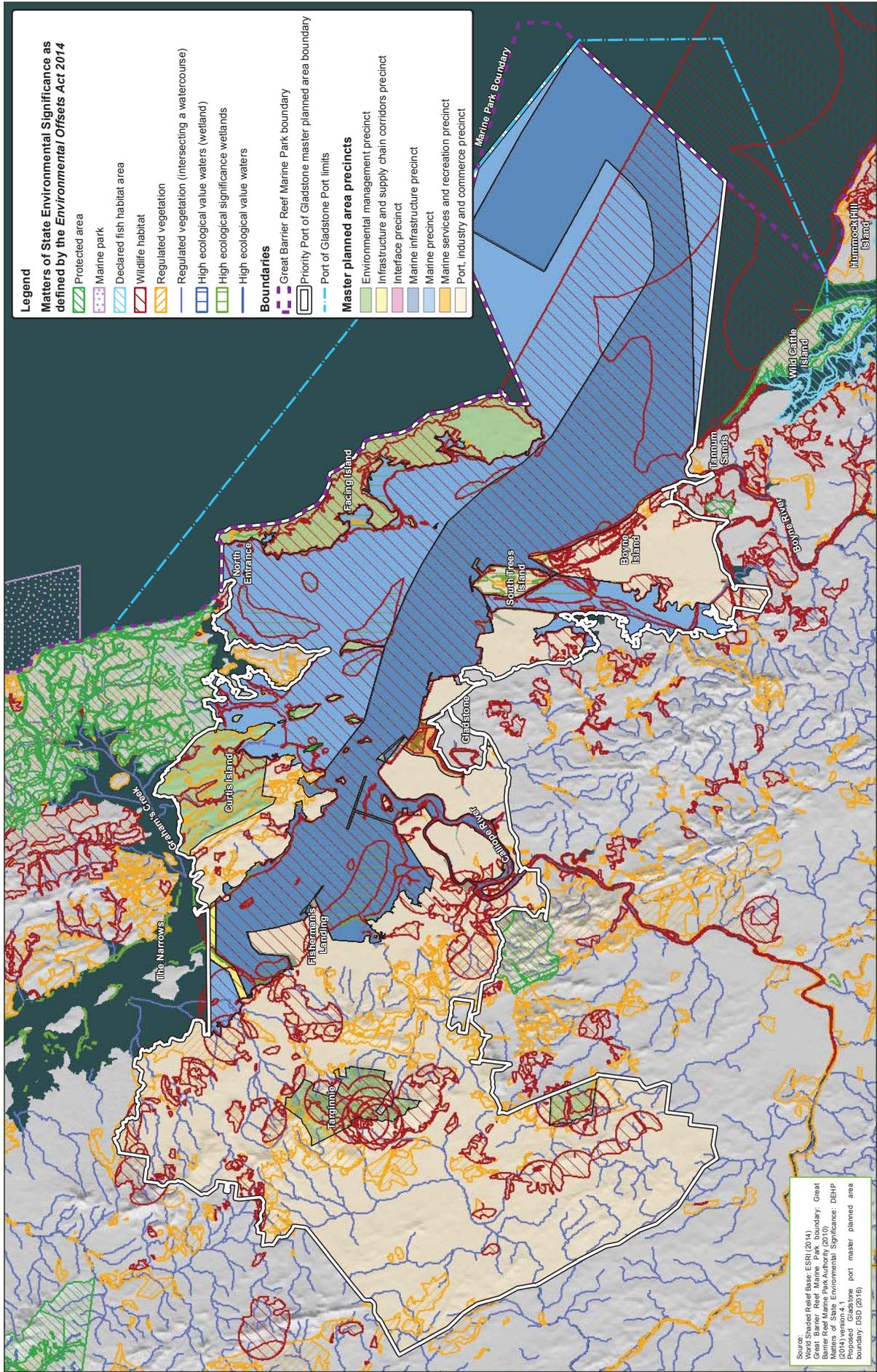
Date: 16/05/2017 Version: 4 Job No: 253916  
 Coordinate system: GDA 1994 MGA Zone 56



Source:  
 World Shaded Relief Base: ESRI (2014)  
 Great Barrier Reef Marine Park boundary: Great Barrier Reef Marine Park Authority (2014)  
 Benthic macroalgae habitat regions and density cover: McKenna et al. (2014)  
 Benthic macroinvertebrate habitat regions and density cover: McKenna et al. (2014)  
 Proposed Gladstone port master planned area boundary: DSD (2016)

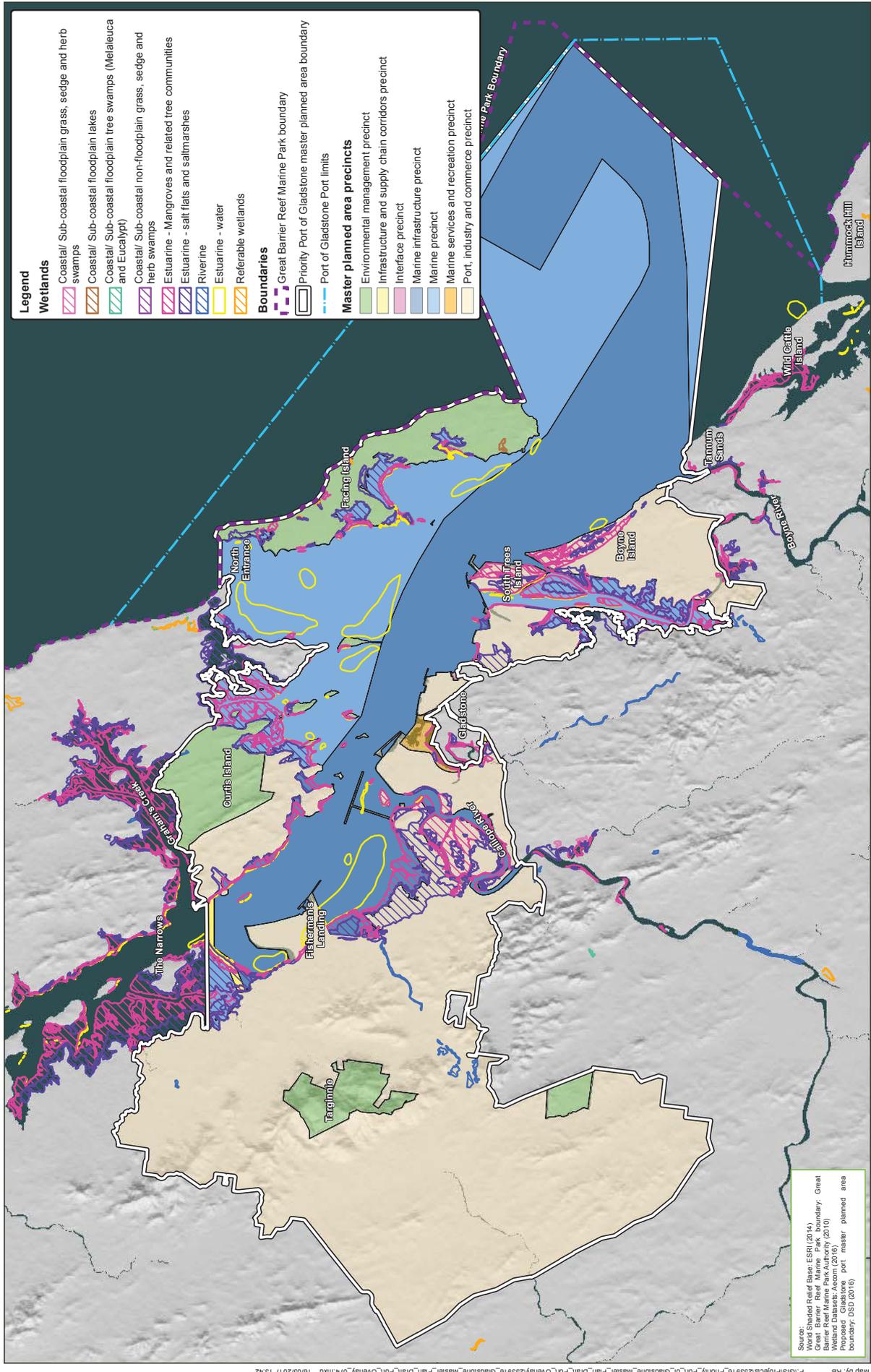
Map by: RB  
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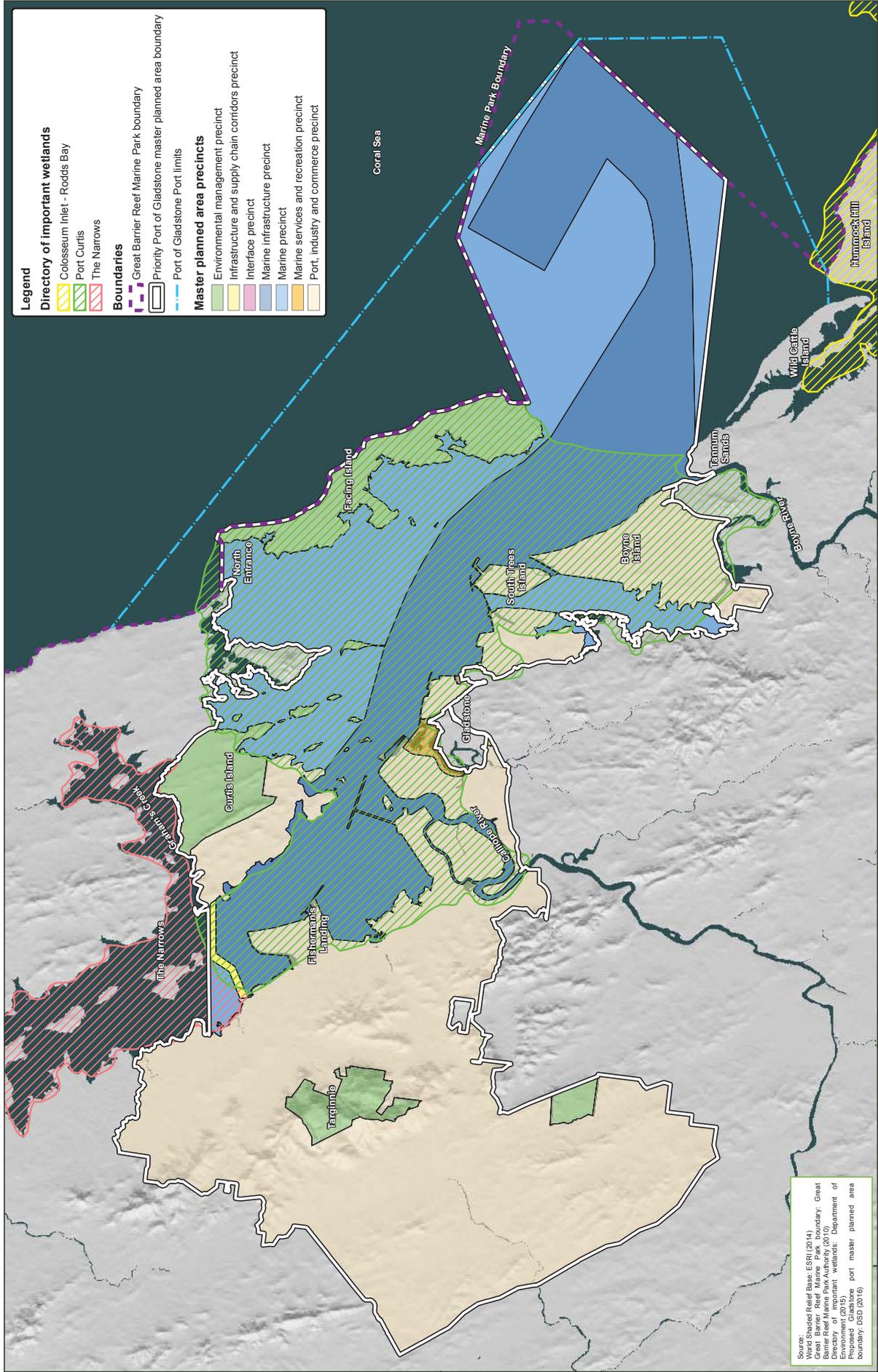


Priority Port of Gladstone master plan

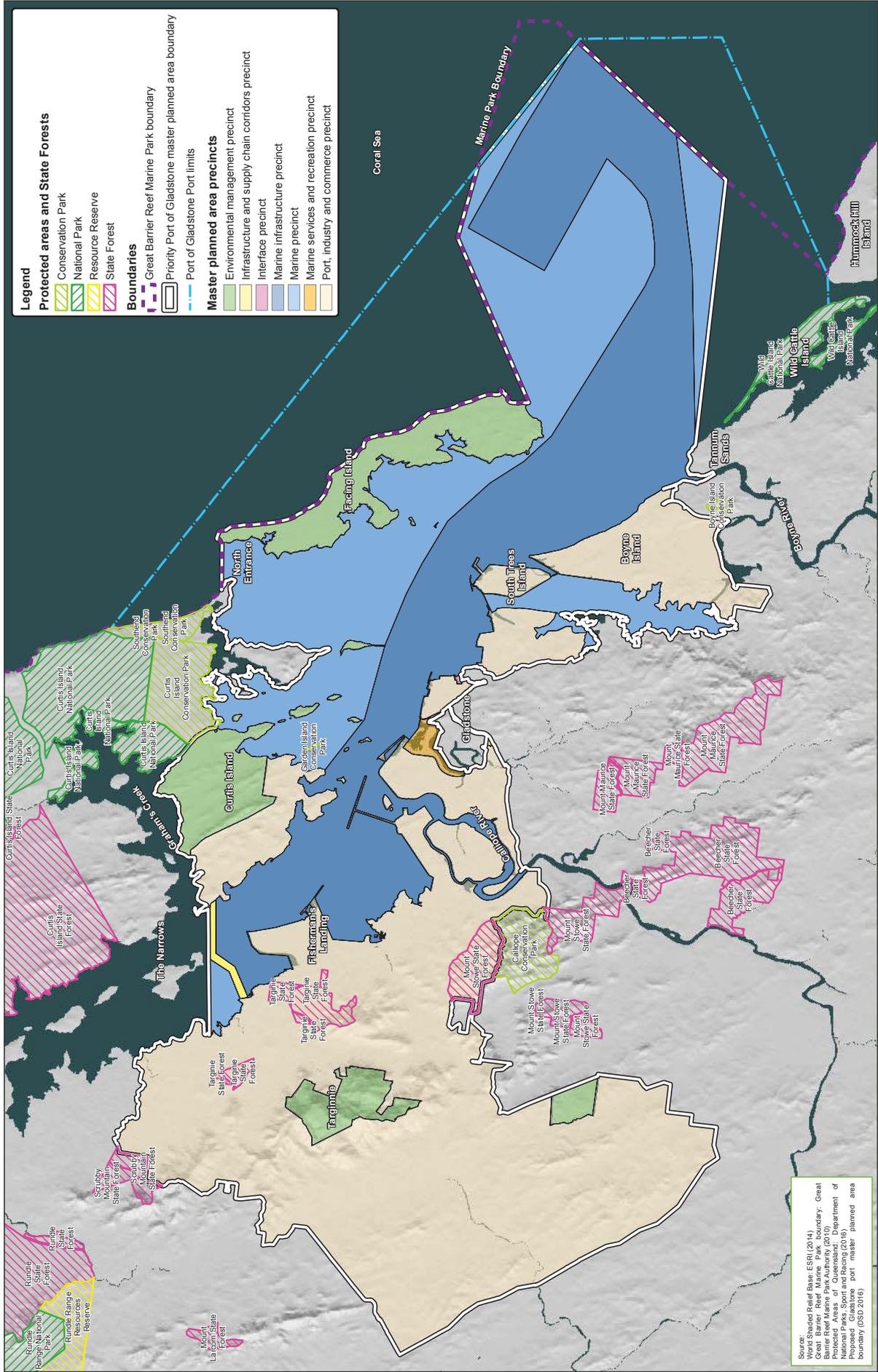
Figure C18: Matters of state environmental significance defined under the Environmental Offsets Act 2014



Priority Port of Gladstone master plan  
 Figure C19: Wetlands as mapped in the Evidence Base Report

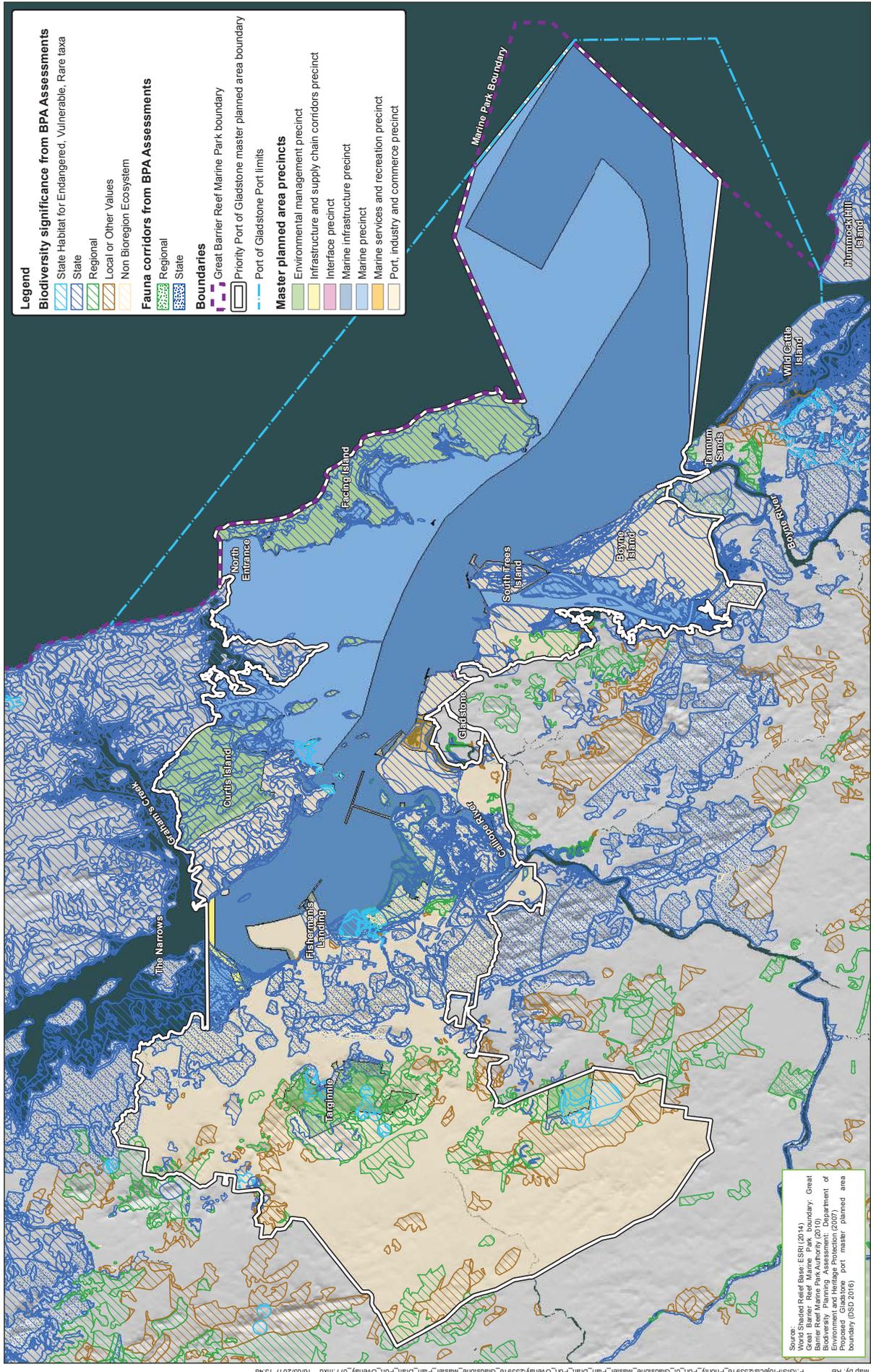


Priority Port of Gladstone master plan  
 Figure C20: Directory of important wetlands

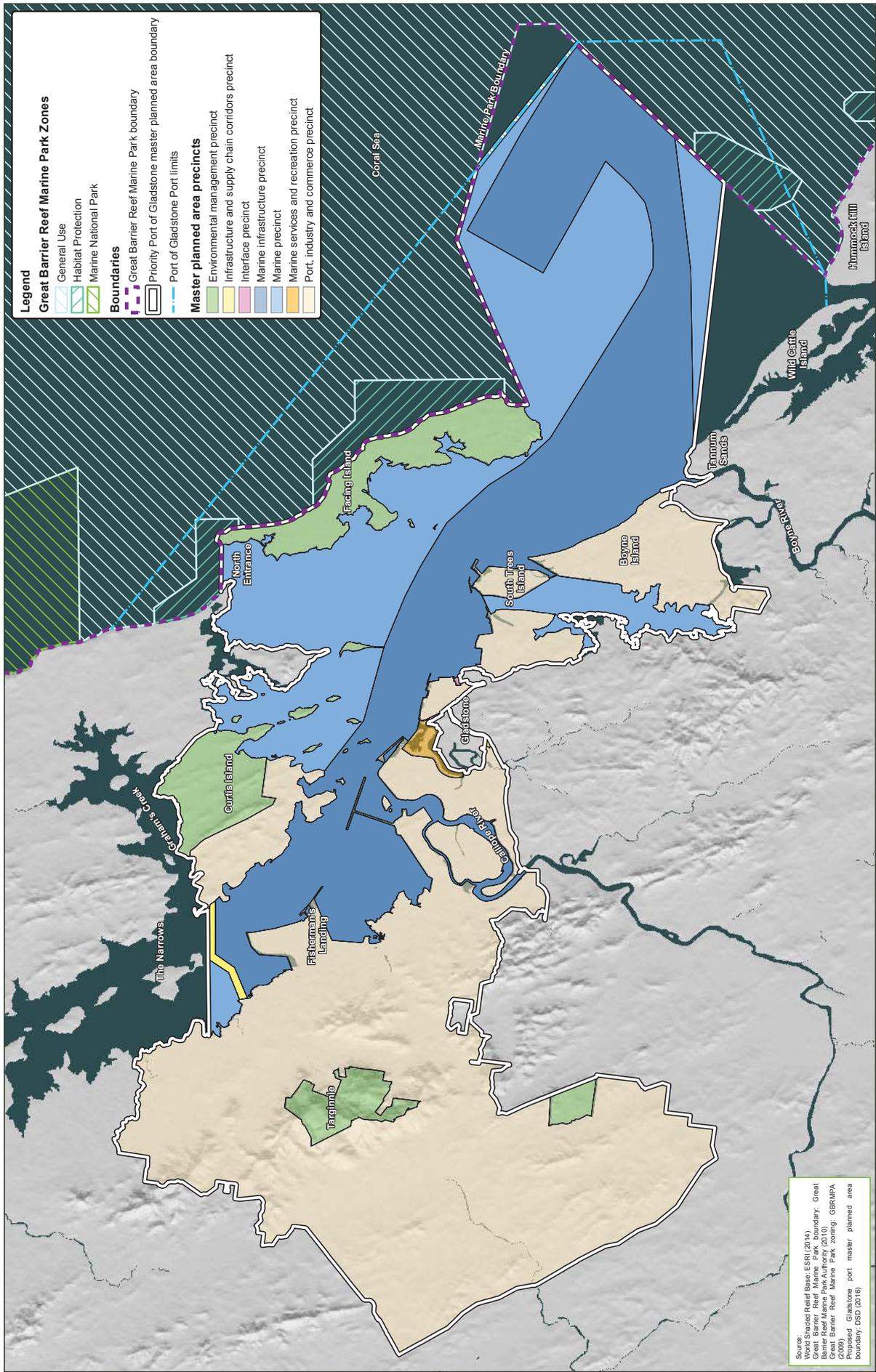


Priority Port of Gladstone master plan

Figure C21: Protected areas regulated under the Nature Conservation Act 1992 and State Forests regulated under the Forestry Act 1959

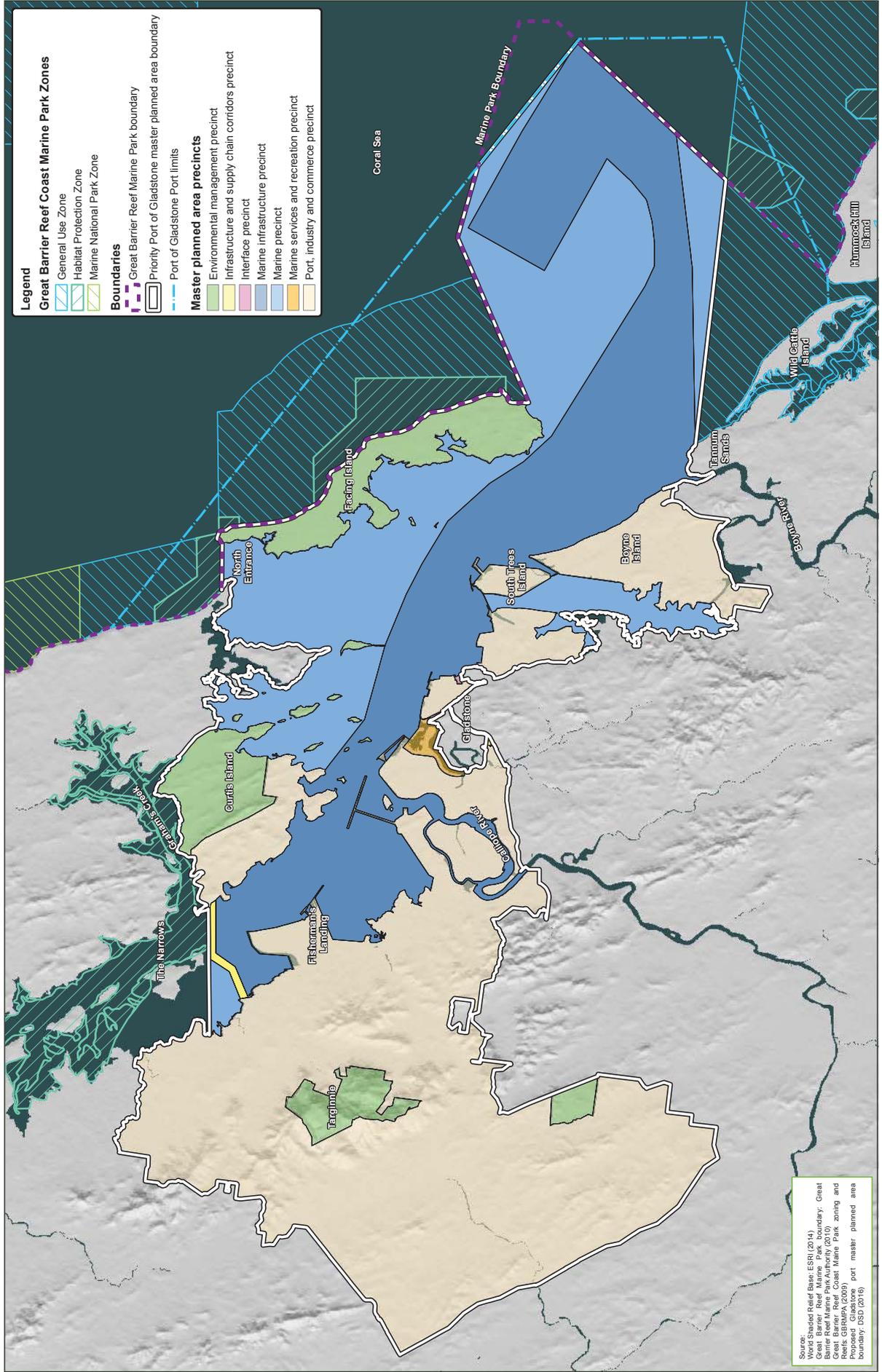


Priority Port of Gladstone master plan  
Figure C22: Biodiversity Planning Assessment areas mapped using the Biodiversity Assessment and Mapping Methodology

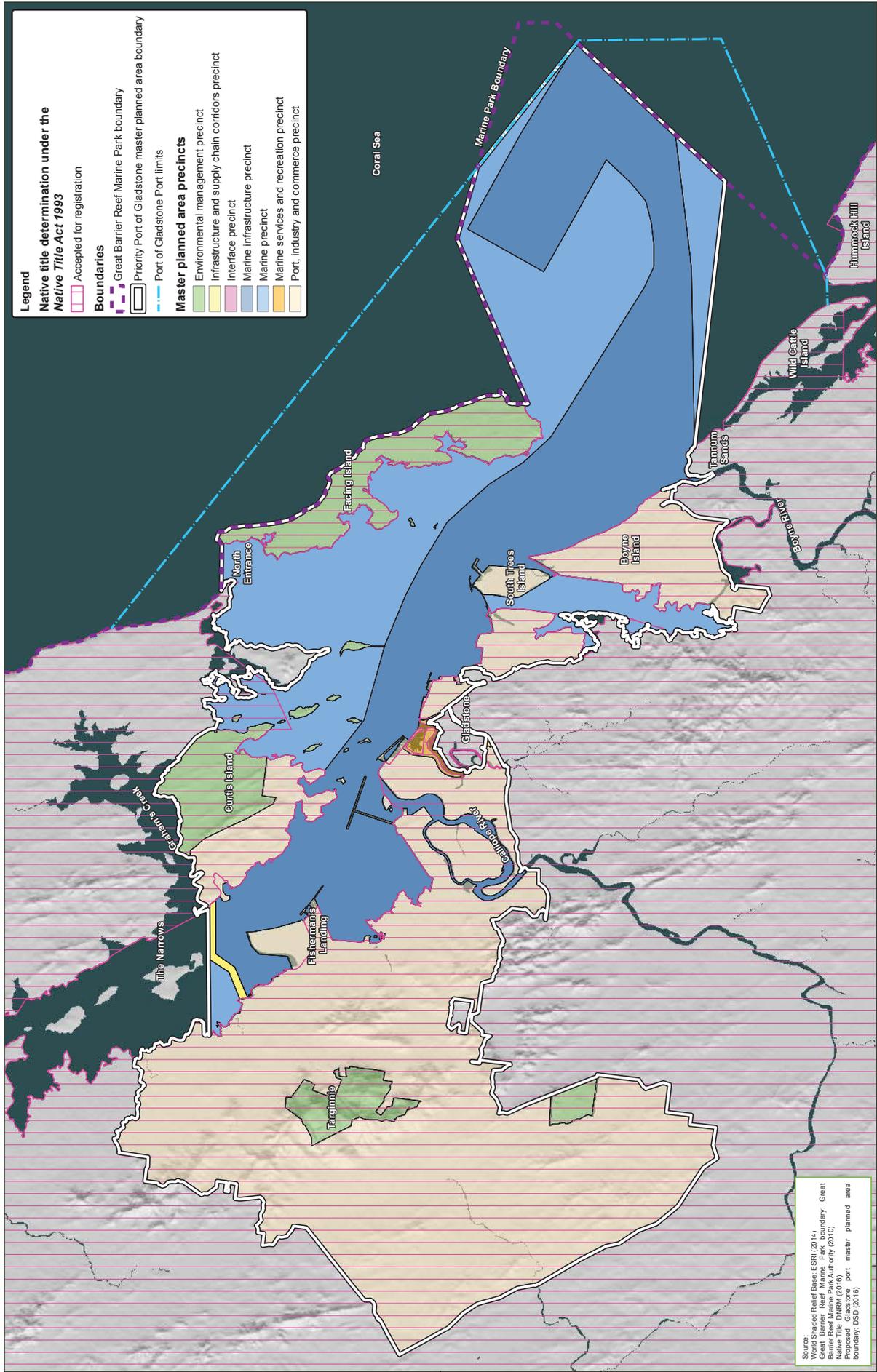


Priority Port of Gladstone master plan  
 Figure C23: Great Barrier Reef Marine Park Zones (Commonwealth)

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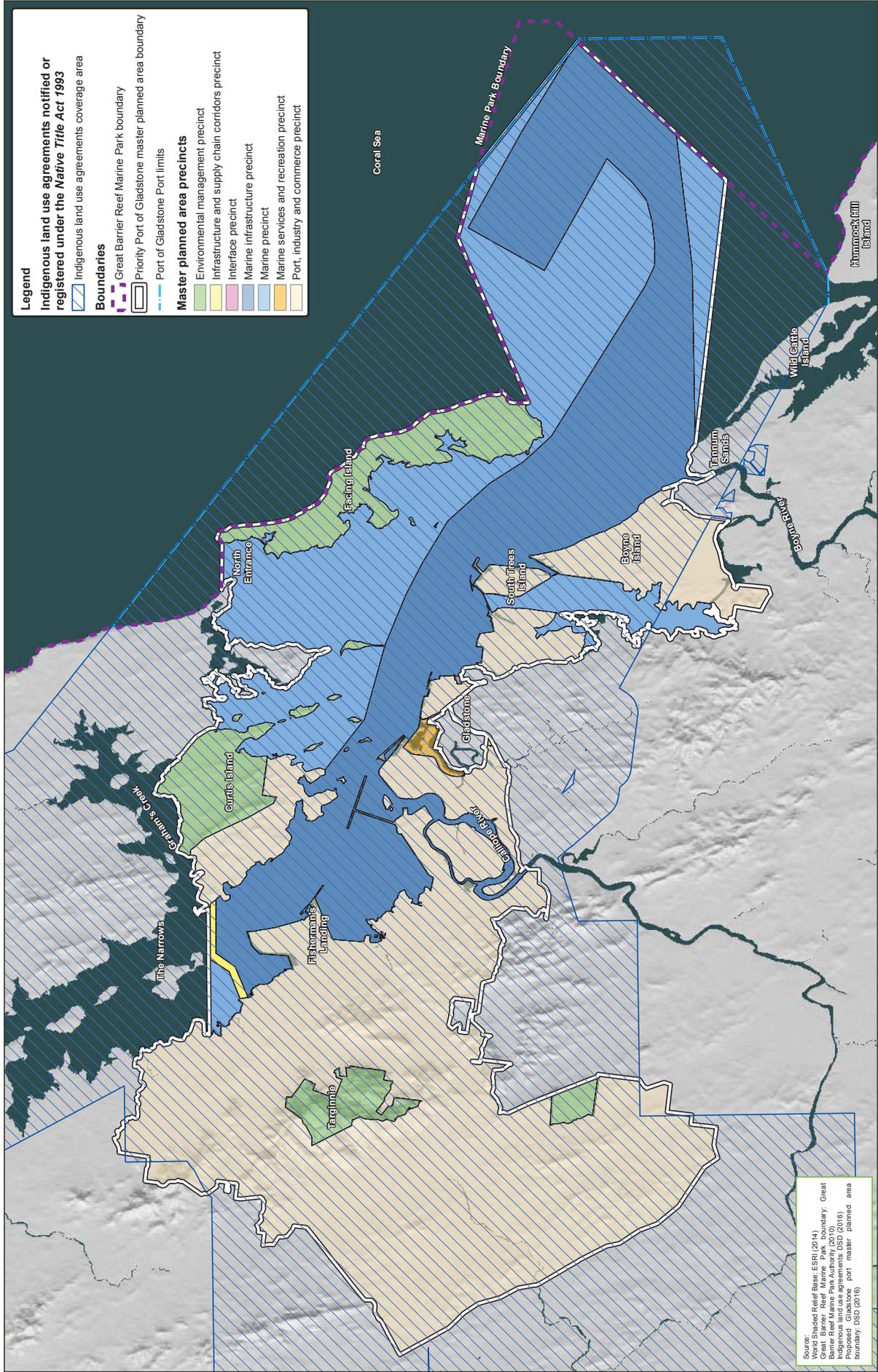


Priority Port of Gladstone master plan  
 Figure C24: Great Barrier Reef Coast Marine Park Zones (State)



Priority Port of Gladstone master plan  
 Figure C25: Native title determination under the Native Title Act 1993

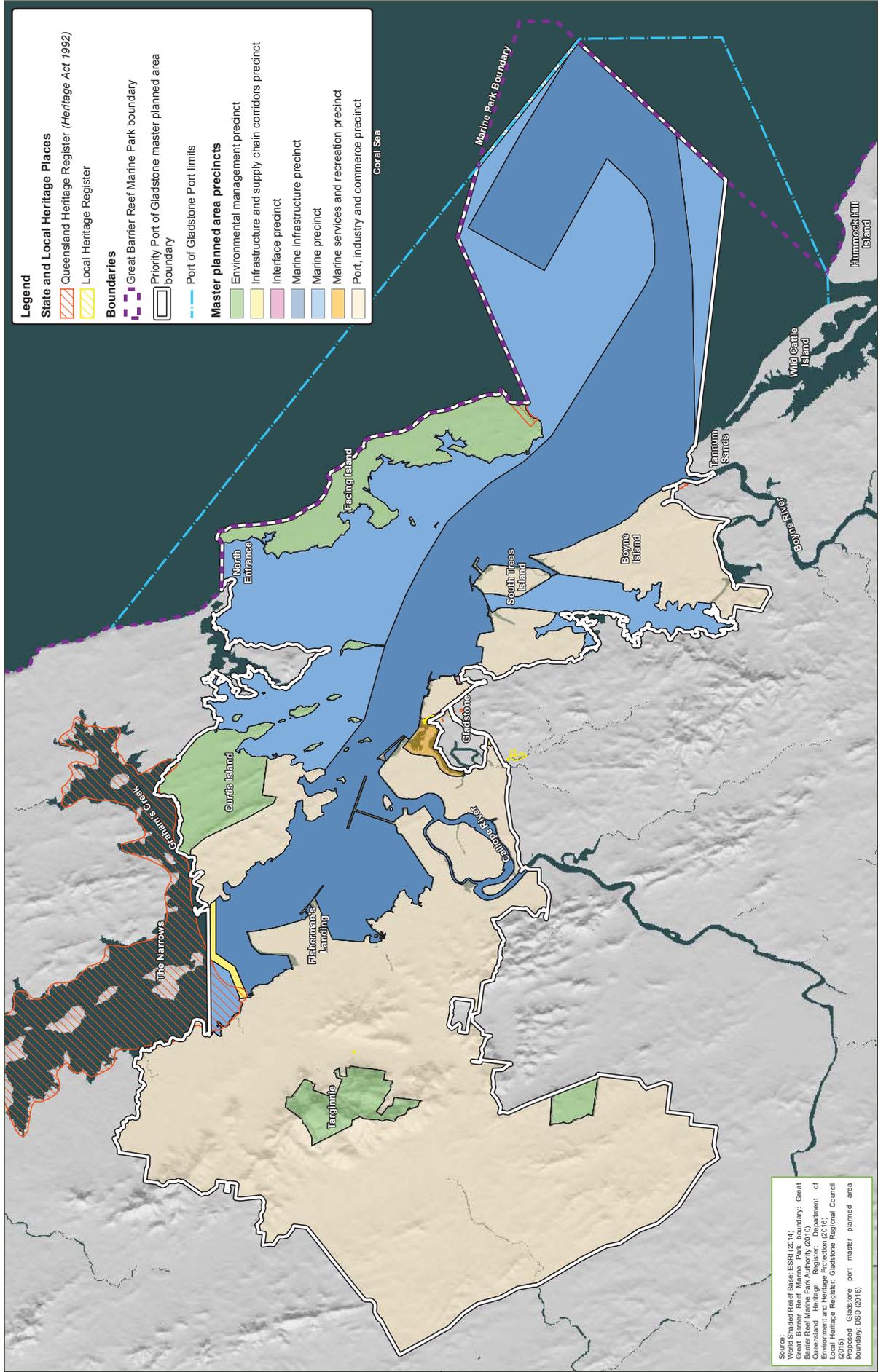
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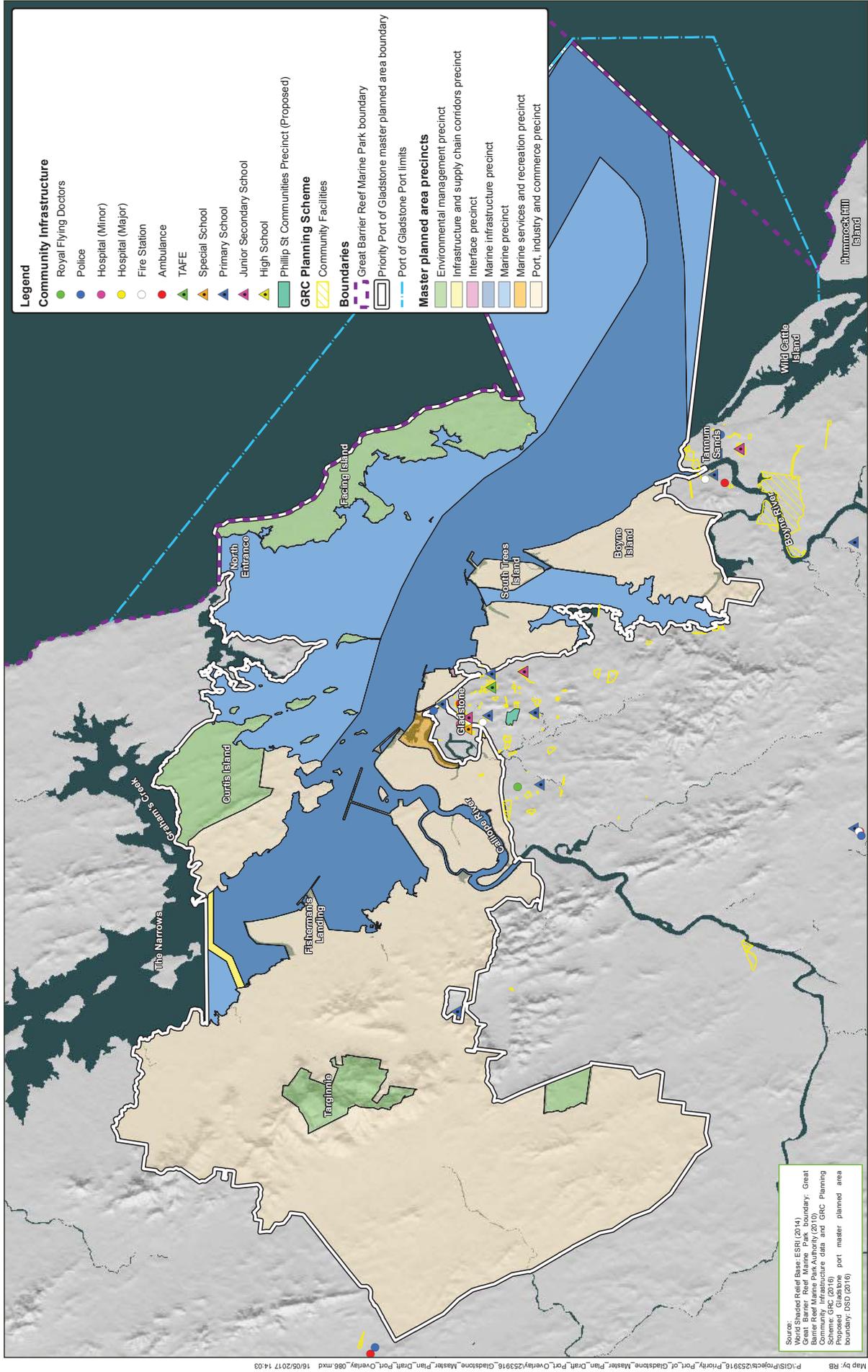
Priority Port of Gladstone master plan  
 Figure C26: Coverage of Indigenous land use agreements notified or registered under the Native Title Act 1993



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Priority Port of Gladstone master plan  
 Figure C28: State heritage places protected under the Heritage Act 1992 and local heritage places



Priority Port of Gladstone master plan  
 Figure C29: Social and community infrastructure identified in the Gladstone Regional Council Planning Scheme





## Appendix D: Definitions

Term	Definition
beneficial reuse	means dredged material that has been used for a purpose that provides social, economic or environmental benefits (or a combination of these). That is, the dredged material is managed as a valuable resource rather than a product destined for disposal. Beneficial reuse can involve the placement of dredged material on-land and in the aquatic zone (i.e. underwater or in intertidal areas). Consideration of beneficial reuse in the Queensland context to date has been focused on applications that provide economic benefits such as on-land processing and industry reuse or land reclamation (Royal Haskoning DHV and AMA 2016).
capital dredging	see <i>Sustainable Ports Development Act 2015</i> (Ports Act), schedule 1
coastal zone	see the <i>Coastal Protection and Management Act 1995</i> , section 15
dredged material	means capital and maintenance dredged material required for the ongoing operation and future expansion of the port
ecologically sustainable development	see <i>Environment Protection and Biodiversity Conservation Act 1999</i> , section 3A
environmental value	see the <i>Environmental Protection Act 1994</i> , section 9
fringing reef	means intertidal to subtidal reefs that grow along the mainland or around the margins of continental high islands (Smithers 2011)
Great Barrier Reef coastal zone	means the areas adjacent to the Great Barrier Reef and includes Queensland waters, islands and adjacent inland areas, five kilometres (inland and 10 metres Australian Height Datum, whichever is further)
highest astronomical tide (HAT)	means the highest level which can be predicted to occur under average meteorological conditions and any combination of astronomical conditions
inshore turbid reef	are generally located in turbid water which is shallower than 10 metres, and are usually located within 10 kilometres of the coast. Inshore turbid reefs include both shore attached (fringing reefs in locations close to the mainland) and non-shore attached shoals (Whiteway et al. 2014).
land management plan area	means an area within the environmental management precinct of the master planned area shown on a land management plan area that is required to be managed in accordance with a land management plan prepared for the area under the provisions of the port overlay
local expression of the Outstanding Universal Value of the Great Barrier Reef World Heritage Area	means environmental values present within and surrounding the priority Port of Gladstone master planned area that contribute to the OUV of the GBRWHA. The local expression of the OUV of the GBRWHA within and surrounding the priority Port of Gladstone master planned area has been identified as part of the evidence base and is specifically referred to in the master plan's EMF.
maintenance dredging	means dredging carried out for the purposes of removing sediments that have accumulated in existing channels, berths, approaches and swing basins of a port to maintain an approved capital dredging profile
marine megafauna	means large marine species which may include cetaceans (whales and dolphins), reptiles (marine turtles), Dugongs, Chondrichthyes (sharks, rays, skates and chimaeras) and pinnipeds (seals or sea lions)
marine parks	see Ports Act, section 4
marine plants	see the <i>Fisheries Act 1994</i> , section 8

Term	Definition
master planned area	see Ports Act, section 6 (1), however for this master plan means all of the area shown on Figure 2
material placement area or areas	means one (or more) existing and future potential material placement areas to be defined in the port overlay for the beneficial reuse and placement of dredged material, until such time as the material placement has been completed and the area is suitable for ground improvement works, or the area is no longer determined to be suitable for material placement
minimise	means the process and actions implemented to avoid, mitigate and/or offset environmental impacts
offsets (environmental offset)	see <i>Environmental Offsets Act 2014</i> , section 7(2), and the relevant Commonwealth and state policies
Outstanding Universal Value (OUV)	as defined in the UNESCO Operational Guidelines for the Implementation of the World Heritage Convention means cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity. As such, the permanent protection of this heritage is of the highest importance to the international community as a whole.
planning instrument	see <i>Planning Act 2016</i> , section 8 (1), and land use plan under the <i>Transport Infrastructure Act 1994</i> , development scheme under the <i>State Development and Public Works Organisation Act 1971</i> and development scheme under the <i>Economic Development Act 2012</i>
port industry activities	means activities carried out for or in association with core port, industrial or commercial activities necessary for the efficient functioning of the priority Port of Gladstone supply chain and future priority Port of Gladstone trade and economic growth for the region
port limits	see <i>Transport Infrastructure (Ports) Regulation 2016</i> , schedule 2, part 2, section 7
port optimisation	<p>means the act of making a port system, design or decision as effective or functional as possible. This may include for example, making efficient use of strategic port land, berths and/or land-based facilities, ability to control berthing allocations and scheduling, minimising capital intensive marine-based infrastructure, minimising the distance between land-based facilities and berths and/or minimising capital or maintenance dredging. Port optimisation requires a balance to be achieved across a number of these issues.</p> <p>For port infrastructure, optimisation usually centres on the resources that are scarcest. However, different development may require different aspects of the infrastructure to be optimised, having regard to the economic, environmental and social context of the project.</p>
port overlay	see Ports Act, section 20
precincts	zones of development intent for specific areas within the master planned area
priority management measures	see Ports Act, section 8 (1)(c)(iii)
priority ports	see Ports Act, section 5
responsible entity	means the entity or entities responsible for implementation of a priority management measure
sensitive land use or uses	see the State Planning Policy 2016
Strategic Port Land (SPL)	see the <i>Transport Infrastructure Act 1994</i> , section 267

Term	Definition
subterranean infrastructure	means infrastructure constructed and operated below the seafloor
supply chain infrastructure	means infrastructure, services and utilities identified as critical to supporting the future functioning of priority Port of Gladstone, and its associated trade and economic growth for the region. This includes, for example road and rail infrastructure and links, above and below ground linear infrastructure (e.g. water, oil, or gas pipelines, conveyors), infrastructure nodes (e.g. power station, treatment plant, extractive resources), transmission lines that service and link the priority Port of Gladstone and industry development.



# Appendix E: Abbreviations and acronyms

Acronym/ abbreviation	Definition
EMF	environmental management framework
EP Act	<i>Environmental Protection Act 1994</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESD	ecologically sustainable development
GBRWHA	Great Barrier Reef World Heritage Area
GPC	Gladstone Ports Corporation
GPC LUP	Gladstone Ports Corporation Land Use Plan
GRC	Gladstone Regional Council
GRC Planning Scheme	Gladstone Regional Council Planning Scheme
HAT	highest astronomical tide
LMDMP	Long-term Maintenance Dredging Management Plan
Maintenance Dredging Strategy	<i>Maintenance Dredging Strategy for Great Barrier Reef World Heritage Area Ports</i>
MNES	matters of national environmental significance
MSES	matters of state environmental significance
NC Act	<i>Nature Conservation Act 1992</i>
OUV	Outstanding Universal Value
PMMs	priority management measures
Ports Act	<i>Sustainable Ports Development Act 2015</i>
Reef 2050	<i>Reef 2050 Long-Term Sustainability Plan</i>
SDA	State Development Area
SPL	Strategic Port Land
TMR	Department of Transport and Main Roads
UNESCO	United Nations Educational, Scientific and Cultural Organization
VM Act	<i>Vegetation Management Act 1999</i>

# Appendix F: References

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