Gladstone Ports Corporation

Growth, Prosperity, Community.

Port of Gladstone Gatcombe and Golding Cutting Channel Duplication
Initial Advice Statement

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Prepared for:
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Port of Gladstone Gatcombe and Golding Cutting Channel Duplication

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Executive summary

This Initial Advice Statement (IAS) has been prepared on behalf of Gladstone Ports Corporation (GPC) for works associated with the proposed duplication of the Gatcombe and Golding Cutting channels in the Port of Gladstone. The document provides information on the proposed development, the existing environment, potential impacts and possible mitigation measures.

The LNG industry of Central Queensland and Gladstone and the expansion of the coal export industry are key drivers in the need to improve the existing facilities and shipping channels within the Port.

GPC propose to duplicate the Gatcombe and Golding Cutting channels with the new channel being 9.12 km long, dredged to a depth of RL-16.1 m and at a width of 200 m.

Both onshore and offshore spoil disposal options will be considered and investigated in detail at a later stage of the project.

The Project is expected to cost about $400 million, with capital dredging works (construction) employing about 100 people and maintenance dredging (operational) employing about 20 people.

1 Introduction

1.1 Background

The Port of Gladstone has been identified by the Queensland Government as a major industrial centre for the future of Australia (CQPA 2006). It is Queensland's largest multi-commodity port, the world's fifth largest coal export terminal, and one of the busiest ports in Australia, vital to the local, state and national economies (GHD 2009). Major exports from the port include coal, alumina, cement, petroleum, aluminium and agricultural resources. It is estimated that 300 million tonnes of product will be handled annually by the Port within the next 50 years.

Furthermore, the recent introduction of the LNG industry to the Gladstone Region and the commencement of the Wiggins Island Coal Terminal will substantially increase the throughput of the Port of Gladstone in the near future.

GPC has released a 50 year Strategic Plan to further develop and expand the Port of Gladstone (herein referred to as the Port) to cater for the future shipping requirements. This process will involve:

- Constructing new berths
- Expanding existing wharves and wharf centres
- Creating the duplicate shipping channel to accommodate an increase in vessel movement

Keeping in mind the committed future traffic, GPC has carried out channel capacity studies to get a better understanding of the adequacy of the existing channels. These studies are updated on a regular basis. The results of these studies have indicated the need for the duplication of the Gatcombe and Golding Cutting channels as a priority. The channels require to be dredged to a depth of RL-16.1m.

The proposed duplicate shipping channels (the subject of this IAS), will run parallel to the existing Gatcombe and Golding shipping channels, creating a two-way rite of passage from the outer harbour, around East Banks, extending up the western side of Facing Island. It will also involve the relocation and construction of the existing and new navigational aids respectively.

Currently the ability of the Port to accommodate the high quantities of vessel movement is limited by the shipping channel depth and lack of passing capacity in the one way channel. (Maunsell-AECOM 2007). Due to the increasing development pressures and access demands from present and future Port developments, there is a need to duplicate and dredge the channel to support the growth within the Gladstone region. Without this Project, further congestion due to vessel movement, delays, and other subsequent issues will limit the Port's capacity.

1.2 Purpose of the Initial Advice Statement

This IAS is for the Port of Gladstone Gatcombe and Golding Cutting Channel Duplication Project (herein referred to as the 'Project') and has been prepared to provide sufficient information for the Queensland Coordinator-General (CG). The CG will determine whether the Project should be declared a 'significant project for which an Environmental Impact Statement (EIS) is required' under Section 26(1) (a) of the *State Development and Public Works Organisation Act 1971.*

This IAS seeks to provide a scope of the potential environmental, social and economic impacts associated with the Project. It also acts as a framework for the setting of the Terms of Reference (ToR) and development of the EIS. The IAS provides:

- A description of the Project
- The need and justification for the Project
- An outline of the existing environment and potential environmental, social and economic impacts associated with the construction and operational phases of the Project
- Possible Project mitigation measures to prevent/minimise potential environmental, social and economic impacts

1.3 Project proponent

GPC is a government owned corporation involved in maintaining, improving and expanding trade within the Port of Gladstone, Port Alma Shipping Terminal and Port of Bundaberg through sustainable planning, the provision of relevant infrastructure and the development of new and existing facilities.

GPC has relevant experience in large scale dredging projects such as the Western Basin Dredging and Disposal Project, Wiggins Island Coal Export Terminal dredging works, dredging for the RG Tanna Coal Terminal, and various others. As the Proponent has a long history in dredging and disposal projects they have the necessary knowledge to operate safely and efficiently while also mitigating potential environmental impacts.

GPC is the proponent for the Project and its contact details are as follows:

Gladstone Ports Corporation
Port of Gladstone
40 Goondoon Street
PO Box 259
GLADSTONE QLD 4680
Telephone: (07) 4976 1333
Facsimile: (07) 4972 3045

2 Project description

2.1 Locality

The Gladstone Port is a shallow, semi-enclosed estuarine system located on the Central Queensland coast approximately 525 km north of Brisbane and 100 km south of Rockhampton.

The Project is located adjacent to the existing Gatcombe and Golding Cutting shipping channels within the Port. Figure 1 illustrates the Project Area of the proposed Project Dredge area and surrounding port infrastructure.

2.2 Project scope

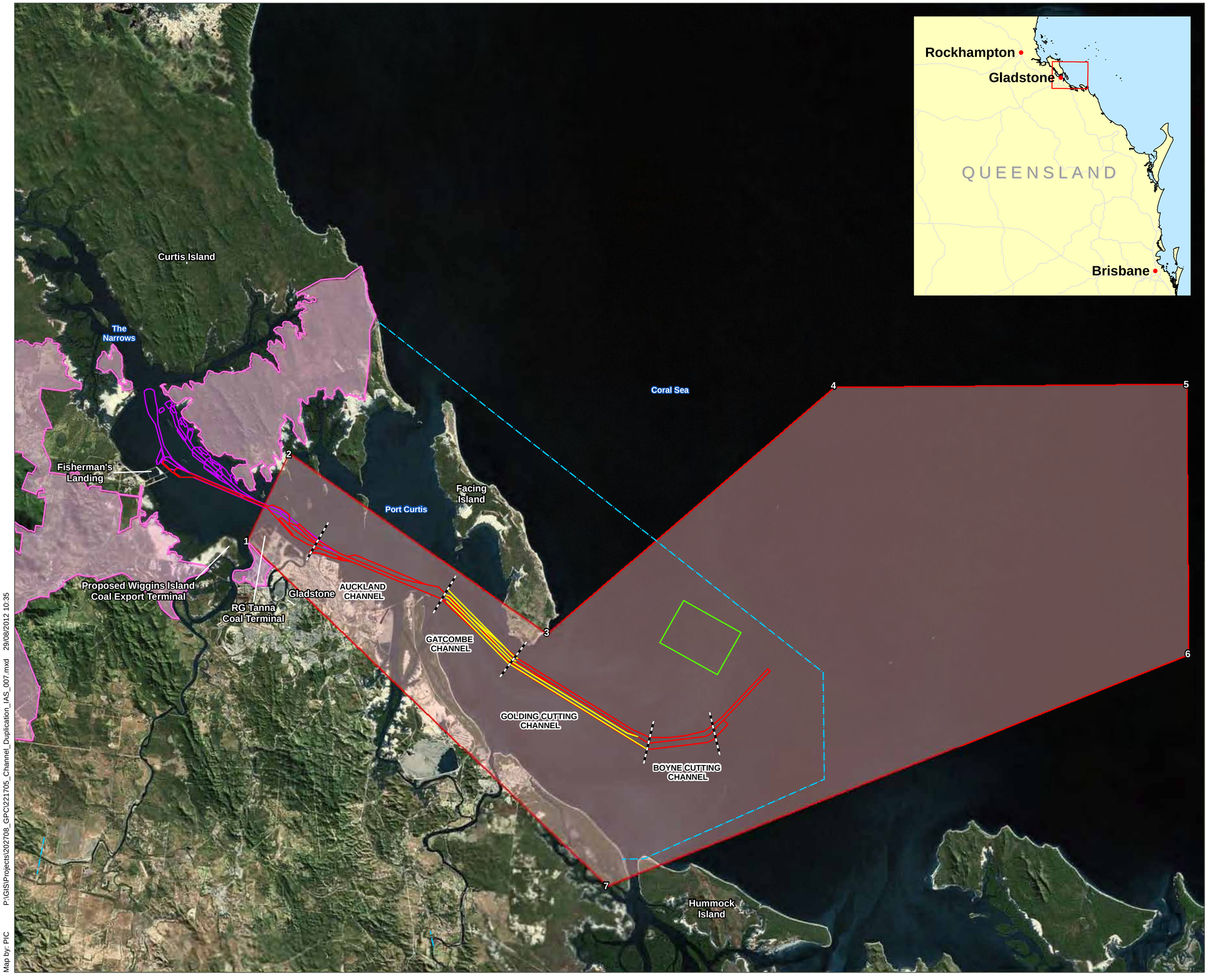
GPC is seeking to expand upon the existing Gatcombe and Golding Cutting shipping channels to accommodate a predicted increase in shipping traffic as a result of ongoing industrial growth within the Port.

The duplicate channel is proposed to be developed adjacent to the existing shipping channel, facilitating a two-way rite of passage from the outer harbour, around East Banks, to the western side of Facing Island. Figure 1 illustrates the layout of the Project and surrounding areas.

The proposed duplicate channel will be approximately 9.12km long, dredging is proposed to be undertaken to a depth of RL-16.1 m, with a channel width (toe to toe) of 200 m. Approximately 12 Mm^3 of seabed material will be removed during the dredging programme. This will release the bottleneck that may be created as a result of increase in the total number of vessels handled annually in order to meet the committed trade. Both onshore and offshore spoil disposal options for the dredged spoil will be investigated as part of the EIS process. The duplication of the channel will also involve the relocation of a few of the existing navigational aids as well as the construction of new navigational aids.

2.2.1 Project staging and timing

The dredging is expected to commence in 2014/2015. The estimated duration of dredging is expected to be about 20 months.



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Legend

- Existing Channel Extent
- Proposed Channel Duplication Project Extent
- Approved Western Basin Channel Extent
- Port of Gladstone Port Limits
- Existing GPC Approved East Banks Sea Disposal Site
- Gladstone State Development Area
- Project Area (inclusive of potential spoil disposal area)

Source:
Aerial: Bing Maps, 2010.
GSDA: DLGP, July 2008.

Note: Western Basin channels are not part of the Channel Duplication Project

Date: 29/08/2012 Version: 1

Map by: PIC P:\GIS\Projects\202708_GPC\221705_Channel_Duplication_IAS_007.mxd 29/08/2012 10:35

A1 scale: 1:110,000

0 2 4 6 8 Kilometers

Job No: 221705

Coordinate system: GDA_1994_MGA_Zone_56

Gatcombe and Golding Cutting Channel Duplication Project

Figure 1: Project Area

2.2.2 Dredging

It is proposed that the channels will be 200 m wide and dredged to a depth of RL -16.1 m. The dredging methodology and footprint of these dredging works will be refined during the EIS process. While preliminary investigations have not identified rock, blasting will be avoided where possible to prevent disturbance to marine megafauna in the area, however it will be considered as an option should hard or fractured material be encountered that cannot be managed by the dredging machinery.

Operational Works and Material Change of Use (Environmentally Relevant Activity 16 – Extractive Activities) approvals for dredging activities, and other aspects of the Project will be sought as they are required for each stage of works.

2.2.3 Spoil disposal

Disposal of approximately 12 Mm^3 of dredged material is proposed to occur either offshore (within a 20 nautical mile radius) and/ or onshore (within close proximity to the Port coastline). Offshore disposal is the first preference for spoil disposal locations as there is limited capacity available onshore. If onshore disposal is necessary for some portion of the spoil, it will depend on space and also the quality of dredged material. As part of the EIS process a range of options will be assessed for suitability of spoil disposal. Disposal location options will be determined with consideration to various criteria including: depth, proximity to the Project footprint, likelihood of impacting upon the surrounding environment and economic viability. Each option will be assessed in consultation with regulators during the EIS process, ultimately determining the most preferred disposal location(s).

The Western Basin Dredging and Disposal Project (Western Basin Project) received conditional approval from the Commonwealth and State Governments for the dredging and disposal of up to 46 Mm^3 of dredge spoil in 2010/2011 to facilitate the access requirements for the LNG industry on Curtis Island, Gladstone. Under Condition 4 of the Western Basin Project EPBC Act approval (EPBC 2009/4904), GPC is required to develop a Long Term Sediment Disposal Plan (LTSDP) to address the dredge spoil disposal requirements of Stages 2, 3 and 4 of the Western Basin Project (approximately 18 Mm^3). In compliance to this condition it is the intention of GPC to develop a LTSDP which not only encompasses the requirements of the Western Basin Project and the Gatcombe and Golding Cutting Channel Duplication Project but also the long term spoil disposal requirements of the Port as a whole including duplication of all the outer harbour channels, new berth pockets or swing basins and the annual maintenance.

While the Western Basin Project is referenced in this document, it does not form part of the Port of Gladstone Gatcombe and Golding Cutting Channel Duplication Project or this IAS.

2.2.3.1 Offshore disposal options

Disposal of dredge spoil material offshore will also be investigated as part of the EIS process. If offshore disposal is required, a study area will be initially defined in consultation with the Commonwealth and State Government. The following criteria will be taken into consideration when identifying suitable disposal locations:

- Distance from sensitive receptors (ie seagrass, coral)
- Local users and navigation restrictions
- Administrative constraints (ie marine park zoning)
- Location of benthic habitats of lower ecological significance (ie sand sheets)
- Depths greater than 25 m, to avoid wave action re-suspending dumped spoil material
- Within 20 nautical miles of the Project footprint to ensure operational feasibility
- Current pattern

The study, if required would be undertaken in 2 phases - phase 1 demarcating a number of discreet preferred investigation areas, and phase 2 consisting of field based assessment of the benthic habitat characteristics. Information from phases 1 and 2 will be used to identify the preferred spoil disposal area(s).

2.2.3.2 Onshore disposal options

Onshore spoil disposal options will be investigated as part of the EIS process. Investigations will take into consideration social, ecological and visual amenity values of the surrounding area(s), economic and operational feasibility issues and beneficial use of the dredge material.

3 Project rationale

3.1 Project need

The Gladstone Port is recognised by the Commonwealth and Queensland Governments as having the potential to manage future large scale imports and exports and resource processing industries (GHD 2009). It is Queensland's largest multi-commodity port and is currently the fifth largest coal export terminal in the world, handling 1,400 vessels annually. In 2009/10 the Port had an annual throughput of 83.4 million tonnes of cargo. Based on current approved developments, the Port is predicted to have an annual coal throughput of 150 million tonnes by 2050, over double that of 2006 (GPC 2010; GHD 2009). Significant expansions of the Port in the past 30 years have occurred to meet the growth of major mining and industrial developments.

The Port is essential to Gladstone's economic viability, and has been a key driving force in the development and growth of the region's key industrial land use areas. In particular, the Port's deep water access was identified to be a major driving factor in the site selection of the current Gladstone State Development Area (GSDA). Established in 1993 under the *State Development and Public Works Organisation Act 1971* (SDPWO Act), this area has grown from its initial 6,800 ha of land at Aldoga, north west of Gladstone, to its current 29,000 ha. Figure 1 illustrates the location of the GSDA.

In 2008, the GSDA was expanded to include the south-west corner of Curtis Island, to accommodate the liquefied natural gas (LNG) processing facilities. The LNG industry of Central Queensland and Gladstone is a key driver in the need to improve the existing facilities and shipping channels within the Port. The LNG industry comprises multiple proponents, including Australia Pacific LNG, Gladstone LNG and Queensland Curtis LNG, which have been granted approval by the Commonwealth and State governments and have commenced construction. There are various other LNG proponents who are currently in different stages of their approvals process. There is international demand for LNG and the Port will be essential in the export of this resource.

The expansion of the coal export industry is an additional driver to develop the Port. The coal industry is currently the Port's largest export with a total of 60.4 million tonnes of coal exported in 2009/10 (GPC 2010). The Wiggins Island Coal Export Terminal (WICET) is entering the construction phase and is expected to have an ultimate capacity in excess of 80 million tonnes per annum.

Other declared significant projects that are reliant on the Port of Gladstone for export of product that have either undertaken environmental assessment or are undergoing environmental assessment include

- Gladstone Pacific Nickel
- Boulder Steel
- Yarwun Coal Terminal

The predicted growth of industries in the Gladstone region will therefore have a substantial demand for access to Port infrastructure. The Port is predominately a bulk export port with deep draft requirements for vessels exiting the port and as such, the tidal window for deep draft vessels leaving the Port is in increasing demand (Maunsell-AECOM 2007). The Port is currently limited by its depth, the volume of vessel movement as well as the lack of passing opportunities associated with one-way channels (Maunsell-AECOM 2007).

This Project aligns with the National Ports Strategy as it addresses the primary objective of improving the efficiency of port movements. Without duplication of this shipping channel would result in further port traffic congestion, delays and significant limitations to the Port's capacity.

3.2 Declaration of a 'significant project'

Following the submission of this IAS, the CG will determine whether the Project be declared a 'significant project' for which an Environmental Impact Statement (EIS) is required, pursuant to the *State Development and Public Works Organisation Act 1971*(as mentioned in Section 1.2).

3.3 Project benefit

The duplication of the existing Gatcombe and Golding Cutting shipping channels within the Port will have substantial economic benefits to the region. The Project will enhance and extend the marine infrastructure to support existing users and facilitate future industries within the Gladstone region and the GSDA by reducing marine traffic congestion and delays.

Improved facility access will promote further industry expansion in the region. There is growing demand from other proponents, particularly those in the LNG and coal industries, for access to the marine infrastructure to load product for global export markets. This can be addressed with the duplication of the shipping channel and will provide substantial benefits for the local, state and national economies.

Future industry encouraged to develop within the Gladstone region due to the international port facilities will provide increased employment opportunities for the region.

3.3.1 Employment and cost

The Project is expected to cost about $400 million, with capital dredging works (construction) employing about 100 people and maintenance dredging (operational) employing about 20 people.

3.4 Project alternatives

A range of alternatives to the shipping channel duplication are outlined below and include the following options:

- Alternative port locations
- Alternative dredging footprint
- No action

3.4.1 Alternative port locations

A variety of alternative port locations were considered for the establishment of industry in Central Queensland, which would negate the requirement of the shipping channel duplication. During the EIS processes of the various LNG projects, a range of other ports were considered for the export of LNG to the international market. These alternatives underwent detailed options assessment in each proponent's EIS and included Townsville, Abbot Point, Mackay, Hay Point and Brisbane (GLNG EIS 2009; QGC EIS 2009). The majority of these options were found to be considerable distances from the

coal seam gas fields and some of the ports were too exposed and spatially limiting for the LNG berthing requirements (GLNG 2009).

Options for alternative coal export facilities have also been considered by various mining companies, such as Xstrata and Fitzroy Coal Terminal, however the requirement for access to deep water for export in Cape class vessels is currently limited to Gladstone, Hay Point/Dalrymple Bay and Abbott Point. The proximity of these ports to the expanding Surat Basin coal fields limits development to the Port of Gladstone.

The duplication of the Gatcombe and Golding Cutting channels is therefore required in order to enable shipment for committed trade. The duplication of the remaining channels may be required at a later date. Should this be required, a separate approval process will be undertaken.

3.4.2 Alternative spoil disposal

The disposal of the dredged material is proposed to occur offshore and/or onshore (within close proximity to the coastline), depending on requirements from the Commonwealth and State Governments. During the EIS phase, a variety of options will be assessed in terms of their suitability for spoil disposal. The criteria that each option will be assessed against will include factors such as: depth and capacity to contain the nominated dredge volume, proximity of the Project footprint, beneficial use of the dredged material and the potential impact on the environment.

3.4.3 Alternative dredging footprint

The dredging footprint considered for the channel duplication is driven by the projected industry requirements as well as the outcome of the channel capacity studies. The proposed footprint has been designed to best accommodate the existing and future users of the Port and minimise the environmental impact associated with dredging.

3.4.4 No action

The committed trade through the port demands certain minimum infrastructure. Without duplication of the Gatcombe and Golding Cutting channels would result in port traffic congestion and delays. This will restrict the ability of the Port to meet future import/export requirements, which will hinder the economic viability of the region. Without action will result in restriction to the growth of future industries and as a result loss of potential employment opportunities and economic benefits on a local, state and national scale.

4 Environmental and planning approval process

4.1 Overview

This section describes the approval framework and the legislation, guidelines and policies relevant to the regulatory compliance and environmental management of the Project. Given the nature, scale and location of the Project, and the potential impact on the surrounding environment, there will be a need for various approvals at the Commonwealth, State and local government levels.

4.2 Commonwealth approvals

4.2.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides that any action (i.e. a project, development, undertaking, activity or series or activities) that has, will have or is likely to have a significant impact on a matter of national environmental significance (NES), or other matters protected under the Act such as the environment of Commonwealth land, requires approval from the Commonwealth Environment Minister (the Minister).

The EPBC Act identifies the following matters of NES as triggers for potential Commonwealth assessment and approval:

- World Heritage properties
- National Heritage places
- Wetlands of international importance
- Listed threatened species and communities
- Listed migratory species
- Protection of the environment from nuclear actions
- Marine environment
- The environment, if the action involves Commonwealth land
- The environment, if the action is taken by the Commonwealth
- Commonwealth Heritage places outside Australian jurisdiction

If a project is likely to impact on any of these matters of NES, a referral under the EPBC Act must be made to the Minister. Subsequent to the receipt of a referral, the Minister will determine whether or not the proposed action is a 'Controlled Action'. If the action is considered a 'Controlled Action' an environmental assessment must be submitted to the Minister for approval.

This environmental assessment can proceed through a bilateral agreement that accredits a State or Territory assessment process (ie EIS process under the SDPWO Act), a ministerial declaration that accredits another Commonwealth agency or through assessment determined by the Minister.

Given the Project is located with Port Curtis and the Great Barrier Reef World Heritage Area (GBRWHA), the Project will be referred to the Commonwealth Department of Sustainability, Environment, Water and Communities (SEWPaC) for a determination on whether the Project is a 'Controlled Action'. The referral addresses the following relevant matters of NES that may be impacted:

- Sections 12 and 15A (World Heritage Properties)
- Sections 15B and 15C (National Heritage)
- Sections 18 and 18A (Listed threatened species and communities)
- Sections 20 and 20A (Listed migratory species)

4.2.2 Native Title Act 1993

The *Native Title Act 1993* (Native Title Act) provides the legal principles for the recognition of native title and the integration of this form of property right into the existing land title system. The Act establishes the processes involved in having native title recognised and the role and responsibilities of the different bodies involved in this process. The Native Title Act adopts the common law definition of 'native title' and establishes the National Native Title Tribunal which governs how native title is dealt with across Australia.

In accordance with the *Aboriginal Cultural Heritage Act 2003* (ACH Act) the relevant native title claimants and Cultural Heritage Bodies for the Project will be notified and invited to be involved in preparing a Cultural Heritage Management Plan (CHMP) as part of the environmental assessment process for the Project.

4.2.3 Environment Protection (Sea Dumping) Act 1981

The *Environment Protection (Sea Dumping) Act 1981* (the Sea Dumping Act) seeks to minimise pollution threats to Australian waters through the regulation of the loading and dumping of waste at sea. The Sea Dumping Act applies to all vessels, aircraft and platforms in Australian waters and to all Australian vessels and aircrafts operating in any part of the sea.

The Sea Dumping Act regulates the disposal of wastes to the sea to ensure that environmental impacts are minimised. Under the Act, a permit is required for all sea dumping activities, including the disposal of dredge material.

Should the Project require the offshore disposal of dredge material, then a Sea Dumping Permit under Section 18 of the Sea Dumping Act will be required.

4.2.4 Great Barrier Reef Marine Park Act 1975

The Great Barrier Reef Marine Park Act 1975 (GBRMP Act) establishes a legislative framework for ensuring the long term protection and management of the World Heritage listed Great Barrier Reef. Specifically, the GBRMP Act:

- Designates the Great Barrier Reef Marine Park (GBRMP) as a protected area
- Establishes the Great Barrier Reef Marine Park Authority (GBRMPA), a Commonwealth authority responsible for the management of the Marine Park
- Provides a framework for planning and management of the Marine Park, including through zoning plans, plans of management and a system of permissions

The zoning plans identify where certain activities within the GBRMP require a Marine Park Permit. Generally the following activities will require a Marine Park Permit prior to commencing:

- Commercial activities
- Installation and operation of structures, such as jetties and marinas
- Any works, such as repairs, to structures

- Dredging and dumping of spoil
- Placement and operation of moorings
- Waste discharge
- Anchoring or mooring for an extended period

In order to be granted a Marine Park Permit, an application must be submitted to GBRMPA (or to Queensland Parks and Wildlife Services (QPWS)). In assessing an application, GBRMPA must consider criteria outlined in the Great Barrier Reef Marine Park Regulations 1983

Where the Project proposes to undertake dredging and/or disposal works within the GBRMP, a Marine Parks Permit will be required.

4.3 State approvals

4.3.1 State Development and Public Works Organisation Act 1971

The *State Development and Public Works Organisation Act 1971* (SDPWO Act) establishes the framework for environmental assessment of major projects in Queensland. The SDPWO Act provides the CG with the power to coordinate the environmental assessment of major projects through declaring them a 'significant project'. Declaration of a project as a 'significant project' is based on one or more of the following criteria:

- Complex approval requirements, including local, State and Commonwealth government involvement
- A high level of investment in the state
- The potential effects on infrastructure and/or the environment
- Provision of substantial employment opportunities
- Strategic significance to a State, region or locality

Part 4 of the SDPWO Act provides the statutory process for environmental impact assessment (EIA) through the preparation of an EIS. Matters to be addressed in an EIS prepared pursuant to the SDPWO Act are detailed in Schedule 1 of the *State Development and Public Works Organisation Regulation 2010.*

4.3.2 Sustainable Planning Act 2009

The *Sustainable Planning Act 2009* (SPA) is Queensland's principal planning legislation and seeks to achieve ecologically sustainable development. SPA sets out the framework in which development made assessable under the Act is to be undertaken and emphasises the coordination and integration of planning at the State, regional and local levels.

Under SPA, development is either exempt, self-assessable, development requiring compliance assessment, assessable or prohibited. Development that is prescribed by the State in Schedule 3 of the *Sustainable Planning Regulation 2009* (SP Reg) or by local government through their planning scheme as assessable development requires an application for development approval under SPA.

SPA also establishes a framework for assessing development through the Integrated Development Assessment System (IDAS). IDAS allows multiple assessments to be integrated in the one overall assessment. However, not all stages or parts of stages are required for all applications.

In addition to evaluating environmental impacts for the Project at the State level in accordance with the SDPWO Act, various development approvals will also be required under SPA.

4.3.3 Coastal Protection and Management Act 1995

The *Coastal Protection and Management Act 1995* (Coastal Act) provides for the protection, conservation, rehabilitation and management of the coast, including its resources and biological diversity.

Under Schedule 3 of the SP Reg, Operational Works that are Tidal Works (that is, works in, on or above land under tidal water, or land that will or may be under tidal water because of development on or near the land), and works within a Coastal Management District (CMD) are Assessable Development.

Under the Coastal Act, the State Government is required to consider the *State Coastal Management Plan – Queensland's Coastal Policy* (State Coastal Plan) and the *Curtis Coastal Regional Management Plan* (CCRCMP) when making decisions relating to coastal development and management in the Curtis Coastal Region.

Under the statutory requirements of the Coastal Act, the current State Coastal Plan has undergone a review process, and in response, a new Draft Queensland Coastal Plan has been prepared. The Queensland Government has approved the making of the Draft Queensland Coastal Plan, and if approved and finalised, will replace the existing state and regional coastal management plans.

The Project will involve development within a CMD at the Port of Gladstone, including tidal works associated with undertaking dredging and/or reclamation works. The Project will therefore trigger approvals under the Coastal Act and will need to be reviewed and assessed against the coastal policy requirements of the Coastal Act as part of any Development Application.

4.3.4 Marine Parks Act 2004

The *Marine Parks Act 2004* (MP Act) provides for the establishment, conservation and protection of marine parks. Specifically, the MP Act regulates the protection of Queensland tidal lands and tidal waters, in a manner which is intended to operate consistently with the Commonwealth GBRMP Act. There are currently three state marine parks in Queensland:

- Great Barrier Reef Coast Marine Park
- Great Sandy Marine Park
- Moreton Bay Marine Park

The MP Act operates together with the *Marine Parks (Declaration) Regulation 2006* and the *Marine Parks Regulation 2006* to protect and conserve the values of these natural marine environments whilst allowing for sustainable use through the provision of zoning plans.

The proposed dredging is located partially within and adjacent to the Great Barrier Reef Coast Marine Park. Under the MP Act, a Marine Parks Permit may be required to authorise the proposed dredging works where they are considered likely to have an impact on the Great Barrier Reef Coast Marine Park.

If offshore disposal within the GBRMP is the preferred disposal option selected during the EIS process, a marine parks permit will be required for the Project.

4.3.5 Fisheries Act 1994

The *Fisheries Act 1994* (Fisheries Act) provides for the management, use, development and protection of fisheries resources and fish habitats, and the management of aquaculture activities. The Act holds provisions for the following:

- Removal, disturbance and/or damage to marine plants, including mangroves
- Works in a declared fish habitat (refer Section 5.3.3 for location)

- Waterway barrier works

Schedule 3, Part 1, Table 4 of the SP Reg specifies that Operational Work for the purposes of the above activities under the Fisheries Act is Assessable Development. Approval under the Fisheries Act in relation to the disturbance of marine plants is likely to be required for the Project, together with the negotiation of appropriate offset arrangements.

4.3.6 Environmental Protection Act 1994

The object of the *Environmental Protection Act 1994* (EP Act) is to protect Queensland's environment and to promote ecologically sustainable development. The EP Act prescribes a general environmental duty which requires that all persons take all reasonable and practical measures to prevent or minimise environmental harm.

The EP Act, together with SPA, provides a licensing and approvals regime for a range of environmentally relevant activities (ERAs), which are activities with the potential to cause environmental harm through release of contaminants.

All ERAs are detailed in Schedule 2 of the *Environmental Protection Regulation 2008* (EP Reg). The EP Act requires that any person carrying out an ERA must hold, or be acting under, a Registration Certificate for the activity. All operators are also required to have a Development Permit for the activity, unless a code of environmental compliance applies to the activity.

The Project will trigger the requirement to obtain approval to lawfully commence the proposed dredging works, in the form of an Allocation of Quarry Material and a Development Permit for a Material Change of Use involving ERA 16 – Extractive Activities under the EP Act.

4.3.7 Aboriginal Cultural Heritage Act 2003

The *Aboriginal Cultural Heritage Act 2003* (ACH Act) binds all persons, including the State, to provide effective recognition, protection and conservation of Aboriginal cultural heritage.

The ACH Act requires the development of a Cultural Heritage Management Plan (CHMP) if:

- An EIS is required
- An environmental authority is required under a different Act
- Under SPA, if a development application is made for the Project or the chief executive is a Concurrence Agency

A CHMP will need to be developed in accordance with the ACH Act as part of any EIS for the Project. Additionally, under the provisions of the ACH Act, the relevant traditional owner groups are required to be identified and invited to be involved in the CHMP process.

4.4 Required approvals

The compliance of the Project to the relevant Acts, State Government Policies, Local Government Planning controls, local laws and policies will be undertaken as part of the EIS. The approvals required are summarised in Table 1.

Table 1 Approvals required for Project

Legislation	Administering Authority	Development Action/ Trigger	Approval	Relevance to project
Commonwealth approvals				
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	DSEWPaC	Undertaking any action which has, will have or is likely to have a significant impact on a matter of National Environmental Significance (NES)	Approval of the 'Controlled Action' under Section 13 of the EPBC Act	Project has the potential to trigger the following matters of NES: · World Heritage properties · National heritage properties · Wetlands of international important · Listed migratory species · Listed threatened species and communities
Native Title Act 1993	DSEWPaC	Undertaking works		Management Plan required under the *Aboriginal Cultural Heritage Act 2003*
Environment Protection (Sea Dumping) Act 1981 (Sea Dumping Act)	DSEWPaC	Disposal of waste to sea	Sea Dumping Permit	Sea Dumping Permit required if Project requires offshore disposal of dredge material
Great Barrier Reef Marine Park Act 1975 (GBRMP Act)	Great Barrier Reef Marine Park Authority (GBRMPA)	Undertaking assessable activities within the Great Barrier Reef Marine Park (GBRMP)	Marine Parks Permit	Marine Parks Permit required where works include dredging and disposal of spoil within the GBRMP
State approvals				
State Development and Public Works Organisation Act 1971	DSDIP, Coordinator-General (CG)	Undertaking a 'Significant Project' which is declared based on one or more of the criteria under Section 27 of the SDPWO Act	Signification Project Declaration by the CG. Approval of a 'Significant Project' under Section 35 of the SDPWO Act. Prescribed Project Declaration by the CG	GPC is seeking declaration of the Project as a 'Significant Project'
Coastal Act 1995	DEHP	Works involving activity in, above or on land under	Development Permit for Operational Works under SPA	Dredging and/or reclamation works will trigger tidal works

Legislation	Administering Authority	Development Action/ Trigger	Approval	Relevance to project
		tidal waters, undertaken by a Port Authority		
Marine Parks Act 2004	DEHP	Undertaking works that are likely to have an impact on the Great Barrier Reef Coast Marine Park	Marine Park Permit	Undertaking dredging works
Fisheries Act 1994	DAFF(Fisheries Queensland)	Works involving the disturbance, damage or disruption of marine plants	Development Permit for Operational Works	Undertaking dredging works
Environment Protection Act 1994	DEHP	Undertaking defined Environmentally Relevant Activity (ERA) under Schedule 2 of the *Environmental Protection Regulation 2008*	Development Permit for Operational Works	Undertaking dredging works
Aboriginal Cultural Heritage Act 2003	DNRM	Undertaking works	Duty of Care to take all reasonable and practical measures to avoid harm to Aboriginal Cultural Heritage	Development of Cultural Heritage Management Plan required as part of the EIS process

5 Existing environment

5.1 Climate

Gladstone is located on the coast of Central Queensland and experiences a sub-tropical climate. The mean annual minimum temperature for the Gladstone region between the years 1981 and 2010 was 18.7 ºC and the mean annual maximum temperature was 27.8 ºC (refer Figure 2) (Bureau of Meteorology (BoM) 2011). The prevailing wind direction in the Gladstone region is from the east and southeast off the coast with a mean wind speed of 15.1 km/h (9am) to 21.8 km/h (3pm) (BoM 2011).

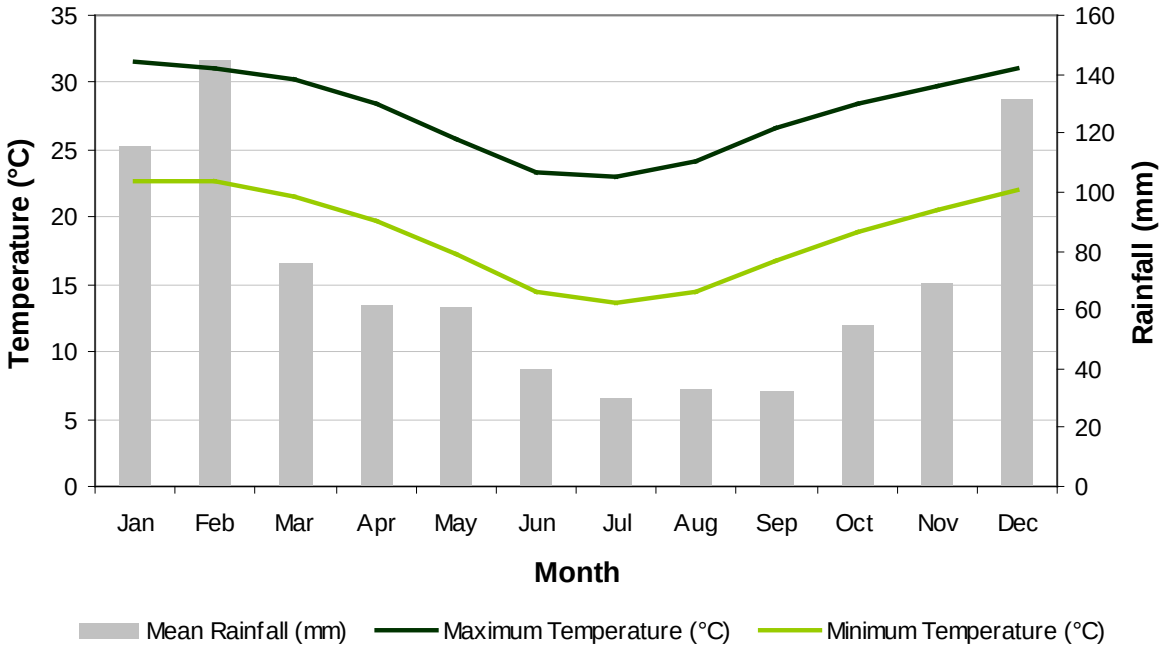


Figure 2 **Mean temperatures (°C) and rainfall (mm) for Gladstone (1981 - 2010)**

Rainfall data from the Bureau of Meteorology (BoM) indicated that the average annual rainfall for Gladstone over a period from 1957 to 2011 was 887 mm, with the wet season occurring during the summer months (December – February). The highest monthly rainfall recorded was 709.8 mm in February 1971 and the highest daily rainfall recorded was 284 mm on 5 February 2003 (BoM 2011). Figure 2 illustrates the mean monthly rainfall in Gladstone from 1981 to 2010.

The region is comparatively humid due to its proximity to the coast. However, Gladstone tends to experience drier afternoons in the warmer months. Annually, relative humidity averages taken at 9.00 am and 3.00 pm were 67% and 59%, respectively (GHD 2009; BoM 2011).

According to BoM, an average of two to four cyclones affect Queensland every year and due to the length of the coastline, may not affect a particular area for many years. Cyclones affecting Queensland tend to develop over the seas to the north and east of the state, although small cyclones occasionally develop closer to the coast (GHD 2009).

5.2 Land use and tenure

The Project is proposed within the Port of Gladstone, which supports, and is surrounded by, predominately industrial land uses. Of particular regional significance are the existing industrial uses which support the continued growth of the coal export industry including - the Gladstone State Development Area, the RG Tanna Coal Terminal and the future Wiggins Island Coal Export Terminal which support the continued growth of the coal export industry. In recent years, diversification of Gladstone's industrial land uses has occurred with the emergence of the LNG industry in the Fisherman's Landing and Curtis Island areas.

The proposed duplicate channel and any proposed offshore disposal will be Unallocated State Land. Also any proposed reclamation areas identified for the onshore disposal of dredge material are likely to predominately comprise Unallocated State Land.

5.3 Protected areas

5.3.1 World heritage area

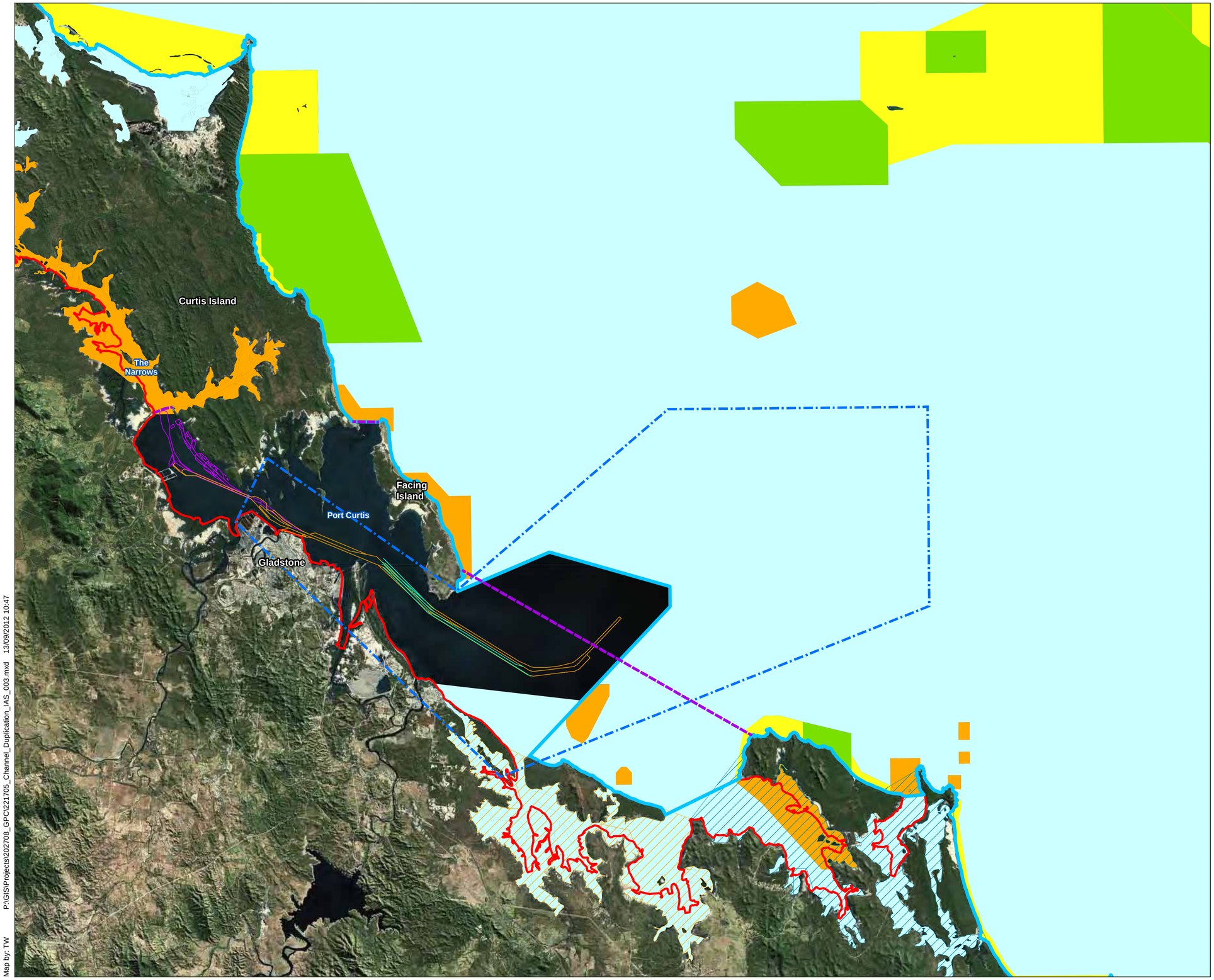
World Heritage Areas are outstanding examples of the world's natural or cultural heritage (DERM 2011). The World Heritage Committee oversees listing these areas on behalf of the United Nations Educational, Scientific and Cultural Organization (UNESCO). The Australian Government has to ensure that Australia's world heritage properties are managed to protect their natural and cultural values.

The Great Barrier Reef (GBR) became Queensland's first world heritage area in 1981, which encompasses an area of approximately 348,000 km^2, extending from the low water mark of the mainland and includes all islands, internal Queensland Waters and *Seas and Submerged Lands Act 1973* exclusions. The GBR meets all the criteria for natural world heritage as it:

- Represents major stages of the earth's evolutionary history
- Is an outstanding example of ongoing ecological and biological processes
- Contains superlative natural phenomena
- Contains important natural habitats for conservation of biological diversity

The Narrows, Port Curtis and parts of the Port fall within the (GBRWHA) boundaries; however they are controlled by the Queensland Government as they are defined as internal Queensland Waters (refer Figure 3).

Under the *Environmental Protection Act 1994* (EP Act) a World Heritage Management Area is defined as a Category B Environmentally Sensitive Area (ESA).



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Legend

- Existing Channel Extent
- Proposed Channel Duplication Project Extent
- Approved Western Basin Channel Extent
- Project Area (Inclusive of potential spoil disposal area)
- Great Barrier Reef Marine Park (Commonwealth - Low Water Mark)
- Great Barrier Reef World Heritage Area (Low Water Mark)
- Rodds Bay Dugong Protection Area Boundary

Declared Fish Habitat Area

- Colosseum Inlet
- Rodds Harbour

Marine Park Zones

- Conservation Park
- General Use
- Habitat Protection
- Marine National Park

Source:
Aerial: Bing Maps, 2010.
World Heritage Area: DERM, Feb 2010.

Great Barrier Reef Marine Park Area: Great Barrier Reef Marine Park Authority 2008.

Note: Declared Fish Habitat Area is approximate only.

Note: Western Basin channels are not part of the Channel Duplication Project

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Coordinate system: GDA_1994_MGA_Zone_56

Gatcombe and Golding Cutting Channel Duplication Project

Figure 3: Protected Areas

5.3.2 Marine parks

5.3.2.1 Great Barrier Reef Marine Park

The Great Barrier Reef Marine Park (GBRMP) was declared in 1975 with enactment of the *Great Barrier Reef Marine Park Act 1975*. The Act provides for the establishment, control, care and development of the GBRMP. The Marine Park comprises 33 sections as per the Proclamations, but excludes Queensland owned islands, internal waters of Queensland and exclusions under the *Seas and Submerged Lands Act 1973*. This area extends from the mean low water mark out toward the 200 nautical mile Economic Exclusion Zone (EEZ) but does not include the Port of Gladstone.

The GBRMP was established with the purpose of preserving the area's biodiversity, whilst providing for reasonable use and access. This was achieved through the establishment of the Great Barrier Reef Marine Park Zoning Plan in 2003. Under the plan, eight zones, ranging from General Use to Preservation, have been created which regulate access protocols and restrict activities within the different zones. The Great Barrier Reef Marine Park Authority (GBRMPA) is responsible for the management of the Marine Park.

The proposed dredging works are located outside the GBRMP, though offshore disposal options are likely to be located within the Marine Park. Figure 3 illustrates the boundaries of the Marine Park in relation to the dredging footprint.

5.3.2.2 Great Barrier Reef Coast Marine Park

The Great Barrier Reef Coast Marine Park (Marine Park) is managed by the Queensland government under the *Marine Parks Act 2004, Marine Parks (Great Barrier Reef Coast) Zoning Plan 2004, Marine Parks Regulation 2006* and the *Marine Parks (Declaration) Regulation 2006*.

The Marine Park extends from Baffle Creek (north of Bundaberg) to Cape York and encompasses tidal waters and tidal lands (to a depth of 1,000 m underground) three nautical miles seaward from the Highest Astronomical Tide (HAT). The Marine Park zoning and regulations generally complement the GBRMP (Commonwealth).

Within the vicinity of Gladstone the Marine Park includes The Narrows (north of Friend and Laird Points), out to three nautical miles from the HAT of Curtis and Facing Islands and the mainland, south of Canoe Point.

The *Marine Parks (Declaration) Regulation 2006* which superseded and overrode the *Marine Parks (GBR Coast) Zoning Plan 2004* designated the GBR Coastal Marine Park boundary as:

- Generally northerly, westerly and southerly along Curtis Island at HAT to where it intersects latitude 23º44.905' south
- Then west along latitude 23º44.905' south to where it intersects Kangaroo Island at the high water mark (HWM)

5.3.3 Fish habitat areas

Declared Fish Habitat Areas (FHAs) give protection to inshore and estuarine fish habitats that are important for sustaining local and regional fisheries. Once an area is declared as a FHA, it equally protects all habitat types (ie vegetation, sandbars and rocky headlands) from direct physical disturbance and coastal development. Declared FHAs are protected by the *Fisheries Act 1994* that restricts development activities.

Two FHAs have been declared under the provisions of the *Fisheries Act 1994* to the south of the proposed dredging area including the Colosseum Inlet and Rodds Harbour FHAs. Both of these FHAs have a combination of management levels, including 'A' areas requiring very strict management and 'B' areas where existing or planned use requires a more flexible management approach. Figure 4 illustrates the location of these FHAs.

5.3.4 Dugong protection areas

Dugong Protection Areas (DPA) under the *Fisheries Act 1994* give protection to known dugong habitats, breeding and feeding grounds within the GBRMP, which was agreed upon by the Great Barrier Reef Ministerial Council in August 1997 (GBRMPA 2011).

DPAs have been declared as places which support significant dugong populations and/or important seagrass habitat. The establishment of DPAs was a critical step in efforts to save the dugong population in the GBRMP. The species is recognised as one of the values for which the GBR was listed as a WHA.

Zone 'A' Dugong Protection Areas include significant dugong habitats in the southern GBR which consistently contain over 50 percent of dugong numbers. In these areas, the use of offshore set, foreshore set, and drift nets are prohibited.

Zone 'B' DPAs have been shown to contain about 22 percent of dugongs in the southern GBR. Mesh netting practices are allowed to continue, but with more rigorous safeguards and restrictions than before. These measures are being kept under review to ensure protection of dugongs in these areas.

The proposed dredge areas partially lie within the Rodds Bay Dugong Sanctuary which is designated as a Zone B (restricted use) DPA, declared under the *Fisheries Act 1994* (refer Figure 3).

5.3.5 Significant wetlands and nationally important wetlands

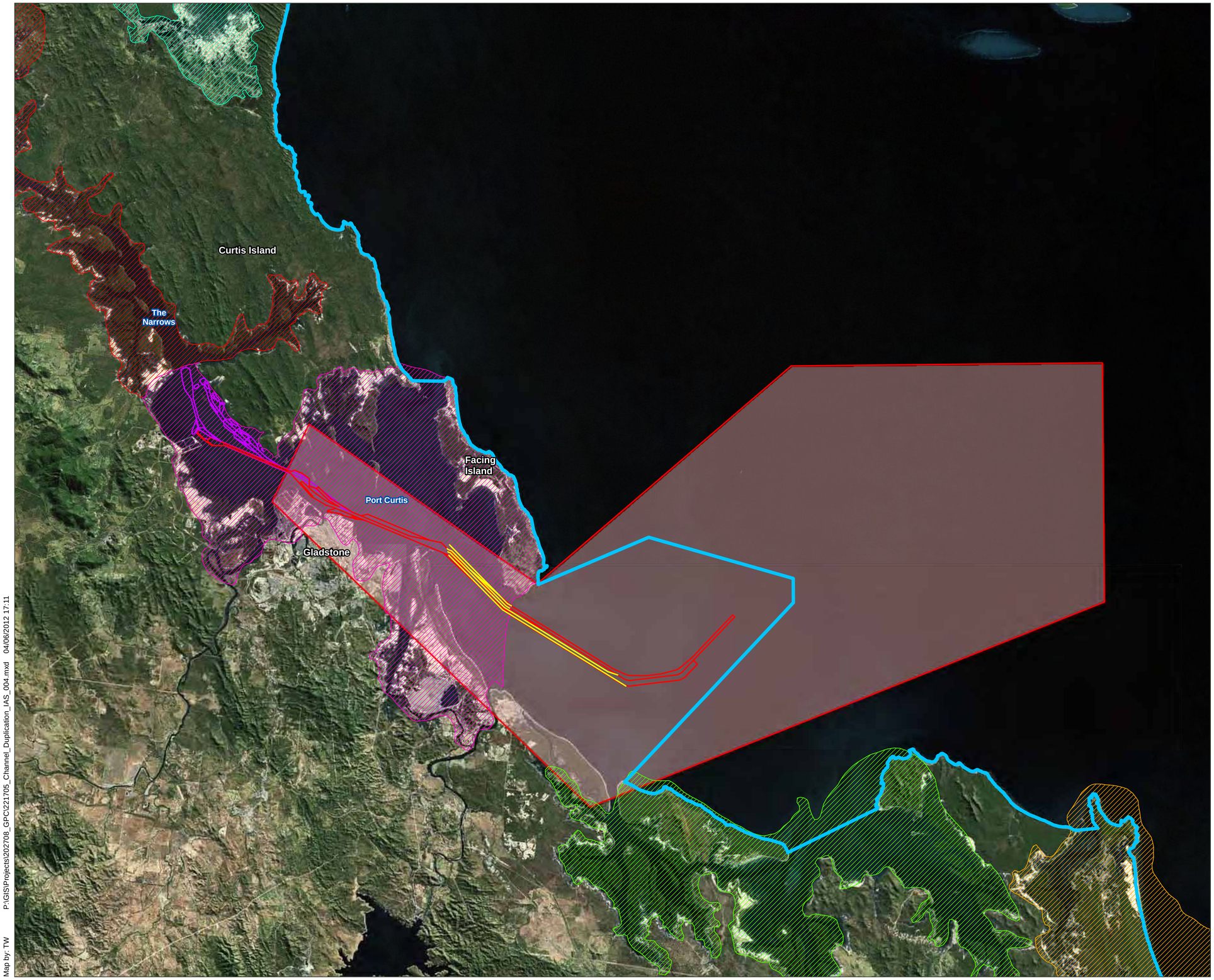
The Directory of Important Wetlands in Australia (DIWA) was initiated to collate and enhance wetland information to provide for better conservation and management of wetlands. In determining a nationally important wetland, a number of criteria were developed, which were based on the Ramsar Convention description of Wetlands of International Importance.

Under these criteria, three nationally listed wetlands occur within close proximity to the proposed dredge areas; Port Curtis Wetlands, the Great Barrier Reef Marine Park and the Colosseum Inlet-Rodds Bay area. Figure 4 illustrates for the location of nationally listed wetlands in relation to the proposed dredge areas.

A search of the EPBC Matters of National Environmental Significance (MNES) search tool identified eight Nationally Important Wetlands within a 10 km radius of the proposed dredge areas. These wetlands include:

- Bustard Bay Wetlands
- Colosseum Inlet - Rodds Bay
- Deepwater Creek
- Granite Creek
- Great Barrier Reef Marine Park
- Northeast Curtis Island
- Port Curtis
- The Narrows

Creation of the duplicate channel within the Port has the potential to impact upon the Port Curtis Wetland and the GBRMP Wetland due to their close proximity to the proposed dredge areas. These Wetlands are discussed in further detail below.



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Legend

- Existing Channel Extent
- Proposed Channel Duplication Project Extent
- Approved Western Basin Channel Extent
- Project Area (inclusive of potential spoil disposal area)
- Great Barrier Reef Marine Park (Commonwealth - Low Water Mark)

Directory of Important Wetlands

- Bustard Bay Wetlands
- Colosseum Inlet - Rodds Bay
- Great Barrier Reef Marine Park
- Northeast Curtis Island
- Port Curtis
- The Narrows

Source:
Aerial: Bing Maps, 2011
Seagrass Distribution, PCIMP, 2009.
Directory of Important Wetlands, EPA, 2001.

Note: Western Basin channels are not part of the Channel Duplication Project

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Coordinate system: GDA_1994_MGA_Zone_56

Gatcombe and Golding Cutting Channel Duplication Project

Figure 4: Significant Wetlands

5.3.5.1 Port Curtis Wetland

Port Curtis Wetland is included as a wetland of national importance under DIWA. The wetland comprises all tidal areas within the Gladstone region spanning from Laird Point and Friend Point in the north, between Gatcombe Head and Canoe Point in the south and including the southern region of Curtis Island and the eastern side of Facing Island. Port Curtis Wetlands span a region of approximately 31,200 ha (Environment Australia 2001).

The inclusion of Port Curtis as an important wetland is in recognition of the areas geomorphology, cultural and socio-economic value and ecological diversity. The area supports a diverse range of wildlife, including significant flora and fauna, as well as being the preferred feeding grounds of several CAMBA (China-Australia Migratory Bird Agreement), JAMBA (Japan-Australia Migratory Bird Agreement) and Convention on Migratory Species (Bonn Agreement) listed migratory birds.

The wetlands of Port Curtis contains various microhabitat types for a number of flora species, including salt flats, mud flats, rocky islands, salt marshes and mangroves (Connell Hatch 2006). Flora species that are reported to inhabit regions of the Port Curtis Wetland include (GHD 2009):

- *Halophila tricostata*
- *Acanthus ilicifolia*
- *Avicennia eucalyptifolia*
- *Xylocarpus australasicus*
- *Bruguiera exaristata*

5.3.5.2 Great Barrier Reef Marine Park

Section 5.3.2 contains a detailed description of the GBRMP.

5.4 Geology and soils

5.4.1 General local geology

A range of studies have been undertaken for various projects within Port Curtis over the past 25 years and generally there is a large amount of geological data for the Inner Harbour (from The Narrows to Targinie Channel). The Outer Harbour has not been the subject of extensive geological investigations, although there are some relevant contextual reports relating to the East Banks sea disposal grounds and other historic sea disposal sites at the entrance of the Port.

The Gladstone area has four distinct forms of landscape:

- The large continental islands adjacent to the coast (Curtis and Facing Islands)
- The deltas of the Fitzroy, Calliope and Boyne Rivers
- The coastal and river floodplains
- The hills of the two main but disjointed ranges that parallel the coast

The Geological Survey of Queensland's 1:100,000 Gladstone Special Sheet (2005) indicates that the coastal flats of the Inner Estuary are likely to be underlain by Holocene aged estuarine deposits overlying rock of the Wandilla Formation of Early Carboniferous age. The tidal flats which skirt the coastline feature mangrove swamps and mud (soft organic silts and clays).

The offshore areas are not included within the Geological Survey map (as the mapping does not extend offshore), although it is likely that alluvial deposits carried down the Calliope River will be encountered offshore.

The general characteristics of the sediments within the proposed dredge areas are a mixture of gravels, sands, silts and clays. The surface sediments in the high current areas are typically the coarser fractions with the finer particles being swept away (Connell Hatch 2006). Investigations for the Western Basin Dredging and Disposal Project (herein referred to as Western Basin) dredge areas demonstrated that the local geology comprises estuarine clay overlaying marine and residual clays with the estuarine clay varying in thickness from 0.5 m to approximately 5 m. The underlying soils vary from clay, silty clay, with some areas containing gravels and/or sand layers most common in the first 10 m below the seabed.

Previous investigations (Douglas Partners 2005; 2006; URS 2009) indicated the presence of interbedded loose sands, gravels and soft clays dominated sub-surface materials of variable thickness (typically <0.5 m up to around 10 m) within and to the south of the Targinie Channel (within the Wiggins Island Coal Terminal site) and the southern end of the Clinton Bypass Channel. The near surface sediment in the area immediately east of Fisherman's Landing wharves (Targinie Swing Basin) included stiff to very stiff silty clay with traces of gravel and sand, overlain by a layer, up to 1 m thick, of very soft to soft sandy silty clay containing some shell fragments (Douglas Partners 2005).

The limited information available for the Outer Harbour indicates different characteristics than the predominantly silt free Inner Harbour channels (which is mainly due to the fast flowing tides through the deeper channels). The Outer Harbour sediments are likely to be comprised of sand, silt and shell grit immediately below the seabed (Blain, Bremner and Williams Pty Ltd 1980).

A limited number of locations have been sampled at the East Banks Sea Disposal Site (refer Figure 1) north-west of Wild Cattle Cutting with sediments at the spoil ground and adjacent to the disposal site being recorded as spatially variable and tending to be dominated by fine to medium sands (WBM 2006). GHD (2006) also recorded that sediments within the disposal site consisted predominantly of the sand fractions. The proportion of sand at the disposal site was higher than that of the inner and outer channels. It was found that the average percentage of clay and silt in all study areas was low and that the mean gravel fraction of the sediment intended for dredging in the inner channel was twice as high as that in the outer channel (GHD 2006).

5.4.2 Sediment chemistry

As discussed in Section 5.4, a wide array of literature exists relating to the sediment type, composition and chemistry within the Inner Harbour. In particular, the recent Western Basin Project undertook sediment sampling in 2009 (GHD 2009), as did Australia Pacific LNG and Queensland Curtis LNG Projects (Australia Pacific LNG 2009; QGC 2009). Currently there has been limited testing in relation to sediment chemistry for the Outer Channel, however data that does exist has not highlighted any contaminants of concern (WBM 1992). Recent testing at the East Banks Sea Disposal Site demonstrated that the sediments contained no organic or inorganic contamination.

The sediment quality of the recent Western Basin dredge material (which incorporates many of the Inner Harbour channels proposed for widening, duplication or realigning) was considered compliant with the National Assessment Guidelines for Dredging (NAGD) and therefore suitable for sea disposal (DEWHA 2009). No organic or inorganic contaminants were recorded during the Western Basin Project EIS investigations exceeding sediment quality screening levels according to the decision process of the NAGD (DEWHA 2009; GHD 2009). A small number of individual results for arsenic and nickel exceeded the Screening Levels (as did a few results for zinc, chromium and copper); however the 95% upper confidence limits (UCLs) in the shallower and deeper sediments were well below the determining guideline.

Occasional elevated concentrations of arsenic and nickel have been previously demonstrated by a number of Port Curtis sediment studies (Connell Hatch 2006), however these are likely attributable to naturally occurring weathering and depositional processes rather than anthropogenic input.

Bioavailability testing was also undertaken as part of the Western Basin Project on any metals found to exceed NAGD screening levels (DEWHA 2009; GHD 2009). The testing illustrated that the metals were present in the biologically available fraction at very low concentrations (ie below NAGD screening levels (DEWHA 2009)) and were therefore considered to pose no risk to marine organisms. Furthermore, elutriate tests showed that none of the metals tested exceeded Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) (2000) water quality trigger values for the protection of 95% of marine species when even the most conservative initial mixing/dilution factor was applied.

In relation to Acid Sulfate Soils (ASS), potential acidity has been recorded in many Inner Harbour areas of Port Curtis at a variety of depths; however, areas containing net excess acidity are usually confined to very discrete limited pockets (GHD 2009). Previous results have also indicated that the majority of the sediments contain sufficient Acid Neutralising Capacity (ANC) to neutralise any acid generation from an organic and or inorganic source.

5.5 Air quality

Wind speed and direction play an important role in the transport and dispersion of air pollutants. The influence of the coastal environment plays a key role in determining the direction in which pollutants will be transported, as onshore breezes will result in an inland displacement of particles.

The proposed channel duplication site occurs within the Gladstone airshed. The Gladstone region is bordered to the east and south by mountain ranges. Pollutants within the area become trapped until dispersed by wind or rinsed from the air by rain. In warmer, windier months of the year, rainfall is more common and tends to disperse pollution and cleanse the air. In cooler conditions, wind speeds and rainfall are generally lower, resulting in less dispersion of pollutants in the airshed (GHD 2009).

Industries in the airshed that have the potential to cumulatively affect air quality in the region include a major coal fired power station, a large aluminium refinery, an aluminium smelter, coal handling, port facilities and cement manufacturing plants. Other sources of dust in the region include landfills, trains, traffic, and exposed areas of land (Connell Hatch 2006). These air emission sources have the potential to impact upon the following sensitive receptors within the region:

- City of Gladstone
- GBRMP
- Rodds Bay DPA

An air quality assessment will be undertaken as part of the EIS process. Mitigation measures will be identified to prevent environmental harm to the above mentioned sensitive receptors from air quality related impacts associated with the onshore disposal option for the Project.

5.6 Noise and vibration

Each year the Port is visited by more than 1,200 vessels. As such the harbour itself has a relatively high number of vessels and users on its waters, as well as the surrounding environments containing a large number of industrial sites.

The largest users of Gladstone Harbour and Port Curtis are recreational boaters with L. Huson and Associates Pty Ltd (2009) estimating (for the Gladstone LNG project) that annual movements in Port Curtis totalled approximately 58,500 mostly occurring on weekends.

Consequently, the Port experiences a high degree of marine noise and vibration (particularly on weekends) at a variety of frequencies, ranging from lower frequency sound emissions from larger slow moving vessels (including existing dredge vessels) and higher frequency sound emissions such as those that are produced by small high speed recreational craft.

The proposed dredging works and piling (for navigational aids) have the potential to create additional noise and vibration impacts on the marine environment and land based sensitive receptors. However previous dredge and piling campaigns in the harbour have resulted in minimal noise and vibration impacts.

5.7 River systems

Freshwater discharges from the Calliope River, Boyne River and overland flows from the adjacent tidal and coastal areas influence the water quality of near shore marine waters and the overall health of the estuarine and marine ecosystems. Land use activities within the Calliope River and Boyne River catchments and adjoining Port Curtis regions have an impact on the water quality and ecological value of the lower reaches through activities such as ruralisation, urbanisation and a large number of industrial activities, including an aluminium refinery and smelter, a cement production works, a chemical plant and a power station. Freshwater pulses from the upper reaches of the catchment contain significant quantities of suspended solids, nutrients, and contaminants which may be detrimental to estuarine and near shore environments.

5.7.1 Calliope River

The Calliope River is currently an unregulated system that flows in an easterly direction from the Calliope Ranges and discharges into Port Curtis. The Calliope River catchment encompasses an area of approximately 2,236 km^2. The River is approximately 100 km in length and includes four major tributaries: Larcom Creek, Oakey Creek, Paddock Creek and Double Creek.

In the lower reaches of the catchment, a number of tributaries and drainage lines are estuarine with tidal influxes from the Calliope River. Upper reaches are primarily ephemeral with sporadic flows associated with seasonal rainfall and overland fall.

5.7.2 Boyne River

The Boyne River lies approximately 14 km south of the city of Gladstone. It spans a length of 125 km beginning in the Bobby Ranges to the west, finishing at Port Curtis. Like the Calliope River, it has a number of creeks and tributaries flowing into the stream, including Glassford Creek, Degalgil Creek, Diglum Creek, Ridler Creek and the Eastern Boyne River (Bonzle 2011). In total, the Boyne River catchment occupies an area of up to 2,550 km^2. Much of the runoff within the catchment is captured and stored within the Awoonga Dam (Australian Government 2009).

As a result of anthropogenic activities mentioned and natural influences both upstream and downstream, the Calliope and Boyne River systems are turbid in nature which impacts upon the water quality of the receiving marine environment (Port Curtis).

5.8 Coastal environment

Principal drivers of sediment movement within Port Curtis are tidal currents and locally generated waves. Other contributors to sediment movement include extreme weather events such as storms and cyclones. These storms generate high waves and water levels that can have major effects on the environment and impact upon areas that would not normally be affected under prevailing conditions (GHD 2009).

Curtis and Facing Islands act to protect the area from ocean waves occurring from the east and hence the wave action towards the north-western coastline is comparatively mild. The area is subject to locally generated sea waves under the influence of local wind conditions characterised predominantly of south-easterly winds in the morning, shifting to east and north-east in the afternoon (GHD 2009).

The large tides of the region generate strong tidal currents up to 1.5 m/s in the main channel of Port Curtis and up to 0.35 m/s on the shallower areas of the estuary. Tides in this area go through a neap-spring cycle over a period of approximately 14 days, with ranges of around 4 m at the spring tide and 1 m during the neap tide (Connell Hatch 2006). Estuary environments in the area have extensive intertidal banks, mangroves and saltpan communities that are inundated to various degrees depending on the tidal range. The storage volume associated with these areas vary with tide height, meaning that the relationship between tidal velocities, the rate of rise and fall of the water level and the tide range is non-linear, particularly for tides of large range.

5.9 Marine water quality

Port Curtis is a naturally turbid environment which is influenced by two main factors – re-suspension of sediments by tidal driven current speeds and seasonal flows from the catchments that discharge into the Port.

Port Curtis is a macro tidal estuary subject to large tides (as explained in Section 5.8). This ensures that the water column is vertically well mixed most of the time, resulting in significant re-suspension of fine sediment. Combined with very large deposits of silt from the hinterland in times of flood, the estuary maintains a highly turbid character impacting the marine water quality.

The background water quality of Port Curtis has been monitored for approximately 15 years from 1995 to present (2011). Numerous studies of water quality have also been conducted in the Port to assess and manage the impacts of previous dredging campaigns. The previous studies have consisted of both short term and long term monitoring programs capturing physicochemical parameters and metal concentrations. The studies have predominantly focussed on sites within the Inner Harbour although more recent work has included reference sites within the Outer Harbour (GHD 2009; Vision Environment 2008). While there are less water monitoring sites in the Outer Harbour, there are three sites along the eastern side of Facing Island and one site in Rodds Bay as part of the Western Basin Water Quality Management Plan (WQMP) (Aurecon 2011).

Turbidity is higher within the Inner Harbour than the Outer Harbour with the highest turbidity found within the shallow muddy environments adjacent to the coast line. Dissolved oxygen and pH also show typical estuarine characteristics with decreasing gradients of dissolved oxygen and decreasing acidity (eg increasing pH) from the Inner Harbour to the Outer Harbour and oceanic zones (Vision Environment 2008).

Turbidity and suspended solids data confirm that the proposed dredge areas are a naturally turbid system. The continuous logger data indicates that turbidity is regularly elevated above the Queensland Water Quality Guidelines (QWQG) (DERM 2009) and ANZECC (2000) guidelines.

The system does show some evidence of nitrification. During wet season rainfall, nitrogen and phosphorus regularly exceeds Australian Water Quality Guidelines (ANZECC/ARMCANZ 2000). This may originate from anthropogenic sources but could also result from naturally high nutrient levels within the system. The PCIMP monitoring (Vision Environment 2008) highlighted that nutrients, and in particular total phosphorus, were elevated across the Port and exceeded Australian Water Quality Guidelines (ANZECC/ARMCANZ 2000) both at the Inner and Outer Harbour although seemed to be bio-available only within the Inner Harbour (when measured as orthophosphate).

Metal concentrations within the marine waters are generally more elevated within the Inner Harbour when compared to the Outer Harbour and oceanic areas. Copper, zinc and manganese in particular have been shown to occur in the highest concentrations at sites within the Inner Harbour when compared to the outer and more oceanic sites (Vision Environment 2008).

5.10 Ecology

Port Curtis is recognised as providing habitat for many species that will be discussed throughout this section. In particular, dugong habitat exists throughout the area, as well turtle foraging habitats at The Narrows and the exposed banks of Kangaroo Island. No fish species of conservation significance are known to occur in The Narrows or Port Curtis.

Four wetlands of national significance (listed in *A Directory of Important Wetlands in Australia*) occur within the Port Curtis area – The Narrows, Port Curtis, GBRMP and Colosseum Inlet-Rodds Bay area.

This section will detail the existing marine ecological environment, specifically seagrass, benthic habitats, coral reefs, marine megafauna and birds.

5.10.1 Seagrass

Seagrass within Port Curtis and the GBRMP function as important feeding locations, nurseries and habitats for a diverse range of fauna such as dugongs, turtles and juvenile tiger prawns (Rasheed et al. 2003). Seagrass meadows support an array of epiphytic seaweeds and filter-feeding animals such as bryozoans, sponges, and hydroids. This assemblage of species is an important resource for a number of species, including fish, mammals and shorebirds (Danaher et al. 2005 and Rasheed et al. 2003).

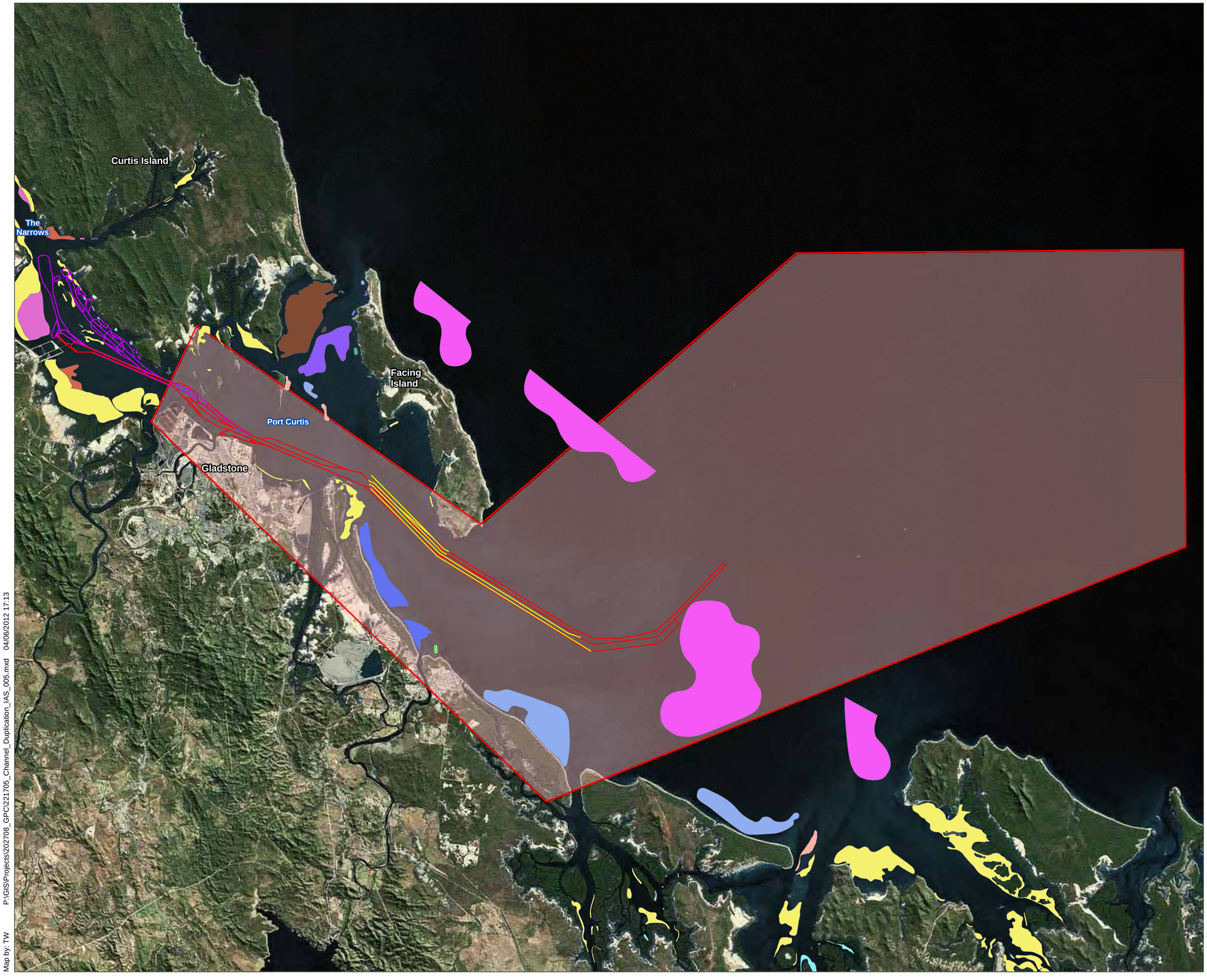
The Port Curtis and Rodds Bay seagrass communities are of regional significance as the closest meadows are located at Hervey Bay to the south and Shoalwater Bay to the north (Rasheed et al. 2003 and Thomas et al. 2010).

In collaboration with GPC, the former DPI&F (now Department of Agriculture, Fisheries and Forestry) initiated an annual long term seagrass monitoring program in Port Curtis and Rodds Bay. An initial baseline study undertaken in 2002 (Rasheed et al. 2003) identified 135 discrete coastal and deepwater seagrass meadows (refer Figure 5). Thirteen of these meadows are monitored during October and November annually by Fisheries Queensland, however due to the construction of the Western Basin Project this monitoring has been increased to twice yearly for seagrass meadows within the region Western Basin Project dredging and disposal footprints. In addition, Fisheries Queensland is also scheduled to undertake quarterly assessments of permanent transect sites at selected key seagrass locations within the Port.

Six species of seagrass have been identified within the Port Curtis locality (Rasheed et al. 2008):

- *Halodule uninervis* (wide and narrow leaf morphology)
- *Halophila decipiens*
- *Halophila minor*
- *Halophila ovalis*
- *Halophila spinulosa*
- *Zostera capricorni*

Results from surveys undertaken between 2002 and 2009 indicate a reduction in coverage by approximately 9% (1500 ha). This reduction was recorded primarily in association with deepwater meadows (Thomas et al. 2010).



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Legend

- Existing Channel Extent
- Proposed Channel Duplication Project Extent
- Approved Western Basin Channel Extent
- Project Area (inclusive of potential spoil disposal area)

Seagrass Communities (2009)

- Dense *Halodule uninervis* (narrow) with mixed species
- Dense *Halodule uninervis* (wide) with mixed species
- Dense *Halophila decipiens* with mixed species
- Dense *Halophila ovalis* with mixed species
- Light *Cymodocea rotundata*
- Light *Halodule uninervis* (narrow) with mixed species
- Light *Halodule uninervis* (wide) with mixed species
- Light *Halophila decipiens*
- Light *Halophila decipiens* with mixed species
- Light *Halophila ovalis* with mixed species
- Light *Halophila spinulosa* with mixed species
- Light *Zostera capricorni* with mixed species
- Moderate *Halodule uninervis* (narrow) with mixed species
- Moderate *Halodule uninervis* (wide) with mixed species
- Moderate *Halophila decipiens* with mixed species
- Moderate *Halophila ovalis* with mixed species
- Moderate *Zostera capricorni* with mixed species

Source:
Aerial: Bing Maps, 2010.
Seagrass Distribution, PCIMP, 2009.

Note: Western Basin channels are not part of the Channel Duplication Project

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Job No: 221705

Coordinate system: GDA_1994_MGA_Zone_56

Gatcombe and Golding Cutting Channel Duplication Project

Figure 5: Seagrass Communities (2009)

Recent monitoring shows a significant difference in coverage and density between the monitoring undertaken in November 2009 and June 2010. With seagrass meadows reducing to approximately half their coverage and density during winter when compared to areas of coverage recorded during summer (Thomas et al. 2010).

In addition, seagrass biomass was significantly higher in the wet season than in the dry season for the majority of meadows (refer section 5.1). *Zostera capricorni* meadows dominated the intertidal areas in both seasonal surveys (56% and 72% of meadows, respectively), while communities dominated by *Halophila decipiens* and *Halophila ovalis* dominated the subtidal areas (Thomas et al. 2010).

5.10.2 Benthic communities

Port Curtis supports a healthy community of estuarine benthic fauna. Monitoring programs indicate that diversity and abundance fluctuated annually, with higher species abundance, richness and diversity in the pre-wet season (November) compared to post-wet season (April) (Alquezar and Small 2006).

5.10.2.1 Benthic Macro invertebrates

Studies undertaken by Central Queensland University within Port Curtis indicate that the most abundant group of macro invertebrates were molluscs, contributing 41% of the total abundance, whilst the polychaetes were the second most abundant group, contributing 21%. Crustacean and chordates (ascidians) accounted for 29% of the remaining fauna and less common taxa included echinoderms (sea stars and sea urchins), cnidarians (anemones and corals) and marine worms (Alquezar and Small 2006).

Species abundance and richness is lowest on fine muddy sediments in the intertidal area and highest in the coarse, sandy sediments that generally occurred in the deeper channels (Currie and Small 2005).

Additionally, studies undertaken by Currie and Small indicate that a high level of turbidity indirectly promotes recruitment and/or survival of benthic fauna in Port Curtis (Currie and Small 2005).

5.10.2.2 Epibenthic Macro invertebrates

Epibenthic macro invertebrates were investigated as part of the 2002 DPI&F (now Department of Environment and Heritage Protection) baseline survey (Rasheed et al. 2003). This survey found that epibenthic macro invertebrates occurred throughout the Port Curtis region in varying densities with the highest densities associated with hard substrate in the form of coral bommies and rubble reefs.

These high-density areas were located outside Facing Island, within an existing dredged material disposal ground, and surrounding Seal Rocks (Rasheed et al. 2003). The inner harbour of Port Curtis ranged from low density areas of open substrate with scattered fauna to high density areas of scallop and rubble dominated reefs.

5.10.3 Marine megafauna

Port Curtis supports a range of marine megafauna, including whales, dolphins, dugongs and reptiles. Marine megafauna species are widely distributed through Port Curtis and the Gladstone region, particularly on a high tide.

Three whale species have been recorded in the vicinity of Port Curtis, including the sperm whale (*Physeter macrocephalus*), humpback whale (*Megaptera novaeangliae*) and curvier's beaked whale (*Ziphius cavirostris*). Four species of dolphin have also been recorded in the area, including bottlenose dolphins which have been sighted in Rodds Bay and in offshore waters.

The dugong (*Dugong dugong*), which is listed as vulnerable under the *Nature Conservation (Wildlife) Regulation 2006*, is recorded as occurring within Port Curtis. Dugongs prefer shallow and sheltered areas where their primary food source, seagrass occur. The proposed dredge areas are located in the vicinity of the Rodds Bay Dugong Sanctuary, which is a Zone B (restricted use) DPA declared under the Fisheries Act as mentioned in Section 5.3.4. The Gladstone coastline and the Rodds Bay DPA are recognised as important habitats for dugong populations despite being within and closely associated with commercial port activities. Dugongs are also protected under the EPBC Act.

Four species of turtle; green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*), flatback turtle (*Natator depressus*) and the loggerhead turtle (*Caretta caretta*) are known to occur along the Curtis Coast, and their range is expected to include Port Curtis (WBM 1992). These species are listed as either "Endangered" or "Vulnerable" under the provisions of the EPBC Act and the *Queensland Nature Conservation (Wildlife) Regulation 1994*. Flatback turtles are known to breed on the seaward beaches of Curtis Island.

Estuarine Crocodiles have been reported in Port Curtis with one caught at Fisherman's Landing (Walker et al. 1999).

5.10.4 Birds

The intertidal areas and wetlands that occur within the Port Curtis region host many terrestrial and marine migratory and wetland bird species, many of which have protection under Commonwealth legislation.

A search of the EPBC protected matters database indicated that there are 33 migratory species (including terrestrial and wetland species) and 72 listed marine bird species thought to occur in areas adjacent to proposed dredge areas.

5.10.5 Coral reefs

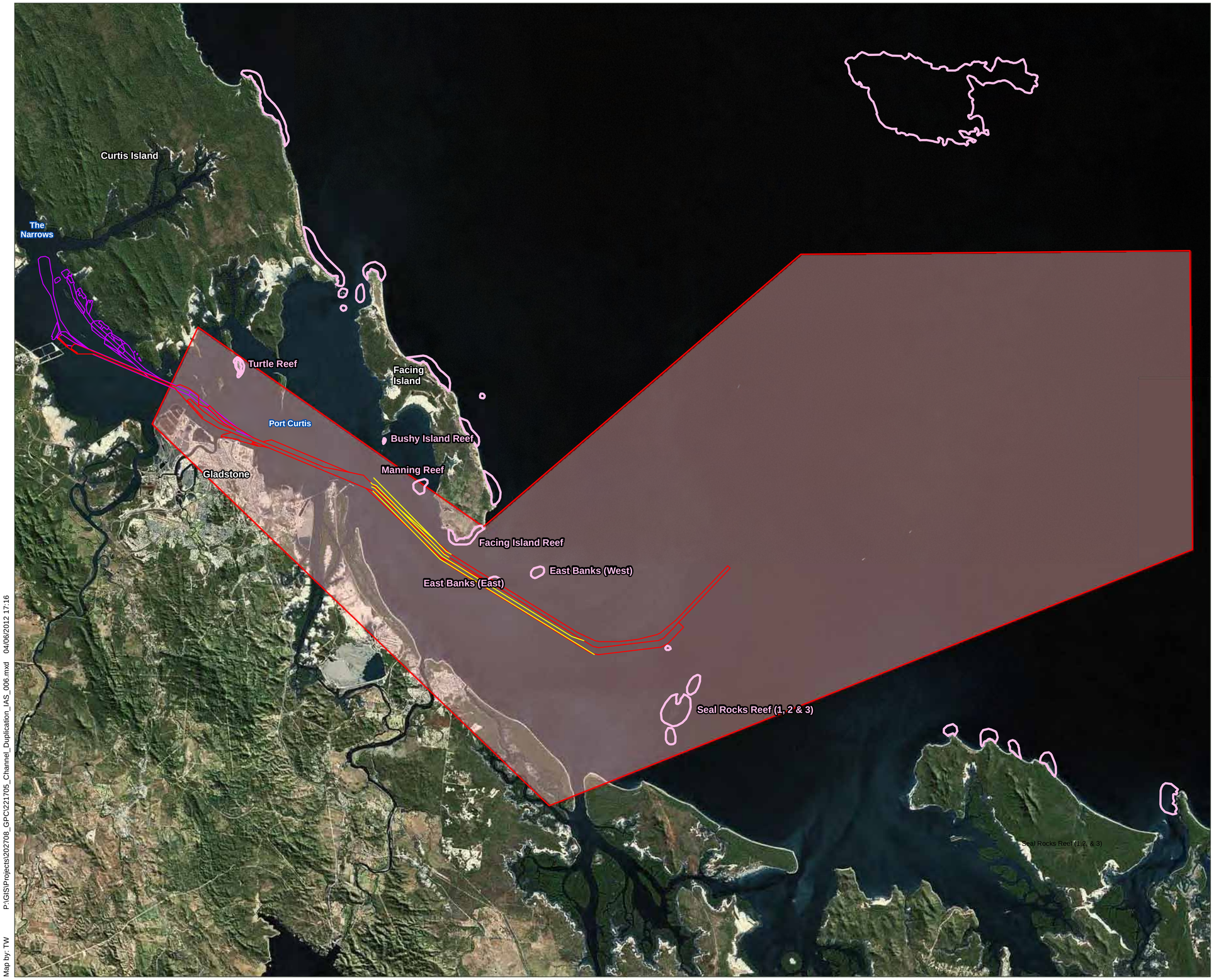
The proposed channel duplication is likely to occur in the vicinity of coral reefs associated with the southern extent of the Great Barrier Reef. Coral reefs are sensitive to nutrient loading in the water column and shading.

In particular, the following reefs are listed by GBRMPA and are located in the vicinity of the proposed channel (refer Figure 6):

- Bushy Island Reef 2.09 ha (within Port Curtis)
- Manning Reef 39.11 ha (within Port Curtis)
- Facing Island Reef (No6) 66.54 ha of reef (within Port Curtis)
- East Banks (East) 24.42 ha of reef (within Port Curtis)
- East Banks (West) 29.17 ha of reef (within Port Curtis)
- Curtis Rock Reef 4.4 ha (within Port Curtis)
- Turtle Island Reef 20.27 ha (within Port Curtis)
- Seal Rocks Reef (no 1) 45.35 ha (within the GBRMP) (Habitat Protect Zone)
- Seal Rocks Reef (no 2) 179.68 ha (within the GBRMP) (Habitat Protect Zone)
- Seal Rocks Reef (no 3) 34.74 ha (within the GBRMP) (Habitat Protect Zone)

5.11 Transport and infrastructure

The Port is a natural deepwater harbour with protected waters sheltered by harbour islands. There is approximately 40 km of shipping channels from Fairway Buoy to Fisherman's Landing with a tidal variation of up to 4.9 m (Connell Hatch 2006). The existing channels within the Port (from the inner-most harbour to the outer-most harbour) are described in Table 1. These channel details were current in 2007, prior to the dredging works in the Western Basin Dredging and Disposal Project (GHD 2009).



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Legend

- Existing Channel Extent
- Proposed Channel Duplication Project Extent
- Approved Western Basin Channel Extent
- Project Area (inclusive of potential spoil disposal area)
- GBRMPA Listed Reef

Source:
Aerial: Bing Maps, 2010.
Reef: GBRMPA, 2011.

Note: Western Basin channels are not part of the Channel Duplication Project

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Job No: 221705

Coordinate system: GDA_1994_MGA_Zone_56

Gatcombe and Golding Cutting Channel Duplication Project

Figure 6: Coral Reefs

Table 1 Shipping channel details (as in 2007)

Channel	Width (m)	Depth (m LAT)	Channel type
Targinie channel	120	-10.6	Inner harbour
Clinton channel	180	-16.0	Inner harbour
Auckland channel	180	-15.8	Inner harbour
Gatcombe channel	183	-16.3	Outer channel
Golding cutting	183	-16.3	Outer channel
Boyne cutting	183	-16.3	Outer channel
Wild Cattle cutting	183	-16.3	Outer channel

Source Maunsell AECOM 2007

The Port facilities primarily manage the export of bulk cargoes with a total of 83.4 million tonnes of cargo handled in the 2009/10 financial year (GPC 2010). The coal industry had the greatest export of the region with 72.4% of the throughput and the alumina industry had the second greatest export with 22.4% of the total throughput. The major coal terminal in the Gladstone Region is the RG Tanna Coal Terminal (RGTCT). The Wiggins Island Coal Export Terminal (WICET) is currently under construction, while the Balaclava Island Coal Export Terminal currently is in the EIS assessment stage.

There is considerable development in the LNG industry in the Gladstone Region with multiple proponents developing LNG facilities within the Curtis Island Industry Precinct of the GSDA. The projects that have gained State and Commonwealth approval include:

- Australia Pacific LNG
- Gladstone LNG
- Queensland Curtis LNG

Arrow Shell also has proposed LNG facilities for Curtis Island in addition to the above proponents and is currently undertaking environmental investigations.

The introduction of the LNG industry will significantly increase the total annual throughput as LNG becomes a major export, increasing the number of vessels annually managed by the Port. Other industries using the Port include recreational and commercial fishing, cement, aluminium, petroleum, grain and metals. In 2010, the Port comprised six operational wharf centres as described in Table 2.

Table 2 Wharf centres in the Port of Gladstone

Wharf centre	Import/Export
GPC owned and operated	
Barney Point Terminal	Coal
RGTCT	Coal
Auckland Point Terminal (Port Central)	Bulk cargo including magnetite, calcite, petroleum products, grain and containers
GPC owned and operated by others	
Boyne Smelter Wharf	Aluminium
Fisherman's Landing	Bulk liquids, cement products, bauxite and alumina

Various boat ramps provide access to the Port for recreational and commercial fishing. Three boat ramps are located in Auckland Creek and the Marina, providing access to the Port via the Auckland Channel. A fourth boat ramp is located in the Calliope River and feeds into the Targinie Channel.

Public boat ramps also exit in the Boyne River and South Trees Inlet and provide direct access to the outer harbour.

5.12 Cultural heritage

5.12.1 European cultural heritage

A cultural heritage database and register search of the Australian Heritage Database (AHD), (former) Register of the National Estate (RNE), Australian National Shipwreck Database (ANSD), (former) DERM's Queensland Heritage Register and the Gladstone Regional Council's heritage database have shown some recorded heritage sites within the vicinity of the proposed dredge areas. The recorded sites include but are not limited to:

- Balaclava Island and The Narrows (RNE)
- Curtis Island (part) (RNE)
- Garden Island Environmental Park (RNE)
- Great Barrier Reef Region (AHD, RNE)
- Various shipwrecks within proximity to the Project (ANSD)

5.12.2 Indigenous cultural heritage

There are a number of traditional owner groups in the Port Curtis area. There is a Native Title Claim (QC01/29) over the Gladstone region. The claimant is the Port Curtis Coral Coast (PCCC) Native Title Claim Group.

The defining legislation pertaining to indigenous cultural heritage is the *Aboriginal Cultural Heritage Act 2003*. The Act states that if a Project area is within the external boundaries of a registered native title claim, then the native title party for that area is the Aboriginal Party with whom consultation occurs. The proposed dredge areas are situated adjacent to the boundaries of the PCCC native title claim. The PCCC native title claim area extends along the shoreline of Gladstone, Curtis Island and Facing Island but does not include waters of the Gladstone Harbour.

5.13 Visual amenity

Industrial development is a major feature of the visual landscape in the Port, including infrastructure for Orica, RG Tanna Coal Terminal, Queensland Alumina and Boyne Smelters. Current and future developments of the Port expect to increase the density and area of the industrial precinct, as well as an increase in dredging activities as part of the Western Basin and WICET projects (GHD 2009; Connell Hatch 2006).

The visual amenity changes towards the Outer Harbour due to the increased distance from the industrial development of Gladstone and the proximity of Protected Areas such as the GBRMP and FHAs. This landscape is more natural especially due to the undeveloped nature of Facing Island, however the visual amenity of the area is temporarily altered with the shipping movements from vessels entering and exiting the Port.

5.14 Socio-economic

Gladstone Regional Council was formed in 2008 with the amalgamation of the former Calliope Shire, Miriam Vale Shire and Gladstone City Councils. According to the 2006 census, the region has a population of 42,903 (Australia Bureau of Statistics (ABS) 2007). Major centres within the region include Gladstone (~28,808), Boyne Island (~3,687), Tannum Sands (~4,139) and Calliope (~1,550).

In December 1993, approximately 6,800 ha of land at Aldoga, north-west of Gladstone, was declared a State Development Area for future large scale industrial development. Since 1993, the GSDA has expanded to cover approximately 29,000 ha. The GSDA was established by the CG under the SDPWO Act, with the intent to promote economic development and address any areas of market failure in the development of industrial land and multi-user infrastructure corridors.

The Gladstone Region's strong economic development is based around resource extraction, mining processes, port facilities and other industries (GHD 2009). These industries include pastoral, agricultural, fishing, processing and manufacturing. The major industrial projects located around Gladstone are summarised in Table 3 and include current projects under construction and those awaiting approval. A large number of these projects include LNG facilities at the Curtis Island Industrial Precinct of the GSDA. The industrial development of Gladstone is a key driver of employment, as shown in Table 4, with a large proportion of people over 15 years employed as technicians and trade works (22.5%), machinery operators and drivers (13.0%) and labourers (13.0%) (ABS 2007).

Table 3 Projects within the Gladstone Region

Project name	Project type
Current projects	
Australia Pacific LNG	LNG facility
Barney Point Coal Terminal	Coal export terminal
Boyne Smelters Limited	Aluminium smelter
Cement Australia	Cement and clinker plant
Gladstone Area Water Board	Gladstone-Fitzroy pipeline
Gladstone LNG	LNG facility
Gladstone Pacific Nickel Refinery	Nickel refinery
Queensland Curtis LNG	LNG facility
Queensland Energy Resources Limited	Oil shale technology development facility
RG Tanna Coal Terminal	Coal export terminal
Rio Tinto Alcan	Alumina refinery
Support Infrastructure Projects	
Fisherman's Landing Northern Expansion	Reclamation expansion with wharves
Western Basin Dredging and Disposal Projects	Capital and maintenance dredging
Wiggins Island Coal Export Terminal	Coal export terminal
Proposed Future projects	
Arrow LNG Plant	LNG facility
Balaclava Island Coal Export Terminal – New precinct proposed about 5km from Port Alma terminal (GPC strategic plan for Port Alma)	Coal export terminal

Project name	Project type
Yarwun Coal Terminal	Coal export terminal
Fitzroy Terminal	Coal export terminal
Boulder Steel Limited	Steel plant
Sunshine Gas / Sojitz Corporation	LNG facility
LNG Ltd	LNG facility

Table 4 Employment within the Gladstone Region

Occupation (employed persons aged 15 years and over)	Total number of employed persons aged 15 years and over	Percentage of total employed persons aged 15 years and over
Technicians and trade workers	4,657	22.5 %
Professionals	2,713	13.1 %
Machinery operators and drivers	2,690	13.0 %
Labourers	2,681	13.0 %
Clerical and administrative workers	2,521	12.2 %
Sales workers	1,814	8.8 %
Managers	1,780	8.6 %
Community and personal service workers	1,433	6.9 %

Source: http://statistics.oesr.qld.gov.au/qld-regional-profiles accessed 20 July 2011

6 Potential environmental impacts and mitigation measures

6.1 Land use

6.1.1 Potential impacts

The proposed channel duplication will provide for increased shipping capacity and improved facility access which will promote the growth of new industrial and commercial land uses in the region through improvements to the import/export chain.

The Project has the potential to facilitate the creation of new areas for land development if reclamation works are undertaken as part of any onshore dredge spoil disposal works.

6.1.2 Mitigation measures

Local and regional planning schemes will ensure that future industrial developments in Gladstone are done in an appropriate manner.

6.2 Geology and soils

6.2.1 Potential impacts

In relation to geology and soils, dredging and the removal of marine sediments can have a number of potential dredging (construction) impacts including:

- Increased turbidity levels due to the mobilisation of sediments
- Mobilisation and release of organic and inorganic contaminants currently bound to the sediments
- Exposure of ASS/PASS sediments
- Alteration of tidal prism of Port Curtis
- Changes to the hydrodynamic processes operating with the Port (including accretion or loss of coastal sediments)

The direct and indirect impacts associated with dredging activities such as removal and mobilisation of sediments are discussed in Section 6.8 (Ecology) and Section 6.7 (Marine water quality).

The results of recent sediment regimes conducted in the vicinity of the proposed dredge footprint indicates that the sediments are likely to be considered ‘probably clean’ under the NAGD (DEWHA 2009). As such, it is not likely that contaminants will be mobilised into the water column.

If PASS is disposed onshore it can oxidise and form ASS if exposed to air for a period of time, resulting in necessary treatment of the spoil and an increased risk. This limits any opportunities for the sediments to move from an anaerobic to aerobic environment.

6.2.2 Mitigation measures

The following preliminary mitigation measures will be investigated further as part of the EIS process:

- Dredge equipment and dredging methodology will be selected on the basis of dredger availability, the nature of the material to be dredged, consideration of environmental impacts, minimisation of dredging timeframes
- Dredging operations will not be undertaken in unsuitable conditions (ie outside the operational parameters of the dredge, for example in high energy situations such as storm surges). If the Bureau of Meteorology (BoM) issues a severe weather warning dredging works within the affected area will cease. All other work in adverse weather conditions will be at the sole discretion of the Principal Contractor.
- If all dredged sediments go to an offshore disposal site there will be minimal risk in relation to ASS as the dredge material will be kept wet and placed back on the seabed as quickly as possible at sea. If sediments are to be disposed onshore, they will need to be treated accordingly.
- Mitigation measures will be developed in consultation with State and Federal governments to minimise the impact of either/both onshore and offshore spoil disposal

6.3 Air quality

6.3.1 Potential impacts

Dredging and disposal of dredge spoil (either onshore or offshore) associated with the Project is unlikely to result in the degradation of air quality within the Gladstone Region. However, a number of impacts have potential to occur:

- Air pollution and greenhouse gas emissions (GHGs) from the dredging works could increase due to exhaust emissions from dredging vessels, which may contain dust/particulates, carbon dioxide, carbon monoxide, nitrogen oxides and sulphur dioxide
- Onshore disposal may generate dust during the construction of the reclamation area, however disposal offshore will prevent wind dispersal of the dredged material
- Greater emissions of GHGs are expected during the dredging of the duplicate channel as an indirect result of increased vessel movement utilising Port facilities

However, when considering current emissions from the Port, it is unlikely that dredging and ongoing operational activities will result in a significant increase in GHG emissions. Consideration of these emissions is required by the users of the Port and is not subject to the Project's approval process.

The potential air quality impacts for the Project will be managed by implementing mitigation measures, to be outlined in the EIS for the Project.

6.3.2 Mitigation measures

The following preliminary mitigation measures will be investigated further as part of the EIS process:

- Dredgers will be properly maintained and fitted with appropriate emission reduction devices
- If onshore disposal is chosen, dust suppression techniques will be explored to reduce dust generation and revegetation of the reclamation area will be employed to reduce wind dispersal of dredged material
- Regardless of the type of disposal selected (ie onshore/offshore), the selection will consider the distance from the dredge footprint to reduce fuel usage, thereby reducing GHG emissions

6.4 Noise and vibration

6.4.1 Potential impacts

The proposed dredging works and piling activities have the potential to create additional noise and vibration impacts on the marine environment and land based sensitive receptors. Primary sources for dredging include, but are not limited to; dredging and dredge barge movements, booster pumps and to a lesser extent, works on land while piling activities will occur with the relocation and construction of the existing and new navigational aids into the seabed.

The potential noise and vibration sensitive receptors within close proximity to the Project include:

- Residential and industrial locations within the surroundings of the Port Curtis area
- Noise sensitive marine species and migratory birds in the vicinity of dredging works and the disposal sites

Potential impacts that may affect these sensitive receptors include the following:

- Both acute and diffuse noise pollution
- Noise impacts from dredging works on marine species
- Noise intrusion on Dugong Protection Area Rodds Bay
- Onshore disposal – impacts on residential and land based receptors as well as marine and coastal species depending on location of reclamation site
- If disposal outside of port area, impacts may be more severe – possibility of noise emissions travelling greater distance because there are less land masses to attenuate the sound waves
- Increased vessel movements to and from reclamation ponds and methods of sediment pumping ashore will add to overall noise generation
- Marine seismic surveys and piling can lead to a change in behavioural responses, injury and death in marine mammals (Gordon et.al 2004)

Noise pollution can be classified as either acute or diffuse. Acute noise pollution is noise produced in a location for a defined period of time. Diffuse noise pollution is an increase in background noise from a combination of sources. The proposed dredging and disposal works have the potential to generate both types of noise pollution with the acute noise being generated during pre-dredge works and dredging operations of the plant, while the combined dredging and reclamation has the potential to be a source of diffuse noise in the area. The proposed piling has the potential to generate an acute noise which will occur intermittently over a few months.

There are many gaps in knowledge about how noise and vibration can impact on marine mammals and fish. Research to date suggests that noise and vibration impacts on fish vary depending on their physiology, hearing sensitivity and behaviour. Flat fish have no swim bladder and they have been reported to show the lowest physical and behavioural responses to noise (Southard et al. 2006). Marine mammals and some fish are active swimmers and have the ability to swim away from the noise and/or vibration source, thereby reducing the level of exposure. Other fish tend to be resident in areas and may not move away from noise and vibration, resulting in dredging operational noise and vibration having much greater impact on the resident fish (Popper et al. 2006).

There is likely to be some noise and vibration intrusion upon the Rodds Bay Dugong Protection Area and the GBRMP and this will require detailed assessment during the EIS process. Research on the effects of human generated noise and vibration on marine mammals has shown some level of tolerance, but more importantly, mammals are shown to alter behaviour patterns in order to avoid sudden pulsed noises (Myrberg 1990). As such, marine mammals are likely to avoid particularly noisy activities. Potential impacts on marine species are not likely to be long-term and unlikely to be significant.

If offshore disposal of the dredge sediments is undertaken the noise and vibration impacts are likely to be similar to those of the dredging itself, although if disposal is outside of the Port area the impacts may be more significant. This is due to the possibility of noise emissions travelling a greater distance due to there being less land masses to attenuate the sound waves. Also the open ocean outside of Port Curtis is likely to have a lower background sound level due to not having the townships and industrial sites adjoining the Port itself.

6.4.2 Mitigation measures

The following preliminary mitigation measures will be investigated further as part of the EIS process:

- Where feasible the adoption of low-noise piling methods
- The implementation of a soft starter procedure between long breaks in activity, slowly increasing the intensity of the driving hammer
- Where possible, dredge and pump equipment will be fitted with noise suppression devices
- All equipment will be turned off when not in use
- A Noise and Vibration Management Plan will be implemented for all construction works

6.5 Surface water

6.5.1 Potential impacts

Dredging activities and sea disposal activities are unlikely to significantly impact upon Port Curtis ground and surface water resources. Potential impacts to marine water quality are considered in Section 6.7. If the onshore disposal option is selected, the following impacts to groundwater and surface water may occur:

- During filling and settlement phases (of stormwater system) there is potential for sediments to be mobilised in stormwater runoff and enter the harbour waters if not managed correctly – which may result in elevating turbidity levels and introducing contaminants (nutrients, hydrocarbons, metals and/or hydrocarbons) into the Port
- Acidification and degradation in quality of both the local groundwater and surrounding marine waters if any ASS material used within the reclamation is not managed appropriately - this could lead to the mobilisation of metals in the fill material, such as aluminium and iron, and subsequent discharge to the sea
- During construction of reclamation ponds, excavation works have the potential to alter local groundwater conditions
- Leaks and spills originating from onshore disposal activities could degrade groundwater quality adjacent to the onshore disposal area

6.5.2 Mitigation measures

The following preliminary mitigation measures will be investigated further as part of the EIS process:

- Stormwater management system will form part of detailed design of reclamation area which will likely include drainage systems and stormwater treatment measures - system will manage runoff and minimise discharge of sediment laden and turbid waters into Port Curtis
- Detailed investigations and modelling of groundwater will be undertaken prior to the reclamation site selection being finalised
- Details relating to possible location of a reclamation area not defined – but if a reclamation area is filled, the dewatering ponds will eventually be capped and appropriate operational stormwater systems installed
- An Acid Sulphate Soil Management Plan will be developed to minimise risk of any ASS exposure and outline treatment options if required
- Location and design of any reclamation area will to consider local groundwater conditions as there is the potential to impact upon perched and deep aquifer water tables

6.6 Coastal environment

6.6.1 Potential impacts

The creation of the duplicate shipping channel within the Port may impact upon coastal processes in the region including the following:

- Increased velocity of tidal currents from increased depth may alter sedimentation and scour patterns in the Port
- Changes to sedimentation patterns may alter the habitats of marine species in the Port and reduce marine water quality, both of which will affect the health of marine flora and fauna
- If onshore disposal of spoil material is chosen, there will be fewer areas for tidal dissipation. This may result in changes to the tidal flows into the reclamation site and surrounding areas, potentially impacting on the distribution of marine habitats in the immediate area.

6.6.2 Mitigation measures

The following preliminary mitigation measures will be investigated further as part of the EIS process:

- Develop a hydrodynamic model covering the dredge areas, disposal location (s) and sensitive receptors within the potential zone of impact
- Reclamation and/or offshore dumping sites will be determined based on a site selection assessment of all factors and risks. The disposal option will be selected based on the least predicted impact from modelling and a detailed risk assessment.
- Develop a Dredge Management Plan (DMP) to specify the performance objectives, actions and procedures to be carried out to minimise and mitigate potential environmental impacts associated with dredging and disposal activities
- Monitoring of sedimentation and deposition rates will be investigated. Monitoring requirements within the Port will be determined prior to and during the EIS process

In order to determine appropriate mitigation measures, further research is required to understand the extent of impact from the Project to the coastal environment. A hydrodynamic model for the Inner Harbour and near Facing Island was developed and implemented during the Western Basin Dredging and Disposal Project EIS and DMP approval process. A similar model will be developed for this Project to determine the effect of the Project on tidal currents, water levels and sedimentation and scour patterns within the Port. The hydrodynamic model will also assist in predicting the potential impacts of the dredge plumes on ecological sensitive receptors.

6.7 Marine water quality

6.7.1 Potential impacts

The dredging and disposal works of the Project may have an impact on the water quality of the Port. Potential impacts resulting from dredging activities include:

- Generation and migration of turbid plumes may increase turbidity of the Port, whilst potentially impacting on the adjacent marine environments, such as the GBRMP and associated World Heritage values
- Re-suspension of the bottom sediments may occur after dredging and may not be stable long term due to changes in tidal currents, including water level and current speed
- Increased turbidity causing light reduction for marine flora and fauna
- Dredging during extreme windy conditions may result in a greater dispersal of sediments due to increased wave action
- Increase in vessel movement may increase spills and contamination from vessels
- Cumulative impacts on marine water quality may occur, including increased turbidity if multiple projects are running concurrently – these impacts may have flow on effects for benthic habitats and communities, including seagrass, algae and coral
- Onshore disposal of dredge spoil may require the construction of a reclamation area – this may cause changes to the water level and current speed in areas around the disposal site, potentially resulting in increased re-suspension and turbidity
- Increased runoff from the reclamation activities which may contain contaminants, pollutants or sediments
- Potential runoff from the reclamation area may impact upon marine water quality including, but not limited to; increased turbidity, nitrification and/or concentration of metals
- Offshore disposal of dredge spoil may result in increased turbidity and an associated reduction in light attenuation
- If offshore disposal is selected, the extent of the impact on marine water quality will be dependent on the disposal location

6.7.2 Mitigation measures

The following preliminary mitigation measures will be investigated further as part of the EIS process:

- Dredging activities are proposed to cease in times when conditions are deemed to be unsafe for operation
- Dredging operations to cease if dredged material is spilt (eg via a ruptured pipeline) and recover material if practical
- Dredgers will be required to carry a spill response kit and dredge workers will be trained in their use
- Dredge equipment and dredging methodology will be selected on the basis of dredger availability, the nature of the material to be dredged, consideration of environmental impacts, minimisation of dredging timeframes
- No waste (including sewage) will be released to the marine environment
- No hydrocarbons are to be discharged into the marine environment. Secondary containment for storage of hazardous material is compulsory and will occur on land
- If offshore disposal of spoil material is selected, dredge material dumping is to be conducted in a way that minimises the generation of turbid plumes

6.8 Ecology

6.8.1 Potential impacts

The duplication of the main shipping channel within the Port may have direct impacts (ie dredge plumes) and indirect impacts (ie facilitating extra shipping traffic in the southern region of the Great Barrier Reef) on sensitive ecological receptors within the Port and southern GBRMP.

Channel duplication will involve dredging, and disposal of spoil (refer Section 2.2). Blasting may also be required to achieve the channel depths. The need for blasting will be confirmed as part of the ongoing seismic survey and offshore geotechnical investigations planned to be undertaken during the EIS process. These construction activities may result in:

- Increased potential of megafauna injury or mortality during construction activities (ie dredging and potential blasting)
- Potential for underwater noise to impact upon marine fauna
- Potential spoil dumping offshore will bury and ecologically change an area of benthic habitat within the southern GBRMP
- Potential spoil dumping onshore may impact upon ecologically sensitive locations and World Heritage values

The Project will also facilitate a higher volume of shipping traffic which may result in:

- Increased likelihood of vessels impacting on marine fauna and the GBRMP
- An increased potential for pollutants to be released into sensitive environments during refuelling practices or through vessel accidents
- The release of marine pest species, via ballast water, into sensitive environments is more likely with higher number of ships frequenting the Port

6.8.2 Mitigation measures

The following preliminary mitigation measures will be investigated further as part of the EIS process:

- Go slow zones will be identified and enforced to reduce vessel strikes within the Port
- Dredging methodology and equipment will be selected on the basis of dredger availability, the nature of the material to be dredged and consideration of environmental impacts
- Dredging operations will not be undertaken in unsuitable conditions (ie outside the operational parameters of the dredge, for example in high energy situations such as storm surges)
- No waste (including sewage) will be released to the environment
- Waste generated during dredging must be stored, handled and transferred in a proper and efficient manner to prevent environmental harm
- Turtle exclusion devises (TED) will be utilised where practical
- Navigational lights, buoys, marks and any warning signs will be installed and maintained
- Dredge equipment and other construction equipment will conform to Australian Quarantine and Inspection Services (AQIS) Guidelines to minimise the risk of the introduction of any introduced marine species

6.9 Transport and infrastructure

6.9.1 Potential impacts

Dredging and associated disposal is likely to have no direct effect on any existing or planned infrastructure adjacent to the Port, including road, rail and air transport and water, electricity, sewerage and telecommunication services (GHD 2009).

Potential impacts resulting from the dredging activities include:

- Interruptions to current shipping activities within the Port
- Increased risk of vessel accidents
- Marine pollution due to spill of dredged material
- Greater capacity of the Port to handle larger amounts of vessel movement and throughput
- Increased industrial development within the region
- Increase in road traffic if onshore reclamation works occur
- Disposal of dredged material offshore may impact on transport through shipping interruptions during disposal and an increase in vessel movement around the disposal site

The degree of operational impacts are dependent on the future proponents within the region and their locations, shipping requirements and the timeline of their operations.

6.9.2 Mitigation measures

The following preliminary mitigation measures will be investigated further as part of the EIS process:

- Inform the Regional Harbour Master, Maritime Safety Queensland (MSQ), of the dredging details and the locations in which dredgers will be operating
- Ensure all dredgers are fitted with lighting and navigational equipment as per the requirements of MSQ
- Proponents of future industries seeking to use the Port (eg LNG industry) will be required to consider the impacts of additional vessel movement in their approval process. This will enable cumulative impacts in the Port to be determined and appropriate mitigation measures addressing these impacts can be implemented.

Mitigation measures to minimise/avoid the indirect impacts caused by an increase in vessel movement have been discussed in other sections, including Section 6.7 (Marine Water Quality) and Section 6.8 (Marine Ecology).

6.10 Protected areas

6.10.1 Potential impacts

The protected areas adjacent to the dredge footprint may be impacted upon during the Project works, either during the dredging or disposal stages, including:

- Sedimentation from the turbid plumes generated during dredging may impact the marine water quality and the marine ecology, including benthic marine systems such as seagrass, algal beds and coral
- Turbid plumes may also migrate beyond the dredge footprint and disposal site(s) and impact the adjacent Protected Areas, including the GBRMP and FHAs
- Impacts to marine fauna from noise and vibration and boat strikes, a particular concern in the Dugong Protection Area
- Potential impacts to Protected Areas from spills of fuel, hydrocarbons or other pollutants
- If onshore reclamation occurs, construction may result in impacts to terrestrial flora and fauna habitats, including those for migratory birds
- If offshore disposal is selected, an area of benthic habitat will be buried and increased sedimentation may occur. This may occur in the GBRMP and/or may have an indirect influence on marine ecology, particularly those in the GBRMP, the Dugong Protection Area and the FHAs

6.10.2 Mitigation measures

The following preliminary mitigation measures will be investigated further as part of the EIS process:

- A DMP will be implemented to ensure that all reasonable measures are taken to protect these Protected Areas from dredging and disposal activities
- Qualified marine fauna observers will be used during dredging to avoid species within the dredge path
- Dredge equipment and dredging methodology will be selected on the basis of dredger availability, the nature of the material to be dredged, consideration of environmental impacts, minimisation of dredging timeframes
- Where possible, dredge and pump equipment will be fitted with noise suppression devices
- Go slow zones will be identified and enforced to reduce vessel strikes within the construction area
- Determination of the dredge spoil disposal location will take the impact on Protected Areas into consideration with the view to minimise the impact

During the EIS process, the potential impacts of the Project will be further assessed, particularly in terms of their significance to the values of the Protected Areas and the communities they support. Further assessment will include hydrodynamic and water quality modelling to determine the likely extent of elevated turbidity and sedimentation, and the likely impact of this dredge on the Protected Areas.

6.11 Cultural heritage

6.11.1 Potential impacts

Potential impacts to cultural heritage resulting from the Project are as follows:

- Loss or destruction of cultural heritage artefacts or areas
- Subsequent loss of values regarding these artefacts or heritage areas

6.11.2 Mitigation measures

The following preliminary measures will be investigated further as part of the EIS process:

- Database searches will be undertaken during the EIS process to confirm exact locations of cultural heritage in relation to the dredge and disposal footprint
- A review of previously conducted cultural heritage surveys studies within the Gladstone Region will also be undertaken
- Detailed Indigenous and European cultural heritage surveys will be undertaken to determine whether there are potential impacts to items/places of cultural heritage as a result of the Project
- The EIS will also detail management measures to mitigate any impacts to cultural heritage as part of the Cultural Heritage Management Plan (CHMP) and Environmental Management Plan for the Project
- For Indigenous cultural heritage, all claimants will be formally notified and invited to be part of a CHMP under the *Aboriginal Cultural Heritage Act 2003*

Previously, during the Western Basin Dredging and Disposal Project, GPC and the claimant, PCCC, worked together to develop a CHMP.

6.12 Visual amenity

6.12.1 Potential impacts

The Project will result in visual amenity impacts as follows:

- Dredging and disposal of dredged material can generate temporary turbid plumes that are visible to shipping traffic and to the general public from air, land and water
- Dredging equipment, machinery and barges are likely to cause a temporary visual change to the landscape

It is considered that the existing visual amenity will not be significantly impacted given the current and predicted levels of dredging and shipping activities currently occurring within the Port.

6.12.2 Mitigation measures

The following preliminary mitigation measures will be investigated further as part of the EIS process:

- If the onshore disposal option is chosen vegetation clearing will be minimised to avoid loss or damage to landscape features
- Implement measures to reduce sedimentation generated during dredging
- A visual impact assessment will be undertaken as required as part of the EIS and mitigation measures identified

6.13 Socio-economic

6.13.1 Potential impacts

The Project will have positive and negative impacts on the socio-economic aspects of the Gladstone Region. The shipping channel duplication will allow more vessel movement and a greater capacity for imports/exports within the Port. This encourages the creation of industry within the Gladstone Region, which would not be viable without support from the Port's marine infrastructure. Indirect economic benefits and employment are then created through the growth of the Port's shipping capacity.

The direct impacts include:

- Greater optimisation of the import/export capacity through increasing vessel movement in the Port
- Increase in Port traffic
- Reduced viability of commercial and recreational fishing in areas of direct dredging and disposal impact

The indirect impacts include:

- Increase in employment opportunities
- Increase demand for housing and services
- Increase property values
- Benefit the local, state and national economics
- Reduced road safety through an increase in construction activities
- Impacts to community values and aspirations

Cumulative impacts of the associated industrial development are expected to have a significant effect on the socio-economic qualities of the Gladstone Region. These impacts are dependent on the timing of the Project and whether there is any overlap between other large scale industrial projects in Gladstone. Cumulative impacts will affect housing and services availability and worker availability.

6.13.2 Mitigation measures

The following preliminary mitigation measures will be investigated further as part of the EIS process:

- Assessment undertaken during the EIS phase will determine the potential impact of the Project on commercial and recreational fishers and potential compensatory requirements
- Prioritise local employment in recruitment where possible
- Preference to contractors who commit to high local spending
- Maintain liaison with other projects being developed simultaneously in the Gladstone Region to coordinate construction and manage cumulative socio-economic impacts
- Encourage workers to share accommodation to reduce the demand for housing

6.14 Greenhouse gases

6.14.1 Potential impacts

The greenhouse gas emissions from the Project will be negligible; however this Project provides greater access to the Port and therefore allows for growth of industrial expansions which will increase the emissions from the area.

6.14.2 Mitigation measures

During further development of industries at the Port, each Proponent will address impacts as part of their own approvals process and environmental impact assessments to mitigate greenhouse gas emissions.

7 Environmental and risk management

7.1 GPC Environmental Policy and Environmental Management System (EMS)

GPC operates within an Environmental Management System (EMS) based on the internationally recognised specification for environmental management, AS/NZSISO14001:2004. External certification of the GPC EMS to AS/NZSISO14001:2004 was achieved by the Port early in 2006, and marked a positive step forward in the way the organisation manages environmental aspects of its business.

The EMS seeks to continually improve our environmental performance by highlighting any environmental risks, incidents, complaints or changes in legislation. It ensures that action is taken to prevent and/or control any environmental harm that may be caused by any of the activities performed by GPC in conducting its day to day operations.

The system continues to meet the requirements of ISO14001:2004. Maintaining this certification and demonstrating continual improvement into the future is a challenge that the GPC is committed to meeting.

GPC's Environmental Policy supports a commitment to operating in a manner that allows for sustainable development and minimises environmental harm to the Port and surrounding areas.

To achieve this GPC is committed to:

- Ongoing improvements in our operations to minimise environmental impacts
- Improving the level of awareness and understanding of our employees and the wider community
- Establishing environmental strategies in association with external stakeholders

7.2 Project environmental management

As part of the EIS process, the environmental risks associated with this Project will be managed by the development and implementation of an Environmental Management Plan (EMP) for the Project. This will allow necessary planning to ensure all reasonable measures are taken to protect the environmental values which may be impacted upon by the construction and operation activities and related infrastructure.

The purpose of an EMP is to detail the actions and procedures to be carried out during the implementation phase to mitigate adverse impacts of the Project.

The EIS will identify the potential construction and operation effects of proceeding with the Project and recommend a range of impact mitigation measures to be implemented during the design, construction and operation stages.

The EMP will address proposed environmental safeguards and control measures, and establish the framework to ensure they are implemented. In effect, the EMP will become the key reference document in that it converts the undertakings and recommendations in the EIS into a set of actions and commitments to be followed by designers, constructors and operators.

The EMP will serve as the framework for measuring the effectiveness of environmental protection and management. This is achieved by specifying the monitoring, reporting and auditing requirements, including responsibilities, timing and format in order to meet the necessary performance criteria. The EMP also makes provision, as appropriate, for unforseen events by outlining corrective actions which may be implemented in these situations. The EMP will be written as a standalone document, so that it may be extracted from the main body of the EIS.

7.3 Hazard, risk and health and safety issues

There will be a number of hazards and associated risks with both the construction and operation of the Port's major shipping channel. A hazard is a source, or a situation with a potential for harm in terms of:

- Human injury or ill health
- Damage to property
- Damage to the environment
- Or a combination of these

A risk is the likelihood and consequence of an injury or harm occurring as result of a hazard. Risk management is the systematic application of management policies, procedures and practices to the tasks of establishing the context, identifying, analysing, assessing, controlling and monitoring risk. To enable effective risk management, some form of formal risk assessment is required to identify the risks associated with the construction and operation of the plant. The formal risk assessment process follows the methodology outlined in AS31000:2009: Risk Assessment. This process is based on:

- Establishing the context
- Identifying the risks
- Analysis of the risks
- Evaluating the risks
- Treating the risks

At various stages of the Project, formal risk assessments will be conducted to ensure that effective risk management of all risks (including health and safety risks) occurs during both the construction and operation phases of the Project.

8 Community and stakeholder consultation

8.1 Introduction

The consultation process of the Project will aim to allow the community and other stakeholders to identify issues, impacts and mitigation measures related to the Project. These will be documented for consideration during the EIS process.

The following sections outline the consultation that has occurred to date and future consultation.

8.2 Existing consultation

GPC currently undertakes regular public consultation through their Environmental Working Group, a regular community consultative group to create awareness of port activities. GPC produce and distribute a quarterly newsletter, Port Talk, as a community and environmental update. A previous Consultation Plan was also developed by GPC during the Western Basin Dredging and Disposal Project, which outlined a framework for consultation activities (GHD 2009).

8.3 Future consultation

The public has been made aware of the Project through existing lines of communication and the Port 50 year Strategic Plan. A Consultation Plan will be developed and implemented for the Project to outline the framework for the consultation and guide the activities during the EIS process. The following activities may be incorporated into the Consultation Plan to foster an open two-way flow of information:

- One-on-one and group meetings
- Project information sheets and feedback forms
- Advertising in newspapers, on the GPC website and in Port Talk
- Community Open Days
- Project hotline and email address
- Community working group

8.4 Stakeholders

Stakeholders for the Project include government, special interest groups, industry, local indigenous groups and the local community. Table 5 contains a summary of potential stakeholders and any interest these stakeholders may have in the Project.

Table 5 Stakeholders and their key interests

Stakeholder	Key Interest
Local government	
Gladstone Regional Council	· Local government authority for Port of Gladstone · Providing local services to the regional community and industry
State government	
Department of Agriculture, Fisheries and Forestry	· Coordinator-General has authority to declare Project as a 'significant project' under the SDPWO Act · Involved in fisheries, tourism and regional development and industry
Department of Environment and Heritage Protection	· Involved in approvals and permits required for the Project including a dredging permit
Great Barrier Reef Marine Park Authority	· Authority in protecting World Heritage Area and marine park and will be involved in determining options for offshore and/or onshore disposal
Maritime Safety Queensland (Department of Transport and Main Roads)	· Regional Harbour Master for the Port of Gladstone
Commonwealth government	
Department of Sustainability, Environment, Water, Population and Communities	· Minister has authority to declare the Project as a 'controlled action' under the EPBC Act
Business and industry groups	
Gladstone Area Promotion and Development Limited	· Promoting and developing tourism, business and industry in the Gladstone Region
Local commercial fishing representatives	· May be affected by potential disturbance to Port operations during dredging works and by impacts to water quality and fish species populations
Current and future industries to use the Port of Gladstone	· Greater access to the Port of Gladstone for their specific industry · Optimising throughput within the Port
Local Indigenous groups	
Port Curtis Coral Coast People	· Native title claim under the *Native Title Act 1993* and may be formally notified and invited to collaborate on a Cultural Heritage Management Plan during the EIS process
Community	
Recreational fishing groups and boaties	· May be affected by potential disturbance to Port operations during dredging works and by impacts to water quality and fish species populations
General community	· Interest in potential or perceived impacts of the Project

9 Conclusion

The proposed Port of Gladstone Gatcombe and Golding Cutting Channel Duplication Project will provide for the ongoing and forecasted growth of various industries within the region through the improvement of the traffic within the Port. It is expected that any potential impacts of this Project on the natural, social or built environment can be minimised through appropriate mitigation measures specified in a Dredge Management Plan for the dredging and disposal of dredged material as well as the relocation and construction of existing and new navigational aids.

The Project is expected to cost about $400 million, with capital dredging works (construction) employing about 100 people and maintenance dredging (operational) employing about 20 people.

Consultation with the relevant State and Commonwealth Government Agencies will be undertaken to identify the scope of the environmental assessment. Depending on the level of assessment required, public comment will be sought through the process, with updates communicated on a regular basis.

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