Ports North

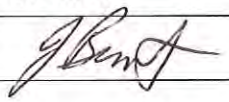
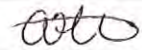
CAIRNS SHIPPING DEVELOPMENT PROJECT

Initial Advice Statement

JULY 2012

Ports North

Document Verification

Job title		Cairns Shipping Development Project			**Job number** 9000697
Document title		Initial Advice Statement			**File reference** 09-03-13
Document ref					
Revision	**Date**	**Filename**	N:\Seaport\Projects\Private\Project Files\Cruise Shipping Project\EIS\IAS & EPBC Referral\IAS\IAS V10		
Draft	30 July 2012	**Description**	Draft for discussion with Environmental Agencies		
			Prepared by	Checked by	Approved by
		Name	Jeff Bunt	Adam Fletcher	Alan Vico
		Signature			
Final	3 September 2012	**Description**	Final for submission to Coordinator-General		
			Prepared by	Checked by	Approved by
		Name	Jeff Bunt	Adam Fletcher	Alan Vico
		Signature			
Final, Rev 1	7 September 2012	**Description**	Final – Revision 1		
			Prepared by	Checked by	Approved by
		Name	Jeff Bunt	Adam Fletcher	Alan Vico
		Signature			

CONTENTS

Executive Summary

The Port of Cairns has a long history as a key cruise destination in Queensland with cruise ship numbers growing steadily over the past 15 years. Cruise shipping has grown significantly in Australia in recent years, both in numbers and in the size of vessels.

The expansion of cruise ship facilities in Cairns is seen as an important step in developing increased tourism opportunities in North Queensland and to support and grow cruise ship operations in Queensland. Improving cruise ship infrastructure in Cairns will result in considerable benefits to the local economy and the Queensland cruise industry. The key requirements, to enhance cruise ship visit numbers, involve dredging a broader and deeper entrance channel to allow port access for larger cruise ships and upgrading berth infrastructure within Trinity Inlet. This will lead to the general expansion of North Queensland's cruise industry, opportunities for increased itineraries throughout the State and bring growth, stability and diversity to the Cairns tourism market sector.

The need for increased development of cruise infrastructure is recognised in all regional economic development plans. The Tropical North Queensland Regional Economic Plan (developed and approved by Advance Cairns), the Cairns Regional Council and the Cairns Chamber of Commerce have the expansion of the cruise industry and the development of key infrastructure, including channel dredging, as an important growth strategy to strengthen and diversify the regions tourism industry and destination appeal. Similarly, Regional Development Australia Far North Queensland and Torres Straits regional road map identifies the development of the cruise shipping channel as a key infrastructure asset needed for social and economic development and future sustainability of the region.

At present, about a quarter of cruise ships visiting the area are unable to come into the Cairns seaport because of their size. This means significant related expenditure is being lost to the regional economy. Such cruise ships must anchor off Yorkey's Knob and ferry passengers ashore before bussing them 15 km into the city, which is very inefficient both in terms of cost and time. Crew are generally unable to come ashore for leave and, if weather conditions are not favourable, passengers are discouraged from coming ashore. Looking forward, the current strong growth in the cruise sector is expected to continue, with most of the growth being in ship sizes not currently able to enter Cairns seaport.

Far North Queensland Ports Corporation Limited (trading as Ports North), with support from the State Government, initiated the Cairns Cruise Shipping Development Strategy to expand tourism cruise ship opportunities by allowing larger cruise vessels to enter the Port of Cairns. It estimates that improved access to Cairns will see mega cruise ship numbers grow by 61 annual visits by 2025, delivering regional economic benefits of $436m over the next 25 years. Importantly, it will allow the cruise industry to establish Cairns Port as a 'Home' port as well as the current 'Transit' port. The project is expected to generate 215 full time equivalent employment opportunities during the construction phase and 370 additional flow-on jobs per annum by 2026 and 540 per annum by 2041 resulting from the increased cruise ship visits. The project will not only deliver significant economic benefit to Cairns, but will also deliver further benefits to the State of Queensland due to the considerable flow-on effects to the wider cruise industry.

Whilst the major justification for the project stems from the potential cruise shipping opportunities, there are also significant benefits to other non-cruise forms of shipping, including:

- The project will enable future expansion of the HMAS Cairns Navy base, in keeping with the Defence Force Posture Review, which recommends upgrading / expansion of bases at Cairns and Darwin. This potential expansion could bring permanent defence force staff to reside in Cairns and will also allow larger visiting overseas Navy vessels (in particular US Navy carriers) to enter the port for R&R visits.
- The wider and deeper shipping channel will reduce the current tidal and loading restrictions on general cargo ships accessing the Port, thereby improving port efficiency.

The existing channel for the Port of Cairns is 13km long, 90m wide with an 8.3m draft and is dredged annually, with the dredge material placed in a Great Barrier Marine Park Authority approved area 9km north of the Port of Cairns. The 10 year permit for the placement area was issued in 2010.

The existing channel is of insufficient size to cater for the new mega cruise ships and the associated landside infrastructure also requires upgrading. The Cairns Cruise Shipping Development Strategy identifies the works necessary to cater for the future growth in cruise ship numbers and overcome existing constraints. Development of the Strategy has been guided by the principle of delivering necessary infrastructure while balancing protection of the environment. Key elements involve widening the existing channel to 140m and increasing its depth to - 9.4m LAT combined with shore based wharf and services infrastructure upgrades.

The project scope for the proposed Cairns Shipping Development (CSD) project, which will deliver the improved cruise ship infrastructure, involves 5million m^3 of capital dredging, relocated navigational aids, wharf fender upgrades and land based infrastructure services upgrades.

This project has direct benefits and linkages to the recently constructed Cairns Cruise Liner Terminal and the Cairns Cityport Masterplan. The Terminal was an award winning development which was opened in 2010 and provides modern facilities to cater for cruise visitations to the region within a heritage listed wharf shed. The Terminal is located within the Cityport project, an urban revitalisation project, opening up the waterfront of Cairns to the public. A key element of this project is to activate the waterfront through marine infrastructure, including Super yachts, Marinas, Reef Fleet and Cruise.

The purpose of this Initial Advice Statement (IAS) is to provide information to the Coordinator General for consideration in seeking significant project declaration for the Cairns Shipping Development project under the provisions of the *State Development and Public Works Organisation Act 1971* (SDPWO Act) for which an Environmental Impact Statement (EIS) will be prepared.

This project will occur within, or within close proximity to a World Heritage Area, the Great Barrier Reef Marine Park and a Fish Habitat Area. These areas contain habitat, such as seagrass beds, that are important for a number of significant species including cetaceans, dugongs, juvenile fish and turtles. Consequently, works have the potential to impact on matters of National Environmental Significance and therefore the project will be referred to *Commonwealth Department of Sustainability, Environment, Water, Population and Communities* (SEWPC) for determination as to what *controlled actions* will require assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The EPBC Act recognises that environmental assessment under the Queensland SDPWO Act may be used for the purposes of the environmental assessment under the EPBC Act in accordance with the Bilateral Agreement between the Commonwealth and Queensland Governments. If such designation is granted, this will allow the Commonwealth Minister to rely on specified environmental impact assessment processes of the State of Queensland in assessing actions under the EPBC Act.

An assessment of the existing environment and an assessment of potential impacts will be undertaken as part of the EIS process. It is expected that the potential impacts resulting from the CSD project on the natural, social and built environment can be avoided or minimised through appropriate mitigation measures. However, where this cannot be achieved, consideration will be given to appropriate offsets in accordance with relevant Government policies.

Consultation with relevant regulatory agencies and other stakeholder including the local community will be implemented to identify the broad issues of concern and to inform the EIS process. A Draft Terms of Reference for the EIS will be prepared and advertised for public comment. Comments will be incorporated into the Final TOR setting out the scope of the EIS.

1 Introduction

1.1 Background

Cairns is a popular destination for cruise ships. During 2010 twenty-eight (28) cruise liners visited Cairns and fifteen (15) other cruise liners anchored off Yorkey's Knob. Together these forty-three (43) cruise liners brought 50,000 passengers to the Cairns region.

Due to the global growth in the cruise industry, there has been an increase in the size of cruise liners to service growing demand and industry sources expect that some of the smaller vessels currently operating in Australasia and the Pacific Regions will be displaced by much larger vessels. Therefore, current port infrastructure is under pressure to provide access for these larger vessels. In Cairns, the existing access channel restricts entry for the larger vessels and less manoeuvrable older liners.

Far North Queensland Ports Corporation Limited (trading as Ports North) initiated the Cairns Cruise Shipping Development Strategy with support from the State Government to identify how tourism cruise ship opportunities can be expanded by allowing larger cruise vessels to enter the Port of Cairns. The final report for the Cairns Cruise Shipping Development Strategy was issued in June 2012 and includes the following components:

- Demand analysis of potential cruise shipping for Cairns
- Environmental assessment to determine aspects, potential impacts and subsequent approval requirements
- Infrastructure assessments to determine the extent of channel dredging and other land based infrastructure requirements to satisfy the cruise demand
- Economic benefits of additional cruise visitation
- Business case for undertaking capital dredging and other infrastructure improvements.

The expansion of cruise ship facilities in Cairns is seen as an important step in developing increased tourism opportunities in North Queensland and to support and grow cruise ship operations in Queensland. Improving infrastructure to facilitate this could result in considerable benefits to the local economy and the Queensland cruise industry. Having an additional alongside berth for mega cruise ships based in the north of the state will provide opportunities for increased cruise itineraries throughout the whole of the state. Dredging a broader and deeper channel to allow port access for larger cruise ships and establishing Cairns Port as a 'Home' port instead of the current 'Transit' port will lead to the general expansion of North Queensland's cruise industry and also bring some stability and diversity to the Cairns tourism market sector.

The development of cruise infrastructure is recognised in the regional economic development plans. The tropical north Queensland regional economic plan developed and approved by Advanced Cairns and the major Cairns based organisations including Cairns Regional Council and Chamber of Commerce has the expansion of the cruise industry and the development of key infrastructure including channel dredging as an important growth strategy to Strengthen and Diversify the Regions Tourism Industry and Destination Appeal. Similarly Regional Development Australia Far North Queensland and Torres Straits regional road map identifies the development of

the cruise shipping channel as a key infrastructure asset needed for social and economic development and future sustainability of the region.

Whilst the major justification for the project stems from the potential cruise shipping opportunities, there are also significant benefits to other non-cruise forms of shipping, including:

- The Defence Force Posture Review recommends the upgrading / expansion of bases at Cairns and Darwin to accommodate the future Offshore Combatant Vessel and the replacement Heavy Landing Craft. The location of the existing main swing basin in the inner harbour restricts the opportunity for the HMAS Cairns Navy base to expand. Relocation of the main swing basin and provision of a wider and deeper inner harbour channel as part of the Cairns Shipping Development project will enable the future Navy base expansion. The wider and deeper outer channel established for cruise shipping will also provide safer access for the new Australian Navy vessels and allow access for the larger US Navy carriers, which cannot currently enter the Port.
- The wider and deeper shipping channel will reduce the current tidal and loading restrictions on general cargo ships accessing the Port.

The Cairns Shipping Development project will provide the improved Port infrastructure to enable ongoing and sustainable growth of the Cairns tourism economy through an increased cruise shipping market and deliver regional economic benefits through efficiencies in the general cargo shipping sector. The project will also enable future growth of the HMAS Cairns Navy Base and provide improved access for both Australian and foreign Navy vessels.

1.2 Purpose of Initial Advice Statement

This Initial Advice Statement (IAS) has been prepared by Ports North, generally using the information provided in the Cairns Cruise Shipping Development Strategy report prepared by consultants Arup Pty Ltd.

The purpose of this IAS is to provide information as required by the *State Development and Public Works Organisation Act* 1971 (Qld) (SDPWO Act) and is intended to assist the Coordinator General (CG) in making a determination regarding the declaration of the Project.

2 The Proponent

Ports North is a Government Owned Corporation established under the Queensland *Government Owned Corporations Act 1993* and operating in accordance with the Commonwealth *Corporations Act 2001*.

Ports North is responsible for the management and operation of approximately 500 hectares of Strategic Port Land and property across:

- Port of Cairns, the key multi-purpose seaport in Far North Queensland catering to a diverse range of industries, including Cityport, an urban-waterfront development project adjacent to the Central Business District;
- Four other trading ports (Mourilyan, Cape Flattery, Skardon River and Karumba) which are particularly specialised for bulk shipments of specific natural resources as well as general maritime operations; and;
- Two community ports (Quintell Beach, Thursday Island) and two other (non-trading) ports (Cooktown, Burketown).

As a Ports Corporation, Ports North has statutory power under the *Transport Infrastructure Act 1994* and the *Transport Infrastructure (Ports) Regulation 2005* to issue licenses, leases and permits for the use of its port facilities and provides a number of multi-user facilities at its ports to achieve higher utilisation of infrastructure and greater efficiency. Ports North is also responsible for maintaining navigable Port depths, Port facilities and Port operations while vessels are alongside its facilities. The operations of the port are strongly supported by the community, particularly the cruise operations.

Ports North has extensive experience in delivering major projects and managing port infrastructure while maintaining a high level of environmental management. The Cityport North project, which involved capital dredging for marina expansions, required approvals of a similar scale to the proposed project, and included a Scientific Advisory Group to oversee environmental management of the project in the early 2000's. This project was completed without any major adverse or unforseen environmental impacts and to the satisfaction of regulatory agencies.

Ports North has demonstrated a long history of undertaking scientific research and monitoring especially in the area of dredging and disposal, including as a key stakeholder in the Trinity Inlet Management Program (1990's-2002), and the joint 5 year James Cook University-CPA *"Environmental Sedimentology of Trinity Bay"* (1997-2002).

Approval of a five (5) year Sea Dumping Permit and Long Term Management Plan (LTMP) (Environment North, 2005) was granted by the GBRMPA in 2005, and building on outcomes of that term, a ten (10) year Sea Dumping Permit and LTMP (Worley Parsons, 2010) is approved for the term to 2020. This was the first of the ten year Sea Dumping Permits and LTMP's approved by SEWPC/GBRMPA for maintenance dredging activities, and clearly demonstrates Ports North's commitment to effective environmental management of dredging activities within Trinity Inlet, and a clear indication that Ports North is committed to continue this approach into the future.

3 The nature of the proposal

3.1 Project Location

The Port of Cairns is located virtually in the heart of Cairns city in Queensland. The main shipping berths lie on the western side of Trinity Inlet and access between the sea and the port is via an existing outer channel approximately 11.2km in length, 90m wide with a declared depth of -8.3m LAT. The inner channel extends for 2.4km in length and has variable width due to requirements for bends and swing basins. The Port is shown on Figure 3.1 below.

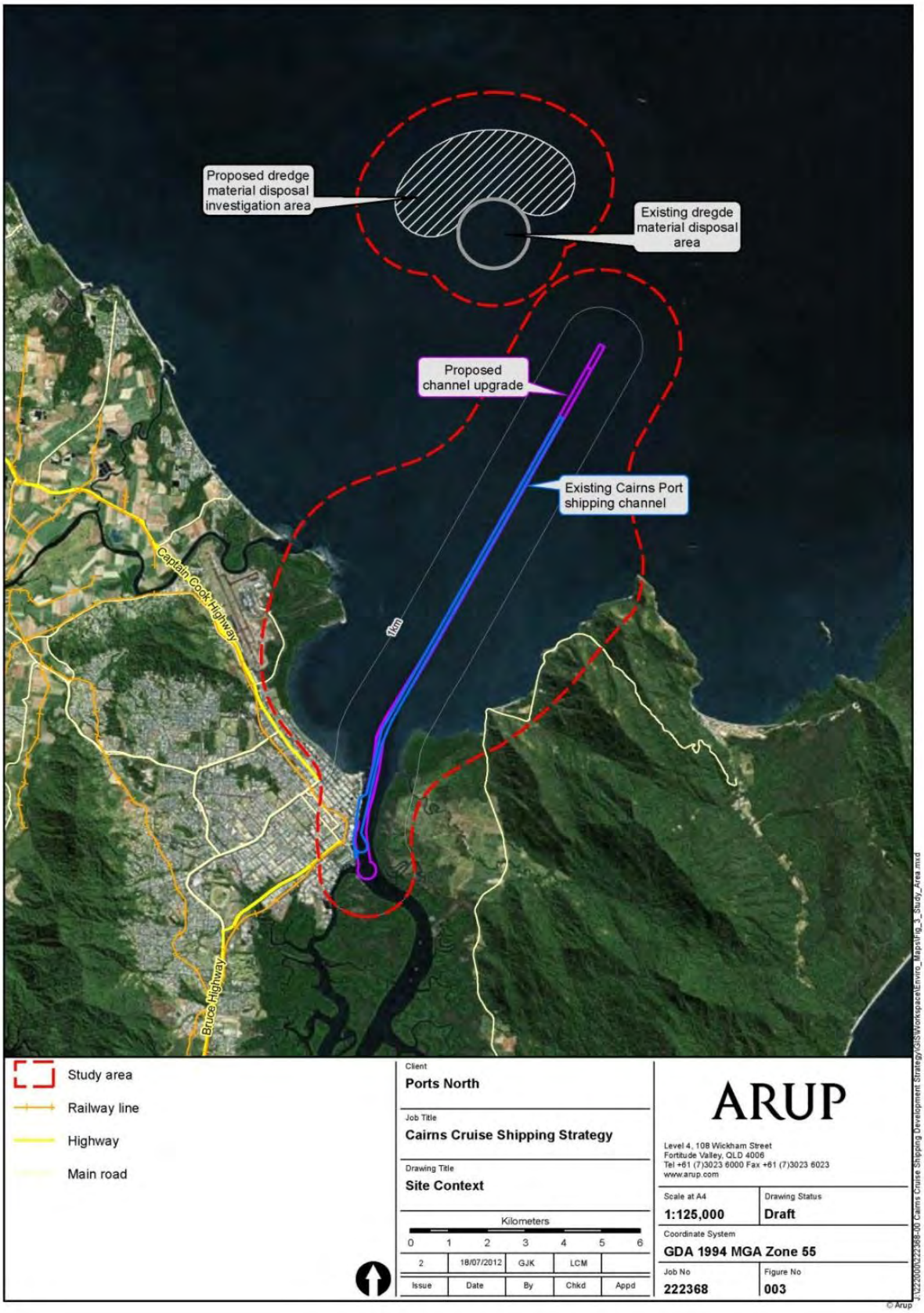


Figure 3.1 - Project Site

3.2 Project Description

The CSD project involves upgrading of the following Port infrastructure:

- Widening and deepening of the existing outer shipping channel and cruise shipping swing basin, which will result in some lengthening of the existing channel;
- Widening and deepening of the existing inner harbour channel and establishment of a new shipping swing basin to enable future expansion of the HMAS Cairns Navy base;
- Structural upgrade of the existing cruise shipping wharves 1-5 to accommodate larger and heavier cruise ships;
- Provision and upgrade of ship services to the cruise shipping wharves, including fuel supply, potable water and fire fighting services.
- Expansion of the existing Dredge Material Placement Area boundaries within the GBRMP to accommodate dredged material from capital and maintenance dredging.

3.2.1 *Channel Upgrade*

Channel Design Process

In developing the cruise ship development strategy and determining the final channel design, a key consideration was to develop a design that provided safe access for the targeted mega cruise ships while minimising the overall dredge volumes to limit both project cost and environmental impacts. This iterative design process allowed a reduction of channel dredge volumes from 10,058,000 m^3 to a final dredge volume of 5,073,600 $m^{3.}$ This reduction in volumes was achieved through the optimisation of channel width and more critically by establishing a channel depth, that while introducing some tidal constraints to access by the cruise ships, achieved significant dredge volume reductions.

The channel dredging works have been developed to a conceptual stage of design with significant input from the Maritime Safety Queensland Regional Harbour Master. The design has been undertaken by experienced maritime engineers with the support of Smartship Australia, a Brisbane based navigation simulator.

The channel design was based on widening the existing 90m channel to 140m and increasing the depth from 8.3m to 9.4m to cater for the following Mega class cruise ships:

Ship Class	Ship Name	Length Over All (m)	Beam (m)	Draft (m)
Regal	Pacific Dawn	245.1	32.3	7.8
Vista	Queen Victoria	294.0	32.3	8.1
Grand	Emerald Princess	290.0	36.0	8.5
Voyager	Voyager of the Seas	311.0	38.6	8.8

The total ship visitation numbers for Mega class ships corresponding to the new Channel Design are shown below:

Channel Design	Forecast year		
	2015	2020	2025
Proposed 140m channel	31	41	61

Mega class ships will not be able to enter the Port unless the proposed improvements in channel width and depth occur.

Navigation simulation undertaken at the Smartship ship simulation facility confirmed the following channel design for the above Cruise Ships:

Channel Widths

Channel Design	Outer Channel	Bend	Inner Channel	Berth Pocket	Crystal Swing Basin Diameter	Declared Depth
Existing Channel	90m	150m	105m	50m	380m	-8.3m
Proposed Channel	140m	210m	190m	50m	400m	-9.4m

The channel will extend outside of the nominated widths above due to the channel batters, which will extend from the channel bed to the natural seabed level at a typical slope of 1 on 5.

Channel Depths

The declared depth for the proposed channel deepening is -9.4m LAT, compared to the current channel declared depth of -8.3m LAT. The channel will be dredged to depths greater than the declared depth in some areas (up to a maximum 1.7m) to allow for siltation between maintenance dredging campaigns.

Swing Basins

In addition to the channel design process, preliminary design was also undertaken for two alternative swing basins. The two options considered were expansion of the existing Crystal swing basin adjacent to Wharves 1–3 for specific use by cruise ships and a new swing basin adjacent to Tropical Reef Shipyard, designated as the Smith's Creek swing basin. The Smith's Creek swing basin would be required should HMAS Cairns wish to expand in the future.

Navigation Aids

A number of existing navigation aids need to be relocated and a number of new ones are required for the channel upgrade.

3.2.2 *Proposed Navy Base Expansion*

The existing channel configuration has the Crystal swing basin located adjacent to Wharves 1-3, specifically for cruise vessels and the main swing basin located immediately adjacent to HMAS Cairns. The location of the main swing basin restricts the opportunity for HMAS Cairns to expand eastward, through provision of new parallel wharf infrastructure to increase the overall berth capacity of the Base as shown below.

Figure 3.2 - Existing Inner Port Swing Basins

Relocation of the main swing basin to a new location adjacent to Tropical Reef Shipyard (designated as the 'Smith's Creek swing basin') will provide future capacity for expansion of HMAS Cairns and provide a wider and deeper inner channel for the full length of the inner Port. This swing basin option requires additional dredging relative to the Crystal swing basin option.

The wider and deeper channel established for cruise shipping will provide safer access for the new LHD class Navy ships and allow access for the larger US Navy Carriers, which cannot currently enter the Port.

The estimated dredging quantity for the swing basin relocation is 89,700 $m^{3.}$

3.2.3 *Wharf Upgrade*

The advent of larger and heavier cruise ships berthing at Cairns and the potential implications on the required upgrade or replacement of the heritage listed wharves 1-5 structure as a result of this were assessed as part of the Cairns Cruise Shipping Development Strategy. The upgrading options for wharves 1-5 were based on the full 490m wharf length to ensure efficiency of port operations.

It was concluded that the following significant structural upgrades are required to accommodate cruise vessels larger than those currently calling at Wharves 1-5:

- Increased mooring bollard size and loading
- Increased fender size and loading

The recommended concept for the wharf upgrade is provision of new dolphin structures placed between existing bents. This is based on the following drivers:

- Minimal landside work is required
- Strengthening works to existing structure is not required
- Fender spacing can be maximised by using large fenders and thereby reducing number of dolphin structures required and subsequently cost.
- Minimise impact on existing heritage listed wharf structure

3.2.4 *Land-based infrastructure and services upgrades.*

The provision and upgrade of the following services is required:

Fuel Supply

Currently, cruise liners visiting Cairns do not refuel while in port. However, smaller vessels with potential interests in home porting in Cairns would benefit from the possibility of refuelling.

Heavy Fuel Oil (HFO) is not currently available and supplied in Cairns. The existing commercial fuel farm within the Port area is the preferred location for new fuel storage infrastructure. A pipeline would be required from the fuel storage area to the cruise wharf.

Fire Fighting Services and Potable Water Supply

It is proposed to upgrade the existing fire Booster Assembly and provide a loop main system around the Terminal building to provide a separated water network for the fire system.

It may also be necessary to reconstruct the existing potable water supply pipeline where it is affected by the wharf structural upgrade.

A number of further studies will be necessary to optimise design requirements prior to upgrading land based infrastructure to accommodate larger cruise ships.

3.2.5 *Capital Dredging*

The capital dredging works will involve a suite of dredging fleet. It is anticipated that the following plant will be required:

- At least one medium size trailing suction hopper dredge (TSHD) with hopper capacity of about 3,000m^3 to 5,000m^3
- Small grab dredger
- Work boats / survey boat

The estimated capital dredging quantity for the channel design is 5,073,600 m^3. The dredge volume is predominantly related to the outer channel.

A dredging production rate of around 180,000m^3 per week can be expected. Based on the estimated capital dredging quantity, the dredging programme will be about 28 weeks.

3.2.6 *Maintenance Dredging*

The current maintenance dredging programme is undertaken by the Trailing Suction Hopper Dredge “Brisbane”. The TSHD “Brisbane” has a hopper capacity of approximately 2,900m^3 and can dredge up to depths of 25m.

It is envisaged that future maintenance dredging will be carried out in a similar manner, using TSHD. The siltation material is soft and fluid and will be easily removed by means of trailing suction. It would be transported to the existing maintenance Dredge Material Placement Area for disposal.

The estimated annual maintenance dredging quantity for the proposed improved channel is 580,000m^3. For comparison, the current average annual maintenance dredging is around 320,000m^3.

3.2.7 *Dredge Material Placement Area*

Existing Dredge Material Placement Area

The existing Dredge Material Placement Area (DMPA) is located at S16º47'24" E145º48'48" which is approximately 9km north of Cairns Port. The DMPA diameter is 1 nautical mile (1,852m) and covers approximately 269ha. This site has been in use circa 1990 for placement of mainly maintenance material and minor volumes (50,000m^3) of capital material from the Port.

Performance of Existing DMPA

The performance of the existing DMPA has been covered in reports by Environment North (2005) and Worley Parson (2010).

The site is mainly affected by wind waves, as the Great Barrier Reef protects the DMPA from swell waves. The current DMPA is in sufficient water depth to limit the influence by wind waves.

Dredge material is tested according to NAGD (2009) before placement at the DMPA. Additionally, material within the DMPA has been tested yearly since 1997 to verify that the material does not pose a contaminant risk to the environment or human health. A GBRMPA approved Sediment Analysis Plan (SAP) is implemented by Ports North and an appointed environmental consultant.

Worley Parson (2010) identified that the existing DMPA was performing well, had minimal environmental impacts and had the capacity to store the maintenance and contingency dredging requirements of the existing channel geometry beyond 2020.

Preliminary analysis shows that there is approximately 7.6million m^3 remaining capacity at the existing DMPA. This could potentially accommodate the capital dredging required for the new Channel (approximately 5million m^3).

Nevertheless, another DMPA or an expansion of the existing site would ultimately be required for the maintenance dredging material resulting from the proposed improved navigational channel.

Alternative DMPA

<u>Terrestrial Options</u>

Connell Wagner (1992) investigations into this issue highlighted the significant constraints associated with acid sulphate soils and dredge material handling / placement issues. They noted that the material consolidates slowly (potentially years) and has high saline water content leading to a need for large tailwater ponds and measures to limit adverse groundwater effects.

Furthermore, the Cairns coastal region is very constrained by residential development, habitat of conservation value, heritage and resource protection areas, areas of cultural significance , high value agricultural land, scenic and recreational areas and flood prone land. Locating a large area for placement of dredged material would be extremely difficult.

Terrestrial disposal of dredge material would be difficult with numerous constraints and potential environmental and social impacts. Whilst unlikely to be feasible, it will be considered as part of the EIS process.

Marine Options

In considering options to place dredged material at sea, factors such as flora and fauna, turbidity levels, current patterns and consistency of the material need to be considered.

Trinity Bay is an area of accretion and the seabed material is very homogenous across the whole bay. Sediment accumulating in the channel is very similar to adjacent inshore areas and the existing or potential new inshore DMPA sites. Environmental impacts are less when the material placed at a DMPA is similar to that found at the DMPA. Offshore placement is possible, but has additional cost implications due to distance from dredge location and potentially significant and less well understood effects on offshore waters / seafloor.

The chemical condition of the dredge material is preliminarily considered to be below the NAGD (2009) threshold levels and therefore likely to be acceptable for marine disposal. The material would not undergo processes (e.g. oxidation of Acid Sulphate Soils and acid generation) that could occur if the material was placed on land.

Ports North has undertaken several investigations into the DMPA associated with previous dredging campaigns which have all indicated that the current DMPA is performing satisfactorily and not resulting in ongoing impacts to nearby areas (Carter *et. al.* 2002, Environment North 2005, Worley Parsons 2010). Benthic communities at the DMPA recover within months of it being used (Neil *et. al.* 2003, Worley Parsons 2009).

In summary, relocation of dredged material to a designated DMPA at sea appears to be the preferred option for the project. With the available data indicating the good performance of the existing DMPA and the lack of other feasible alternatives, there is a strong case to continue using the existing placement site or extending it into adjacent areas and this will be addressed in the EIS.

3.3 Project Timing

It is assumed that with the support of the State and Federal Governments, the environmental approvals can be completed by mid-2014 i.e. a 2 year approval timetable.

The dredging program is expected to be a 10 month campaign, subject to the size of the dredgers used, with overall project completion by mid-2015. The land based works will be coordinated for completion prior to the dredging works.

3.4 Project Rationale

There is significant growth in the International and Australian cruise industry and this is expected to continue into the future. Sydney forecast cruise ship numbers to increase from 116 ships in 2010 to 322 ships by 2020. The size of these ships are also increasing, putting pressure on capacity of ports to service the ships with 80% of the new cruise ships built since 2008 unable to access the Port of Cairns.

The expansion of cruise ship facilities in Cairns is seen as an important step in developing increased tourism opportunities in North Queensland and to support and grow cruise ship operations in Queensland. Improving infrastructure to facilitate this could result in considerable benefits to the local economy and the Queensland cruise industry. Having an additional alongside berth for mega cruise ships based in the north of the state will provide opportunities for increased cruise itineraries throughout the whole of the state. Dredging a broader and deeper channel will allow port access

to larger cruise ships which will lead to the general expansion of North Queensland's cruise industry and also bring some stability and diversity to the Cairns tourism market sector.

The completion of this channel and wharf upgrades will see cruise ships growing from an expected 33 ships in 2025 without infrastructure improvements to 130 ships on completing this project. The development of cruise infrastructure is recognised in all of the regional economic development plans. The Tropical North Queensland Regional Economic Plan developed and approved by Advanced Cairns and the major Cairns based organisations including Cairns Regional Council and Chamber of Commerce has the expansion of the cruise industry and the development of key infrastructure including channel dredging as an important growth strategy to Strengthen and Diversify the Regions Tourism Industry and Destination Appeal. Similarly Regional Development Australia Far North Queensland and Torres Straits regional road map identifies the development of the cruise shipping channel as a key infrastructure asset needed for social and economic development and future sustainability of the region.

3.5 Employment Opportunities

The initial phase of the project will involve extensive field investigation works to allow preparation of the environmental impact assessment. This work will be undertaken by consultants specialising in the relevant fields. Final designs will also be prepared for the shipping channel and land based infrastructure upgrades by engineering consultants. The field studies, design and EIS process is expected to extend over a 12 to 18 month period and involve direct and indirect employment of consultants, field technicians and scientists, surveyors, public relations and project management, support and supply personnel of 10 personnel over the duration of this work.

The estimated construction period is one year from mid-2014 to mid-2015. Construction works will be undertaken by contractors and the estimated employment opportunities are:

- The dredging component will be undertaken by a specialist dredging contractor. The anticipated major plant will be 2 x TSHD vessels each with a crew of 13, a combined support and supervision crew of 5 and a full time equivalent of 5 indirect suppliers and service providers. A smaller local grab dredger would also be required with a crew of 4 and a support tug with a crew of 2. Ancillary people required for overall project management, administration, environmental monitoring and survey support could number as many as 8 at peak times. Hence the project workforce for dredging is potentially around 50 persons for the duration of the dredging works.
- Based on the scope of the land based work and using a typical employment ratio for full time equivalent direct and indirect employment over the life of the project for this type of work derives a potential on site workforce during peak times of 165 persons. This would likely include designers, project management, head contractors, local sub-contractors, suppliers and fabricators across a broad range of industries.

In summary the construction phase of the project is expected to generate approximately 215 full time equivalent employment opportunities over the one year duration.

The greatest employment opportunities expected from the project are due to the additional flow-on jobs resulting from the increased cruise ship visits which are estimated at 370 per annum by 2026 and 540 per annum by 2041 (refer section 8).

The project will enable future expansion of the HMAS Cairns Navy base, in keeping with the Defence Force Posture Review, which recommends upgrading / expansion of bases at Cairns and Darwin to accommodate LHD vessels. This potential expansion could bring permanent defence force staff to reside in Cairns. The project will also allow larger visiting overseas Navy vessels (in particular US Navy carriers) to enter the port for R&R visits with the spin off benefits of increased employment opportunities in the tourism sector.

3.6 Relationship to other projects

This project has a direct relationship with the development of the Cairns Cityport Masterplan and the recently constructed Cairns Cruise Liner Terminal. This Terminal was an award winning development which was opened in 2010 and provides modern facilities to cater for cruise visitations to the region within a heritage listed wharf shed. The Terminal is located within the Cityport project, an urban revitalisation project, opening up the waterfront of Cairns to the public. A key element of this project is to activate the waterfront through marine infrastructure, including Super yachts, Marinas, Reef Fleet and Cruise.

The development of the Cairns Cruise project also supports other cruise developments in both Brisbane and Townsville. Cruise ship operations are seeking itineraries with multiple destinations where the larger mega ships can come alongside berthing facilities and this Cruise project will support the overall cruise development in Queensland.

3.7 Project Alternatives

There are no practical project alternatives to cater for mega cruise ships in Cairns.

Currently, cruise ships that cannot enter the Port, due to channel constraints, must anchor off Yorkey's Knob and tender passengers ashore, for a bus transfer of about 15km to the Cairns CBD. The no action option will result in a significantly reduced number of visits by mega cruise ships to Cairns and the region, as no mega cruise ships can enter the Port and all will need to anchor off Yorkey's Knob. As ships increase in size, the logistics of tendering large volumes of passengers ashore at Yorkey's Knob becomes more difficult and the experience less pleasant, especially for elderly passengers, than for an alongside berth. Also, the practicality of these large vessels tendering at multiple destinations throughout their itinerary is not viable.

The detailed demand study highlighted that without improvements in infrastructure, the number of cruise ships visiting the Port of Cairns would only increase from the existing 27 cruise ships to 33 cruise ships in 2025 and the vessels that would visit the region and anchor off Yorkey's Knob would grow from 22 to 32 vessels with overall regional visitation limited to 65 vessels per annum.

The economic input into the region, due to a combination of reduced passengers coming to shore via tendering and the limitations of potential home porting is significantly less than if these vessels can come alongside. This project will see cruise ships growing to 130 ships alongside, including 61 mega ships.

4 Key Project Elements

4.1 The Project

The dredging works will generally occur within a 200m wide corridor (refer Figure 3.1) adjacent to the existing channel and swing basin. The EIS study area will focus over an additional 1km buffer to allow for the potential impacts of sediment plumes (this buffer area will be refined following sediment plume modelling that is yet to be undertaken).

The existing approved maintenance DMPA and an additional 1 nautical mile radius seawards, which is currently the preferred disposal area for additional dredged material.

The Cairns Wharf Complex - Wharves 1-5 (refer Figure 4.1 below).

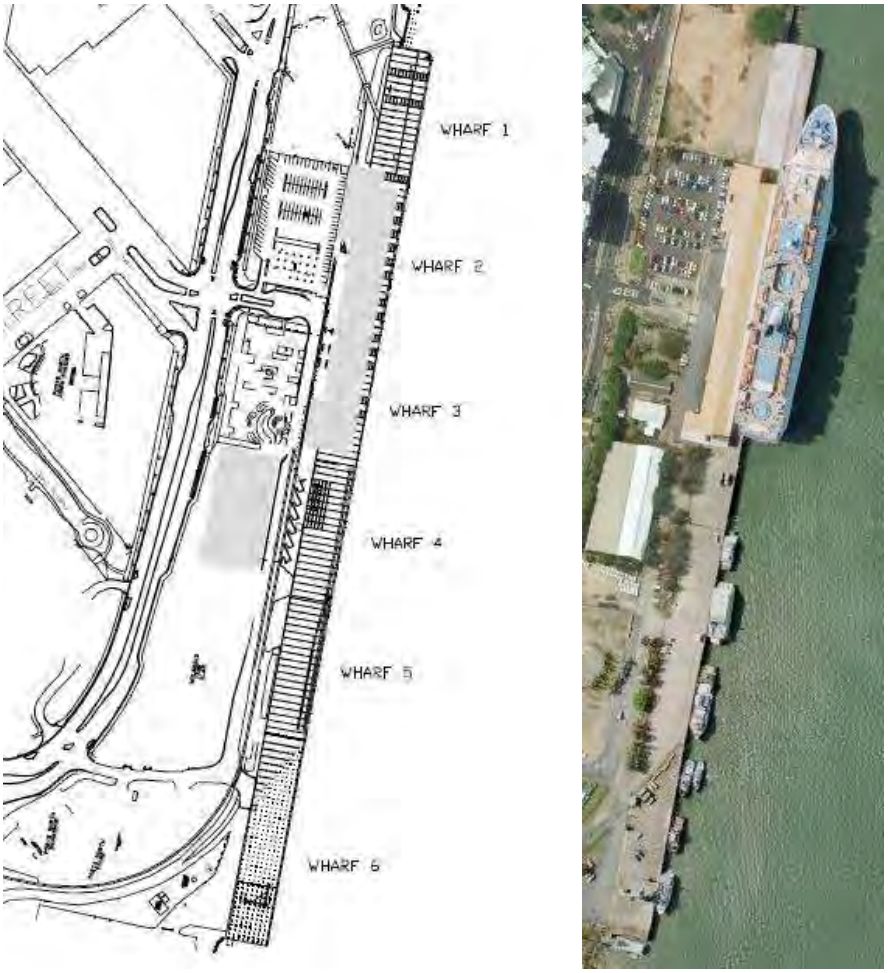


Figure 4.1: Plan and aerial photo with cruise ship at Port

4.2 Historical and Existing Dredging of Trinity Inlet

Although Trinity Inlet is a natural harbour, access to the sea is across a broad shallow mudflat. Since the inception of the Port in 1906, it has been necessary to maintain an access channel through these mudflats by regular dredging to remove sediment which collects in the channel. This work is so essential for the Port's survival that for many years the Cairns Harbour Board owned and operated a dredge the "*Trinity Bay*' to ensure the dredging could be carried out whenever it was required.

Since 1986, disposal of dredge spoil at sea has been controlled by the issue of Sea Dumping Permits which have required the Port Authority to demonstrate that the disposal of material does not have any significant detrimental environmental impacts. Environmental impacts associated with dredging and disposal have been well-managed and carefully monitored by Ports North and significant environmental investigations / studies have shown that these activities have a limited impact on the surrounding environment. The degree of confidence in the dredging processes for Cairns Port allowed the GBRMPA and SEWPC to issue a 10 year Sea Dumping Permit G/1033155.1 and SDP No. 10/03 for material recovered from channel maintenance dredging for 2010 to 2020. This was the first of the long term (10 year) maintenance dredging approvals granted for an Australian port.

4.3 Existing Land Use Tenure and Management

The project area is subject to the following tenure management and land use planning requirements. Further assessment of the consistency of the channel design, capital dredging and associated land-based infrastructure elements with these may be required.

4.3.1 *Far North Queensland Regional Plan*

The Port of Cairns is identified as regionally significant transport infrastructure in the Far North Queensland Regional Plan (FNQRP) which provides the strategic planning framework for the Far North Queensland region Queensland Coastal Plan.

The *Coastal Protection and Management Act 1995* (Coastal Act), provides the framework for integrated management of Queensland coastal zone. Under the provisions of the Coastal Act, the Plan identifies coastal resources and policies for coastal management.

The *Queensland Coastal Plan* (DEHP, 2011) addresses management of the coast and planning for future urban development in the coastal zone by incorporating the State Policy for Coastal Management and State Planning Policy for Coastal Protection.

4.3.2 *Strategic Port Land*

Ports North has prepared a Land Use Plan (LUP) pursuant to Section 285 of the Queensland *Transport Infrastructure Act 1994* (TI Act). The LUP specifies Strategic Port Land (SPL) as well as the current and future uses of SPL. The Land Use Plan sets out the main Local Area Plans that are applicable to the project.

Seaport Local Area Plan

The Seaport Local Area Plan (LAP) forms part of Ports North's LUP providing the planning framework for the Seaport area within the SPL and provides the strategic vision for future development of the Seaport. The Seaport area is divided into six (6) planning areas as depicted on Figure 4.2.

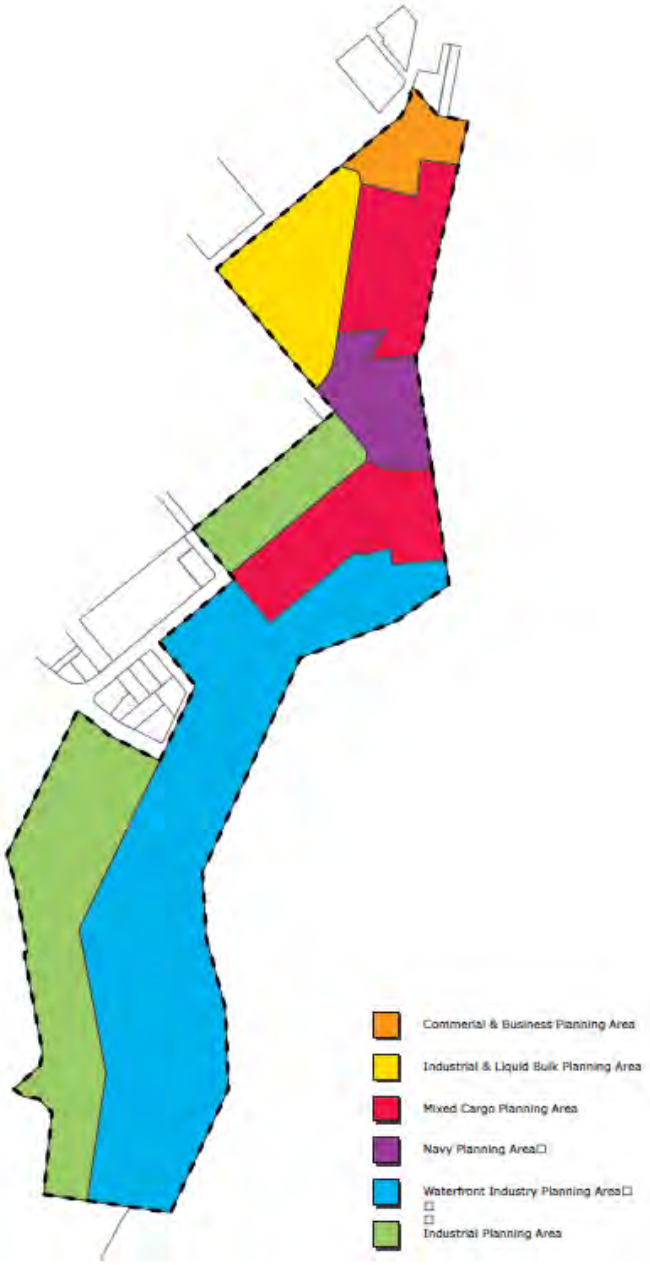


Figure 4.2 - Planning Areas within the Seaport LAP area (Source: Cairns Port Authority, 2006).

Some of the land-based infrastructure required to service proposed cruise ship operations (for example, fuel supply storage and distribution pipeline) will potentially be located within the Seaport LAP area and may trigger approval in accordance with the Ports North's LUP.

Cityport Local Area Plan

Similar to the Seaport LAP, the Cityport LAP is used by Ports North to regulate future development within the Cityport area, and ensure that future development reinforces the vision and preferred character for the area.

Cityport is located at the seaward extremity of the western shore of Trinity Inlet, with the Cairns CBD to the west, the Cairns Esplanade to the north and the commercial port facilities to the south. It includes both water and land, of which the land area is approximately 33 hectares.

Cityport comprises the whole waterfront from the Seaport in the south (adjacent to White's Shed) to beyond the existing reclamation edge which aligns with Shields Street. One area on the western side of Wharf Street is also included, the Ports North offices.

The Cityport area is intended to provide for the integration of the CBD with part of the Cairns waterfront to create an outstanding urban waterfront redevelopment area. Ports North intended that this area will have ongoing benefits for residents, the commercial community and tourists alike and will facilitate the consolidation of port operations, while also providing new buildings and spaces which are integral with the City centre and provide a range of activities to maximise the community and tourism attraction of the waterfront, such as the provision of facilities for embarkation and disembarkation of passengers for cruise ships.

The Cityport area is divided into eleven (11) precincts in which each has a preferred land use character. These precincts are depicted on Figure 4.3.

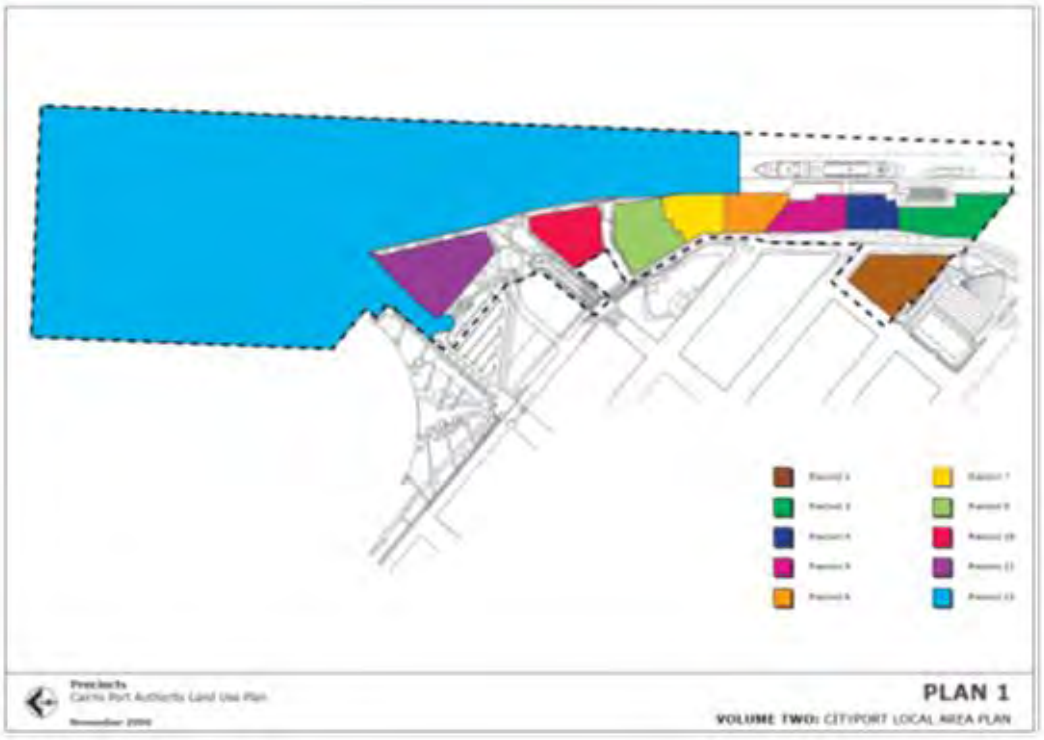


Figure 4.3 - Cityport Local Area Plan Precincts

4.3.3 *CairnsPlan*

Cairns Regional Council administers the Cairns Plan, which sets out the land use planning elements for the existing and future uses of the city. This plan interfaces with the intent of the Ports North Land Use Plan for Strategic Port Land and includes the following sections applicable to the project.

East Trinity Area

The area immediately along the eastern edge of Trinity Inlet consists of natural conservation areas which contribute significantly to biodiversity around Cairns and is included in the Conservation Zone under the *CairnsPlan* as a reflection of its environmental values. The area "behind" this environmentally-significant strip is zoned Rural and as such is intended for agricultural or undeveloped rural purposes.

Cairns CBD Area

The Cairns CBD Area located west of Trinity Inlet and Cityport accommodates a wide range of regional and specialised forms of retail, business, administration, accommodation for residents and tourists, community and indoor entertainment and leisure facilities. The CBD also provides a focus for cultural activities. The CBD is mainly zoned City Centre with some community facility designation.

The CBD contains a significant range of accommodation. Accommodation located closest to Trinity Inlet within the CBD includes the Pullman Reef Hotel Casino.

The Esplanade Parkland, which borders Cityport North, provides a major green space and a range of activities associated with informal recreation, including the Esplanade Lagoons and walkway. *CairnsPlan* intent is for the Esplanade to be a significant open space city.

Portsmith - Woree Industrial District

The Portsmith - Woree Industrial District is located on the western bank of Trinity Inlet south of the CBD. The area is characterised by the Trinity Inlet ecosystem which includes extensive mangrove and wetland areas.

The *CairnsPlan* intends for this District to continue to function as a major industrial area and employment node incorporating a range of general industrial activities. Industries associated with the Seaport and maritime activities, rail and road freight are likely to have a major role.

4.3.4 *Tenure*

The tenure in the study area is depicted in Figure 4.4.

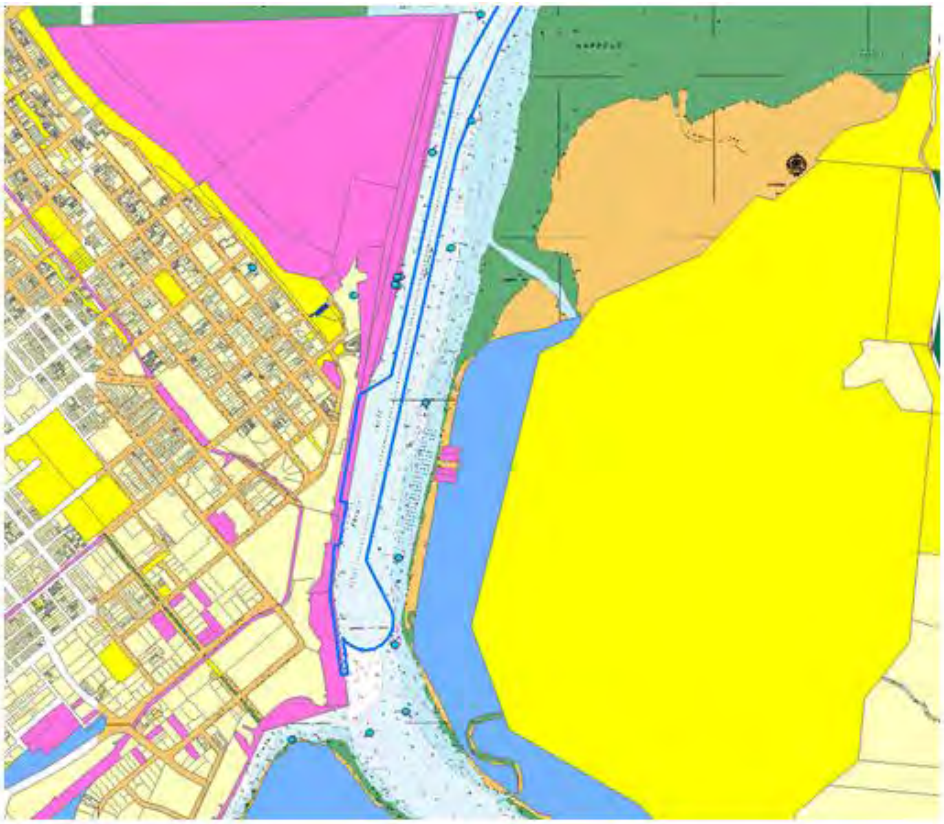


Figure 4.4 - Land Tenure

The existing and proposed channel portion of the project is on crown land located within the Port Limits over which Ports North has vested powers under the TI Act. The land based infrastructure works are on State land under jurisdiction of the Ports North Land Use Plan.

5 Description of the Existing Environment

This section presents an overview of the existing conditions in the project area that may be influenced by the proposed development. Information is based on previous studies within and adjacent to the project site as referenced. A detailed assessment of these is likely to be required as part of the EIS process and findings presented in the EIS outcomes.

5.1 Existing Climate Conditions

The climate in Cairns is tropical with generally hot and humid summer and mild dry winters. Most rainfall occurs during summer between January and March. Rainfall patterns heavily influence the turbidity levels within Trinity Inlet, with rainfall contributing to higher turbidity in the wet season.

The cyclone season is normally confined between December and April, but exceptions can occur and flooding and coastal inundation is common in the wet season, particularly in association with cyclones and storm surges.

Winds at Trinity Bay are predominantly from a South to South Easterly direction. The yearly average is a southerly wind in the morning and a southerly to northerly wind in the afternoon with wind speeds mainly below 40km/h.

The seasonal variation of the wind direction is similar during the morning hours between summer and winter, where the predominant wind direction is from south. During summer, the wind speed and occurrence is lower than during winter.

The bay is protected from the predominant wind and wave action from a south-easterly direction by Cape Grafton and False Cape.

The DMPA is situated approximately 26km from the Great Barrier Reef and about 9km from the shoreline and is exposed to all wind directions.

5.2 Terrestrial Geology

Project areas for the wharf and shore based infrastructure are proposed for the main wharf precinct which is located on historically filled and reclaimed land. This material is either clean imported fill or reclaimed dredge spoil. There is potential for acid sulphate soils (potential or actual) to be disturbed. Further investigation would be required to determine the potential extent. Certain areas are listed on the Environmental Management Register with low risk of soil contamination due to past site activities. Activities such as excavation, piling and construction that have potential to disturb these soil types and as the project site is in a coastal location, erosion of exposed soils or unprotected areas as a result of weather or wave action needs to be considered in design assessment and construction management.

5.3 Marine Geology

5.3.1 *Proposed Capital Dredge Material*

Advice from Golder Associates (2012) indicates that the materials within the proposed zone of widening and deepening are anticipated to consist of a majority of silt and clay materials with minor zones of sand. Capital dredge material is unlikely to be contaminated.

Golder Associates (2012) noted that the material proposed to be extracted from this location is not likely to be considered suitable as fill without significant treatment. Works would typically require a large land treatment area for dewatering and mechanical mixing of hydrated lime to dry and stabilise the material. This process involves significant periods of time. Some of the marine sediments proposed to be dredged are likely to be Potential Acid sulphate Soils and hence specific management measures would need to be adopted for the disposal of this material on land.

5.3.2 *Maintenance Dredge Material*

The Long Term Management Plan (LTMP) (2010-2020) (WorleyParsons, 2010) examined the maintenance dredging material from the existing channel in detail, describing it as predominantly fine silts and clays, with some sand and gravel fractions. The LTMP (2010-2020) states that the maintenance dredge material is not suitable as engineered fill, nor is it suitable for other land based uses (such as agricultural).

The report concludes that the dredge material is benign and does not pose a threat to the environment either when dredged or when dumped at the DMPA. Monitoring of dredging operations at Cairns Port over the years continues to confirm this.

5.4 Coastal Processes

5.4.1 *Tidal Levels*

Water levels at Trinity Inlet and Trinity Bay are influenced on a daily basis by semidiurnal tidal variation. Tidal levels at Cairns as reported in the Queensland Tide Tables 2011 (Maritime Safety Queensland, 2011) are presented below.

Tidal Plane	**Level (m, LAT)**
Highest Astronomical Tide (HAT)	3.50
Mean High Water Spring (MHWS)	2.62
Mean High water Neap (MHWN)	1.94
Mean Sea Level (MSL)	1.70
Australian Height Datum (AHD)	1.643
Mean Low Water Neap (MLWN)	1.46
Mean Low Water Spring (MLWS)	0.78
Lowest Astronomical Tide (LAT)	0.00

The catchment area of Trinity Inlet is very small and does not contribute to flows that will affect water levels in the inlet (JCU, 1997). Therefore, tidal levels at Trinity Bay are similar to Trinity Inlet.

For the Cairns region, a storm tide level of 4.16m above LAT is expected for a 100 year return period (Cairns Marlin Marina Design Current Investigation (WBM, 1997)). This is based on a storm surge occurring in combination with the peak of the mean spring tide.

Sea Level Rise and Climate Change

Records have shown that sea level has been rising as a result of climate change. The Queensland Coastal Plan, (Queensland Government, 2011) refers to a sea level rise of 0.8m by 2100 relative to 1990 levels. This is based on the upper range of the projections by the IPCC 2007 (AR4) (IPCC: 2007). It also predicts an increase in the maximum cyclone intensity by 10%. These will be addressed and consider further in the EIS.

5.4.2 *Currents and Flow*

Currents in Trinity Inlet and Trinity Bay are mainly caused by tidal variation. The currents in the main channel of Trinity Inlet are about 0.8 to 0.9 m/s and 0.3 to 0.4 m/s during spring and neap tides respectively.

The total tidal discharge of the Trinity Inlet is approximately 2,500 to 3,000 m^3/s during spring and 500 to 1,000 m^3/s during neap tides (WBM 1998). Storm tide can create current velocity of approximately 1.5m/s in the main channel.

Current velocities reduce toward the river banks from the main channel. Tidal currents are generally less than 0.3 m/s in shallow sections, deeper offshore areas and fringing shoreline.

Spring tide currents are reported to create eddies on the western side of Trinity Inlet.

Currents at the DMPA are unconfined by the coastline. The typical current direction varies between south-east and north to north-east with a spring tide current speed of 0.16m/s during flood tides and 0.07m/s during ebb tides. Neap tide currents are below 0.1m/s (James Cook University, 1998). During cyclone events currents can reach up to 1.6 m/s, causing shore-parallel sediment transport (Carter *et. al.*, 2002).

Figure 5.1 (Environment North 2005,) indicates the general physical environment features of Trinity Bay applicable to the proposed project.

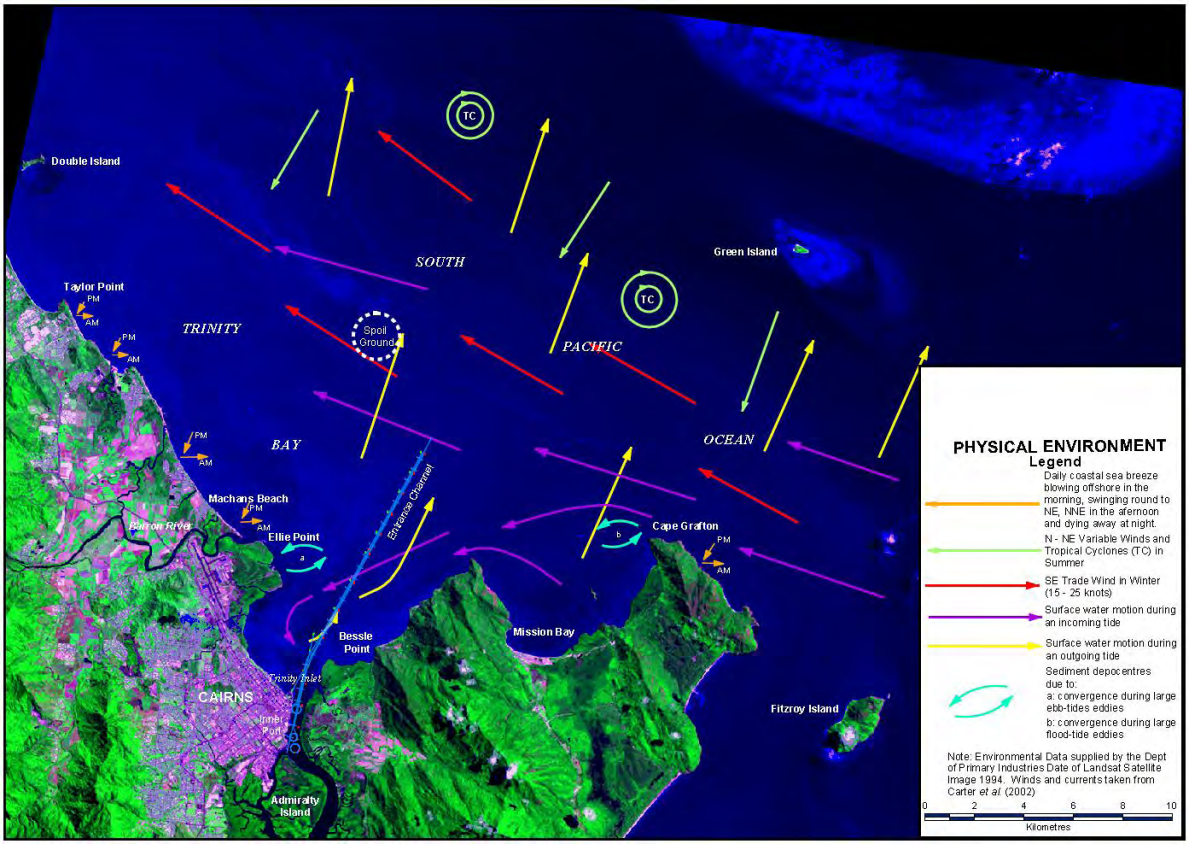


Figure 5.1

5.4.3 *Waves*

Trinity Bay is located in shallow waters in an area of low wave energy with broad intertidal mud flats protected by Cape Grafton to the south and the mainland to the west. The Great Barrier Reef provides protection to Trinity Bay from high energy waves from offshore.

Waves are generally local wind generated waves, with the most common wave height about 0.2 to 0.4m with a wave period of 2.5 to 4 seconds (JCU & CPA, 1997). During cyclone events larger waves with a higher wave period can be expected.

Wave set up and run-up is therefore usually very small and just becomes important during cyclone events. During a storm event, wave set-up of about 0.5m can occur and mean wave run-up up to 1.1m above the storm tide level with a possible maximum of 2m can be expected. (JCU & CPA, 1997).

The DMPA, whilst located further offshore, is still within shallow water (10-12m) and is protected by the Great Barrier Reef from larger swell waves.

Sediment Transport

Trinity Bay is a low energy area. Sediment transport is mainly determined by tidal currents on a daily basis and by cyclonic events on a yearly basis (extreme events). The general and net sediment movement is towards the north easterly direction. This is mainly due to the effects of south easterly winds and water motion. Some minor south easterly sediment transport can occur during cyclone events and in summer when the wind direction is from north.

Most of the sediment supply in Trinity Bay originates from the Barron River which is located approximately 7 km north of Trinity Inlet. Even though most of the Barron River sediment gets transported north eventually, some of it moves south into the bay. The material transported into the bay mainly consists of fine sediments with 25% to 70% mud component, which generally increases with distance offshore. Most of these sediments are deposit onshore of the 15m isobath (JCU-CPA, 1998). During cyclone events mud and sand gets transported into the bay from the mid shelf.

Coastal waters of the Bay are generally turbid due to suspended sediment concentration caused by wave and currents on the mud flats. The muddy nature of the sediment in the bay (unconsolidated mud/very soft clay) is easily suspended with minor wave or current action. This suspended sediment settles readily at locations with calmer conditions.

The present shipping channel, Barron Delta, Cairns Esplanade and Mission Bay are identified as sediment sinks (James Cook University, 1998).

Research by Carter *et. al.,* (2002), estimated that 173,500 m^3/year of sediments is supplied from Barron River, with 2% of these sediments transported to the south. During a cyclone event, 15,000 m^3/year sediments are transported towards the shore.

Prevailing currents at the DMPA result in a net northerly to north-easterly sediment transport of dredge material if it is mobilised from the DMPA. The direction of circulating currents within Trinity Bay ensure that almost no remobilised material re-enters the Bay. Surveys revealed that about 50% of the deposited material is retained at the DMPA and the rest is transported further north to north-east, merging with the surrounding material (Environment North 2005).

Siltation

Assessment of differential plots of pre and post dredging hydrographic surveys in the Cairns Port Long Term Management Plan (WorleyParsons, 2010) identified an average of 0.5-1m of siltation per annum for the Channel. Siltation rates vary along the channel and show that siltation of up to 2.0m can be expected approximately mid-way of the outer channel.

For further detail on maintenance dredging requirements for the project, refer to Section 3.2.6.

5.5 Protected Areas

The project may affect the protected areas listed below and then shown in Figure 5.2, World and National Heritage Areas and Figure 5.3, Great Barrier Reef Marine Park boundary and use zones.

	Protected Areas
International & National	World Heritage Area
	Great Barrier Reef Marine Park
	Nationally Important Wetland
	National Heritage Place
State	Fish Habitat Area
	National Park
	Referrable wetland

5.5.1 *International and National Protected Areas*

World Heritage Area

The proposed project is within the GBR WHA and will require assessment for impacts to matters of NES. The WHA boundary mostly accords with the Great Barrier Reef Marine Park (GBRMP) boundary (refer to Figure 5.3); however it also includes some additional islands and intertidal areas.

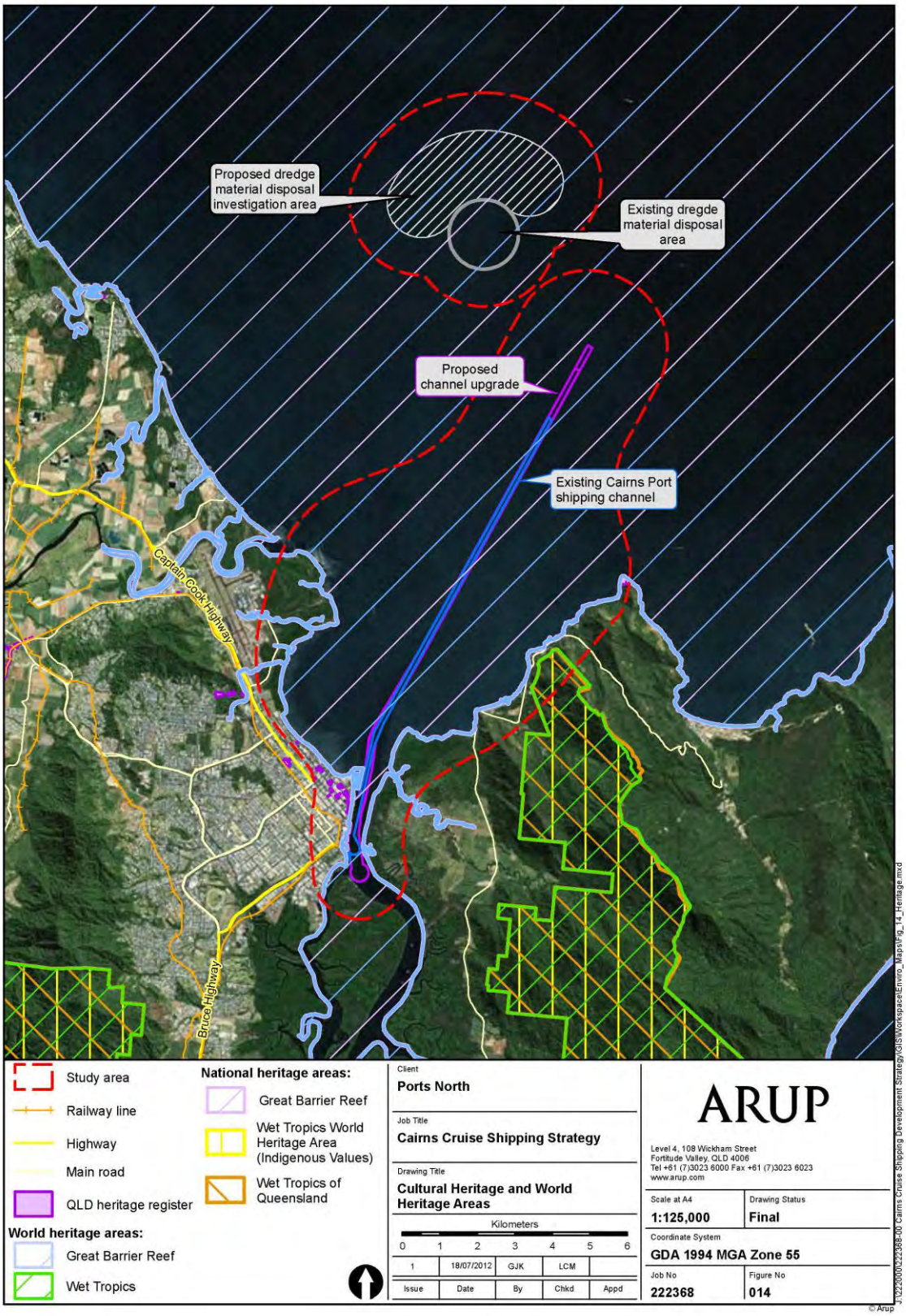


Figure 5.2 - World and National Heritage Areas

Great Barrier Reef Marine Park

The existing approach channel does not fall within the Great Barrier Reef Marine Park but the existing dredge DMPA is located within the General Use Zone as shown on Figure 5.3.

GBRMPA issued a Marine Park Permit (Permit No: G10/33155.1) to Ports North which is valid for the period 17 June 2010 to 1 June 2020 for the DMPA (located within a circular area of one nautical mile diameter centred on Latitude -16.70, Longitude 145.8133).

The GBRMPA *Dredging and Spoil Disposal Policy* (Australian Government; 2010) provides specific guidance on requirements for dredging activities and dredge material disposal within the GBRMP.

The GBRMP is also a Matter of National Environmental Significance under the EPBC Act and impacts on its values will be a consideration for a referral application.

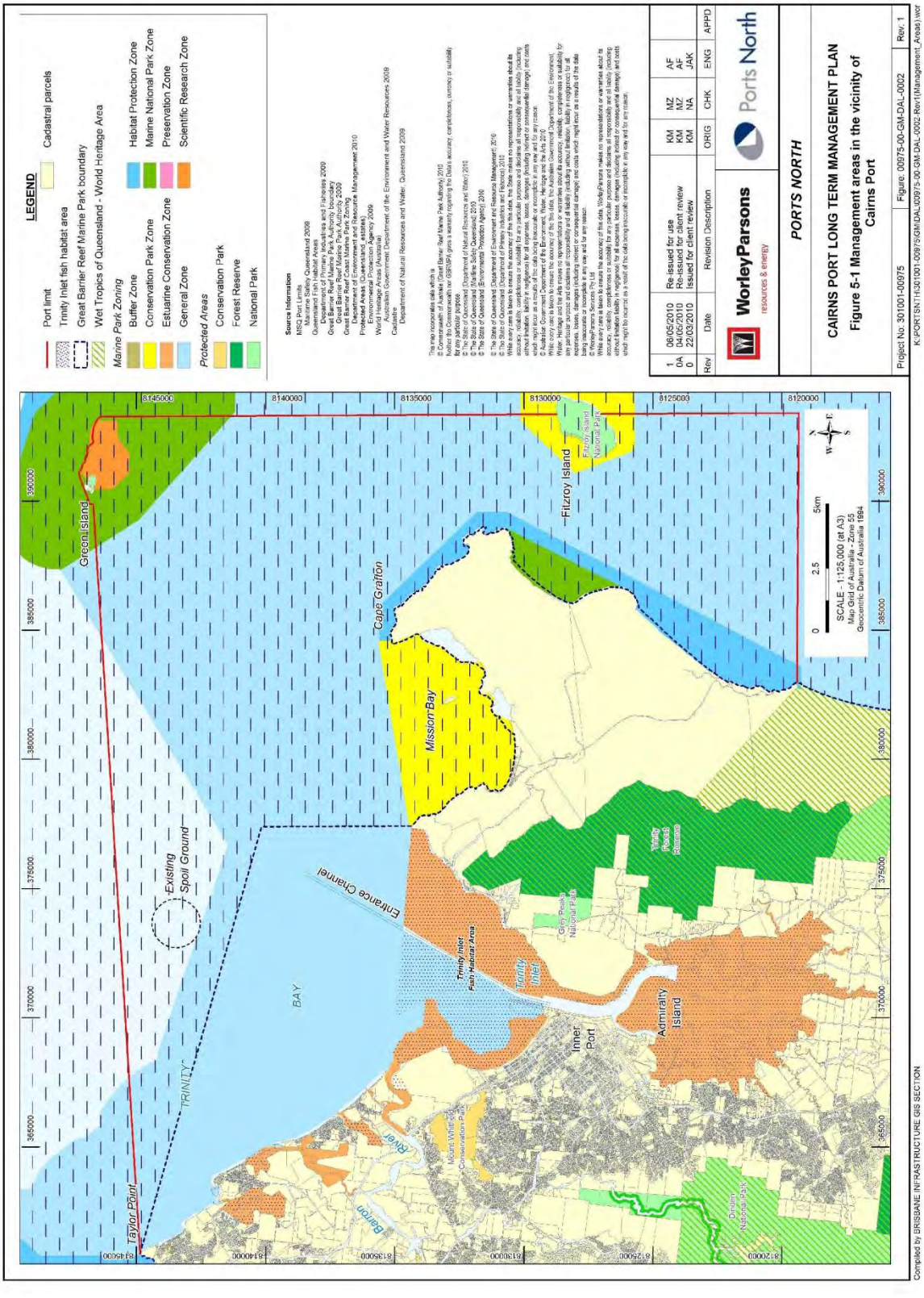


Figure 5.3 – Management Areas, including the Great Barrier Reef Marine Park boundary

Nationally Important Wetlands

The Port of Cairns / Trinity Inlet is listed under the *EPBC Act* as a Nationally Important Wetland (wetland No. QLD157) and it has been determined that it is of national significance.

The *Wetland Information Sheet* (SEWPC; 2011) reports that the wetland supports large populations of birds, fish and prawns despite its proximity to the urban areas of Cairns.

Natural Heritage Place

The project area falls within the Great Barrier Reef Natural Heritage Place under the Environment and Heritage Legislation Amendment Act (No. 1) 2003. The listing covers the same location as the World Heritage Area listing and is included in recognition of its natural values. Referral to SEWPC will be required under the EPBC Act as potential impact to national heritage is a Matter of National Environmental Significance.

5.5.2 *State Protected Areas*

Fish Habitat Area

The Trinity Inlet Fish Habitat Area (FHA) was declared in 1998 and covers an area of 7,440ha. It covers extensive mangrove wetlands, seagrass beds and deep-water areas that support recreational, commercial and traditional fisheries. The FHA lies within the heart of a major population centre which creates complex management issues.

The FHA (refer Figure 5.4) encapsulates the majority of the Trinity Inlet area with the exception of the inner harbour and the access channel. Early in the development of the Trinity Inlet Management Plan, a designation was made for a 'Port and Harbour Activities' area which included the main wharves and channel. A 200m wide zone was included in the Port and Harbour Activities area to accommodate the existing 90m wide shipping channel (100 metres from and parallel to the centre-line of the marked navigation channel) and to allow for future growth. Whilst this 200m exclusion zone is equally spaced on either side of the existing channel alignment, the preliminary channel design for the CSD has widening on one side only at the channel bend to reduce the volume of dredging and lessen the impact on seagrass beds east of the channel. Consequently, the proposed channel design will impact the FHA at this location.

Encroachment of the proposed widened channel into the Trinity Inlet FHA will require approval under the Fisheries Act. This may require revocation (e.g. changing the statutory boundaries) of the FHA.

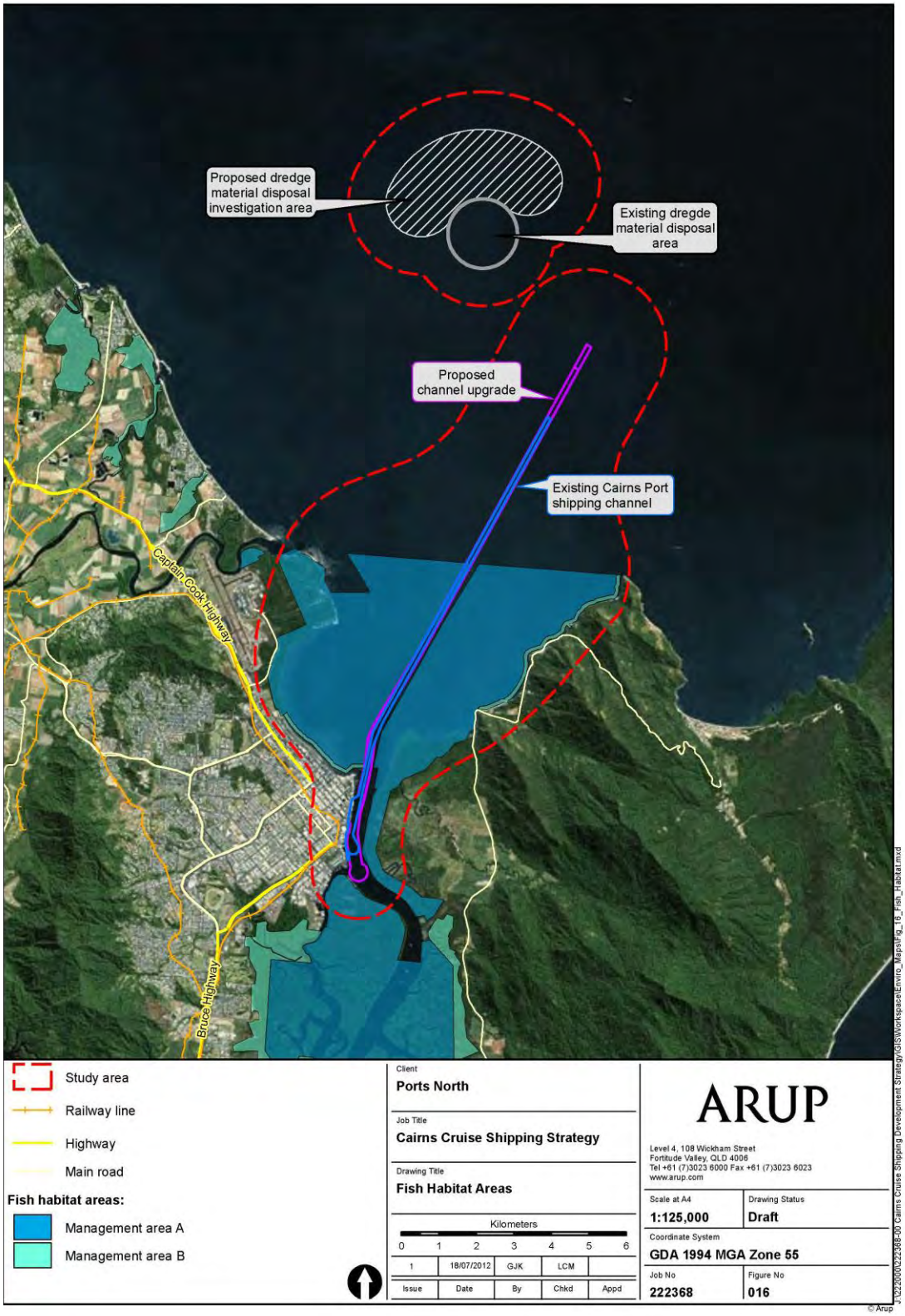


Figure 5.4 - Fish Habitat Area

Great Barrier Reef Coast Marine Park

Under the *Marine Parks Act 2004* and the Marine Parks (Great Barrier Reef Coast) Zoning Plan 2004, the inner portion of the existing entrance channel is excluded from the Great Barrier Reef Coast Marine Park while the outer portion is within the 'General Use' zone. The area to the immediate east of the access channel is part of the Estuarine Conservation Zone. The existing DMPA is located outside, but immediately adjacent to, the outer limits of the Great Barrier Reef Coast Marine Park (refer Figure 5.3).

National Parks

There are no National Parks within the study area; the closest parks are Greys Peak National Park approximately 5km to the south-east and Barron Gorge National Park, approximately 20km to the south-west. The Mount Whitfield Conservation Park is also situated approximately 4km to the north-west.

Referrable Wetland Management Area

A Wetland Management Area (WMA) is a mapped wetland of State interest. Wetland management areas comprise of a wetland of ecological significance plus a 100-metre trigger area.

There is a small area of High Ecological Significance (HES) wetland protected under the *Temporary State Planning Policy* and the *Queensland Coastal Plan 2011* within the study area, in Eastern Trinity Inlet (Figure 5.5).

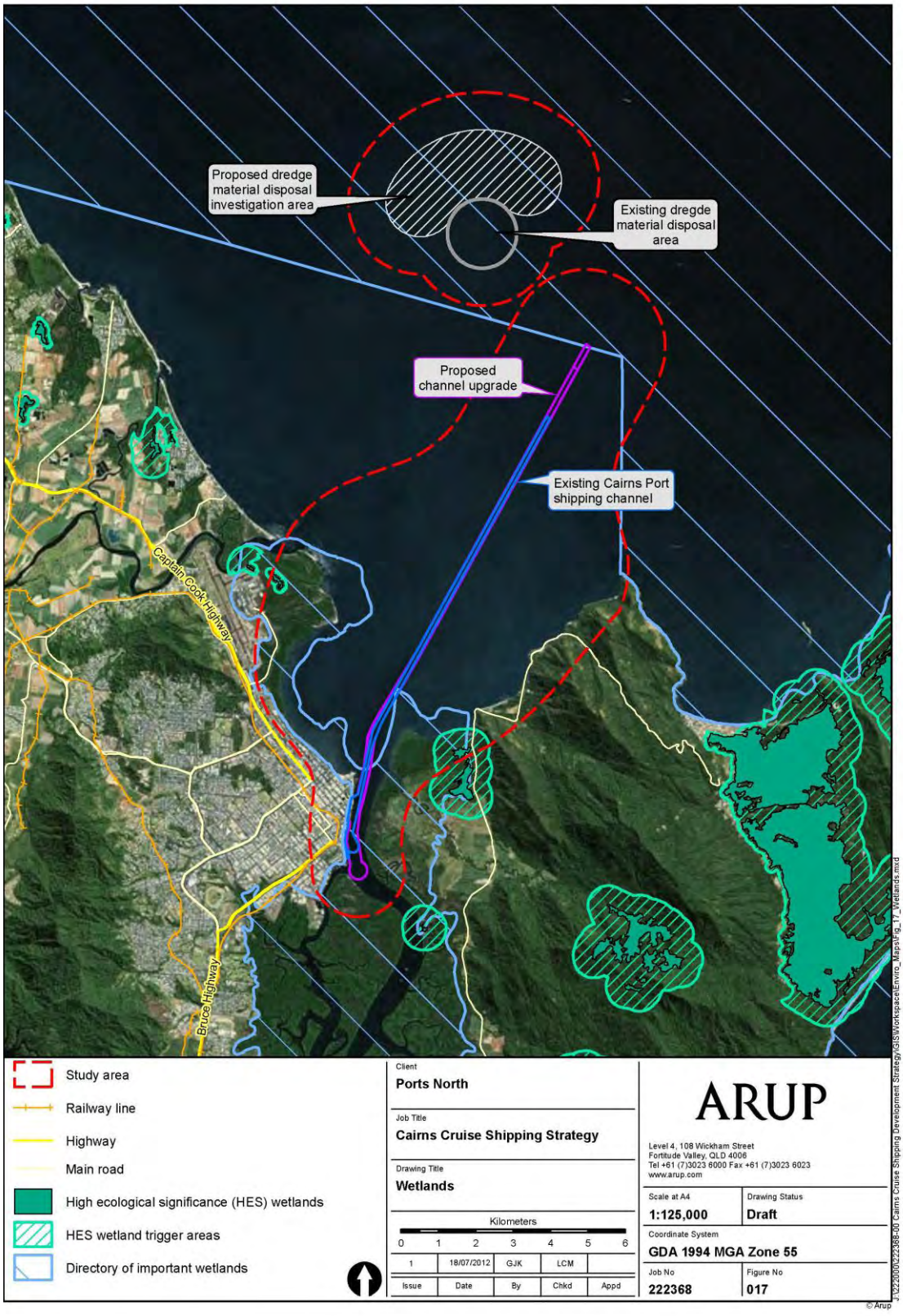


Figure 5.5 - Wetlands

5.6 Marine Ecology and Habitats

The study area contains a number of habitats and fauna species which are protected at an international, national and state level. Some of the fauna species are presently considered endangered or vulnerable at a national level such as the Humpback Whale, the Loggerhead Turtle and migratory wader birds.

5.6.1 *Flora and Habitats*

Intertidal Areas

The site is not listed as a Threatened Ecological Community under the *EPBC Act*.

DEHP Regional Ecosystem mapping shows that there are no Regional Ecosystems within the project area, although east Trinity Inlet contains extensive areas of 'Of Concern' Regional Ecosystem as illustrated in Figure 5.6.

As detailed in Section 5.5, these areas are also protected as 'wetlands' under several pieces of legislation.

Intertidal sand banks and mud banks also provide habitat for migratory birds, many of which are protected under the *EPBC Act*.

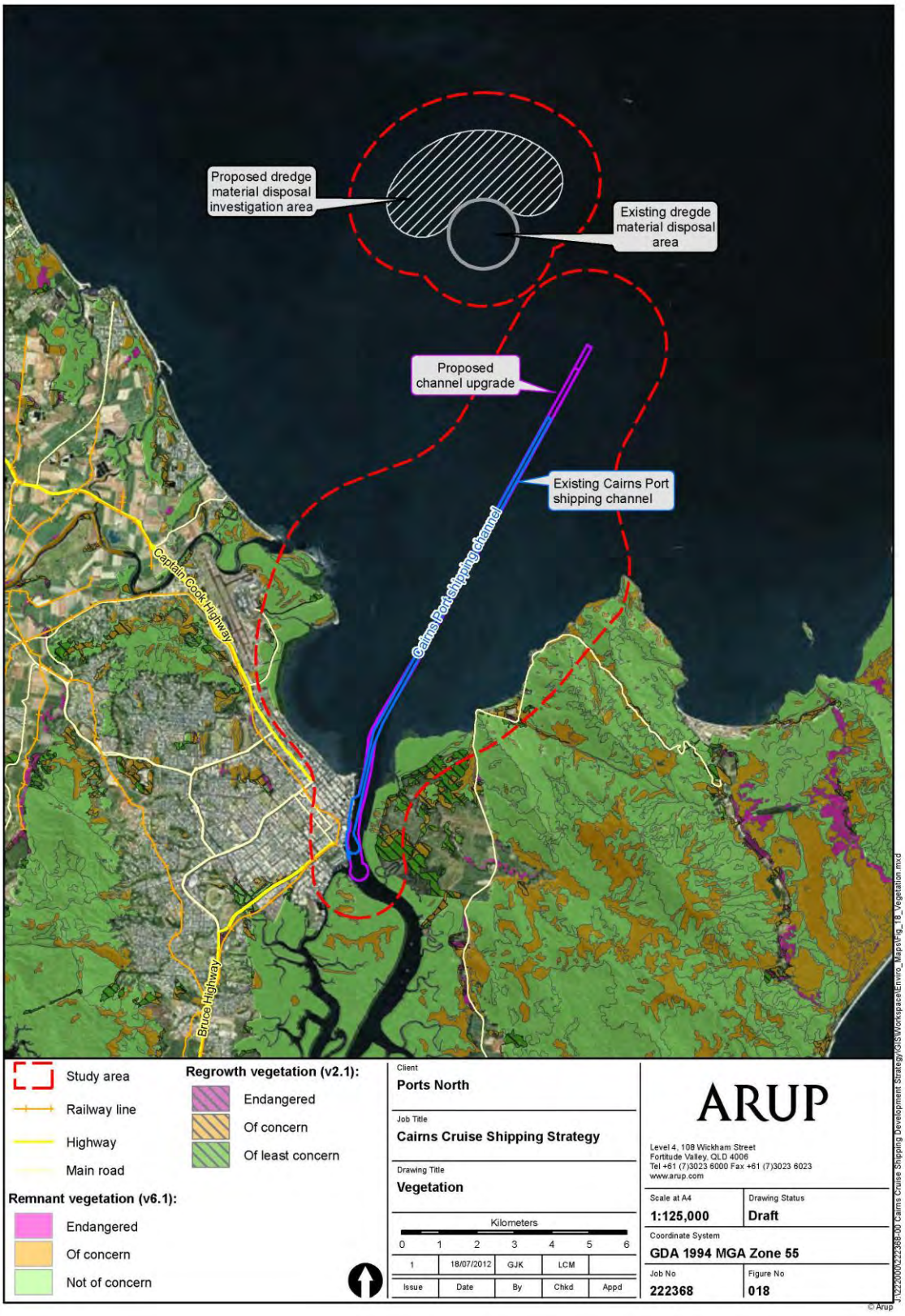


Figure 5.6 – Regional Ecosystem Mapping (Source: DEHP 2011)

Seagrass Beds

A baseline survey of the Cairns Harbour and Trinity Inlet seagrass beds was undertaken in 2001 by Ports North using the former Department of Primary Industries (now part of the Department of Agriculture, Fisheries and Forestry [DAFF]). Annual monitoring has since been undertaken, with the latest survey in September 2011 (Reason et. al. 2012). The goal of the monitoring is to use seagrass condition as an indicator of the health of Trinity Inlet. Monitoring has not identified any dredging or port related impacts to seagrass communities. The 2011 results indicate that existing seagrass habitat was much reduced in extent and in vulnerable condition when compared to their long term average condition. This decline has been linked to recent La Nina weather events (increased cyclones and floods) and is part of a regional decline in seagrass extent. The report states that '*while port activities in 2011 were unlikely to have had a significant impact, the current vulnerable state of some seagrasses in Cairns underscores the need for continued monitoring to ensure the long-term viability of these marine habits".*

The extent of seagrass beds within Trinity Bay is show on Figure 5.7.

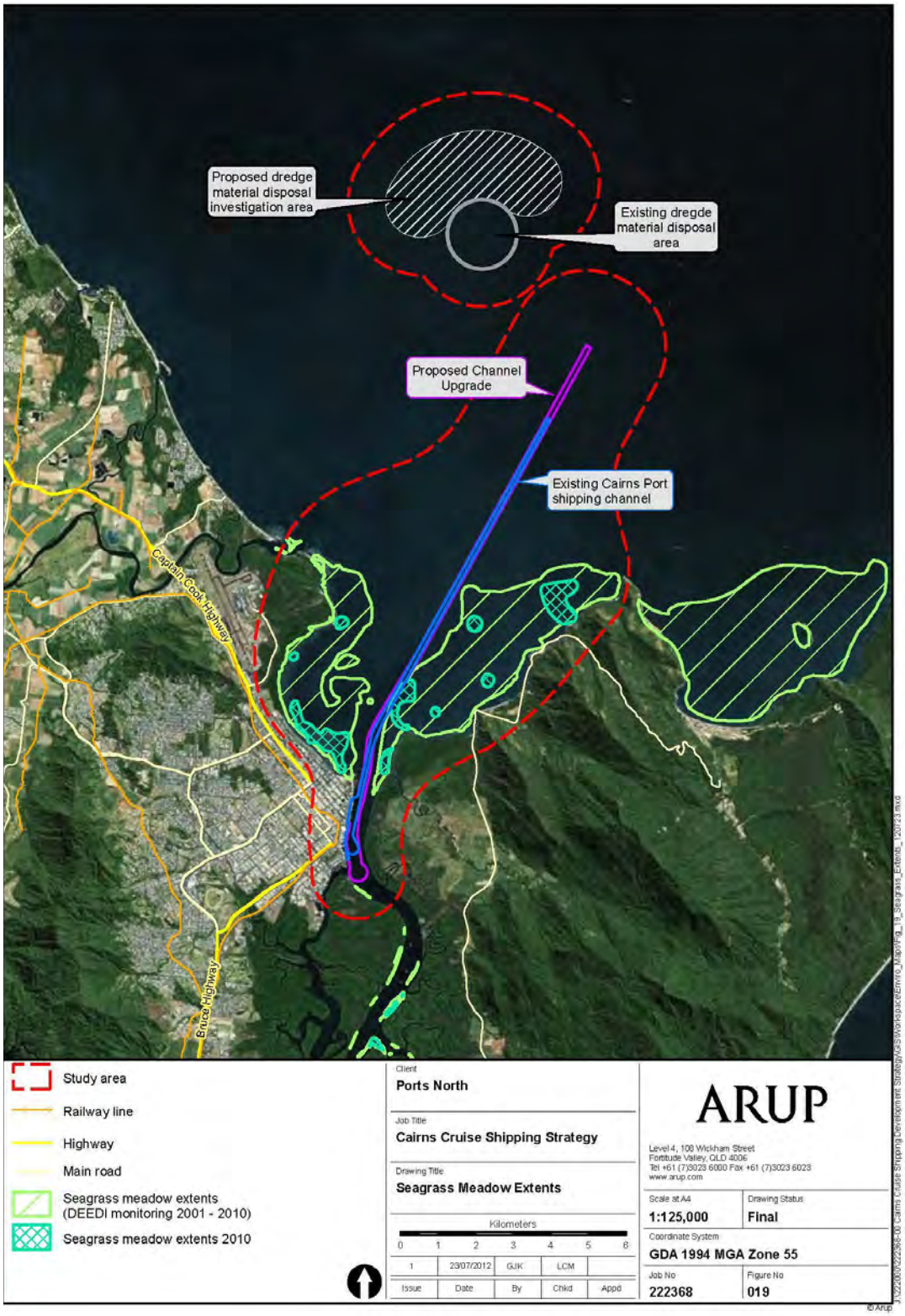


Figure 5.7 - Seagrass Extent in 2010

Coastal Waters

The open and enclosed coastal waters of Trinity Bay provide habitat for various marine turtles, including the loggerhead and green turtles protected under the EPBC Act, the Humpback Whale and dolphins. Worley Parsons (2010) suggest that whales may occur in the vicinity of the existing DMPA, but are more likely to be found further offshore. Further ecological surveys may be required as part of the EIS.

Benthic Habitat (Channel Area)

Surveys of benthic communities have been undertaken for the existing channel and concluded that it is unlikely that the channel supports benthic communities with high diversity. Communities associated with the channel are similar to those in nearby undisturbed areas. Further benthic ecology surveys will be undertaken as part of the EIS.

Benthic Habitat (DMPA)

Surveys of the existing DMPA (and some areas beyond) have been undertaken and concluded that benthic communities recover rapidly following dredge material placement and that over time, the species composition of the DMPA was similar to nearby areas in Trinity Inlet (Neil *et. al* (2003) and Worley Parsons (2009).

The existing and potential expansion area for the DMPA is not near to sites identified as having special scientific or ecological importance and appear simular to adjacent areas. Further benthic ecology surveys will be undertaken as part of the EIS.

Significant Flora Species

Searches of the *EPBC Act* and the DEHP online database identified five (5) flora species as having the potential to occur within a 5km radius of the site. However, these are all terrestrial species and no suitable habitat within the project area exists.

5.6.2 *Marine Fauna*

Significant Fauna Species

WorleyParsons (2010) undertook an assessment of the significant fauna species likely to be present within Trinity Inlet. A total of ten (10) species (of significant status under either the *EPBC Act* or the *NC Act*) were considered likely to occur within the maintenance dredging and/or existing DMPA.

These species are:

- Humpback Whale - *Megaptera novaeangliae*
- Dugong – *Dugong dugon*
- Australian Snubfin Dolphin - *Orcaella heisohni*
- Indo-pacific Humpback Dolphin - *Souse chinensis*
- Loggerhead Turtle - *Caretta caretta*
- Green Turtle - *Chelonia mydas*
- Hawksbill Turtle - *Eretmochelys imbricate*

- Olive Ridley Turtle - *Lepidochelys olivacea*
- Flatback Turtle - *Natatory depressus*
- Salt-water Crocodile - *Crocodylus porosus*

A further search of fauna databases has identified other species of conservation significance including migratory birds that may require further consideration during the EIS.

5.6.3 *Marine Pests*

The Port Baseline Survey for Marine Pest (CRC Reef, 2001) established an understanding of local and introduced marine species, and identified the presence of one marine pest, the Asian Green Mussel in 2001. Monitoring programs within Trinity Inlet have been established by Biosecurity Queensland and Ports North since that time. Occasional detections of the Asian Green Mussel, Caribbean Tube Worm and Asian Bag Mussel have occurred. Monitoring using settlement plate devices and periodic detailed benthic surveys as part of the annual SAP implementation have indicated that these species are not colonising sediments, but favouring vessels or other hard infrastructure and have failed to establish viable local populations. There have been no confirmed ongoing populations of Asian Green Mussel, Caribbean Tube Worm or Asian Bag Mussel, since the Biosecurity Qld proof of freedom surveys were conducted in 2009. Cairns is one of 16 priority Australian ports for future monitoring by the Commonwealth Department of Agricultural, Fisheries and Forestry (DAFF) under the national marine pest system. The EIS will consider marine pests issues.

5.7 Water Quality

A large number of studies have investigated water quality at the Port of Cairns, and the wider regions of Trinity Inlet and Trinity Bay. Many of these have been undertaken to understand the potential impacts of port activities, most notably dredging and material disposal, on water quality and ecosystem health. The recent *Cairns Port Long Term Management Plan - Dredging and Dredge Spoil Management* (LTMPDDSM) (WorleyParsons, 2010) provides the most comprehensive recent compilation of water quality in Trinity Bay and is the primary reference in establishing the baseline water quality conditions and potential water quality impacts for this project.

The physical characteristics and hydrodynamic processes in Trinity Bay result in naturally high suspended solids and turbidity levels. The Barron River to the north of the Bay contributes significant sediment and nutrient loads from upstream agricultural and urban catchments, and the heavily urbanised catchments of the Cairns CBD and surrounds is also likely to contribute a range of nutrients and minor toxicant inputs (Worley Parsons, 2010). Dredging of the shipping channel and dredge material disposal has occurred since the port was established in 1876, with generally only minor short term impacts on water quality in the bay observed or recorded.

The following sections summarise the outcomes of previous water quality monitoring of the major parameters. A more detailed assessment of baseline water quality will be required as part of the EIS.

5.7.1 *Turbidity and Suspended Solids*

Trinity Inlet and Trinity Bay are described as naturally high turbidity systems, experiencing typical total suspended solids concentrations of 20-200 mg/l. Physical hydrodynamic processes and the extent of shallow water drive the regular mobilisation of fine sediments within the water column (Carter *et al*., 2002; cited in WorleyParsons, 2010).

The 2010 LTMPDDSM (Worley Parsons, 2010) reviewed the outcomes of various previous sediment and turbidity monitoring studies, and concluded the following Total Suspended Solids (TSS) levels range from 1000-2000mg/l over the mud banks adjacent to the esplanade, a relatively constant 400mg/l near the port entrance and at the DMPA, and a mean of 30-50mg/l adjacent to Marlin Jetty (wet season measurements from close to sea bed).

Turbidity recorded within the inner port area with a mean of 18NTU at the surface, increasing with depth to approximately 30NTU, with typical maximums of 200-300NTU and a peak of 700NTU.

5.7.2 *Nutrients, Dissolved Oxygen and Chlorophyll-a*

The 2010 LTMPDDSM (Worley Parsons, 2010) outlines the results of nutrient, dissolved oxygen and chlorophyll-a monitoring undertaken by the Cairns Port Authority from 2001 to 2008. In summary the results indicate:

- General compliance with water quality objectives for total nitrogen and chlorophyll-a, however concentrations for ammonia and phosphorus remain in excess of objectives.
- Dissolved oxygen levels at the lower end of acceptable limits, potentially indicating excessive organic loads.
- Increases in sediment and nutrient levels following rainfall and during the wet season period.

The report indicates that elevated nutrient levels in the bay are unlikely to be associated with port activities due to the consistency in nutrient levels across the different sampling locations, and are more likely due to urban and agricultural land uses and discharges of effluent from municipal and industrial facilities.

5.7.3 *Toxicants*

The 2010 LTMPDDSM (Worley Parsons, 2010) outlines the results of heavy metals and hydrocarbon water quality monitoring undertaken around the port and material disposal site. In summary, the results indicate:

- Within the inner harbour - compliance with water quality objectives for median zinc, chromium and cadmium concentrations, however exceedence of objectives for copper, lead and TBT (including DBT and MBT).
- Dredge material disposal ground – compliance with water quality objectives for most toxicants, however slightly elevated zinc and hydrocarbons concentrations were detected.
- Channel entrance - compliance with water quality objectives for all heavy metals.

Trinity Inlet could be described as a moderately disturbed (or modified) ecosystem within the vicinity of the Port and the dredged channels. These areas are used to some level of disturbance and would be less sensitive to a change in water quality. The eastern side of the Inlet and the Bay are subject to fewer disturbances however and contain ecological values such as seagrass beds and mangroves that would be considered sensitive to deterioration in water quality from sediment plumes caused by capital or maintenance dredging. For this reason, the channel design is based on disturbing the area to the west of the existing channel, rather than the more sensitive eastern side. Additionally, new areas of substrate would be disturbed that are not currently subject to dredging activity or dredge material disposal.

5.8 Cultural Heritage

5.8.1 *Non-indigenous cultural heritage*

Adjacent cultural heritage sites listed on the Australian Heritage Database include the land based, Cairns Wharf Complex, Jack and Newell Building, Barrier Reef Hotel, Adelaide Steamship Company Building. Marine areas listed on the Australian Heritage Database included, Cairns Tidal Wetlands and refined area #2 Esplanade, the Great Barrier Reef and the Great Barrier Reef Region (Commonwealth).

The Queensland Heritage Register contains three registered locations applicable to the project, being the Cairns Wharf Complex, Jack and Newell Building, and Barrier Reef Hotel.

A search of the National Shipwrecks Database (28 September 2011) using a 20 kilometre search radius centred on Cairns Port identified seven (7) historic shipwrecks.

5.8.2 *Aboriginal Cultural Heritage*

Traditional Owners have shown an interest in past projects at the Cairns Port and would also be expected to have an interest in and participate in planning for the capital dredging program.

To date, no detailed survey work to identify indigenous archaeological cultural heritage material has been undertaken of coastal sites and areas to be dredged, although a number of likely environments have been identified (e.g. raised sand ridged and cheniers with mangrove systems and old underwater reef sites). A Cultural Heritage Management Plan is required to be developed should an EIS be prepared. The aboriginal heritage value of the study area will be further explored during this process.

5.8.3 *Native Title*

At the time of preparation of this report, there has been only one (1) native title determination in relation to native title in the Trinity Inlet area (for the Mandingalbay Yidinji People). There are no other applications seeking native title determination over the Cairns Port area or the project area.

5.9 Climate Change and Extreme Events

Cairns is subject to occasional extreme weather events due to the tropical climate conditions, most notably cyclones, which each have had potential to affect infrastructure and lead to additional mobilisation of sediments and resultant loss of channel depth or disturbance to the DMPA. In recent years, and despite two major cyclone events, influences on existing infrastructure and channel depth has been minor, with only small additional volumes of emergency dredging required. Predictions for the effects of climate change, including more intense and more frequent extreme weather events on the project area will be considered during the EIS stage.

Climate change projections that are likely to be appropriate for consideration in this project are summarised below:

Climate variable	Indicative climate change projections
Rainfall and runoff	Change in annual average rainfall = -40% Change in average summer monthly rainfall = -22% Change in average winter monthly rainfall = -48%
Temperature	Mean increase in annual temperature = 3C Mean increase in number of days over 35C = 65
Wind (average)	Change in average 10m wind speeds = -2% to +15%
Sea level	Change in mean sea level = +0.8m by 2100
Cyclones	Change in maximum cyclone intensity = +10%
Storm surges	Change in storm surge + tide for 50 year return period + +0.4m

Existing wharf infrastructure is most at risk from climate change impacts, particularly a rising sea level, an increase in existing storm surge levels and increased intensity of cyclonic events. The existing wharf is currently at R.L. 5.0 with the Highest Astronomical tide (HAT) level at 3.4m. A sea level rise of 0.8m should not impact the wharf structure but may require consideration.

5.10 Noise and Vibration

There are few sensitive human receptors within the study area that would be affected by noise or vibration. The area is industrial or commercial in nature, with any accommodation considered temporary. Those living in boats within Trinity Inlet may be more vulnerable, however it is not expected works would occur at night times, avoiding any sleep disturbance. Heritage-listed buildings may be susceptible to vibration from piling. Further investigations of underwater noise impacts to aquatic fauna (turtles, dugong, whales, and dolphins) within Trinity Inlet may also be warranted due to their vulnerability to noise and vibration disturbance.

5.11 Air quality

Air pollution within the Cairns Region is considered to be of a low level. There are not considered to be any receptors sensitive to air pollution in the study area. Prior studies to establish the baseline for air quality have not been warranted and monitoring or impact modelling may be a consideration for further stages of the assessment.

6 Potential Impacts of the Project and Management / Mitigation Measures

This section outlines the potential impacts of the proposed works. Impacts have been explored across all aspects. It should however be noted that this assessment is based on desktop information only to give an indication of high level risks. A number of key studies are needed before the extent of some impacts can be determined, particularly sediment plume and hydrodynamic modelling and ecological surveys.

Consideration has also been given to possible mitigation or management which may help to control the impacts in question and these are provided for reference.

It is considered highly likely that a full EIS will be required for the project for which substantial further investigation will be required. Further studies or further investigations that are likely to be required for an EIS have been outlined.

6.1 Geological Conditions

Maintenance dredging at the port has been ongoing for a number of years, with no significant contamination or acid sulphate soil issues identified to date.

Material with low levels of contamination found within Trinity Inlet could be transferred to the dredge material disposal site, impacting on water quality and species habitat. Previous investigations indicate that sediments within Trinity Inlet are not significantly contaminated; therefore contamination is unlikely to be transferred to the DMPA. Nevertheless, ongoing testing and monitoring during construction will be required as per the NAGD standards. The acidity of soil to be dredged may require further investigation. As dredge material will be collected in wet suspension and disposed of underwater rather than land, it is unlikely that capital dredging activities will cause the release of acid either during capital dredging or disposal as oxidation should not occur.

In order to obtain a Sea Dumping Permit, an assessment of sediment quality via a SAP will be required, separate to the approved SAP for maintenance material, to determine the quality of the capital dredge material.

6.2 Coastal Processes

The following potential impacts of the proposed capital dredging works on coastal processes have been determined from the information currently available.

6.2.1 *Currents and Flow*

A review of previous reports has indicated currents are mainly generated by tidal variation, but wave and wind can also generate surface and subsurface currents. The tidal current in the main channel in Trinity Inlet is about 0.8 to 1 m/s during spring tide (WBM, 1998, JCU 1999).

Increasing the shipping channel width and depth (cross-sectional area) will generally decrease the tidal currents in the channel. This effect would be felt in confined waterways, i.e. Trinity Inlet, however

currents will tend to concentrate within the channel. In Trinity Bay, there is a potential for slight reduction in current speed at the sea bed in the channel with increased water depth, however, the depth averaged currents are not likely to be altered.

Flow in and out of Trinity Inlet is considered very unlikely to be changed. The flow is dominated by daily tidal variation and not by fluvial flow. The tidal prism is a comparative order of magnitude larger than the fluvial flow. Dredging for the improved shipping channel at the outlet of Trinity Inlet will be unlikely to cause any further saline intrusion further upstream. Currents in and around the DMPA are unlikely to be altered.

6.2.2 *Sediment Transport*

The navigation channel does not interrupt the littoral drift. The net sediment transport would be able to bypass the channel. The sediment supply in Trinity Bay is from the littoral drift past Cape Grafton, from the discharge from Barron River and during cyclone events from the mid-shelf. Hence, the navigation channel will not impact on the sediment transport within Trinity Bay.

However, siltation within the shipping channel would likely be increased with a wider area available for deposition, requiring additional maintenance dredging. The source of the siltation material is from the surrounding area in the form of suspended sediment and bed load.

The DMPA might act as a sediment supply in the short term during placement of the dredged material. Disturbed sediments placed at the material ground from placement activities can be drifted by tidal currents and wind generated waves. However, the magnitude of the sediments that would be transported is very minimal compared to the natural sediment transport.

6.2.3 *Siltation of dredged channel*

The existing channel experiences siltation of varying magnitude along the channel. Approximately 320,000 m^3 of siltation material is removed through maintenance dredging every year. Current speed and sediment concentration influences siltation rates.

Increased siltation rates are experienced in sections of the outer channel offshore from the bend due to the variation in tidal currents in the channel as shown in Figure 6.1.

By increasing the channel dimensions, tidal velocities may decrease slightly in Trinity Inlet. This may result in a slight shift of siltation locations and a slight increase in siltation rate, but this needs to be verified with detailed modelling. If the siltation rate increases, less sediment will be transported into the bay. It is expected that this will have a limited effect on the overall sediment transport and availability of sediments in the bay because changes are expected to be minor. The overall sediment supply from Trinity Inlet is relatively minor compared to the other sediment sources in the bay.

Figure 6.1 - Typical tidal current distribution in the navigation channel

Due to the increase in the channel depth, the channel has to be extended further offshore. This is not expected to have an impact on siltation rates at the channel entrance because current speeds are generally low and greater water depth prevents sediments from settling quickly on the bed.

No changes are expected for the DMPA as the increased navigational channel will not impact on surrounding currents or sediment movement patterns. The sediment will continue spreading north to north-easterly, merging with the surrounding material.

Further Investigations

This assessment has identified a number of additional studies that are likely to be required for the preparation of an Environmental Impact Statement and ongoing maintenance environmental management. These include hydrodynamic modelling, sediment plume modelling, assessment of material drift rates at the DMPA and determination of siltation rates within the channel.

6.3 Protected Areas

Dredging may potentially have an impact on seagrass beds and water quality at the mouth of Trinity Inlet and also at the DMPA, both of which are within the WHA boundary. The DMPA is also within the GBRMP. Given the size of the WHA and GBRMP (and associated listings as National Heritage Place and Nationally Important Wetland), it is unlikely dredging activities would cause a significant effect that would impact on the overall value of the WHA or Marine Park. Any disturbance to seagrass beds or other values would be monitored by SEWPC however, and Ports North will need to demonstrate that no adverse impacts will occur as part of an *EPBC Act* referral, as per the *GBRMPA Dredging and Disposal Policy and EPBC Significance Guidelines*.

Dredging is more likely to have a significant impact on the Trinity Inlet Fish Habitat Area and the state-listed referrable wetland (parts of the study area are considered to be wetlands of High Ecological Significance under the *Queensland Coastal Plan 2011*), as the area is smaller and hence would be more vulnerable to disturbance as a higher percentage of the overall area would be impacted. It appears that the main channel will only impact a small area of the FHA where the channel bend is being widened. Some minor adjustments to the channel alignment have already been made to avoid and reduce this intrusion. Whilst works will have only a minor direct physical intrusion in the FHA, sediment plumes created by dredging would be expected to have some level of impact on the values of the FHA, even if only temporary. The level of impact would need to be confirmed by further investigations during the EIS.

Mitigation measures to reduce impacts on the values of protected areas largely relate to managing water quality (dredging related turbidity and sedimentation) and dredge operational activities and these will be explored further in the EIS.

6.4 Marine Ecology

6.4.1 *Seagrass beds*

The extent of seagrass beds within Trinity Inlet vary over time, depending on factors such as sedimentation levels, season and extreme weather events. The seagrass beds within the Inlet and Bay have undergone a significant reduction over recent times due to extreme weather events and further studies are required to determine their existing extent and condition.

Ultimately, seagrass distribution is determined by the minimum light requirements, suitable substrate and water quality conditions. The minimum light requirements for the Trinity Inlet beds would need to be determined in conjunction with turbidity plume modelling to determine sedimentation rates, turbidity conditions and hence the length of time seagrass beds could be affected. Based on an understanding of the existing tidal regime, it is most likely that plumes will dissipate to the north, away from seagrass beds, thereby reducing the level of impact.

The EIS will determine the potential impact on seagrass within Trinity Inlet and the specific mitigation measures for the project.

6.4.2 *Mangroves and Fish Habitat*

Although mangroves would not be directly impacted by dredging works, they may be subject to increased levels of turbidity, changes in sediment movement and deposition or changes to tidal flows. Hydrological modelling of changes to flows and sedimentation rates would be required to determine the magnitude of this impact and whether there is a risk to mangrove communities.

Initial investigations have predicted that changes in flows within Trinity Inlet are expected to be minor; therefore impacts on mangrove or mudflat communities are anticipated to be minimal.

6.4.3 *Direct Physical Impacts*

Entrainment

The trailer suction hopper dredging methodology uses a suction arm to vacuum up sediment. Turtles and other marine life can be taken. In order to reduce this impact, turtle exclusion devices and dredge management procedures can be applied to mitigate impacts to mega-fauna. This will greatly reduce the number of incidents, but some impact is still possible.

Smothering

Dredging causes disturbance of benthic communities both in the dredged area and where material is disposed, hence benthic surveys of these areas may be required for the EIS.

A benthic survey of the DMPA in 2009 identified benthic fauna communities that were common to the region. Surrounding areas were also surveyed and had similar characteristics. Hence the placement of material within the vicinity of the existing site (the preferred material disposal location) is unlikely to impact any significant benthic fauna or habitat (e.g. coral or seagrass or other marine plants). The dredged material has a similar consistency with the existing substrate at the preferred material disposal ground, which should assist with recolonisation.

Further investigations will be required to establish the ability of the existing benthic communities to re-establish and the impact associated with their disturbance.

Boat Strike

Turtles, Dugongs and Whales are surface-breathing mammals, and are therefore often injured by vessels when coming up for air, particularly in shallow feeding areas where they are unable to dive to escape. Further investigation of the frequency of boat strike on marine mammals found in the area may be required to gain a greater understanding of their vulnerability. It is unlikely the increase in vessel numbers visiting the Port would be of sufficient scale to have a significant impact on the existing number of vessel strikes.

Management procedures for minimising harm to marine mammals would be addressed in the Dredge Management Plan prepared in association with the EIS and, in the longer term, within the Port Operational Plan.

6.4.4 *Pest and diseases*

A small number of priority marine pests have been detected in the Cairns Port in the past, however Ports North and DAFF have undertaken regular monitoring and treatment programs. There is a risk that dredging activities could disperse marine pests to the DMPA, however the existing management measures in place and monitoring that would be applied would ensure the risk is low. There is also an equal probability that natural dispersal mechanisms of pest species could result in movement of pests to the DMPA. Operationally, additional vessel visits could increase the opportunity for marine pests and diseases to be introduced to the Cairns Port; however the risk will be considered in more detail in the EIS.

Further Investigations

Further survey work may be required to gain a greater understanding of key fauna populations within the study area, their habitat utilisation, threats and their tolerance to disturbance. This may include establishing the population parameters of cetaceans, dugongs, turtles and fish that utilise the area to be disturbed and their tolerance to disturbance from noise, turbidity and boat strikes in particular; surveys of migratory birds utilising the area to be disturbed and potential changes to any feeding, nesting or roosting sites and review of seasonality of key species/habitat tolerances.

The EIS will quantify the quality of the habitats that are directly impacted by the proposed works and identify if any offsets are required. It will also develop appropriate indicators for monitoring programs.

6.5 Water Quality

The expansion of the port under the Cairns Shipping Development project presents a number of possible impacts to water quality in Trinity Bay. Expansion activities which may impact on water quality are capital dredging, increased maintenance dredging, use of the offshore DMPA, increased shipping traffic and land-based fuel storage.

A more detailed assessment of potential water quality impacts will be required as part of the environmental impact assessment, taking into consideration findings of other studies inclusive of hydrodynamic modelling and determination of applicable management actions to address the range of water quality regulations that exist.

It is noted that impacts on water quality have carry-on effects on the health of marine ecosystems and the range of inhabiting species. The potential impacts of water quality on various aspects of ecosystem health are described in Section 5.6 of this report.

6.5.1 *Turbidity*

A localised increase in turbidity is anticipated during capital dredging works, particularly at areas close to the dredging equipment within the channel and at the DMPA. Dredging activities are likely to cause some short term effects on turbidity and sediment mobilisation.

Increases in suspended sediments and turbidity levels from dredging and disposal operations may under certain conditions have adverse effects on marine animals (particularly filter feeding organisms) and

plants (e.g. seagrass) by temporarily reducing light penetration into the water column and by physical disturbance.

The impacts of turbidity can be variable depending on the background levels; turbidity within Trinity Inlet is already considered naturally high, particularly during the wet season. To some extent the ecosystems of Trinity Bay are adapted to this regime and would be more able to tolerate a further disturbance depending on the extent and duration. In general, the effects of suspended sediments and turbidity are short term and of limited range (<1km) for existing maintenance dredging campaigns (BMT-WBM, 2011).

The impacts of the long term turbidity levels from dredging work may not be significant, however modelling of the likely duration, direction and extent of sediment plumes will be required to confirm the potential impact on ecological values and water quality within Trinity Inlet. Based on current tidal flows, it is considered most likely that sediment plumes will disperse in a northerly direction, away from key habitat areas on the southern side of Trinity Inlet.

At the DMPA, turbidity will increase above the background level during material placement. However, with the current flows, the suspended sediment will be dispersed and turbidity levels should reduce quickly over time. Modelling of the likely extent of any suspended sediment will be required to determine whether this causes any impact on marine or benthic fauna.

Measures to minimise the impact of turbidity can be applied including the following hierarchy:

- Establish specific water quality limits or objectives
- Conduct regular and continuous monitoring at sensitive locations
- Implement management or stop work procedures immediately if the established limits or objectives are found to be exceeded.

Appropriate management measures would be defined through future research and environmental impact assessment.

6.5.2 *Dredging and Dredge Material Placement*

The water quality impacts associated with historic dredging and material disposal at the Cairns Port have been extensively monitored and analysed. In general, the water quality impacts of capital and maintenance dredging have been reported as relatively minor and highly localised, with suspended sediment and turbidity concentrations returning to ambient levels within short distances from the activity and within relatively short time-frames. The high ambient turbidity in the bay, as previously discussed, and distance from the existing channel and material disposal site to sensitive receptors, has been reported to limit water quality impacts from dredging activities.

The impacts of dredging relative to the time of year it is undertaken will need to be assessed.

6.5.3 *Increased Shipping Traffic*

There is only a minor increase in shipping numbers associated with this project, however the increased volume of shipping traffic and introduction of larger sized vessels to the port, may adversely impact on water quality.

These potential impacts will need to be assessed in more detail as the Cairns Shipping Development project is progressed. The increase in ship movement is not anticipated to significantly increase risks to water quality from spills etc., above the existing risk level. This however would require further investigation and risk assessment under future environmental impact assessment processes.

Mitigation measures to ensure the water quality objectives and environmental values of Trinity Bay are protected may include measures such as:

- Provision of appropriate navigational controls;
- Provision and upkeep of spill kits at the Port;
- Update Emergency response plans in the event of a spills; and
- Provision of best practice waste disposal facilities (solid waste and sewage).

Port North's Environmental Management System already addresses these measures, but will be reviewed to consider any additional impact from more frequent vessels visiting the port.

6.5.4 *Land-based Infrastructure Development*

The proposed upgrades to land-based infrastructure include fuel and water supply. From the planning undertaken to date, it is considered that potential impacts on water quality associated with development activity may include:

- Accidental chemical spills / contamination associated with fuel supply and the management of sewage and solid waste from vessels;
- Contamination from site stormwater or wash-down water from any new land-based facilities required for the port expansion;
- Mobilisation of sediments, nutrients, toxicants, acid sulphate soils or other pollutants due to the upgrade of new maritime infrastructure such as wharves or jetties; and
- Change to water pH levels from concreting activities associated with wharf upgrading.

The Cairns Port has detailed procedures in place for the management of oil or contaminant spills; these would be expected to be reviewed to accommodate any new infrastructure or vessel movement. A Construction Environmental Management Plan would be implemented for works involving the upgrading of land-based infrastructure or wharf upgrades outlining measures to protect water quality. It is therefore anticipated that potential impacts to water quality during construction would be readily managed using standard management procedures.

Further Investigations

In preparation for an environmental impact assessment, further analysis / modelling of potential water quality impacts will need to be undertaken and include an assessment of dredging volumes, sediment characteristics and dredging techniques to understand the likely quality and extent of sediment, nutrient and toxicants mobilised in the water column; analysis of the sediment of the proposed material disposal site to determine its similarity to the dredge material and modelling and analysis of the dispersion of the sediment plume. Development and implementation of measures to mitigate and monitor water quality impacts from dredging activities including ongoing water quality monitoring at strategic sites, and

sampling and analysis of contaminant levels in dredged sediment prior to disposal will be refined based on the outcomes of the EIS.

6.6 Cultural Heritage

6.6.1 *Non indigenous cultural heritage*

Wharf and infrastructure upgrade works are proposed to Wharves 1 to 5 that are listed on the Queensland Heritage Register. The major upgrading works involve the installation of larger fenders, which can be designed to minimise the impact on heritage values of the wharf.

Vibration from piling works may affect the existing wharf structure, however vibration assessments and monitoring during construction will mitigate this risk.

The proposed works would be unlikely to pose a risk to the values of other nearby listed sites.

6.6.2 *Indigenous cultural heritage*

Previous studies have identified that indigenous cultural heritage values exist with the Study Area, although detailed archaeological surveys have not been undertaken. As part of the EIS process, a CHMP will be required which will involve consultation with relevant aboriginal parties. The Plan would outline an assessment of potential impacts, measures to protect these impacts and management during dredging.

6.7 Climate change and extreme weather events

The potential impact on the proposed development from climate change relate to rainfall and runoff, temperature, wind, sea level, cyclones / storm surges, greenhouse gas emissions and extreme events.

A range of adaptation measures, in relation to adaptation to the effects of climate change and extreme events, as well as the mitigation of impacts on climate change, will be explored during the development of detailed design proposals.

6.8 Air, Noise and Vibration

The proposed capital and maintenance dredging activities associated with widening of the Port of Cairns / Trinity Inlet channel may give rise to noise, vibration and air quality impacts on sensitive receptors and environmental values as follows:.

- Capital dredging works and disposal will generate minor noise and vibration due to vessel operation. Some minor exhaust emissions will also be produced by the dredging vessels.
- Works to upgrade port infrastructure will generate some noise and vibration (piling in particular).
- Additional larger ships arriving and leaving Trinity Inlet will generate more noise, vibration and air emissions, but these are not considered to be significant.

Commercial shipping is a major contributor to anthropogenic underwater noise, mainly from propeller noise, hydrodynamic hull flow, engines and other machinery. This has the potential to interfere with the behaviour of marine fauna, particularly mammals that communicate or navigate using sound.

The EIS will assess the noise and vibration generated by the project and the increased shipping and determine mitigation measures, if required.

6.9 Land Management

There are a number of land uses, predominantly located in the CBD and Cityport that are moderately noise and amenity sensitive. These land uses include tourism accommodation, restaurants and eateries. Dredging and wharf construction activities may temporarily affect the views across the harbour and generate additional noise, but these impacts are considered minor.

Dredging operation may also impact recreational boating activities in areas where works are in progress.

The increased shipping and activity in the inlet generated by the project, is in keeping with the intentions to develop the Cityport area into a hub for tourism and cultural activities. Increased activity is likely to enhance the viability and functioning of the area and its land uses.

6.10 Matters of National Environmental Significance

Referral of the project to SEWPC for determination as to whether the project constitutes a 'controlled action' under the EPBC Act will be required, as a number of Matters of National Environmental Significance (MNES) has been highlighted for consideration. Ports North will seek approval for the development relative to these MNES.

Review of the Existing Environment, Tenure and Planning instruments, and potential impacts of the proposed project was used to identify the MNES protected under the EPBC Act which are summarised in the following table:

Matter of NES	Number
World Heritage Properties	1
National Heritage Places	1
Wetlands of International Significance	None
Great Barrier Reef Marine Park	Relevant
Commonwealth Marine Areas	1
Threatened Ecological Communities	None
Threatened Species	31
Migratory Species	55
Commonwealth Lands	None
Commonwealth Heritage Places	1
Listed Marine Species	118
Whales and other cetaceans	12
Critical Habitats	None
Commonwealth Reserves	None

The above MNES are briefly discussed in the following section and the potential impacts on each of the relevant matters will be assessed as part of the EIS process.

6.10.1 *World Heritage Area*

The project area is located within the boundaries of the Great Barrier Reef World Heritage Area (GBRWHA). The World Heritage Values of the Great Barrier Reef are extensive as is the size of the area listed. The specific criteria for which the GBRWHA is listed and those that are inclusive of elements found throughout Trinity Bay include:

- coastal inter tidal areas;
- many species of crustaceans, invertebrates, fish, seabirds, mammals and reptiles;
- seagrass meadows and mangrove ecosystems; and
- habitats for species of conservation significance.

Further details about the marine environment specific to the project area are discussed in Section 5.6.

6.10.2 *National Heritage Places*

The Great Barrier Reef is the only National Heritage place potentially affected by the project. The natural and cultural heritage values associated with the world heritage criteria listed above, will also apply to the Great Barrier Reef as a National Heritage place.

6.10.3 *Great Barrier Reef Marine Park*

The existing DMPA and potentially a portion of the proposed channel expansion are located within the boundaries of the Great Barrier Reef Marine Park (GBRMP) (refer to Figure 5.3). This area is General Use Zone designation. Dredging and placement of material at the DMPA from the channel, and installation of navigation infrastructure, to the extent that these works are within the boundaries of the marine park, will require a permit under the GBRMP Act and is therefore relevant to the EPBC Act.

6.10.4 *Commonwealth Marine Area*

Approval may be required for a proposed activity that may impact the Territorial Sea or EEZ, which extends seaward from the three nautical mile territorial baseline. Portions of the proposed project may extend or indirectly affect such area and may require referral for consideration under the EPBC Act.

6.10.5 *Listed Threatened and Migratory Species*

Listed threatened and migratory species have been identified by the EPBC Protected Matters Search Tool as potentially occurring or having suitable habitat within the project area. The presence or absences of these species and potential effects of the project will be investigated during the EIS process.

No threatened ecological communities were identified from database searches and previous studies in the area as potentially occurring within the waters of the CSD study area.

Migratory species and 'Listed' marine species under the EPBC Act can potentially occur within or adjacent to the project area. As identified in Section 6.4, the key Migratory and Listed marine species that will be investigated as part of the EIS include; marine turtles, dugong, dolphins and other cetaceans, migratory waterbirds and estuarine crocodiles.

6.11 Overarching Environmental Management Measures

6.11.1 *Consideration of Existing Environment in Design*

Planning for the project has been guided by the principle of delivering necessary infrastructure while balancing protection of the environment. Based on current and previous investigations, the ecological and other environmental values of Trinity Bay have been thoroughly considered in the context of the wharf infrastructure, channel and DMPA design and set out. This includes the consideration of options and scenarios to ensure potential impacts can be accurately predicted and where possible, modifications to the design to avoid or minimise impacts.

Some of the specific measures that have been considered and incorporated into the design and construction methodology to protect ecological and other environmental values include the following:

- maintaining the main channel in the existing location and not a green field development;
- continued use of the existing DMPA. The suitability of its location has been extensively assessed. Ongoing research and monitoring of the possible impacts of use of the DMPA have continued to confirm the location is appropriate for placement of dredged material in the Trinity Bay area and recovers quickly;
- selection of channel design and alignment to reduce dredging quantities and intrusion / impact on existing areas of high ecological value.

In accordance with the principles of adaptive management, these design measures will be further investigated and refined as part of the EIS process.

6.11.2 *Environmental Management Plans and Monitoring Programs*

A site-specific Construction EMP will be required for the capital development stage of the project and this will aim to provide:

- commitments to practical and achievable strategies for the management of the project to ensure that environmental requirements are specified and complied with;
- local, state and federal government authorities, stakeholders and the proponent with a common focus for approval and compliance conditions; and
- the community with evidence that the environmental management of the project is acceptable.

An integrated comprehensive environmental monitoring program for stages of the project will be required, commencing with baseline studies, those arising from the EIS Terms of Reference, impact monitoring during the construction phase, and potential post construction verification monitoring. The scope of the program will be informed by the EIS and include the typical environmental aspects of water, flora, fauna, air, noise and any such aspects identified during project assessment. Outcomes of these program elements will be critical to the ongoing stakeholder and regulatory agency engagement for the project.

Management of operational impacts associated with the project which become the responsibility of Ports North will be integrated into the existing Environmental Management System.

Port users and operators that utilise the final project deliverables will be required to develop and implement applicable environmental management for their operations to meet regulatory approval conditions from regulatory agencies, and lease conditions applied by Ports North, applicable to the scale of their operations at the completed project site.

6.11.3 *Dredge Management Plan*

A Dredge Management Plan will be prepared for the project, the objectives of which are to:

- Provide evidence of practical and achievable plans for the management of the project such that environmental requirements are complied with, by producing an integrated planning framework which provides for monitoring and control of the dredging impacts;
- Provide Ports North and the regulatory authorities with a framework to confirm compliance with environmental policies and requirements; and
- Provide the community with evidence of the management of the project in an environmentally acceptable manner.

Management procedures for minimising harm to marine mammals would be addressed in the Dredge Management Plan and long term in the management of port operations.

Assessment of impacts associated with dredging and material disposal will need to be undertaken in accordance with the NAGD (DEWHA, 2009).

6.11.4 *Residual Impacts and Environmental Offsets*

Following the environmental management hierarchy, where impacts cannot be 'designed out', best practice management and mitigation strategies will be applied to minimise such environmental impacts. Where such strategies are unable to account for the residual impacts, any such residual environmental impact identified in the EIS (for example, impacts that are a necessary and unavoidable impact of the construction or operation of the infrastructure), consideration will be given to appropriate offsets in accordance with the Australian Government's *Draft Policy on the use of environmental offsets under the EPBC Act* for impacts to MNES, and or the Queensland Government's, *Environmental Offsets Policy* (Queensland Government, 2008) where applicable.

7 Approvals Required for the Project

The marine and land-based works required to facilitate the expansion of shipping operations in the Port of Cairns will trigger the requirement for various approvals under Commonwealth and Queensland legislation. Key to achieving such approvals will be the need for significant technical assessment of the proposal in relation to its potential impacts upon the environment and identification of relevant appropriate means to mitigate the effects of such impacts. Applicable legislations relating to the required approvals include:

Commonwealth

- *Environmental Protection and Biodiversity Conservation Act 1999*
- *Great Barrier Reef Marine Park Act 1971*
- *Environmental Protection (Sea Dumping) Act 1981*

Queensland

- *State Development and Public Works Organisation Act 1971*
- *Environmental Protection Act 1994*
- *Coastal Protection and Management Act 1995*
- *Fisheries Act 1994*
- *Marine Parks Act 2004*
- *Sustainable Planning Act 2009*
- *Transport Infrastructure Act 1994*
- *Heritage Act 1992*
- *Aboriginal Cultural Heritage Act 2003*
- *Building Act 1975*

7.1 Environmental Impact Assessment

From the review of available information and through initial consultation with agencies including GBRMPA, DAFF and DEHP, the proposed works have the potential to impact on several matters of National Environmental Significance (NES). Therefore, the project will require determination as to what 'controlled actions' will require assessment and approval under the *EPBC Act*.

Further, the probable need to expand the existing DMPA (or establish a new DMPA) for maintenance dredging material placement within the GBRMP will trigger the requirement for a new Marine Park Permit and Sea Dumping Permit, and variation to the existing permit for the increased maintenance component. This will necessitate the consideration of the potential environmental impacts and relevant mitigation measures by the GBRMPA.

The initial consideration of the project against the criteria specified in Part 4 of the SDPWO Act identifies that it is highly likely to be determined as a 'significant project' requiring an EIS in accordance with Section 26 of the SDPWO Act.

Under the *Aboriginal Cultural Heritage Act 2003*, a Cultural Heritage Management Plan is required for a project should any of the following be required; an EIS under another Act, or an environmental authority

under the EP Act; or when a development application is made under the SP Act and DEHP is a concurrence agency.

The EIS will determine if a CHMP with relevant Aboriginal Parties under the ACH Act will be required for the project.

7.2 Capital Dredging and Dredge Material Placement

Capital dredging required for widening and deepening the outer and inner channel and swing basins will likely require the following approvals under Commonwealth and State legislation.

Activity	Legislation	Approval	Approving Authority
Dredging works	*Environmental Protection Act 1994*	Development Permit for Material Change of Use for an Environmentally Relevant Activity ERA16 Extractive and Screening Activities (Dredging) and Registration Certificate	DEHP
Removal of quarry materials from tidal waters	*Coastal Protection and Management Act 1995*	Allocation of Quarry Material or Dredge Management Plan (if other than marine disposal of dredge material is proposed)	Ports North and DEHP
Dredging works in tidal waters		Development Permit for Operational Works (that are tidal works for capital dredging)	DEHP
Works within the Trinity Inlet Fish Habitat Area	*Fisheries Act 1994*	Development Permit for Operational Works (that are completely or partly within a declared fish habitat area)	Ports North and DAFF
Destruction of marine plants found within the dredge footprint area or at or adjacent to the material ground		Development Permit for Operational Works (that that is the removal, destruction or damage of a marine plant) – if marine plants are found in the dredge footprint or at or adjacent to the proposed dredge material ground	Ports North and DAFF
Dredging to widen the access channel within the General Use Zone of the Great Barrier Reef Coast Marine Park (State Marine Park)	*Marine Parks Act 2004*	Marine Park Permit	DEHP

The type of statutory approvals required for the relocation of material from the capital dredging for widening and deepening the outer and inner channel and swing basins will vary depending on whether a land or a marine-based disposal option is determined as the most appropriate. Based on the preferred option for a marine-based DMPA, the likely approvals are provided below.

Activity	Legislation	Approval	Approving Authority
Disposal of dredge material from capital dredging within the GBRMP	*Great Barrier Reef Marine Park Act 1971*	Marine Park Permit (integrated with Sea Dumping Permit)	GBRMPA
Dredging and dumping of dredge material at sea within the GBRMP	*Environmental Protection (Sea Dumping) Act 1981*	Sea Dumping Permit (integrated with Marine Park Permit)	GBRMPA
Disposal of dredge material in tidal water (as defined under the *Coastal Protection and Management Act 1995*) where it is within the Port of Cairns and Trinity Inlet area included within the coastal management district.	*Coastal Protection and Management Act 1995*	Development Permit for Operational Works (that that is within a coastal management district)	Ports North and DEHP

7.3 Wharf Upgrades and New Moorings

It is envisaged that wharf upgrades will include the following:

- piling works;
- local strong point strengthening for the wharf structure; and
- installation of fenders and bollards.

The installation of additional piles within the existing wharf footprint area and the installation of fenders and bollards will be "tidal works" as defined in the Coastal Act and which are defined as assessable development in accordance with Schedule 3 of the SP Reg. Given that the tidal works are completely located in Ports North's strategic port land tidal area, Ports North will be the assessment manager for the tidal works in accordance with Schedule 6 of the SP Reg. DEHP and MSQ will be referral agencies for the tidal works application, which will be assessed through the IDAS.

As identified in this report, the Cairns Wharf Complex is listed on Queensland Heritage Register (QHR 601790) and therefore approval for development within a heritage-listed place under the Heritage Act will also be required for the proposed wharf upgrades in accordance with Schedule 3 of the SP Reg. This will likely be integrated with the application for tidal works and therefore Ports North will be the assessment manager and DEHP will be a concurrence agency under the IDAS in regard to the purposes of the *Heritage Act 1992* (Heritage Act).

Further, on the basis that the site is listed on Environmental Management Register / Contaminated Land Register (EMR/CLR), any removal and disposal of contaminated soils associated with the wharf upgrades will require approval under the EP Act. As with the heritage requirements, if contaminated soils are to be disturbed as part of the wharf upgrades, this will likely be integrated with the other aspects of development for which application is being made and therefore Ports North will be the assessment manager and DEHP will be a concurrence agency under the IDAS in regard to the purposes of the EP Act.

In the event that Ports North determines that new major mooring points need to be installed on the landward side of the wharves for additional tying-up for larger cruise ships, development of such facilities will trigger the need for approvals under the Heritage Act and the *Building Act 1975* (Building Act).

7.4 Support Infrastructure Upgrades

Potentially, approvals that may be triggered for these infrastructure upgrades subject to the determination of detailed design and siting arrangements include:

- Development Permit for Material Change of Use for an Environmentally Relevant Activity (ERA 8 – Chemical Storage) under the EP Act for the proposed 3,000 ton Heavy Fuel Oil storage tank;
- Development Permit for Building Work declared as assessable under Chapter 2 of the *Building Act 1975*; and
- Compliance Certificate for Regulated Plumbing Works under the *Plumbing and Drainage Act 2002*.

7.5 Trinity Inlet Fish Habitat Area

The proposed widening of the approach channel may encroach into the declared Trinity Inlet FHA and existing policies developed under the *Fisheries Act 1994* do not support dredging within a declared FHA. These matters will require further assessment and discussion with DAFF during the EIS phase.

8 Costs and Benefits Summary

8.1 Economic Impact

The proposed Cairns Shipping Development project will see mega cruise ship numbers grow by 61 annual visits by 2025, with continued growth beyond that time. The additional value added in the economy, generated over the 25-year project period 2016 to 2041, is estimated at $436m.

This project delivers significant economic benefits to both Cairns and the State of Queensland. The expansion of cruise ship facilities in Cairns is seen as an important step in developing increased tourism opportunities in North Queensland and to support and grow cruise ship operations in Queensland. Improving infrastructure to facilitate this will result in considerable benefits to the local economy and the Queensland cruise industry. Having an additional alongside berth for mega cruise ships based in the north of the state will provide opportunities for increased cruise itineraries throughout the whole of the state. Dredging a broader and deeper channel to allow port access for larger cruise ships will lead to the general expansion of North Queensland's cruise industry and also bring some stability and diversity to the Cairns tourism market sector.

The fact that about a quarter of cruise ships currently visiting the area are not able to come into Cairns seaport and that this was because of their size, means that significant expenditure is being lost. Looking forward, the sector is currently growing strongly and is expected to grow strongly into the future, with most of the growth being in ship sizes not currently able to enter Cairns seaport. Major economic benefits will accrue from deepening the channel and having available fuel types suitable for large cruise ships, with the additional value added to the economy estimated at $46m pa by 2026 and $116m pa by 2041.

The estimated additional direct and flow-on jobs resulting from the increased cruise ship visits is 370 pa in 2026 and 540 pa in 2041.

8.2 Economic Efficiency (Benefit Cost Analysis)

The major justification for the project stems from Economic Efficiency gains in terms of direct benefits.

The current situation where the larger cruise ships need to stand off the coast and ferry passengers into Yorkey's Knob and then bus most of them into the city is very inefficient; in extra costs of shore transfers and bus transfers, but also in time cost. In these circumstances also, generally crew are unable to come ashore for leave and passengers are discouraged from coming ashore, especially if weather conditions are not good.

The above cost efficiency benefits are offset, in part, by higher port charges. Operating costs of coming into Trinity Wharf however, are more than outweighed by the extra crew and operating costs of remaining at sea and benefits of being able to carry out maintenance activities while wharf side.

The indications are that the net additional costs to passengers and the ship of landing via Yorkey's Knob is about $55 per passenger on board the ship in 2016 dollars.

With the projected growth in larger cruise ship visits, it is projected that over the 25-year project period, 2016 to 2041, the direct benefits to the cruise ship trade of deepening the channel, wharf improvement, and installing facilities for fuel types used by larger ships would have an NPV of $141m in 2011 prices.

8.3 Non Cruise Ships

Calculated NPV (2011 prices) of savings to existing larger fuel, fertiliser and sugar ships being able to enter the port without tidal restrictions are estimated to be of the order of $9m.

9 Community and Stakeholder Consultation

This project is strongly supported by the business community. It is identified both in the Tropical North Queensland regional economic plan prepared by Advance Cairns and the Regional Road Map prepared by the Regional Development Australia (RDA).

In developing the project demand study and overall cruise ship development strategy there was extensive consultation with cruise ship companies, agents, inbound tour operators, port users, service providers, government tourism agencies and other tourism stakeholders. This stakeholder consultation was used to assist key stakeholders in their understanding of the project and identify a range of information about existing and future cruise vessels that may use the port and the opportunities and constraints in doing so.

To inform this IAS, interviews with key environmental approval stakeholders have been undertaken via informal telephone meetings with the purpose of obtaining preliminary feedback regarding likely legislative requirements and potential environmental issues or concerns. The following government departments have been consulted as part of this process:

- Great Barrier Reef Marine Park Authority (GBRMPA);
- Department of Agriculture Fisheries and Forestry (DAFF) (Fisheries Queensland Division); and
- Department of Environment and Heritage Protection (DEHP) – Coastal Division, Cairns.

In general, all stakeholders expressed that the project is of significance and that detailed environmental investigations are required prior to approval for works being granted.

During the EIS process, a comprehensive public and stakeholder consultation process will be implemented that will provide opportunities for involvement and education through best practice community engagement mechanisms.

Ports North has an existing Technical Advisory Consultative Committee (TACC) established to support implementation of the existing Sea Dumping Permit and LTMP. This includes representatives as set out in the NAGD, and will be one of the established forums through which Ports North will communicate to stakeholders on the project, and outcomes of the EIS phase investigations.

10 References and data sources

Arup Cairns Cruise Shipping Development Strategy – Business Case

Arup Cairns Cruise Shipping Development Strategy - Preliminary Environmental Assessment Scoping Study Report

- ANZECC & ARMCANZ, 2000. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*
- Arup, 2011. *Land-based Infrastructure Report*. Prepared for Ports North.
- Australian Government, 2010. *Dredging and Material Disposal Policy*. Prepared by the GBRMPA on behalf of the Australian Government.
- Bartol S M (2008) 'A review of auditory function of sea turtles', *Bioacoustics* Vol 17(1-3) PP57-59
- Cairns Regional Council, 2011. Heritage City Walk, http://www.cairns.qld.gov.au/region/heritage/cairns-heritage. Accessed September, 2011.
- Campbell, S.J., Rasheed, M.A. and Thomas, R. (2001). Seagrass Habitat of Cairns Harbour and Trinity Inlet: December 2001.
- Carter R.M., Larcombe, P., Liu, K., Dickens, J., Heron, M.L., Prytz, A., Purdon, R., and Ridd, P.V., 2002. *The Environmental Sedimentology of Trinity Bay, Far North Queensland.*
- Commonwealth of Australia, 2002. *National Ocean Disposal Guidelines for Dredged Material.* Canberra.
- Commonwealth of Australia, 2009. *National Assessment Guidelines for Dredging,* Canberra.
- Connell Wagner, 1990. *Cairns Harbour Channel Material Disposal Study.*
- David, B., 1994. *The Trinity Inlet Ethnographic Study: Planning the Management of Traditional Yirrganydji, Yidinji and Gunnggandji Country*
- Department of Environment, and Resources Management, 2010. *Environmental Protection (water) Policy 2009*. The Trinity Inlet Environmental Values and Water Quality Objectives – Basin No. 111.
- Dixon, M & Beumer, J. 2002. *Mitigation and Compensation for Works or Activities Causing Marine Fish Habitat Loss*. Prepared on behalf of Queensland Fisheries Service.
- Department of Primary Industries, 1998. *Dredging, Extraction and Material Disposal Activities Operational Policy FHMOP 004.*
- Engineers Australia, 2004. *Guidelines for Responding to the Effects of Climate Change in Coastal and Ocean Engineering.*
- Environment North, 2005. *Cairns Harbour Dredging Long Term Dredge Material Disposal Management Plan*.
- Fairweather, C, McKenna, S and Rasheed, M (2011). *Long Term seagrass monitoring in Cairns Harbour and Trinity Inlet.*

- GHD, 2000. *HMAS Cairns Dredge Material Disposal Options*. Report prepared by Gutteridge Haskins and Davey for the Department of Defence, June 2000.
- GRMPA, 2010. *Water Quality Guidelines for the Great Barrier Reef Marine Park.*
- IPCC, 2007. *Fourth Assessment Report: Climate Change 2007* (AR4).
- JCU-CPA, 1997. *The Environmental Sedimentology of trinity Bay, Far North Queensland.* CPA-JCU Collaborative Project, 2002
- JCU-CPA, 1997. *Environmental Sedimentology of Trinity Bay Research Project Report II. A summary Report of Existing Sedimentological, Geochemical and Oceanographic Data of Trinity Bay, Far North Queensland.* James Cook University of North Queensland and Cairns Port Authority, 1997
- JCU-CPA Environmental Sedimentology of Trinity Bay Research Project Report IV. Computer modelling of the Trinity Bay depositional system. James Cook University, 1998
- James Cook University, 1999 *Measurement of surface currents in trinity Bay and Trinity Inlet 12 June 1999 – 19 June1999 Data Report*.
- Ketten D R and Bartol S M (2005) *Functional Measures of Sea Turtle Hearing –Final Report* Woods Hole Oceanographic Institution
- Ketten DR (2008) 'Underwater ears and the physiology of impacts: Comparative Liability for Hearing Loss' in *Sea Turtles, Birds and Mammals Bioacoustics* Vol 17(103) PP315-318
- Maritime Safety Queensland, 2011. *Tide Tables 2011*.
- Moein S E, Musick JA, Keinath J A, Barnard D E, Lenhardt M L, and George R (2003) 'Evaluation of seismic sources for repelling sea turtles from hopper dredges', in *Sea Turtle Research Program: Summary Report* (Ed by L Z Hales) pp.90-93 Technical Report CERC95
- Neil, K.M., Stafford, H., Rose, C and Thomas, 2003. *Flora and Fauna Survey: Cairns Port Authority Ocean Disposal Site*. Report prepared for Cairns Port Authority by CRC Reef Research Centre and Queensland Department of Primary Industries, Cairns, Australia.
- Queensland Government (Office of Climate Change), 2009. *Guidelines for Preparing a Climate Change Impact Statement.*
- Queensland Government, 2010. *Queensland Offsets Policy 2010*.
- Queensland Government, 2010. *Temporary State Planning Policy: protecting wetlands in High Ecological significance in Great Barrier Reef catchments*.
- Stadler J H and Woodbury D P (2009) *Assessing the effects to fishes from pile driving: Application of new hydroacoustic criteria* National marine Fisheries Service USA, Proceedings Internoise August 2009 Ottawa, Canada.
- State of Queensland (Department of Infrastructure and Planning), 2009. *Far North Queensland Regional Plan 2009-2031*.
- State of Queensland, 2011. *Queensland Coastal Plan*. Prepared by the Department of Environment and Resource Management

- State of Queensland, 2003. *Wet Tropical Coast Regional Coastal Management Plan*. Prepared by the Environmental Protection Agency.
- WBM, 1998. *Cityport Impact Assessment Study Water Quality, Hydrodynamics, Sedimentation and Coastal Process Issues.*
- WBM, 2007. *Cairns Marlin Marina Design Current Investigation.*
- BMT WBM, 2011. *Cairns Cruise Ship Demand Study: Preliminary Findings Report*. Prepared for Ports North.
- Include use of Plume Verification Report
- GHD marine pest surveys
- 5 years of SAP documents
- WorleyParsons, 2009.*Cairns Port Ocean Disposal Site: Benthic Macro-Invertebrate Infauna and Introduced Marine Pest Monitoring Survey 2009*. Report prepared for Far North Queensland Ports Corporation by WorleyParsons Services Pty Ltd. August 2009.
- Worley Parsons, 2010. *Cairns Port Long Term Management Plan 2010-2020*

Cummings Economics – Cruise Shipping Development Economic Analysis

- Cairns Cruise Shipping Development Strategy – Demand Study Final Report – BMTWBM, December 2011.
- Access Economics (2009), The Australian Cruise Sector, Report for Carnival Australia.
- AEC Group (2010), Economic Impact Assessment of the Cruise Shipping Industry Australia, 2009 – 2010, Final Report prepared by Cruise Down Under.
- DAFF (2010), Queensland Mega and Adventure / Expedition Cruise Ship Market Demand Study 2012, Report by Doyle Tourism Services (with the AEC Group) for the Queensland Department of Employment, Economic Development and Innovation (DAFF).

Arup Cairns Cruise Shipping Development Strategy - Land Based Infrastructure (Ship Services)

Arup Cairns Cruise Shipping Development Strategy – Shipping Channel Design

11 Glossary, acronyms and abbreviations

Terms and abbreviations used in this document:

ACH Act	Queensland *Aboriginal Cultural Heritage Act 2003*
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
ASS	Acid Sulphate Soils
Building Act	Queensland *Building Act 1975*
CBD	City Business District
CPA	Cairns Port Authority (now Ports North)
CG	Coordinator-General of Queensland
CHMP	Cultural Heritage Management Plan
Coastal Act	Queensland *Coastal Protection and Management Act 1995*
CSD project	Cairns Shipping Development project
DAFF	Queensland Department of Agriculture Fisheries and Forestry
DECC	Department of Environment and Climate Change
DEHP	Queensland Department of Environment and Heritage Protection
DMPA	Dredge Material Placement Area
DPI	Department of Primary Industries (now DAFF)
EEZ	Exclusive Economic Zone
EIS	Environmental Impact Study
EMP	Environmental Management Plan
EMR	Environmental Management Register
EMS	Environmental Management System
EP Act	Queensland *Environmental Protection Act 1994*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ERA	Environmentally Relevant Activity
Fisheries Act	Queensland *Fisheries Act 1994*
FHA	Fish Habitat Area (declared under Part 6 of the Fisheries Act)
FHMOP	Fish Habitat Management Operational Policy
FNQRP	Far North Queensland Regional Plan
GBRMPA	Great Barrier Reef Marine Park Authority
GBRMP Act	Commonwealth *Great Barrier Reef Marine Park Act 1975*
Heritage Act	Queensland *Heritage Act 1992*
HES	High Ecological Significance
HFO	Heavy Fuel Oil
IAS	Initial Advice Statement

IDAS	Integrated Development Assessment System
ILUA	Indigenous Land Use Agreement
IPCC	Intergovernmental Panel on Climate Change
JCU	James Cook University
LAP	Seaport Local Area Plan
LAT	Lowest Astronomical Tide
LHD	Amphibious Assault Ship
LTMP	Long Term Management Plan
LTMPDDSM	Long Term Management Plan - Dredging & Dredge Spoil Management
LUP	Land Use Plan
m3	cubic metres (dredge quantities are insitu)
MNES	Matter of National Environmental Significance
MSQ	Maritime Safety Queensland
NAGD	National Assessment Guidelines for Dredging 2009
NC Act	Queensland *Nature Conservation Act 1992*
NEPM	National Environment Protection Measure for Ambient Air Quality 2003
NPV	Net Present Value
NT Act	Commonwealth *Native Title Act 1993*
NES	National Environmental Significance
pa	Per annum
QHR	Queensland Heritage Register
SAP	Sediment Analysis Plan
SDPWO Act	Queensland *State Development and Public Works Organisation Act 1971*
SEWPC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities
SP Act	Queensland *Sustainable Planning Act 2009*
SPL	Strategic Port Land
SP Reg	Queensland *Sustainable Planning Regulation 2009*
TACC	Technical Advisory Consultative Committee
TI Act	Queensland *Transport Infrastructure Act 1994*
TOR	Terms of Reference
TSHD	Trailing Suction Hopper Dredge
TSS	Total Suspended Solids
WMA	Wetland Management Area
VM Act	Queensland *Vegetation Management Act 1999*
WHA	World Heritage Area