

# CAIRNS SHIPPING DEVELOPMENT PROJECT

## Revised Draft Environmental Impact Statement

### Chapter B1: Land





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## B1.1 Introduction

### B1.1.1 Scope

This chapter describes 'land' issues associated with the CSD Project. These comprise both physical and planning-related issues, namely:

- **soils**, comprising terrestrial topography, geology, soils, acid sulphate soils (ASS) and terrestrial land contamination
- **land use**, comprising tenure, planning status, and land use at and surrounding the areas under consideration.

There are some related matters that are discussed in other chapters as follows:

- land subject to conservation or heritage legislative protection – **Chapter B2** (Nature Conservation Areas)
- surface water and groundwater – **Chapter B6** (Water Resources)
- amenity issues involving noise and visual amenity – **Chapter B10** (Noise and Vibration), **Chapter B12** (Landscape and Scenic)
- land use issues related to cultural heritage and Native Title – **Chapter B13** (Cultural Heritage)
- flooding and cumulative and consequential impacts – **Chapter B17** (Hazard and Risk), **Chapter B18** (Cumulative Impacts Assessment).

While references are made to these issues where appropriate, readers are referred to the detailed chapters for the assessment of impact and recommended mitigation.

### B1.1.2 Study Area and Project Areas

As noted in **Chapter A1** (Introduction), the 'study area' for the EIS varies depending on the issue at hand while various 'project areas' are the immediate footprints of the proposed works. For the consideration of land issues, the 'local scale' is considered to be appropriate. Elements of the local scale relevant to this chapter are the Cairns coastal plain generally between the Wet Tropics World Heritage Area and the coast between Trinity Inlet and Cairns' Northern Beaches. This area is characterised by (from south to north):

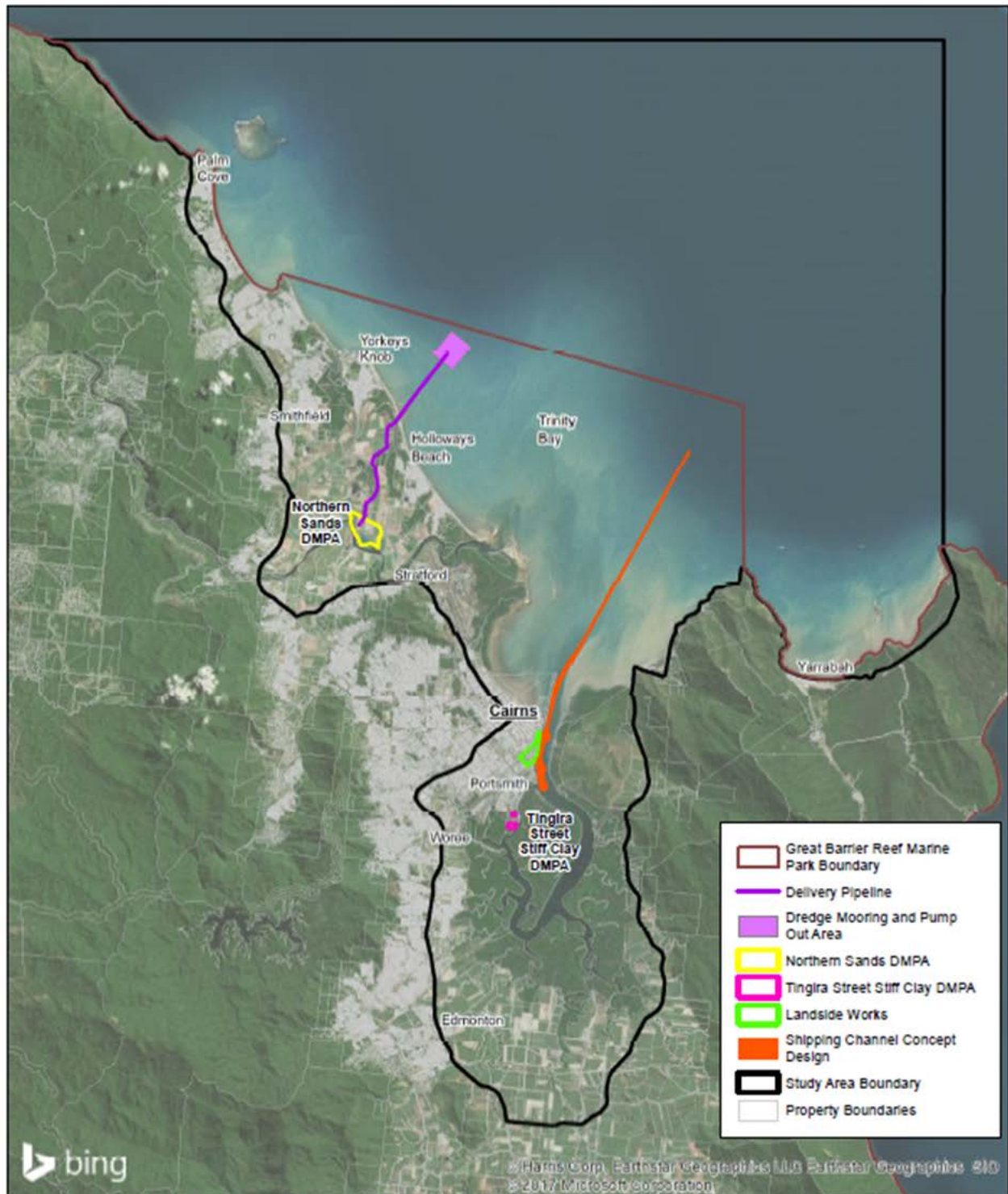
- the Trinity Inlet wetlands
- the Cairns CBD (fronting the Cairns foreshore between Trinity Inlet and the Barron River and spreading south-west, west, and north-west) to the coastal ranges
- the Port of Cairns and the allied industrial area east of the CBD and fronting Trinity Inlet
- the Barron River flood plain with its mosaic of agricultural, industrial, and residential developments of the southern Northern Beaches (Machans Beach to Yorkeys Knob)
- the township of Smithfield and the balance of the Northern Beaches.

Project areas are also shown on **Figure B1-1** and on more detailed figures throughout this chapter where relevant) and encompass, depending on the issue under consideration:

- Channel Project Area including the shipping channel and the route to the pump out point at the seaward end of the pipeline to the Northern Sands DMPA.
- Landside Works Project Area for wharf upgrades and berthing of cruise ships.
- Northern Sands DMPA Project Area (includes the soft clay DMPA, delivery pipeline corridor, tailwater ponds, and tailwater outlet works).
- Tingira Street Stiff Clay DMPA Project Area.

This chapter on Land discusses the last three project areas.





**Cairns Shipping  
Development Project  
Revised Draft EIS**

**Project Location Plan**

Ref: 3527-02-02b  
Date: 30/05/2017  
Projection: MGA94 Zone 55  
Scale at A4 Size 1:200,000



0 2 4 8 Kms



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**Figure B1-1** Study Area and Project Areas.



This chapter focuses on potential impacts on land (predominantly soils) and land use issues at the local scale which is essentially the two project areas described above and their immediate surrounds. Further discussion of impacts at regional and whole of Great Barrier Reef (GBR) scale is provided in **Chapter B18** (Cumulative Impacts Assessment) where relevant.

### **B1.1.3 Overview of the CSD Project**

The following is a brief discussion of the CSD Project as it relates to land and land use. A more detailed description is provided in **Chapter A3** (Project Description). Management is proposed via two plans documented elsewhere in this Revised Draft EIS and referred to with respect to mitigation below:

- **Chapter C1** (Construction Environmental Management Plan). This covers the works necessary to prepare the DMPAs for receiving the soft clays (Northern Sands DMPA) and stiff clays (Tingira Street DMPA) and then remove all temporary works and make good.
- **Chapter C2** (Dredge Management Plan). This covers the actual placement activities and will be integrated with dredging operations.

#### **B1.1.3.a Northern Sands Project Area**

The Northern Sands DMPA contains an operating sand mine and a 25 ha water-filled void (known locally as Lake Narelle) that is to be enlarged and used for the placement of soft clays pumped to the site. The current void contains fresh water from groundwater seepage and rainfall.

Site preparation at the DMPA will involve bunding and enlargement of the existing void to the north as part of future 'business as usual' quarry expansion plans, forming a total bunded placement area of 29.6 ha. The DMPA operations will be separated from ongoing sand extraction and construction and demolition waste disposal by a lined rock wall.

Erosion and sedimentation control works in accordance with FNQROC requirements will be installed as soon as possible in the site preparation process. All establishment and demobilisation works will be as described in **Chapter C1** (Construction Environmental Management Plan).

Dredged material will be delivered into the lake as a slurry through the dredged material delivery pipeline in pulses as the TSHD completes approximately six circuits per 24 hours over the dredging program. As the prepared void fills with the dredge material slurry, solids will settle and commence consolidation on the floor of the void leaving turbid supernatant waters (tailwater). These will gradually clarify to meet the adopted water quality discharge standards, prior to discharge via a discharge pipeline to the Barron River.

A contingency tailwater tertiary pond is included in the project concept in case it is required in order to meet water quality standards for tailwater. The water level in the tailwater treatment ponds will be only slightly above typical lake levels, and will only be elevated for a short period of time. The potential for impact on groundwater is thus significantly less than for the DMPA.

When the lake level is raised during the period of dredged material placement along with large volumes of seawater, a hydraulic gradient away from the lake will be created, and saline water will flow away from the lake, primarily through the upper sand layer as a result of the higher permeability of these sediments. Flow will diminish over time as a result of the low permeability of dredged material which will fill the base of the lake and 'seal' the upper sand unit.

Placement and tailwater management operations are as described in **Chapter C2** (Dredge Management Plan).

#### **B1.1.3.b Tingira Street Project Area**

Site preparation at the DMPA will be minor and will involve clearing and grubbing to remove the existing grass and regrowth vegetation and then the formation of bunds (estimated to be < 0.5 m high) around the perimeter of the placement areas using insitu clay materials. Erosion and sedimentation control works in accordance with FNQROC requirements will be installed as soon as possible in the site preparation process. All establishment and demobilisation works will be as described in **Chapter C1** (Construction Environmental Management Plan).

The results of available laboratory testing on samples of the stiff clays proposed for dredging indicate that the clays are typically of high plasticity with <10% sand content. The stiff clays are not ASS. Dredging of these clays is likely to generate 'chunks' of material and relatively small amounts of seawater. Even with relatively small amounts of seawater these materials are likely to be 'sticky' and potentially difficult to handle until drying occurs.

The dredged material will be progressively placed within the bunded area using heavy haulage vehicles and other plant. The average thickness is expected to be 2.0 m if the material is evenly spread and this is proposed to be achieved by using thin layers of about 0.3 m maximum thickness. Each layer is to be compacted prior to placing subsequent layers. This is a simple procedure that is expected to involve minimal interference with surface water and groundwater. Accordingly, the assessment of impacts on water resources has been undertaken at a high level.

Run-off of the minor volume of expected entrained seawater will be managed during the unloading, transporting, and placement operations as described in **Chapter C2** (Dredge Management Plan).

#### **B1.1.4 End Use of DMPAs**

End uses of the DMPAs are described below because an appreciation of these is critical to the assessment of impacts.

##### **B1.1.4.a Northern Sands DMPA**

The soft clay placement campaign will fill all or most of the void over a period of some three months. Once this filling is complete, the DMPA will revert to the control of the owner who will then determine subsequent uses. No assumptions can be made about this use, although current approvals imply that at some time the void is to be completely filled.

##### **B1.1.4.b Delivery Pipeline**

Soft clay will be delivered to the DMPA via the dredge material delivery pipeline which commences at the offshore pump out facility located approximately 2.8 km offshore from Yorkeys Knob. The marine section of the pipeline will be submerged, while the landward section will be constructed above ground and suspended on low (<0.5 m) earthen plinths. Up to three terrestrial booster stations may be necessary because of the pipeline length. Booster stations will be placed in cleared grassland areas or cane headlands in consultation with landowners, to minimise interference with farming operations.

After the completion of the soft clay placement campaign, the inlet pipeline (landward and marine sections) and booster stations will be disassembled and removed. The disturbed area will be restored and the small amount of natural vegetation cleared for its construction will be rehabilitated using appropriate native species. A specific Restoration Plan will be prepared and implemented for this purpose prior to commence as defined during the approvals phase of project delivery.

##### **B1.1.4.c Tailwater Discharge Pipeline(s)**

Similarly, the tailwater discharge pipelines will be disassembled and removed and the disturbed area restored and rehabilitated as described in **Chapter C1** (Construction Environmental Management Plan).

##### **B1.1.4.d Tailwater Ponds**

When no longer required, the tailwater ponds will be filled and the disturbed area restored such that the area can be re-used for growing sugar cane. No rehabilitation will be necessary.

##### **B1.1.4.e Tingira Street Project Area**

The Tingira Street DMPA is currently cleared (although some marine plants have recolonised much of the area not covered by anthropogenic grasslands) and in its past has been filled to above Highest Astronomical Tide. The placed stiff clay will be used to fill and preload the site to accelerate settlement. As a separate project, Ports North intends to import additional fill and construct port related industrial hardstands and other infrastructure. This project has been under consideration for many years and most of the necessary approvals have already been obtained.

## B1.2 Methodology

### B1.2.1 Detailed Technical Assessments

Several detailed technical assessments were undertaken in support of both the concept design of the project (documented in **Chapter A2** (Project Background)) and this chapter. These are listed in **Table B1-1** below. The final column shows where these reports are located in this Revised Draft EIS.

**TABLE B1-1 DETAILED TECHNICAL ASSESSMENTS**

STUDY	DETAILS	APPENDIX NO
Draft Values and Constraints Assessment: Soils Report Northern Sands	Existing situation - dry season of the Northern Sands and East Trinity DMPAs and the Northern Sands pipeline corridor	<b>Appendix K</b>
Soils and Groundwater Impact Assessment – Tingira Street DMPA	Existing situation and assessment of soils and groundwater impacts at the Tingira Street DMPA	<b>Appendix X</b>
Proposed Pipelines Northern Sands DMPA	Existing situation and assessment of soils impacts of the Northern Sands DMPA and pipeline corridor.	<b>Appendix Y</b>
Desktop Assessment of Storm Tide Risk at Tingira St Portsmouth	Flooding assessment of the Tingira Street DMPA.	<b>Appendix AL</b>

These studies are referred to where appropriate. While all relevant findings have been incorporated into this chapter, readers are referred to the original reports for further details if required. Together these technical studies involved:

- literature reviews to gather relevant information from previous studies
- desktop assessment of geology, soils and ASS / PASS as later defined
- field investigations (soils) undertaken specifically for this Revised Draft EIS during March 2017.

Summaries are provided below. In addition, many of the maps used in this chapter are extracted from appendices as noted. Refer also to **Chapter B6** (Water Resources) for related information on groundwater hydrology.

### B1.2.2 Detailed Methodology

#### B1.2.2.a Soils

This assessment is based on a combination of a desktop study and monitoring / modelling using new and historic data. As later explained in detail, all available information on ground conditions from the current studies and from historical investigations in the vicinity was collated. Two simplified cross-sectional numerical models were developed, based on the inferred subsurface conditions along SSW to NNE and SW to NE oriented cross-sections. There are several instances where it is necessary for readers to refer also to **Chapter B6** (Water Resources) for related information on ground conditions and stratigraphy. The stiff clay placement at the Tingira Street DMPA does not involve any significant risks to soils and assessment was based on desktop information and findings of previous work.

#### B1.2.2.b Land Use

Chapter B1 of the Draft EIS contained considerable detail on planning issues relevant to the Landside Works that is not repeated in this chapter. While it provided information on the detailed regulatory and land use environment of the Landside Works Project Area, this area is the subject of considerable planning over many years and, as demonstrated in this chapter, the proposed works are totally consistent with this planning. While relevant information on these matters is presented, the focus of this Revised Draft EIS has shifted to include the terrestrial placement areas for the soft and stiff clays. Information on required approvals is detailed in **Chapter A4** (Legislation and Approvals).

## B1.3 Existing Situation

### B1.3.1 Introduction

This section describes the existing situation with respect to broad soils and land use issues for each of the three relevant project areas. For clarity, the relevant physical and planning issues are described for each project area in turn.

### B1.3.2 Landside Works Project Area

#### B1.3.2.a Location and Site Details

The Landside Works Project Area covers the area currently occupied the Cairns Cruise Liner Terminal (CCLT) and existing wharfs and associated infrastructure as shown on **Figure B1-2**. Works in this area will include infrastructure upgrades involving fender system upgrade to the existing cruise shipping Wharves 1-5 to accommodate larger and heavier cruise ships, decommissioning of Wharf 6 including retention and upgrading of key bollards and retention of representative historic elements, and an upgrade of ship services to the cruise shipping wharves, including Intermediate Fuel Oil (IFO), potable water and fire-fighting services. Further details of existing infrastructure and land use in this project area are provided in the following sections.

#### Lots Affected

Ports North has vested planning powers under the *Transport Infrastructure Act 1994* (Qld) (TI Act) for an area identified as Strategic Port Land (SPL). This SPL stretches from Portsmith to Cairns North, extends into tidal waters and includes land at East Trinity. As required by the TI Act, Ports North has prepared a Land Use Plan (LUP) to guide development of the SPL. The SPL is identified as 'covenant' and 'lands lease' and Ports North has registered rights and interests over these parcels of land. The Department of Natural Resources and Mines (DNRM) describes a 'covenant' as a registered right or interest over a parcel of land used to restrict usage of that land. The remaining areas of the SPL are under freehold title, predominantly owned by Ports North.

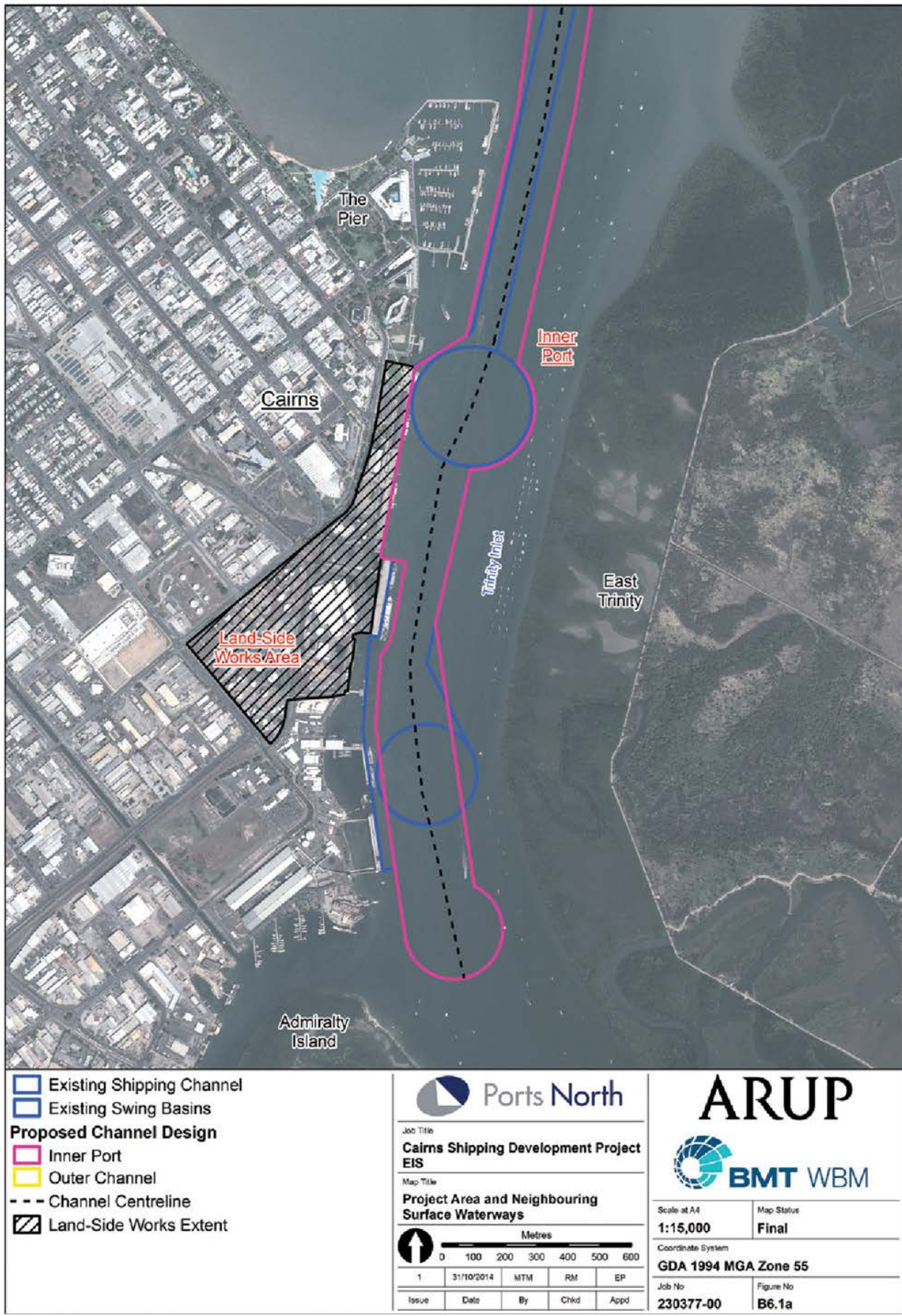
Further west, the Cairns CBD area is generally under freehold title with the exception of road reserves (managed by CRC as trustee for the Crown) and easements for service utilities, access and the like. On the eastern side of Trinity Inlet, there is a wide strip of state land and four leasehold lots (with Ports North as the registered/interested party) identified within the SPL. Further east is land reserved for community or public purposes.

Specifically, the Landside Works Project Area comprises four freehold titles and two perpetual leases as shown on **Figure B1-6** and detailed in **Table B1-2**.

**TABLE B1-2 LOTS COMPRISING THE LANDSIDE WORKS PROJECT AREA**

ADDRESS	PROPERTY DESCRIPTION	TENURE	OWNER
33 Kenny St, Portsmith	345 SP113643	Freehold	Far North Queensland Ports Corporation Limited
1 Dutton St, Portsmith	1 SP113642	Freehold	Far North Queensland Ports Corporation Limited
8 Wharf St, Cairns	9 SP113632	Freehold	Far North Queensland Ports Corporation Limited
34 Esplanade, Cairns	10 SP214821	Freehold	Far North Queensland Ports Corporation Limited
Bunda St, Cairns	509 NR5788	Lease in perpetuity	Lessee: QR/Aurizon
74 to 280 Esplanade, Cairns	15 SP214821	Lease in perpetuity	Lessee: Far North Queensland Ports Corporation Limited





**Figure B1-2** Landside Works Project Area.

### **B1.3.2.b Land Tenure**

As noted in **Table B1-2** above, the project area contains four freehold titles and two perpetual leases. All freehold lots and one of the two leases are under the control of Far North Queensland Ports Corporation Limited (Ports North).

### **B1.3.2.c Site History**

The Landside Works Project Area is in what is called Cityport which 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.

The Cityport area is intended to consolidate port operations and provide for the integration of the CBD with the Cairns waterfront to create an urban waterfront with a focus on uses that maximise the community and tourism values of the area. Cityport provides international cruise terminal and reef fleet tourist vessel facilities, reinforcing Cairns' reputation as the gateway to Far North Queensland and the Great Barrier Reef. As such, facilities for embarkation and disembarkation of passengers for cruise ships are a key land use of the precinct. Through redevelopment over time,

Ports North intends that this area will have ongoing benefits for residents, the commercial community and tourists alike.

### **B1.3.2.d General Description**

The Port of Cairns comprises a number of berths, wharves and moorings on the western side of Trinity Inlet. Wharves 1 to 6 form a continuous quay length of approximately 600 m. These are used predominantly for cruise vessels and visiting naval vessels. Award-winning Queensland Heritage Register listed cargo sheds, which have been extensively refurbished, are situated on Wharves 2&3, one of which was established as the Cairns Cruise Liner Terminal (CCLT) in 2010 as an international cruise terminal. The adaptive reuse of those sheds has received wide acclaim.

Wharves 7&8 are approximately 250 m in total length and are used for general cargo, dry bulk, containers and fertiliser. Wharf 10 is a tanker berth for petroleum, oil and LP gas and can accommodate a vessel of 189 m in length. Wharf 12 is owned and operated by Queensland Sugar Ltd and accommodates bulk sugar and molasses. This wharf is approximately 183 m in length.

Wharves 1-5 were built between 1911 and 1914 and are heritage listed under the *Queensland Heritage Act 1992*. See **Chapter B13** (Cultural Heritage).

Currently, Wharves 1-3 are predominately used for berthing cruise vessels and are serviced by the international CCLT, located within Shed 3 of the Port's heritage-listed wharf sheds.

### **B1.3.2.e Surrounding Land Use**

#### **Commercial Uses**

Key existing land uses in and near the Landside Works Project Area (see **Section B1.3.2.m**) are as follow.

- Within and in the vicinity of the Seaport Local Area (see **Figure B1-4**):
  - Port of Cairns – port related uses
  - Smiths Creek – port related uses
  - the Navy base
  - Portsmouth – Woree Industrial Area
  - pile moorings – for boats, including some that are used for residential purposes (eastern side of Trinity Inlet).
- Within and in the vicinity of the Cityport Local Area (see **Figure B1-5**):
  - Cairns Cruise Liner Terminal – embarking/disembarking for cruise ships and events space when not used as the CCLT
  - Cityport Local Area – mixed use development
  - Marlin Marina – featuring 261 berths
  - The Pier – providing restaurants, cafés, bars and shopping
  - Shangri-La Hotel and Events Centre

- Harbour Lights Residential Apartments
- the Hilton Hotel
- the Reef Hotel and Casino and the Barrier Reef Hotel
- residential apartments, including Jack and Newell, Piermonde and Madison on Abbott (directly west of the Cityport Local Area boundary)
- Cairns Convention Centre (located outside on the western boundaries of the two local areas)
- Cairns Central Business District (west of the local area).
- The Esplanade Parkland – recreational space for tourists and residents (west of the local area boundary)
- Trinity Inlet – used for tourism and recreation, port-related activities and areas of environmental significance (east of the local area)
- East Trinity Area – mangrove and wetland areas and some local residences (located to the east of the local areas, across Trinity Inlet).

There is strong alignment and complementary land use throughout the interface between port land and the CBD. The evolution of land use change has been 'one way' and this is reflected in a strong accord between the two land use authorities in policy, development approvals, and development outcome.

### **Infrastructure**

The key land-based infrastructure within the vicinity of the project, including roads, rail, gas water and power is described in detail in **Chapter A3** (Project Description).

#### **B1.3.2.f Topography**

Land in the Landside Works Project Area is flat, with the existing wharves at the CCLT having a deck level of 3.26 m AHD. The following section highlights land-forming processes and provides further details of the nature of the land at and around the project area.

#### **B1.3.2.g Geology**

##### **CBD Overview**

The following text is derived from the Draft EIS and is based largely on detailed work by Eric Bird (1970) who is a recognised expert on the geomorphology of the Cairns area. Other work cited is by the Wet Tropics Management Authority (2000) and the Department of Nature Resources and Mines (2014).

Cairns City was built upon a low-lying plain of quaternary coastal and estuarine sediments of sand, silt and mud. It is thought that these formed approximately 4000 to 5500 years ago. Although the topography of the area has been altered and the sand ridges have been largely concealed, the streets parallel to the Esplanade mimic the ridge pattern in the CBD area.

The sand ridges consist of medium quartzose sand, with occasional coarser material such as granules and small pebbles. The superficial sand layer is approximately 8.5 m deep and exists over soft blue- grey clay formations. Due to the stability of the sand, silts and muds, most large buildings in Cairns must be placed on piles that are driven into the underlying clay. The blue-grey clay formation is approximately 3 m to 23 m thick. This rests upon a firm yellow-grey clay formation that includes relics of mangroves and indicates an earlier phase of deposition and swamp conditions, most likely during high sea levels of the Pleistocene age (2.5 million years ago to 11 700 years ago). The yellow-grey clay layer is approximately 12 m thick and overlays sands and gravels.

Before development, the CBD area contained north-west to south-east running sand ridges with mangrove-lined creeks. Swamps were formed on the mud between the sand ridges and sand ridges of the Cairns City area were once present at the Esplanade; hence, older residents may remember the Esplanade foreshore as a sandy beach. However, once the Esplanade foreshore was widened, the sand ridge was built over, leaving tidal mud flats as the current foreshore. The physical change throughout Cairns to create the urban area now widely accepted is dramatic and the Esplanade/Port area is an indicator of the pattern of physical change evident throughout the region.

The region is heavily constrained by low land, ecological values, steep slopes and limited non- agricultural land availability. Within and adjacent to the CBD the degree of intervention to fill and create land has been extensive.



Most of the port land has been reclaimed and Fogarty Park, the Pier, Hilton, Points North, the Esplanade Lagoon and all the Esplanade Park from the Esplanade carriageway to the outer extremities of that park, have been created by fill. The industrial suburb of Portsmith and parts of Manunda, Cairns North, and Parramatta Park have also been extensively filled.

Further information on onshore geology and geomorphology is provided in **Chapter B3** (Coastal Processes).

### **Project Area**

The Draft EIS concluded that, given the extent of services in the area, the geology is considered suitably stable to provide for the proposed landside infrastructure. This will be confirmed during detailed design.

A full description of geology is not provided in this Revised Draft EIS due to the minor nature of land-side infrastructure upgrades and the limited relevance of existing geological conditions.

#### **B1.3.2.h Soils**

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) Soils of Babinda - Cairns Area 2016 soils map shows that the whole of the Cairns CBD (including this Project Area) consists of a combination of soils formed on beach ridges (Hull) and poorly drained soils formed on alluvium (Holloway). It is likely that the original soils have been covered with dredge spoil many years ago as part of the general reclamation / drainage works in the CBD.

A full description of soils is not provided in this Revised Draft EIS due to the minor nature of land-side infrastructure upgrades and the limited relevance of existing soil conditions other than acid sulfate soils and contaminated land as discussed below.

#### **B1.3.2.i Acid Sulfate Soil**

Acid Sulfate Soil (ASS) is a general term applying to both a soil horizon that contains sulfides (i.e. Potential Acid Sulfate Soil – PASS) and an acid soil horizon affected by oxidation of sulfides (i.e. Actual Acid Sulfate Soil – AAS).

In certain conditions (under water, without oxygen and with bacterial activity), ASS are produced when sulphate mixes with metals and organic matter. Left undisturbed, these soils pose little or no risk, however, when disturbed or exposed to oxygen, these soils begin to oxidise, producing sulphuric acid. ASS can degrade concrete and steel structures, such as foundations and have detrimental environmental impacts.

The State of Queensland (Department of Natural Resources and Mines) 2016 ASS mapping shows the Landside Works Area Project Area to have PASS starting in the top 0.5 m. An extract from the ASS mapping prepared for the Tingira Street Project Area (**Section B1.3.4.j**) but also including the Landside Works Project Area shows the interpreted distribution of PASS is reproduced as **Figure B1-18**. It is noted that the soft clays underlying the reclamation filling at the site are also PASS.

The Landside Works Area Project Area is excluded from CRC's Acid Sulfate Soils Overlay Map (CRC 2016).

#### **B1.3.2.j Contaminated Land**

A search on the Queensland Contaminated Land Register (CLR) for the land within the Landside project area was conducted for the Draft EIS. The search identified that the study area contains three sites listed on the Environmental Management Register (EMR). **Figure B1-3** illustrates the extent of the search conducted on the CLR and highlights the parcels of land identified on the EMR. The EMR identifies properties likely to be affected by contaminants. It is common for a working port of 100 years operation to be subject to possible contamination. This figure illustrates a northern area for which most potentially contaminating activities have ceased and the area has been or is scheduled for remediation, and a southern area which is subject to ongoing use for the environmentally relevant activities of fuel storage.

Properties identified on the EMR must be properly investigated to determine what, if any, contaminants might exist, prior to undertaking any development. Where works are proposed on contaminated land, a management plan and/or permit will be required.



**Figure B1-3** Contaminated soils search and results.

**Source:** Ports North (2014) Chapter B1.

### **B1.3.2.k Geotechnical Conditions**

Geotechnical conditions have not been specifically assessed. However, it is known that the Landside Works Project Area is typical of the CBD / port area as described in **Section B1.3.2.g** above. A wealth of detailed knowledge of local conditions is available to inform the detailed design of structures required by the CSD Project.

### **B1.3.2.l Previously Proposed End Use**

The works proposed for the Landside Works Project Area involve all previously proposed end uses that are consistent with planning for the area (see **Section B1.3.2.m**) below.

### **B1.3.2.m Planning Considerations**

#### **State Planning Policy**

The State Planning Policy (SPP) is a single statement of planning principles and guidance for planning schemes and development assessment in Queensland. It defines the Queensland Government's policies about matters of State interest in land use planning and development. State interests defined in the *Sustainable Planning Act 2009*, and accordingly the SPP has considerable weight in development assessment on non-port land where State interests have not been integrated into the local planning instrument. In the hierarchy of planning instruments in Queensland, the SPP sits above regional plans and planning schemes.

The State interest for Strategic Ports requires the protection of the operation of strategic ports and enables their growth and development. Cairns Port is listed as a port to which the SPP applies.

The SPPs focus is upon ensuring a planning scheme integrates this state interest. Development assessment on port land occurs outside the jurisdiction of the SPA and accordingly the SPP does not embrace development assessment criteria pertaining to a port.

The Planning Scheme is required to integrate the State interest by:

- identifying strategic ports and associated strategic port land and core port land
- facilitating development surrounding strategic ports that is compatible with, depends upon or gains significant economic advantage from being in proximity to a strategic port, or supports the strategic port's role as a freight and logistics hub
- protecting strategic ports from development which may adversely affect the safety, viability or efficiency of existing and future port operations
- ensuring sensitive development is appropriately sited and designed to mitigate adverse impacts on the development from environmental emissions generated by port operations
- identifying and protecting key transport corridors (including freight corridors) linking strategic ports to the broader transport network
- considering statutory land use plans for strategic ports and the findings of planning and environmental investigations undertaken in relation to strategic ports.

CairnsPlan 2016 (see below) is considered to have integrated the principles of the SPP as they relate to the Cairns Port with land uses and access well developed at the interface.

#### **Far North Queensland Regional Plan**

The FNQ Regional Plan provides a framework with which to manage growth and change land use and development in the region to 2031, and generally applies to the Cairns local government planning area. Because the land under the control of Port North is excluded from the provisions of the CairnsPlan 2016, the application of the FNQ Regional Plan as it relates to development on Strategic Port Land (SPL) is limited. The FNQ Regional Plan does however have a number of provisions which support protection of the Port's operation and its ongoing compatibility with the adjoining CBD. They are:

- 6.1.4 Key sites, corridors and buffer areas for current and future regional infrastructure and services are identified, preserved, protected and where appropriate, proactively acquired and managed.
- 8.3.8 Cairns and Mourilyan sea ports and Cairns Airport and Mareeba Aerodrome, and their access roads and operations, are protected from urban activities that may impact on current and future operations, except where permitted on land use plans for strategic port land.



## **CairnsPlan**

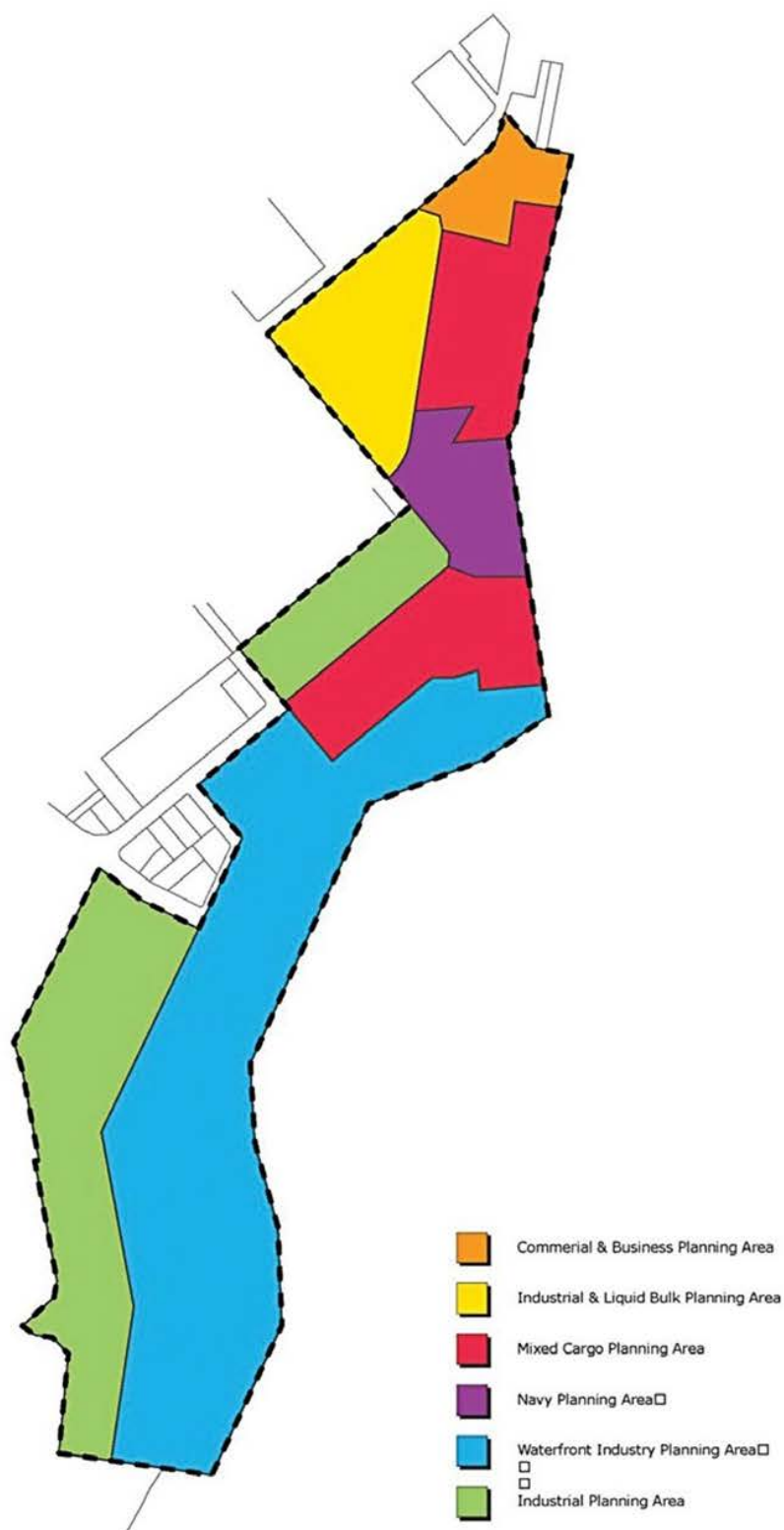
The Landside Works Project Area is located within the Ports North confines on SPL, within the Seaport Local Area and the Waterfront Industry Planning Area.

## **Ports North Land Use Plan & Cityport Masterplan**

### *Land Use Plan*

The Ports North Land Use Plan (LUP) came into effect in July 2006, with amendments to the LUP in March 2013. The LUP has been prepared for all strategic port land under the control of Ports North. Ports North acts as the Assessment Manager for all development applications wholly undertaken on SPL. See **Figure B1-4**.

The TI Act stipulates that SPL is not subject to a local government planning scheme. As such the Ports North LUP is the key planning document for the Landside Works Project Area.



**Planning Areas**  
Land Use Plan  
November 2006

**PLAN 1**

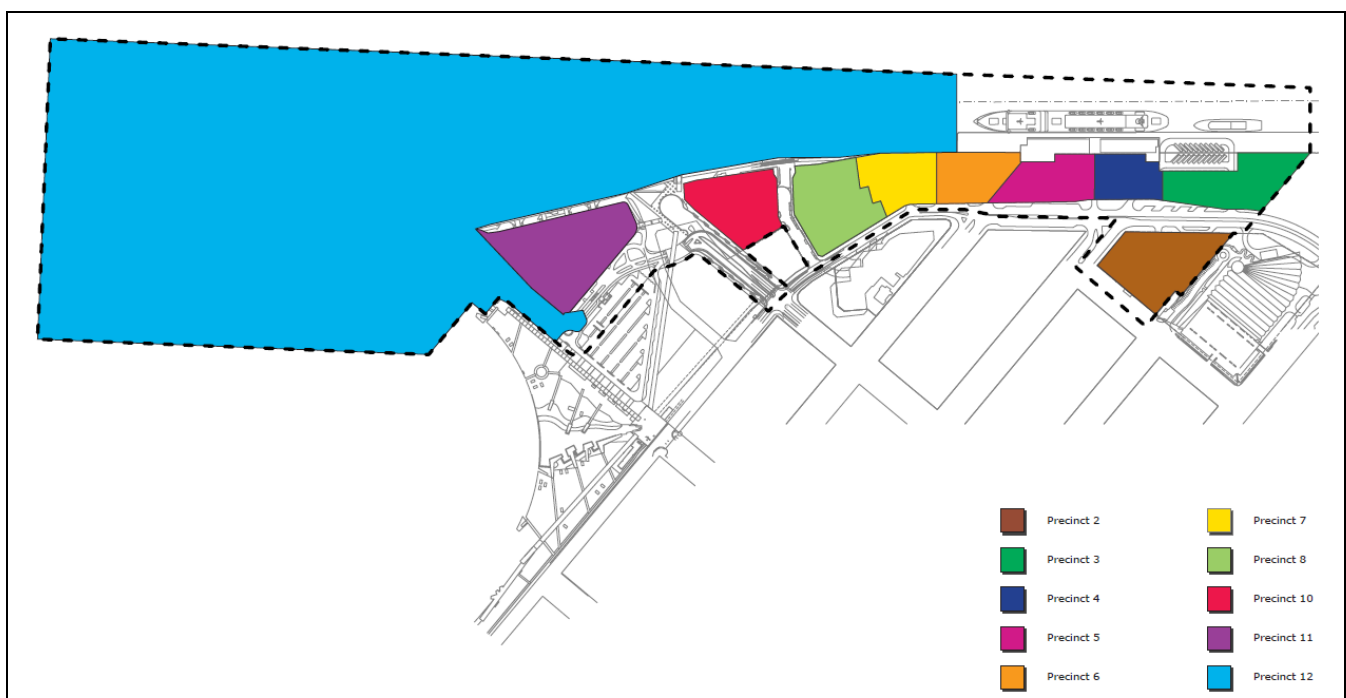
**VOLUME THREE: SEAPORT LOCAL AREA PLAN**

**Figure B1-4** Seaport Local Plan – Land Use Plan.

**Source:** Ports North (2006, amended March 2013).

The City Port Local Area (Figure B1-5) is divided into 11 precincts that define the preferred land use, summarised as follows:

- **Precinct 2** – primarily a business and commercial precinct, with short-term accommodation and other uses which complement the nearby Cairns Convention Centre.
- **Precinct 3** – primarily a mixed-use residential, tourism and commercial precinct, with large outdoor spaces providing for meeting places and recreation. This precinct contains the heritage-listed wharves (listed on the Queensland Heritage Register under the *Queensland Heritage Act*), so development in the area will have to be sensitive to the area's heritage values and to be undertaken in accordance with Cairns Cityport Wharf Area Conservation and Management Plan. Further, future development in this precinct will be subject to approval by the Queensland Heritage Council.
- **Precinct 4** – a tourist activity and accommodation precinct, with a focus on the waterfront location, boardwalk and links to the Cairns CBD.
- **Precinct 5** – primarily a tourist area providing short-term accommodation, support facilities, large outdoor spaces, pedestrian plaza and links to the Cairns CBD.
- **Precinct 6** – a predominantly residential precinct, with ground level retail and entertainment uses which complement the residential intent for the precinct and encourage activation of Wharf Street.
- **Precinct 7** – lower scale and density residential and tourism accommodation and restaurants, retail and recreational uses that provide primarily for hotel guests
- **Precinct 8** – centred around the Hilton Hotel and primarily a tourist accommodation precinct. No major development in this precinct is envisaged.
- **Precinct 10** – this tourist precinct is a prominent redevelopment area and is centred around the Reef Fleet Terminal and associated uses. The existing buildings within this precinct are likely to be replaced within the medium to long term. A waterfront promenade will link this precinct to adjoining areas and a continuous awning will be provided around the Reef Fleet Terminal. The Reef Fleet Terminal building is two storeys and other buildings should be a maximum of 12 storeys.
- **Precinct 11** – a mixed-use precinct of retail, commercial, tourist and accommodation uses, this precinct is centred around the Radisson Hotel and The Pier shopping complex.
- **Precinct 12** – fronting Marlin Marina, this is a mixed-use precinct with a range of tourism, commercial, public open space and marina related uses.



**Figure B1-5** City Port Local Area Plan.

**Source:** Ports North (2006, amended in March 2013).

### Cityport Masterplan

Ports North has developed the Cityport Masterplan which sets out a vision to revitalise the waterfront to attract visitors and residents to the public foreshore. Cruise shipping is central to achieving this vision. The Masterplan aims to provide a world class waterfront facility with a mix of hotels, residential apartments, tourist apartments, coffee shops, restaurants, bars and offices.

The Masterplan provides a conceptual design layout for future development consistent with the desired development intent outlined in the LUP. Ports North has commenced development of this precinct and will progressively release land parcels within Cityport to be developed in accordance with the Masterplan.

## B1.3.3 Northern Sands Project Area

### B1.3.3.a Location and Site Details

#### Lots Affected

##### DMPA

The Northern Sands site comprises three freehold titles as shown on **Figure B1-6** along with all affected lots in the delivery pipeline corridor. The three lots have a total area of approximately 84 ha (including easements) as detailed in **Table B1-3**.

**TABLE B1-3 LOTS COMPRISING THE NORTHERN SANDS DMPA**

LOT AND PLAN	TITLE REFERENCE	AREA (HA)	TENURE	ROAD FRONTAGE
Lot 2 on RP712954	21131047	20.4	Freehold	Captain Cook Highway
Lot 5 on SP245573	50888439	62.3	Freehold	Captain Cook Highway
Lot 6 on SP245573	50888440	1.1	Freehold	Captain Cook Highway

The lots are accessed by the Captain Cook Highway as designated above.

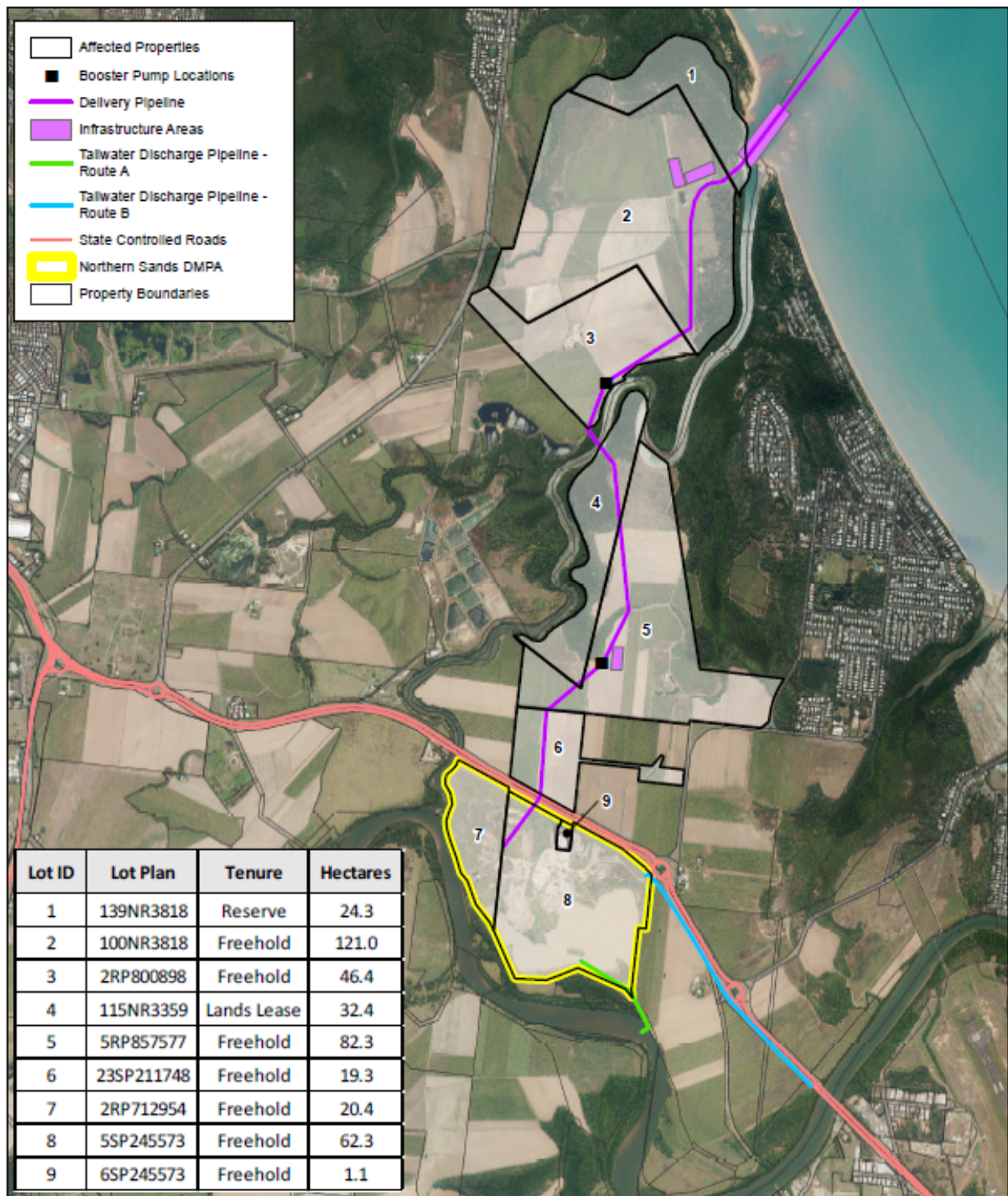
##### Delivery Pipeline Corridor

The delivery pipeline corridor will cross six lots as detailed in **Table B1-4**, as well as the Captain Cook Highway and a Cairns Regional Council esplanade.

**TABLE B1-4 LOTS COMPRISING THE DELIVERY PIPELINE CORRIDOR**

LOT AND PLAN	TITLE REFERENCE	AREA (HA)	TENURE	ROAD FRONTAGE
Lot 139 on NR3818	49103044	24.3	Reserve	No road frontage
Lot 100 on NR3818	20983091	121.0	Freehold	No road frontage
Lot 2 on RP800898	21449028	46.4	Freehold	Morabito Road
Lot 115 on NR3359	40068719	32.4	Lands lease	No road frontage
Lot 5 on RP857577	21543037	82.3	Freehold	Holloway Beach Access Road & Wisteria Street
Lot 23 on SP211748	50867594	19.3	Freehold	Captain Cook Highway





**Cairns Shipping  
Development Project  
Revised Draft EIS**

**Northern Sands Project Area -  
Affected Properties**

Ref: 3527-02-13b  
Date: 31/05/2017  
Projection: MGA94 Zone 55  
Scale at A4 Size 1:30,000



0 0.3 0.6 1.2 Km



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**Figure B1-6** Affected lots in the Northern Sands Project Area.

## Reserves and Easements

### DMPA

Several easements exist over the land as tabulated below.

**TABLE B1-5 EASEMENTS – NORTHERN SANDS DMPA**

LOT AND PLAN	EASEMENT NUMBER	IN FAVOUR OF	PURPOSE
Lot 5 on SP245573	714601794	Lot 6 on SP245573	Not identified
Lot 5 on SP245573	714601799	Lot 5 on SP245573	Not identified
Lot 6 on SP245573	714601794	Lot 6 on SP245573	Not identified
Lot 6 on SP245573	714601799	Lot 5 on SP245573	Not identified

### Delivery Pipeline Corridor

There are no relevant easements over the delivery pipeline corridor.

### **B1.3.3.b Land Tenure**

The tenure of the lots affected by the DMPA and the delivery pipeline is indicated on **Figure B1-6** and include freehold, reserve, and lands lease. State land includes Richters Creek and the Captain Cook Highway. Two protected areas exist within the Northern Sands Project Area, namely:

- the Great Barrier Reef Coast Marine Park (State)
- the Yorkeys Creek Fish Habitat Area.

These are discussed in **Chapter B2** (Nature Conservation Areas).

### **B1.3.3.c DMPA Site History**

Northern Sands has been operating at the Barron delta location since 1990. The site currently contains an operating sand pit and is licenced to receive 'inert wastes' and potential acid sulfate soils (PASS), both of which are placed into the excavated pit below the water table. This water body, known locally as Lake Narelle, covers an area of about 25 hectares. A possible extension area is located north-west of the pit as described in **Chapter A3** (Project Description).

Existing development on the land includes a single detached dwelling, landscape supply bins and associated infrastructure, office, a large industrial type shed, screening plants and waste disposal areas.

### **B1.3.3.d General Description**

#### **Northern Sands DMPA**

The site is located adjacent to the Captain Cook Highway. The Captain Cook Highway is a State-controlled road under the jurisdiction of the Department of Transport and Main Roads (TMR). The Mulgrave Sugar Mill cane train line also traverses the entire frontage of the site, between the Captain Cook Highway and the property boundary of the site. The Barron River forms the southern and western boundary of the site. Above ground electricity supply lines are located in the Captain Cook Highway road reserve along the full frontage of the site.

The Captain Cook Highway / Holloway Beach Access Road roundabout is located adjacent to the eastern most boundary of the site. The Holloway Beach Access Road is local government controlled road providing access to the nearby beachside community of Holloway Beach. The Captain Cook Highway / Holloway Beach Access Road roundabout is State controlled under the jurisdiction of TMR.



The Northern Sands site currently operates as a landscape supply and waste reduction and disposal facility, providing a wide range of services including:

- concrete
- builders rubble
- green wastes
- demolition material
- potential acid sulphate soils.

The company also supplies a wide range of landscape and supply products including:

- sand (bedding sand, fill sand, playground sand, concrete sand)
- topsoil (screened & unscreened)
- river gravel & maintenance gravel
- road base
- mulch
- crusher dust.

### Delivery Pipeline

The land-based section of the delivery pipeline will make landfall at the mouth of Richters Creek where the corridor traverses conservation land (Yorkeys Creek Fish Habitat Area, Great Barrier Reef Coast Marine Park), and then run across agricultural land, crossing Richters Creek between Lot 2 on RP800898 and Lot 115 on NR3359, and then via culverts under the Captain Cook Highway to the DMPA as shown on **Figure B1-6**. Refer **Photo B1-1** to **Photo B1-4**.

Natural vegetation at this location and at the Richters Creek mouth will be encountered and this is described in detail in **Chapter B8** (Terrestrial Ecology).

The Yorkeys Knob residential community is located approximately 1.4 km to the west of the pipeline at the closest point. The Holloway Beach residential community is located approximately 0.6 km from the proposed pipeline, at the closest point, and across Richters Creek.

The Captain Cook Highway at this location is a State-controlled road. A rail spur of the Mulgrave Sugar Mill cane train line is located on the eastern boundary of Lot 23 on SP211748. Lot 23 on SP211748 also has frontage to the Captain Cook Highway at this location.

Primary development on the land associated with the Northern Sands pipeline includes agricultural land, specifically sugar cane production. Buildings and structures include single detached dwellings and associated outbuildings and farm sheds.



**Photo B1-1** Richters Creek where pipeline comes ashore.



**Photo B1-2** Typical headland around cane farm - north side of Richters Creek.



**Photo B1-3** North bank of Richters Creek crossing.



**Photo B1-4** Typical headland through cane farm south side of Richters Creek.

### **B1.3.3.e Surrounding Land Use**

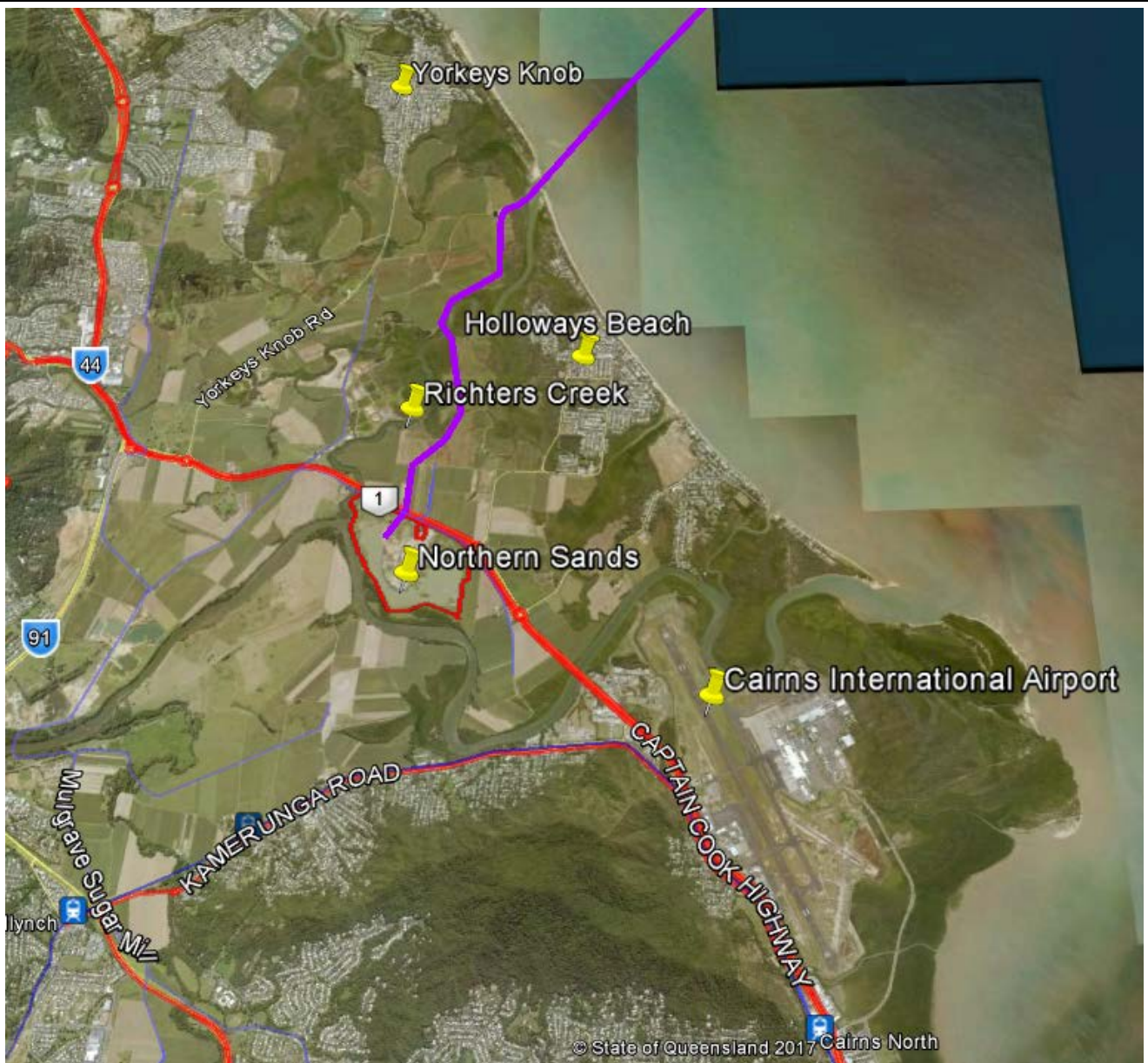
Key existing land uses in the Northern Sands Project Area include:

- Agricultural land (sugarcane production). Land immediately to the east and west includes agricultural land. Land immediately to the south and across the Barron River is also dominated by agricultural land, as is land immediately to the north and across the Captain Cook Highway.
- Holloway Beach residential area is located approximately 1.3 km to the north-east of the Northern Sands DMPA.
- Machans Beach residential area is located approximately 2.0 km east of the Northern Sands DMPA.
- Conservation land near the mouth of Richters Creek (Yorkeys Creek Fish Habitat Area).
- Holloways Beach residential area.
- Yorkeys Knob residential area.

The Cairns International Airport is located approximately 8 km to the south-east of Northern Sands DMPA. The Skyrail Rainforest Cableway is located approximately 2.5 km west of Northern Sands.

**Figure B1-7** shows the key land uses in the Northern Sands Project Area.



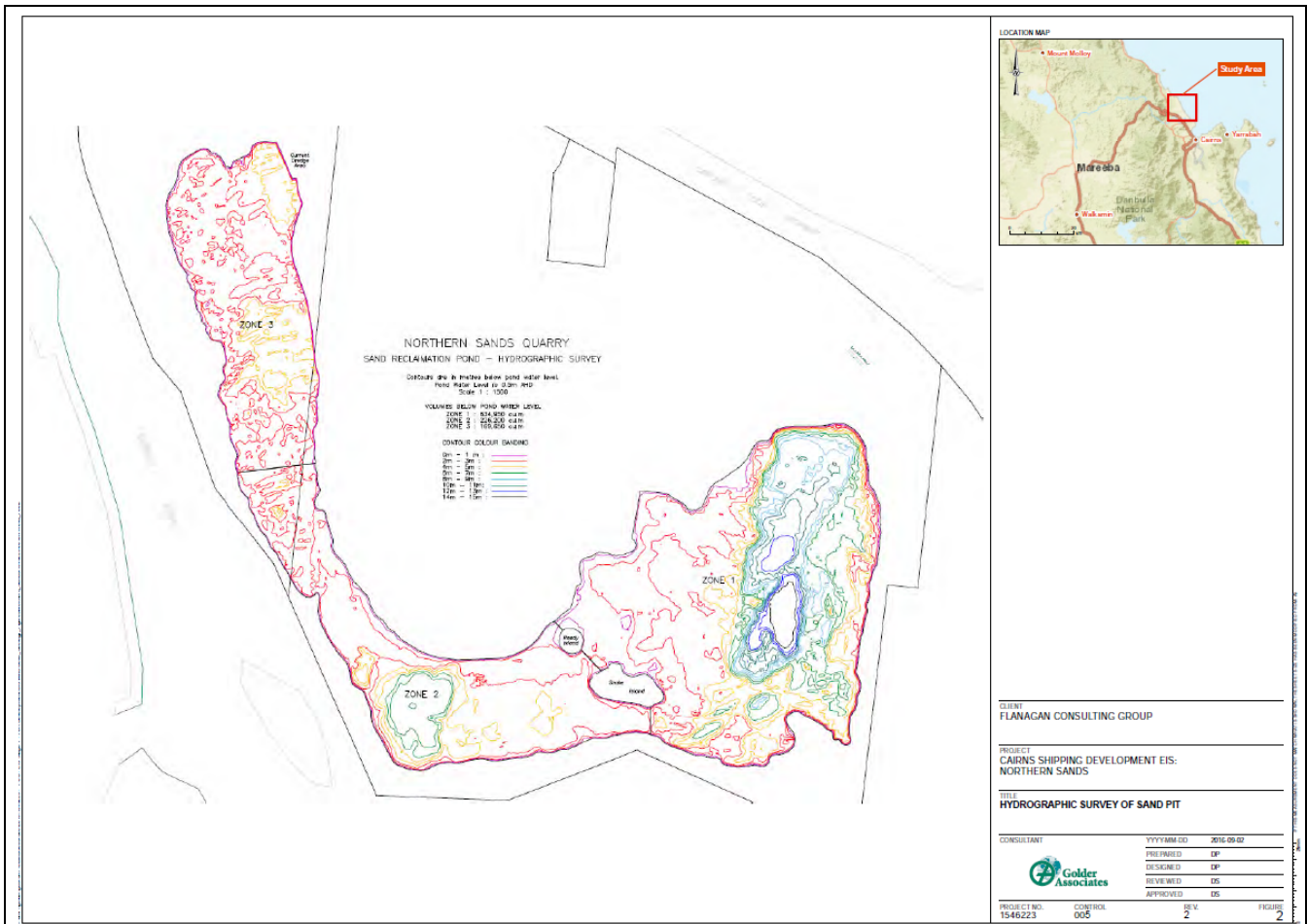


**Figure B1-7** Key surrounding land uses – Northern Sands Project Area.

### **B1.3.3.f Topography**

#### **Northern Sands DMPA**

Ground surface levels across the Northern Sands DMPA site typically range from about 2.0 m to 5.5 m AHD. Recent hydrographic survey (July 2016, see **Figure B1-8**) of the pit indicates excavation levels typically in the range of -1.5 m to -4.5 m AHD across the majority of the pit, apart from the southern and eastern portions of the pit where excavation levels range from -6.5 m to -14.5 m AHD. The Barron River is present immediately south and west of the Northern Sands DMPA.



**Figure B1-8** Topography – Northern Sands DMPA.

**Source:** Appendix K (Figure 2). A larger version of this figure is included in **Appendix K**.

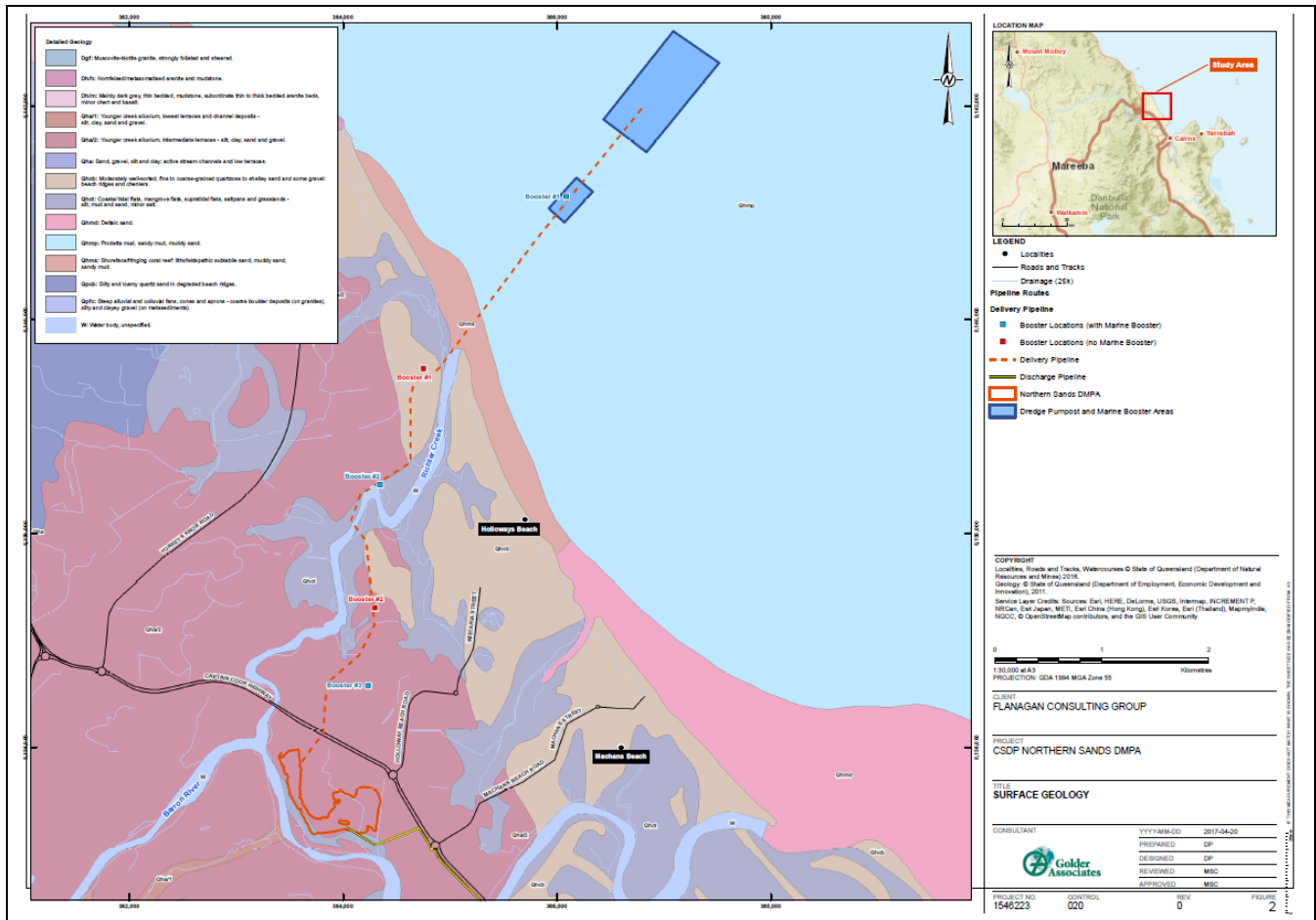
### Delivery Pipeline Corridor

The delivery pipeline corridor traverses the flood plain from the shoreline to the site. Surface levels typically range from between 1 m to 2 m AHD near the mouth of Richters Creek, rising to about 4 m AHD along the cane farm headlands to the north and south of Richters Creek and then to the Captain Cook Highway and the Northern Sands site.

#### B1.3.3.g Geology

Erosion of the bedrock within the Macalister Ranges has resulted in the formation of the Barron River floodplain that stretches from Trinity Beach in the north to Cairns Airport in the south.

Published geological information from Queensland Digital Geological Map Data 1:100 000 Cairns 8064 series Department of Natural Resources and Mines indicates that the Northern Sands DMPA and inlet and discharge pipeline routes are underlain by Holocene aged alluvial deposits comprising silts, muds, clays, sands and gravels. The surficial deposits are underlain by varying sequences of older sand and clay deposits, underlain by bedrock comprising Silurian/Devonian meta-sediments. A map showing the surface geology along the pipeline routes is reproduced on **Figure B1-9**.



### B1.3.3.h Soils

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) Soils of Babinda - Cairns Area, North QLD 2016 (1:50 000 scale) soils map indicates the presence of one soil unit (Liverpool) across the North Sands site. Soil units along the pipeline route are summarised below:

**TABLE B1-6 SOILS**

LOCATION	SOIL UNITS PRESENT
Delivery pipeline - Mouth of Richters Creek to creek crossing	Mangrove, Hull and Liverpool
Delivery pipeline - Creek crossing to Northern Sands	Mangrove, Hull, Brosnan and Liverpool
Discharge pipeline - Northern Sands to Barron River	Liverpool and Mangrove

**Source: Appendix X** (Unlabelled table in s3.4).

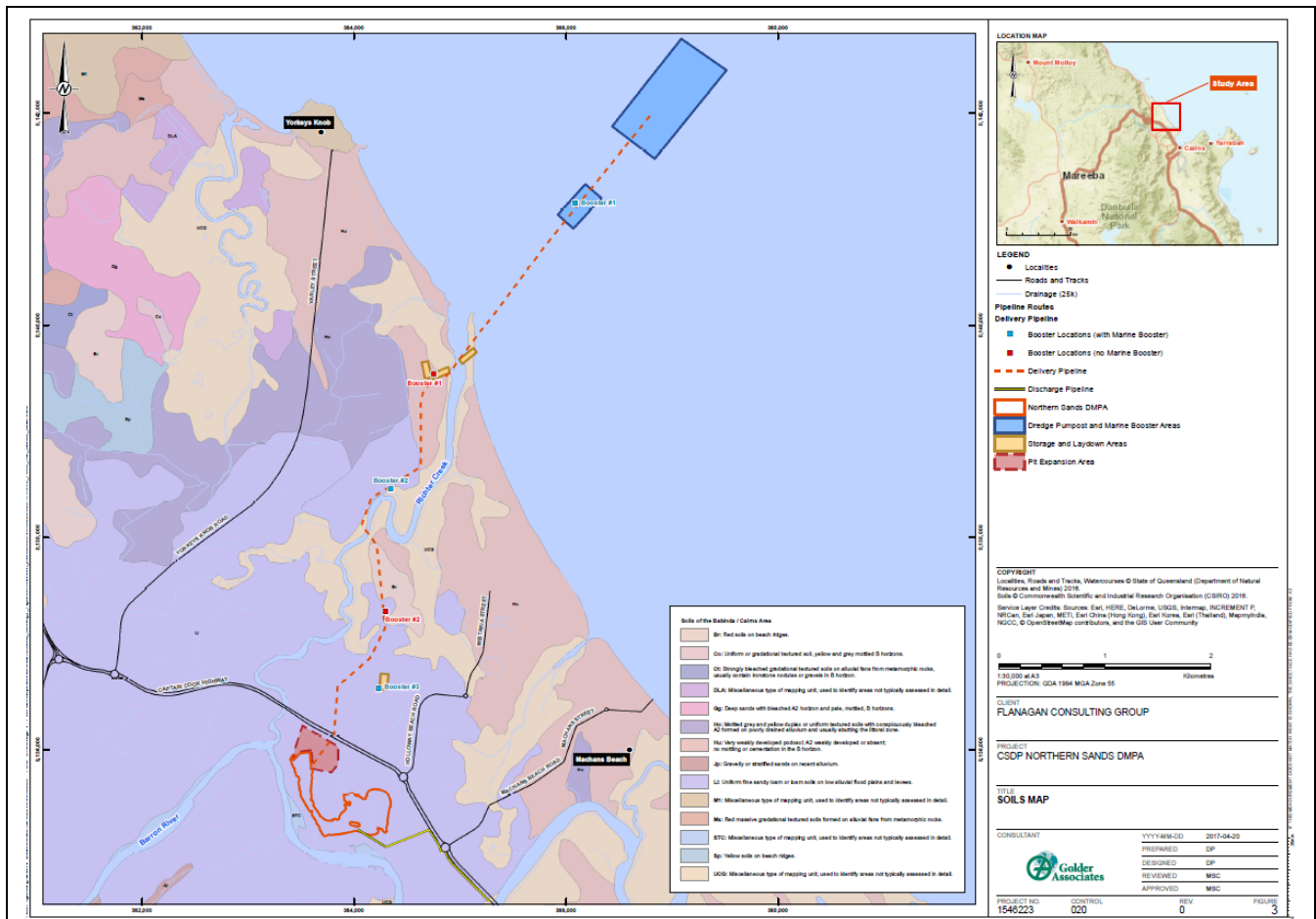
The soil units are shown on **Figure B1-10** and described below:



**TABLE B1-7 SOILS – NORTHERN SANDS PROJECT AREA**

UNIT NAME	TYPICAL ORIGIN	DESCRIPTION
Brosnan	Alluvium	Soils formed on beach ridges, Red Kandosol: Brown sandy loam over yellowish red or red sandy loam to sandy light clay.
Hull	Beach Dune	Deep sandy soils – Tenosols;
Liverpool	Alluvium	Well drained soils formed on alluvium, Orthic Tenosol: Dark grey brown silty loams over yellow brown silty loam and silty clay loam to about 0.6m overlying fine sands.
Mangrove	Swamps and Intertidal Zone	Saline soils of the intertidal zone.

Source: Appendix K (Table in s3.4)



**Figure B1-10 Soils – Northern Sands Project Area.**

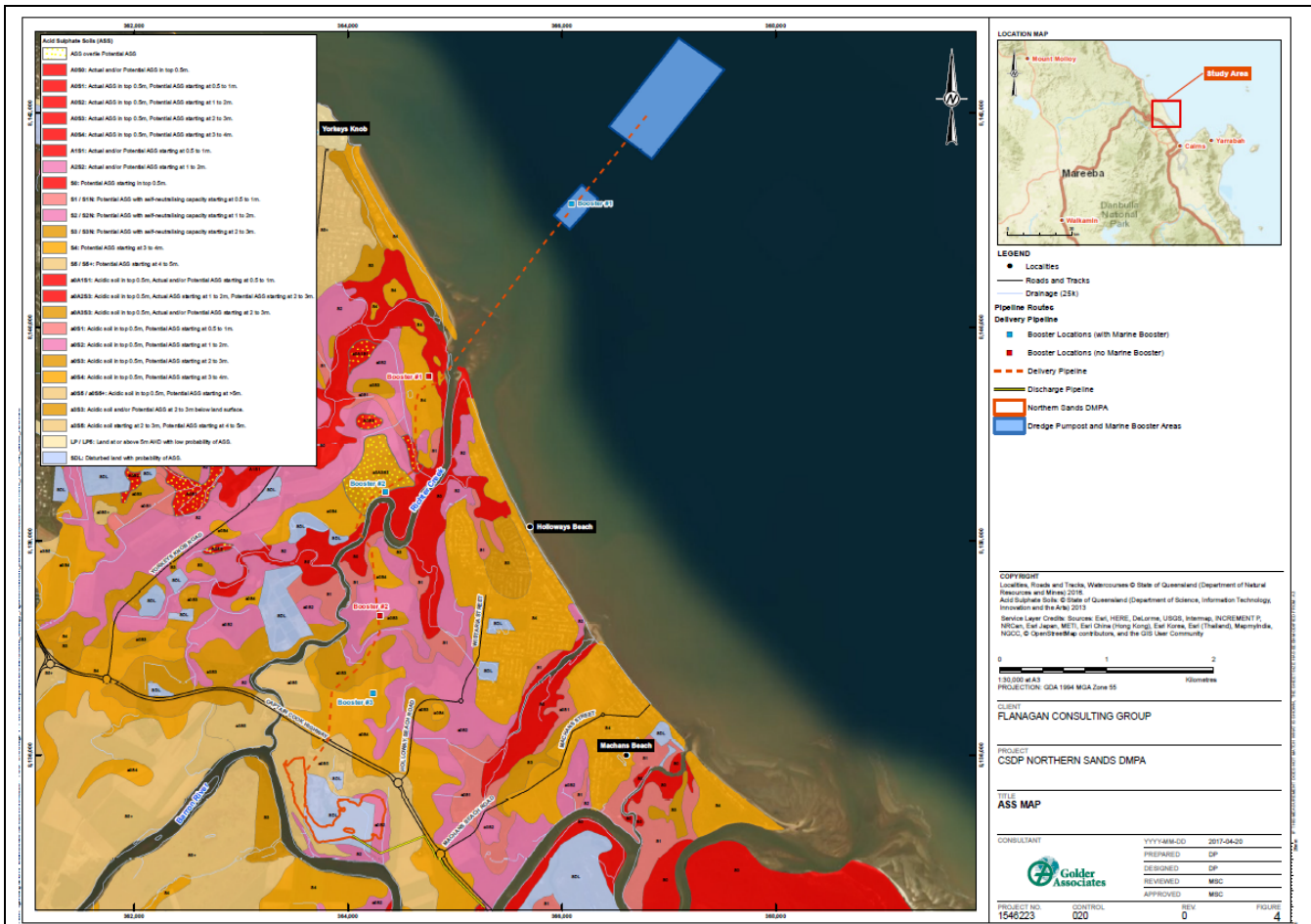
Source: Appendix Y (Figure 3). A larger version of this figure is included in Appendix Y.

### B1.3.3.i Acid Sulfate Soil

As discussed above, ASS is a general term applying to both:

- a soil horizon that contains sulfides (i.e. Potential Acid Sulfate Soil – PASS)
- an acid soil horizon affected by oxidation of sulfides (i.e. Actual Acid Sulfate Soil – AASS).

The following extract from the Department of Environment and Resource Management (Manders *et al.* 2009) Acid Sulfate Soils of Cairns North Queensland (1:50 000 scale) shows the interpreted distribution of PASS within the Northern Sands Project Area (**Figure B1-11**).



**Figure B1-11 Acid sulfate soils – Northern Sands Project Area.**

**Source:** Appendix Y (Figure 4). A larger version of this figure is included in Appendix Y.

## Northern Sands DMPA

Across the Northern Sands site the following conditions are indicated:

- The existing sand pit is mapped as 'Disturbed Land – likely to contain ASS'.
- Surrounding the pit, strongly acidic soil conditions ( $\text{pH} > 4.0$  to  $\leq 5.0$ ) are indicated from the surface (this does not indicate the presence of ASS). A PASS layer is generally indicated within 4 m to 5 m of the surface and within 1 m to 2 m of the surface around the southern and eastern margins of the pit.

## Delivery Pipeline Corridor

Along the pipeline route (upstream to downstream) the following conditions are indicated:

- Between the Captain Cook Highway and Thomatis Creek, strongly acidic soil conditions ( $\text{pH} > 4.0$  to  $\leq 5.0$ ) are generally indicated from the surface. A PASS layer is generally indicated within 1 m to 5 m along this section. PASS is present at depths between 1m and the surface at the Thomatis Creek crossing point.
- West of Thomatis Creek, PASS is again present at depths between 1 m and the surface near the bank and then there are strongly acidic soil conditions ( $\text{pH} > 4.0$  to  $\leq 5.0$ ) are generally indicated from the surface over the majority of the route with a PASS layer is generally indicated within 2 m to 4 m over most of this route. The last 400 to 500 m of the route prior to the mouth of Thomatis / Richters Creek has PASS present at depths between 1 m and the surface.

The above are findings from the desktop assessment. Refer to **Section B1.3.2.k** for a discussion on overall geotechnical conditions (i.e. that include assessment of ASS / PASS).

### **B1.3.3.j Contaminated Land**

No contaminated land assessment was undertaken on the basis that it is not relevant to the construction process or the operation of the DMPA and pipeline.

### **B1.3.3.k Geotechnical Conditions**

#### **Literature Review Assessment**

According to **Appendix K**, previous subsurface investigations have been undertaken across the Northern Sands site, and include:

- Borehole investigation carried out by Probin (2007), comprising 21 No. boreholes to depths ranging between approximately 15 and 24 m below ground level.
- Borehole investigation carried out by GEO Investigate (2013), comprising 10 No. boreholes within the extent of the existing dredged area (i.e. 'lake'). The boreholes were drilled to depths ranging from 18 to 30 m below water level.
- Cone Penetration Testing (CPT) carried out by GEO Investigate/GEO Design (2016) in July 2016 comprising 30 No. CPTs to depths ranging from approximately 8 to 24 m below ground level.

Based on cross sections of inferred subsurface conditions and Interpreted logs from the Queensland Government Registered Groundwater Bores Database, it was concluded that the identified soil conditions within the site were broadly consistent with published geology and soil units. The typical profile encountered includes:

- Sandy silty clay (typically above 0 m AHD): medium plasticity, approximately 0.5 to 3 m thick, brown to brown-grey; overlying
- Upper sand/gravelly sand (broadly between 3 m AHD to -5 m AHD): inferred loose to medium dense, fine to coarse grained, grey and brown; overlying
- Silty clay (broadly between -5 m AHD to -15 m AHD): medium to high plasticity, brown, grey and dark grey; overlying
- Lower sand/ gravelly sand (broadly between -10 m AHD to -25 m AHD): inferred loose to medium dense, grey and brown, with occasional coarse gravel and cobbles.

Variations occur in the thickness and sequence of each unit across the area and minor layers of sand/clay commonly occur within each unit, characteristic of an alluvial floodplain deposit. The sand/clay sequence tends to be shallower towards the south of the site.

Groundwater bore RN139211 located immediately north-west of the site on the opposite side of the Barron River extends to 66 m depth. This borehole record indicates a continuation of interbedded sand and clay layers to a depth of 62 m where weathered rock was encountered.

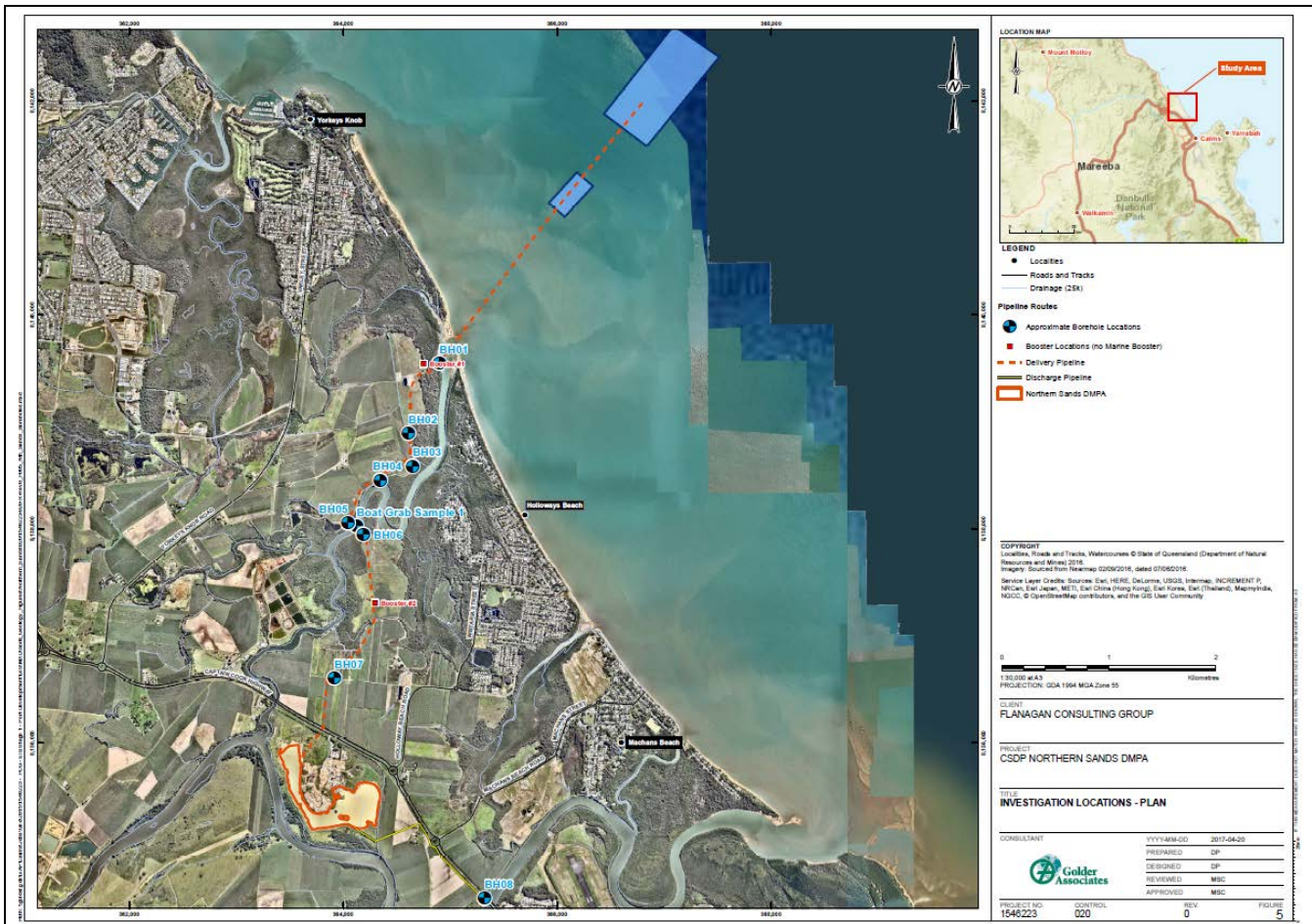
#### **Field Investigations – Northern Sands DMPA**

No additional field investigations of soils on the Northern Sands DMPA were undertaken as the proposed works are limited to construction of bunds from material won on site and placement of soft clay in the void. However, detailed information was collected for the hydrogeological study as documented in **Chapter B6** (Water Resources).

#### **Field Investigations – Delivery Pipeline Corridor**

Field investigations were undertaken in March 2017 along the route of the delivery pipeline corridor as shown on **Figure B1-12**. See also **Photo B1-1** to **Photo B1-4**.





**Figure B1-12** Field investigation locations – delivery pipeline corridor.

**Source:** Appendix Y (Figure 5). A larger version of this figure is included in Appendix Y.

The sampling program included:

- Eight hand auger boreholes: Seven boreholes (BH01 to BH07) were located along the delivery pipeline route and one borehole was located on the discharge pipeline route. The boreholes were positioned within soil units with a higher potential for ASS materials being encountered. Note that boreholes BH03 to BH06 were located in inferred natural soils adjacent to the cane farm headlands on the pipeline route. Borehole BH02 encountered inferred fill materials from the headland. Boreholes BH01, BH07, and BH08 were located in inferred natural soils on the delivery pipeline route.
- Overwater sampling: A sample of soil (Boat Sample 1) was collected from the bed of Richters Creek at the location where the pipeline is proposed to cross the creek.

Detailed findings are included in **Appendix Y**. In general terms the soils encountered along the pipeline routes are consistent with those indicated on the geology, soils and ASS maps (**Figure B1-9** and **Figure B1-11**). Soil properties and ASS potential are summarised below.

**TABLE B1-8 GROUND CONDITIONS – DELIVERY PIPELINE CORRIDOR**

SOIL UNIT (REFER FIGURE B1-10)	RELEVANT BOREHOLE (REFER FIGURE B1-12)	NEAR SURFACE SOIL CONDITIONS	ASS POTENTIAL
Mangrove	BH01, BH04	Soft to very soft clays and loose sands	PASS in top 0.5 m.
Hull	BH06	Loose silty/clayey sands	Acidic soils to 0.5 m, PASS below 3 m
Brosnan		Firm to stiff silty/sandy clays	Acidic soils to 0.5 m, PASS below 3 - 4 m
Liverpool	BH03, BH05, BH07, BH08	Firm to stiff silty/sandy clays	Acidic soils to 0.5 m, PASS below 2 - 3 m

**Source: Appendix Y** (Unlabelled table in s5.0).

From an ASS perspective the following ground conditions are inferred along the delivery pipeline route:

- The first 400 m to 500 m of the route from the mouth of Richters Creek has PASS present at depths between 1 m and the surface. From there to the crossing of Richters Creek, PASS is again present at depths between 1 m and the surface near the creek bank. Away from the creek bank acidic soil conditions (i.e. non PASS) are present from the surface, with PASS generally present within 2 m to 4 m of the surface.
- At the creek crossing PASS is present at depths between 1 m and the surface.
- Between Richters Creek and the Captain Cook Highway, acidic soil conditions (i.e. non PASS) are generally present from the surface with PASS generally present within 2 m to 4 m of the surface.
- Surrounding the Northern Sands pit, acidic soil conditions (i.e. non PASS) are present from the surface, with PASS generally present within 4 m to 5 m of the surface.

The following conditions are inferred along the discharge pipeline route to the Barron River bridge:

- From the Northern Sands pit to the bank of the Barron River, acidic soil conditions (i.e. non PASS) are present from the surface, with PASS generally present within 2 m to 4 m of the surface.
- At the river bank PASS is present at depths between 1 m and the surface.

### **B1.3.3.1 Planning Considerations**

#### **State Planning Policy**

##### Details

The SPP (see **Section B1.3.2.m**) applies to the use of the Northern Sands as a DMPA. Specifically, the following State interests apply to the development as detailed below.

- Economic Growth
  - Mining and extractive resources
    - KRA – resource/processing
    - KRA – separation area
    - KRA – Transport route
    - KRA – transport route separation area
- Environment and Heritage
  - Biodiversity
    - Declared fish habitat area
    - MSES – regulated vegetation (intersecting a watercourse)
    - MSES – regulated vegetation (Lot 2 on RP712954)

- Coastal environment
  - Coastal Management District
- Hazards and Safety
  - Natural hazards risk and resilience
    - Bushfire hazard
    - Coastal hazard area – erosion prone area
    - Coastal hazard area – medium storm tide inundation area
    - Coastal hazard area – high storm tide inundation area
    - Flood hazard area (Level 1 – Queensland floodplain assessment overlay)
- Infrastructure
  - Strategic airports and aviation facilities (Cairns International Airport).

Economic growth, Environment and Heritage and Infrastructure State interests have been incorporated into the CairnsPlan 2016. Accordingly, as assessment against the provisions of the SPP as they relate to extractive resources, biodiversity and strategic airport and aviation facilities are not required where these State interests have been included in the Planning Scheme.

The following State interest has not been included in the CairnsPlan 2016:

- Hazards and safety – natural hazards, risk & resilience (for coastal hazards – erosion prone areas).

Refer to **Chapter B17** (Hazard and Risk).

### **FNQ Regional Plan 2009-2031**

The Far North Queensland (FNQ) Regional Plan 2009-2031 (Department of State Development Infrastructure and Planning 2009) provides a framework with which to manage growth and change land use and development in the region to 2031, and generally applies the Cairns government planning area.

The FNQ Regional Plan 2009-2031 applies to the use of the Northern Sands as a DMPA. The Northern Sands site is identified as being located in the Regional Landscape and Rural Production Area (RLRPA) of the FNQ Regional Plan.

The intent of the RLRPA is to protect land that has regional landscape, rural production or other non-urban values from encroachment by inappropriate development, including urban or rural residential development.

The RLRPA includes land with one or more of the following values:

- good quality agricultural land and other productive rural areas
- natural resources such as mineral and extractive resources and native and plantation forests
- water catchment and groundwater areas
- areas of ecological significance including endangered and of concern ecosystems and Wet tropics World Heritage Area and protected tenures.

Whilst the provisions of the FNQ Regional Plan have been repealed, Cairns Regional Council may take into account the provisions of the FNQ Regional Plan when considering any application for assessable development associated with the Northern Sands DMPA.

### **CairnsPlan 2016**

The CairnsPlan 2016 came into effect on 1 March 2016 and is the Planning Scheme for the Cairns Regional Council local government area. The Planning Scheme sets out the Council's intention for future development in the Planning Scheme area over the next 20 years.

The CairnsPlan 2016 contains the following Zone codes applicable to the Northern Sands DMPA.

- Rural zone code. The remaining Zone codes are not applicable to the development.

The following Development codes are applicable to the Northern Sands DMPA:

- Environmental performance code
- Excavation and filling code.



The remaining Development codes are not applicable to the Northern Sands DMPA.

The site is also affected by a number of Overlays which are applicable to the development. Assessable development associated with the Northern Sands DMPA will be required to be assessed against the relevant overlay code.

### B1.3.4 Tingira Street Project Area

#### B1.3.4.a Location and Site Details

##### Lots Affected

The Tingira Street DMPA site contains one freehold title as shown on **Figure B1-13**. This lot has a total area of approximately 27 ha as detailed in **Table B1-9**.

**TABLE B1-9 LOTS COMPRISING THE TINGIRA STREET DMPA**

LOT AND PLAN	TITLE REFERENCE	AREA (HA)	TENURE	ROAD FRONTAGE
Lot 27 on SP218291		26.52	Freehold	Tingira Street

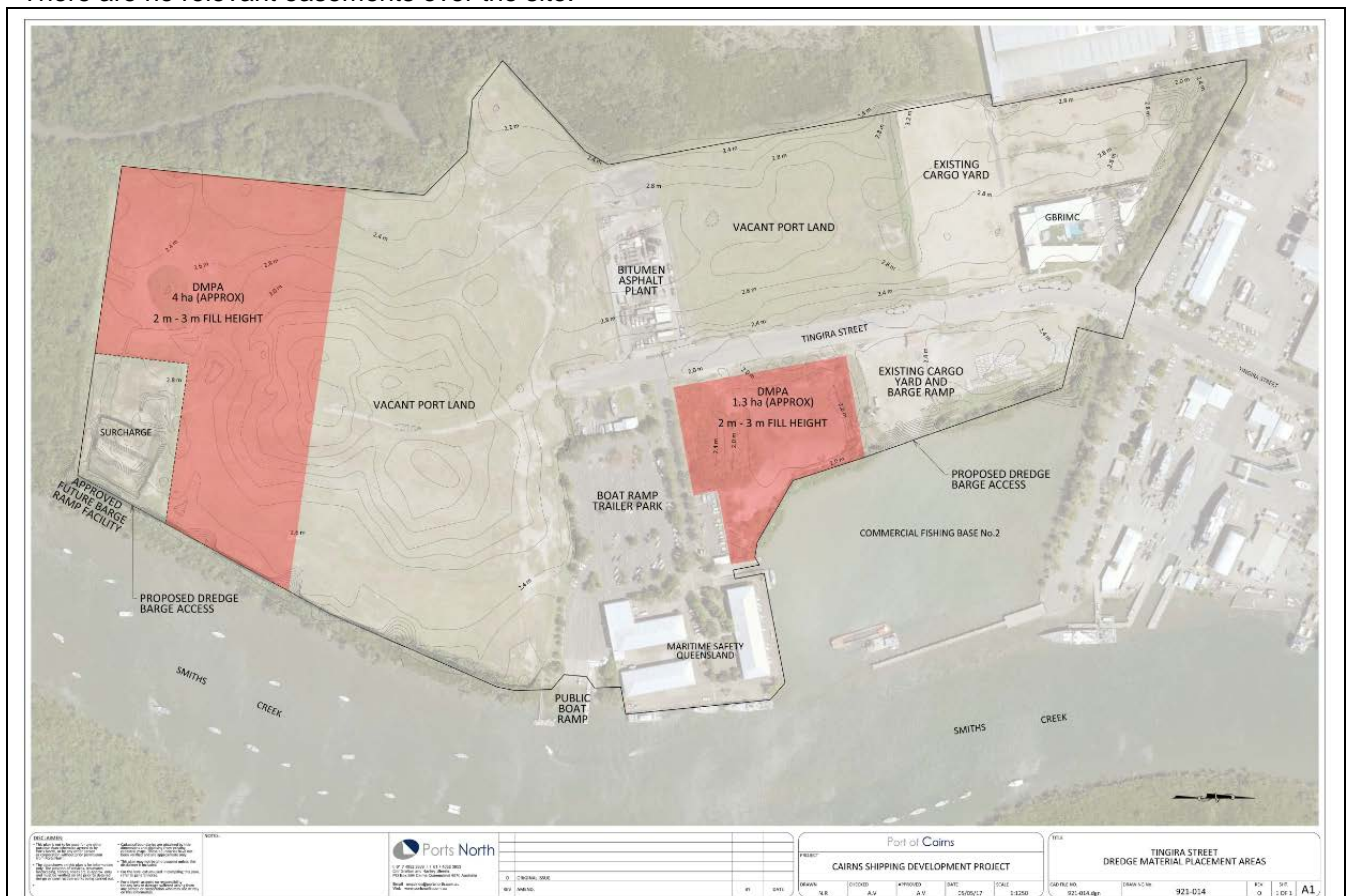
This lot is accessed by Tingira Street as designated above.

Within Lot 27 SP218291 are two DMPA sites (**Figure B1-13**), namely:

- Site 1 (southern site) 4.3 ha (approx.)
- Site 2 (northern site) 1.3 ha (approx.)

##### Reserves and Easements

There are no relevant easements over the site.



**Figure B1-13** Site plan– Tingira Street DMPA.

**Source:** Ports North



#### **B1.3.4.b Land Tenure**

Lot 27 SP218291 is freehold.

#### **B1.3.4.c Site History**

Available historical information for the overall Tingira Street site indicates the following:

- Prior to 1982 the overall Tingira Street site was mangrove wetland.
- In 1982 a bund was constructed around the portion of the site west of the present Tingira Street alignment. After construction of the bund some mangroves were cleared and about 0.5 m of dredged material from Commercial Fisherman's Base No 2 was hydraulically placed within the bunded area.
- In the late 1980s the remainder of the site was cleared of mangroves and imported quarry fill was placed to form and surcharge the proposed alignment of Tingira Street and the area of what is now the Harbours and Marine Base. Excess material from the surcharge was later used as fill in adjacent areas of the site.
- From the early 1990s the Cairns Port Authority began to accept small amounts of soil and pavement materials at the site from the Cairns City Council and building contractors. The Port Authority is also understood to have entered into agreements with several demolition contractors to accept demolition wastes (e.g. concrete rubble and soils). The majority of filling at the site is understood to have occurred between 1994 and 1996.
- From around 2008 various parts of the site were surcharged, with some areas subsequently being developed.

#### **B1.3.4.d General Description**

The Tingira Street DMPA is currently unoccupied land with sparse marine plant regrowth and anthropogenic grassland.

It is set within an urban industrial landscape to the north and borders areas of ecological value to the east, south, and west. The site represents the furthest extent of urban intrusion associated with the southern industrial area of Cairns into the natural landscape of the Trinity Inlet and associated lands.

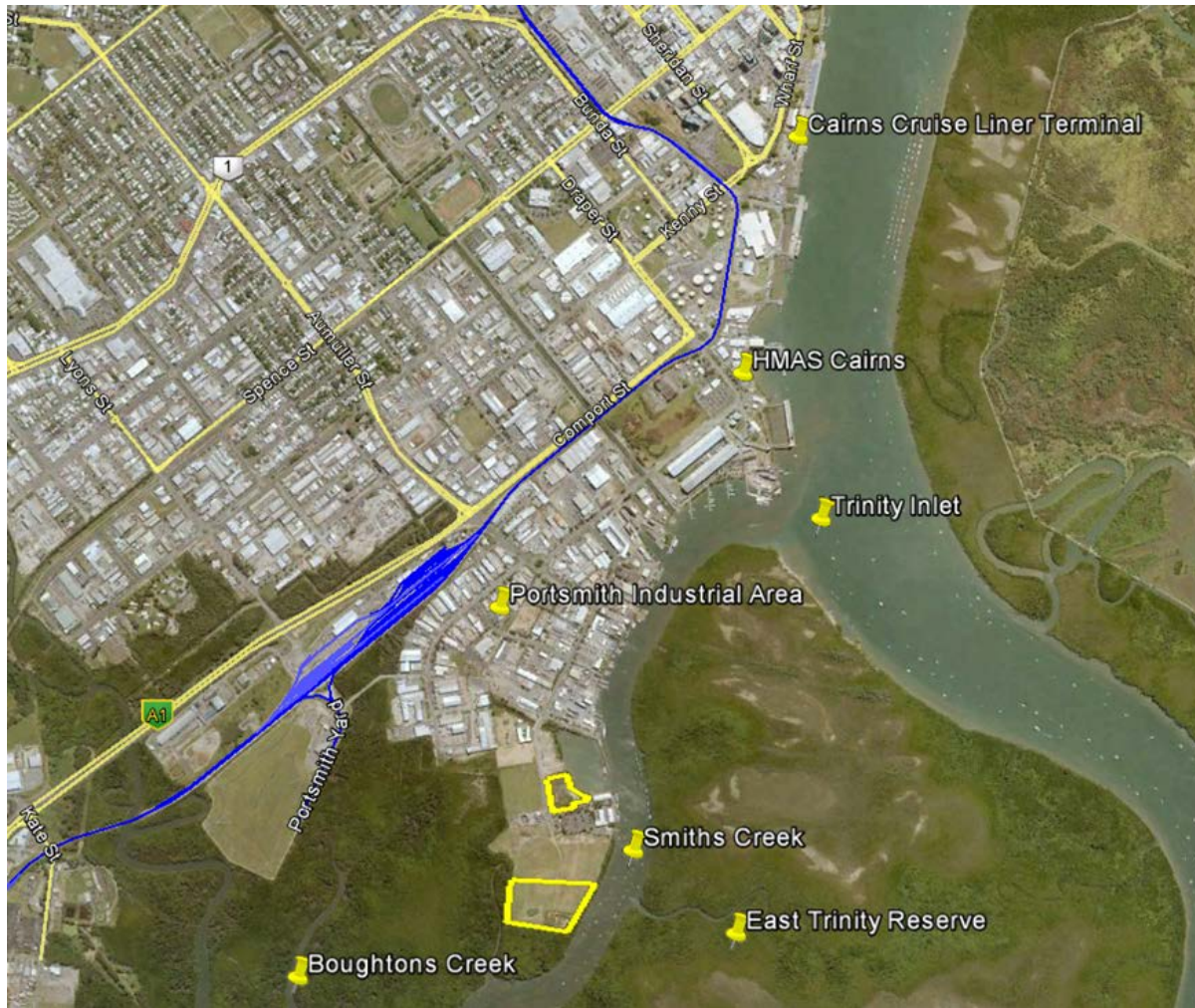
#### **B1.3.4.e Surrounding Land Use**

Tingira Street is a local government controlled road.

Key existing land uses within the immediate vicinity including land uses within the Seaport Local Area include:

- Port of Cairns – port related uses
- Smiths Creek port related uses
- HMAS Cairns Navy Base
- Portsmouth – Woree industrial areas
- pile moorings in Smiths Creek for boats, including some that are used for residential purposes.

**Figure B1-14** shows the key land uses in the Tingira Street Project Area.



**Figure B1-14** Land use in the vicinity of the Tingira Street Project Area.

#### **B1.3.4.f Previously Proposed End Use**

The area to be used as the Tingira Street DMPA was identified in Ports North planning (FCG 2011, 2016) with three identified land use precincts being:

- Marina/Commercial precinct adjacent to the marina basin and east of Tingira Street
- Seaport Business Park on land west of Tingira Street
- Smiths Creek Industrial Park located south of the existing Tingira Street.

Refer to **Figure B1-15** for details.





**Figure B1-15** End use of the Tingira Street DMPA.

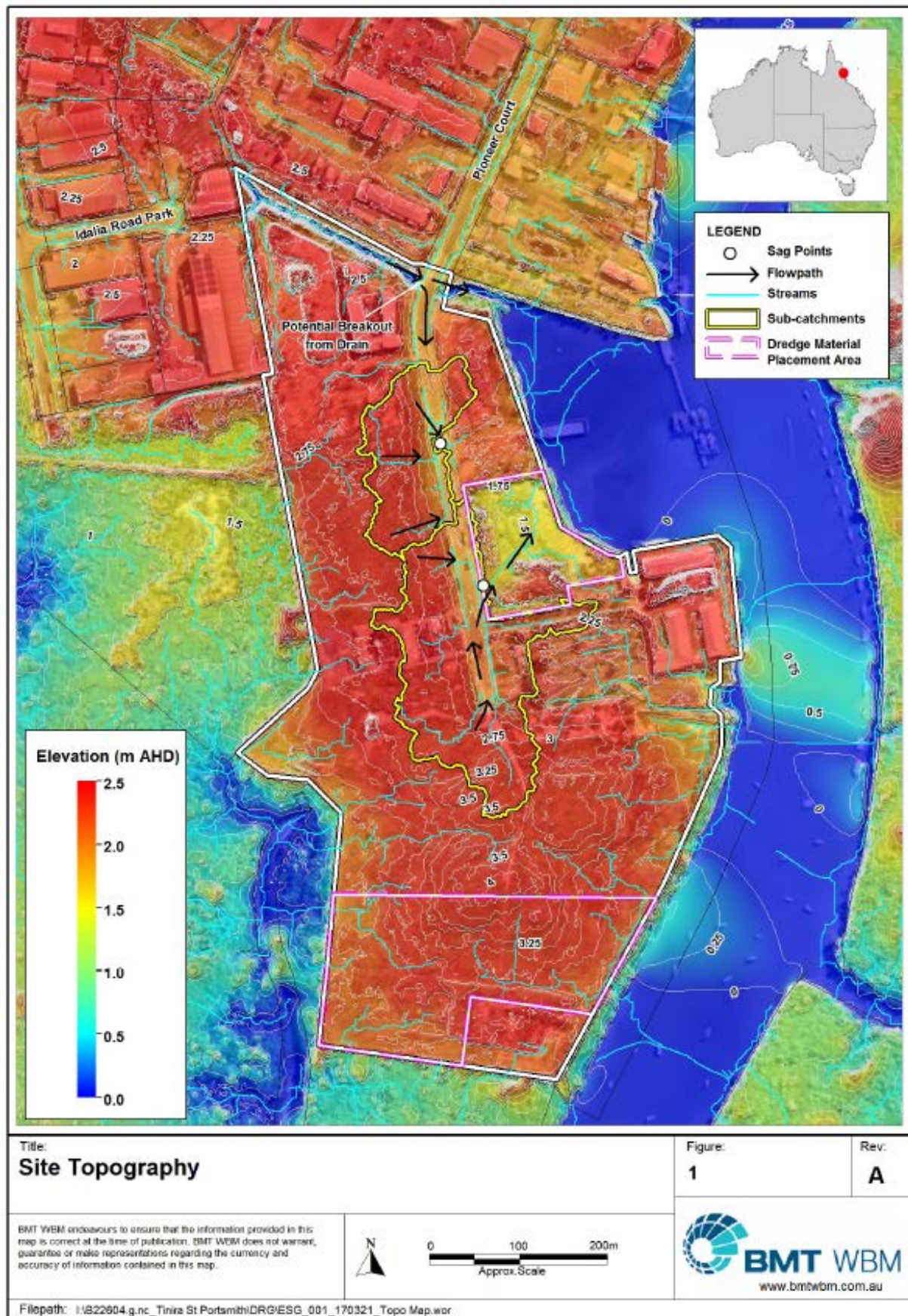
**Source:** FCG (2016).

On this plan, the two Tingira Street DMPA lots are 6 (part), 7, 8 (part), 9 (part), and 3 (part).

#### **B1.3.4.g Topography**

As outlined in **Section B1.3.4.c**, the Tingira Street DMPA site has been formed by reclamation filling. Ground surface levels across the site typically range from about 2.0 m AHD around the boundaries of the site to about 4.0 m AHD in the south central part of the site. Localised lower lying areas with surface levels of about 1.7 m AHD exist within proposed DMPA Site 2. It is noted that surcharge material for the proposed Common Users Barge Facility (CUBF) remains in place adjacent to proposed DMPA Site 1. **Figure B1-16** below is derived from 2008 LiDAR. **Figure B1-19** also shows site levels from a site survey subsequent to the latest filling works.





**Figure B1-16 Elevation – Tingira Street DMPA.**

**Source:** Appendix AL (Figure 1).



DMPA Site 1 is bordered by mangroves to the west and south, Smiths Creek to the east and vacant land to the north. A bund has been constructed along Smiths Creek on the eastern boundary. Surface levels within the mangrove areas are typically around 1.0 m AHD. See **Photo B1-5** below.

DMPA Site 2 is bordered by Tingira Street to the west, an access road and carpark to the south, the basin for Commercial Fisherman's Base No 2 to the east and barge loading facilities to the north. See **Photo B1-6** below.



**Photo B1-5** Tingira Street DMPA Site 1.



**Photo B1-6** Tingira Street DMPA Site 2.

#### **B1.3.4.h Surface Geology**

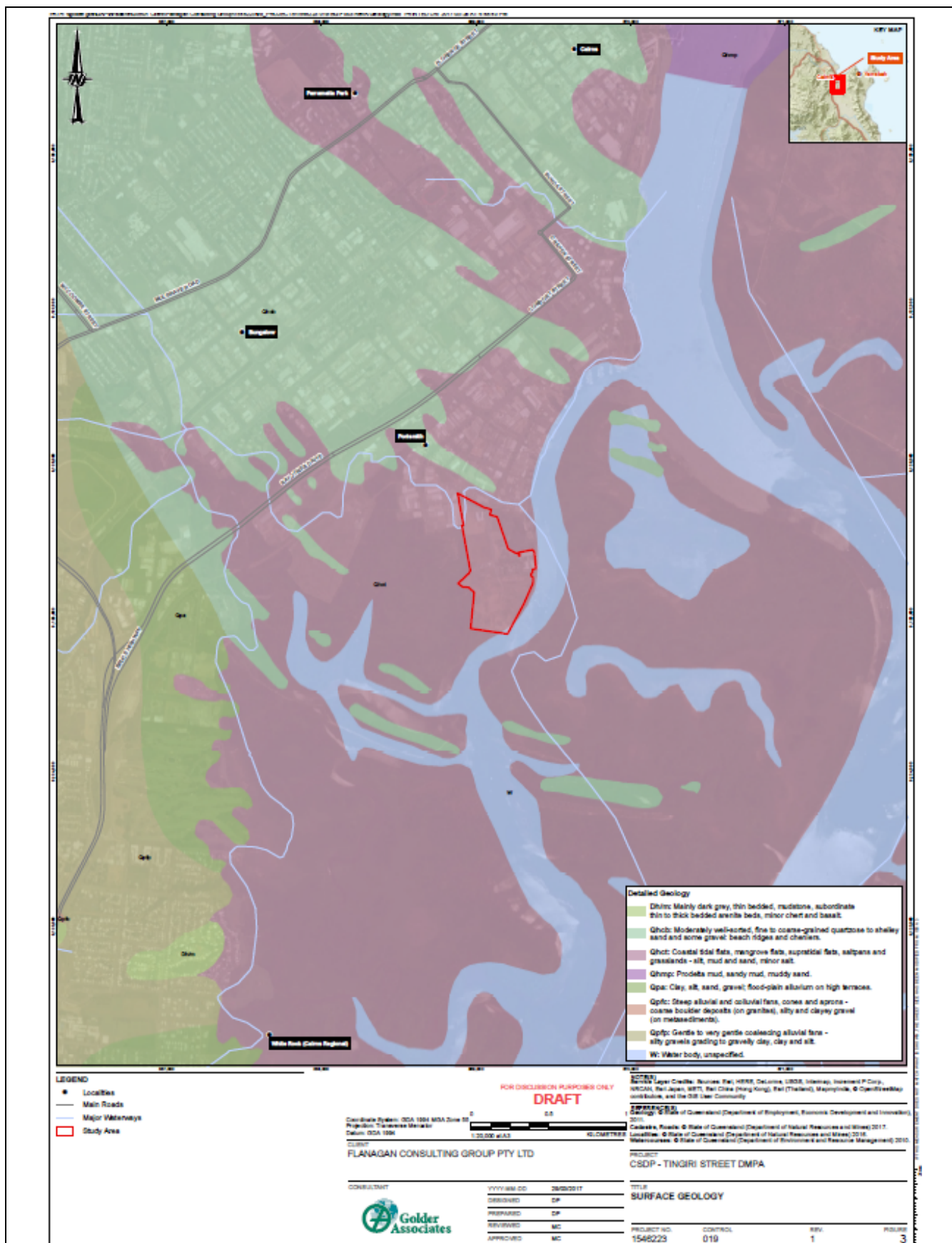
Published geological information from State of Queensland (Department of Employment, Economic Development and Innovation 2011) indicates that the Tingira Street site is underlain by Holocene aged coastal mangrove flats comprising mud, silt and sand. The Holocene aged deposits are underlain by older Pleistocene age consolidated alluvial deposits comprising clays and sands. An extract from the geology mapping showing the surface geology of the Tingira Street area is reproduced as **Figure B1-17**.

#### **B1.3.4.i Soils**

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) Soils of Babinda – Cairns Area 2016 soils map indicates that detailed mapping of soil units has not been carried out in the area of the Tingira Street site. In any case, it is known that the soils now evident are the result of filling with dredge spoil.

#### **B1.3.4.j Acid Sulfate Soil**

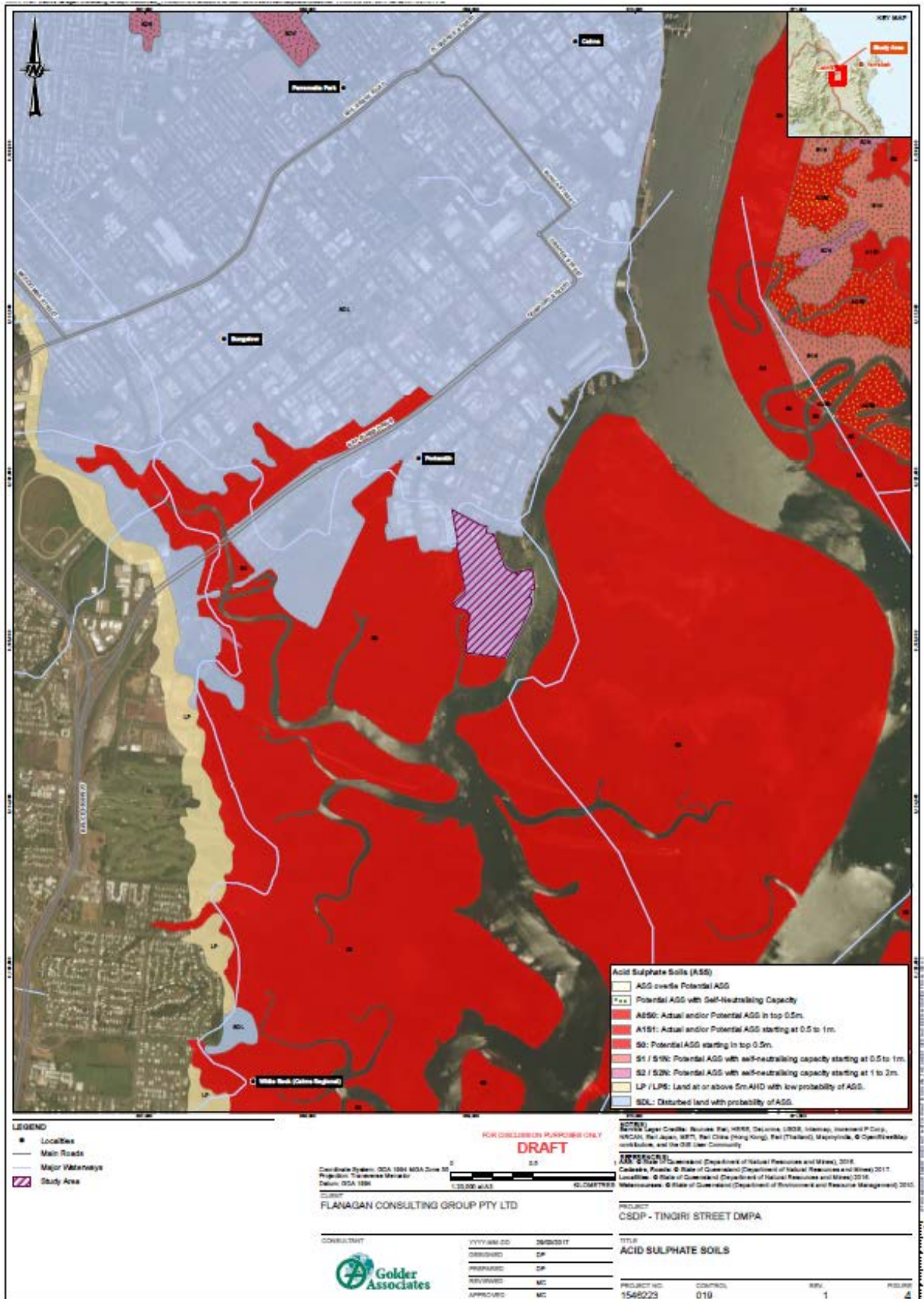
The State of Queensland (Department of Natural Resources and Mines 2016) ASS mapping shows the areas to the west and south of the site to have PASS starting in the top 0.5 m. An extract from the ASS mapping covering the site area and showing the interpreted distribution of PASS is reproduced as **Figure B1-18**. It is noted that the soft clays underlying the reclamation filling at the site are also PASS.



**Figure B1-17** Geology – Tingira Street DMPA.

**Source:** Appendix X (Figure 3). A larger version of this figure is included in Appendix X.





**Figure B1-18 Acid sulfate soils – Tingira Street DMPA.**

**Source: Appendix X** (Figure 4). A larger version of this figure is included in **Appendix X**.

#### **B1.3.4.k Contaminated Land**

The Golder (1998) report included a preliminary evaluation of the contamination status of the site. The results of this preliminary evaluation are summarised below:

- Prior to 1982 the site was mangrove wetland. A bunded area was constructed around the portion of the site west of the present Tingira Street alignment and the mangroves were cleared after this time. About 0.5m of dredged spoil was then hydraulically placed within the bunded area.
- From the early 1990s small amounts of soil and pavement materials from Cairns City Council and building contractors were accepted at the site. Cairns Port Authority (the predecessor of Ports North) also entered into agreements with several demolition contractors to accept demolition wastes (e.g. concrete rubble and soils from about 1994 to 1996).
- Hydrocarbon impacted soils from various locations were remediated on portions of the site from 1994 to 1996. The remediation works were conducted in a controlled manner and the soil was validated on completion of these works.
- From early 1997 to 1998, the site accepted only 'good quality' fill material, although a thin layer of concrete rubble was understood to have been placed in the south west corner of the site during this time.
- Limited sampling and analysis of the site fill materials indicated that the human health risks associated with residual chemicals in the fill materials were considered to be acceptable for a commercial/industrial development.
- Given that a large proportion of the site is likely to be covered by buildings and pavements, and that additional clean fill will be placed over landscape areas, the potential for impacts upon ecological receptors and associated environmental risks was considered to be acceptably low.
- The potential for migration of the residual concentrations of chemicals to groundwater was also considered to be low given that generally low concentrations of contaminants were observed in the fill and given that buildings and pavements are likely to cover the majority of the site and prevent infiltration of rainwater.

Since the Golder (1998) report was written, the guidelines for the assessment and management of contaminated land have been updated. A review of the Golder (1998) report with respect to the more recent guidelines indicates the following:

- The site is still considered to be suitable for future commercial/industrial land use.
- The land parcels forming the overall site are listed on the Environmental Management Register and more recently this has enabled placement of contaminated soil from other areas of the Port. Only soils with contaminant concentrations below current health investigation thresholds for commercial/industrial land use have been accepted from the other Port sites. (**Appendix X**)

In addition to the previous activities described above, soils from the CityPort remediation excavations have been accepted in an area at the southern end of the site from 2007 to date. Only soils with contaminant concentrations below current health investigation thresholds for commercial / industrial land use have been accepted from the CityPort site. The presence of these materials does not alter the above review comments.

#### **B1.3.4.l Geotechnical Conditions**

Previous subsurface investigations have been carried out across the Tingira Street site over the past 30 years. These include the following:

- Investigations for Proposed Harbours and Marine Base and Commercial Fishing Base No.2, Portsmith (Hollingsworth Consultants 1987).
- Geotechnical Investigation Tingira Street Land Development Portsmith, Queensland (Golder Associates 1998).
- Geotechnical Studies – Redevelopment of Cairns Ports Land at Tingira Street, Portsmith (Golder Associates 2008).
- Geotechnical Investigation Common User Barge Facility Stage 1 and Smiths Creek Revetment, Tingira Street, Portsmith (Golder Associates 2013).

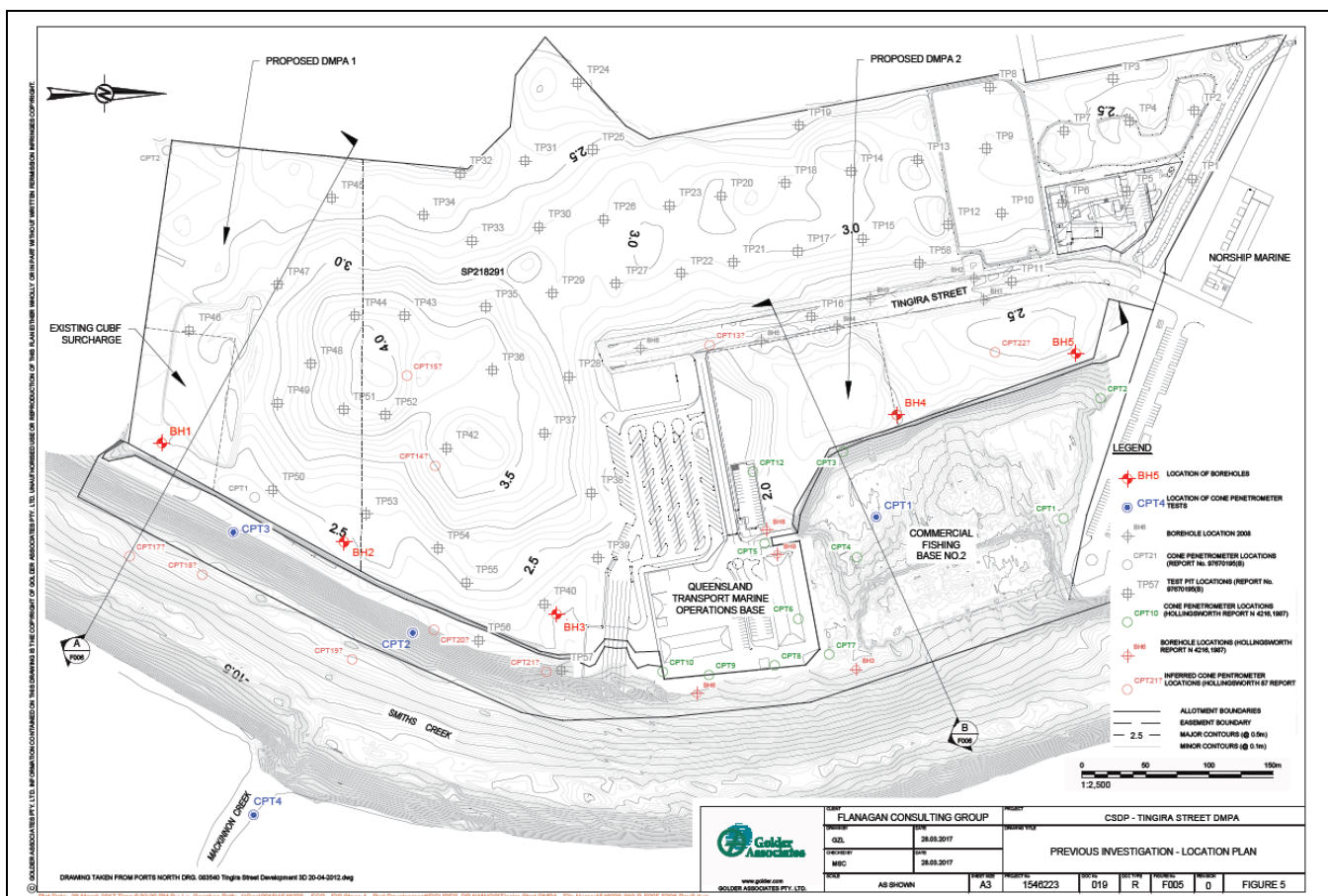
Investigation locations from these previous studies are shown on **Figure B1-19** and inferred geotechnical sections for DMPA 1 and 2 are presented on **Figure B1-20**.



The results of previous investigations indicated that subsurface conditions at the Tingira Street site generally comprise the following units:

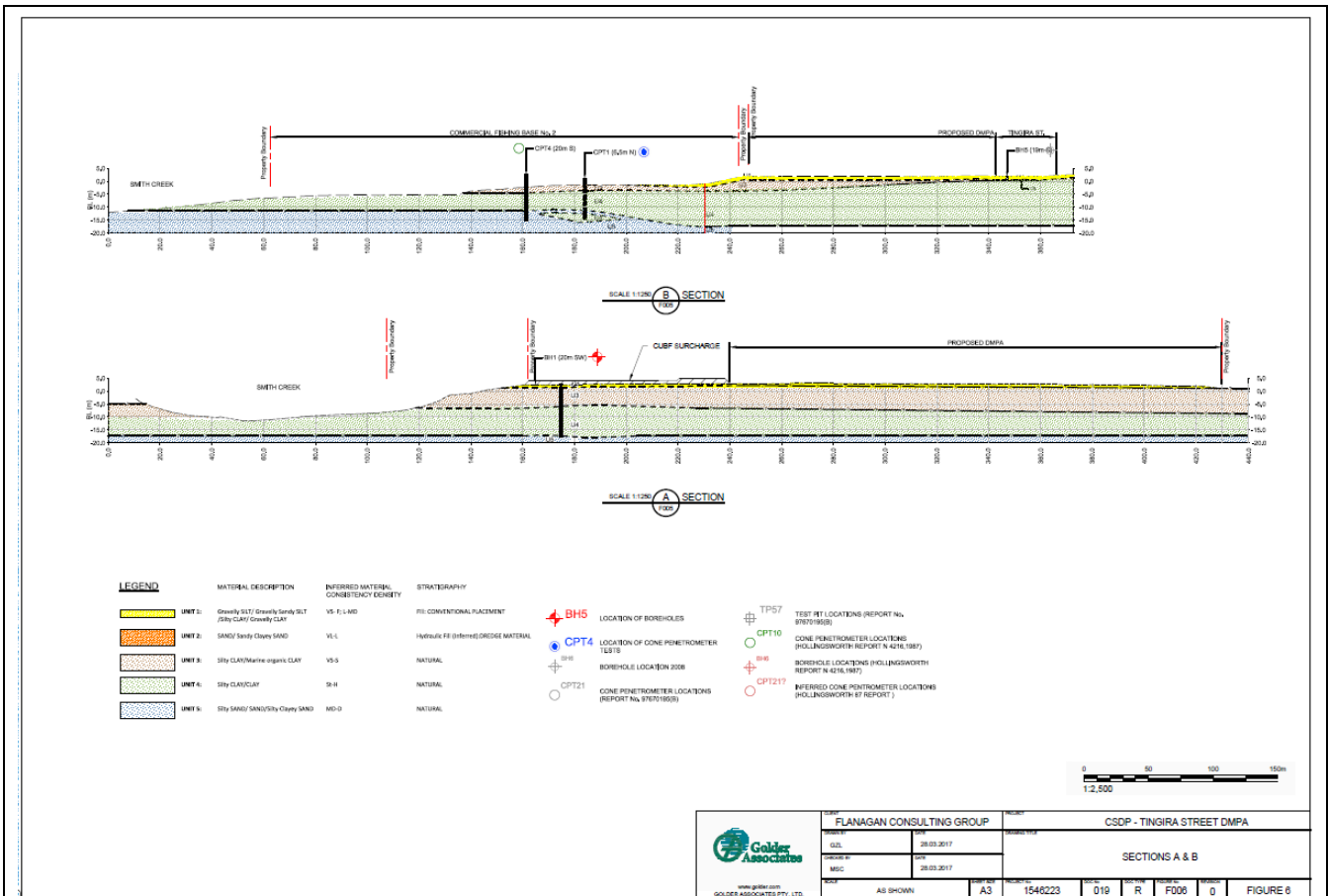
- Unit 1 – Fill materials generally comprising gravelly sandy silts/clays with variable amounts of pavement and building materials. Typically extending from the surface to about RL 0 m; overlying Unit 2.
- Unit 2 – Hydraulic fill materials comprising sand and clayey sand (these materials may not be present in the areas of proposed DMPA 1 and 2).
- Unit 3 – Soft marine clays. Typically extending from about RL 0 m to between about RL -4 m and RL -9 m (note the upper parts of this unit may also include some hydraulically placed soft clay); overlying Units 4 and 5.
- Units 4 and 5 – Stiff to hard silty/sandy clays and medium dense to dense silty/clayey sands. Typically extending from about -4 m AHD and -9 m AHD to greater than -20 m AHD.

Based on the above, the subsurface conditions in the site area are considered to be consistent with the site history, published geology, and ASS mapping.



**Figure B1-19** Site levels and location of test pits.

**Source:** Appendix X (Figure 5). See **Figure B1-20** for cross sections AA and BB. A larger version of this figure is included in **Appendix X**.



**Figure B1-20** Sections through Tingira Street DMPA.

**Source:** Appendix X (Figure 6). Location of sections shown on **Figure B1-19**. A larger version of this figure is included in Appendix X.

### B1.3.4.m Planning Considerations

#### State Planning Policy

In this regard the Tingira Street Project Area is identical to the Landside Works Project Area. See **Section B1.3.2.m**.

#### Far North Queensland Regional Plan

In this regard the Tingira Street Project Area is identical to the Landside Works Project Area. See **Section B1.3.2.m**.

#### CairnsPlan

In this regard the Tingira Street Project Area is identical to the Landside Works Project Area. See **Section B1.3.2.m**.

#### Ports North Land Use Plan

In this regard the Tingira Street Project Area is identical to the Landside Works Project Area. See **Section B1.3.2.m**.

Both Tingira Street DMPA sites are located in the Seaport Local Plan Area and the Waterfront Industry Planning Area (see **Figure B1-4**).

## **B1.3.5 Other Land Use Issues**

### **B1.3.5.a Native Title**

Refer to **Chapter B13** (Cultural Heritage).

### **B1.3.5.b Sensitive Land Uses**

Sensitive land uses are considered to be sensitive receptors to the impacts associated with noise and air pollution. Such uses include residential dwellings, hospitals and other accommodation facilities and childcare and educational establishments. As identified in the discussion above, a number of residential uses exist adjacent to the study area. These are addressed in detail as follows:

- **Chapter B10** (Noise and Vibration)
- **Chapter B11** (Air).

Two protected areas exist within the Northern Sands Project Area, namely:

- the Great Barrier Reef Coast Marine Park (State) – this covers the mouth of Richters Creek and upstream to beyond the crossing of the delivery pipeline corridor and the creek
- the Yorkeys Creek Fish Habitat Area – this covers most of the area of the marine park.

These are discussed in **Chapter B2** (Nature Conservation Areas).

## B1.4 Assessment of Potential Impacts

### B1.4.1 Impact Assessment Methodology

#### B1.4.1.a Risk-based Assessment

The following impact assessment has been undertaken for each of the matters described in the previous chapter. It uses the risk-based process adopted for the Revised Draft EIS as outlined in **Chapter A1** (Introduction) and includes an assessment of the following:

- the magnitude of impacts (consequence) as discussed below
- the duration of impact (from **Chapter A1** (Introduction))
- the likelihood of impact (from **Chapter A1** (Introduction))
- risk level (from **Chapter A1** (Introduction)).

These are considered together to determine the final level of impact risk, which is defined differently for soils and land use. While the above approach applies equally to soils and land use, the two are subtly different and are therefore discussed separately. In particular, each has different:

- consequence descriptors
- risk rating descriptions.

#### B1.4.1.b Soils

In the balance of this chapter, 'Soils' issues are all of those relating to:

- terrestrial topography, geology and soils
- terrestrial land contamination / acid sulphate soils (ASS).

#### Consequence Criteria

Impact consequence criteria are different for each matter under discussion.

**Table B1-10** describes consequences (sometimes referred to as significance criteria). These have been developed specifically for the soils-related topics addressed in this chapter.

**TABLE B1-10 CONSEQUENCE CRITERIA – SOILS**

CONSEQUENCE	CONSEQUENCE DESCRIPTORS
Very High	The impact is considered critical to the decision-making process. Impacts tend to be permanent or irreversible or otherwise long term and can occur over large scale areas.
High	The impact is considered likely to be important to decision-making. Impacts tend to be permanent or irreversible or otherwise long to medium term. Impacts can occur over large or medium scale areas.
Moderate	The effects of the impact are relevant to decision making including the development of environmental mitigation measures Impacts can range from long term to short term in duration Impacts can occur over medium scale areas or otherwise represents a significant impact at the local scale
Minor	Impacts are recognisable/detectable but acceptable. These impacts are unlikely to be of importance in the decision making process. Nevertheless, they are relevant in the consideration of standard mitigation measures. Impacts tend to be short term or temporary and/or occur at local scale.
Negligible	Minimal change to the existing situation. This could include, for example, impacts which are beneath levels of detection, impacts that are within the normal bounds of variation, or impacts that are within the margin of forecasting error.
Beneficial	Remediation of contaminated land.



## Duration of Impacts

**Table B1-11** shows the general approach to classifying the duration of identified impacts. This applies to all topics and is identical to that contained in **Chapter A1** (Project Introduction).

**TABLE B1-11 CLASSIFICATIONS OF THE DURATION OF IDENTIFIED IMPACTS**

RELATIVE DURATION OF IMPACTS	
Temporary	Days to months
Short Term	Up to one year
Medium Term	From one to five years
Long Term	From five to 50 years
Permanent / Irreversible	In excess of 50 years

## Likelihood

Likelihood of risk is described in **Table B1-12** below. This applies to all topics and is identical to that contained in **Chapter A1** (Project Introduction).

**TABLE B1-12 LIKELIHOOD OF IMPACT**

CATEGORY	DEFINITION
Almost Certain	Very likely to occur during construction or the operational phases.
Likely	Likely to occur during construction or operational phases.
Possible	Less than likely to occur but still appreciable with the probability of occurrence rated above 50 percent.
Unlikely	May occur during construction or during the life of the project with the probability of occurrence being below 50 percent, but not negligible.
Highly Unlikely/Rare	Highly unlikely to occur but theoretically possible.

## Risk Matrix

Risk is described as the product of likelihood and consequence as shown in **Table B1-13** below. This applies to all topics and is identical to that contained in **Chapter A1** (Project Introduction).

**TABLE B1-13 RISK MATRIX**

LIKELIHOOD	CONSEQUENCE				
	Negligible	Minor	Moderate	High	Very high
Highly Unlikely/ Rare	Negligible	Negligible	Low	Medium	High
Unlikely	Negligible	Low	Low	Medium	High
Possible	Negligible	Low	Medium	Medium	High
Likely	Negligible	Medium	Medium	High	Extreme
Almost Certain	Low	Medium	High	Extreme	Extreme

## Risk Rating

The rating of risk as assessed above is as shown in **Table B1-14** below. This is unique to soils.

**TABLE B1-14 RISK RATING LEGEND – SOILS**

Extreme Risk	An issue requiring change in project scope; almost certain to result in a 'significant' impact on the environment
High Risk	An issue requiring further detailed investigation and planning to manage and reduce risk; likely to result in a 'significant' impact on the environment
Medium Risk	An issue requiring project specific controls and procedures to manage
Low Risk	Manageable by standard mitigation and similar operating procedures
Negligible Risk	No additional management required

### B1.4.1.c Land Use

In the balance of this chapter, 'Land use' issues are all of those relating to:

- land use
- land tenure.

### Impact Significance / Consequence Criteria

Impact significance / consequence criteria are different for each matter under discussion.

**Table B1-15** describes consequences (sometimes referred to as significance criteria). These have been developed specifically for the land use-related topics addressed in this chapter.

**TABLE B1-15 SIGNIFICANCE / CONSEQUENCE CRITERIA – LAND USE**

CONSEQUENCE	CONSEQUENCE DESCRIPTORS
Very High	Irreversible and significant adverse change to the function or objectives of current land uses or values Significant conflict with the SPP or the Ports North Seaport LUP Permanent or total loss of income and livelihood to residents or commercial activities in the study area Loss of a community facility of regional value
High	Medium to long-term impact on the function or objectives of current land uses or values, although impact is reversible over time Significant conflict with an aspect of the SPP, local planning policy, or the Ports North Seaport LUP that may be overcome Permanent displacement or relocation of a number of residences or businesses Relocation of a community facility of local value to a less optimal location
Moderate	Short to medium-term impact on an existing land use or its values Some conflict with an existing local planning policy or the Ports North Seaport LUP, although the project generally meets overall objectives Temporary disruption of land uses, with minimal loss of productivity or relocation of residences Temporary loss of a community facility of local value
Minor	Temporary and minor impact to existing land uses Minor conflict with an existing local planning policy or the Ports North Seaport LUP Minor disruption to a community facility
Negligible	No change to existing land uses or values No conflict with an existing planning policy or the Ports North Seaport LUP No disruption to use of a community facility

CONSEQUENCE	CONSEQUENCE DESCRIPTORS
Beneficial	Improvement in the ability to use land for its intended purposes, or development that meets the desired intent of strategic and statutory regulation or the Ports North Seaport LUP Improved access to a community facility Improved facilities and opportunities for commercial activity

### Duration of Impacts

Duration of impact is described in **Table B1-11** above. This applies to both soils and land use.

### Likelihood

Likelihood of risk is described in **Table B1-12** above. This applies to both soils and land use.

### Risk Matrix

Risk is described as the product of likelihood and consequence as shown in **Table B1-13** above. This applies to both soils and land use.

### Risk Rating

The rating of risk as assessed above is as shown in **Table B1-14** below. This is unique to land use. In considering this risk rating, it must be appreciated that conflict with a specific land use planning instrument is not necessarily a serious impact or an undesirable outcome – any new land use that was not contemplated by a planning instrument is likely to be in contravention of it. The land use risk assessment undertaken for this chapter therefore focuses on high level planning principles and in particular, any change to land use that creates likely conflicts with adjacent uses.

**TABLE B1-16 RISK RATING LEGEND – LAND USE**

Extreme Risk	An issue requiring change in project scope; almost certain to result in a 'significant' impact on the SPP or the Ports North Seaport LUP Leads to unacceptable conflicts with adjacent land uses
High Risk	An issue requiring further detailed investigation and planning to manage and reduce risk; likely to result in a 'significant' impact on the SPP or the Ports North Seaport LUP Leads to highly undesirable conflicts with adjacent land uses
Medium Risk	An issue requiring project specific controls and procedures to manage Requires compensation in the case of undesirable conflicts with adjacent land uses
Low Risk	Manageable by standard mitigation and similar operating procedures. No conflicts with adjacent land uses
Negligible Risk	No additional management required
Beneficial	Beneficial impacts on all instruments, policies, and principle

#### B1.4.1.d The Role of Mitigation

In accordance with the adopted impact assessment process, impacts are assessed in **Section B1.4** in the absence of mitigation. Recommended mitigation actions are described in **Section B1.5**, and mitigated impacts assessed in **Section B1.6**. Certain actions (i.e. such as standard construction management) are assumed to be in-scope (i.e. not a mitigation recommendation). See 'Assumptions' below.

### B1.4.1.e Assumptions

The following assumptions are used for the impact assessment process:

- Standard construction management will be undertaken. This is in-scope (i.e. not a mitigation recommendation) and includes.
  - soil and water management (i.e. an Erosion and Sedimentation Control Plan will be prepared to guide all earthworks)
  - other standard environmental management actions (i.e. control of construction traffic, dust, noise etc.)
  - implementation of ASS Management Plan
  - investigation into land identified on the Contaminated Land Register or Environmental Land Register and preparation and implementation of a management plan to ensure contaminated soils are not dispersed.
- There will be a 20 m buffer between the edge of the bunds and the mangrove vegetation at Tingira Street study area.
- End uses are as described in **Section B1.1.3**. These are critical to an appreciation of impacts.

These measures are incorporated in **Chapter C1** (Construction Environmental Management Plan)

## B1.4.2 Landside Works Project Area

### B1.4.2.a Soils

#### Discussion

As noted, the Landside Works Project Area is excluded from CRC's Acid Sulfate Soils Overlay Map. However, due to the elevation of the land any insitu soils could be ASS / PASS.

Three sites within the Project Area are listed on the EMR and these are likely to be affected by contaminants. It is common for a working port of 100 years operation to be subject to possible contamination. In the northern area, most potentially contaminating activities have ceased and the area has been or is scheduled for remediation, while the southern area (where the additional fuel storage and associated pipeline is proposed) is on the CLR (i.e. subject to ongoing use for the environmentally relevant activities of fuel storage).

Earthworks will be limited to trench excavations for the establishment of a fuel pipeline between the wharves and the fuel farm and minor excavations will be required to construct the proposed sewerage connection.

#### Risk Assessment

**Table B1-17** sets out the results of the risk assessment for soils issues. This assumes that only standard mitigation (i.e. statutory matters including those measures listed in **Section B1.4.1.e**). These statutory measures include the following (i.e. are not considered to be additional mitigation):

- soil and water management (i.e. an Erosion and Sedimentation Control Plan will be prepared to guide all earthworks)
- other standard environmental management actions (i.e. control of construction traffic, dust, noise etc.)
- implementation of an ASS Management Plan to cover excavation
- investigation into land identified on the CLR or EMR and preparation and implementation of a management plan to ensure contaminated soils are not dispersed.

**TABLE B1-17 RISK ASSESSMENT (SOILS) – LANDSIDE WORKS PROJECT AREA**

PRIMARY IMPACTING PROCESSES	SIGNIFICANCE OF IMPACT	LIKELIHOOD OF IMPACT	RISK RATING
Exposure of actual acid sulphate soils.	Negligible	Likely	Negligible
Disturbance and dispersal of contaminated soils.	Negligible	Likely	Negligible
Erosion and sedimentation resulting from excavation works.	Negligible	Likely	Negligible
Remediation of contaminated land	Beneficial	Almost certain	Beneficial



As noted above, all impacts are readily managed by normal best practice and are considered to be negligible.

#### **B1.4.2.b Land Use**

##### **Discussion**

Land uses predominantly affected by the project are those located in the immediate footprint of the project (i.e. the shipping channel, fuel pipeline and storage facility and wharf/infrastructure upgrades), as described in **Chapter A3** (Project Description). These uses, namely port operations and marine and boating activities, will experience some disruption during excavations for the fuel pipeline, construction of the wharf and land-based infrastructure upgrades and works to facilitate the dredging (e.g relocation on Navigation Aides). Moving of recreational fishing and dwelling boats in the Marlin Marina and Trinity Inlet may also be required to provide access to dredging. Ecological impacts of the land and marine-based works are addressed in **Chapter B8** (Terrestrial Ecology) and **Chapter B7** (Marine Ecology) respectively.

Despite temporary inconveniences which are considered to be of minor impact, upon completion of the works and during the operation, the project will have a positive impact on these port and marine uses through the expansion of the cruise ship facilities and improvements to the wharf infrastructure. Additionally, works to the wharves will provide long-term protection of the heritage listed wharf structure whilst enabling ongoing use at an increased capacity.

Residents and patrons of surrounding residences, including those in short-term accommodation and commercial establishments may experience reduced levels of amenity due to periodic minor increases in noise exposure from the project's construction, operational activities or associated vehicular traffic. However, given that construction hours will be scheduled to abide by applicable noise management restrictions and that land uses adjacent to the proposed works are predominantly short-term tourism accommodation, retail or office uses (with limited permanent accommodation), predicted noise impacts on to occupants of surrounding land uses are considered to be low. Noise impacts are discussed in **Chapter B10** (Noise and Vibration) while emissions are assessed in **Chapter B11** (Air). Impacts on visual amenity are discussed in **Chapter 12** (Landscape and Visual).

The increase in traffic volumes associated with the construction and operational phase of the project are considered to be minor and no upgrades for traffic (with the exception of management measures to achieve a more efficient use of existing infrastructure) are required as a result of the project. Traffic impacts are discussed in **Chapter B14** (Transport).

General disturbance to local residents from increased operational activity at the port can be minimised by regulating operational hours for loading/unloading activities for ship supplies. As such, this impact is considered to be negligible.

Also, because of the complementary land use planning for this locality, expectations of land use, and land use change are now well known and the reasonable amenity expectations of those living or working in the area, or those intending to live, are well entrenched. There is nothing about the proposed works that cuts across those expectations.

In terms of land use, the proposed wharf upgrades and other works in the Landside Works Project Area are considered compatible with planned development in the Ports North Land Use Plan, specifically the Cityport Local Area Plan. Other impacts listed above are dealt with in the identified chapters:

- **Chapter B7** (Marine Ecology)
- **Chapter B8** (Terrestrial Ecology)
- **Chapter B10** (Noise and Vibration)
- Chapter B11 (Air)
- **Chapter 12** (Landscape and Visual)
- **Chapter B14** (Transport).

##### **Risk Assessment**

**Table B1-18** sets out the results of the risk assessment for land use issues (i.e. does not include matters addressed in other chapters).

**TABLE B1-18 RISK ASSESSMENT (LAND USE) – LANDSIDE WORKS PROJECT AREA**

PRIMARY IMPACTING PROCESSES	SIGNIFICANCE OF IMPACT	LIKELIHOOD OF IMPACT	RISK RATING
Conflict with State Planning Policy or associated planning principles	Beneficial	Almost certain	Beneficial
Conflict with FNQ Regional Plan 2009-2031 or associated planning principles	Beneficial	Almost certain	Beneficial
Conflict with CairnsPlan 2016 or associated planning principles	Beneficial	Almost certain	Beneficial
Conflict with Ports North Seaport LUP or associated planning principles	Beneficial	Almost certain	Beneficial

All of the potential impacts are assessed as being beneficial. This is because all works in the Landside Works Project Area are compatible with and lead to implementation of planned development in the Ports North LUP, specifically the Cityport Local Area Plan. The LUP was created within the context of the SPP. Specifically, the State interest for Strategic Ports such as Cairns involve protecting the operation of strategic ports and enabling their growth and development.

### B1.4.3 Northern Sands Project Area

#### B1.4.3.a Soils

##### Discussion

Potential impacts relating to soils resulting from construction, operation and removal of the delivery and discharge pipelines include the following:

- Instability on the banks of Richters Creek or the Barron River resulting in ground displacement into the waterway.
- Instability on the banks of Richters Creek or the Barron River resulting in disturbance of PASS materials.
- Erosion on the banks of Richters Creek or the Barron River resulting in sediment discharge into the waterway.
- Earthworks required during construction of the pipeline resulting in disturbance of PASS materials and possibly generation of acidic water.
- Settlement and/or failure of pipeline support foundations, possibly resulting in disturbance of PASS materials and possibly generation of acidic water.
- Settlement and/or failure of pipeline support foundations, possibly resulting in burst or leaking pipelines.

Engineered crane pads and pipe support pads will probably be required in some areas. This will likely mitigate potential impacts related to soft ground conditions (e.g. instability and/or settlement). It is noted that all of the other impacts are also likely to be able to be mitigated. However, in relation to PASS impacts it is important to note that when PASS is exposed to oxygen by disturbance (via excavation or displacement) or by drainage (via dewatering or other means of lowering the water table), pyrite can oxidise and form sulfuric acid when combined with water. Sulfuric acid can leach out of these affected soils and strip metals (including iron, aluminium and heavy metals) from the surrounding soils. Acidic and metals impacted water can migrate into surface waters and groundwater.

These processes can lead to degradation of terrestrial vegetation through:

- stunting of root growth
- increased toxicity from higher concentrations of aluminium, iron and manganese
- reduced plant minerals and nutrients
- reduced resistance to pathogen attack.

Longer term impacts may include species die off and changes to vegetation cover (domination by more acid tolerant species).

The discharge of acidic water to estuarine environments may cause the following impacts:

- Increased acidity and increased iron and aluminium concentrations may be toxic to some aquatic organisms and may cause fish diseases (e.g. red spot).
- Iron and aluminium precipitates can affect water quality and coat stream banks, benthic (sediment-dwelling) organisms and aquatic vegetation.
- Aquatic vegetation communities may change to become dominated by acid tolerant species.
- Deoxygenated water may also result from the secondary oxidation of the Fe<sup>2+</sup> consuming oxygen and lowering the level of dissolved oxygen in surface waters.

Acidic waters can also weaken concrete and steel infrastructure such as culverts, pipes and piles.

### Risk Assessment

**Table B1-19** sets out the results of the risk assessment for soils issues. This assumes that only standard mitigation (i.e. statutory matters including those measures listed in **Section B1.4.1.e**). Note that additional potential impacts on groundwater are dealt with in **Chapter B6** (Water Resources).

**TABLE B1-19 RISK ASSESSMENT (SOILS) – NORTHERN SANDS PROJECT AREA**

PRIMARY IMPACTING PROCESSES	SIGNIFICANCE OF IMPACT	LIKELIHOOD OF IMPACT	RISK RATING
Instability on the banks of Richters Creek or the Barron River resulting in ground displacement into the waterway	Moderate	Possible	Medium
Instability on the banks of Richters Creek or the Barron River resulting in disturbance of PASS materials	Moderate	Possible	Medium
Erosion on the banks of Richters Creek or the Barron River resulting in sediment discharge into the waterway	Minor	Unlikely	Low
Earthworks required during construction of the pipeline resulting in disturbance of PASS materials	Minor	Possible	Low
Disturbance of PASS results in acidic water being generated	Moderate	Unlikely	Low
Settlement and/or failure of pipeline support foundations, possibly resulting in burst or leaking pipelines	Moderate	Unlikely	Low

**Source:** Appendix Y (Table 6).

All of the potential impacts are assessed as being temporary or short term.

Mitigation of these impacts is possible as detailed in **Section B1.5.2.b**.

### B1.4.3.b Land Use

#### Discussion – DMPA

The proposed construction and operation of the Northern Sands DMPA and associated pipelines are not specifically contemplated by existing planning.

Land uses predominantly affected by the operation of Northern Sands as a DMPA are those located in the immediate vicinity of Northern Sands. These uses, predominantly agricultural, are not expected to experience any impacts arising from the placement process and associated infrastructure development and demobilisation. Operations at Northern Sands are considered high impact industry uses and the short-term use of the site for a DMPA is considered consistent with the high impact industry uses currently operating on the land.

#### State Planning Policy

Regarding the SPP, *Economic growth, Environment and heritage*, and *Infrastructure* State interests have been incorporated into the CairnsPlan 2016. Accordingly, as assessment against the provisions of the SPP as they relate to extractive resources, biodiversity and strategic airport and aviation facilities are not required where these State interests have been included in the Planning Scheme.

The following State interest has not been included in the CairnsPlan 2016:

- Hazards and safety – natural hazards, risk & resilience (for coastal hazards – erosion prone areas).

The subject land is located in a coastal hazard area – erosion prone area. Accordingly an assessment against Part E – Interim development assessment requirements of the SPP is required as they relate to any assessable development associated with the Northern Sands DMPA.

#### FNQ Regional Plan 2009-2031

Whilst the provisions of the FNQ Regional Plan have been repealed, Cairns Regional Council may consider the provisions of the FNQ Regional Plan when considering any application for assessable development associated with the Northern Sands DMPA. It is considered that the placement of dredge material at the Northern Sands site is consistent with the existing use of the land for high impact industry uses.

#### CairnsPlan 2016

The Northern Sands DMPA is subject to CairnsPlan's Rural zone code.

The proposal does not result in a new use being conducted on the land and is considered compatible with the local planning provisions. As such, the impact of the proposed placement activities at Northern Sands in regards to local planning provisions is neutral (i.e. no change). When the economic benefits of the expenditure incurred by Ports North in securing and utilising the site are considered, a better assessment of impacts is 'beneficial'.

Assessable development associated with the use of the Northern Sands site for a DMPA such as Operational Works will require consideration of state and local planning instruments as detailed in **Chapter A4** (Legislation and Approvals) and this includes a number of overlay codes.

#### Other Matters

In addition, the construction of the bunds required to reduce the risk of mobilisation of placed dredged material in the short involves the possibility of flood effects (afflux) being experienced outside the boundary of the Northern Sands property. This is discussed in detail in **Chapter B17** (Hazard and Risk) where it is concluded that the risk is low. This is not considered further in this chapter.

#### **Risk Assessment – DMPA**

**Table B1-18** sets out the results of the risk assessment for land use issues for the Northern Sands DMPA.

**TABLE B1-20 RISK ASSESSMENT (LAND USE) – NORTHERN SANDS DMPA**

PRIMARY IMPACTING PROCESSES	SIGNIFICANCE OF IMPACT	LIKELIHOOD OF IMPACT	RISK RATING
Conflict with State Planning Policy or associated planning principles	Negligible	Almost certain	Low
Conflict with FNQ Regional Plan 2009-2031 or associated planning principles	Negligible	Almost certain	Low
Conflict with CairnsPlan 2016 or associated planning principles	Negligible	Almost certain	Low
Conflict with Ports North Seaport LUP or associated planning principles	N/A	N/A	N/A

All of the potential impacts are assessed as being low. Mitigation is not required.

#### **Discussion – Delivery Pipeline Corridor**

As noted above, the proposed construction and operation of the Northern Sands DMPA and associated pipelines are not contemplated by existing planning.

Land uses predominantly affected by the construction of the delivery pipeline are those located in the immediate footprint of pipeline. These uses (agricultural) may experience some disruption while the pipeline is being constructed.

Residents in nearby farming dwellings and those located on local roads may experience reduced levels of amenity due to periodic minor increases in noise exposure from the pipeline construction or associated vehicular traffic. This is assessed in **Chapter B10** (Noise and Vibration) and not considered further in this chapter.



The increase in traffic associated with the construction of the pipeline is minor and will be for a short period. Following construction, vehicular traffic associated with the pipeline will be limited to maintenance vehicles.

#### State Planning Policy

As described above, all *Economic growth*, *Environment and heritage*, and *Infrastructure* State interests have been incorporated into CairnsPlan (and assessment against the provisions of the SPP as they relate to extractive resources, biodiversity and strategic airport and aviation facilities are not required where these State interests have been included in the Planning Scheme). Also as noted, Hazards and safety – natural hazards, risk & resilience (for coastal hazards – erosion prone areas) has not been included in CairnsPlan. The delivery pipeline corridor is located in a coastal hazard area – erosion prone area and an assessment against Part E – Interim development assessment requirements of the SPP is required as they relate to any assessable development associated with the Northern Sands delivery pipeline.

#### FNQ Regional Plan 2009-2031

As for the DMPA - it is considered that the placement of dredge material at the Northern Sands site is consistent with the existing use of the land for high impact industry uses and that the delivery pipeline is minor and ancillary to this use.

#### CairnsPlan 2016

Like the DMPA, the Northern Sands delivery pipeline corridor subject to CairnsPlan's Rural zone code.

The overall project is considered compatible with the local planning provisions and as such the impact of the pipeline in regards to local planning provisions is negligible. While as part of the overall CSD Project, the impacts are considered to be 'beneficial', there will be minor short-term impacts on amenity along the corridor and these are given preference in the assessment.

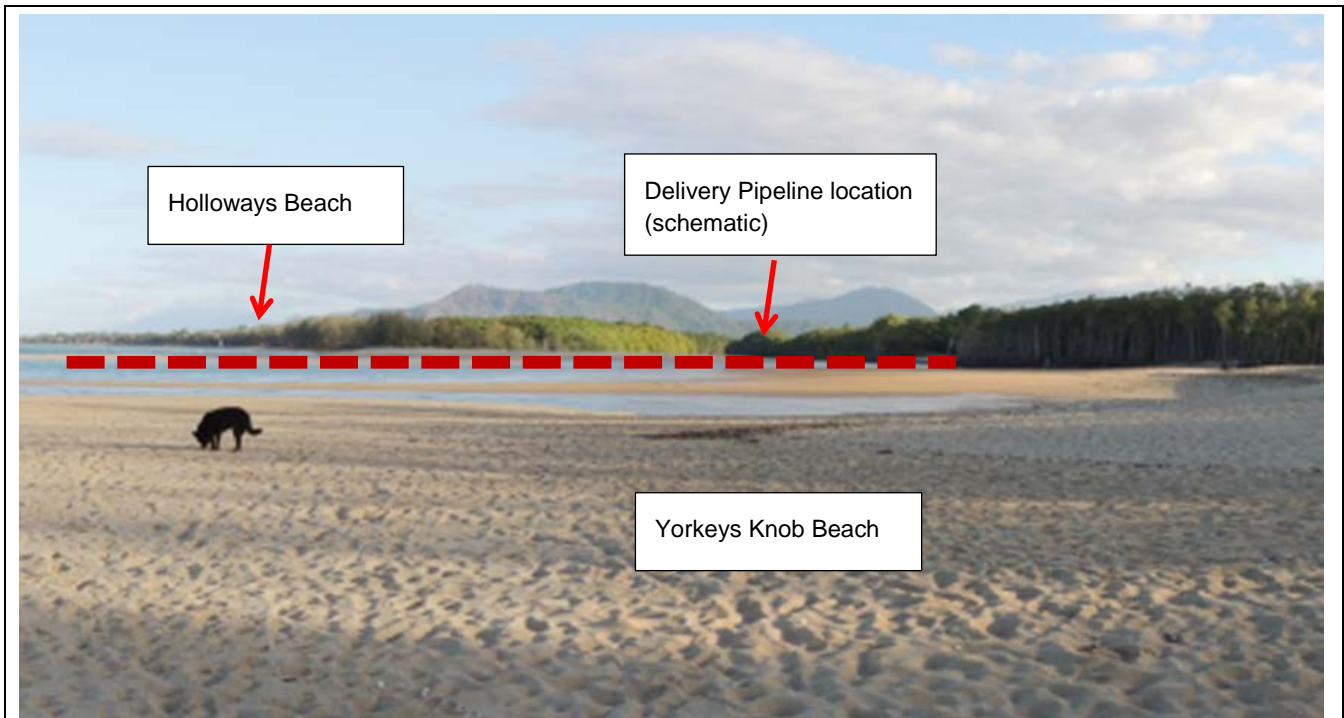
Assessable development associated with the use of rural lands for the short term pumping campaign such as Operational Works will require consideration of state and local planning instruments as detailed in **Chapter A4** (Legislation and Approvals) and this includes a number of overlay codes.

#### Other Matters

The main impacts of the delivery pipeline infrastructure are amenity issues at the mouth of Richters Creek. The proposed site for landfall of the delivery pipeline is at the mouth of Richters Creek near its confluence with Yorkeys Creek. Public access to the foreshore in the vicinity is as follows (see **Photo B1-7**):

- Holloways Beach: foot access to the southern side of the mouth of Richters Creek is available from the south only via the Holloways Beach Township, either along the beach itself or via the footpath within the dunal vegetation.
- Yorkeys Knob Beach: foot access to the northern side of the mouth of Richters Creek is available from the north only via the Yorkeys Knob Township, along the beach itself.
- Richters Creek can be crossed on foot from Holloways Beach to Yorkeys Knob Beach during very low tides but this is not a common occurrence.
- There is no physical public access to the foreshore abutting the site at Lot 100 NR3818 although there is an unformed esplanade along the eastern boundary of this lot. The land between Lot 100 and Richters Creek is Crown land and forms part of the Great Barrier Reef Coast Marine Park (state). It is also part of the Yorkeys Creek FHA.

The area is largely devoid of infrastructure and is in a remote setting used for informal active and passive recreation. Cairns Regional Council undertakes dredging for beach replenishment in the mouth of Richters Creek every couple of years. This involves a floating barge that delivers to trucks that cart the sand along a track located in the foreshore vegetation on the Holloways Beach side. Such use temporarily impinges on the remoteness of the area.



**Photo B1-7** View looking south from Yorkeys Knob Beach towards Richters Creek mouth.

Photo: D Rivett (2014). Pipeline route will run from left to right across the sandbar.

The works will not prevent access or interfere with use of the beach. However, as concluded in the **Chapter B12** (Landscape and Visual), they will be visible and will detract from amenity.

#### **Risk Assessment – Delivery Pipeline**

**Table B1-18** sets out the results of the risk assessment for land use issues for the Northern Sands delivery pipeline corridor.

**TABLE B1-21 RISK ASSESSMENT (LAND USE) – NORTHERN SANDS DELIVERY PIPELINE CORRIDOR**

PRIMARY IMPACTING PROCESSES	SIGNIFICANCE OF IMPACT	LIKELIHOOD OF IMPACT	RISK RATING
Conflict with State Planning Policy or associated planning principles	Negligible	Almost certain	Low
Conflict with FNQ Regional Plan 2009-2031 or associated planning principles	Negligible	Almost certain	Low
Conflict with CairnsPlan 2016 or associated planning principles (i.e. amenity)	Minor	Almost certain	Medium
Conflict with Ports North Seaport LUP or associated planning principles	N/A	N/A	N/A

At a high level (i.e. in terms of overall land use outcomes) most impacts associated with the delivery pipeline are those accruing to the CSD Project as a whole and these are beneficial. However, there will be short- term low and medium risk amenity impacts associated with the construction and operation of the delivery pipeline.

As noted in **Section B1.5.2**, mitigation of adverse impacts is feasible.

## B1.4.4 Tingira Street Project Area

### B1.4.4.a Soils

#### Discussion

Potential impacts relating on soils resulting from construction and operation of the DMPAs are:

- Instability around the perimeter of the DMPAs during placement resulting in disturbance of adjacent mangrove areas (including PASS materials).
- Instability along Smiths Creek during placement resulting in disturbance into the waterway (including PASS materials).
- Instability within the DMPAs during placement resulting in disturbance of insitu fill materials and underlying soft clays (including PASS materials).

A further soils-related issue that could affect water quality is the breach of perimeter bunds, possibly resulting in discharge of water to the adjacent mangrove areas. The material is unlikely to contain much free water by the time it is placed at the DMPA. Management of drainage water from loading and haulage will be covered in the ESCP developed under **Chapter C1** (Construction Environmental Management Plan).

In relation to PASS materials, it is important to note that when PASS is exposed to oxygen by disturbance (via excavation or displacement) or by drainage (via dewatering or other means of lowering the water table), pyrite can oxidise and form sulfuric acid when combined with water. Sulfuric acid can leach out of these affected soils and strip metals (including iron, aluminium and heavy metals) from the surrounding soils. Acidic and metals impacted water can migrate into surface waters and groundwater. These processes can lead to degradation of terrestrial vegetation as described in **Section B1.4.3.a** above.

Acidic waters can also weaken concrete and steel infrastructure such as culverts, pipes and piles. Note that some of these potential impacts apply to groundwater. These are dealt with in **Chapter B6** (Water Resources).

The use of the stiff clay as a fill / surcharge material is considered to be a beneficial impact as it avoids the need to import this volume of a similar material from an alternative source.

#### Risk Assessment

**Table B1-22** sets out the results of the risk assessment for soils issues. This assumes that only standard mitigation (i.e. statutory matters including those measures listed in **Section B1.4.1.e**). Note that additional potential impacts on groundwater are dealt with in **Chapter B6** (Water Resources).

**TABLE B1-22 RISK ASSESSMENT (SOILS) – TINGIRA STREET DMPA**

PRIMARY IMPACTING PROCESSES	SIGNIFICANCE OF IMPACT	LIKELIHOOD OF IMPACT	RISK RATING
Instability around the perimeter of the DMPAs during placement results in disturbance of PASS materials	Moderate	Possible	Medium
Instability along Smiths Creek during placement results in displacement of insitu and placed materials into the waterway	Moderate	Possible	Medium
Instability within the DMPA areas during placement results in disturbance of contaminated fill materials and/or PASS materials	Moderate	Possible	Medium
Breach of perimeter bunds results in discharge of water to the adjacent mangrove areas	Minor	Possible	Low
Dredged materials provide a source of fill for reclamation and surcharging	Beneficial	Almost certain	Beneficial

**Source:** Appendix X (Table 8 – part). See also **Chapter B6** (Water Resources).

All of the potential impacts are assessed as being temporary or short term.

Mitigation of these impacts is possible as detailed in **Section B1.5.2.b**.

#### B1.4.4.b Land Use

##### Discussion

Land uses predominantly affected by the use of the Tingira Street sites for DMPAs are those located in the immediate vicinity. These uses, namely industrial uses and port operation uses, are not expected to experience any disruption while the stiff clay placement is underway. Any impacts during this period will be of short-term duration. Once the placement activity is completed, the land will be developed under a separate project in accordance with the LUP.

The project is considered compatible with the local and State planning instruments and planned development of the port and surrounding uses as prescribed in the Ports North LUP, CairnsPlan, and the Far North Queensland Regional Plan.

Some very minor (negligible) impacts may arise in terms of the amenity of people resident on boats using nearby moorings. These people may experience reduced levels of amenity due to periodic minor increases in noise exposure and light emissions from the works. This is assessed in **Chapter B10** (Noise and Vibration), **Chapter 11** (Air), and **Chapter B12** (Landscape and Visual) and not considered further in this chapter.

Other impacts listed above are dealt with in the identified chapters:

- **Chapter B7** (Marine Ecology).
- **Chapter B8** (Terrestrial Ecology)
- **Chapter B10** (Noise and Vibration).
- Chapter B11 (Air).
- **Chapter 12** (Landscape and Visual).
- **Chapter B14** (Transport).

##### Risk Assessment

**Table B1-23** sets out the results of the risk assessment for land use issues (i.e. does not include matters addressed in other chapters).

**TABLE B1-23 RISK ASSESSMENT (LAND USE) – TINGIRA STREET PROJECT AREA**

PRIMARY IMPACTING PROCESSES	SIGNIFICANCE OF IMPACT	LIKELIHOOD OF IMPACT	RISK RATING
Conflict with State Planning Policy or associated planning principles	Beneficial	Almost certain	Beneficial
Conflict with FNQ Regional Plan 2009-2031 or associated planning principles	Beneficial	Almost certain	Beneficial
Conflict with CairnsPlan 2016 or associated planning principles	Beneficial	Almost certain	Beneficial
Conflict with Ports North Seaport LUP or associated planning principles	Beneficial	Almost certain	Beneficial

All of the potential impacts are assessed as being beneficial. This is because the use of the site as a DMPA is compatible with planned development in the Ports North LUP and the works in part lead to the realisation of this planning. As previously noted, the LUP was created within the context of the SPP. Specifically, the State interest for Strategic Ports such as Cairns involve protecting the operation of strategic ports and enabling their growth and development.

#### B1.4.4.c Native Title

Refer to **Chapter B13** (Cultural Heritage).



## **B1.5 Recommended Mitigation Measures**

### **B1.5.1 Landside Works Project Area**

#### **B1.5.1.a Soils**

As described in **Section B1.4.2.a**, potential impacts on soils at the Landside Works Project Area are:

- exposure of actual acid sulphate soils
- disturbance and dispersal of contaminated soils
- erosion and sedimentation resulting from excavation works.

However, these impacts are readily managed by normal best practice and no further mitigation is required.

#### **B1.5.1.b Land Use**

As all of the potential land use impacts are assessed as being beneficial, no mitigation is required.

### **B1.5.2 Northern Sands Project Area**

#### **B1.5.2.a Soils**

As described in **Section B1.4.3.a** potential impacts related to soils have been identified as follows:

- Instability on the banks of Richters Creek or the Barron River resulting in ground displacement into the waterway.
- Instability on the banks of Richters Creek or the Barron River resulting in disturbance of PASS materials.
- Erosion on the banks of Richters Creek or the Barron River resulting in sediment discharge into the waterway.
- Earthworks required during construction of the pipeline resulting in disturbance of PASS materials and possibly generation of acidic water.
- Settlement and/or failure of pipeline support foundations, possibly resulting in disturbance of PASS materials and possibly generation of acidic water.
- Settlement and/or failure of pipeline support foundations, possibly resulting in burst or leaking pipelines.

It is expected that that impacts related to instability are all likely to be able to be mitigated by appropriate geotechnical input during detailed design and implementation of the proposed works. In addition, the use of engineered crane pads and pipe support pads will likely further mitigate potential impacts related to soft ground conditions (e.g. instability and/or settlement). It is noted that all of the other impacts are also likely to be able to be mitigated.

The likely effect of this mitigation (i.e. residual risk) is assessed in **Section B1.6.3**.

#### **B1.5.2.b Land Use**

##### **DMPA**

As all of the potential land use impacts at the DMPA are assessed as being beneficial, no mitigation is required.

## Delivery Pipeline Corridor

It is expected that there will be a short-term medium risk amenity impacts associated with the construction and operation of the delivery pipeline. Recommended mitigation is associated with reducing the impact on amenity of the delivery pipeline where it makes landfall at the mouth of Richters Creek. Recommendations are:

- community engagement to inform the public of the works, prepare them for the short term intrusion, and reassure them that full restoration of the area will be undertaken
- controls over the construction and demobilisation of the works to reduce impacts and provide adequate public notice to explain the process and invite queries /complaints – see **Chapter C1** (Construction Environmental Management Plan)
- controls over the operation of the pipeline to reduce impacts and provide adequate public notice to explain the process and invite queries /complaints – see **Chapter C2** (Dredge Management Plan).

## B1.5.3 Tingira Street Project Area

### B1.5.3.a Soils

As described in **Section B1.4.4.a**, potential impacts related to soils have been identified (see also **Chapter B6** (Water Resources) for impacts on groundwater).

- instability around the perimeter of the DMPAs during placement results in disturbance of PASS materials
- instability along Smiths Creek during placement results in displacement of insitu and placed materials into the waterway
- instability within the DMPA areas during placement results in disturbance of contaminated fill materials and/or PASS materials.

It is noted that impacts related to instability are likely to be able to be mitigated by appropriate geotechnical input during detailed design and implementation of the proposed works. Mitigation opportunities relating to instability mitigation measures are presented in **Table B1-24**. These will also mitigate the risk of breach of perimeter bunds resulting in discharge of sediment/water to the adjacent mangrove areas.

**TABLE B1-24 MITIGATION**

IMPACTING PROCESSES	PROPOSED MITIGATION MEASURES
Instability around the perimeter of the DMPAs during placement resulting in disturbance of PASS materials	Adopt a minimum setback from the perimeter of DMPA and a batter profile to achieve the required factor of safety against instability of proposed profile. If minimum setback cannot be achieved place appropriate high strength geotextile reinforcement to achieve required factor of safety against instability of proposed profile.
Instability along Smiths Creek during placement resulting in displacement of insitu and placed materials into the waterway	Adopt a minimum setback from the perimeter of DMPA and a batter profile to achieve the required factor of safety against instability of proposed profile. If minimum setback cannot be achieved place appropriate high strength geotextile reinforcement to achieve required factor of safety against instability of proposed profile.
Instability within the DMPA areas during placement resulting in disturbance of contaminated fill materials and/or PASS materials	Assess minimum thickness of existing fill required within DMPA to achieve required factor of safety against instability. If minimum thickness cannot be achieved place appropriate high strength geotextile reinforcement to achieve required factor of safety against instability of proposed profile.

**Source:** Appendix X (Table 8).

The likely effect of this mitigation (i.e. residual risk) is assessed in **Section B1.6.3**.

### B1.5.3.b Land Use

As all of the potential land use impacts at the DMPA are assessed as being beneficial, no mitigation is required.

## B1.6 Residual Impacts and Assessment Summary

### B1.6.1 Landside Works Project Area

#### B1.6.1.a Soils

**Table B1-25** below summarises the assessment of impacts with only statutory mitigation and then with additional (proposed) mitigation. As there is no mitigation proposed, there is no change in risk.

**TABLE B1-25 MITIGATED RISK ASSESSMENT (SOILS) – LANDSIDE WORKS PROJECT AREA**

PRIMARY IMPACTING PROCESSES	INITIAL ASSESSMENT WITH STANDARD (STATUTORY) MITIGATION MEASURES IN PLACE			RESIDUAL ASSESSMENT WITH ADDITIONAL (PROPOSED) MITIGATION IN PLACE		
	CONSEQUENCE OF IMPACT	LIKELIHOOD OF IMPACT	RISK RATING	CONSEQUENCE OF IMPACT	LIKELIHOOD OF IMPACT	RISK RATING
Exposure of actual acid sulphate soils.	Negligible	Likely	Negligible	Negligible	Likely	Negligible
Disturbance and dispersal of contaminated soil	Negligible	Likely	Negligible	Negligible	Likely	Negligible
Erosion and sedimentation resulting from excavation works	Negligible	Likely	Negligible	Negligible	Likely	Negligible
Remediation of contaminated land	Beneficial	Almost certain	Beneficial	Beneficial	Almost certain	Beneficial

All impacts are readily managed by normal best practice and no further mitigation is required. The risk of all residual impacts is negligible or beneficial.

#### B1.6.1.b Land Use

As all of the potential land use impacts are assessed as being negligible or beneficial, no mitigation is required and there is no change in risk.

### B1.6.2 Northern Sands Project Area

#### B1.6.2.a Soils

**Table B1-26** below summarises the assessment of impacts with only statutory mitigation and then with additional (proposed) mitigation.

**TABLE B1-26 MITIGATED RISK ASSESSMENT (SOILS) – NORTHERN SANDS PROJECT AREA**

PRIMARY IMPACTING PROCESSES	INITIAL ASSESSMENT WITH STANDARD (STATUTORY) MITIGATION MEASURES IN PLACE			RESIDUAL ASSESSMENT WITH ADDITIONAL (PROPOSED) MITIGATION IN PLACE		
	CONSEQUENCE OF IMPACT	LIKELIHOOD OF IMPACT	RISK RATING	CONSEQUENCE OF IMPACT	LIKELIHOOD OF IMPACT	RISK RATING
Instability on the banks of Richters Creek or the Barron River resulting in ground displacement into the waterway	Moderate	Possible	Medium	Moderate	Unlikely	Low
Instability on the banks of Richters Creek or the Barron River resulting in disturbance of PASS materials	Moderate	Possible	Medium	Moderate	Unlikely	Low
Erosion on the banks of Richters Creek or the Barron River resulting in sediment discharge into the waterway	Minor	Unlikely	Low	Minor	Unlikely	Low
Earthworks required during construction of the pipeline resulting in disturbance of PASS materials	Minor	Possible	Low	Minor	Possible	Low
Disturbance of PASS results in acidic water being generated	Moderate	Unlikely	Low	Moderate	Unlikely	Low
Settlement and/or failure of pipeline support foundations, possibly resulting in burst or leaking pipelines	Moderate	Unlikely	Low	Moderate	Unlikely	Low

**Source:** Appendix Y (Table 6).

This assessment reveals that in all cases the risk of mitigated impacts is Low. **Appendix Y** includes an assessment of the nature of these impacts, i.e.:

- adverse / beneficial
- consequential
- cumulative
- short-term / long term
- reversible / irreversible
- predictable / unpredictable.

This concludes that all of the potential impacts related to soils will be short-term and reversible, irrespective of whether or not they are predictable or unpredictable.



### B1.6.2.b Land Use

#### Risk Assessment – DMPA

All of the potential land use impacts are assessed as being negligible short term issues. No mitigation is required and there is no change in risk.

#### Risk Assessment – Delivery Pipeline

**Table B1-27** sets out the results of the risk assessment for land use issues for the Northern Sands delivery pipeline corridor.

**TABLE B1-27 MITIGATED RISK ASSESSMENT (LAND USE) – NORTHERN SANDS DELIVERY PIPELINE CORRIDOR**

PRIMARY IMPACTING PROCESSES	INITIAL ASSESSMENT WITH STANDARD (STATUTORY) MITIGATION MEASURES IN PLACE			RESIDUAL ASSESSMENT WITH ADDITIONAL (PROPOSED) MITIGATION IN PLACE		
	CONSEQUENCE OF IMPACT	LIKELIHOOD OF IMPACT	RISK RATING	CONSEQUENCE OF IMPACT	LIKELIHOOD OF IMPACT	RISK RATING
Conflict with State Planning Policy or associated planning principles	Negligible	Almost certain	Low	Negligible	Almost certain	Low
Conflict with FNQ Regional Plan 2009-2031 or associated planning principles	Negligible	Almost certain	Low	Negligible	Almost certain	Low
Conflict with CairnsPlan 2016 or associated planning principles (i.e. amenity)	Minor	Almost certain	Medium	Negligible	Almost certain	Low
Conflict with Ports North Seaport LUP or associated planning principles	N/A	N/A	N/A	N/A	N/A	N/A

With the recommended mitigation of amenity impacts, the highest residual impact is low. This will be a short-term impact that will disappear once the pipeline is decommissioned and the impacted area at the mouth of Richters Creek rehabilitated.

### B1.6.3 Tingira Street Project Area

#### B1.6.3.a Soils

**Table B1-28** below summarises the assessment of impacts with only statutory mitigation and then with additional (proposed) mitigation.

**TABLE B1-28 MITIGATED RISK ASSESSMENT (SOILS) – TINGIRA STREET DMPA**

PRIMARY IMPACTING PROCESSES	INITIAL ASSESSMENT WITH STANDARD (STATUTORY) MITIGATION MEASURES IN PLACE			RESIDUAL ASSESSMENT WITH ADDITIONAL (PROPOSED) MITIGATION IN PLACE		
	CONSEQUENCE OF IMPACT	LIKELIHOOD OF IMPACT	RISK RATING	CONSEQUENCE OF IMPACT	LIKELIHOOD OF IMPACT	RISK RATING
Instability around the perimeter of the DMPAs during placement results in disturbance of PASS materials	Moderate	Possible	Medium	Moderate	Unlikely	Low
Instability along Smiths Creek during placement results in disturbance into the waterway	Moderate	Possible	Medium	Moderate	Unlikely	Low
Instability within the DMPA areas during placement results in disturbance of contaminated fill materials and/or PASS materials	Moderate	Possible	Medium	Moderate	Unlikely	Low
Breach of perimeter bunds results in discharge of water to the adjacent mangrove areas	Minor	Possible	Low	Minor	Possible	Low
Dredged materials provide a source of fill for reclamation and surcharging	Beneficial	Almost certain	Beneficial	Beneficial	Almost certain	Beneficial

**Source: Appendix X** (Table 9 (part) – see **Chapter B6** (Water Resources) for groundwater impacts).

This assessment reveals that in all cases the risk of mitigated impacts is Low or Beneficial. **Appendix X** includes an assessment of the nature of these impacts as listed above for the Northern Sands Project Area.

This concludes that in the case of the Tingira Street Project Area as well, all of the potential impacts related to soils will be short-term and reversible, irrespective of whether or not they are predictable or unpredictable.

#### **B1.6.3.b Land Use**

As all of the potential land use impacts at the Tingira Street Project Area are assessed as being beneficial, no mitigation is required and there is no change in risk.

## B1.6.4 Conclusion

### B1.6.4.a Soils

- Landside Works Project Area. Impacts associated with the potential disturbance and exposure of ASS and contaminated soils can be adequately minimised through the implementation of appropriate management plans. These are considered to be standard practice and not involve any special mitigation measures. Addressing existing contamination is seen as a beneficial impact,
- Northern Sands Project Area. As above, certain management actions are considered to be standard practice and not involve any special mitigation measures. It is expected that that impacts related to instability are all likely to be able to be mitigated by appropriate geotechnical input during detailed design and implementation of the proposed works. In addition, the use of engineered crane pads and pipe support pads will likely further mitigate potential impacts related to soft ground conditions (e.g. instability and/or settlement). The likely residual risk is assessed as low.
- Tingira Street Project Area. As above, certain management actions are considered to be standard practice and not involve any special mitigation measures. As for Northern Sands, it is expected that impacts related to instability are likely to be able to be mitigated by appropriate geotechnical input during detailed design and implementation of the proposed works. Recommended mitigation will also reduce the risk of breach of perimeter bunds resulting in discharge of sediment/water to the adjacent mangrove areas. The likely residual risk is assessed as low.

All adverse residual soils risks are short-term, reversible, and predictable. Addressing existing contamination at the Landside Works Project Area is seen as a long term beneficial impact.

### B1.6.4.b Land Use

- Landside Works Project Area. The CSD Project is consistent with planning of the Landside Works Project Area (specifically the Ports North LUP and the Cityport Local Area Plan). The LUP was created within the context of the SPP and all State interests for Strategic Ports such as Cairns are embodied in the LUP.
- Northern Sands Project Area. The use of the existing water-filled void for the placement of soft clay and the construction and operation of the associated pipelines are not specifically contemplated by existing planning. However, current operations at Northern Sands are considered high impact industry uses and the short-term use of the site for a DMPA is considered consistent with the high impact industry uses currently operating on the land. The construction and operation of the delivery pipeline will have some risk of impact on the amenity values of the mouth of Richters Creek. With appropriate mitigation (essentially communications and environmental management) these can be reduced to negligible.
- Tingira Street Project Area. As for the Landside Works, the CSD Project is consistent with planning of the Tingira Street Project Area (specifically the Ports North LUP as described above). At the completion of the use of the site for placement of stiff clay, it will be further developed in accordance with the LUP.

All residual land use risks are short-term, reversible, and predictable.

A key mitigation measure for the land use impacts identified in this chapter is ongoing and timely communications with relevant state and local government authorities, business operators, port tenants, residents, and the boating community regarding the potential impacts, including disruption to commercial operations, recreational activities, and traffic conditions. Management of these and other matters addressed in all technical chapters of this Revised Draft EIS are documented as follows:

- **Chapter C1** (Construction Environmental Management Plan). This covers the works necessary to prepare the DMPAs for receiving the soft clays (Northern Sands DMPA) and stiff clays (Tingira Street DMPA) and then remove all temporary works and make good.
- **Chapter C2** (Dredge Management Plan). This covers the actual placement activities and will be integrated with dredging operations.

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